

FILE

PUCO EXHIBIT FILING

Date of Hearing: 10-2-15

Case No. 14-1693-EL-RDR, 14-1694-EL-AAM

PUCO Case Caption: In the Matter of the Application Seeking  
Approval of Ohio Power Company's Proposal to  
Enter into an Affiliate Power Purchase Agreement for  
Inclusion in the Power Purchase Agreement Rides.

In the Matter of the Application of Ohio Power Company  
for approval of Certain ~~Accounting~~ Accounting Authority.

List of exhibits being filed:

Volume V

IEU - 9

P3-1

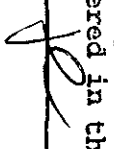
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BEFORE THE PUBLIC UTILITIES COMMISSION OF OHIO

- - -

In the Matter of the :  
Application Seeking :  
Approval of Ohio Power :  
Company's Proposal to : Case No. 14-1693-EL-RDR  
Enter into an Affiliate :  
Power Purchase Agreement :  
for Inclusion in the Power:  
Purchase Agreement Rider. :

In the Matter of the :  
Application of Ohio Power :  
Company for Approval of : Case No. 14-1694-EL-AAM  
Certain Accounting :  
Authority. :

- - -

PROCEEDINGS

before Ms. Greta See and Ms. Sarah Parrot, Attorney  
Examiners, at the Public Utilities Commission of  
Ohio, 180 East Broad Street, Room 11-D, Columbus,  
Ohio, called at 9:00 a.m. on Friday, October 2, 2015.

- - -

VOLUME V

- - -

ARMSTRONG & OKEY, INC.  
222 East Town Street, Second Floor  
Columbus, Ohio 43215-5201  
(614) 224-9481 - (800) 223-9481  
Fax - (614) 224-5724

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AMENDMENT NO. 12  
to  
STATION AGREEMENT  
dated as of January 1, 2014  
by and between  
AEP GENERATION RESOURCES INC.,  
BUCKEYE POWER, INC.  
and  
CARDINAL OPERATING COMPANY



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AMENDMENT NO. 12 TO STATION AGREEMENT  
(A RESTATEMENT OF THE STATION AGREEMENT)

Dated as of January 1, 2014

This AMENDMENT NO. 12 TO STATION AGREEMENT ("Amendment"), dated as of January 1, 2014, to that certain Station Agreement, dated as of January 1, 1968, as supplemented and amended from time to time, entered into by and between AEP GENERATION RESOURCES INC., a Delaware corporation (herein called "AEP GenCo"), BUCKEYE POWER, INC., an Ohio corporation not for profit (herein called "Buckeye"), and CARDINAL OPERATING COMPANY, an Ohio corporation (herein called "Operating Company");

W I T N E S S E T H:

WHEREAS, AEP GenCo is a corporation organized and existing under the laws of the State of Delaware and is engaged in the generation and sale of electric energy at wholesale in the State of Ohio; and

WHEREAS, Buckeye is a corporation not for profit organized and existing under the laws of the State of Ohio and is engaged in the generation and transmission of electric energy in said State for distribution and use by its membership, which presently consists of twenty-five cooperatively organized non-profit electric companies operating in said State; and

WHEREAS, AEP GenCo is the owner of a steam electric generating unit at the Cardinal Station located near Brilliant, Ohio, and Buckeye is the owner of a second and third steam electric generating unit at the Cardinal Station, and AEP GenCo and Buckeye own as tenants in common certain interests in real property and general facilities at the Cardinal Station; and

WHEREAS, Operating Company is a corporation organized under the laws of the State of Ohio by Ohio Power Company, an Ohio corporation ("Ohio") and Buckeye to operate and maintain the aforesaid Cardinal Station in accordance with the provisions of this Agreement and otherwise as AEP GenCo and Buckeye may determine to be in their mutual interest; and

WHEREAS, Ohio, Buckeye and Operating Company have entered into a Station Agreement dated as of January 1, 1968, and eleven prior amendments thereto dated, respectively, as of October 1, 1973, March 1, 1976, March 1, 1977, December 1, 1977, April 15, 1980, June 1, 1981, January 1, 1993, September 1, 1999, July 1, 2003, October 1, 2007, and November 14, 2013 (herein called the "Station Agreement"), concerning the operation and use of the Cardinal Station; and

WHEREAS, Ohio has sold and transferred Ohio's Land, Ohio's Initial Unit, Ohio's Substation Facilities, and Ohio's interest in the Joint Land, the Common Land, the Landfill Land, the Initial Cardinal Station General Facilities, the Cardinal Station Common Facilities, and Operating Company, to AEP GenCo effective as of January 1, 2014 (herein called the "AEP Corporate Separation"); and

WHEREAS, in connection with the AEP Corporate Separation, Ohio has retained ownership of the Substation Land and all transmission-related assets at the Cardinal Station; and

WHEREAS, in connection with the AEP Corporate Separation, Ohio has assigned Ohio's interest in the Station Agreement to AEP GenCo, and Ohio has been relieved of all further liability under the Station Agreement from and after the effective date of the AEP Corporate Separation; and

WHEREAS, AEP GenCo, Buckeye and Operating Company desire by this Amendment to (a) make certain changes to the Agreement necessary as a result of the AEP Corporate Separation, and (b) amend and restate the Station Agreement;

NOW, THEREFORE, in consideration of the premises and the mutual covenants herein contained, the parties hereto do hereby agree as follows:

1. Effective as of the Effective Date of this Amendment, delete Article 1 through Article 15 of the Station Agreement in their entirety and in lieu thereof substitute the following:

#### ARTICLE ONE - DEFINITIONS.

- 1.1. The following terms when used herein shall have the meanings specified:

*Additional Cardinal Station* means the aggregate of (a) Buckeye's Additional Land, (b) Buckeye's Additional Unit, (c) the respective portions of the Common Land and the Cardinal Station Common Facilities allocable to Buckeye's Additional Unit, and (d) Buckeye's Additional Substation Facilities.

*Additional Cardinal Station Coal Stock* means the tons of coal in storage at the Cardinal Station for the Additional Cardinal Station.

*Additional Unit Monthly Coal Requirement* in any month means the amounts of coal (tons) allocable to the Total Net Generation of the Additional Cardinal Station during such month.

*Additional Unit Monthly Consumable Handling Costs* in any month means the total monthly variable costs incurred by Operating Company for such month associated with the use and/or production of any Consumable for the Additional Cardinal Station, excluding Consumable unloading and storing costs but including the net cost of (or credit for amounts realized from) the handling and disposal of Consumables.

*Additional Unit Monthly Consumable Requirement* in any month means the amounts of any particular inventoried Consumable (tons) allocable to the Total Net Generation of the Additional Cardinal Station during such month.

*Additional Unit Monthly Fuel Handling Costs* in any month means the total monthly costs incurred by Operating Company for such month for handling all fuels and ashes for the Additional Cardinal Station, excluding coal unloading and storing costs but including the net

costs of (or credit for amount realized from) the disposal of ashes or other by-products of combustion.

*AEP OATT* means the Federal Energy Regulatory Commission accepted Open Access Transmission Tariff of American Electric Power Service Corporation filed on behalf of the operating companies, including Ohio, of the AEP Transmission System, or any successor tariff, including, but not limited to, any successor tariff of any regional transmission organization, the Network Integration Transmission Service Agreement and the Network Operating Agreement.

*AEP Transmission System* means the transmission and distribution facilities owned by affiliates of American Electric Power Company, Inc., including Ohio, or their successors in ownership or control of such facilities, including, but not limited to, any regional transmission organization.

*Agreement* means the Station Agreement, dated as of January 1, 1968, among AEP GenCo, Buckeye and Operating Company, as the same shall from time to time be amended, modified, revised and/or supplemented.

*Ancillary Services* means the services, other than electric generating capacity and energy, which the Cardinal Station is capable of producing, including, without limitation, spinning reserve, regulation service and reactive power, which such services PJM may recognize as supporting the reliable operation of the PJM transmission grid.

*Back-up Energy* means any energy supplied by AEP GenCo pursuant to Section 9.2 of this Agreement to firm up Buckeye's Total Cardinal Station Capacity Reservation. Back-up Energy does not include Capacity Credits, which are dealt with separately under Article Ten of this Agreement.

*Bonds* means the bonds which have been, and from time to time may in the future be, issued pursuant to the provisions of the Buckeye Mortgage.

*Buckeye's Additional Land* means the parcels of land described as Buckeye's Additional Land in the description of the Cardinal Station Site contained in Part I of Appendix A hereto, which descriptions may be modified or supplemented from time to time by mutual agreement among the parties hereto.

*Buckeye Additional Scheduled Delivery Points Hourly Demand* shall have the meaning assigned to such term in Subsection (c) of Section 11.2 hereof.

*Buckeye's Additional Substation Facilities* means all items of property owned by Buckeye which are located at Cardinal Station appurtenant to Buckeye's Additional Unit, including retirements, replacements and/or additions from time to time made in respect thereof, and which are required and/or useful to connect Buckeye's Additional Unit electrically with the Cardinal Station high voltage busses which are classified under Accounts 351 through 359 and Account 397 of the Uniform System of Accounts, as such account numbers may be amended or replaced from time to time. Buckeye's Additional Substation Facilities are more specifically described in Part X of Appendix A hereto, which description may be modified or supplemented from time to time by mutual agreement among the parties hereto.

*Buckeye's Additional Unit* means the nominally rated 630,000 kw steam electric generating unit which commenced commercial operation on September 20, 1977, including retirements, replacements and/or additions from time to time made in respect thereof. Buckeye's Additional Unit is more specifically described in Part IV of Appendix A hereto, which description may be modified or supplemented from time to time by mutual agreement among the parties hereto.

*Buckeye's Additional Unit Capacity Reservation* for any month means an amount of capacity, as of the high voltage Cardinal Station buses, equal to 86.9565% of the then Buckeye's Contractual Net Capability of Buckeye's Additional Unit.

*Buckeye's Additional Unit Monthly Energy* for any month means that portion of the Total Net Generation of Buckeye's Additional Unit allocated to Buckeye for such month in accordance with the principles set forth in Article Eight hereof.

*Buckeye Bulk Power Delivery Points* means delivery points established on the AEP Transmission System, or interconnecting the AEP Transmission System with the transmission systems of other utilities, pursuant to the AEP OATT and applicable law for the purpose of the sale of power, and the energy related thereto, by the Buckeye Members, at wholesale, or by Buckeye, at wholesale, to customers other than the Buckeye Members.

*Buckeye Cardinal Hourly Demand* for any hour means the kilowatt demand at the Cardinal Station's high-voltage buses which is equal to (i) the number of kilowatts of demand for such hour as measured by suitable metering equipment at Buckeye's delivery points in the AEP Transmission System, plus (ii) the amounts of hourly power scheduled for such hour by Buckeye or its agent through the AEP Transmission System to delivery points interconnecting the AEP Transmission System with the transmission systems of other utilities, less (iii) the amounts of hourly power scheduled for such hour by Buckeye or its agent from any source other than the Cardinal Station for delivery into the AEP Transmission System to serve the loads of the Buckeye Members at Buckeye's delivery points in the AEP Transmission System, including, without limitation, NYPA Power and Energy. All such amounts shall be adjusted to include applicable losses on the transmission and distribution facilities of the AEP Transmission System per the AEP OATT.

*Buckeye's Contractual Net Capability* of Buckeye's Initial Unit and Buckeye's Additional Unit at any time means an amount equal to the average Total Net Capability thereof as determined in accordance with the procedure set forth in Appendix C hereto for the then effective AEP GenCo Maximum Peak Requirement Quarter.

*Buckeye's Initial Cardinal Station Capacity Reservation* means an amount of capacity, as of the high voltage Cardinal Station buses, equal to 86.9565% of the then Buckeye's Contractual Net Capability of Buckeye's Initial Unit.

*Buckeye's Initial Land* means the parcel of land described as Buckeye's Initial Land in the description of the Cardinal Station Site contained in Part I of Appendix A hereto, which description may be modified or supplemented from time to time by mutual agreement among the parties hereto.

*Buckeye's Initial Substation Facilities* means all items of property located at the Initial Cardinal Station appurtenant to Buckeye's Initial Unit, including retirements, replacements and/or additions from time to time made in respect thereof, and which are required and/or useful to connect Buckeye's Initial Unit electrically with the Cardinal Station high voltage buses which are classified under Accounts 351 through 359 and Account 397 of the Uniform System of Accounts, as such account numbers may be amended or replaced from time to time. Buckeye's Initial Substation Facilities are more specifically described in Part IX of Appendix A hereto, which description may be modified or supplemented from time to time by mutual agreement among the parties hereto.

*Buckeye's Initial Unit* means the nominally rated 600,000 kw steam electric generating unit, including retirements, replacements and/or additions from time to time made in respect thereof, which commenced commercial operation on July 1, 1967. Buckeye's Initial Unit is more specifically described in Part III of Appendix A hereto, which description may be modified or supplemented from time to time by mutual agreement among the parties hereto.

*Buckeye's Initial Unit Monthly Energy* for any month means Buckeye's portion of the Total Net Generation of Initial Cardinal Station for such month determined in accordance with the principles set forth in Article Eight hereof.

*Buckeye Member* means (a) any one of the twenty-five electric companies organized and operated not for profit on a cooperative basis and which together constitute the present membership of Buckeye, (b) any electric company similarly organized and operated which may hereafter be or become a member of Buckeye, and (c) any successor to any existing Buckeye Member or Buckeye Members except (i) a successor which is at the date of this Agreement a public utility included as such under the definition of that term contained in Section 4905.02 of the Revised Code of Ohio or which is a successor to any such public utility, or (ii) Buckeye or a successor to Buckeye, or (iii) a successor which is a political subdivision of the State of Ohio or a municipal corporation, bureau or department organized by or serving any such political subdivision or any other governmental agency or any successor to any of the foregoing.

*Buckeye's Monthly Energy* means the sum of Buckeye's Initial Unit Monthly Energy and Buckeye's Additional Unit Monthly Energy.

*Buckeye Mortgage* means the Mortgage and Deed of Trust dated as of April 1, 1968, as supplemented, amended, and restated from time to time, or any successor document superseding or replacing such Mortgage and Deed of Trust, made by Buckeye with The Ohio National Bank of Columbus (now US Bank National Association) or any successor trustee, as Trustee. Whenever reference is made in this Agreement to the Trustees under the Buckeye Mortgage, or to the corporate trustee under the Buckeye Mortgage, such terms shall mean the corporations or corporation which shall at the time in question be acting in such capacities or capacity under the Buckeye Mortgage.

*Buckeye Power Requirement* means the lesser of (a) the Buckeye Cardinal Hourly Demand or (b) Buckeye's Total Cardinal Station Capacity Reservation.

*Buckeye's Total Cardinal Station Capacity Reservation* means an amount of capacity equal to the sum of (a) Buckeye's Initial Cardinal Station Capacity Reservation and (b) Buckeye's Additional Unit Capacity Reservation.

the sum of (a) Buckeye

*Buckeye's Units means Buckeye's Initial Unit and Buckeye's Additional Units.*

[illegible][illegible]

*Cardinal Station* means the Initial Cardinal Station as from time to time modified or expanded as contemplated by the Cardinal Units, including the Initial Cardinal Station and the Additional Cardinal Station.

[illegible]

*Cardinal Station Consumable Stock* means the amount of such Consumable in storage at the Cardinal Station for the operation of the ~~the~~ Total Net Generation of the ~~the~~ Consumable Requirement in any month means the amount of

*Cardinal Station Monthly*  
any particular inventoried Consumer  
Cardinal Station during such month.

740688.14

*Committee* means the committee established under Section 12.11.

*Cardinal Station Operating Co.*

Site in the descriptions of the Cardinal Station Site which descriptions may be modified or supplemented from time to time by the Bureau of Land Management, U.S. Department of the Interior, which descriptions are hereby incorporated by reference.

*Cardinal Units* means AEP GenCo's initial 1,000 MW of generating capacity, including the 1,000 MW of generating capacity owned by Buckeye and AEP GenCo, and the 1,000 MW of generating capacity owned by the Buckeye Generation Site contained in Part I of the Schedule of Assets, Liabilities and Other Information.

*Common Land* means the land described as the Common Land in the description of the land in Schedule A hereto, which description may be modified or supplemented from time to time by the Board.

Consumables shall include limestone byproducts, its mutual agreement among the parties.

produced as part of the operation of the plant, such as urea, trona, gypsum and any other non-fuel materials consumed in the production of any one or more of the products of the plant, shall be included in the cost of the products of the plant.

*Consumable Handling Company* for such month associated with the handling and disposal of such Consumable. *Consumable Handling Company* is not entitled to a credit for amounts realized from the handling and disposal of such Consumable, excluding Consumable unloading and storing costs but including the costs incurred by Operating Company for such month associated with the handling and disposal of such Consumable.

*Credit Rating means, with respect to the Bonds, the rating then assigned to the Bonds by S&P, Moody's or any other rating agency agreed to by the Owners.*

*Date of Commercial Operation* means February 1, 1967 in the case of AEP GenCo's Initial Unit, July 1, 1967 in the case of Buckeye's Initial Unit, and September 20, 1977 in the case of Buckeye's Additional Unit.

*Economic Dispatch Energy* means the amounts of energy that AEP GenCo elects, pursuant to Section 8.4 and according to principles of economic dispatch, to provide from time to time from AEP GenCo's generation resources rather than from Buckeye's Units in order to satisfy all or a portion of Buckeye's Monthly Energy requirement during periods that Buckeye's Units were available and could have supplied that energy from their Total Net Available Capability. Economic Dispatch Energy shall not be deemed Back-up Energy for any purpose.

*Equivalent Availability Factor of Buckeye's Units* for the relevant period means a ratio where (A) the numerator is the sum of all hours during the relevant period that both Buckeye's Initial Unit and Buckeye's Additional Unit were available to generate electricity, and (B) the denominator is the number of hours in the relevant period.

*FGD System* means a flue gas desulfurization system employed for the treatment of sulfur dioxide gas emissions caused by the coal combustion of Buckeye's Initial Unit, AEP GenCo's Initial Unit or Buckeye's Additional Unit.

*General Facilities* means all items of property at Cardinal Station that comprise the Initial Cardinal Station General Facilities and the Cardinal Station Common Facilities.

*Initial Cardinal Station* means the aggregate of (a) AEP GenCo's Land, Buckeye's Initial Land and the Joint Land, (b) Buckeye's Initial Unit, (c) AEP GenCo's Initial Unit, (d) the Initial Cardinal Station General Facilities, (e) Buckeye's Initial Substation Facilities, (f) AEP GenCo's Substation Facilities, and (g) the respective portions of the Common Land and the Cardinal Station Common Facilities allocable to Buckeye's Initial Unit and AEP GenCo's Initial Unit.

*Initial Cardinal Station Coal Stock* means the tons of coal in storage at the Cardinal Station for the Initial Cardinal Station.

*Initial Cardinal Station General Facilities* means all items of property associated with the Initial Cardinal Station which are useful and/or necessary for operation of the Initial Units but not Buckeye's Additional Unit or Buckeye's Additional Substation Facilities, including retirements, replacements and/or additions from time to time made in respect thereof, and which cannot be properly associated specifically with AEP GenCo's Initial Unit, Buckeye's Initial Unit, AEP GenCo's Substation Facilities or Buckeye's Initial Substation Facilities. The Initial Cardinal Station General Facilities are more specifically described in Part V of Appendix A hereto, which description may be modified or supplemented from time to time by mutual agreement among the parties hereto.

*Initial Unit* means either AEP GenCo's Initial Unit or Buckeye's Initial Unit.

*Initial Units Monthly Coal Requirement* in any month means the amounts of coal (tons) allocable to the Total Net Generation of the Initial Cardinal Station during such month.

*Initial Units Monthly Consumable Handling Costs* in any month means the total monthly variable costs incurred by Operating Company for such month associated with the use and/or production of any Consumable for the Initial Cardinal Station, excluding Consumable unloading and storing costs but including the net cost of (or credit for amounts realized from) the handling and disposal of Consumables.

*Initial Units Monthly Consumable Requirement* in any month means the amounts of any particular inventoried Consumable (tons) allocable to the Total Net Generation of the Initial Cardinal Station during such month.

*Initial Units Monthly Fuel Handling Cost* in any month means the total monthly costs incurred by Operating Company for such month for handling all fuels and ashes for the Initial Cardinal Station, excluding coal unloading and storing costs but including the net cost of (or credit for amounts realized from) the disposal of ashes or other by-products of combustion.

*Joint Land* means the parcels of land jointly owned by Buckeye and AEP GenCo described as Joint Land in the description of the Cardinal Station Site contained in Part I of Appendix A hereto, which descriptions may be modified or supplemented from time to time by mutual agreement among the parties hereto.

*Landfill Land* means the parcels of land jointly owned by Buckeye and AEP GenCo described as Landfill Land in the descriptions of the Cardinal Station Site contained in Part I of Appendix A hereto, which descriptions may be modified or supplemented from time to time by mutual agreement among the parties hereto.

*Letter(s) of Credit* means one or more irrevocable, transferable standby letters of credit issued by a U.S. commercial bank or a foreign bank with a U.S. branch, with such bank having a long term debt or a deposit rating of at least A- from S&P or A3 from Moody's and having at least \$10 Billion United States Dollars in assets, with such letters of credit in a form reasonably acceptable to the Owner in whose favor the letter of credit is issued. Costs of a Letter of Credit shall be borne by the applicant for such Letter of Credit.

*Major Spare Parts* means the spare parts usable at the Cardinal Station listed in Appendix D hereto and in any subsequent addition to said Appendix D made in accordance with the provisions of Section 4.1.

*Maximum Permissible Continuous Loading* means the maximum continuous loading capability of any generating unit as established in accordance with the procedure set forth in Appendix C hereto.

*Moody's* means Moody's Investors Service, Inc. or its successor.

*Network Integration Transmission Service Agreement* means that certain Network Integration Transmission Service Agreement dated July 29, 2003, and effective on and after July 1, 2003, between Buckeye and American Electric Power Service Corporation on behalf of the operating companies, including Ohio, of the AEP Transmission System pursuant to the AEP OAIT to provide delivery of power and energy to Buckeye for sale by Buckeye to the Buckeye Members, or any successor agreement with American Electric Power Service Corporation or

with any successor to American Electric Power Service Corporation or any of its affiliates, including, but not limited to, any regional transmission organization.

*Network Operating Agreement* means that certain agreement dated July 29, 2003 and effective on and after July 1, 2003, between Buckeye and American Electric Power Service Corporation, on behalf of the operating companies, including Ohio, of the AEP Transmission System pursuant to the AEP OATT to provide, inter alia, for the interconnected operation of their respective systems in continuous synchronism through the interconnections, or any successor agreement with American Electric Power Service Corporation or with any successor to American Electric Power Service Corporation or any of its affiliates, including, but not limited to, any regional transmission organization.

*NYPA Power and Energy* means any allocations to the Buckeye Members of hydroelectric power and energy from the New York Power Authority, or any successor thereto.

*AEP GenCo Additional Unit Monthly Energy* for any month means that portion of the Total Net Generation of Buckeye's Additional Unit allocated to AEP GenCo for such month in accordance with the principles set forth in Article Eight.

*AEP GenCo Associate* means the affiliated utility operating companies of AEP GenCo located in the PJM region, consisting of Appalachian Power Company, Ohio Power Company, Indiana Michigan Power Company, Kentucky Power Company and their respective successor utility operating companies with respect to which 50% or more of the outstanding voting securities are owned, directly or indirectly, by American Electric Power Company, Inc.

*AEP GenCo Back-up Stations* means AEP GenCo Generating Stations and AEP GenCo's Initial Unit.

*Ohio's Bulk Transmission Facilities* means the 138-kv, 345-kv and 765-kv transmission facilities owned by Ohio or its successors in ownership of such facilities, including, but not limited to, any regional transmission organization, and such higher voltage transmission facilities as Ohio or such successors may install and own subsequent to the date hereof.

*AEP GenCo Generating Stations* means AEP GenCo's presently operating Muskingum River Station, Conesville Station, Mitchell Station, and the Gavin Station. Other future additions made to the major generating capacity of AEP GenCo or any wholly owned subsidiary of AEP GenCo located within the State of Ohio will be included as AEP GenCo Generating Stations as of the first day of the month following the month in which the date of commercial operation of such new generating capacity shall occur; provided, however, that new generating capacity installed by AEP GenCo which is substantially different in design and operating characteristics from then existing steam generating capacity constituting AEP GenCo Generating Stations or which shall have been installed by AEP GenCo as a result of unusual circumstances shall not be included as AEP GenCo Generating Stations for purposes of this Agreement except by mutual agreement between AEP GenCo and Buckeye. Generating capacity transferred to others or retired by AEP GenCo or held in cold reserve and generating capacity determined by mutual agreement between AEP GenCo and Buckeye no longer to constitute part of the major

generating capacity of AEP GenCo within the State of Ohio shall be excluded as AEP GenCo Generating Stations.

*AEP GenCo's Initial Unit* means the nominally rated 600,000 kw steam electric generating unit, including retirements, replacements and/or additions from time to time made in respect thereof, which generating unit commenced commercial operation on February 1, 1967. AEP GenCo's Initial Unit is more specifically described in Part II of Appendix A hereto, which description may be modified or supplemented from time to time by mutual agreement among the parties hereto.

*AEP GenCo's Initial Units Monthly Energy* for any month means AEP GenCo's portion of the Total Net Generation of the Initial Cardinal Station for such month determined in accordance with the principles set forth in Article Eight hereof.

*AEP GenCo's Land* means the parcel of land described as AEP GenCo's Land in the description of the Cardinal Station Site contained in Part I of Appendix A hereto, which description may be modified or supplemented from time to time by mutual agreement among the parties hereto.

*AEP GenCo Maximum Peak Requirement* in effect for any month means the largest AEP GenCo Monthly Peak Demand established in any month up to and including such month.

*AEP GenCo Maximum Peak Requirement Quarter* at any time means that period of three consecutive calendar months which includes the month in which the AEP GenCo Maximum Peak Requirement then in effect was established, the month immediately preceding and the month immediately following, and shall become effective as of the month in which such AEP GenCo Maximum Peak Requirement was established.

*AEP GenCo's Monthly Energy* means the sum of AEP GenCo's Initial Units Monthly Energy and AEP GenCo Additional Unit Monthly Energy.

*AEP GenCo Monthly Peak Demand* for any month means the largest kilowatt demand of Ohio for such month as reported by the American Electric Power Service Corporation in its Daily Summary of Generation and Load for Ohio under the caption or heading "Ohio System Load" or on such other form as may hereafter be used by Ohio or the American Electric Power Service Corporation in lieu thereof to report such information.

*AEP GenCo's Substation Facilities* means all items of property owned by AEP GenCo which are located at Cardinal Station appurtenant to AEP GenCo's Initial Unit, including retirements, replacements and/or additions from time to time made in respect thereof, and which are required and/or useful to connect AEP GenCo's Initial Unit electrically with the high voltage buses for Cardinal Station which are located in Ohio's Tidd Plant substation and which are classified under Accounts 351 through 359 and Account 397 of the Uniform System of Accounts, as such account numbers may be amended or replaced from time to time. AEP GenCo's Substation Facilities are more specifically described in Part VIII of Appendix A hereto, which description may be modified or supplemented from time to time by mutual agreement among the parties hereto.

*Operating Company* means Cardinal Operating Company, an Ohio corporation organized by Ohio and Buckeye to operate Cardinal Station as herein provided.

*Owner* means either AEP GenCo or Buckeye or their respective successors in interest at the Cardinal Station, as the case may be.

*Owners* means AEP GenCo and Buckeye or their respective successors in interest at Cardinal Station collectively.

*Performance Assurance* means collateral in the form of either cash, Letter(s) of Credit, or a guaranty in the form set forth in Appendix B from a guarantor with a Credit Rating equal to or greater than BBB- from S&P or Ba3 from Moody's, or other security acceptable to the requesting Owner.

*PJM* means PJM Interconnection, LLC, or any successor regional transmission organization, which owns or controls the AEP Transmission System.

*Property Unit* means either (i) a unit of property as such units are defined in the Retirement Unit List, or (ii) an item of property, the investment in which at the time of that such item of property shall not be a Property Unit.

*Replacement Energy* means any energy which AEP GenCo shall supply, pursuant to the provisions of Section 9.2(d) of this Agreement, during any period in a calendar year when (i) the capability of Buckeye's Initial Unit and/or Buckeye's Additional Unit shall be curtailed, for any reason, including preventative maintenance and/or repairs, shortages of fuels, or as a result of environmental conditions, and (ii) Buckeye shall not have any entitlement to Back-up Energy under Section 9.2(a) of this Agreement.

*S&P* means Standard & Poor's Rating Group (a division of McGraw-Hill, Inc.) or its successor.

*Retirement Unit List* means the publication listing retirement units for steam production property kept by AEP GenCo in accordance with applicable requirements of regulatory authorities and heretofore delivered to Buckeye by AEP GenCo or any revised Retirement Unit List substituted therefor pursuant to Section 3.4.

*Substation Land* means the parcel of land described as Substation Land in the description modified or supplemented from time to time by mutual agreement among the parties hereto.

*Total Net Available Capability* of any unit at the Cardinal Station for any hour means the Total Net Capability of such unit, adjusted for circulating water temperature, fuel quality, equipment condition and outages and other factors affecting capability that may prevail in such hour.

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*Total Net Capability* of any generating unit or combination of generating units means the total net capability of such unit or units in kilowatts as of the high voltage Cardinal Station buses determined in accordance with the provisions of Appendix C hereto.

*Total Net Generation* in any month, as applied to any generating unit or combination of high-voltage buses of Cardinal Station, determined in accordance with the provisions of Appendix C hereto.

*Uniform System of Accounts* means the uniform system of accounts prescribed for AEP GenCo by the Federal Energy Regulatory Commission, as in effect on the date of this Amendment.

## ARTICLE TWO - OWNERSHIP OF FACILITIES.

### 2.1. (a) Buckeye's Initial Land and Buckeye's Additional Land and Buckeye's Initial Unit and Buckeye's Additional Unit located thereon shall be owned by AEP GenCo and AEP GenCo's Initial Unit shall be operated by AEP GenCo in accordance with the provisions of this Agreement.

(b) AEP GenCo's Land and AEP GenCo's Initial Unit located thereon shall be owned by AEP GenCo, and AEP GenCo's Initial Unit shall be operated by AEP GenCo in accordance with the provisions of this Agreement.

(c) Substation Land shall be owned by Ohio subject to the right of Buckeye to own any of Buckeye's Initial Substation Facilities and Buckeye's Additional Substation Facilities located thereon.

(d) Buckeye's Initial Substation Facilities and Buckeye's Additional Substation Facilities shall be owned by Buckeye and shall be located on Buckeye's Initial Land, Buckeye's Additional Land, Joint Land, Common Land, and Substation Land.

(e) AEP GenCo's Substation Facilities shall be owned by AEP GenCo and shall be located on AEP GenCo's Land, Joint Land, Common Land, and Substation Land.

(f) The Joint Land and the Initial Cardinal Station General Facilities shall be owned by Buckeye and AEP GenCo as tenants in common of the whole thereof, and each of them shall have an undivided one-half interest therein. The ownership of the Initial Cardinal Station General Facilities by Buckeye and AEP GenCo as tenants in common shall be regardless of whether in fact any one or more parts of the Initial Cardinal Station General Facilities shall be affixed to real property owned by either Buckeye or AEP GenCo.

(g) The Landfill Land, the Common Land and the Cardinal Station Common Facilities shall be owned by Buckeye and AEP GenCo as tenants in common of the whole thereof, and Buckeye shall have an undivided two-third interest therein, and each of them shall have an undivided one-third interest therein. The ownership of the Cardinal Station Common Facilities by Buckeye and AEP GenCo as tenants in common shall exist regardless of whether in fact any one or more parts of the Cardinal Station Common Facilities shall be affixed to real property owned by either Buckeye or AEP GenCo.

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fact any one or more parts of the Cardinal Station Common Facilities shall be affixed to real property owned by either Buckeye or AEP GenCo.

(b) Buckeye and AEP GenCo recognize that because the property constituting the Cardinal Station Common Facilities will be useful and/or necessary for the operation of each Buckeye and one-third to AEP GenCo, unless Buckeye and AEP GenCo agree to allocate two-thirds to Common Facilities in another manner as will reflect the relationships of such Cardinal Station instruments and documents as may from time to time be reasonably requested by one from the property constituting the Cardinal Station Site, other than the Substation Land, and in and to the access thereto, as herein provided and including for purposes of updating the description of real property and facilities contained in Appendix A. Buckeye and AEP GenCo shall arrange to obtain easements from Ohio for their generation-related facilities located on the Substation Land, and Buckeye and AEP GenCo shall grant easements to Ohio for Ohio's transmission-related facilities located on Buckeye's Initial Land, Buckeye's Additional Land, AEP GenCo's Land, the Joint Land, the Common Land, and/or the Landfill Land.

## 2.2.

Buckeye and AEP GenCo hereby agree to grant to each other appropriate basins, water treatment facilities and such other facilities as may be the property of one Owner and are necessary for the operation of the other Owner's Initial Unit and/or Buckeye's Additional Unit, to the extent that such use will not impair the operation of either Owner's Initial Unit and/or Buckeye's Additional Unit.

## 2.3.

AEP GenCo's or Ohio's Tidd Station is no longer operational but has not yet been demolished and is located on the Common Land. The parties shall mutually agree upon a schedule for the demolition of the Tidd Station and the sharing between them of the costs thereof. AEP GenCo will indemnify and hold Buckeye and its employees, agents, officers, directors, and affiliates harmless from and against any and all losses, liabilities, costs, expense and damages associated with claims or causes of action regarding the operation of the Tidd Station, including reasonable attorney fees incurred by such indemnified parties to defend against such claims or causes of action, and including claims or causes of action regarding hazardous materials or pollution located on the site of the Tidd Station in connection with the operation of the Tidd Station.

## 2.4.

[Reserved].

## 2.5.

Neither AEP GenCo nor Buckeye shall, so long as this Agreement shall remain in effect, bring any action for partition in respect of the Joint Land, the Common Land, the Landfill Land, the Initial Cardinal Station General Facilities and/or the Cardinal Station Common Facilities.

(a) AEP GenCo shall pay any property taxes applicable to AEP GenCo's Land, and to its improvements thereon, and Buckeye shall pay any property taxes applicable to Buckeye's Initial Land and Buckeye's Additional Land, and to its improvements thereon. AEP GenCo and Buckeye shall pay the property taxes applicable to their respective ownership interests in the Joint Land, the Common Land, the Landfill Land, and any improvements thereon, and in the General Facilities. Ohio shall pay any property taxes applicable to the Substation Land and to its improvements thereon. Buckeye shall pay any property taxes applicable to its improvements located on the Substation Land, and AEP GenCo shall pay any property taxes applicable to its improvements located on the Substation Land.

## (b)

Each Owner agrees adequately to insure its respective properties and property interests at the Cardinal Station, whether held by it in its individual capacity or as tenant in common with the other, with mutually agreeable coverage against public liability, losses resulting from fire, machinery breakdown, explosion of pressure vessels and other risks customarily insured against in the case of comparable power plant facilities, and each policy of insurance obtained by either Owner shall name the other Owner and Operating Company as persons insured thereunder.

## 2.7.

In the event that any adverse claim should be asserted by any third party against the Cardinal Station Site or any part thereof, other than the Substation Land, whether owned by AEP GenCo or Buckeye or AEP GenCo and Buckeye as tenants in common, which is based on a claim, AEP GenCo and Buckeye shall cooperate in taking such action as may be required to defend against such claim and shall share equally all costs and expenses incurred in connection with such claim and defense.

## 2.8.

(a) If requested by AEP GenCo, Buckeye shall deliver to AEP GenCo (i) within 120 days following the end of each fiscal year of Buckeye, a copy of Buckeye's annual report containing consolidated audited financial statements for such fiscal year and (ii) within 60 days after the end of each of the first three fiscal quarters of each fiscal year of Buckeye, a copy of Buckeye's quarterly report containing consolidated unaudited financial statements for such fiscal quarter. In all cases the statements shall be for the most recent accounting period and prepared in accordance with generally accepted accounting principles; provided, however, that should any such statements not be available on a timely basis due to a delay in preparation or certification, Buckeye shall diligently pursue the preparation, certification and delivery of the statements.

## (b)

If at any time Buckeye's Credit Rating falls below BBB- from S&P or Moody's, or if Buckeye is not rated by either S&P or Moody's, then AEP GenCo may by notice to Buckeye require Buckeye to provide Performance Assurance in an amount determined in accordance with the formula set forth below for the then-current calendar year and for the following calendar year(s), as such amount is reset from time to time in accordance with this Section 2.8, until Buckeye obtains a Credit Rating of BBB- or greater from S&P or Moody's greater from Moody's. Upon receipt of such notice, Buckeye shall have ten (10) days to remedy the situation by providing such Performance Assurance to AEP GenCo for the applicable calendar year. If Buckeye provides Performance Assurance in the form of a guaranty, and the Credit Rating for Buckeye's guarantor falls below BBB- from S&P and Baa3 from Moody's, or

if such guarantor is not rated by S&P or Moody's at any point during the term of the guaranty, AEP GenCo may by notice to Buckeye require Buckeye to provide substitute Performance Assurance that otherwise complies with the requirements of this Agreement, and upon the provision of such substitute Performance Assurance, whether from an alternate guarantor with the required Credit Ratings or a Letter of Credit or cash, the guaranty from the original guarantor shall automatically terminate and be of no further force and effect (and the guarantor shall have no liability thereunder) on and as of such date of substitution. If Buckeye's Credit Rating, subsequent to providing Performance Assurance to AEP GenCo, is equal to or greater than BBB- from S&P or Ba3 from Moody's, AEP GenCo will return the then balance of Performance Assurance to Buckeye.

#### FORMULA FOR CALCULATION OF BUCKEYE PERFORMANCE ASSURANCE MAXIMUM AMOUNT

Calculation as of the date of the Performance Assurance request for the then-current calendar year, until reset, as set forth below:

An amount equal to the sum of:

- \$ \_\_\_\_\_ 1) Twelve times the average monthly billable costs of Buckeye's share of the estimated cost of any retirement, replacement or addition of a Property Unit made or expected to be made under Section 3.2 of the Agreement during the current calendar year, as approved in Operating Company's budget for such period; and
- \$ \_\_\_\_\_ 2) For other expenses, Buckeye's share of twelve (12) times the average monthly billable costs under the Agreement of Buckeye for the current calendar year, as approved in Operating Company's current budget for such period times 110% (or if the current budget is not yet approved, based on 120% of the last approved annual budget), including, by way of example:

a. Twelve times the average monthly billable costs of Buckeye's investment in Initial Cardinal Station Coal Stock, Additional Cardinal Station Coal Stock, Consumables, fuel oil reserves and fuel oil charged to Buckeye under Article 6 of the Agreement, times 110% (or if the current budget is not yet approved, based on 120% of the last approved annual budget); and

b. Twelve times the average monthly billable costs of Buckeye's share of apportioned Cardinal Station costs related to fuel supply costs under Article 7 of the Agreement, including Buckeye's share of the Initial Units Monthly Coal Requirement, the Initial Units Monthly Consumable Requirement, the Initial Units Monthly Fuel Handling Cost, and the Initial Units Monthly Consumable Handling Cost, Buckeye's share of the Additional Unit Monthly Coal Requirement, the Additional Unit Monthly Consumable Requirement, the Additional Unit Monthly Fuel Handling Costs, and the Additional Unit Monthly Consumable Handling Costs, and Buckeye's share of all fuel oil consumed, calculated pursuant to Section 7.2 and Section 7.3 of the Agreement, times 110%.

(or if the current budget is not yet approved, based on 120% of the last approved annual budget); and

c. Twelve times the average monthly billable costs of Buckeye's share of the Cardinal Station Monthly Maintenance Costs calculated under Section 7.4 of the Agreement, Buckeye's share of the Cardinal Station Monthly Prorated Capacity Cost calculated under Section 7.5 of the Agreement, and Buckeye's costs of consumed emissions allowances under Section 7.6 of the Agreement, times 110% (or if the current budget is not yet approved, based on 120% of the last approved annual budget); and

\$ \_\_\_\_\_ 3) 110% of Operating Company's and Buckeye's good faith estimate of Buckeye's allocated portion of the expected present value of decommissioning expenses associated with the General Facilities, including fly ash, bottom ash and FGD System byproducts impoundments, initially estimated at \$30,000,000.

Minus:

\$ \_\_\_\_\_ After demand from AEP GenCo, any amounts previously paid to Operating Company or AEP GenCo by application of any previous Performance Assurance provided by Buckeye to Operating Company or AEP GenCo for payment of obligations due to Operating Company or AEP GenCo from Buckeye; and

\$ \_\_\_\_\_ Any amounts previously paid by Buckeye for decommissioning expenses associated with Buckeye's Initial Unit and/or Buckeye's Additional Unit;

Equals:

\$ \_\_\_\_\_ Total Performance Assurance Maximum Amount for Buckeye

After providing Performance Assurance, should Buckeye's Credit Rating remain below BBB- from S&P and Ba3 from Moody's or if Buckeye is not rated by S&P or Moody's, the Total Performance Assurance Maximum Amount shall be reset on or before January 31<sup>st</sup> of each subsequent calendar year(s), as applicable, and Operating Company shall calculate the applicable amount in accordance with the above formula, and Operating Company will provide notice thereof to Buckeye, provided that, until the determination and notice to Buckeye of the new Total Performance Assurance Maximum Amount, and the provision by Buckeye to AEP GenCo of Performance Assurance in such reset amount by no later than February 7 of the applicable calendar year, the applicable Total Performance Assurance Maximum Amount for the previous year shall continue to apply. Buckeye shall have until no later than February 7 of the applicable calendar year to provide Performance Assurance to AEP GenCo in the amount reset for the applicable calendar year. If Buckeye provides Performance Assurance in the form of a guaranty, Buckeye may substitute the entity that serves as the guarantor by providing a guarantee in the format of Appendix B from an alternate guarantor, provided such alternate guarantor has a Credit Rating of BBB- from S&P or Ba3 from Moody's, and upon the provision of a guarantee from an alternate guarantor, the guarantee from the original guarantor shall automatically terminate

and be of no further force and effect (and the guarantor shall have no liability thereunder) on and as of such date of substitution. If Buckeye provides Performance Assurance in the form of a Letter of Credit, Buckeye may substitute the bank that serves as the Letter of Credit provider by providing a Letter of Credit from an alternate bank, provided such alternate bank is a U.S. commercial bank or a foreign bank with a U.S. branch having a long term debt or a deposit rating of at least A- from S&P or A3 from Moody's and having at least \$10 Billion United States Dollars in assets.

(c) If requested by Buckeye, AEP GenCo shall deliver to Buckeye (i) within 120 days following the end of each fiscal year of AEP GenCo's guarantor, a copy of the annual report of AEP GenCo's guarantor containing consolidated audited financial statements for such fiscal year, provided, that if AEP GenCo has a Credit Rating equal to or greater than BBB- from S&P or Baa3 from Moody's, AEP GenCo will instead provide within 120 days following the end of each of its fiscal years a copy of AEP GenCo's annual report containing consolidated audited financial statements for such fiscal year; and (ii) within 60 days after the end of each of the first three fiscal quarters of each fiscal year of AEP GenCo's guarantor, a copy of AEP GenCo's guarantor's quarterly report containing consolidated unaudited financial statements for such fiscal quarter, provided, that if AEP GenCo has a Credit Rating equal to or greater than BBB- from S&P or Baa3 from Moody's, AEP GenCo will instead provide within 60 days following the end of each of the first three fiscal quarters of each fiscal year of AEP GenCo, a copy of AEP GenCo's quarterly report containing consolidated unaudited financial statements for such fiscal quarter. In all cases the statements shall be for the most recent accounting period and prepared in accordance with generally accepted accounting principles; provided, however, that should any such statements not be available on a timely basis due to a delay in preparation or certification, AEP GenCo or AEP GenCo's guarantor, as applicable, shall diligently pursue the preparation, certification and delivery of the statements.

(d) If at any time AEP GenCo's Credit Rating falls below BBB- from S&P and Baa3 from Moody's, or if AEP GenCo is not rated by either S&P or Moody's, then Buckeye may by notice to AEP GenCo require AEP GenCo to provide Performance Assurance in an amount determined in accordance with the formula set forth below for the then-current calendar year and for the following calendar year(s), as such amount is reset from time to time in accordance with this Section 2.8, until AEP GenCo obtains a Credit Rating of BBB- or greater from S&P or Baa3 or greater from Moody's. Upon receipt of such notice, AEP GenCo shall have ten (10) days to remedy the situation by providing such Performance Assurance to Buckeye for the applicable calendar year. If AEP GenCo's Credit Rating, subsequent to providing Performance Assurance to Buckeye, is equal to or greater than BBB- from S&P or Baa3 from Moody's, Buckeye will return the then balance of Performance Assurance to AEP GenCo. As AEP GenCo will not initially have a Credit Rating, prior to consummation of the AEP Corporate Separation, Buckeye will be deemed to have given AEP GenCo notice of a requirement to provide Performance Assurance in an amount determined in accordance with the formula set forth below to Buckeye, and AEP GenCo will deliver such Performance Assurance prior to the consummation of the AEP Corporate Separation. If AEP GenCo provides Performance Assurance in the form of a guaranty, and the Credit Rating for AEP GenCo's guarantor falls below BBB- from S&P and Baa3 from Moody's, or if such guarantor is not rated by S&P or Moody's at any point during the term of the guaranty, Buckeye may by notice to AEP GenCo require AEP GenCo to provide substitute Performance Assurance that otherwise complies with

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the requirements of this Agreement, and upon the provision of such substitute Performance Assurance, whether from an alternate guarantor with the required Credit Ratings or a Letter of Credit or cash, the guaranty from the original guarantor shall automatically terminate and be of no further force and effect (and the guarantor shall have no liability thereunder) on and as of such date of substitution.

#### FORMULA FOR CALCULATION OF AEP GENCO PERFORMANCE ASSURANCE MAXIMUM AMOUNT

Calculation as of the date of the Performance Assurance request for the then-current calendar year, until reset, as set forth below:

An amount equal to the sum of:

- \$ \_\_\_\_\_ 1) Twelve times the average monthly billable costs of AEP GenCo's share of the estimated cost of any retirement, replacement or addition of a Property Unit made or expected to be made under Section 3.2 of the Agreement during the current calendar year, as approved in Operating Company's budget for such period; and
- \$ \_\_\_\_\_ 2) For other expenses, AEP GenCo's share of twelve (12) times the average monthly billable costs under the Agreement of AEP GenCo for the current calendar year, as approved in Operating Company's current budget for such period times 110% (or if the current budget is not yet approved, based on 120% of the last approved annual budget), including, by way of example:
  - a. Twelve times the average monthly billable costs of AEP GenCo's investment in Initial Cardinal Station Coal Stock, Additional Cardinal Station Coal Stock, Consumables, fuel oil reserves and fuel oil charged to AEP GenCo under Article 6 of the Agreement, times 110% (or if the current budget is not yet approved, based on 120% of the last approved annual budget), and
  - b. Twelve times the average monthly billable costs of AEP GenCo's share of apportioned Cardinal Station costs related to fuel supply costs under Article 7 of the Agreement, including AEP GenCo's share of the Initial Units Monthly Coal Requirement, the Initial Units Monthly Consumable Requirement, the Initial Units Monthly Fuel Handling Cost, and the Initial Units Monthly Consumable Handling Cost, AEP GenCo's share of the Additional Unit Monthly Coal Requirement, the Additional Unit Monthly Consumable Requirement, the Additional Unit Monthly Fuel Handling Costs, and the Additional Unit Monthly Consumable Handling Costs, and AEP GenCo's share of all fuel oil consumed, calculated pursuant to Section 7.2 and Section 7.3 of the Agreement, times 110% (or if the current budget is not yet approved, based on 120% of the last approved annual budget), and
  - c. Twelve times the average monthly billable costs of AEP GenCo's share of the Cardinal Station Monthly Maintenance Costs calculated under

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Section 7.4 of the Agreement, AEP GenCo's share of the Cardinal Station Monthly Prorated Capacity Cost calculated under Section 7.5 of the Agreement, and AEP GenCo's costs of consumed emissions allowances under Section 7.6 of the Agreement, times 110% (or if the current budget is not yet approved, based on 120% of the last approved annual budget), and

\$ \_\_\_\_\_ 3) 110% of Operating Company's and AEP GenCo's good faith estimate of AEP GenCo's allocated portion of the expected present value of decommissioning expenses associated with the General Facilities, including fly ash, bottom ash and FGD System byproducts impoundments, initially estimated at \$15,000,000; and

\$7,000,000 4) Which amount represents Buckeye's good faith estimate of its potential exposure to incremental costs above AEP GenCo's charges to Buckeye for Back-up Energy under Article 9 of the Agreement for replacement energy for the current calendar year that Buckeye would incur should AEP GenCo default in providing Back-up Energy under Article 9 of the Agreement to Buckeye;

Minus:

\$ \_\_\_\_\_ After demand from Buckeye, any amounts previously paid to Operating Company or Buckeye by application of any previous Performance Assurance provided by AEP GenCo to Operating Company or Buckeye for payment of obligations due to Operating Company or Buckeye from AEP GenCo; and

\$ \_\_\_\_\_ Any amounts previously paid by AEP GenCo for decommissioning expenses associated with AEP GenCo's Initial Unit.

Equals:

\$ \_\_\_\_\_ Total Performance Assurance Maximum Amount for AEP GenCo

After providing Performance Assurance, should AEP GenCo's Credit Rating remain below BBB- from S&P and Baaz from Moody's or if AEP GenCo is not rated by S&P or Moody's, the Total Performance Assurance Maximum Amount shall be reset on or before January 31st of each subsequent calendar year(s), as applicable, and Operating Company shall calculate the applicable amount in accordance with the above formula, and Operating Company will provide notice thereof to AEP GenCo, provided that, until the determination and notice to AEP GenCo of the new Total Performance Assurance Maximum Amount, and the provision by AEP GenCo to Buckeye of Performance Assurance in such reset amount by no later than February 7 of the applicable calendar year, the applicable Total Performance Assurance Maximum Amount for the previous year shall continue to apply. AEP GenCo shall have until no later than February 7 of the applicable calendar year to provide Performance Assurance to Buckeye in the amount reset for the applicable calendar year. If AEP GenCo provides Performance Assurance in the form of a guaranty, AEP GenCo may substitute the entity that serves as the guarantor by providing a guarantee in the format of Appendix B from an alternate guarantor, provided such alternate guarantor has a Credit Rating of BBB- from S&P or Baaz

from Moody's, and upon the provision of a guarantee from an alternate guarantor, the guarantee from the original guarantor shall automatically terminate and be of no further force and effect (and the guarantor shall have no liability thereunder) on and as of such date of substitution. If AEP GenCo provides Performance Assurance in the form of a Letter of Credit, AEP GenCo may substitute the bank that serves as the Letter of Credit provider by providing a Letter of Credit from an alternate bank, provided such alternate bank is a U.S. commercial bank or a foreign bank with a U.S. branch having a long term debt or a deposit rating of at least A- from S&P or A3 from Moody's and having at least \$10 Billion United States Dollars in assets.

(e) To secure its obligations under this Agreement and to the extent either Owner or both Owners deliver(s) Performance Assurance hereunder to the other Owner, each such party that delivers Performance Assurance (a "Pledgor") hereby grants to the other party (the "Secured Party") a present and continuing security interest in, and lien on (and right of setoff against), and assignment of, all cash collateral, whether now or hereafter held by, on behalf of, or for the benefit of, such Secured Party as Performance Assurance hereunder, and each such party agrees to take such action as the other party reasonably requires in order to perfect the Secured Party's first-priority security interest in, and lien on (and right of setoff against), such collateral.

Upon or any time after the occurrence and during the continuation of a Pledgor's material breach of this Agreement, the other party holding Performance Assurance may do any one or more of the following:

- (i) exercise any of the rights and remedies of a Secured Party with respect to all such Performance Assurance, including any such rights and remedies under law then in effect;
- (ii) exercise its rights of setoff against any and all such Performance Assurance in the possession of the Secured Party or its agent;
- (iii) draw on any outstanding Letter of Credit issued for its benefit; and
- (iv) liquidate all Performance Assurance then held by or for the benefit of the Secured Party free from any claim or right of any nature whatsoever of the Pledgor, including any equity or right of purchase or redemption by the Pledgor.

The Secured Party shall apply the proceeds of the collateral realized upon the exercise of any such rights or remedies to reduce the Pledgor's obligations under the Agreement (the Pledgor remaining liable for any amounts owing to the Secured Party after such application), subject to the Secured Party's obligation to return any surplus proceeds remaining after such obligations are satisfied in full.

(f) For Performance Assurance in the form of cash that is held by a party the interest rate will be, for any day, the federal funds (effective) rate in effect for such day, as published in the most recent weekly statistical release designated as H.15(519), or any successor publication, published by the Board of Governors of the Federal Reserve System. Such interest shall be calculated commencing on the date Performance Assurance in the form of cash is received by a Secured Party but excluding the earlier of: (i) the date Performance Assurance in

the form of cash is returned to the Pledgor, or (ii) the date Performance Assurance in the form of cash is applied to a Pledgor's obligations. The Pledgor shall invoice the Secured Party monthly setting forth the calculation of the interest amount due, and the Secured Party shall make payment thereof by the later of (x) the third Business Day of the first month after the last month to which such invoice relates or (y) the third Business Day after the day on which such invoice is received.

#### ARTICLE THREE - RETIREMENTS, REPLACEMENTS AND ADDITIONS.

3.1. (a) When a Property Unit is retired from service, the investment in such Property Unit shall for the purpose of all computations under this Agreement be removed from the applicable plant investment account of the Owner thereof or the Owners, as the case may be, and from any related reserve for depreciation, as of the out-of-service date of such Property Unit.

(b) When a Property Unit is placed in service replacing a retired Property Unit, or when a Property Unit is placed in service but not as a replacement, the original investment in such replacement or additional Property Unit, as the case may be, shall for the purpose of all computations made under this Agreement be added to the plant investment of the Owner thereof or the Owners, as the case may be, as of the in-service date of such Property Unit.

(c) A removal, change or supplement of an item of property which, of itself, consists of less than an entire Property Unit shall not be deemed to constitute a retirement, replacement or addition of a Property Unit, and any expense involved therein shall constitute maintenance expense.

3.2. Operating Company shall, from time to time, recommend to the Owners action to be taken in connection with the retirement, replacement or addition of Property Units to any portion of the Cardinal Station and shall have the right, on behalf of the Owners, to make or cause to be made recommended retirement, replacements or additions of Property Units in their respective portions of the Cardinal Station; provided, however, that no single retirement, replacement or addition of a Property Unit involving an investment exceeding \$50,000 in amount shall be made by Operating Company except with the prior approval of the Owner or Owners, as the case may be, which approval shall not be unreasonably withheld. Each Owner shall be obligated to make such retirements, replacements and additions as shall be required by law. In addition, either Owner may make other retirements, replacements or additions of Property Units in its portion of the Cardinal Station on its own responsibility and at its own expense, subject to approval thereof by the other Owner. The cost of any retirement, replacement or addition of a Property Unit in any portion of the Cardinal Station other than the jointly owned General Facilities shall be borne by the Owner thereof. The cost of any retirement, replacement or addition of a Property Unit in the Initial Cardinal Station General Facilities shall be shared by the Owners in proportion to their respective ownership interests in such facilities, i.e. each Owner shall be responsible for one-half the cost. The cost of any retirement, replacement or addition of a Property Unit in the Cardinal Station Common Facilities shall be shared by the Owners in proportion to their respective ownership interests in such facilities, i.e. Buckeye shall be responsible for two-thirds of the cost, and AEP GenCo shall be responsible for one-third of the cost, unless Buckeye and AEP GenCo agree to share such costs in another manner as will reflect

the relationships of such Cardinal Station Common Facilities to the three generating units involved.

3.3. Any removal, change or supplement involving an item of property which is not a Property Unit shall be the responsibility of Operating Company and any expense involved therein shall constitute maintenance expense.

3.4. Upon any revision of the Retirement Unit List, the revised Retirement Unit List shall be substituted for the Retirement Unit List then in effect unless Buckeye shall, within twenty days after delivery to it of notice of such revision, advise AEP GenCo that it objects thereto.

#### ARTICLE FOUR - MAJOR SPARE PARTS.

4.1. AEP GenCo shall purchase and own Major Spare Parts interchangeable, to the extent specified in Appendix D hereto, with equivalent parts of AEP GenCo's Initial Unit and Buckeye's Initial Unit and/or Buckeye's Additional Unit, and shall also purchase and own such other spare parts as AEP GenCo and Buckeye may from time to time mutually agree to include in the category of Major Spare Parts. Buckeye agrees that its approval of any such inclusion shall not be unreasonably withheld.

4.2. AEP GenCo agrees that, if and when any AEP GenCo Associate constructs and owns a generating unit (or units) for which parts are interchangeable with the Major Spare Parts, or if and when AEP GenCo constructs and owns a generating unit (or units) for which parts are interchangeable with the Major Spare Parts, it will arrange to interchange Major Spare Parts owned by it with such interchangeable parts owned by such AEP GenCo Associate so that duplication of investment in expensive spare parts may be minimized. Accordingly, when a Major Spare Part is owned by an AEP GenCo Associate, AEP GenCo shall not be obligated under Section 4.1 to purchase and own a duplicate thereof.

4.3. AEP GenCo hereby extends to Buckeye the right to use any of the Major Spare Parts for Buckeye's Units and it will extend to Buckeye its rights and obligations in respect of any major spare parts arrangements from time to time existing between AEP GenCo and AEP GenCo Associates. Buckeye hereby agrees to accept such rights and obligations, which it is understood shall be as follows:

(a) If at any time Buckeye has need of a Major Spare Part to replace an equivalent item which has been damaged, the owner of such Major Spare Part shall make such Major Spare Part available for Buckeye's use (at the location where such Major Spare Part is stored) as expeditiously as possible; provided, however, that if AEP GenCo or an AEP GenCo Associate also develops a need for such Major Spare Part prior to the time of the actual installation thereof in one of the Buckeye Units, the owner of the generating unit having the highest net capability for which such Major Spare Part is required shall have prior claim to the use of such Major Spare Part, and in the event such net capabilities are equal, the owner of the item equivalent to such Major Spare Part which was damaged earliest shall have prior claim to the use of such Major Spare Part.

(b) If an Owner uses a Major Spare Part to replace an equivalent item which has been damaged, such Owner shall have an obligation to cause the repair of such damaged item, or to acquire a new item in place thereof, if necessary, as expeditiously as possible, and to transfer the repaired item, or new item, as the case may be, to the original owner for such Major Spare Part at its original location.

(c) If the damaged item can be repaired, the cost of loading, freighting, unloading and freight charges in respect of such Major Spare Part and/or damaged item, and the costs of removal of, and repairs made to, such damaged item, together with all incidental expenses related thereto, shall be a part of the Cardinal Station Monthly Maintenance Cost.

(d) If the damaged item has been damaged beyond repair, and if such damaged item is a Property Unit, the entire cost of the retirement and replacement of such damaged item shall be borne by AEP GenCo and Buckeye in proportion to their respective ownership interests in such Property Unit; if, however, such damaged item is less than a Property Unit, the costs associated with its removal, and the acquisition of a new item in place thereof, shall be a part of the Cardinal Station Monthly Maintenance Cost.

4.4. (a) Buckeye shall pay to AEP GenCo in respect of the rights extended by AEP GenCo as provided in Section 4.3 a monthly charge for each Major Spare Part associated with Buckeye's Initial Unit equal to the product of (i) 0.011042, (ii) the total gross investment (i.e., the aggregate purchase price including freight, excise taxes, etc.) of AEP GenCo and AEP GenCo Associates in such Major Spare Part, (iii) the quotient obtained by dividing (A) 115% of Buckeye's Initial Cardinal Station Capacity Reservation by (B) the then Total Net Capability of Buckeye's Initial Unit and (iv) the quotient of (C) one, divided by (D) the total number of generating units of AEP GenCo and any AEP GenCo Associate which are then in commercial operation, for which such Major Spare Part is interchangeable, plus one.

(b) Buckeye shall pay to AEP GenCo in respect of the rights extended by AEP GenCo as provided in Section 4.3 a monthly charge for each Major Spare Part associated with Buckeye's Additional Unit equal to the product of (i) 0.011042, (ii) the total gross investment (i.e., the aggregate purchase price including franchise, excise taxes, etc.) of AEP GenCo and AEP GenCo Associates in such Major Spare Part, (iii) the quotient obtained by dividing (A) 115% of Buckeye's Additional Unit Capacity Reservation by (B) the then Total Net Capability of Buckeye's Additional Unit, and (iv) the quotient for such month of (C) the number of items of equipment at the Additional Cardinal Station which can be interchanged with a particular Major Spare Part, divided by (D) the total number of the items of equipment at the generating units of AEP GenCo and any AEP GenCo Associate and at the Additional Cardinal Station which can be interchanged with such Major Spare Part.

(c) In addition, Buckeye shall pay to AEP GenCo an amount in dollars sufficient to reimburse AEP GenCo for any amounts paid or payable by it as sales, excise or similar taxes (other than taxes based on or measured by net income) in respect of the total amount paid by Buckeye pursuant to this Section and to enable AEP GenCo, after provision for such taxes, to realize the net amount payable by Buckeye as herein provided. Buckeye shall also make available to the extent that is practicable to do so space within its portion of Cardinal Station for the storage of Major Spare Parts. In the event that any amounts paid or payable by

Buckeye to AEP GenCo pursuant to this Section shall at any time become subject to any income or similar tax based on or measured by net income levied by any State or subdivision thereof, then the amount payable hereunder shall be increased by an additional amount which, after provision for the payment of such tax, will net the amount otherwise payable hereunder.

4.5. AEP GenCo shall invoice Buckeye promptly for the monthly charge to be paid by Buckeye pursuant to Section 4.4 and such invoices shall be paid within fifteen (15) days after receipt thereof by Buckeye. Interest shall be paid by Buckeye at the rate of 6% per annum on any amount overdue.

4.6. Buckeye agrees that it will purchase and maintain a suitable stock of spare parts for Buckeye's Initial Substation Facilities and Buckeye's Additional Substation Facilities in accordance with the practices employed by AEP GenCo for the maintenance of spare parts for comparable substation facilities at other generating stations of AEP GenCo.

#### ARTICLE FIVE - WORKING CAPITAL REQUIREMENTS.

5.1. The Owners shall provide the funds required for use as working capital in meeting payroll and other expenses incurred in the operation and maintenance of the Cardinal Station, and in buying materials and supplies, and the Owners hereby authorize Operating Company as their agent to draw upon such funds for expenditures on their behalf necessary to operate and maintain Cardinal Station.

5.2. Buckeye shall provide its appropriate share of working capital requirements, other than for fuel and Consumables in the ratio of 115% of Buckeye's Total Cardinal Station Capacity Reservation to the then Total Net Capability of the Cardinal Units and AEP GenCo shall provide the balance. Each Owner shall make the requisite funds available by cash payments directly to Operating Company, by deposits to bank accounts established by Operating Company, by investing in materials and supplies, by prepayments, by purchase of spare parts, or by a combination of such methods as may be agreed to between the Owners from time to time.

#### ARTICLE SIX - INVESTMENT IN FUEL AND CONSUMABLES.

6.1. It is recognized by the Owners that a reasonable amount of coal in stock is desirable for the Cardinal Station at all times in order to provide adequate fuel reserves against interruptions of normal fuel supply. The Owners agree to establish and maintain such reserves of coal in stock of such quality and in such quantities, as Operating Company shall determine to be required for that purpose.

6.2. Each Owner shall invest directly in a portion of coal in stock for the Initial Cardinal Station as follows:

(a) Buckeye shall make such monthly investments in the Initial Cardinal Station Coal Stock as are necessary to maintain its ownership, after taking into account the consumption by Buckeye of its share of the Initial Units Monthly Coal Requirement, of that number of tons of coal in the storage pile or piles equal to the product of (i) the ratio of the total Buckeye's Initial Unit Monthly Energy for the preceding twelve-month period to the Total Net

Generation of the Initial Units for the preceding twelve-month period, and (ii) the total tons of coal in the Initial Cardinal Station Coal Stock.

(b) AEP GenCo shall make such monthly investments in the Initial Cardinal Station Coal Stock as are necessary to maintain its ownership, after taking into account the consumption by AEP GenCo of its share of the Initial Units Monthly Coal Requirement, of that number of tons of coal in the storage pile or piles equal to the product of (i) the ratio of the total AEP GenCo's Initial Units Monthly Energy for the preceding twelve-month period to the Total Net Generation of the Initial Units for the preceding twelve-month period, and (ii) the total tons of coal in the Initial Cardinal Station Coal Stock.

6.3. Each Owner shall invest directly in a portion of coal in stock for the Additional Cardinal Station as follows:

(a) Buckeye shall make such monthly investments in the Additional Cardinal Station Coal Stock as are necessary to maintain its ownership, after taking into account the consumption by Buckeye of its share of the Additional Unit Monthly Coal Requirement, of that number of tons of coal in the storage pile or piles equal to the product of (i) the ratio of the total Buckeye's Additional Unit Monthly Energy for the preceding twelve-month period to the Total Net Generation of Buckeye's Additional Unit for the preceding twelve-month period, and (ii) the total tons of coal in the Additional Cardinal Station Coal Stock.

(b) AEP GenCo shall make such monthly investments in the Additional Cardinal Station Coal Stock as are necessary to maintain its ownership, after taking into account the consumption by AEP GenCo of its share of the Additional Unit Monthly Coal Requirement, of that number of tons of coal in the storage pile or piles equal to the product of (i) the ratio of the total AEP GenCo Additional Unit Monthly Energy for the preceding twelve-month period to the Total Net Generation of Buckeye's Additional Unit for the preceding twelve-month period, and (ii) the total tons of coal in the Additional Cardinal Station Coal Stock.

6.4. The parties recognize that under certain circumstances it may be more equitable to establish the number of tons of coal in stock for Buckeye and AEP GenCo on the basis of twelve-month forecasts of Buckeye's Initial Unit Monthly Energy and Buckeye's Additional Unit Monthly Energy requirements and AEP GenCo's Initial Units Monthly Energy and AEP GenCo Additional Unit Monthly Energy requirements, respectively, instead of on the basis of the preceding twelve-month period, and agree that the Operating Company may from time to time employ such alternative method.

6.5. Fuel oil reserves and fuel oil charged to operation shall be owned and accounted for between the Owners in the same manner as coal by converting the quantities and costs of such fuel oil to the basis of equivalent tons of coal.

6.6. Unless the Owners mutually agree otherwise, Operating Company shall take such steps as are necessary to keep the Initial Cardinal Station Coal Stock separate and apart from the Additional Cardinal Station Coal Stock and shall keep separate records of the respective investments of the Owners therein. If the Owners elect to inventory and account for coal collectively for the Cardinal Station, rather than separately for the Initial Cardinal Station and the

Additional Cardinal Station, then, unless the Owners mutually agree otherwise, each Owner shall invest directly in a portion of coal in stock for the Cardinal Station in the same manner as for Consumables as set forth in Section 6.7(a).

6.7. Reserves of each inventoried Consumable shall be owned and accounted for between the Owners in the same manner as coal, except as follows:

(a) If the Owners so agree, an inventory and accounting system may be employed for any inventoried Consumable collectively for the Cardinal Station, rather than separately for the Initial Cardinal Station and the Additional Cardinal Station. If a Consumable is inventoried and accounted for collectively, each Owner shall invest directly in a portion of such Consumable in stock as follows:

(i) Buckeye shall make such monthly investments in the applicable Cardinal Station Consumable Stock as are necessary to maintain its ownership, after taking into account the consumption by Buckeye of its share of the applicable Cardinal Station Monthly Consumable Requirement, of that number of tons of such Consumable in the storage pile or piles equal to the product of (A) the ratio of the portion of Buckeye's Monthly Energy for the preceding twelve-month period allocated to the units consuming the applicable Consumable to the Total Net Generation of such units for the preceding twelve-month period, and (B) the total tons of such Consumable in the applicable Cardinal Station Consumable Stock.

(ii) AEP GenCo shall make such monthly investments in the applicable Cardinal Station Consumable Stock as are necessary to maintain its ownership, after taking into account the consumption by AEP GenCo of its share of the applicable Cardinal Station Monthly Consumable Requirement, of that number of tons of such Consumable in the storage pile or piles equal to the product of (A) the ratio of the portion of AEP GenCo's Monthly Energy for the preceding twelve-month period allocated to the units consuming the applicable Consumable to the Total Net Generation of such units for the preceding twelve-month period, and (B) the total tons of such Consumable in the applicable Cardinal Station Consumable Stock.

(b) If a particular Consumable is accounted for separately for the Initial Cardinal Station and the Additional Cardinal Station, at such time, if any, as only Buckeye's Initial Unit or AEP GenCo's Initial Unit, but not both Initial Units, is using and/or producing such Consumable, each Owner shall invest directly in a portion of such Consumable in stock for such unit as follows:

(i) Buckeye shall make such monthly investments in the stock of such Consumable as are necessary to maintain its ownership, after taking into account the consumption by Buckeye of its share of the applicable Initial Units Monthly Consumable Requirement of that number of tons of such Consumable in inventory equal to the product of (A) the ratio of Buckeye's take of energy from such unit for the preceding twelve-month period to the Total Net Generation of such unit for the preceding twelve-month period, and (B) the total tons of such Consumable in the applicable Cardinal Station Consumable Stock.

(ii) AEP GenCo shall make such monthly investments in the stock of such Consumables as are necessary to maintain its ownership, after taking into account the consumption by AEP GenCo of its share of the applicable Initial Units Monthly Consumable

Requirement of that number of tons of such Consumable in inventory equal to the product of (A) the ratio of AEP GenCo's take of energy from such unit for the preceding twelve-month period to the Total Net Generation of such unit for the preceding twelve-month period, and (B) the total tons of such Consumable in the applicable Cardinal Station Consumable Stock.

(c) If with respect to any Consumable, there is a measurable difference in the rate per kilowatthour of consumption of such Consumable between any units, the Owners shall adjust the required investments in such Consumable accordingly.

#### ARTICLE SEVEN - APPORTIONMENT OF STATION COSTS.

7.1. Operating Company shall keep books of record and accounts, on the same basis for each Owner, covering the sums of money expended for the account of each Owner in operating and maintaining Cardinal Station. The allocation of expenses between the Owners shall be made in the manner set forth in Sections 7.2, 7.3, 7.4, 7.5 and 7.6, the actual allocation to be made by Operating Company.

7.2. Unless the Owners mutually agree otherwise, the allocation of all costs with respect to fuel supply for the Cardinal Station shall be accounted for separately for the Initial Cardinal Station and for the Additional Cardinal Station.

(a) With respect to the Initial Cardinal Station:

(i) All coal delivered to each Owner during a calendar month shall be charged to such Owner's fuel in stock at either the average delivered unit cost of all coal delivered to the Initial Cardinal Station during such month or, if the delivered unit cost of coal is different for each Owner, at the average delivered unit cost for such Owner of coal delivered to the Initial Cardinal Station during such month, and, in addition, each Owner's fuel in stock shall be charged in each month with the total coal unloading costs incurred by Operating Company for such month in the ratio of tons of coal delivered for each Owner. Each Owner's fuel in stock shall also be charged in each month with the total coal storage costs incurred by Operating Company in such month in the ratio of tons of coal in stock for each Owner at the end of such month.

(ii) The Initial Units Monthly Coal Requirement shall be divided between Buckeye and AEP GenCo in the same ratio for each month as Buckeye's Initial Unit Monthly Energy and AEP GenCo's Initial Units Monthly Energy, respectively, bear to the Total Net Generation of the Initial Units for such month. Each Owner's share of the Initial Units Monthly Coal Requirement shall be separately converted into a dollar amount by using the average cost per ton of coal in such Owner's fuel in stock at the close of such month and such dollar amount will then be credited to such Owner's fuel in stock and charged to such Owner's fuel consumed.

(iii) The Initial Units Monthly Fuel Handling Costs will be divided between Buckeye and AEP GenCo in the same ratio for each month as Buckeye's Initial Unit Monthly Energy and AEP GenCo's Initial Units Monthly Energy,

respectively, bear to the Total Net Generation of the Initial units for such month. Each Owner's fuel consumed will be charged at the close of such month with each Owner's share of the Initial Units Monthly Fuel Handling Costs.

(b) With respect to the Additional Cardinal Station:

(i) All coal delivered to each Owner during a calendar month shall be charged to such Owner's fuel in stock at either the average delivered unit cost of all coal delivered to the Additional Cardinal Station during such month or, if the delivered unit cost of coal is different for each Owner, at the average delivered unit cost for such Owner of coal delivered to the Additional Cardinal Station during such month, and, in addition, each Owner's fuel in stock shall be charged in each month with the total coal unloading costs incurred by Operating Company for such month in the ratio of tons of coal delivered for each Owner. Each Owner's fuel in stock shall also be charged in each month with the total coal storage costs incurred by Operating Company in such month in the ratio of tons of coal in stock for each Owner at the end of such month.

(ii) The Additional Unit Monthly Coal Requirement shall be divided between Buckeye and AEP GenCo in the same ratio for each month as Buckeye's Additional Unit Monthly Energy and AEP GenCo Additional Unit Monthly Energy, respectively, bear to the Net Generation of Buckeye's Additional Unit for such month. Each Owner's share of the Additional Unit Monthly Coal Requirement shall be separately converted into a dollar amount by using the average cost per ton of coal in such Owner's fuel in stock at the close of such month and such dollar amount will then be credited to such Owner's fuel in stock and charged to such Owner's fuel consumed.

(iii) The Additional Unit Monthly Fuel Handling Costs will be divided between Buckeye and AEP GenCo in the same ratio for each month as Buckeye's Additional Unit Monthly Energy and AEP GenCo Additional Unit Monthly Energy, respectively, bear to the total Net Generation of Buckeye's Additional Unit for such month. Each Owner's fuel consumed will be charged at the close of such month with each Owner's share of the Additional Unit Monthly Fuel Handling Costs.

(c) Fuel oil reserves will be accounted for in the same manner as coal stock, and fuel oil consumed will be charged to the Owners in the same manner as coal consumed, by converting the quantities and costs of such fuel oil to the basis of equivalent tons of coal.

(d) If the Owners elect to allocate all costs with respect to fuel supply for the Cardinal Station collectively for the Cardinal Station, rather than separately for the Initial Cardinal Station and the Additional Cardinal Station, then, unless the Owners mutually agree otherwise, fuel supply will be accounted for and charged to the Owners, and Fuel Handling Costs will be allocated, in the same manner as for Consumables and Consumable Handling Costs, respectively, as set forth in Section 7.3(c).

7.3. The allocation of all costs with respect to a particular Consumable for the Cardinal Station shall be allocated to the units deemed by the Operating Company to be consuming such Consumable and accounted for as follows:

- (a) For each inventoried Consumable, a separate Consumables in stock account shall be established for the Initial Cardinal Station and the Additional Cardinal Station unless the Owners have agreed to account for any Consumable collectively for the Cardinal Station, rather than separately for the Initial Cardinal Station and the Additional Cardinal Station.
- (b) Each Consumable stock will be accounted for in the same manner as coal stock, each Consumable consumed will be charged to the Owners in the same manner as coal consumed, and Consumable Handling Costs will be allocated to each Owner in the same manner as fuel handling costs, except as provided in subsections (c) and (d) below.
- (c) If the Owners elect to account for any Consumable collectively for the Cardinal Station, rather than separately for the Initial Cardinal Station and the Additional Cardinal Station, such Consumable will be accounted for and charged to the Owners, and Consumable Handling Costs will be allocated, as follows:

- (i) All such Consumable delivered to each Owner during a calendar month shall be charged to such Owner's applicable Consumable in stock

at either the average delivered unit cost of all such Consumable delivered to the Cardinal Station during such month or, if the delivered unit cost of such Consumable is different for each Owner, at the average delivered unit cost for such Owner of such Consumable delivered to the Cardinal Station during such month, and, in addition, each Owner's applicable Consumable in stock shall be charged in each month with the total unloading costs for such Consumable incurred by Operating Company for such month in the ratio of tons of such Consumable delivered for each Owner. Each Owner's applicable Consumable in stock shall also be charged in each month with the total storage costs for such Consumable incurred by Operating Company in such month in the ratio of tons of such Consumable in stock for each Owner at the end of such month.

- (ii) The applicable Cardinal Station Monthly Consumable Requirement shall be divided between Buckeye and AEP GenCo in the same ratio for each month as the portions of Buckeye's Monthly Energy and AEP GenCo's Monthly Energy allocated to the units consuming such Consumable, respectively, bear to the Total Net Generation of such units for such month. Each Owner's share of the applicable Cardinal Station Monthly Consumable Requirement shall be separately converted into a dollar amount by using the average cost per ton of such Consumable in such Owner's Consumable in stock at the close of such month and such dollar amount will then be credited to such Owner's Consumable in stock and charged to such Owner's Consumable consumed.

- (iii) The Consumable Handling Costs will be divided between Buckeye and AEP GenCo in the same ratio for each month as the portions of Buckeye's Monthly Energy and AEP GenCo's Monthly Energy allocated to the units consuming such

Consumable, respectively, bear to the Total Net Generation of such units for such month. Each Owner's Consumable consumed will be charged at the close of such month with each Owner's share of the Consumable Handling Costs.

- (d) If a particular Consumable is accounted for separately for the Initial Cardinal Station and the Additional Cardinal Station, at such time, if any, as only Buckeye's Initial Unit or AEP GenCo's Initial Unit, but not both Initial Units, is using and/or producing such Consumable:

- (i) The applicable Initial Units Monthly Consumable Requirement shall be divided between Buckeye and AEP GenCo in the same ratio for each month as Buckeye's take of energy from such unit for such month and AEP GenCo's take of energy from such unit for such month, respectively, bear to the Total Net Generation of such unit for such month. Each Owner's share of the applicable Initial Units Monthly Consumable Requirement shall be separately converted into a dollar amount by using the average cost per ton of such Consumable in such Owner's Consumable in stock at the close of such month and such dollar amount will then be credited to such Owner's Consumable in stock and charged to such Owner's Consumable consumed.

- (ii) The Initial Units Monthly Consumable Handling Costs will be divided between Buckeye and AEP GenCo in the same ratio for each month as Buckeye's take of energy from such unit for such month and AEP GenCo's take of energy from such unit for such month, respectively, bear to the Total Net Generation of such unit for such month. Each Owner's Consumable consumed will be charged at the close of such month with each Owner's share of the Initial Units Monthly Consumable Handling Costs.

- (c) If, with respect to any Consumable, there is a measurable difference in the rate per kilowatt-hour of consumption of such Consumable by any unit or units, the Owners shall adjust the allocations described in this Section 7.3 relating to such Consumable accordingly.

7.4. The Cardinal Station Monthly Maintenance Cost will be divided between Buckeye and AEP GenCo in the same ratio for each month as Buckeye's Monthly Energy and AEP GenCo's Monthly Energy, respectively, bear to the Total Net Generation of the Cardinal Units for such month; provided, however, that a recomputation shall be made on a running twelve-months average basis which will divide the aggregate Cardinal Station Monthly Maintenance Cost for such twelve month period between Buckeye and AEP GenCo in the same ratios for such twelve month period as Buckeye's Monthly Energy and AEP GenCo's Monthly Energy, respectively, bear to the Total Net Generation of the Cardinal Units for such period, and an appropriate credit or charge will be made to each Owner to adjust the aggregate of such Owner's twelve month charges hereunder over such twelve month period to conform with the recomputation on such twelve months basis. Any proceeds of insurance received by either Owner in respect of any item of expense constituting maintenance expense included or includible in the Cardinal Station Monthly Maintenance Cost for any month shall be credited thereto in the month in which such proceeds are received.

- 7.5. The Cardinal Station Monthly Prorated Capacity Cost will be divided between the Owners so that Buckeye's share will be in the ratio for each month of (a) 115% of Buckeye's

Total Cardinal Station Capacity Reservation to (b) the then Total Net Capability of the Cardinal Units, and AEP GenCo's share will be the balance.

7.6. Pursuant to the Federal Energy Regulatory Commission (herein called "Commission") Final Rule and Clarification of Policy Statement, issued April 26, 1995, in Docket No. PL95-1-000, whenever reference is made to costs of energy under this Agreement, such costs will be understood to include the costs of consumed emission allowances, if any, incurred by the Owners.

Emission allowance cost recovery will be governed by the following provisions.

- a) The Owners will use the most current Market Price Index published by the Cantor-Fitzgerald Environmental Brokerage Services to establish the replacement cost of emission allowances each month.
- b) The Owners intend to monitor the performance of the Cantor-Fitzgerald Environmental Brokerage Service and other indicators of emission allowance market value, and reserve the right with mutual agreement to change their selection of such indicator, subject to acceptance by the Commission.
- b) The Owners will reimburse each other for emission allowances by in-kind transfer of allowances. The Owner(s) must deliver such allowances not later than a date sufficient to allow the other party to submit such allowances to the Federal Environmental Protection Agency (herein called "EPA"). Based on present EPA requirements, the Owners will need to provide such in-kind settlement by January 20<sup>th</sup> of the year following any transactions.
- c) The generating unit(s) used to compute the number of emission allowances consumed for a transaction will be the same unit(s) used to determine the out-of-pocket costs associated with the energy supplied pursuant to the Station Agreement.
- d) The Owners will round fractional amounts of allowances as follows:  
From 0.001 – 0.499 will be rounded to 0  
From 0.500 – 0.999 will be rounded to 1

#### ARTICLE EIGHT - OPERATION OF CARDINAL STATION.

8.1. The Cardinal Station shall be operated and maintained by Operating Company as a single station in accordance with good commercial practices, employed in a manner consistent with the operating procedures employed by AEP GenCo at the AEP GenCo Generating Stations, and otherwise in conformity with the terms and conditions of this Agreement, the Network Integration Transmission Service Agreement, the Network Operating Agreement, and the AEP OAIT.

8.2. The entitlement of AEP GenCo and Buckeye in and to the use of the Total Net Capability of the Cardinal Station shall be determined as follows:

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(a) Buckeye shall be entitled at any time to that portion of the generating capacity then available at the Cardinal Station to the extent required to supply the total amount of the Buckeye Power Requirement at such time, up to a maximum entitlement equal to 86.9363% of the total Buckeye's Contractual Net Capability of Buckeye's Initial Unit and Buckeye's Additional Unit.

(b) AEP GenCo shall be entitled at any time to that portion of the generating capacity then available at the Cardinal Station in excess of the entitlement of Buckeye thereto at such time, subject, however, to the rights of Buckeye to receive therefrom Back-up Energy as provided in Article Nine of this Agreement.

8.3. In each hour during the term of this Agreement there shall be delivered hereunder at the Cardinal Station's high voltage busses for the account of Buckeye, to the extent that the total output of electric power by the Cardinal Station in such hour shall be sufficient for that purpose and otherwise subject to the provisions of this Agreement, that number of kilowatts of electric power equal to the lesser of (a) Buckeye's Total Cardinal Station Capacity Reservation, or (b) the Buckeye Cardinal Hourly Demand for such hour. Operating Company shall operate the Cardinal Station in accordance with the provisions set forth in Section 8.4.

8.4. (a) AEP GenCo and Buckeye agree that the Cardinal Units shall be loaded in any hour as directed by AEP GenCo, between the minimum and maximum operating limits set forth in this Section and insofar as it may be physically possible to do so consistent with good and safe commercial practice according to principles of economic dispatch employed by AEP GenCo at the AEP GenCo Generating Stations, as if the Buckeye Units were other AEP GenCo Generating Stations.

(b) When operating the Cardinal Units and the AEP GenCo Generating Stations according to principles of economic dispatch, AEP GenCo will have the option in its discretion to provide Economic Dispatch Energy in order to satisfy all or a portion of Buckeye's Monthly Energy provided that Buckeye's Units were available and could have supplied that energy from their Total Net Available Capability. AEP GenCo's election to provide Economic Dispatch Energy shall not adversely affect or disadvantage Buckeye in any way under this Agreement.

(c) Buckeye shall pay AEP GenCo for Economic Dispatch Energy furnished in any month an amount equal to the product of (i) the total kilowatt-hours of such Economic Dispatch Energy for such month, and (ii) Buckeye's Units Average Fuel, Consumables and Maintenance Cost. Economic Dispatch Energy, as determined for each hour, shall be accumulated and billed on a calendar month basis.

(d) The maximum operating limit of each of the Cardinal Units shall be equal to the Total Net Available Capability of such unit. The minimum operating limit of each of the Cardinal Units shall be the lowest level of operation that insures stability of combustion in the steam generator of such unit at low firing rates.

8.5. Energy generated each month by Buckeye's Units, in accordance with the provisions of Section 8.4 shall be allocated between Buckeye and AEP GenCo as follows:

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(a) Buckeye's Initial Unit Monthly Energy for any month shall be determined by multiplying (i) Buckeye's total energy requirement associated with the Buckeye Power Requirement for such month (adjusted to the high voltage buses at the Cardinal Station) less Back-up Energy, if any, less Replacement Energy, if any, by (ii) the ratio of the Total Net Generation of Buckeye's Initial Unit for that month to the sum of the Total Net Generation of Buckeye's Units for such month.

(b) Buckeye's Additional Unit Monthly Energy for any month shall be determined by multiplying (i) Buckeye's total energy requirement associated with the Buckeye Power Requirement for such month (adjusted to the high voltage buses at the Cardinal Station) less Back-up Energy, if any, less Replacement Energy, if any, by (ii) the ratio of the Total Net Generation of Buckeye's Additional Unit for that month to the sum of the Total Net Generation of Buckeye's Units for such month.

(c) AEP GenCo's allocation of energy from Buckeye's Initial Unit for any month shall be determined by deducting Buckeye's Initial Unit Monthly Energy for that month from the Total Net Generation of Buckeye's Initial Unit for such month.

(d) AEP GenCo's allocation of energy from Buckeye's Additional Unit for any month shall be determined by deducting Buckeye's Additional Unit Monthly Energy for that month from the Total Net Generation of Buckeye's Additional Unit for such month.

8.6. Except as set forth below, Buckeye will not schedule any hourly electric power or energy from an additional source or sources in any amount that would result in Buckeye's Units being loaded at less than their then available hourly minimum load capability as such capability is determined in accordance with good commercial operating practices. If, consistent with good and safe commercial practice according to principles of economic dispatch employed by AEP GenCo at the AEP GenCo Generating Stations, as if the Buckeye Units were other AEP GenCo Generating Stations, AEP GenCo places one or both of Buckeye's Units on reserve shutdown, but such units remain available to generate electricity, then Buckeye may, but shall not be required to, elect, after the 72nd hour in shutdown, upon notice given at least two hours prior to the PJM day-ahead scheduling deadline for the hour such election is to become effective, to reduce the amount of electric output that it is entitled to receive, and that AEP GenCo has the obligation to deliver, under this Agreement to an amount that is no less than the then available hourly minimum load capability, as such capability is determined in accordance with good commercial operating practices, and no more than the Total Net Capability, of Buckeye's Units that are available to generate electricity and which are not then placed on reserve shutdown by AEP GenCo, provided that if Buckeye makes this election, such reduction shall remain in effect for the lesser of (a) the remainder of the period that Buckeye's Initial Unit or Buckeye's Additional Unit, or both, is placed in reserve shutdown by AEP GenCo, or (b) the effective date of Buckeye's election to revoke the reduction made by Buckeye in accordance with this paragraph, which effective date shall be not less than 30 days after the date that Buckeye provides notice to AEP GenCo of Buckeye's election to revoke Buckeye's reduction; provided, further, that the number of hours of the period of such reduction shall not be considered for purposes of determining the number of kilowatt-hours that AEP GenCo is obligated to supply Back-Up Energy to Buckeye under Section 9.2(a). If Buckeye does not elect to reduce the amount of electric output that it is entitled to receive, and that AEP GenCo has the obligation to deliver, under this Agreement, or if Buckeye revokes, upon no less than 30 days advance notice

to AEP GenCo, a reduction previously made by Buckeye in accordance with this paragraph, during periods when AEP GenCo has placed one or both of Buckeye's Units on reserve shutdown, then Buckeye's entitlement to the electric output of the Cardinal Station, and AEP GenCo's obligation to provide such output, either from Buckeye's Units or as Back-up Energy (from the Buckeye unit, if any, not placed on reserved shutdown), or as Economic Dispatch Energy (from the Buckeye unit or units placed on reserved shutdown), under this Agreement shall not be reduced, and Buckeye's Units placed on reserve shutdown shall be deemed available to generate electricity for all purposes of this Agreement.

#### ARTICLE NINE. - BACK-UP OF BUCKEYE POWER REQUIREMENTS.

9.1. In order to assure that the Buckeye Power Requirement may be supplied upon a basis which shall be as reliable as may reasonably be provided, AEP GenCo agrees to deliver Back-up Energy upon the terms and conditions set forth in this Article Nine.

9.2. Back-up Energy shall be provided by AEP GenCo as follows:

(a) AEP GenCo shall furnish Back-up Energy, to the full extent that it backs up firm contract demands of its own customers, during such period or periods of time during any calendar year when the capability of Buckeye's Initial Unit and/or Buckeye's Additional Unit shall be curtailed and/or Buckeye's Initial Unit and/or Buckeye's Additional Unit shall be removed from service, for any reason, including preventative maintenance and/or repairs, shortages of fuels, or as a result of laws and/or rules and regulations affecting emissions of pollutants, discharge of wastes or other environmental conditions, and no capacity charge shall be payable by Buckeye to AEP GenCo for Back-up Energy furnished pursuant to the provisions of this subsection (a); provided, however, that in no event shall AEP GenCo be obligated to supply Back-up Energy during any one calendar year which in the aggregate exceeds a number of kilowatt-hours of energy equal to the sum of (A) the product of (i) 0.130435, (ii) Buckeye's Contractual Net Capability of Buckeye's Initial Unit, and (iii) 8,760 hours, reduced as set forth in Section 8.6, and (B) the product of (i) 0.130435, (ii) Buckeye's Contractual Net Capability of Buckeye's Additional Unit, and (iii) 8,760 hours, reduced as set forth in Section 8.6, except that when in any calendar year the Back-up Energy furnished by AEP GenCo to Buckeye shall aggregate a number of kilowatt-hours that is less than the sum of (A) and (B) above, the deficiency shall be carried forward to the succeeding calendar year and added to the amount of Back-up Energy which AEP GenCo shall be obligated, if required, to furnish in such year, and any such amount of Back-up Energy not being so supplied by AEP GenCo in such subsequent year shall be similarly carried forward into the next succeeding calendar year until such deficiency shall have been exhausted. For purposes of the immediately preceding proviso, with respect to calendar year 2012 in which the initial term of this Agreement expires and each calendar year thereafter during the term of this Agreement:

(1) the period from January 1, 2012 through September 30, 2012, and the period from October 1, 2012 through December 31, 2012, will each be considered a "year",

(2) for the period from January 1, 2012 through September 30, 2012, the quantity (A) above shall equal the product of (i) 0.130435, (ii) Buckeye's Contractual Net

Capability of Buckeye's Initial Unit, and (iii) 6,576 hours, reduced as set forth in Section 8.6, and the quantity (B) above shall equal the product of (i) 0.130435, (ii) Buckeye's Contractual Net Capability of Buckeye's Additional Unit, and (iii) 6,576 hours, reduced as set forth in Section 8.6;

(3) for the period from October 1, 2012 through December 31, 2012, the quantity (A) above shall equal the product of (i) 0.130435, (ii) Buckeye's Contractual Net Capability of Buckeye's Initial Unit, (iii) 2,208 hours, reduced as set forth in Section 8.6 and (iv) the Equivalent Availability Factor of Buckeye's Units for the period from January 1, 2012 to December 31, 2012, and the quantity (B) above shall equal the product of (i) 0.130435, (ii) Buckeye's Contractual Net Capability of Buckeye's Additional Unit, (iii) 2,208 hours, reduced as set forth in Section 8.6 and (iv) the Equivalent Availability Factor of Buckeye's Units for the period from January 1, 2012 to December 31, 2012;

(4) for each calendar year commencing on and after January 1, 2013, the quantity (A) above shall equal the product of (i) 0.130435, (ii) Buckeye's Contractual Net Capability of Buckeye's Initial Unit, (iii) 8,760 hours, reduced as set forth in Section 8.6, and (iv) the Equivalent Availability Factor of Buckeye's Units for such calendar year, and the quantity (B) above shall equal the product of (i) 0.130435, (ii) Buckeye's Contractual Net Capability of Buckeye's Additional Unit, (iii) 8,760 hours, reduced as set forth in Section 8.6, and (iv) the Equivalent Availability Factor of Buckeye's Units for such calendar year;

(5) the deficiency carried forward to October 1, 2012 will be reduced to 1.4 billion kilowatthours and any amount in excess of 1.4 billion kilowatthours existing on October 1, 2012, and all rights and obligations of the parties with respect thereto, shall become null and void as of that date, so that the amount of Back-Up Energy which AEP GenCo shall be obligated, if required, to furnish for the period October 1, 2012 through December 31, 2012 shall equal 1.4 billion kilowatthours, plus the sum of (A) and (B) as determined above, for the period October 1, 2012 through December 31, 2012, and any deficiency for that period and for each calendar year thereafter shall be carried forward to the succeeding calendar year and added to the amount of Back-up Energy which AEP GenCo shall be obligated, if required, to furnish in such year, and any such amount of Back-up Energy not being so supplied by AEP GenCo in such subsequent year shall be similarly carried forward into the next succeeding calendar year until such deficiency shall have been exhausted.

(b) Buckeye shall pay AEP GenCo for Back-up Energy furnished in any month an amount equal to the product of (i) the total kilowatthours of such Back-up Energy for such month, and (ii) Buckeye's Units Average Fuel, Consumables and Maintenance Cost.

(c) Back-up Energy, for any hour, shall be equal to the amount by which the lesser of (i) Buckeye Cardinal Hourly Demand or (ii) Buckeye's Total Cardinal Station Capacity Reservation, exceeds the Total Net Available Capability of Buckeye's Units for such hour. Back-up Energy, as determined for each hour, shall be accumulated and billed on a calendar month basis.

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(d) In the event that, during any hour, in any calendar year (i) the capability of Buckeye's Initial Unit and/or Buckeye's Additional Unit shall be curtailed, and/or Buckeye's Initial Unit and/or Buckeye's Additional Unit shall be removed from service for any reason, including preventative maintenance and/or repairs, shortages of fuels, or as a result of laws and/or rules and regulations affecting emissions of pollutants, discharge of wastes, or other environmental conditions, and (ii) AEP GenCo shall not at such time be obligated to furnish Back-up Energy pursuant to the provisions of subsection (a) of this Section 9.2, AEP GenCo shall, to the extent that it determines that it has electric power and energy available from its own sources or can obtain electric power and energy from systems with which it is directly or indirectly interconnected, supply Replacement Energy to the extent required to supply, in addition to other power and energy then supplied by AEP GenCo to Buckeye under this Agreement, the Buckeye Power Requirement, and Buckeye shall pay to AEP GenCo for such Replacement Energy, the PJM market price for energy for such hour (currently the PJM locational marginal price or LMP) and any additional out of pocket costs which AEP GenCo reasonably incurs in supplying such power and energy for such hour, including charges under the AEP OATT, delivered to the Cardinal Station's high voltage busses or such other delivery point(s) as Buckeye and AEP GenCo shall mutually agree, and no capacity charge shall be payable by Buckeye to AEP GenCo for Replacement Energy furnished pursuant to the provisions of this subsection (d).

(e) Replacement Energy, for any hour in which AEP GenCo is not obligated to furnish Back-up Energy, shall, if AEP GenCo supplies Replacement Energy, be equal to the amount by which the lesser of (i) Buckeye Cardinal Hourly Demand or (ii) Buckeye's Total Cardinal Station Capacity Reservation, exceeds the Total Net Available Capability of Buckeye's Units for such hour. Replacement Energy, as determined for each hour, shall be accumulated and billed on a calendar month basis.

(f) In the event that, pursuant to the provisions of subsection (a) of this Section 9.2, it is determined that, for any calendar year, AEP GenCo is not obligated to provide Back-up Energy for all or any part of such calendar year, the amount of Back-up Energy that AEP GenCo is obligated to provide for such calendar year shall be applied beginning with the first hour of January 1 of such calendar year and applied thereafter to each immediately succeeding hour until AEP GenCo's obligation to provide Back-up Energy for such calendar year is satisfied. Replacement Energy shall be provided beginning with the first hour of such calendar year after AEP GenCo's obligation to provide Back-up Energy for such calendar year is satisfied and applied thereafter to each immediately succeeding hour until AEP GenCo's obligation to provide Replacement Energy is satisfied.

9.3. If Buckeye's Initial Unit or Buckeye's Additional Unit is out of service during any hour the auxiliary power requirements, if any, for such unit shall be deemed to have been supplied for such hour from the remaining Buckeye Unit if such unit is in service during such hour and from the AEP GenCo Back-up Stations if both Buckeye Units are out of service during that hour.

9.4. In addition to any amounts to be paid by Buckeye pursuant to this Article Nine, Buckeye shall pay to AEP GenCo an amount in dollars sufficient to reimburse AEP GenCo for any amounts paid or payable by it as sales, excise or similar taxes (other than taxes based on or

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measured by net income) in respect of the total amounts paid by Buckeye hereunder and to enable AEP GenCo, after provision for such taxes, to realize the net amounts payable by Buckeye as herein provided.

9.5. As soon as practical after the end of any month in which any Back-up Energy, and/or Replacement Energy, is provided hereunder for which Buckeye is required to pay AEP GenCo, a statement in respect thereof will be rendered to Buckeye by Operating Company on behalf of AEP GenCo. AEP GenCo shall furnish Operating Company such computations as shall be necessary to permit Operating Company to prepare such statement. Buckeye shall pay AEP GenCo within fifteen (15) days after the receipt of such statement the amount charged therein. Interest shall be charged by AEP GenCo to Buckeye at the rate of 6% per annum on any overdue amount.

#### ARTICLE TEN - ENTITLEMENT TO CAPACITY CREDITS AND ANCILLARY SERVICES.

10.1. (a) Unless the Owners mutually agree otherwise, Capacity Credits shall be allocated between AEP GenCo and Buckeye as follows: (i) Capacity Credits associated with AEP GenCo's Initial Unit shall be allocated 100% to AEP GenCo, (ii) Capacity Credits associated with Buckeye's Initial Unit shall be allocated to Buckeye in an amount equal to Buckeye's Initial Cardinal Station Capacity Reservation (such Capacity Reservation determined, however, as an amount equal to 86.9565% of the average Total Net Capacity of Buckeye's Initial Unit as determined in accordance with the procedure set forth in Appendix C hereto for the period in which the capability of Buckeye's Initial Unit is determined for PJM purposes, rather than for the then effective AEP GenCo Maximum Peak Requirement Quarter), and the remainder shall be allocated to AEP GenCo, and (iii) Capacity Credits associated with Buckeye's Additional Unit shall be allocated to Buckeye in an amount equal to Buckeye's Additional Unit Capacity Reservation (such Capacity Reservation determined, however, as an amount equal to 86.9565% of the average Total Net Capacity of Buckeye's Additional Unit as determined in accordance with the procedure set forth in Appendix C hereto for the period in which the capability of Buckeye's Additional Unit is determined for PJM purposes, rather than for the then effective AEP GenCo Maximum Peak Requirement Quarter), and the remainder shall be allocated to AEP GenCo. AEP GenCo shall be responsible for ensuring that such allocated Capacity Credits are deposited into Buckeye's and AEP GenCo's respective PJM accounts prior to each year's PJM capacity auction (currently referred to by PJM as the Base Residual Auction or BRA).

(b) In the event that the Capacity Credits allocated to Buckeye's Initial Unit in any PJM planning year based upon the availability of Buckeye's Initial Unit (currently referred to by PJM as UCAP) is greater than the Capacity Credits allocated to Buckeye's Initial Unit in such year based upon Buckeye's Initial Cardinal Station Capacity Reservation, as determined in accordance with subsection (a) of this Section 10.1, then Buckeye shall be entitled to a number of dollars of banked Capacity Credits equal to such excess, expressed in megawatts, multiplied by the price, expressed in dollars per megawatt-day, multiplied by the number of days in the applicable PJM planning year, for available capacity in such year (currently referred to by PJM as Reliability Pricing Model or RPM capacity), which banked Capacity Credits dollars may, together with any previously banked Capacity Credits dollars, including banked Capacity Credits

dollars described in subsections (c) and (f) of this Section 10.1, be used by Buckeye to satisfy its requirement, if any, to reimburse AEP GenCo for deficit Capacity Credits as described in subsections (d) and (e) of this Section 10.1.

(c) In the event that the Capacity Credits allocated to Buckeye's Additional Unit in any PJM planning year based upon the availability of Buckeye's Additional Unit is greater than the Capacity Credits allocated to Buckeye's Additional Unit in such year based upon Buckeye's Additional Unit Capacity Reservation, as determined in accordance with subsection (a) of this Section 10.1, then Buckeye shall be entitled to a number of dollars of banked Capacity Credits equal to such excess, expressed in megawatts, multiplied by the price, expressed in dollars per megawatt-day, multiplied by the number of days in the applicable PJM planning year, for available capacity in such year (currently referred to by PJM as Reliability Pricing Model or RPM capacity), which banked Capacity Credits dollars may, together with any previously banked Capacity Credits dollars, including banked Capacity Credits dollars described in subsections (b) and (f) of this Section 10.1, be used by Buckeye to satisfy its requirement, if any, to reimburse AEP GenCo for deficit Capacity Credits as described in subsections (d) and (e) of this Section 10.1.

(d) In the event that the Capacity Credits allocated to Buckeye's Initial Unit in any PJM planning year based upon the availability of Buckeye's Initial Unit is less than the Capacity Credits allocated to Buckeye's Initial Unit in such year based upon Buckeye's Initial Cardinal Station Capacity Reservation, as determined in accordance with subsection (a) of this Section 10.1, then Buckeye shall be required to pay AEP GenCo an amount in dollars equal to the product of (i) the number of megawatts of such deficit Capacity Credits, and (ii) the price, expressed in dollars per megawatt-day, multiplied by the number of days in the applicable PJM planning year, for available capacity in such year (currently referred to by PJM as Reliability Pricing Model or RPM capacity). Buckeye shall use banked Capacity Credits dollars to satisfy its obligations under this subsection (d). In the event that there are insufficient banked Capacity Credits dollars to satisfy its obligations under this subsection (d), Buckeye may supply such deficit Capacity Credits directly to PJM rather than making a payment to Ohio.

(e) In the event that the Capacity Credits allocated to Buckeye's Additional Unit in any PJM planning year based upon the availability of Buckeye's Additional Unit is less than the Capacity Credits allocated to Buckeye's Additional Unit in such year based upon Buckeye's Additional Unit Capacity Reservation, as determined in accordance with subsection (a) of this Section 10.1, then Buckeye shall be required to pay AEP GenCo an amount in dollars equal to the product of (i) the number of megawatts of such deficit Capacity Credits, and (ii) the price, expressed in dollars per megawatt-day multiplied by the number of days in the applicable PJM planning year, for available capacity in such year. Buckeye shall use banked Capacity Credits dollars to satisfy its obligations under this subsection (e). In the event that there are insufficient banked Capacity Credits dollars to satisfy its obligations under this subsection (e), Buckeye may supply such deficit Capacity Credits directly to PJM rather than making a payment to Ohio.

(f) Effective June 1, 2015, Buckeye shall be allocated \$3,000,000 of banked Capacity Credits based upon the historic availability of Buckeye's Units prior to such date.

(g) The Owners have agreed upon the allocation of Capacity Credits through May 31, 2015 pursuant to the PJM Services and Cost Allocation Agreement, dated as of November 14, 2013, by and between AEP GenCo and Buckeye, and such agreement supersedes the default allocation provided for under this Section 10.1 for the period through May 31, 2015.

10.2. Unless the Owners mutually agree otherwise, Ancillary Services shall be allocated to the Owner from whose entitlement to the capacity and energy of Cardinal Station such Ancillary Service was generated or produced. With respect to any Ancillary Service produced by Cardinal Station that cannot be clearly identified as generated or produced from the entitlements of the Owners to the capacity and energy of Cardinal Station, then such Ancillary Service will be allocated as follows: (a) such Ancillary Service associated with Buckeye's Initial Unit shall be allocated 100% to AEP GenCo, (b) such Ancillary Service associated with Buckeye's Initial Unit shall be allocated 86.9565% to Buckeye and the remainder shall be allocated to AEP GenCo, and (c) such Ancillary Service associated with Buckeye's Additional Unit shall be allocated 86.9565% to Buckeye and the remainder shall be allocated to AEP GenCo. The Owners have agreed upon the allocation of Ancillary Services through May 31, 2015 pursuant to the PJM Services and Cost Allocation Agreement, dated as of November 14, 2013, by and between AEP GenCo and Buckeye, and such agreement supersedes the default allocation provided for under this Section 10.2 for the period through May 31, 2015.

#### ARTICLE ELEVEN - DELIVERY SERVICE.

11.1. AEP GenCo will deliver, and Buckeye will receive, at the Cardinal Station's high-voltage busses all electric power and energy (including all related Ancillary Services) which Buckeye is entitled to receive under this Agreement. Buckeye will make arrangements for that transmission of such power and energy to delivery points established by Buckeye for that purpose from time to time. AEP GenCo will cooperate with Buckeye in establishing delivery points for such power and energy in accordance with the terms of this Agreement, the AEP OATT, and applicable law.

11.2. (a) In order to provide for the sale of power, and the energy related thereto, by the Buckeye Members, at wholesale, or by Buckeye, at wholesale to customers other than the Buckeye Members, Buckeye Bulk Power Delivery Points may be established in accordance with the AEP OATT and applicable law.

(b) Buckeye may, by giving AEP GenCo such reasonable notice as shall be mutually agreed upon by the parties, consistent with the standards and practices of the applicable transmission provider under the AEP OATT, schedule hourly amounts of power to be delivered by AEP GenCo or on AEP GenCo's behalf by the applicable transmission provider under the AEP OATT at the Buckeye Bulk Power Delivery Points. The parties shall take all steps necessary to minimize deviations between actual and scheduled deliveries of such power and energy.

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(c) Buckeye Additional Scheduled Delivery Points Hourly Demand for any hour shall mean the total number of kilowatts of demand scheduled for such hour by Buckeye for delivery in accordance with the provisions of Subsection (b) of this Section to the Buckeye Bulk Power Delivery Points. In the event scheduled service to any of the Buckeye Bulk Power Delivery Points is interrupted or affected in any hour for any reason, so that the total number of kilowatts of power scheduled for delivery to such Buckeye Bulk Power Delivery Points for such hour cannot be delivered, the Buckeye Additional Scheduled Delivery Points Hourly Demand at such Buckeye Bulk Power Delivery Points shall equal that portion of the scheduled amounts of power which can be delivered, or were delivered pursuant to a revised schedule, in such hour.

(d) For all purposes of this Agreement, Buckeye Additional Scheduled Delivery Points Hourly Demand shall be considered to be included in the Buckeye Cardinal Hourly Demand.

(e) The amounts of power and the associated amounts of energy scheduled for delivery in accordance with the provisions of Subsection 11.2(b) hereinabove to the Buckeye Bulk Power Delivery Points shall, for all purposes of this Agreement, be considered a portion of the Buckeye Power Requirement.

11.3. Nothing contained in this Agreement shall be construed to restrict, limit or waive, directly or by implication, any rights which Buckeye may have under the AEP OATT or applicable law with respect to the establishment of delivery points for the receipt of any power and energy (including any related Ancillary Services) that Buckeye may be entitled to under this Agreement.

#### ARTICLE TWELVE - FUNCTIONS OF OPERATING COMPANY.

12.1. Operating Company shall operate and maintain the Cardinal Station in accordance with the provisions of this Agreement and in conformity with the provisions of the Network Integration Transmission Service Agreement, the Network Operating Agreement, and the AEP OATT. In operating and maintaining the Cardinal Station as aforesaid, Operating Company shall act without compensation and only as agent for the Owners. All funds received and disbursements made by Operating Company in connection with the operation and obligations of the Cardinal Station shall be for the account of the Owners as their interests and obligations shall appear hereunder.

12.2. Each Owner has purchased at the par value thereof 250 shares of capital stock of Operating Company, representing 50% of the authorized number of such shares. Neither Owner shall sell, assign or otherwise dispose of its share interest in Operating Company except as an entirety to a successor or substantially all its assets, property and business or to the Trustees, or for cash in the amount of the par value thereof or, in the case of Buckeye, to the Trustees, or either of them, under the Buckeye Mortgage. In the event that (i) AEP GenCo desires to sell AEP GenCo's Initial Unit and/or assign its interest in this Agreement to a person or entity that is not an affiliate of American Electric Power Company, Inc., or (ii) there is a material breach of this Agreement by AEP GenCo, including, but not limited to, a failure by AEP GenCo to provide Back-up Energy to Buckeye in accordance with Article Nine of this Agreement, AEP GenCo shall sell, at par value thereof, 83 of its shares of capital stock of Operating Company to Buckeye

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prior to selling its remaining 167 shares of capital stock of Operating Company to such person or entity and prior to consummating any such sale of AEP GenCo's Initial Unit and/or assignment of AEP GenCo's interest in this Agreement so that Buckeye shall own 2/3 of the outstanding capital stock of Operating Company prior to the consummation of any such sale and/or assignment.

12.3. Each Owner shall be entitled to designate such number of nominees for election as directors of Operating Company as shall represent one-half of the authorized number of such directors and shall also be entitled to designate nominees for election to succeed any director previously nominated by it and elected as contemplated hereby. Each Owner agrees that, in any election of directors of Operating Company, including the election of directors to fill vacancies from time to time existing on the Board of Directors of Operating Company, it will vote the shares of capital stock of Operating Company owned by it for the election of the nominees designated by the other Owner to the end that the Board of Directors of Operating Company shall at all times consist equally of directors nominated by the respective Owners. In the event that (i) AEP GenCo desires to sell AEP GenCo's Initial Unit and/or assign its interest in this Agreement to a person or entity that is not an affiliate of American Electric Power Company, Inc., or (ii) there is a material breach of this Agreement by AEP GenCo, including, but not limited to, a failure by AEP GenCo to provide Back-up Energy to Buckeye in accordance with Article Nine of this Agreement, and AEP GenCo sells 83 of its shares of capital stock of Operating Company to Buckeye so that Buckeye owns 2/3 of the outstanding capital stock of Operating Company in accordance with Section 12.2 of this Agreement, Buckeye shall be entitled to designate such number of nominees for election as directors of Operating Company as shall represent two-thirds of the authorized number of such directors and shall also be entitled to designate nominees for election to succeed any director previously nominated by it and elected as contemplated hereby, and each Owner agrees that, in any election of directors of Operating Company, including the election of directors to fill vacancies from time to time existing on the Board of Directors of Operating Company, it will vote the shares of capital stock of Operating Company owned by it for the election of the nominees designated by the other Owner to the end that the Board of Directors of Operating Company shall at all times consist of directors nominated two-thirds by Buckeye and one-third by the other Owner.

12.4. Operating Company shall keep all necessary books of record, books of account and memoranda of all transactions involving the Cardinal Station and shall make daily, monthly and annual computations and allocations on behalf of the respective Owners as required under this Agreement and the Network Integration Transmission Service Agreement, the Network Operating Agreement, and the AEP OATT. The books of record, books of account and memoranda shall be kept by Operating Company on the same basis for each of the Owners and in such manner as to enable either of them to conform, where so required, to the Uniform System of Accounts, and to the rules and regulations of any regulatory body or bodies having jurisdiction. Upon any sale by AEP GenCo of AEP GenCo's Initial Unit and/or any assignment by AEP GenCo of its interest in this Agreement to any person or entity that is not an affiliate of American Electric Power Company, Inc. or a material breach of this Agreement by AEP GenCo, including, but not limited to, a failure by AEP GenCo to provide Back-up Energy to Buckeye in accordance with Article Nine of this Agreement, and upon the termination of the agreements between American Electric Power Service Corporation, AEP GenCo and Operating Company referred to in Section 12.11 of this Agreement, pursuant to which American Electric Power

Service Corporation and AEP GenCo provide special services to Operating Company relating to the operation of the Cardinal Station, AEP GenCo shall assure the timely, accurate and complete transfer to Operating Company (or its designee) of all books and records, maps, surveys, drawings, contracts, licenses, permits, approvals, manuals, warranties, employee records, and other documents, whether in written or electronic form, in AEP GenCo's possession and/or in the possession of Ohio, American Electric Power Service Corporation, and/or their affiliates relating to the operation of the Cardinal Station and the provision by American Electric Power Service Corporation and AEP GenCo of special services to Operating Company under the agreements referred to in Section 12.11 of this Agreement. In addition, AEP GenCo shall, in such circumstances, reasonably cooperate, and shall assure that its affiliates, including Ohio and American Electric Power Service Corporation, shall reasonably cooperate in the timely transfer and transition of such special services from AEP GenCo and American Electric Power Service Corporation to Operating Company (or its designee), including the transfer and transition of Cardinal Station employees, and their wage and retirement and insurance benefit plans, and the transfer and transition of, among other things, Cardinal Station fuel procurement, environmental permitting, and construction management and contracting responsibilities, from American Electric Power Service Corporation and AEP GenCo to Operating Company (or its designee).

12.5. Operating Company shall perform all necessary invoicing on behalf of the respective Owners as herein provided (whether such invoicing shall be to the other Owner or to a third party) when requested by them so to do.

12.6. Operating Company shall keep the Owners accurately informed (by telephone communication in the case of emergencies) of any operating conditions at the Cardinal Station which may adversely affect its efficiency and reliability as a source of power.

12.7. Operating Company shall maintain the metering equipment at the Cardinal Station. Each Owner may, at its option and expense, install check metering. Operating Company shall make periodic tests and inspections of the meters (in accordance with policy established by the Cardinal Station Operating Committee) and shall adjust the meters as may be necessary to maintain the same at the highest practicable commercial standard of accuracy. Operating Company will advise the Owners promptly of the results of any meter tests. Operating Company will give the Owners notice of all tests and inspections, and the Owners shall be entitled to have representatives present when such tests and inspections are made. Operating Company shall make additional tests of any of the meters at the request of either Owner. If the periodic or additional tests to be made by Operating Company do not show any meter to be less accurate than 1% slow or fast, no correction shall be made in the various information and statements therefore furnished to the Owners hereunder. If any such tests show that a meter is inaccurate by more than 1% slow or fast, corrections shall be made in the information and statements based on readings derived therefrom furnished to the Owners for the previous month and for the elapsed period in the month during which the test was made, or from the date of the latest test if within the previous month.

12.8. Funds required by Operating Company for performance of its functions under this Agreement shall be provided by Buckeye and AEP GenCo in accordance with the provisions of Article Five hereof. Operating Company shall establish such bank accounts as it may from time to time require.

12.9. (a) As soon as practicable after the end of each month, Operating Company shall furnish to Buckeye and to AEP GenCo a statement setting forth in reasonable detail the amounts to be paid by Buckeye and AEP GenCo to or for the account of Operating Company hereunder, including the amounts to be paid by Buckeye to AEP GenCo for Economic Dispatch Energy supplied by AEP GenCo during such month, in accordance with Section 8.4 hereto. Buckeye and AEP GenCo shall pay the amounts respectively to be paid by them within fifteen (15) days after receipt of such statement.

(b) Buckeye and AEP GenCo recognize that as much as fifteen (15) days may be required after the close of each calendar month to assemble all the data required to compute and render a final statement. Accordingly, Operating Company may, at its option, or shall upon request by the Owners, render an estimated statement to the Owners promptly after the close of each month, using the then available data. In such event, any necessary adjustments to conform such estimated statement to the final statement shall be submitted at the time when the estimated statement is rendered for the next succeeding month.

(c) In addition to any amounts required to be paid by them to Operating Company hereunder, Buckeye and AEP GenCo shall pay Operating Company such amounts in dollars as shall be sufficient to reimburse Operating Company for any amounts paid or payable by Operating Company as sales, excise or similar taxes (other than taxes based on or measured by net income) in respect of the total amounts respectively paid by AEP GenCo and Buckeye hereunder and to enable Operating Company, after provision for such taxes, to realize the net amounts payable by AEP GenCo and Buckeye as herein provided.

12.10. Buckeye and AEP GenCo shall have the right, at any reasonable times during the term of this Agreement, and any extensions thereof, and for five years thereafter, to inspect all books, records and accounts pertaining to the operations of Cardinal Station for five years immediately preceding such inspection, and to make such audits thereof as Buckeye and AEP GenCo may deem necessary in their respective interests.

12.11. Operating Company has entered into an agreement dated as of January 1, 1968 with American Electric Power Service Corporation to obtain special services required as an incident to the operation of Cardinal Station. In the event that American Electric Power Service Corporation is no longer able to provide any or all of such special services to Operating Company because of regulatory constraints resulting from the AEP Corporate Separation, AEP GenCo shall enter into an agreement with Operating Company to provide such special services to Operating Company to the extent that American Electric Power Service Corporation is no longer able to provide such special services as a result of the AEP Corporate Separation.

12.12. Operating Company is hereby authorized to obtain materials, labor and such other services as it considers necessary in connection with the performance of the functions to be performed by it hereunder from such sources or through such subagents as it may designate.

12.13. [reserved].

#### ARTICLE THIRTEEN - CARDINAL STATION OPERATING COMMITTEE.

13.1. There is established hereunder a Cardinal Station Operating Committee consisting of five members to exercise the responsibilities specified in Section 13.5 and to perform such other duties as may from time to time be assigned to it by the Board of Directors of Operating Company.

13.2. Each Owner shall appoint two authorized representatives to act as members of the Cardinal Station Operating Committee and shall designate alternates who may act in the absence of such representatives, and each Owner shall, in alternate years, appoint the fifth member, who shall serve as the Committee Chairman. Each Owner shall evidence such appointments by written notice to the other Owner and, by similar notice, either Owner may change its representatives or its alternates on such Committee at any time. Each member of the Cardinal Station Operating Committee may invite one other person, who need not be a member of his or her organization but shall be acting as his personal advisor, to attend certain meetings of the Cardinal Station Operating Committee as such advisor for the purpose of assisting him or her in respect of matters scheduled to be considered thereat by prearranging such attendance with the Committee Chairman.

13.3. The expenses of each member of the Cardinal Station Operating Committee shall be borne by the Owner he or she represents.

13.4. The Cardinal Station Operating Committee shall hold regularly scheduled monthly meetings and may meet at other times upon call of the Chairman of the Committee. Any regularly scheduled meeting of the Committee may be omitted but only by unanimous consent of all members thereof.

13.5. The responsibilities of the Cardinal Station Operating Committee shall include periodic reviews of Cardinal Station operation and performance with the plant manager thereof, including any problems encountered by plant management in connection therewith.

13.6. Operating Company shall make available to the Cardinal Station Operating Committee studies, reports and recommendations received upon the performance of engineering and special services obtained by Operating Company pursuant to Section 12.11 and 12.12.

#### ARTICLE FOURTEEN - TERM OF AGREEMENT.

14.1. This Agreement shall continue for (i) an initial term from the date on which the effective date of Amendment No. 1 to the Station Agreement occurred to and until 11:59:59 p.m. on September 30, 2012; and (ii) thereafter, for an additional term beginning upon the expiration of the initial term as set forth above and continuing until 11:59:59 p.m. on December 31, 2026. Buckeye and AEP GenCo shall commence negotiations in respect of the extension of the additional term, or termination, of this Agreement not less than seven (7) years prior to the end of such additional term.

#### ARTICLE FIFTEEN - GENERAL.

15.1. The parties hereto recognize that this Agreement, the Network Integration Transmission Service Agreement, the Network Operating Agreement, the AEP OATT, and any tariff or rate schedule which shall embody or supersede either, are in certain respects subject to the jurisdiction of the Federal Energy Regulatory Commission under the Federal Power Act, and are subject to such lawful action as any regulatory authority having jurisdiction shall hereafter take with respect thereto. The performance of any obligation of any party hereto shall be subject to the receipt from time to time as required of such authorizations or approvals of regulatory authorities having jurisdiction as shall be required by law.

15.2. AEP GenCo agrees to pay Buckeye for electric service furnished to AEP GenCo by Buckeye and for the right to receive the same, and Buckeye agrees to pay AEP GenCo for electric service furnished to Buckeye and for the right to receive the same, in accordance with the provisions of this Agreement, or any applicable superseding tariff or rate schedule(s) accepted for filing and made effective by such regulatory agency or agencies as shall have jurisdiction in the premises, each of which is incorporated herein by reference thereto, and service under this Agreement, and/or under any such applicable superseding tariff or rate schedule(s) shall be subject to all of the provisions of this Agreement as the same may be changed or modified by any such superseding tariff or rate schedule(s). It is expressly understood that any party hereto shall be entitled, at any time and from time to time, to make application for, or to take other action, to submit for filing to any regulatory agency having jurisdiction in the premises any tariff or rate schedule(s) designed to supersede, in whole or in part, any provision of this Agreement, or of any prior superseding tariff or rate schedule(s), applicable to any electric service furnished under this Agreement by such party to this Agreement to any other party to this Agreement.

15.3. The parties hereto agree that, in the event that any term or condition of this Agreement shall become the subject (other than at the instance of a party to this Agreement) of a proceeding before any regulatory agency, the parties will cooperate and use their best efforts to defend the same; provided, however, that if any term or condition of this Agreement or the Network Integration Transmission Service Agreement, the Network Operating Agreement, or the AEP OATT or any term or condition under which electric service shall be provided by AEP GenCo to Buckeye, or by Buckeye to AEP GenCo, shall be required to be changed in any such proceeding pursuant to final order of a regulatory authority having jurisdiction, then the parties hereto shall, at the request of Buckeye or of AEP GenCo, review the terms and conditions of this Agreement and of the Network Integration Transmission Service Agreement, the Network

Operating Agreement, and the AEP OATT in the light of such change and shall negotiate in good faith with respect to any additional change or changes which either Buckeye or AEP GenCo shall consider necessary or desirable to restore, in the light of such change, the relative relationships between benefits and burdens under all of the interrelated conditions of this Agreement, the Network Integration Transmission Service Agreement, the Network Operating Agreement, and the AEP OATT which existed prior to such change; and provided further that, in the event that the parties hereto shall not agree to any additional change or changes so requested, then any party hereto shall, upon delivery of prior written notice to each other party hereto, be entitled to take such action before, or make such filings with, any regulatory authority having jurisdiction with respect to any term or condition of this Agreement or of the Network Integration Transmission Agreement, the Network Operating Agreement, or the AEP OATT as such party shall deem appropriate and, in the event of any such action by any party, the terms and conditions under which service shall be rendered by any party hereto shall be the terms and conditions as so changed or shall result from any ensuing action by or before any regulatory authority having jurisdiction.

15.4. All notices under this Agreement shall be in writing and, if to AEP GenCo, shall be sufficient in all respects if delivered in person to its President, Executive Vice President or Vice President or sent by registered mail, certified mail or nationally recognized overnight delivery service addressed to it at its office at 1 Riverside Plaza, Columbus, Ohio 43215, or at any subsequent address of which AEP GenCo may notify Buckeye in writing; if to Buckeye, shall be sufficient in all respects if delivered in person to its President and CEO, or sent by registered mail, certified mail or nationally recognized overnight delivery service to its office at 6677 Busch Boulevard, Columbus, Ohio 43229, or any subsequent address of which Buckeye may notify AEP GenCo in writing; and, if to Operating Company, shall be sufficient in all respects if delivered in person to its President or sent by registered mail, certified mail or nationally recognized overnight delivery service to such address as Operating Company shall provide to Buckeye and AEP GenCo by notice given as herein provided.

15.5. If, at any time, there shall be a dispute or difference of opinion between Buckeye and AEP GenCo in respect of the amount of any payment to be made by either of them hereunder, then on or prior to the date herein fixed for such payment the billed party shall pay the amount thereof which it admits to be due and at the same time (a) may pay to the billing party under protest all or any part of any amount in dispute, and (b) shall deliver to the billing party a written statement of the reasons why any amount claimed by the billing party to be due is disputed, and the issues in connection therewith shall be submitted to arbitration in accordance with the terms of Section 15.6. Upon determination of the dispute, the billing party shall refund any portion of the amount in dispute paid by the billed party in excess of the amount held to have been due, and the billed party shall pay to the billing party any amount by which the disputed amount paid, if any, was less than the amount held to have been due. Interest at 6% per annum shall be paid from the payment date to the date of any subsequent payment or refund, as the case may be. The payment by the billed party of any amount or disputed amount, or the acceptance by the billing party of any amount or disputed amount, as contemplated hereby prior to such arbitration shall not be regarded as a waiver by either of them and shall not in any way prejudice the rights of either of them to additional payment or refund, as the case may be. No payment made or received under this Section 15.5 shall be construed to effect a waiver or release by any party or to prejudice the rights of any party to additional payment or refund, as the case may be.

15.6. Any controversy, claim, counterclaim, defense, dispute, difference or misunderstanding arising out of or relating to this Agreement, or the breach thereof, shall be settled by arbitration before three arbitrators one of whom shall be named by Buckeye, one of whom shall be named by AEP GenCo, and the third of whom shall be named by the two arbitrators appointed by Buckeye and AEP GenCo, respectively. In the event that the two arbitrators so appointed shall fail to name a third arbitrator within thirty (30) days after the date of the appointment of the second of them, then the third arbitrator shall be appointed by the American Arbitration Association. The arbitration proceeding shall be conducted in accordance with the Rules of the American Arbitration Association then in effect, and judgment upon any provision shall survive the termination of this Agreement. The parties expressly agree that this provision shall constitute a condition precedent to the institution of any proceeding in any court preclude, or be deemed to preclude, any party to this Agreement from taking action contemplated by this Agreement before, or making such filings with, any regulatory authority having jurisdiction with respect to any term or condition of this Agreement or of the Network Integration Transmission Service Agreement, the Network Operating Agreement, or the Network OAT as such party shall deem appropriate, or (b) require, or be deemed to require, the AEP party to institute, or complete, an arbitration proceeding under this Section 15.6 prior to the taking of such action before, or the making of such filing with, any such regulatory authority.

15.7. The failure of any party hereto to insist in any one or more instances upon strict performance of any of the provisions of this Agreement or to take advantage of its rights hereunder, shall not be construed as a waiver of any such provisions, or the relinquishment of any such rights, but the same shall continue to remain in full force and effect.

15.8. (a) AEP GenCo shall not be held responsible or liable for any loss or damage to Buckeye or any Buckeye Member on account of its failure to perform any obligation to be performed by it hereunder at any time, caused by Act of God, fire, flood, explosion, strike, civil or military authority, governmental action or inaction, insurance or riot, enemy attack, malicious mischief, act of the elements, failure of equipment, or any other cause beyond its control or failure of any portion of Ohio's Bulk Transmission Facilities and/or other facilities used to deliver Cardinal Station power and energy; provided, however, that AEP GenCo shall use its best efforts to resume with utmost dispatch the performance of any obligation hereunder, the performance of which is excused by this subsection.

(b) Buckeye shall not be held responsible or liable for any loss or damage to AEP GenCo on account of its failure to perform any obligation to be performed by it hereunder at any time, caused by Act of God, fire, flood, explosion, strike, civil or military authority, governmental action or inaction, insurance or riot, enemy attack, malicious mischief, act of the elements, failure of equipment, or any other cause beyond its control or failure of any portion of its facilities or the facilities of any Buckeye Member, provided, however, that Buckeye shall use its best efforts to resume with utmost dispatch the performance of any obligation hereunder, the performance of which is excused by this subsection. Failure of Buckeye to make capacity available to AEP GenCo hereunder because of the aforesaid conditions of this Agreement shall not relieve AEP GenCo of its obligations to furnish Back-up Energy or to make payments to Buckeye as herein provided.

(c) Operating Company shall not be held responsible or liable for any loss or damage to AEP GenCo, Buckeye or to any Buckeye Member on account of its failure to perform any obligation to be performed by it hereunder at any time, caused by Act of God, fire, flood, explosion, strike, civil or military authority, governmental action or inaction, insurance or riot, enemy attack, malicious mischief, act of the elements, failure of equipment, or any other cause beyond its control or failure of any portion of Ohio's Bulk Transmission Facilities and/or other facilities used to deliver Cardinal Station power and energy; provided, however, that Operating Company shall use its best efforts to resume with utmost dispatch the performance of any obligation hereunder, the performance of which is excused by this subsection.

(d) The parties hereto hereby recognize that if either Buckeye or AEP GenCo shall be precluded by any of the reasons specified in the foregoing, force majeure provisions of this Section 15.8 from carrying out its obligations under this Agreement or any of the agreements referred to in this Agreement, some alternative arrangement may be necessary for the delivery of power to Buckeye Members and, in case such an alternative arrangement becomes necessary under such conditions, it is the intention of the parties hereto to negotiate in good faith some alternative arrangement designed to provide for the delivery to the Buckeye Members of their requirements in part from Buckeye's entitlement in the Cardinal Station and in part from generating stations of AEP GenCo within the State of Ohio under terms approximating, as nearly as practicable in the light of then prevailing conditions, those contemplated herein and in the Network Integration Transmission Service Agreement, the Network Operating Agreement, and the AEP OAT.

15.9. This Agreement shall not be assigned by either Buckeye or AEP GenCo, except to a successor to substantially all of its assets, property and business, without the prior written consent of the other party, provided that either Buckeye or AEP GenCo, or both, may assign its right, title and interest in, to and by virtue of this Agreement, including any and all extensions, renewals, amendments and supplements thereto, to a trustee or trustees, individual or corporate, as security for bonds or other obligations or securities, without such trustee or trustees assuming, or becoming in any respect obligated to perform any of the obligations of the assignor, and, if any such trustee be a corporation, without its being required by the parties hereto to qualify to do business in the State of Ohio, and such trustee or trustees may transfer, convey and assign all the right, title and interest of the assigning party in, to or by virtue of this Agreement in connection with any proceeding (whether or not judicial) to realize on any security provided for said bonds or other obligations or securities to any purchaser of any part of such security. It is further expressly stipulated and provided that no assignment by either Buckeye or AEP GenCo to any other person or party of any of their rights or interests under this contract shall have the effect of relieving Buckeye or AEP GenCo, as the case may be, from full liability and financial responsibility for performance (both before and after any such assignment) of all the obligations and duties herein provided and imposed upon Buckeye and AEP GenCo, respectively, nor shall any such assignment by Buckeye or AEP GenCo have the effect of waiving or releasing or in any manner altering or changing whatsoever the express restrictions and covenants as to the use to be made of electric energy sold and delivered hereunder as provided in this Agreement. This Agreement shall not be assigned by Operating Company under any circumstances without the prior written consent of AEP GenCo and Buckeye and of the Trustees under the Buckeye Mortgage. Subject to the foregoing provisions of this Section, this Agreement shall inure to the benefit of and be binding upon the parties hereto and their respective successors and assigns.

[illegible][illegible][illegible]

710688.14

51 Buckeye's entitlement to

[illegible][illegible][illegible][illegible][illegible]

(a) This Amendment, between Ohio, Beckeye and  
dated as of November 14, 2013,

10688, 10689

shall each have been filed with, and accepted for filing without material modification or condition by, the Federal Energy Regulatory Commission under the Federal Power Act as a rate schedule, or as a supplement to a rate schedule, of Ohio or AEP GenCo, as applicable;

(b) Buckeye, Operating Company and AEP GenCo shall each have caused this Amendment to be executed by their officers thereunto duly authorized;

(c) The closing of the AEP Corporate Separation;

(d) Approval of this Amendment by Buckeye's lenders under the Buckeye Mortgage, if such approval is required;

(e) The execution and delivery to Buckeye by American Electric Power Company, Inc. of the form of guaranty attached to this Amendment as Appendix B;

(f) Approval of this Amendment by Buckeye's Board of Trustees;

(g) Unless waived by Buckeye, approval of an amendment to the Buckeye Mortgage by Buckeye's lenders (i) modifying the events of default thereunder so that defaults by AEP GenCo under this Amendment or the bankruptcy or insolvency of AEP GenCo do not constitute events of default under the Buckeye Mortgage unless such events cause a material adverse effect on Buckeye's financial condition, or eliminating such events of default from the Buckeye Mortgage, and (ii) removing certain restrictions on Buckeye's ability to borrow on an unsecured basis;

(h) Approval by the Federal Energy Regulatory Commission of market based rate authority for AEP GenCo and the effectiveness of the PJM Services and Cost Allocation Agreement dated as of November 14, 2013 between AEP GenCo and Buckeye; and

(i) Release of Ohio from residual liability under the Station Agreement pursuant to Section 4(c) of the Assignment and Assumption Agreement between Buckeye, Ohio, AEP GenCo and Operating Company dated as of November 14, 2013.

5. This Amendment constitutes the entire agreement between the parties hereto with respect to the matters covered herein.

6. This Amendment shall be governed by, and construed in accordance with, the laws of the State of Ohio, exclusive of conflicts of laws provisions.

IN WITNESS WHEREOF, the parties have executed this Amendment as of the date first written above.

AEP GENERATION RESOURCES INC. BUCKEYE POWER, INC.

By: /s/ Charles E. Zebula By: /s/ Anthony J. Ahern

Name: Charles E. Zebula

Name: Anthony J. Ahern

Its: President

Its: President and CEO

CARDINAL OPERATING COMPANY

By: /s/ Anthony J. Ahern

Name: Anthony J. Ahern

Its: Executive Vice President

# APPENDIX A

## I. DESCRIPTION OF CARDINAL STATION SITE.

The parcels of real property constituting the Cardinal Station Site are described as follows, with reference being made to that certain draft drawing titled "Cardinal Main Plant Site Depicting Land Ownership," dated November 13, 2013 (the "Map"):

AEP GenCo's Land  
(Unit One Land)

Tract 7 on Map

Buckeye's Initial Land  
(Unit Two Land)

Tract 6 on Map;  
Area C on Map

Buckeye's Additional Land (Unit Three Land)

Tract 3 on Map (including Area B on Map and excluding Area A on Map)

Joint Land

Tract 4 on Map (including Area A and Area E on Map, excluding Area B and Area D on Map)

Tract 5 on Map (excluding Area C and Area D on Map. Tract 5 to be subsumed within Tract 4 in final version of Appendix A)

Common Land

Tract 1 on Map;

Tract 2 on Map;

Tract 9 on Map;

Tract 10 on Map;

Tract 11 on Map (excluding Area E on Map);

Tract 12 on Map;

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Tract 13 on Map;

Tract 15 on Map;

Area D on Map;

Area F on Map;

Area G on Map;

Area I on Map

Substation Land

Tract 8 on Map;

Area H on Map

Landfill Land

The following parcels identified on the draft drawing titled "Cardinal Plant Landfill Land," dated November 13, 2013:

- (1) Tax Parcel 50-05010-000, 53.17 acres;
- (2) Tax Parcel 50-01000-000, 37.54 acres;
- (3) Tax Parcel 50-04072-000, 253.98 acres;
- (4) Tax Parcel 50-04072-005, 49.134 acres;
- (5) Tax Parcel 50-04077-000, 111.8 acres;
- (6) Tax Parcel 50-00853-000, 61.94 acres;
- (7) Tax Parcel 50-04073-000, 128.16 acres;
- (8) Tax Parcel 50-01529-000, 82.99 acres;
- (9) Tax Parcel 50-00853-000, 11.01 acres;
- (10) Tax Parcel 50-00852-000, 52.75 acres;
- (11) Tax Parcel 50-01545-000, 59.481 acres;
- (12) Tax Parcel 50-05067-000, 37.510 acres;

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- (13) Tax Parcel 50-01530-000, 6.484 acres;
- (14) Tax Parcel 50-01534-000, 8.33 acres;
- (15) Tax Parcel 50-04064-000, 76.78 acres;
- (16) Tax Parcel 50-00847-000, 37.402 acres;
- (17) Tax Parcel 50-01565-000, 43.022 acres;
- (18) Tax Parcel 50-01563-000, 373.54 acres;
- (19) Tax Parcel 50-00949-000, .95 acres;
- (20) Tax Parcel 50-00852-000, 146.13 acres;
- (21) Tax Parcel 50-00837-000, 39.116 acres;
- (22) Tax Parcel 50-00838-000, 22.283 acres;
- (23) Tax Parcel 50-05019-000, 236.658 acres;
- (24) Tax Parcel 50-00838-001, 6.943 acres;
- (25) Tax Parcel 444-g, 4.59 acres;
- (26) Tax Parcel 50-00374-000, 236.254 acres;
- (27) 1.046 acre parcel, no tax parcel number identified, D.B.V. 625 Page 132.
- (28) Tax Parcel 50-04066-000, 188.10 acres;
- (29) Tax Parcel 50-00840-000, 57.564 acres;
- (30) Tax Parcel 50-00831-000, 29.52 acres;
- (31) Tax Parcel 50-00944-000, 2.33 acres;
- (32) Tax Parcel 50-04038-000, 35.26 acres;
- (33) Tax Parcel 50-04042-000, 4.51 acres;
- (34) Tax Parcel 50-00296-000, 44.40 acres;
- (35) Tax Parcel 50-00295-000, 47.48 acres;

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- (36) Tax Parcel 50-00294-000, 119.42 acres;
- (37) Tax Parcel 50-00300-000, 30.85 acres;
- (38) Tax Parcel 50-00038-000, .29 acres;
- (39) Tax Parcel 50-01247-000, 8.56 acres;
- (40) Tax Parcel 50-00299-000, 11.01 acres;
- (41) Tax Parcel 50-00050-000, .23 acres;
- (42) Tax Parcel 50-01222-000, .21 acres;
- (43) Tax Parcel 50-00030-000, 2.05 acres.

II. Description of AEP GenCo's Initial Unit (Unit One)

AEP GenCo's Initial Unit is located on the parcel of land described as AEP GenCo's Land of the Cardinal Station Site and includes (a) all foundations and structures thereon bounded by and including walls and/or structural members for AEP GenCo's Initial Unit on the north and adjoining to walls and/or structural members for Buckeye's Initial Unit to the south, it being understood that to the extent that the foundations and structures for AEP GenCo's Initial Unit encroach upon Buckeye's Initial Land, Joint Land or Common Land, such foundations and structures are nevertheless part of AEP GenCo's Initial Unit, (b) all machinery, equipment, pipes, cables, etc., on or within the structures located on AEP GenCo's Land, (c) items of property specifically described as Exception BI-2 and BI-15 in Part III of this Appendix A, Exception BA-2 in Part IV of this Appendix A, Exceptions GF-1, GF-13, GF-26, GF-28, GF-30 and GF-32 in Part V of this Appendix A, and Exceptions CF-3, CF-7 and CF-19 in Part VI of this Appendix A, and (d) the following specific items of property:

- OI-1: AEP GenCo's Initial Unit old stack [item 41];
- OI-2: AEP GenCo's Initial Unit steam generator building [item 42];
- OI-3: AEP GenCo's Initial Unit turbine building [item 43];
- OI-4: AEP GenCo's Initial Unit selective catalytic boxes reduction system boxes [item 44];
- OI-5: AEP GenCo's Initial Unit screen house [item 53];
- OI-6: AEP GenCo's Initial Unit contaminated condensate storage tank [item 55]; and
- OI-7: AEP GenCo's Initial Unit clean condensate storage tank [item 57];

with the following exceptions in respect of the property described in subsections (a) and (b) of this Part:

*Exception OI-1:* All property described in subsections (a) and (b) of this Part classified under Accounts 351 through 359, and Account 397, of the Uniform System of Accounts, as such account numbers may be amended or replaced from time to time. All items of property included under this Exception OI-1 are designated as a part of AEP GenCo's Substation Facilities.

*Exception OI-2:* River bank improvements and rip-rap on AEP GenCo's Land adjoining to the walls of the pump house and water intake structures for AEP GenCo's Initial Unit. All such improvements are designated as part of Initial Cardinal Station General Facilities.

*Exception OI-3:* The sheet piling water diversion wall located on AEP GenCo's Land and adjoining to the northeast corner of the screen well bulkhead and extending in an easterly direction to the river bank. Such diversion wall is designated as part of Initial Cardinal Station General Facilities.

*Exception OI-4:* [Reserved.]

*Exception OI-5:* Fuel oil pumping equipment, including valves, strainers and other accessories, which are located on AEP GenCo's Land to the west of the contaminated condensate storage tank, and all valves, fittings and piping necessary and/or useful for connecting the aforesaid fuel oil pumping equipment with the 840,000 gallon fuel oil tank [Item 64] which is located on Joint Land to the west of the warehouse [Item 77]. All items of property included under this Exception OI-5 are designated as part of Initial Cardinal Station General Facilities.

*Exception OI-6:* The well water softener located at elevation 645'-0" in the water treatment plant area near the intersection of building column lines I and C for AEP GenCo's Initial Unit, and the 6,000-gallon well water tank located at elevation 757'-6" between building column lines J and H and building column lines 7 and 8 for AEP GenCo's Initial Unit, and all valves, fittings and piping on or within the structures on AEP GenCo's Land which are necessary and/or useful for connecting the aforesaid well water softener, the aforesaid well water tank and the Cardinal Station deep well. All items of property included under this Exception OI-6 are designated as part of Initial Cardinal Station General Facilities.

*Exception OI-7:* Motor-driven service water pump set, including automatic self-cleaning strainer, located on elevation 645'-0" between building column lines 7 and 8 for AEP GenCo's Initial Unit. All such equipment is designated as part of Initial Cardinal Station General Facilities.

*Exception OI-8:* The southerly motor-driven ash handling pump set, including automatic self-cleaning strainer, located on elevation 645'-0" between building column lines 10 and 11 for AEP GenCo's Initial Unit. All such equipment is designated as part of Initial Cardinal Station General Facilities.

*Exception OI-9:* One fire system pegging pump set located on elevation 645'-0" between building column lines 10 and 11 for AEP GenCo's Initial Unit. All such equipment is designated as part of Initial Cardinal Station General Facilities.

*Exception OI-10:* Chemical cleaning equipment, including chemical cleaning tank and chemical cleaning station located on elevation 671'-0" between building column lines 6 and 7 for AEP GenCo's Initial Unit, two chemical cleaning pumps located on elevation 659'-0" between building column lines 4 and 6 for AEP GenCo's Initial Unit, and pertinent valves, fittings and interconnecting piping for the aforesaid equipment. All items of property included under this Exception OI-10 are designated as part of Initial Cardinal Station General Facilities.

*Exception OI-11:* The centrifugal plant air compressor and the associated air compressor oil pump located on elevation 661'-0" between building column lines 7 and 8 for AEP GenCo's Initial Unit. All such equipment is designated as part of Initial Cardinal Station General Facilities.

*Exception OI-12:* Freight elevator located to the west of the intersection of building column lines C and 2 for AEP GenCo's Initial Unit. Such elevator is designated as part of Initial Cardinal Station General Facilities.

*Exception OI-13:* Miscellaneous store rooms, including 5-ton monorail and hoist located on elevation 671'-0" in the smoke stack for AEP GenCo's Initial Unit. All items of property included under this Exception OI-13 are designated as part of Initial Cardinal Station General Facilities.

*Exception OI-14:* The 300 kva lighting transformer for service building lighting system and for emergency lighting for AEP GenCo's Initial Unit and Buckeye's Initial Unit located on the transformer deck elevation 674'-0" for AEP GenCo's Initial Unit. Such lighting transformer is designated as part of Initial Cardinal Station General Facilities.

*Exception OI-15:* The switchgear and control devices for ash handling pump referred to in Exception OI-8 in cubicle 1A8 in the 4 kv control center, together with all cables and connections leading therefrom to such pump and its controls, but not including any cable pans, ducts, conduits, hangers, etc., which are necessary and/or useful for routing such cables through the structures which are part of AEP GenCo's Initial Unit. All items of property included under this Exception OI-15 are designated as part of Initial Cardinal Station General Facilities.

*Exception OI-16:* The combination starter and control devices in motor control center TC-E for strainer drive for ash handling pump referred to in Exception OI-8 and all electrical connections therefrom to such strainer drive. All items of property included under this Exception OI-16 are designated as part of Initial Cardinal Station General Facilities.

*Exception OI-17:* The switchgear and control devices for service water pump referred to in Exception OI-7 in cubicle 1F4 in the 600 volt control center, together with all cables and connections leading therefrom to such pump and its controls, but not including any cable pans, ducts, conduits, hangers, etc., which are necessary and/or useful for routing such cables

through the structures which are part of AEP GenCo's Initial Unit. All items of property included under this Exception OI-17 are designated as part of Initial Cardinal Station General Facilities.

*Exception OI-18:* The combination starter in motor control center TC-D for strainer drive for service water pump referred to in Exception OI-7 and all electrical connections therefrom to such strainer drive. All items of property included under this Exception OI-18 are designated as part of Initial Cardinal Station General Facilities.

*Exception OI-19:* The switchgear and control devices for centrifugal plant air compressor referred to in Exception OI-11 in cubicle 1B2 in the 4 kv control center, together with all cables and connections leading therefrom to such air compressor and its controls, but not including any cable pans, ducts, conduits, hangers, etc., which are necessary and/or useful for routing such cables through the structures which are part of AEP GenCo's Initial Unit. All items of property included under this Exception OI-19 are designated as part of Initial Cardinal Station General Facilities.

*Exception OI-20:* The combination starter in motor control center TB-F for oil pump for centrifugal plant air compressor referred to in Exception OI-11 and all electrical connections therefrom to such pump and its controls. All items of property included under this Exception OI-20 are designated as part of Initial Cardinal Station General Facilities.

*Exception OI-21:* The motor control breaker in motor control center TMZ-E for freight elevator motor-generator set and controls. All items of property included under this Exception OI-21 are designated as part of Initial Cardinal Station General Facilities.

*Exception OI-22:* The motor combination starter in motor control center TC-E for the fire system pegging pump and all electrical connections therefrom to the fire system pegging pump and its controls. All items of property included under this Exception OI-22 are designated as part of Initial Cardinal Station General Facilities.

*Exception OI-23:* Two combination starters in motor control center PCR-C and one control breaker in motor control center PCR-F for fuel oil pumping equipment included under Exception OI-5 and all electrical connections therefrom to such fuel oil pumping equipment and its controls. All items of property included under this Exception OI-23 are designated as part of Initial Cardinal Station General Facilities.

*Exception OI-24:* Switchgear and control devices for chemical cleaning pump in cubicle 1A2 in the 4 kv control center, together with all cables and connections leading therefrom to such pump, but not including any cable pans, ducts, conduits, hangers, etc., which are necessary and/or useful for routing such cables through the structures which are part of AEP GenCo's Initial Unit. All items of property included under this Exception OI-24 are designated as part of Initial Cardinal Station General Facilities.

*Exception OI-25:* The combination starter in the motor control center EB-F for the chemical cleaning pump and all electrical connections therefrom to the chemical cleaning

pump and its controls. All items of property included under this Exception OI-25 are designated as part of Initial Cardinal Station General Facilities.

*Exception OI-26:* The switchgear in cubicle 1D2 in the 600 volt control center, together with all cables and connections leading therefrom to power panel MS-D, but not including any cable pans, ducts, conduits, hangers, etc., which are necessary and/or useful for routing such cables through the structures which are part of AEP GenCo's Initial Unit. All items of property included under this Exception OI-26 are designated as part of Initial Cardinal Station General Facilities.

*Exception OI-27:* The switchgear for 75-ton turbine room cranes in cubicle 1F7 in the 600 volt control center, together with all cables and connections leading therefrom to the crane trolley wires for AEP GenCo's Initial Unit and Buckeye's Initial Unit, but not including any cable pans, ducts, conduits, hangers, etc., which are necessary and/or useful for routing such cables through the structures which are part of AEP GenCo's Initial Unit. All items of property included under this Exception OI-27 are designated as part of Initial Cardinal Station General Facilities.

*Exception OI-28:* The fuel oil pump lines placed in or on AEP GenCo's Land for the purposes of connecting the fuel oil pumping equipment included under Exception OI-5 with Buckeye's Initial Unit. All such fuel oil pipe lines included under this Exception OI-28 are designated as part of Buckeye's Initial Unit.

### III. Description of Buckeye's Initial Unit (Unit Two)

Buckeye's Initial Unit is located on the parcel of land described as Buckeye's Initial Land of the Cardinal Station Site and includes (a) all foundations and structures thereon bounded by and including walls and/or structural members for Buckeye's Initial Unit on the south and adjoining to walls and/or structural members for AEP GenCo's Initial Unit to the north, it being understood that to the extent that the foundations and structures for Buckeye's Initial Unit encroach upon AEP GenCo's Land, Joint Land, or Common Land such foundations and structures are nevertheless part of Buckeye's Initial Unit, (b) all machinery, equipment, pipes, cables, etc., on or within the structures located on Buckeye's Initial Land, (c) items of property specifically described as Exception BA-3 in Part IV of this Appendix A, Exception OI-28 in Part II of this Appendix A, Exceptions GF-2, GF-14, GF-27, GF-29, GF-31, GF-33, GF-37 and GF-38 in Part V of this Appendix A, and Exceptions CF-4 and CF-6 in Part VI of this Appendix A, and (d) the following specific items of property:

*BI-1:* Buckeye's Initial Unit old stack [item 46];

*BI-2:* Buckeye's Initial Unit steam generator building [item 47];

*BI-3:* Buckeye's Initial Unit turbine building [item 48];

*BI-4:* Buckeye's Initial Unit selective catalytic reduction system boxes [items 49];

*BI-5:* Buckeye's Initial Unit screen house [item 54];

*BI-6: Buckeye's Initial Unit contaminated condensate storage tank [item 56]; and*

*BI-7: Buckeye's Initial Unit clean condensate storage tank [item 58];*

with the following exceptions in respect of the property described in subsections (a) and (b) of this Part:

*Exception BI-1:* All property described in subsections (a) and (b) of this Part classified under Accounts 351 through 359, and Account 397, of the Uniform System of Accounts, as such account numbers may be amended or replaced from time to time. All items of property included under this Exception BI-1 are designated as part of Buckeye's Initial Substation Facilities.

*Exception BI-2:* The equipment installed for the purpose of conveying and/or handling coal between Station No. 8 and Station No. 9 which is identified as Conveyor No. 9, the centers of said Stations Nos. 8 and 9 being located 492'-0" and 239'-0", respectively, southwest of the northeast line of AEP GenCo's Land and 226'-3" and 230'-1", respectively, southeast of the northwest line of AEP GenCo's Land, Buckeye's Initial Land and Joint Land. All such equipment is designated as part of AEP GenCo's Initial Unit.

*Exception BI-3:* River bank improvements and rip-rap on Buckeye's Initial Land adjoining to the walls on building column line C for Buckeye's Initial Unit and adjoining to the circulating water discharge structure. All such improvements are designated as part of Initial Cardinal Station General Facilities.

*Exception BI-4:* The sheet piling water diversion wall located on Buckeye's Initial Land and adjoining to the circulating water discharge structure at a point between building column lines 7 and 8 for Buckeye's Initial Unit and extending in an easterly direction into the Ohio River. Such diversion wall is designated as part of Initial Cardinal Station General Facilities.

*Exception BI-5:* Any part or parts of the fuel barge unloading dock which may be located on Buckeye's Initial Land. Such dock is designated as part of Cardinal Station Common Facilities.

*Exception BI-6:* [Reserved.]

*Exception BI-7:* [Reserved.]

*Exception BI-8:* The switchgear in cubicle 2D9 in the 600 volt control center MCC BBN-D, together with all cables and connections therefrom and from the AEP GenCo's Initial Unit 4 kv control centers leading to the fly ash pumps and fly ash seal water pump, but not including any cable pans, ducts, conduits, hangers, etc., which are necessary and/or useful for routing such cables through the structures which are part of Buckeye's Initial Unit. All items of property included under this Exception BI-8 are designated as part of Initial Cardinal Station General Facilities.

*Exception BI-9:* The combination starter in motor control center PCR-C for fuel oil pumping equipment included under Exception OI-5 and all electrical connections therefrom

to such fuel oil pumping equipment. All items of property included under this Exception BI-9 are designated as part of Initial Cardinal Station General Facilities.

*Exception BI-10:* The carbon dioxide storage tank for the fire fighting system located on floor elevation 645'-0" and all fittings and piping connected thereto. All items of property included under this Exception BI-10 are designated as part of Initial Cardinal Station General Facilities.

*Exception BI-11:* The fall-out shelter room, including the diesel-generator set and all other equipment therein, located on elevation 671'-0" in the smoke stack for Buckeye's Initial Unit. All items of property included under this Exception BI-11 are designated as part of Cardinal Station Common Facilities.

*Exception BI-12:* The switchgear in the 600 volt control center MCC PCR-C, together with all cables and connections therefrom leading to the motor control center in the chlorine building located on Joint Land, but not including any cable pans, ducts, conduits, hangers, etc., which are necessary and/or useful for routing such cables through the structures which are part of Buckeye's Initial Unit. All items of property included under this Exception BI-12 are designated as part of Initial Cardinal Station General Facilities.

*Exception BI-13:* The Regional Dispatch Center including all associated equipment to be located in the smoke stack for Buckeye's Initial Unit. All items of property included under this Exception BI-13 are to be owned exclusively by AEP GenCo and do not constitute part of the Cardinal Station.

*Exception BI-14:* The cable trenches and control cables located on Buckeye's Initial Land which are used to connect Buckeye's Additional Unit control devices with Buckeye's Additional Substation Facilities. Such cable trenches and control cables are designated as part of Buckeye's Additional Substation Facilities.

*Exception BI-15:* The selective catalytic reduction system box and its associated foundations and structural supports located on Buckeye's Initial Land which is used in connection with the selective catalytic reduction system for AEP GenCo's Initial Unit. Such selective catalytic reduction system box is designated as part of AEP GenCo's Initial Unit.

#### IV. Description of Buckeye's Additional Unit (Unit Three)

Buckeye's Additional Unit is located on the parcel of land described as Buckeye's Additional Land of the Cardinal Station Site and includes (a) all foundations and structures thereon, (b) all machinery, equipment, pipes, cables, etc., on or within the structures located on Buckeye's Additional Land, (c) a 138-kv circuit breaker and associated structures and equipment located at Ohio's Tidd Plant substation for purposes of controlling the 138-kv auxiliary start-up lines for Buckeye's Additional Unit, (d) items of property specifically described as Exceptions GF-10, GF-15, GF-18, GF-21, and GF-23 in Part V of this Appendix A, and Exceptions CF-8, CF-10, CF-11, CF-12, CF-13, and CF-15 in Part VI of this Appendix A, and (e) the following specific items of property:

# A-11

*BA-1:* Buckeye's Additional Unit stack [item 86];

*BA-2:* Buckeye's Additional Unit steam generator building [item 87];

*BA-3:* Buckeye's Additional Unit turbine building [item 88];

*BA-4:* Buckeye's Additional Unit water treating building [item 89];

*BA-5:* Service building for Buckeye's Additional Unit [item 90];

*BA-6:* Buckeye's Additional Unit auxiliary boiler building [item 91];

*BA-7:* Buckeye's Additional Unit precipitator and airheaters [item 92];

*BA-8:* Buckeye's Additional Unit induced draft fans [item 93];

*BA-9:* Selective Catalytic Reduction Unit 3A [item 94];

*BA-10:* Selective Catalytic Reduction Unit 3B [item 95];

*BA-11:* Buckeye's Additional Unit jet bubble reactor mechanical enclosure [item 96];

*BA-12:* Buckeye's Additional Unit jet bubble reactor [item 97];

*BA-13:* Oxidation air building [item 98];

*BA-14:* Buckeye's Additional Unit jet bubble reactor electrical enclosure [item 99];

*BA-15:* Buckeye's Additional Unit cooling tower [item 100];

*BA-16:* Circulating water pump house [item 101];

*BA-17:* Continuous emissions monitoring system enclosure [item 102];

*BA-18:* Induced draft fans and auxiliary equipment [item 103];

*BA-19:* Induced draft fans electrical enclosure [item 104];

*BA-20:* River pump house [item 105];

*BA-21:* Clean condensate storage tank [item 106];

*BA-22:* Contaminated condensate storage tank [item 107];

*BA-23:* Reclaim water tank [item 108];

*BA-24:* Reagent storage tank [item 109];

*BA-25:* Byproduct storage tank [item 110];

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# A-12

*BA-26:* Flue gas desulfurization pump house [item 111];

*BA-27:* Sulfuric acid tank [item 112];

*BA-28:* Fire service water tank [item 113];

*BA-29:* Fire pump building [item 114];

*BA-30:* [Reserved];

*BA-31:* Hydrogen skid/exclusion zone [item 116];

*BA-32:* Service water pump house and emergency diesel generator [item 117];

*BA-33:* Utility pipe rack [item 118];

*BA-34:* Nitrogen tank area [item 119];

*BA-35:* Chemical storage building [item 121];

*BA-36:* Troma silos [item 122];

*BA-37:* Troma truck unloading facility [item 123];

*BA-38:* Blower/MCC building [item 124];

*BA-39:* Chiller/dehumidifier building [item 125];

*BA-40:* Reclaim conveyor [item 126];

*BA-41:* Coal breaker house [item 132];

*BA-42:* Boom stacker and reclaimr [item 133];

*BA-43:* Sewage treatment plant [item 134];

*BA-44:* Coal Station F transfer house [item 138];

*BA-45:* Coal transfer house [item 140];

*BA-46:* Radial stacker [item 141];

*BA-47:* Buckeye's Additional Unit urea conversion area [item 142];

*BA-48:* Urea solution pump skid [item 143];

*BA-49:* Urea solution storage tank [item 144];

*BA-50:* Region 2 plant engineering office facility [item 145];

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- BA-51:* Electrical building [item 146];  
*BA-52:* Oil storage buildings [items 147];  
*BA-53:* Fuel oil containment tank [item 148];  
*BA-54:* Oil spill warehouse [item 149];  
*BA-55:* Buckeye's Additional Unit fire house [item 150];  
*BA-56:* Transformer storage [item 151]; and  
*BA-57:* Barge unloading dock [item 156];

with the following exceptions in respect of the property described in subsections (a) and (b) of this Part:

*Exception BA-1:* The bottom-ash drainage sumps located on Buckeye's Additional Land. All items included under this Exception BA-1 are designated as part of Initial Cardinal Station General Facilities.

*Exception BA-2:* Ash disposal pipelines and associated support structures, located on Buckeye's Additional Land, from AEP GenCo's Initial Unit to the bottom ash storage area. Such ash disposal pipelines are to be owned by AEP GenCo and are designated as part of AEP GenCo's Initial Unit.

*Exception BA-3:* Ash disposal pipelines and associated support structures, located on Buckeye's Additional Land, from Buckeye's Initial Unit to the bottom ash storage area. Such ash disposal pipelines are to be owned by Buckeye and are designated as part of Buckeye's Initial Unit.

*Exception BA-4:* The main power, UAT and RAT transformer area, located on Buckeye's Additional Land. Such transformer equipment is owned by Buckeye and is designated as part of Buckeye's Additional Substation Facilities. [item 120]

*Exception BA-5:* Several transmission towers and the lines attached thereto, located on Buckeye's Additional Land. All such transmission towers and lines are to be owned by Ohio and do not constitute part of the Cardinal Station. [items 37]

*Exception BA-6:* The coal rail car dumper located on Buckeye's Additional Land, which is designated as part of the Cardinal Station Common Facilities. [item 74]

*Exception BA-7:* The warehouse designated Warehouse 83, located on Buckeye's Additional Land, which is designated as part of the Cardinal Station Common Facilities. [item 127]

*Exception BA-8:* The training center building located on Buckeye's Additional Land, which is designated as part of the Cardinal Station Common Facilities [item 128]

*Exception BA-9:* The warehouse located adjacent to the training center building on Buckeye's Additional Land, which is designated as part of the Cardinal Station Common Facilities. [item 129]

*Exception BA-10:* The storage building located immediately north of the warehouse on Buckeye's Additional Land, which is designated as part of the Cardinal Station Common Facilities. [item 130]

*Exception BA-11:* The fuel oil pump house located on Buckeye's Additional Land. Such fuel oil pump house is designated as part of the Cardinal Station Common Facilities. [item 135]

*Exception BA-12:* The fuel oil storage tanks located on Buckeye's Additional Land, which are designated as part of the Cardinal Station Common Facilities. [item 136]

*Exception BA-13:* The fuel oil barge unloading facility located on Buckeye's Additional Land, which is designated as part of the Cardinal Station Common Facilities. [item 137]

*Exception BA-14:* The Coal Station RI barge unloading facility located on Buckeye's Additional Land, which is designated as part of the Cardinal Station Common Facilities. [item 139]

*Exception BA-15:* The direct charge warehouse located on Buckeye's Additional Land, which is designated as part of the Cardinal Station Common Facilities. [item 152]

## V. Description of Initial Cardinal Station General Facilities.

The Initial Cardinal Station General Facilities include the service building which adjoins AEP GenCo's Initial Unit to the north and all improvements, roads, foundations, structures, machinery, tools, equipment, electric conductors, etc., to the Initial Cardinal Station, which are useful and/or necessary for the operation of the Initial Units but not Buckeye's Additional Unit, which are located and described as follows:

(a) All items of property included in Exceptions BI-3, BI-4, BI-6 through BI-10 inclusive, and BI-12 in Part III of this Appendix A, Exceptions OI-2, OI-3 and OI-5 through OI-27, inclusive, in Part II of this Appendix A, Exception BA-1 in Part IV of this Appendix A, and Exceptions CF-1, CF-2, CF-3, CF-16, CF-17 and CF-20 in Part VI of this Appendix A.

(b) [Reserved]

(c) All items of property associated with the Initial Cardinal Station which are located in or on Joint Land (and are not included as a part of AEP GenCo's Initial Unit, Buckeye's Initial Unit, Buckeye's Additional Unit, or Cardinal Station Common Facilities, as described in Parts II, III, IV and VI of this Appendix A, respectively), including the following specific items of property:

*GF-1:* New flue gas desulfurization stack for AEP GenCo's Initial Unit and Buckeye's Initial Unit, [item 3]

*GF-2:* Service building for AEP GenCo's Initial Unit and Buckeye's Initial Unit, [item 26]

*GF-3:* Machine shop for AEP GenCo's Initial Unit and Buckeye's Initial Unit, [item 27]

*GF-4:* Oxidation air blower building, [item 31]

*GF-5:* Sewage treatment plant, [item 36]

*GF-6:* Flyash Slurry Pumphouse, [item 51]

*GF-7:* Fuel oil tank for AEP GenCo's Initial Unit and Buckeye's Initial Unit, [item 64]

*GF-8:* Coal Station 7, [item 65]

*GF-9:* Coal Station 6A, [item 66]

*GF-10:* Coal Silo A, and [item 70]

*GF-11:* Hydrogen storage and unloading facility for AEP GenCo's Initial Unit and Buckeye's Initial Unit, [item 79]

with the following exceptions in respect of the property described in the introductory paragraph of this Part:

*Exception GF-1:* Ash disposal pipelines, located on Joint Land, from AEP GenCo's Initial Unit to the bottom ash storage basin. Such ash disposal pipelines are owned by AEP GenCo and are designated as part of AEP GenCo's Initial Unit.

*Exception GF-2:* Ash disposal lines, located on Joint Land, from Buckeye's Initial Unit to the bottom ash storage basin. Such ash disposal lines are to be owned by Buckeye and are designated as part of Buckeye's Initial Unit.

*Exception GF-3:* Any of AEP GenCo's Substation Facilities that are placed on Joint Land.

*Exception GF-4:* Any of Buckeye's Initial Substation Facilities that are placed on Joint Land.

*Exception GF-5:* [Reserved]

*Exception GF-6:* Any transmission towers and lines placed on Joint Land prior or subsequent to construction of the Cardinal Station, excepting those described in Exceptions GF-17 and GF-18. All such transmission towers and lines shall be owned by Ohio and do not constitute part of the Cardinal Station, [item 37]

*Exception GF-7:* The cable trenches and control cables located on the Joint Land which are used to connect AEP GenCo's Initial Unit control devices with AEP GenCo's Substation Facilities. Such cable trenches and control cables are designated as part of AEP GenCo's Substation Facilities.

*Exception GF-8:* The cable trenches and control cables located on the Joint Land which are used to connect Buckeye's Initial Unit control devices with Buckeye's Initial Substation Facilities. Such cable trenches and control cables are designated as part of Buckeye's Initial Substation Facilities.

*Exception GF-9:* Any part or parts of the fuel barge unloader, and fuel rail unloader and their associated facilities and equipment located on Joint Land. Such rail unloader, and barge unloader are designated as part of the Cardinal Station Common Facilities. The Coal Station 1 barge unloader located on Joint Land. Such barge unloader is designated as part of the Cardinal Station Common Facilities, [item 131]

*Exception GF-10:* Any coal handling facilities associated specifically with Buckeye's Additional Unit and located on Joint Land. Such facilities are designated as part of Buckeye's Additional Unit.

*Exception GF-11:* Any coal handling facilities installed on Joint Land which are useful and/or necessary for operation of the Cardinal Units and which cannot be properly associated specifically with the Initial Units or Buckeye's Additional Unit. Such facilities are designated as part of Cardinal Station Common Facilities.

*Exception GF-12:* The equipment installed on Joint Land for the purpose of conveying and/or handling coal between the barge unloader and Station No. 2 which is identified as Conveyor No. 2, between the truck unloader and Station No. 5 which is identified as Conveyor No. 5, between the rail unloader and Station No. 5 which is identified as Conveyor No. 4, between Station No. 2 and Station No. 6 which is identified as Conveyor No. 3, between Station No. 5 and Station No. 6 which is identified as Conveyor No. 6 as well as Stations No. 2 and No. 5. All such equipment is identified as Cardinal Station Common Facilities.

*Exception GF-13:* Ash disposal pipelines and associated support structures, located on Joint Land, from AEP GenCo's Initial Unit to the fly ash disposal area. Such ash disposal pipelines are designated as part of AEP GenCo's Initial Unit.

*Exception GF-14:* Ash disposal pipelines and associated support structures, located on Joint Land, from Buckeye's Initial Unit to the fly ash disposal area. Such ash disposal pipelines are designated as part of Buckeye's Initial Unit.

*Exception GF-15:* Ash disposal pipelines and associated support structures, located on Joint Land, from Buckeye's Additional Unit to the fly ash disposal area located on Common Land. Such ash disposal pipelines are designated as part of Buckeye's Additional Unit.

*Exception GF-16:* Guard houses located on Joint Land. Such guard houses are designated Cardinal Station Common Facilities.

*Exception GF-17:* The generator leads and associated structures, located on Joint Land, connecting Buckeye's Additional Unit with Buckeye's Additional Substation Facilities. Such leads and associated structures are designated as part of Buckeye's Additional Substation Facilities.

*Exception GF-18:* The 138-kv auxiliary start-up supply leads and associated structures, located on Joint Land, used to provide auxiliary power to Buckeye's Additional Unit from AEP GenCo's Substation Facilities. Such leads and structures are designated as part of Buckeye's Additional Unit.

*Exception GF-19:* The cable trenches and control cables located on Joint Land which are used to connect Buckeye's Additional Unit control devices with Buckeye's Additional Substation Facilities. Such cable trenches and control cables are designated as part of Buckeye's Additional Substation Facilities.

*Exception GF-20:* Flyash drainage sumps located on Joint Land. Such drainage sumps are designated Cardinal Station Common Facilities.

*Exception GF-21:* The railroad track and associated facilities constituting the construction spur for Buckeye's Additional Unit and located on Joint Land. Such railroad track is designated as part of Buckeye's Additional Unit.

*Exception GF-22:* Any of the Buckeye's Additional Substation Facilities that are placed on Joint Land.

*Exception GF-23:* The fencing and lighting facilities associated with the access road for Buckeye's Additional Unit. Such fencing and lighting facilities are designated part of Buckeye's Additional Unit.

*Exception GF-24:* The yard utility building. Such building is designated as part of the Cardinal Station Common Facilities.

*Exception GF-25:* The cafeteria equipment located in the service building which adjoins AEP GenCo's Initial Unit to the north. Such cafeteria equipment is designated as part of the Cardinal Station Common Facilities.

*Exception GF-26:* The jet bubble reactor for AEP GenCo's Initial Unit located on Joint Land. Such jet bubble reactor is designated as part of AEP GenCo's Initial Unit. [item 1]

*Exception GF-27:* The jet bubble reactor for Buckeye's Initial Unit located on Joint Land. Such jet bubble reactor is designated as part of Buckeye's Initial Unit. [item 2]

*Exception GF-28:* AEP GenCo's Initial Unit induced draft fans located on Joint Land. Such draft fans are designated as part of AEP GenCo's Initial Unit. [item 32]

*Exception GF-29:* Buckeye's Initial Unit induced draft fans located on Joint Land. Such draft fans are designated as part of Buckeye's Initial Unit. [item 33]

*Exception GF-30:* AEP GenCo's Initial Unit flue gas ductwork which is located on Joint Land. Such ductwork is designated as part of AEP GenCo's Initial Unit. [items 34]

*Exception GF-31:* Buckeye's Initial Unit flue gas ductwork which is located on Joint Land. Such ductwork is designated as part of Buckeye's Initial Unit. [items 35]

*Exception GF-32:* AEP GenCo's Initial Unit precipitators which are located on Joint Land. Such precipitators are designated as part of AEP GenCo's Initial Unit. [items 45]

*Exception GF-33:* Buckeye's Initial Unit precipitators which are located on Joint Land. Such precipitators are designated as part of Buckeye's Initial Unit. [items 50]

*Exception GF-34:* The Coal Silo Station 6 located on Joint Land, which is designated as part of the Cardinal Station Common Facilities. [item 67]

*Exception GF-35:* The Coal Station 5 Sample House located on Joint Land, which is designated as part of the Cardinal Station Common Facilities. [item 68]

*Exception GF-36:* The Sample House, which is located on Joint Land southeast of Coal Silo Station 6. Such Sample House is designated as part of the Cardinal Station Common Facilities. [item 69]

*Exception GF-37:* Coal Silo B, which is located on Joint Land. Such Coal Silo B is owned by Buckeye and is designated as part of Buckeye's Initial Unit. [item 71]

*Exception GF-38:* The junction house and deluge valve station located on Joint Land. Such junction house and deluge valve station are designated as part of Buckeye's Initial Unit. [item 72]

*Exception GF-39:* The tractor garage and locomotive shop located on Joint Land, which is designated as part of the Cardinal Station Common Facilities. [item 73]

*Exception GF-40:* The Coal Station 3 located on Joint Land. Such Coal Station 3 is designated as part of the Cardinal Station Common Facilities. [item 80]

*Exception GF-41:* The deluge valve house located on Joint Land. Such deluge valve house is designated as part of the Cardinal Station Common Facilities. [item 81]

## VI. Description of Cardinal Station Common Facilities.

The Cardinal Station Common Facilities include all improvements, roads, foundations, structures, machinery, tools, equipment, electric conductors, etc., associated with the Initial Units or Buckeye's Additional Unit, which are useful and/or necessary for operation of all of the Cardinal Units, and which are located and described as follows:

(a) Items of property included in Exception OI-4 in Part II of this Appendix A, in Exceptions BI-5 and BI-11 in Part III of this Appendix A, in Exceptions BA-6 through BA-15, inclusive, in Part IV of this Appendix A, and in Exceptions GF-9, GF-11, GF-12, GF-16, GF-20, GF-24, GF-25, GF-34, GF-35, GF-36, GF-39, GF-40 and GF-41 in Part V of this Appendix A.

(b) All items of property associated with the Cardinal Station which are portable and movable, such as automotive equipment, office furniture and equipment, laboratory equipment, welding machines, portable hoists, spare parts (other than Major Spare Parts) and portable tools, etc., which cannot be properly associated specifically with AEP GenCo's Initial Unit, Buckeye's Initial Unit, or Buckeye's Additional Unit.

(c) All items of property associated with the Cardinal Station which are located in or on Landfill Land (and which are not included as part of AEP GenCo's Initial Unit, Buckeye's Initial Unit, Buckeye's Additional Unit, or Initial Cardinal Station General Facilities).

(d) All items of property associated with the Cardinal Station which are located in or on Common Land (and which are not included as part of AEP GenCo's Initial Unit, Buckeye's Initial Unit, Buckeye's Additional Unit, or Initial Cardinal Station General Facilities as described in Parts II, III, IV and V of this Appendix A, respectively), including the following specific items of property:

- CF-1: Metal cleaning waste treatment pump house; [item 157]
- CF-2: Metal cleaning waste treatment tank; [item 158]
- CF-3: Ash basin drainage structure; [item 159]
- CF-4: Rectriculating water ash pond pump house; [item 160]
- CF-5: Urea mix tank and pump building; [item 59]
- CF-6: Urea recycle tank; [item 60]
- CF-7: Urea storage tank; [item 61]
- CF-8: Wastewater treatment facility; [item 76]
- CF-9: The several office/storeroom/warehouse buildings located across the road from the wastewater treatment facility, east of Coal Station 6A; [items 77]
- CF-10: The slag blower shop [item 82]
- CF-11: Reagent storage tanks located adjacent to the AEP GenCo Unit and Buckeye Initial Unit flue gas desulfurization stack, used for the flue gas desulfurization system; [item 4]
- CF-12: The flue gas desulfurization system common building; [item 5]

CF-13: The limestone silos located adjacent to the flue gas desulfurization common building; [items 6]

CF-14: The maintenance tank located adjacent to the two flue gas desulfurization water tanks [item 7];

CF-15: The gypsum dewatering tanks used for the FGD byproduct dewatering system; [items 9]

CF-16: The reclaim tanks located adjacent to the dewatering tanks, used for the flue gas desulfurization system; [items 10]

CF-17: Flue gas desulfurization system service water tanks; [items 11]

CF-18: The limestone reclaim conveyor used for the flue gas desulfurization system; [item 12]

CF-19: The gypsum stackout conveyor; [item 13]

CF-20: The limestone emergency reclaim hopper used for the flue gas desulfurization system; [item 14]

CF-21: The limestone stockpile used for the flue gas desulfurization system; [item 15]

CF-22: The commercial gypsum stockpile (covered); [item 16]

CF-23: Waste gypsum stockpile (covered); [item 17]

CF-24: Balanced hydraulic crane; [item 18]

CF-25: Limestone unloading hopper; [item 19]

CF-26: New 40 foot diameter loading/unloading cells (YP); [item 20]

CF-27: New 18 foot diameter fleeing cells (YP); [item 21]

CF-28: Limestone stackout conveyor; [item 22]

CF-29: Long term limestone storage; [item 23]

CF-30: Waste gypsum stockpile; [item 24]

CF-31: Coal Station 4 truck unloading hopper; [item 75]

CF-32: Main gate guard house; [item 78]

with the following exceptions in respect of the property described in the introductory paragraph of this Part.

*Exception CF-1:* The bottom ash discharge structures installed as part of the Initial Cardinal Station. Such discharge structures are designated as part of the Initial Cardinal Station General Facilities.

*Exception CF-2:* The bottom ash drainage sumps. Such drain-age sumps are designated as part of Initial Cardinal Station General Facilities.

*Exception CF-3:* Ash disposal pipelines and associated supporting structures, from AEP GenCo's Initial Unit to the bottom ash disposal area. Such ash disposal pipelines are designated as part of AEP GenCo's Initial Unit.

*Exception CF-4:* Ash disposal pipelines and associated supporting structures, from Buckeye's Initial Unit to the bottom ash disposal area. Such ash disposal pipelines are designated as part of Buckeye's Initial Unit.

*Exception CF-5:* Ash disposal pipelines and associated supporting structures, from AEP GenCo's Initial Unit and Buckeye's Initial Unit to the fly ash disposal area and installed prior to January 1, 1973. Such ash disposal pipelines are designated as part of Initial Cardinal Station General Facilities.

*Exception CF-6:* Ash disposal pipelines and associated support structures from Buckeye's Initial Unit to the fly ash disposal area installed on or subsequent to January 1, 1973 but prior to or on the Date of Commercial Operation of Buckeye's Additional Unit. Such ash disposal pipelines are designated as part of Buckeye's Initial Unit.

*Exception CF-7:* Ash disposal pipelines and associated support structures from AEP GenCo's Initial Unit to the fly ash disposal area installed on or subsequent to January 1, 1973. Such ash disposal pipelines are designated as part of AEP GenCo's Initial Unit.

*Exception CF-8:* Ash disposal pipelines and associated support structures from Buckeye's Additional Unit to the fly ash disposal area. Such ash disposal pipelines are designated as part of Buckeye's Additional Unit.

*Exception CF-9:* Any transmission towers and lines placed on Common Land, excepting those described in Exceptions CF-14 and CF-15. All such transmission towers and lines are to be owned by Ohio and do not constitute part of the Cardinal Station. [Items 37]

*Exception CF-10:* The bottom ash recirculating pipelines from the recirculating pond to Buckeye's Additional Unit. Such recirculating pipelines are designated as part of Buckeye's Additional Unit.

*Exception CF-11:* The bottom ash recirculating pump house and associated equipment constituting a part of the bottom ash recirculating system for Buckeye's Additional Unit. Such pump house and associated equipment are designated as part of Buckeye's Additional Unit.

*Exception CF-12:* Ash disposal pipelines and associated support structures from Buckeye's Additional Unit to the bottom ash disposal area. Such ash disposal pipelines are designated as part of Buckeye's Additional Unit.

*Exception CF-13:* The railroad track and associated facilities constituting the construction spur for Buckeye's Additional Unit and located on Common Land. Such railroad track is designated as part of Buckeye's Additional Unit.

*Exception CF-14:* The generator leads and associated structures located on Common Land, connecting Buckeye's Additional Unit with Buckeye's Additional Substation Facilities. Such leads and associated structures are designated as part of Buckeye's Additional Substation Facilities.

*Exception CF-15:* The 138-kv auxiliary start-up leads and associated structures located on Common Land, used to provide auxiliary power to Buckeye's Additional Unit from AEP GenCo's Substation Facilities. Such leads and structures are designated as part of Buckeye's Additional Unit.

*Exception CF-16:* [Reserved.]

*Exception CF-17:* [Reserved.]

*Exception CF-18:* The Tidd Plant Building located on Common Land, such building having been constructed by AEP GenCo or Ohio for use by the Tidd Plant. The Tidd Plant Building is owned by AEP GenCo or Ohio and does not constitute part of the Cardinal Station. [item 8]

*Exception CF-19:* [Reserved.]

*Exception CF-20:* The interplant building located on Common Land adjacent to the Tidd Plant Building, which is designated as part of the Initial Cardinal Station General Facilities. [item 38]

*Exception CF-21:* Any transmission towers and lines placed on Common Land prior or subsequent to construction of the Cardinal Station. All such transmission towers and lines shall be owned by Ohio and do not constitute part of the Cardinal Station. [item 37]

## VII. Reserved

## VIII. Description of AEP GenCo's Substation Facilities

AEP GenCo's Substation Facilities are located on the parcels of property described as AEP GenCo's Land, Joint Land and Substation Land, or on other land owned by AEP GenCo adjacent to the Cardinal Station Site, and include all items of property located at the Cardinal Station appurtenant to AEP GenCo's Initial Unit and required and/or useful to connect electrically AEP GenCo's Initial Unit with the 138-kv busses for Cardinal Station and Tidd Plant which are located in Ohio's Tidd Plant substation, including the main power transformer located adjacent to AEP GenCo's Initial Unit, circuit breakers, disconnect switches, lightning arresters,

conductors, 13.8-kv start-up lines for AEP GenCo's Initial Unit, the lines connecting AEP GenCo's Initial Unit to the transformers that supply auxiliary power to the Cardinal Station, meters, relays and all other substation and transmission facilities, other than Buckeye's Initial Substation Facilities, required and/or useful to connect structurally and/or electrically Buckeye's Initial Substation Facilities and AEP GenCo's Initial Unit with the existing Tidd Plant substations and switchyards and Ohio's 13.8-kv and 34.5-kv transmission facilities and classified under Accounts 351 through 359 and Account 397, of the Uniform System of Accounts, as such account numbers may be amended or replaced from time to time, including Exception OI-1 in Part II of this Appendix and Exception GF-7 in Part V of this Appendix A.

#### IX. Description of Buckeye's Initial Substation Facilities

Buckeye's Initial Substation Facilities are located on the parcels of property described as Buckeye's Initial Land, Joint Land and Substation Land and include all items of property located at the Cardinal Station appurtenant to Buckeye's Initial Unit and required and/or useful to connect electrically Buckeye's Initial Unit and the Cardinal Station 34.5-kv bus, including the main power transformer located adjacent to Buckeye's Initial Unit, the 13.8-kv start-up lines for Buckeye's Initial Unit, the lines connecting Buckeye's Initial Unit to the transformers that supply auxiliary power to the Cardinal Station, the most southeasterly circuit breaker and the associated disconnect switches, lightning arresters, conductors, meters, relays and all other facilities electrically located between Buckeye's Initial Unit and said circuit breaker classified under Accounts 351 through 359, and Account 397, of the Uniform System of Accounts, as such account numbers may be amended or replaced from time to time, including Exception BI-1 in Part III of this Appendix A and Exception GF-8 in Part V of this Appendix A. Ohio and Buckeye have agreed that the 34.5-kv circuit breaker and certain related facilities associated with Buckeye's Initial Unit will be transferred by Buckeye to Ohio and retained by Ohio as transmission facilities. Once transferred, such facilities shall no longer be a part of the Cardinal Station.

#### X. Description of Buckeye's Additional Substation Facilities

Buckeye's Additional Substation Facilities are to be located on parcels of property described as Buckeye's Additional Land, Joint Land, and Substation Land and are to include all items of property located at the Cardinal Station appurtenant to and required and/or useful to connect electrically Buckeye's Additional Unit and the Cardinal Station 34.5-kv bus, including the main power transformer located adjacent to Buckeye's Additional Unit, the lines connecting Buckeye's Additional Unit to the transformers that supply auxiliary power to the Cardinal Station, the two 34.5-kv circuit breakers and the associated disconnect switches, lightning arresters, conductors, meters, relays and all other facilities electrically located between Buckeye's Additional Unit and said circuit breakers classified under Accounts 351 through 359, and Account 397, of the Uniform System of Accounts, as such account numbers may be amended or replaced from time to time, including Exceptions GF-17 and GF-19 in Part V, BI-14 in Part III, BA-4 in Part IV, and CF-14 in Part VI of this Appendix A. Ohio and Buckeye have agreed that the 34.5-kv circuit breakers and certain related facilities associated with Buckeye's Additional Unit will be transferred by Buckeye to Ohio and retained by Ohio as transmission facilities. Once transferred, such facilities shall no longer be a part of the Cardinal Station.

#### XI. Cardinal Station Plot Plan and Ownership Records

The location of the Joint Land, Common Land, and the location and description of the various components of AEP GenCo's Initial Unit, Buckeye's Initial Unit, Buckeye's Additional Unit, Initial Cardinal Station General Facilities, Cardinal Station Common Facilities, AEP GenCo's Substation Facilities, Buckeye's Initial Substation Facilities and Buckeye's Additional Substation Facilities, as described in this Appendix A, are shown on the Cardinal Station Plot Plan, drawing numbers MSK-CD13-040113, MSK-CD13-040213, MSK-CD13-040313, and MSK-CD13-040413 and MSK-CD13-030613 (the "Cardinal Station Plot Plan"). Personal property item numbers referenced in this Appendix A relate to item numbers set forth on the Cardinal Station Plot Plan.

A more detailed description of the various components of the Cardinal Station, and the ownership of same by Buckeye and AEP GenCo, are shown in the Cardinal Station books and records as maintained by Operating Company, currently maintained in an enterprise management system known as Asset Suite, which books and records are subject to Buckeye's and AEP GenCo's review and approval. In the event of any conflict between this Appendix A and the Cardinal Station books and records, the Cardinal Station books and records as maintained by Operating Company, and reviewed and approved by Buckeye and AEP GenCo, shall control.

## APPENDIX B

## FORM OF GUARANTY

GUARANTY AGREEMENT

THIS GUARANTY AGREEMENT (this "Guaranty"), dated as of January 20, 1968, is issued and delivered by [ ] a [ ] (the "Guarantor"), for the account of [ ] a [ ] (the "Obligor"), and for the benefit of Cardinal Operating Company, an Ohio corporation ("Cardinal"), and [Buckeye Power, Inc. or AEP Generation Resources Inc., a [ ] ("Buckeye" or "AEP GenCo" as applicable)] (Cardinal and [Buckeye or AEP GenCo, as applicable] are individually or collectively referred to as the "Beneficiary").

Background Statement

WHEREAS, the Obligor is a party to that certain Station Agreement dated as of January 1, 1968 with the Beneficiary and the Obligor (as amended, supplemented or otherwise modified from time to time, the "Agreement") and Obligor is providing Performance Assurance in accordance with the Agreement to the Beneficiary in the form of this Guaranty.

Agreement

NOW, THEREFORE, in consideration of the foregoing and for good and valuable consideration received, the Guarantor hereby agrees as follows:

1. Guaranty; Limitation of Liability. The Guarantor hereby absolutely and unconditionally guarantees to the Beneficiary, with effect from the date of the Agreement, the full and timely payment of the Obligor's present and future payment obligations arising under the Agreement, as or when such amounts become due and payable, whether secured or unsecured, absolute or contingent, joint or several, at their scheduled due dates, upon acceleration, or as determined by a court of law (the "Guaranteed Obligations"), and agrees to pay any Guaranteed Obligations within three (3) business days of demand by [Buckeye or AEP GenCo, the applicable Beneficiary]; provided, however, that the Guarantor's aggregate liability hereunder shall not exceed the maximum amount of \$ [ ] U.S. Dollars (the "Maximum Amount"). This Guaranty shall extend to any and all Guaranteed Obligations to the Beneficiary regardless of whether such Guaranteed Obligations are in the form of notes, bills, open accounts or any other instrument or method used for the payment of money which is executed and/or endorsed and delivered by Obligor to Beneficiary.

Subject to the other terms of this Guaranty, the liability of the Guarantor under this Guaranty is limited to the payment of Guaranteed Obligations only, and Guarantor shall have no obligation to sell, deliver, supply or transport gas, power or ancillaries or perform any related services. The obligations of Guarantor under this Guaranty shall not be affected by any action taken under the Agreement by Beneficiary in the exercise of any right or power therein conferred; or by any failure or omission by Beneficiary to enforce any right conferred thereby or by any waiver by Beneficiary of any covenant or condition therein provided; it being the purpose

and intent that this Guaranty and the obligations of Guarantor hereunder shall not be discharged except as provided herein.

The Guarantor agrees that the Guaranteed Obligations may at any time and from time to time exceed the Maximum Amount without impairing the guaranty hereunder or affecting the rights or remedies of the Beneficiary hereunder.

2. Effect of Amendments. The Guarantor agrees that the Beneficiary and the Obligor and the other parties to the Agreement, individually or together (as applicable under the Agreement), may modify, amend and/or supplement the Agreement, may delay or extend the date on which any payment must be made pursuant to the Agreement or delay or extend the date on which any act must be performed by the Obligor thereunder or any demand for payment under the Agreement may be rescinded, or the liability of any person for any part of any payment or any collateral security or other guarantee or right of offset with respect to any payment may be renewed, accelerated, compromised, waived, surrendered or released by the Beneficiary or any other person, may change in form or amount, or renew at any time, such Guaranteed Obligations, and that Beneficiary may grant indulgences to the Obligor under the Agreement, and Obligor may incur additional Guaranteed Obligations under the Agreement (subject to the limit on Guarantor's obligations under this Guaranty of the Maximum Amount); all without notice to or further assent by the Guarantor, who shall remain bound by this Guaranty, notwithstanding any such act by the Beneficiary or any other person and waives any defenses based on the foregoing.

3. Waiver of Rights. The obligations of the Guarantor hereunder shall be unconditional, irrespective of any circumstance which might otherwise constitute a legal or equitable discharge of a surety or guarantor. Without limiting the generality of the foregoing, the Guarantor expressly waives notice of acceptance of this Guaranty, diligence, presentment, protest, demand for payment or notice of default or nonpayment, notice of dishonor and protest and any requirement that at any time any person exhaust any right to take any action against Obligor or their assets or any other guarantor or person, provided, however, that any failure of Beneficiary to give notice will not discharge, alter or diminish in any way Guarantor's obligations under this Guaranty. The Guarantor waives any and all notices of the creation, renewal, extension or accrual of any of the Guaranteed Obligations and notice of or proof of reliance by the Beneficiary upon this Guaranty, and the Guaranteed Obligations shall conclusively be deemed to have been contracted, incurred, renewed, extended, amended, or waived in reliance on this Guaranty. The Guarantor waives all defenses based on, and this Guaranty shall be construed as a continuing, absolute and unconditional guaranty of payment without regard to, (i) the validity or enforceability of the Agreement or any Guaranteed Obligations or any other collateral security, other guarantee or right of set off with respect thereto or lack of power or authority of Obligor to execute the Agreement or any other documents executed in connection with the Agreement or to incur the Guaranteed Obligations, or change, restructuring or termination of the company existence or structure of, Obligor or Guarantor, (ii) any defense, set-off or counterclaim other than those to which the Obligor may be entitled to under the Agreement, as qualified by Section 5 below, (iii) suretyship defenses or impairment of collateral, in bankruptcy or any other circumstance, any insolvency, bankruptcy, reorganization or other similar proceeding affecting the Obligor or its assets, and (iv) any right to require Beneficiary to sue the Obligor or any other person, or to seek enforcement of any performance against Guarantor or any other person, or as a prerequisite to Beneficiary's taking

any action against Guarantor under this Guaranty or to join Obligor in any suit brought on this Guaranty.

4. Postponement of Subrogation. The Guarantor hereby postpones and subordinates in favor of the Beneficiary any and all rights which the Guarantor may have to (a) assert any claim against the Obligor based on subrogation rights with respect to payments made by Guarantor hereunder and (b) any realization on any property of the Obligor, including participation in any marshalling of the Obligor's assets, until all Guaranteed Obligations have been paid in full and Obligor's rights and obligations under the Agreement have been terminated. Upon payment in full of such Guaranteed Obligations and termination of the Obligor's rights and obligations under the Agreement, Beneficiary agrees that Guarantor shall be subrogated to the rights of Beneficiary against Obligor to the extent of Guarantor's payment to Beneficiary.

5. Reservation of Defenses. The Guarantor reserves to itself all rights, setoffs, counterclaims and other defenses that the Obligor may have expressly under the Agreement to payment of all or any portion of the Guaranteed Obligations, except defenses arising from the bankruptcy, insolvency, dissolution or liquidation of the Obligor and other defenses expressly waived in this Guaranty, including under Section 2 and Section 3 above.

6. Settlements Conditional. If any monies paid to the Beneficiary in reduction of the Guaranteed Obligations of the Obligor under the Agreement have to be repaid by the Beneficiary or any other person by virtue of any provision or enactment relating to bankruptcy, insolvency or liquidation for the time being in force or otherwise, the liability of the Guarantor under this Guaranty shall be computed, notwithstanding the termination or revocation of this Guaranty, which shall be reinstated and continue to be effective, as if such monies had never been paid to the Beneficiary; provided, however, if this Guaranty is replaced by a substitute security pursuant to Section 17(f), this provision shall only be applicable to such substitute security and this Guaranty shall not be reinstated. Beneficiary shall not be obligated to file any claim relating to the Guaranteed Obligations owing to it in the event that Obligor becomes subject to bankruptcy, reorganization or similar proceedings (whether voluntary or involuntary), and the failure of Beneficiary to so file shall not affect Guarantor's obligations hereunder.

7. Primary Liability of the Guarantor. The Guarantor agrees that the Beneficiary may enforce this Guaranty without the necessity at any time of resorting to or exhausting any other rights or remedies, security or collateral or guarantees. This is a continuing Guaranty of payment and not merely of collection. This Guaranty shall not be affected by any change in the relationship between the Guarantor and the Obligor. Beneficiary shall be entitled to apply any payment received from Guarantor in such order and against such liabilities under the Agreement or any other document executed in connection therewith as it shall determine in its sole discretion.

8. Term of Guaranty. This Guaranty shall remain in full force and effect until the earlier of (i) eighteen (18) months following the issuance of this Guaranty, (ii) such time as all the Guaranteed Obligations have been discharged in full or terminated, (iii) such time as the Guarantor has after demand from Buckeye or AEP GenCo, the applicable Beneficiary, paid the Guaranteed Obligations up to the Maximum Amount (including any potential for

reinstatement pursuant to Section 6), as confirmed in writing by Buckeye or AEP GenCo, the applicable Beneficiary, or (iv) in accordance with the terms for Early Termination set forth in Section 17 (the "Expiration Date").

9. Governing Law. This Guaranty shall be governed by and construed in accordance with the laws of the State of New York.

10. Expenses. The Guarantor agrees to pay all reasonable out-of-pocket expenses (including the reasonable fees and expenses of the Beneficiary's counsel) relating to the enforcement of the Beneficiary's rights hereunder in the event the Guarantor disputes its obligations under this Guaranty. All payments under this Section 10 shall be in addition to any amounts of Obligor which Guarantor has guaranteed to pay hereunder and shall not be subject to the Maximum Amount; provided, however, that Guarantor shall not be required to make payments under this Section 10 in excess of \$500,000.

11. Submission to Jurisdiction; Waiver of Jury Trial. The Guarantor and the Beneficiary, through acceptance of this Guaranty, submit for any legal action relating to this Guaranty or for recognition or enforcement of any judgment in respect thereof, to the non-exclusive jurisdiction of the courts of the State of New York, the courts of the United States of America for the Southern District of New York, and appellate courts from any thereof, and consent that any such action may be brought in such courts and waives any objection it may now or hereafter have to the venue of any such action in any such court or such action was brought in an inconvenient court. The Guarantor and the Beneficiary, through acceptance of this Guaranty, waive all rights to trial by jury in any action, proceeding or counterclaim arising or relating to this Guaranty.

12. Representations and Warranties. The Guarantor hereby represents and warrants, as of the date of this Guaranty, that:

(a) it is a corporation duly organized, validly existing and in good standing under the laws of the jurisdiction of its incorporation and has the corporate power and authority to conduct the business in which it is currently engaged and enter into and perform its obligations under this Guaranty;

(b) it has the corporate power and authority and the legal right to execute and deliver, and to perform its obligations under, this Guaranty, and has taken all necessary corporate action to authorize its execution, delivery and performance of this Guaranty;

(c) this Guaranty constitutes a legal, valid and binding obligation of the Guarantor enforceable in accordance with its terms, except as affected by bankruptcy, insolvency, fraudulent conveyance, reorganization, moratorium and other similar laws relating to or affecting the enforcement of Beneficiary's rights generally and general equitable principles;

(d) the execution, delivery and performance of this Guaranty will not violate any provision of any requirement of law or contractual obligation of the Guarantor (except to the extent that any such violation would not reasonably be expected to have a material adverse effect on the Guarantor's ability to perform this Guaranty);

(c) no consent or authority or, filing with, or other act by (including, without limitation, any stockholder or creditor of the Guarantor) is required in connection with the execution, delivery, performance, validity or enforceability of this Guaranty, other than any which have been obtained or made prior to the date hereof and remain in full force and effect;

(f) no litigation, investigation or proceeding of or before any arbitrator or governmental authority is pending or, to the knowledge of the Guarantor, threatened by or against the Guarantor relating to this Guaranty or that would have a material adverse effect on the Guarantor's ability to perform this Guaranty; and

(g) Guarantor has long-term senior unsecured non-credit enhanced debt having at least a BBB- rating from Standard & Poor's Rating Services, a division of The McGraw Hill Companies, Inc. ("S&P"), or at least a rating of Baa3 from Moody's Investors Service, Inc. ("Moody's").

13. Entire Agreement; Amendments. This Guaranty integrates all of the terms and conditions mentioned herein or incidental hereto and supersedes all oral negotiations and prior writings in respect to the subject matter hereof. This Guaranty may only be amended or modified by an instrument in writing signed by each of the Guarantor and [Buckeye or AEP GenCo, the applicable Beneficiary].

14. Headings. The headings of the various Sections of this Guaranty are for convenience of reference only and shall not modify, define or limit any of the terms or provisions hereof.

15. No Third-Party Beneficiary. This Guaranty is given by the Guarantor solely for the benefit of the Beneficiary and its successors, transferees and assigns, and is not to be relied upon by any other person or entity.

16. Assignment. This Guaranty shall inure to the benefit to the Beneficiary and its respective representatives, successors and permitted assigns. This Guaranty shall be binding upon the Guarantor and its successors and permitted assigns. The Guarantor may not assign its rights or obligations under this Guaranty without the prior written consent of [Buckeye or AEP GenCo, the applicable Beneficiary] (which consent may not be unreasonably withheld or delayed). Any purported assignment in violation of this Section 16 shall be void and without effect.

17. Early Termination. This Guaranty shall terminate (i) ten (10) days after receipt by the Beneficiary of reasonably satisfactory written evidence from the Guarantor notifying the Beneficiary that the Obligor's long-term senior unsecured non-credit enhanced debt has at least a BBB- rating from S&P or at least a rating of Baa3 from Moody's; or (ii) immediately, upon the replacement of the Guaranty by substitute security (cash, Letter of Credit, a guaranty or other security) meeting the requirements of Performance Assurance as defined in the Agreement and in an amount calculated in accordance with Section 2.8 of the Agreement for

the then applicable calendar year and in form and substance reasonably acceptable to [Buckeye or AEP GenCo, the applicable Beneficiary].

18. Notices. Any communication, demand or notice to be given hereunder will be duly given when delivered in writing or sent by facsimile to the Guarantor or to the Beneficiary, as applicable, at its address as indicated below:

If to the Guarantor, at:

Attention: \_\_\_\_\_  
Facsimile: ( ) \_\_\_\_\_

With a copy to Obligor:

Attention: \_\_\_\_\_  
Facsimile: ( ) \_\_\_\_\_

If to the Beneficiary, at:

Cardinal Operating Company  
155 W. Nationwide Blvd., Suite 500  
Columbus, Ohio 43215  
Facsimile: (614) 583-XXXX  
Attn: Treasurer

[Buckeye Power, Inc. or AEP Generation Resources Inc., as applicable]

Facsimile: ( ) \_\_\_\_\_  
Attn: \_\_\_\_\_

or such other address as the Guarantor or the Beneficiary shall from time to time specify. Notice shall be deemed given (a) when received, as evidenced by signed receipt, if sent by hand delivery, overnight courier or registered mail or (b) when received, as evidenced by transmission confirmation report, if sent by facsimile and received on or before 4:00 p.m. local time of recipient, or (c) the next business day, as evidenced by transmission confirmation report, if sent by facsimile and received after 4:00 p.m. local time of recipient.

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IN WITNESS WHEREOF, the Guarantor has executed this Guaranty as of the day and year first above written.

\_\_\_\_\_

By: \_\_\_\_\_

Name: \_\_\_\_\_

Title: \_\_\_\_\_

\*Bracketed language to be adjusted as necessary to reflect the name and information of the appropriate party.

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#### APPENDIX C

##### DETERMINATION OF TOTAL NET GENERATION AND TOTAL NET CAPABILITY

The Total Net Generation and Total Net Capability of any Initial Unit, Buckeye's Additional Unit, or combination of Initial and/or Buckeye's Additional Unit of the Cardinal Station shall be determined in accordance with the following procedures:

1. Total Net Generation, in connection with any generating unit, or combination of generating units, means, during the period being considered, the electrical output of the generator, or generators of such unit or units, as the case may be, measured in kilowatt hours reduced by (a) the energy used by auxiliaries for the unit, or units, during such period, and (b) the transformation losses between the generator terminals of such unit or units and the high-voltage Cardinal Station busses. Transformation losses will be measured by suitable instruments, or by any alternative method recommended by the Cardinal Station Operating Committee and approved by the Owners.

2. Operating Company shall make maximum loading tests for each of the Initial Units and for Buckeye's Additional Unit at intervals of approximately two weeks duration during the term of the foregoing Station Agreement. In the case of Buckeye's Additional Unit, such tests shall commence in the month during which the Date of Commercial Operation of Buckeye's Additional Unit occurs. Such maximum loading tests shall be made over a minimum period of six hours with all regularly operated equipment in service, with the boilers consuming fuel of average quality being supplied for such unit, and operating with the power factor normally imposed upon Cardinal Station, or, if at any time it shall not be possible to conduct these tests under such conditions, Operating Company shall make appropriate adjustments to the loading test results to take into account any deviations from such conditions. Operating Company shall bring the unit being tested to maximum loading with the turbine governor wide open, or as nearly wide open as possible without a resulting decline in turbine throttle steam pressure, and may back off load by such amount as may be necessary in the event that overloading of any auxiliary apparatus is observed, to arrive at the maximum continuous loading capability. The parties recognize that maximum loading tests made in the manner and over the minimum period and at the intervals specified above may shorten the useful service life of the generating unit subjected thereto and/or increase the maintenance required in respect thereof. Accordingly, the Operating Committee may, after an initial series of twelve maximum loading tests for each generating unit installed at the Cardinal Station have been made by AEP GenCo and/or by Operating Company, specify to Operating Company from time to time such alternate methods and/or schedules for loading tests to determine the maximum loading capability of each such generating unit as it may deem to be acceptable and adequate for making the determinations to be made hereunder, having regard for periodic variables resulting from maintenance schedules. An amount not in excess of 10 mw specified by the Engineering Department of the American Electric Power Service Corporation as being necessary to provide the minimum margin of control consistent with good and safe commercial practice shall be deducted from such maximum continuous loading capability to arrive at the maximum permissible continuous loading (Maximum Permissible Continuous Loading).

3. The Total Net Capability of the Cardinal Units for each month shall be determined at three-months intervals beginning with, or following, the first day of the calendar month following the Effective Date in the case of the Initial Units, and with the first day of the calendar month following the month in which the Date of Commercial Operation of Buckeye's Additional Unit occurs in the case of Buckeye's Additional Unit. The Total Net Capability of the Cardinal Units shall be equal to such value each month of each calendar year as shall be mutually agreed upon by AEP GenCo and Buckeye. In the event that AEP GenCo and Buckeye cannot mutually agree to the Total Net Capability of the Cardinal Units, such Total Net Capability shall be equal to the average Maximum Permissible Continuous Loading as determined by the maximum loading tests made during the preceding 12 months period or actual months of commercial operation, whichever is the briefer period, of each unit, diminished by the total of the auxiliary load demands and the transformation losses between such unit and the high-voltage Cardinal Station busses applicable to such unit, except that the Total Net Capability for Buckeye's Additional Unit shall be determined by mutual agreement for the first three calendar months following its date of commercial operation.

## APPENDIX D

### LIST OF MAJOR SPARE PARTS

Major spare parts interchangeable with equivalent parts of Buckeye's Initial Unit and AEP GenCo's Initial Unit, as follows:

- 1 — Second Reheat Turbine Rotor
- 1 — Low Pressure Turbine Rotor
- 2 — Low Pressure Turbine Rotors
- 5 — Storage Frames
- 1 — Storage Frame
- 1 — High Pressure Turbine Rotor
- 1 — Generator Field
- 24 — Generator Stator Bars
- 2 — Generator Bushings
- 12 — Excitor Stator Bars
- 1 — Feed Pump Turbine Rotor
- 1 — Main Feed Pump Inner Assembly
- 1 — Forced Draft Fan Rotor
- 1 — Forced Draft Fan Motor
- 2 — Pulverized Motors
- 1 — Pulverized Fan Motor
- 5 — Railroad Cars
- 1 — 100 Ton Railroad Car
- 2 — Sets 11st Stage Buckets
- 1 — Set of H.P. Turbine Spill Strips & Springs
- 1 — Set of Pulverizer Spare Parts

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- 1—Gas Fan Rotor
- 1—First Reheat Nozzle and 1 Second Reheat Nozzle
- 1—Spare Inlet Nozzle
- 1—Gas Recirculating Fan Rotor

Appurtenant accessories such as steel storage frames, wedges, clips and shims for any of the above.

Major spare parts interchangeable with equivalent parts of Buckeye's Additional Unit as follows:

- 2—Low Pressure Turbine Rotors (A Location)
- 2—Low Pressure Turbine Rotors (B Location)
- 1—Set of Low Pressure Stationary Blading (A Location)
- 1—Set of Low Pressure Stationary Blading (B Location)
- 1—Generator Field
- 2—Hydrogen Fans
- 1—Slip Ring Fan
- 1—Generator Stator
- 1—Set of Generator Stator Bars
- 1—Exciter Stator
- 1—Exciter Rotor
- 1—Servo Motor (Intercept Valve)
- 1—Servo Motor (Reheat Stop Valve)
- 1—Set of Gears for Gear Train (Turning Gear)
- 1—Drum for Turning Gear
- 1—Set of Gears for Main Oil Pump
- 1—Starting Device for Control System
- 1—Pump Insert for Control Fluid Pump

D-3

- 2—Filter Replacements for Control Fluid System
  - 1—Set of Low Pressure Turbine Packing
  - 2—Sets of No. 3 Bearing Segments
  - 2—Sets of No. 4 Bearing Segments
  - 2—Sets of No. 5 Bearing Segments
  - 1—Set of Coupling Bolts (HP-LPA)
  - 1—Set of Coupling Bolts (LPA-LPB)
  - 1—Set of Coupling Bolts (LPB-Generator)
  - 2—Single Convolution Expansion Joints
  - 2—Double Convolution Expansion Joints
  - 2—Bearing Lift Pumps
  - 2—Exciter Bearings (No. 6 Bearing)
  - 2—Exciter Bearings (No. 7 Bearing)
  - 2—Exciter Bearings (No. 8 Bearing)
  - 1—Set of Pump Motors
  - 1—Turning Gear Motor
  - 3—Sets designated as Miscellaneous Generator Spare Parts
  - 3—Sets of Instrument and Control Miscellaneous Parts
  - 12—Oil Deflector Rings (Bearings)
  - 24—Oil Deflector Rings (Hydrogen Seal)
  - 6—Sealing Rings
  - 2—Generator Bushings
  - 1—Pilot Exciter Complete—Permanent Magnet Generator
  - 3—Sets designated as Miscellaneous Excitation Spare Parts
- Appurtenant accessories such as steel storage frames, wedges, clips and shims for any of the above.

Additional major spare parts may be added to the above list by agreement between AEP GenCo and Buckeye as provided in Section 4.1 of the foregoing Station Agreement.

# APPENDIX E

## CARDINAL STATION DRAWINGS AND PLANS

The following constitute the current drawings and plans of the Cardinal Station. The Cardinal Station drawings and plans may be updated by Operating Company from time to time and shall be approved by Buckeye and Ohio. In the event of any conflict between this Appendix B and the Cardinal Station drawings and plans as maintained by Operating Company, the Cardinal Station drawings and plans as maintained by Operating Company, and reviewed and approved by Buckeye and Ohio, from time to time shall control.

### Drawings & Descriptions Relating to the Initial Cardinal Station

| Old Description                                                                              | New Description                    | Old Drawing # | New Drawing #       | Revision Date |
|----------------------------------------------------------------------------------------------|------------------------------------|---------------|---------------------|---------------|
| Plot of Property                                                                             |                                    | S-SK-121764   | Not found           |               |
| Plot Plan                                                                                    | Same                               | 1-2-5030-4    | 1-2-5030-12         | 3/3/2008      |
| General Cross section - Units 1 & 2                                                          | Same                               | 1-2-5031-1    | 1-2-5031-5          | 7/20/2009     |
| Longitudinal Section Through Turbine Room - Units 1 & 2                                      | Same                               | 1-2-5032-1    | 1-2-5032-3          | 11/26/2007    |
| Longitudinal Section Through Heater Bay - Units 1 & 2                                        | Same                               | 1-2-5033-1    | 1-2-5033-1          | 6/28/1965     |
| Longitudinal Sections front of Steam Generator & through Tubular Air Heaters Units 1 & 2     | Same                               | 1-2-5034-1    | 1-2-5034-2          | 9/27/2007     |
| Cross section of Pulverizer Bay - Units 1 & 2                                                | Same                               | 1-2-5035-1    | 1-2-5035-1          | 6/28/1965     |
| Arrangement of Circ water tunnels - Units 1 & 2                                              | Same                               | 1-2-5036-1    | 1-2-5036-1          | 6/28/1965     |
| Condenser pit Elevation 645' and Forebay Elevations Units 1 & 2                              | Same                               | 1-2-5037-2    | 1-2-5037-4          | 11/26/2007    |
| Turbine Room and Heater Bay Basement Ele 663' & Service bldg Basement Ele 671' - Units 1 & 2 | Same                               | 1-2-5038-2    | 1-2-5038-5          | 4/27/2005     |
| Plan of Boiler Room Basement - Units 1 & 2                                                   | Same                               | 1-2-5039-1    | 1-2-5039-6          | 9/15/2006     |
| Transformer Deck Elevation 674' - Units 1 & 2                                                | Same                               | No Listing    |                     |               |
| Main floor Plan Elevation 691' - Units 1 & 2                                                 | Same                               | 1-2-5040-1    | 1-2-5040-4          | 9/27/2007     |
| Heater Bay and Boiler Plan Ele 714' 6" - Units 1 & 2                                         | Same                               | 1-2-5041-1    | 1-2-5041-2          | 12/11/1978    |
| Heater Bay and Boiler Plan - Units 1 & 2                                                     | Same, but individual drawings/unit | 1-2-5042-1    | 1-5042-2/<br>5042-2 | 2- 11/28/2007 |
| Plans - Deaerator and Upper Level                                                            | Same                               | 1-2-5043-1    | 1-2-5043-4          | 4/30/1998     |

E-2

|                                                        |                                                                          |                    |                 |            |
|--------------------------------------------------------|--------------------------------------------------------------------------|--------------------|-----------------|------------|
| Slagblower Platforms - Units 1 & 2                     | Same                                                                     | OP -2978-1000-3    | OP- 2978-1000-9 | 4/14/1984  |
| Main One-Line Diagrams                                 | Same                                                                     | OP-2978-1-1200A-5  | 1-1200A-26      | 8/15/2011  |
| Auxiliary One-Line Diagram Unit 1                      | Same                                                                     | OP-2978-2-1200A-3  | 2-1200A-27      | 10/14/2011 |
| Auxiliary One-Line Diagram Unit 2                      | Same                                                                     | OP-2978-1-1200B    | 1-1200B-35      | 2/27/2013  |
| Motor Control Centers Aux One-Line Diagrams Unit 1     | Same                                                                     | OP-2978-2-1200B    | 2-1200B-36      | 7/11/2013  |
| Motor Control Centers Aux One-Line Diagrams Unit 2     | Same                                                                     | OP-2978-12-1200C-1 | 12-1200C-25     | 7/16/2010  |
| Coal Handling Auxiliary One Line Diagram - Units 1 & 2 | Same                                                                     | 1-2-3800-8         | 1-2-3800-8      | 4/1/1966   |
| General Plan - Coal Handling Equipment                 | Same                                                                     | 1-2-5216-6         | 1-2-5216-6      | 3/1/1967   |
| Arrangement of Flyash Slurry Piping - Unit 1 & 2       | Same                                                                     | 1-2-5217-4         | 1-2-5217-5      | 11/21/1995 |
| Arrangement of Flyash Slurry Piping - Unit 1 & 2       | Same                                                                     | 1-2-5219-3         | 1-2-5219-4      | 9/27/1972  |
| Ash Removal Piping - Units 1, 2 and Tidd Flyash Piping | Revision of Sanitary Systems Required by Construction of Pike Island Dam | A-4101-2           | 1-2-4104-4      | 5/1/2002   |

## Drawings &amp; Descriptions Relating to the Initial Cardinal station (Additional Plans)

| Old Description                                                          | New Description                                 | Old Drawing # | New Drawing # | Revision Date |
|--------------------------------------------------------------------------|-------------------------------------------------|---------------|---------------|---------------|
| Plot Plan                                                                | Site Arrangement                                | 3-5030-0      | 3-509004-B, C | 6/8/2012      |
| General Cross Section Unit 3                                             | General Arrangement Floor Plan                  | 3-5031-0      | 3-5031-0      | 10/24/1972    |
| Longitudinal Section Through Turbine Room Unit 3                         | General Arrangement Mezz Floor Ele 121'         | 3-5032-0      | 3-5032-1      | 7/20/2009     |
| Longitudinal Section Through Heater Bay Unit 3                           | General Arrangement Main Floor Ele 141'         | 3-5033-0      | 3-5033-0      | 4/28/1976     |
| Longitudinal Section Through Steam Generator & Tubular Air Heater Unit 3 | General Arrangement at Burners                  | 3-5034-0      | 3-5034-0      | 4/28/1976     |
| Cross section of Pulverizer Bay - Unit 3                                 | Heater & Conveyor Floor Ele 233'6"              | 3-5035-0      | 3-5035-0      | 12/9/2005     |
| Arrangement of Cite water tunnels - Unit 3                               | General Arrangement Deaerator Floor (Plan View) | 3-5036-0      | 3-5036-0      | 4/28/1976     |
| Condenser pit Elevation 645' and Forebay Elevations A - Unit 3           | General Arrangement Roof Plan                   | 3-5037-0      | 3-5037-0      | 12/9/2005     |
| Turbine Room and Heater Bay Basement Floor Elevation B - Unit 3          | General Arrangement Section "A-A"               | 3-5038-0      | 3-5038-1      | 10/1/1990     |
| Boiler Room Basement and Transformer Deck Ele C - Unit 3                 | General Arrangement Section "B-B"               | 3-5039-0      | 3-5039-0      | 4/28/1976     |

E-3

|                                                        |                                        |                |            |            |
|--------------------------------------------------------|----------------------------------------|----------------|------------|------------|
| Main Floor Plan Elevation D - Unit 3                   | General Arrangement Section "C-C"      | 3-5040-0       | 3-5040-0   | 4/28/1976  |
| Heater Bay and Boiler Plans Elevation E - Unit 3       | General Arrangement Section "D-D"      | 3-5041-0       | 3-5041-0   | 4/28/1976  |
| Heater Bay and Boiler Plan Unit 3                      | General Arrangement Section "E-E"      | 3-5042-0       | 3-5042-1   | 7/20/2009  |
| Deaerator and Upper Slagblower Platforms Unit 3        | General Arrangement Section "F-F"      | 3-5043-0       | 3-5043-0   | 4/28/1976  |
| General Plan - Coal Handling System                    | Same                                   | 3-3500-0       | 3-3800-11  | 10/14/1977 |
| Main One-Line Diagram - Unit 3                         | 13.8KV Switchgear                      | 3-1000-0       | 3-1000A-21 | 12/17/2009 |
| Auxiliary One-Line Diagram - Unit 3                    | Key Diagram Switchgear Bus 3A          | 3-1200A        | 3-1200A-20 | 2/29/2012  |
|                                                        | Key Diagram Switchgear Bus 3B          | 6.9KV          | 3-1200B-20 | 2/29/2012  |
|                                                        | Key Diagram Switchgear Bus 3C          | 6.9KV          | 3-1200C-20 | 2/29/2012  |
|                                                        | Key Diagram Switchgear Bus 3D          | 6.9KV          | 3-1200D-21 | 2/29/2012  |
| Motor Control Center Auxiliary One-line Diagram Unit 3 | Key Diagram Substation 31A             | 3-1200B        | 3-1200B-7  | 3/1/2011   |
|                                                        | Key Diagram Substation 31B1            | 600V AC Unit   | 3-1200B-8  | 1/5/2009   |
|                                                        | Key Diagram Substation 31B2            | 600V AC Unit   | 3-1200G-6  | 11/17/1997 |
|                                                        | Key Diagram Substation 31C             | 600V AC Unit   | 3-1200H-6  | 3/1/2011   |
|                                                        | Key Diagram Substation 31D1            | 600V AC Unit   | 3-1200J-7  | 3/1/2011   |
|                                                        | Key Diagram Substation 31D2            | 600V AC Unit   | 3-1200K-6  | 11/17/1997 |
|                                                        | Key Diagram Switchgear Bus AWXP        | 480V AC Unit   | 3-1200L-5  | 4/29/2008  |
|                                                        | Key Diagram Switchgear Bus 31PA        | 480V AC Unit   | 3-1200M-5  | 11/17/1997 |
|                                                        | Key Diagram Switchgear Bus 31PB        | 480V AC Unit   | 3-1200N-5  | 11/17/1997 |
|                                                        | Key Diagram Switchgear Bus 31PC        | 480V AC Unit   | 3-1200P-5  | 11/17/1997 |
|                                                        | Key Diagram Precip Switchgear Bus 31PD | 480V AC Unit   | 3-1200Q-5  | 11/17/1997 |
| Coal Handling Auxiliary One Line Diagram Unit 3 Plan   | Key Diagram Switchgear Bus CH1V & CH1W | 600V 3-1200C   | 3-1200K-11 | 9/14/2007  |
| Location Plan                                          | Key Diagram Switchgear Bus CHB & CHW   | 600V 3-1200V-4 | 3-1200V-4  | 11/17/1997 |

## New General Arrangements for Added Equipment, NOT on Original Drawing List

| Old Description | New Description                                                       | Old Drawing # | New Drawing #                | Revision Date |
|-----------------|-----------------------------------------------------------------------|---------------|------------------------------|---------------|
|                 | General Arrangement Unit 1<br>SCR                                     |               | 1-BBP-100075-9268030-0       | 6/1/2002      |
|                 | General Arrangement Unit 2<br>SCR                                     |               | 2-BBP-100076-9268017-00      | 8/20/2001     |
|                 | General Arrangement FGD Units 1 & 2                                   |               | 12-508003-SH01-7             | 1/28/2007     |
|                 | General Arrangement Units 1 & 2 Hydrolyzers                           |               | 12-586801-0                  | 2/26/2004     |
|                 | General Arrangement Units 1 & 2 Dry Sorbent Injection                 |               | 2-MSK-M011F-0                | 1/11/2008     |
|                 | General Arrangement Unit 3<br>SCR                                     |               | cdp-3 dbriley-100077-9268010 | 7/24/2001     |
|                 | General Arrangement Unit 3<br>FGD                                     |               | 3-508010A-2                  | 7/9/2012      |
|                 | General Arrangement Unit 3<br>Hydrolyzers                             |               | 3-586801-0                   | 2/26/2004     |
|                 | General Arrangement Unit 3<br>Dry Sorbent Injection                   |               | 3-MSK-M012AG-0               | 11/7/2008     |
|                 | General Arrangement Units 1,2 & 3 Reagent Prep and Deaerating Systems |               | 12-508001SH01-7              | 1/3/2011      |
|                 | General Arrangement Units 1,2 & 3 Limestone Material Handling         |               | CDP-3-recep-0805-PPL-L1      | 6/26/2008     |
|                 | General Arrangement Units 1,2, & 3 Gypsum By Product Handling         |               | CDP-12-recep-0601-cvyg2-L1-2 | 5/26/2006     |
|                 | General Arrangement Units 1,2, & 3 FGD Waste Water Treatment          |               | 13-507901-6                  | 7/30/2010     |
|                 | General Arrangement Units 1,2, & 3 Urea Handling and Prep             |               | 13-506801-2                  | 11/30/2002    |
|                 | General Arrangement Unit 1<br>CEMS                                    |               | 1-560961-0                   | 4/27/2007     |
|                 | General Arrangement Unit 2<br>CEMS                                    |               | 2-560961-0                   | 4/27/2007     |
|                 | General Arrangement Unit 3<br>CEMS                                    |               | 3-15696-1                    | 6/8/2012      |
|                 | SCR Project Aux One line                                              |               | 1-12076-12                   | 6/12/2009     |

|                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                     |                                                                          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------|
| (Unit 1)<br>SCR Project Aux One line<br>(Unit 2)<br>FGD Project Aux One line<br>Diagram Overall Units 1,2,3<br>(Reagent Prep& Deaerating)<br>13.8 SWGR Bus One line<br>Diagram U3<br>FGD Aux One line 480<br>SWGR Bus 03-EL- 31A/31B<br>& 32A/32B U3 FGD<br>FGD Purge Stream<br>Wastewater Treatment<br>Electrical - Overall One Line<br>diagram<br>Precipitator 13.8KV & 600V<br>Three Line diagram<br>Precipitator Addition | 2-12076-13<br>12-121000-4<br>3-121000-2<br>3-121010-0<br>13-121600-2<br>12-12001A-7 | 6/12/2009<br>7/14/2008<br>5/9/2011<br>5/8/2009<br>5/30/2008<br>10/5/2007 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------|

## NON-OVEC PPA UNITS

| Plant              | Location | Unit | PPA<br>Entitlement<br>(MW) | Total Size<br>(MW)    | AEP<br>Percentage | In<br>Service |
|--------------------|----------|------|----------------------------|-----------------------|-------------------|---------------|
| <b>AEPGR Units</b> |          |      |                            |                       |                   |               |
| Cardinal           | OH       | 1    | 592                        | 595 MW <sup>1</sup>   | 100%              | 1967          |
| Conesville         | OH       | 4    | 339                        | 780 MW <sup>2</sup>   | 44%               | 1973          |
| Conesville         | OH       | 5    | 405                        | 405 MW <sup>3</sup>   | 100%              | 1976          |
| Conesville         | OH       | 6    | 405                        | 405 MW <sup>4</sup>   | 100%              | 1978          |
| Stuart             | OH       | 1    | 150                        | 585 MW <sup>5</sup>   | 26%               | 1971          |
| Stuart             | OH       | 2    | 150                        | 585 MW <sup>6</sup>   | 26%               | 1970          |
| Stuart             | OH       | 3    | 150                        | 585 MW <sup>7</sup>   | 26%               | 1972          |
| Stuart             | OH       | 4    | 150                        | 585 MW <sup>8</sup>   | 26%               | 1974          |
| Zimmer             | OH       | 1    | 330                        | 1,300 MW <sup>9</sup> | 25%               | 1991          |
| <b>TOTAL</b>       |          |      | <b>2,671</b>               | <b>5,825</b>          |                   |               |

<sup>1</sup> Direct Prepared Testimony of Toby Thomas, p. 3, Lines 18/19

<sup>2</sup> Direct Prepared Testimony of Toby Thomas, p. 4, Lines 5/6

<sup>3</sup> Direct Prepared Testimony of Toby Thomas, p. 4, Line 9

<sup>4</sup> Direct Prepared Testimony of Toby Thomas, p. 4, Line 9

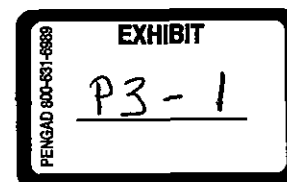
<sup>5</sup> Direct Prepared Testimony of Toby Thomas, p. 4, Lines 14/15

<sup>6</sup> Direct Prepared Testimony of Toby Thomas, p. 4, Lines 14/15

<sup>7</sup> Direct Prepared Testimony of Toby Thomas, p. 4, Lines 14/15

<sup>8</sup> Direct Prepared Testimony of Toby Thomas, p. 4, Lines 14/15

<sup>9</sup> Direct Prepared Testimony of Toby Thomas, p. 4, Lines 19



## Attachment A

### *PPA Units*

| Plant        | Unit | Average Annual Capacity (MW) | AEPGR Ownership (%) | AEPGR Ownership (MW) | Currently Planned Retirement Year |
|--------------|------|------------------------------|---------------------|----------------------|-----------------------------------|
| Cardinal     | 1    | 592                          | 100.0%              | 592                  | 2033                              |
| Conesville   | 4    | 779                          | 43.5%               | 339                  | 2033                              |
| Conesville   | 5    | 405                          | 100.0%              | 405                  | 2036                              |
| Conesville   | 6    | 405                          | 100.0%              | 405                  | 2038                              |
| Stuart       | 1    | 577                          | 26.0%               | 150                  | 2033                              |
| Stuart       | 2    | 577                          | 26.0%               | 150                  | 2033                              |
| Stuart       | 3    | 577                          | 26.0%               | 150                  | 2033                              |
| Stuart       | 4    | 577                          | 26.0%               | 150                  | 2033                              |
| Zimmer       | 1    | 1,300                        | 25.4%               | 330                  | 2051                              |
| <b>Total</b> |      | <b>5,789</b>                 |                     | <b>2,671</b>         |                                   |

OHIO POWER COMPANY'S RESPONSES TO  
OHIO CONSUMERS' COUNSEL'S DISCOVERY REQUESTS  
PUCO CASE NO. 14-1693-EL-RDR  
FIFTH SET

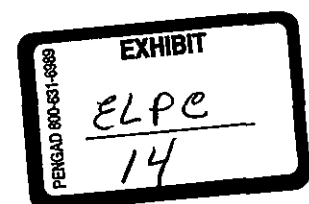
**INTERROGATORY**

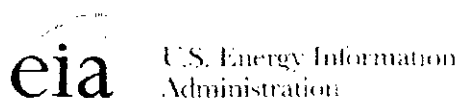
INT-5-129 Referring to the load forecasts (weather normalized, 5% lower, 5% higher, average of high and low) presented on page 12 of the Direct Testimony of Witness Pearce, what is the basis for these load growth scenarios; including all models used to forecast load growth and all inputs assumptions used in developing the forecast model and the forecast of load growth?

**RESPONSE**

Witness Bletzacker examined the power price reaction in PJM to loads that deviate 5% from the weather-normalized forecast utilized as the basis for the Long-Term North American Energy Market Forecast ("Fundamentals Forecast"). The salient purpose was to illustrate the asymmetric wholesale power price reaction (Bletzacker Direct Testimony pages 9-12). The 5% load deviation is equal to the Fundamentals Forecast projected load adjusted 5% upward, and, 5% downward. The +/- 5% load boundary was chosen with the understanding that PJM AEP Gen Hub load may vary +/- 12% with only a one standard deviation change in temperature from average.

Prepared by: Karl R. Bletzacker





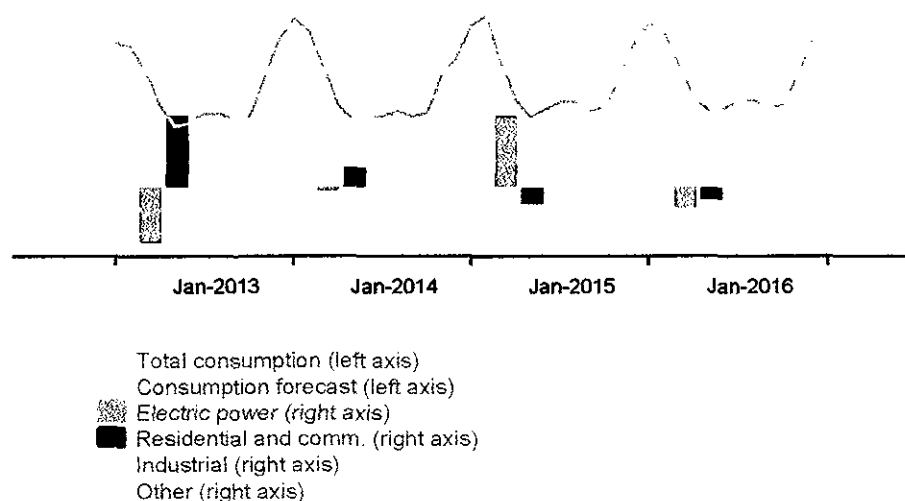
**Release Date:** September 9, 2015 | **Next Release Date:** October 6, 2015

Total weekly natural gas storage injections from the beginning of the injection season through August 28 were 1,732 billion cubic feet (Bcf), compared with the five-year (2010-14) average of 1,420 for the same time period. However, 2015 injections have been 8% lower than last year's record injections of 1,887 for the same weeks. The largest injections occurred earlier in the injection season, with injections in recent weeks closer to the five-year average. Production growth has been the main driver of strong inventory builds this year.

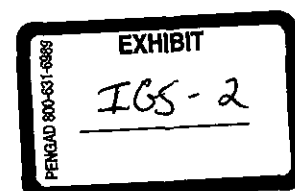
EIA's forecast of U.S. total natural gas consumption averages 76.5 Bcf/d in 2015 and 76.6 Bcf/d in 2016, compared with 73.5 Bcf/d in 2014. EIA projects natural gas consumption in the power sector to increase by 14.4% in 2015 and then decrease by 3.3% in 2016. Natural gas prices, which are expected to remain below \$3 per million British thermal units (MMBtu) through November, support increased use of natural gas for electricity generation in 2015. Industrial sector consumption increases by 0.9% in 2015 and by 6.4% in 2016, as new industrial projects, particularly in the fertilizer and chemicals sectors, come online late this year and next year, and as industrial consumers continue to take advantage of low natural gas prices. Natural gas consumption in the residential and commercial sectors is projected to decline in both 2015 and 2016.

## U.S. Natural Gas Consumption

[DOWNLOAD](#)



eia



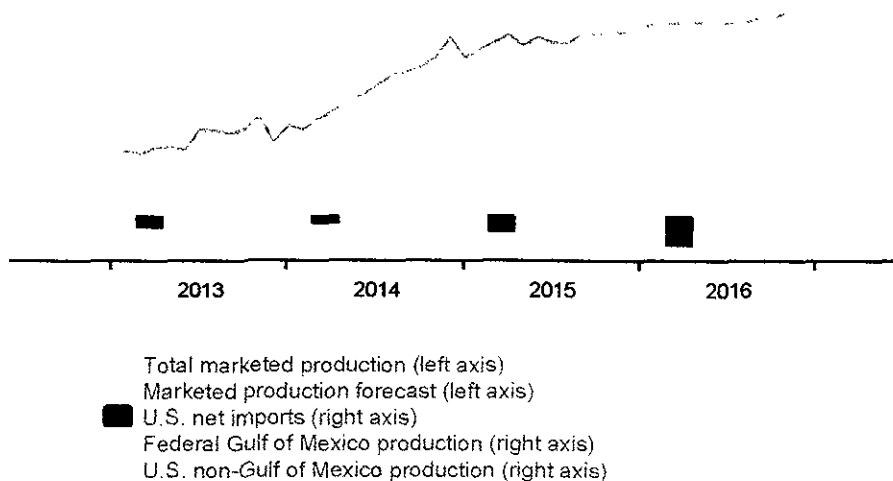
EIA expects that marketed natural gas production will increase by 4.2 Bcf/d (5.7%) and by 1.7 Bcf/d (2.2%) in 2015 and 2016, respectively. EIA expects moderate production growth through 2016, with increases in the Lower 48 states expected to more than offset continuing production declines in the Gulf of Mexico. Increases in drilling efficiency will continue to support growing natural gas production in the forecast despite relatively low natural gas prices. Most of the growth is expected to come from the Marcellus Shale as the backlog of uncompleted wells is reduced and as new pipelines come online to deliver Marcellus natural gas to markets in the Northeast.

Increases in domestic natural gas production are expected to reduce demand for natural gas imports from Canada and to support growth in exports to Mexico. Earlier this year, natural gas net imports fell to the lowest monthly level since 1987, averaging 2.3 Bcf/d in both May and June. EIA expects natural gas exports to Mexico, particularly from the Eagle Ford Shale in South Texas, to increase because of growing demand from Mexico's electric power sector coupled with flat natural gas production in Mexico.

EIA projects liquefied natural gas (LNG) gross exports will increase to an average of 0.79 Bcf/d in 2016, with the startup of a major LNG liquefaction plant in the Lower 48 states.

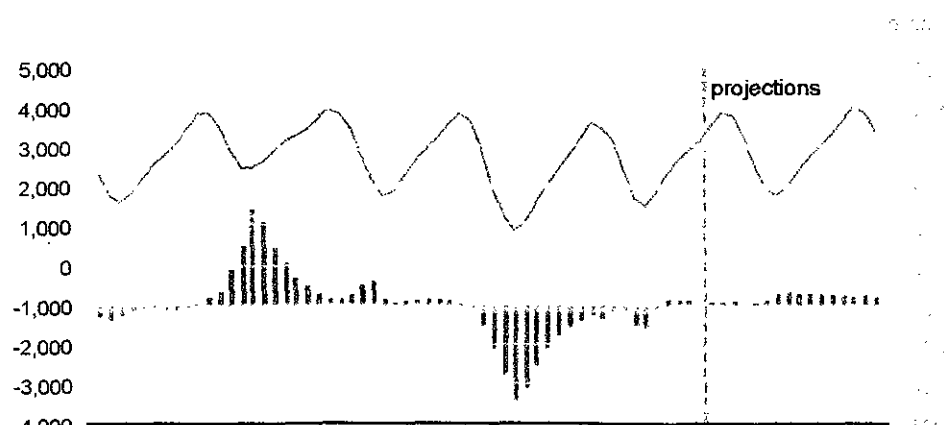
### U.S. Natural Gas Production and Imports

 [DOWNLOAD](#)



eia

On August 28, natural gas working inventories totaled 3,193 Bcf, 495 Bcf (18%) above the level at the same time in 2014 and 122 Bcf (4%) above the five-year average for that week. EIA projects end-of-October 2015 inventories will total 3,840 Bcf, which would be 43 Bcf above the five-year average.

**U.S. Working Natural Gas in Storage**
 **DOWNLOAD**


Note: Colored band around storage levels represents the range between the maximum and minimum storage levels between 2010 and Oct. 2014.

The Henry Hub natural gas spot price averaged \$2.77/MMBtu in August, a decrease of 7 cents/MMBtu from the July price. The current STEO lowers the projection for prices slightly from last month's forecast; monthly average spot prices remain lower than \$3/MMBtu through November, and lower than \$4/MMBtu through the remainder of the forecast. The projected Henry Hub natural gas price averages \$2.84/MMBtu in 2015 and \$3.11/MMBtu in 2016.

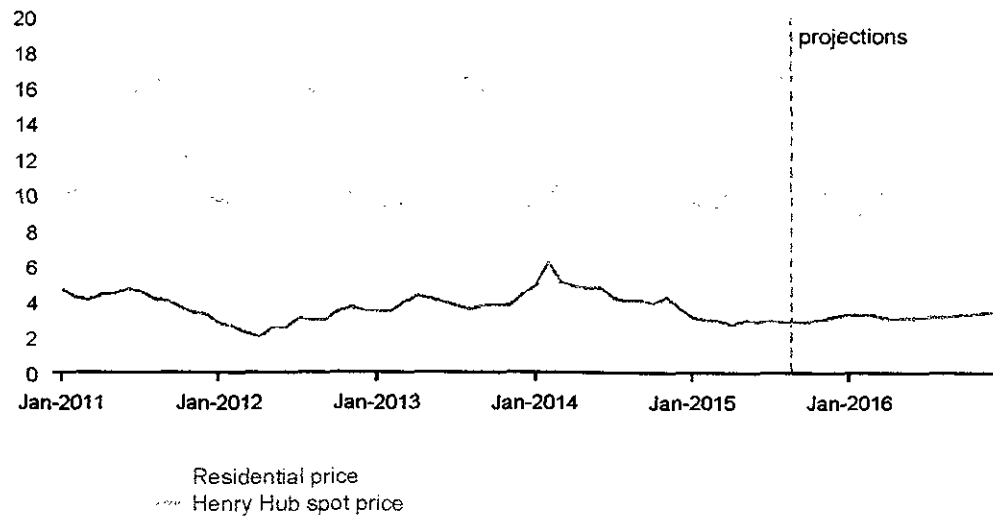
Natural gas futures contracts for December 2015 delivery traded during the five-day period ending September 3 averaged \$2.91/MMBtu. Current options and futures prices imply that market participants place the lower and upper bounds for the 95% confidence interval for December 2015 contracts at \$2.08/MMBtu and \$4.06/MMBtu, respectively. At this time in 2014, the natural gas futures contract for December 2014 delivery averaged \$4.07 /MMBtu, and the corresponding lower and upper limits of the 95% confidence interval were \$3.09/MMBtu and \$5.35/MMBtu, respectively.

## Henry Hub Natural Gas Price

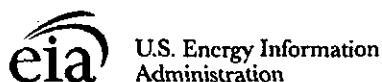
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Henry Hub natural gas spot price is the benchmark for U.S. natural gas pricing. The price is quoted in dollars per million British thermal units (Btu) and is based on the first day of the month. The price is based on the first day of the month and is based on the first day of the month.

## U.S. Natural Gas Prices

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eia



## Weekly Natural Gas Storage Report

for week ending September 26, 2015 | Released: October 1, 2015 at 10:30 a.m. | Next Release: October 8, 2015

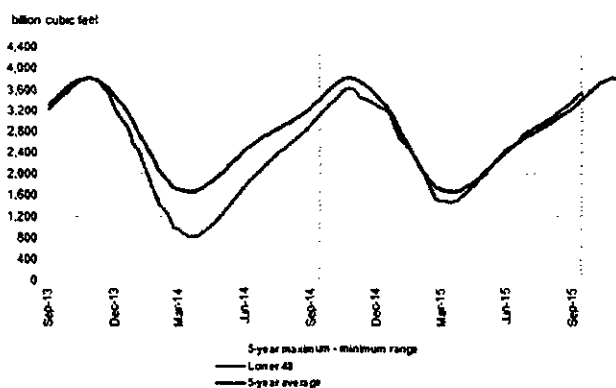
| Summary text |          | CSV      | JSN Working gas in underground storage, lower 48 states |              |                        |          |                               |          |
|--------------|----------|----------|---------------------------------------------------------|--------------|------------------------|----------|-------------------------------|----------|
|              |          |          | Historical Comparisons                                  |              |                        |          |                               |          |
|              |          |          | Stocks<br>billion cubic feet (Bcf)                      |              | Year ago<br>(09/25/14) |          | 5-Year average<br>(2010-2014) |          |
| Region       | 09/25/15 | 09/18/15 | net change                                              | implied flow | (Bcf)                  | % change | (Bcf)                         | % change |
| East         | 1,804    | 1,742    | 62                                                      | 62           | 1,704                  | 5.9      | 1,829                         | -1.4     |
| West         | 502      | 496      | 6                                                       | 6            | 452                    | 11.1     | 488                           | 2.9      |
| Producing    | 1,232    | 1,202    | 30                                                      | 30           | 928                    | 32.8     | 1,068                         | 15.4     |
| Salt         | 321      | 312      | 9                                                       | 9            | 246                    | 30.5     | 216                           | 48.6     |
| Nonsalt      | 911      | 890      | 21                                                      | 21           | 682                    | 33.6     | 852                           | 6.9      |
| Total        | 3,538    | 3,440    | 98                                                      | 98           | 3,064                  | 14.7     | 3,386                         | 4.5      |

The U.S. Energy Information Administration previously announced upcoming changes to the Weekly Natural Gas Storage Report (WNGSR). Details and dates for the public testing of the new file formats can be found at: <http://ir.eia.gov/ngs/notice.html>.

### Summary

Working gas in storage was 3,538 Bcf as of Friday, September 25, 2015, according to EIA estimates. This represents a net increase of 98 Bcf from the previous week. Stocks were 454 Bcf higher than last year at this time and 152 Bcf above the 5-year average of 3,386 Bcf. In the East Region, stocks were 25 Bcf below the 5-year average following net injections of 62 Bcf. Stocks in the Producing Region were 164 Bcf above the 5-year average of 1,068 Bcf after a net injection of 30 Bcf. Stocks in the West Region were 14 Bcf above the 5-year average after a net addition of 6 Bcf. At 3,538 Bcf, total working gas is within the 5-year historical range.

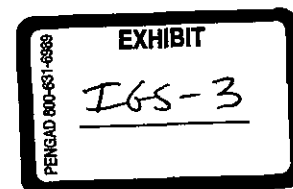
Working gas in underground storage compared with the 5-year maximum and minimum



Source: U.S. Energy Information Administration

Note: The shaded area indicates the range between the historical minimum and maximum values for the weekly series from 2010 through 2014.

Source: Form EIA-912, "Weekly Underground Natural Gas Storage Report." The dashed vertical lines indicate current and year-ago weekly periods.



OHIO POWER COMPANY'S RESPONSES TO  
IGS ENERGY'S DISCOVERY REQUESTS  
PUCO CASE NO. 14-1693-EL-RDR  
SECOND SET

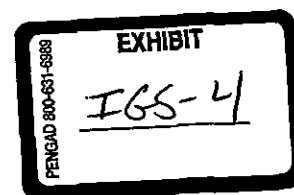
**INTERROGATORY**

- INT-2-006      Regarding the AuroraXMP model runs identified by witness Bletzecker.
- a. For each year of the forecast, identify the level of solar resource construction assumed by the model.
  - b. For each year of the forecast, identify the level of wind resource construction assumed by the model.
  - c. For each year of the forecast, identify the level of assumed energy efficiency in each state, including combined heat and power construction assumed by the model.

**RESPONSE**

a.-c. Please refer to file IGS-INT-2-006 Attachment 1.

Prepared by: Karl R. Bletzacker



Solar and Wind Resource Construction (MW)

| Year | Solar | Wind |
|------|-------|------|
| 2013 | 140   | 1050 |
| 2014 | -     | 75   |
| 2015 | 240   | -    |
| 2016 | 360   | 450  |
| 2017 | 400   | -    |
| 2018 | 360   | -    |
| 2019 | 240   | -    |
| 2020 | 620   | -    |
| 2021 | 220   | 150  |
| 2022 | 180   | -    |
| 2023 | 180   | 225  |
| 2024 | 160   | -    |
| 2025 | 120   | -    |
| 2026 | 180   | -    |
| 2027 | 100   | -    |
| 2028 | 120   | -    |
| 2029 | 100   | -    |
| 2030 | -     | -    |
| 2031 | -     | -    |
| 2032 | -     | -    |
| 2033 | -     | -    |
| 2034 | 40    | 1650 |
| 2035 | -     | -    |

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**NERC Region Energy Forecasts  
Adjustment for Energy Efficiency**

| <b>Year</b> | <b>Scaling<br/>Factor</b> | <b>Percentage<br/>Load<br/>Reduction</b> |
|-------------|---------------------------|------------------------------------------|
| 2013        | 0.99519                   | 0.48%                                    |
| 2014        | 0.99126                   | 0.87%                                    |
| 2015        | 0.98723                   | 1.28%                                    |
| 2016        | 0.98358                   | 1.64%                                    |
| 2017        | 0.98006                   | 1.99%                                    |
| 2018        | 0.97695                   | 2.30%                                    |
| 2019        | 0.97391                   | 2.61%                                    |
| 2020        | 0.97090                   | 2.91%                                    |
| 2021        | 0.96800                   | 3.20%                                    |
| 2022        | 0.96580                   | 3.42%                                    |
| 2023        | 0.96385                   | 3.61%                                    |
| 2024        | 0.96234                   | 3.77%                                    |
| 2025        | 0.96026                   | 3.97%                                    |
| 2026        | 0.95862                   | 4.14%                                    |
| 2027        | 0.95699                   | 4.30%                                    |
| 2028        | 0.95561                   | 4.44%                                    |
| 2029        | 0.95348                   | 4.65%                                    |
| 2030        | 0.95163                   | 4.84%                                    |

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OHIO POWER COMPANY'S RESPONSES TO  
SIERRA CLUB'S DISCOVERY REQUESTS  
PUCO CASE NO. 14-1693-EL-RDR  
SIXTH SET

**INTERROGATORY**

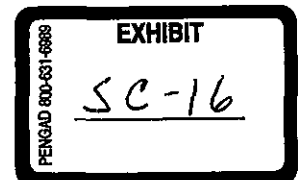
INT-6-138 Refer to your response to IEU INT-4-002.

- a. State whether the Company, AEPSC, AEPGR, or AEP has evaluated whether additional capital expenditures would be needed at any of the PPA Units to avoid penalties under the capacity performance construct.
  - i. If so:
    - 1. Explain the results of such analysis
    - 2. Identify any written report or other documentation of such analysis
    - 3. Identify which corporate entity undertook such analysis
    - 4. Identify by name, employer, and position who was involved in such analysis.
  - ii. If not, explain why not.

**RESPONSE**

a. *At this time, the Company has not evaluated and projected the cost, if any, of additional capital investment above the level included in this filing which could potentially result in reducing any PJM reliability charges under the capacity performance construct. Such evaluations will be an ongoing process.*

Prepared by: Kelly D Pearce and Toby L. Thomas



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OHIO POWER COMPANY'S RESPONSES TO  
SIERRA CLUB'S DISCOVERY REQUESTS  
PUCO CASE NO. 14-1693-EL-RDR  
SIXTH SET

**INTERROGATORY**

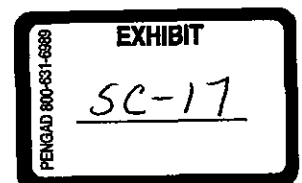
INT-6-146            What percentage of AEPGR's generation fleet located in Ohio or serving Ohio load is fueled from:

- a.            Coal
- b.            Natural gas
- c.            Combined heat and power
- d.            Wind
- e.            Solar
- f.            Geothermal

**RESPONSE**

- a. Coal 79.3% of AEPGR's generation fleet in Ohio is coal.
- b. Natural gas 20.0% of AEPGR's generation fleet in Ohio is gas.
- c. Combined heat and power 0% of AEPGR's generation fleet in Ohio is combined heat and power.
- d. Wind 0% of AEPGR's generation fleet in Ohio is wind.
- e. Solar 0% of AEPGR's generation fleet in Ohio is solar.
- f. Geothermal 0% of AEPGR's generation fleet in Ohio is geothermal.
- g. Hydro 0.7% of AEPGR's generation fleet in Ohio is hydro.

Prepared by: Toby L. Thomas



| Y2013H1 Reference |                 |                      |                       |                           |
|-------------------|-----------------|----------------------|-----------------------|---------------------------|
| Year              | Growth Rate (%) | Real Growth Rate (%) | Implied Inflation (%) | Exchange Rate (Euro/\$US) |
| 2011              | 5.3             | 3.1                  | 2.1                   | 1.39                      |
| 2012              | 3.9             | 2.1                  | 1.8                   | 1.29                      |
| 2013              | 3.6             | 2.1                  | 1.5                   | 1.32                      |
| 2014              | 4.6             | 2.5                  | 2.1                   | 1.27                      |
| 2015              | 4.7             | 2.6                  | 2.2                   | 1.25                      |
| 2016              | 4.7             | 2.5                  | 2.2                   | 1.25                      |
| 2017              | 4.5             | 2.3                  | 2.1                   | 1.25                      |
| 2018              | 4.5             | 2.3                  | 2.2                   | 1.25                      |
| 2019              | 4.3             | 2.3                  | 2.0                   | 1.25                      |
| 2020              | 4.1             | 2.2                  | 1.9                   | 1.25                      |
| 2021              | 4.1             | 2.3                  | 1.9                   | 1.25                      |
| 2022              | 4.2             | 2.2                  | 1.9                   | 1.25                      |
| 2023              | 4.2             | 2.2                  | 2.0                   | 1.25                      |
| 2024              | 4.2             | 2.2                  | 2.0                   | 1.25                      |
| 2025              | 4.2             | 2.2                  | 2.0                   | 1.25                      |
| 2026              | 4.1             | 2.2                  | 2.0                   | 1.25                      |
| 2027              | 4.1             | 2.1                  | 2.0                   | 1.25                      |
| 2028              | 4.0             | 2.1                  | 1.9                   | 1.25                      |
| 2029              | 4.0             | 2.1                  | 1.9                   | 1.25                      |
| 2030              | 4.0             | 2.1                  | 1.9                   | 1.25                      |
| 2031              | 4.0             | 2.1                  | 1.9                   | 1.25                      |
| 2032              | 4.0             | 2.1                  | 1.9                   | 1.25                      |
| 2033              | 3.9             | 2.1                  | 1.9                   | 1.25                      |
| 2034              | 3.9             | 2.1                  | 1.9                   | 1.25                      |
| 2035              | 3.9             | 2.1                  | 1.8                   | 1.25                      |

| Time Period      | Definition                                                           |
|------------------|----------------------------------------------------------------------|
| On-Peak          | normal peak hours: 5 days x 16 hours                                 |
| Off-Peak         | ALL hours not on-peak (5 days x 8 hours + 2 days x 24 hours weekend) |
| Nights           | ALL night hours: 7 days x 8 hours                                    |
| Weekends         | all weekend hours: 2 days x 24 hours                                 |
| Weekend Peak     | normal peak hours weekend only: 2 days x 16 hours                    |
| PROMOD Weeknight | 32 hrs (excludes Friday night)                                       |
| PROMOD Weekend   | 56 hrs (includes Friday night - Monday morning)                      |

#### 1.1023 Short ton to Metric Tonne conversion factor

| Year | Power Prices (\$/MWh) - Nominal \$'s |          |         |          |             |          |             |          |            |          |
|------|--------------------------------------|----------|---------|----------|-------------|----------|-------------|----------|------------|----------|
|      | PJM - AEP GEN HUB                    |          | SPP     |          | ERCOT North |          | ERCOT South |          | ERCOT West |          |
|      | On-Peak                              | Off-Peak | On-Peak | Off-Peak | On-Peak     | Off-Peak | On-Peak     | Off-Peak | On-Peak    | Off-Peak |
| 2013 | 34.37                                | 23.40    | 34.02   | 23.50    | 30.71       | 29.33    | 30.96       | 29.60    | 29.94      | 28.53    |
| 2014 | 37.94                                | 24.50    | 41.16   | 26.95    | 37.86       | 35.77    | 38.06       | 35.99    | 36.96      | 34.91    |
| 2015 | 48.38                                | 28.52    | 47.93   | 30.98    | 41.67       | 39.60    | 41.81       | 39.73    | 40.66      | 38.60    |
| 2016 | 55.92                                | 34.10    | 53.00   | 35.50    | 45.32       | 43.11    | 46.02       | 43.79    | 44.39      | 42.24    |
| 2017 | 58.33                                | 37.38    | 55.91   | 37.99    | 46.97       | 44.72    | 47.52       | 45.26    | 45.95      | 43.75    |
| 2018 | 59.02                                | 38.37    | 56.96   | 39.47    | 47.75       | 45.50    | 48.23       | 45.95    | 46.69      | 44.44    |
| 2019 | 59.69                                | 39.25    | 58.35   | 41.11    | 48.47       | 46.09    | 48.68       | 46.28    | 47.29      | 44.89    |
| 2020 | 61.51                                | 40.76    | 60.60   | 43.05    | 49.80       | 47.64    | 50.12       | 47.85    | 48.64      | 46.42    |
| 2021 | 64.04                                | 42.25    | 64.14   | 45.34    | 52.21       | 50.02    | 52.58       | 50.23    | 51.01      | 48.75    |
| 2022 | 72.74                                | 53.89    | 71.59   | 54.52    | 60.55       | 58.14    | 60.94       | 58.39    | 59.26      | 56.79    |
| 2023 | 74.33                                | 54.86    | 73.41   | 55.90    | 61.42       | 58.99    | 61.78       | 59.22    | 60.11      | 57.60    |
| 2024 | 75.87                                | 56.20    | 76.11   | 57.84    | 63.28       | 60.71    | 63.56       | 60.85    | 61.90      | 59.26    |
| 2025 | 77.51                                | 57.24    | 78.77   | 59.67    | 64.72       | 62.29    | 65.13       | 62.49    | 63.37      | 60.84    |
| 2026 | 78.86                                | 58.16    | 79.76   | 61.29    | 65.57       | 63.20    | 65.91       | 63.32    | 64.19      | 61.70    |
| 2027 | 80.60                                | 59.05    | 82.49   | 63.15    | 67.33       | 64.82    | 67.65       | 64.89    | 65.91      | 63.28    |
| 2028 | 81.99                                | 60.20    | 84.68   | 64.68    | 68.27       | 66.00    | 68.59       | 66.01    | 66.83      | 64.43    |
| 2029 | 83.65                                | 61.45    | 86.60   | 66.55    | 69.88       | 67.52    | 70.21       | 67.49    | 68.43      | 65.91    |
| 2030 | 84.41                                | 62.69    | 89.22   | 68.29    | 70.73       | 68.41    | 70.96       | 68.30    | 69.24      | 66.76    |
| 2031 | 86.04                                | 64.20    | 91.67   | 70.46    | 72.40       | 70.04    | 72.58       | 69.85    | 70.89      | 68.35    |
| 2032 | 88.14                                | 66.16    | 95.35   | 73.61    | 74.37       | 71.77    | 74.46       | 71.54    | 72.76      | 70.04    |
| 2033 | 90.15                                | 68.50    | 97.29   | 75.30    | 75.34       | 73.20    | 75.53       | 72.91    | 73.78      | 71.44    |
| 2034 | 88.94                                | 70.00    | 91.11   | 72.19    | 77.14       | 75.05    | 77.23       | 74.62    | 75.53      | 73.23    |
| 2035 | 91.25                                | 71.70    | 94.28   | 74.87    | 78.90       | 76.72    | 78.98       | 76.30    | 77.27      | 74.87    |

| Year | 12395 Btu/lb<br>1.6# SO2<br>CAPP | 12500 Btu/lb<br>1.6# SO2<br>CAPP CSX-Rail | 12000 Btu/lb<br>1.2# SO2<br>CAPP Compliance | 12000 Btu/lb<br>1.67# SO2<br>CAPP NYMEX | Coal (\$/ton) FOB<br>12500 Btu/lb<br>6# SO2<br>NAPP High Sulfur | Nominal \$'s<br>13000 Btu/lb<br>4# SO2<br>NAPP Med Sulfur | 11512 Btu/lb<br>4.3# SO2<br>I-Basin | 8800 Btu/lb<br>0.8# SO2<br>PRB 8800 | 8400 Btu/lb<br>0.8# SO2<br>PRB 8400 | 11700 Btu/lb<br>0.9# SO2<br>Colorado |
|------|----------------------------------|-------------------------------------------|---------------------------------------------|-----------------------------------------|-----------------------------------------------------------------|-----------------------------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------------------|
| 2013 | 63.46                            | 64.00                                     | 75.00                                       | 62.85                                   | 55.00                                                           | 58.65                                                     | 49.45                               | 11.25                               | 10.10                               | 35.59                                |
| 2014 | 68.42                            | 69.00                                     | 77.00                                       | 66.50                                   | 57.00                                                           | 62.40                                                     | 51.45                               | 12.50                               | 10.70                               | 35.83                                |
| 2015 | 72.39                            | 73.00                                     | 78.00                                       | 71.00                                   | 59.00                                                           | 64.90                                                     | 53.45                               | 13.50                               | 11.35                               | 38.27                                |
| 2016 | 73.25                            | 73.87                                     | 72.90                                       | 71.20                                   | 61.00                                                           | 67.10                                                     | 53.15                               | 13.20                               | 11.35                               | 38.42                                |
| 2017 | 74.60                            | 75.23                                     | 72.60                                       | 71.90                                   | 71.14                                                           | 69.49                                                     | 53.95                               | 13.44                               | 11.75                               | 39.10                                |
| 2018 | 77.68                            | 78.04                                     | 72.60                                       | 72.10                                   | 75.06                                                           | 73.82                                                     | 56.91                               | 13.68                               | 11.96                               | 39.19                                |
| 2019 | 81.77                            | 82.46                                     | 72.60                                       | 72.10                                   | 79.83                                                           | 79.15                                                     | 60.65                               | 14.42                               | 12.45                               | 39.39                                |
| 2020 | 86.29                            | 87.02                                     | 75.00                                       | 74.20                                   | 83.40                                                           | 84.25                                                     | 63.42                               | 15.49                               | 13.23                               | 39.29                                |
| 2021 | 86.35                            | 87.08                                     | 76.20                                       | 74.80                                   | 83.50                                                           | 83.42                                                     | 63.56                               | 15.44                               | 13.19                               | 40.46                                |
| 2022 | 90.99                            | 91.76                                     | 80.70                                       | 79.70                                   | 85.91                                                           | 86.80                                                     | 65.01                               | 16.36                               | 13.96                               | 40.56                                |
| 2023 | 94.43                            | 95.23                                     | 84.80                                       | 83.30                                   | 88.34                                                           | 91.73                                                     | 67.85                               | 16.97                               | 14.49                               | 41.15                                |
| 2024 | 96.90                            | 97.72                                     | 91.01                                       | 89.07                                   | 88.78                                                           | 91.96                                                     | 68.04                               | 16.73                               | 14.29                               | 41.53                                |
| 2025 | 99.97                            | 100.82                                    | 92.49                                       | 93.10                                   | 88.63                                                           | 91.75                                                     | 68.27                               | 16.68                               | 14.24                               | 43.19                                |
| 2026 | 103.53                           | 104.41                                    | 104.05                                      | 102.11                                  | 88.74                                                           | 91.91                                                     | 68.37                               | 16.88                               | 14.45                               | 43.39                                |
| 2027 | 105.71                           | 106.61                                    | 106.91                                      | 104.97                                  | 89.30                                                           | 91.16                                                     | 68.47                               | 17.14                               | 14.62                               | 45.14                                |
| 2028 | 108.22                           | 109.14                                    | 108.12                                      | 106.18                                  | 89.70                                                           | 89.82                                                     | 68.07                               | 17.38                               | 15.10                               | 46.41                                |
| 2029 | 112.66                           | 113.61                                    | 115.22                                      | 113.28                                  | 89.90                                                           | 91.81                                                     | 68.57                               | 17.89                               | 15.42                               | 46.60                                |
| 2030 | 117.43                           | 118.42                                    | 117.18                                      | 116.75                                  | 90.10                                                           | 93.44                                                     | 69.57                               | 20.10                               | 17.28                               | 47.12                                |
| 2031 | 119.98                           | 121.00                                    | 119.15                                      | 120.25                                  | 91.10                                                           | 94.98                                                     | 69.77                               | 22.48                               | 19.54                               | 46.96                                |
| 2032 | 122.95                           | 123.99                                    | 125.74                                      | 123.80                                  | 93.40                                                           | 97.99                                                     | 71.57                               | 26.50                               | 23.24                               | 47.00                                |
| 2033 | 126.16                           | 127.23                                    | 127.51                                      | 129.25                                  | 97.39                                                           | 101.99                                                    | 73.82                               | 30.05                               | 26.38                               | 47.48                                |
| 2034 | 130.12                           | 131.22                                    | 129.29                                      | 130.76                                  | 102.12                                                          | 105.20                                                    | 77.82                               | 33.38                               | 29.39                               | 48.25                                |
| 2035 | 133.27                           | 134.40                                    | 134.21                                      | 132.27                                  | 105.59                                                          | 108.36                                                    | 80.81                               | 32.80                               | 28.78                               | 49.24                                |

| Year | Natural Gas (\$/mmbtu) - Nominal \$'s |          |                   |           |      |            |                     |      | Uranium Fuel UO2 (\$/mmbtu) - Nominal \$'s |
|------|---------------------------------------|----------|-------------------|-----------|------|------------|---------------------|------|--------------------------------------------|
|      | Henry Hub                             | TCO Pool | Union South Point | TCO Deliv | HSC  | PEPL TX-OK | Swing Service Adder |      |                                            |
| 2013 | 4.04                                  | 4.11     | 4.08              | 4.39      | 3.91 | 3.79       | 0.25                | 0.82 |                                            |
| 2014 | 5.05                                  | 5.10     | 5.06              | 5.40      | 4.94 | 4.80       | 0.25                | 0.84 |                                            |
| 2015 | 5.47                                  | 5.49     | 5.48              | 5.80      | 5.37 | 5.22       | 0.25                | 0.85 |                                            |
| 2016 | 5.83                                  | 5.86     | 5.84              | 6.17      | 5.73 | 5.58       | 0.25                | 0.87 |                                            |
| 2017 | 6.01                                  | 6.03     | 6.02              | 6.35      | 5.91 | 5.76       | 0.25                | 0.89 |                                            |
| 2018 | 6.12                                  | 6.14     | 6.13              | 6.46      | 6.02 | 5.87       | 0.25                | 0.91 |                                            |
| 2019 | 6.19                                  | 6.21     | 6.20              | 6.53      | 6.09 | 5.94       | 0.25                | 0.92 |                                            |
| 2020 | 6.43                                  | 6.45     | 6.44              | 6.78      | 6.33 | 6.18       | 0.25                | 0.94 |                                            |
| 2021 | 6.75                                  | 6.77     | 6.76              | 7.11      | 6.65 | 6.50       | 0.25                | 0.96 |                                            |
| 2022 | 7.18                                  | 7.20     | 7.19              | 7.54      | 7.08 | 6.93       | 0.25                | 0.98 |                                            |
| 2023 | 7.30                                  | 7.32     | 7.31              | 7.67      | 7.20 | 7.05       | 0.25                | 1.00 |                                            |
| 2024 | 7.51                                  | 7.52     | 7.52              | 7.88      | 7.40 | 7.26       | 0.25                | 1.02 |                                            |
| 2025 | 7.75                                  | 7.76     | 7.75              | 8.12      | 7.64 | 7.49       | 0.25                | 1.04 |                                            |
| 2026 | 7.85                                  | 7.86     | 7.86              | 8.23      | 7.74 | 7.60       | 0.26                | 1.06 |                                            |
| 2027 | 8.04                                  | 8.06     | 8.05              | 8.42      | 7.94 | 7.79       | 0.26                | 1.08 |                                            |
| 2028 | 8.22                                  | 8.24     | 8.23              | 8.61      | 8.12 | 7.97       | 0.27                | 1.10 |                                            |
| 2029 | 8.41                                  | 8.42     | 8.41              | 8.79      | 8.30 | 8.15       | 0.27                | 1.13 |                                            |
| 2030 | 8.52                                  | 8.54     | 8.53              | 8.91      | 8.42 | 8.27       | 0.28                | 1.15 |                                            |
| 2031 | 8.73                                  | 8.75     | 8.74              | 9.13      | 8.63 | 8.48       | 0.28                | 1.17 |                                            |
| 2032 | 8.94                                  | 8.96     | 8.95              | 9.34      | 8.84 | 8.69       | 0.28                | 1.19 |                                            |
| 2033 | 9.16                                  | 9.18     | 9.17              | 9.56      | 9.06 | 8.91       | 0.28                | 1.22 |                                            |
| 2034 | 9.39                                  | 9.41     | 9.40              | 9.80      | 9.29 | 9.14       | 0.28                | 1.24 |                                            |
| 2035 | 9.61                                  | 9.63     | 9.62              | 10.02     | 9.51 | 9.36       | 0.28                | 1.27 |                                            |

| Year | Emissions (\$/ton) - Nominal \$'s |                        |                        | (\$/metric tonne) -<br>Nominal \$'s |  | Heat Rates (mmBtu/MWh) |          |                  |                  |                 |  |
|------|-----------------------------------|------------------------|------------------------|-------------------------------------|--|------------------------|----------|------------------|------------------|-----------------|--|
|      | SO <sub>2</sub>                   | NO <sub>x</sub> Annual | NO <sub>x</sub> Summer | CO <sub>2</sub>                     |  | AEP GEN HUB - HR       | SPP - HR | ERCOT North - HR | ERCOT South - HR | ERCOT West - HR |  |
| 2013 | 0                                 | 0                      | 0                      | 0.00                                |  | 8.44                   | 9.01     | 7.87             | 7.93             | 6.81            |  |
| 2014 | 0                                 | 0                      | 0                      | 0.00                                |  | 7.46                   | 8.60     | 7.71             | 7.71             | 6.85            |  |
| 2015 | 0                                 | 0                      | 0                      | 0.00                                |  | 8.83                   | 9.20     | 7.77             | 7.80             | 7.02            |  |
| 2016 | 0                                 | 0                      | 0                      | 0.00                                |  | 9.38                   | 9.51     | 7.92             | 8.05             | 7.21            |  |
| 2017 | 0                                 | 0                      | 0                      | 0.00                                |  | 9.69                   | 9.72     | 7.96             | 8.06             | 7.25            |  |
| 2018 | 0                                 | 0                      | 0                      | 0.00                                |  | 9.66                   | 9.72     | 7.95             | 8.08             | 7.24            |  |
| 2019 | 0                                 | 0                      | 0                      | 0.00                                |  | 9.64                   | 9.85     | 7.97             | 8.01             | 7.25            |  |
| 2020 | 0                                 | 0                      | 0                      | 0.00                                |  | 9.66                   | 9.83     | 7.88             | 7.93             | 7.18            |  |
| 2021 | 0                                 | 0                      | 0                      | 0.00                                |  | 9.47                   | 9.89     | 7.86             | 7.92             | 7.19            |  |
| 2022 | 0                                 | 0                      | 0                      | 15.08                               |  | 10.12                  | 10.35    | 8.58             | 8.62             | 7.86            |  |
| 2023 | 0                                 | 0                      | 0                      | 15.28                               |  | 10.17                  | 10.43    | 8.54             | 8.59             | 7.85            |  |
| 2024 | 0                                 | 0                      | 0                      | 15.48                               |  | 10.10                  | 10.51    | 8.55             | 8.59             | 7.86            |  |
| 2025 | 0                                 | 0                      | 0                      | 15.67                               |  | 10.00                  | 10.52    | 8.48             | 8.53             | 7.81            |  |
| 2026 | 0                                 | 0                      | 0                      | 15.88                               |  | 10.04                  | 10.51    | 8.47             | 8.51             | 7.81            |  |
| 2027 | 0                                 | 0                      | 0                      | 16.08                               |  | 10.01                  | 10.61    | 8.49             | 8.53             | 7.83            |  |
| 2028 | 0                                 | 0                      | 0                      | 16.29                               |  | 9.97                   | 10.64    | 8.42             | 8.46             | 7.77            |  |
| 2029 | 0                                 | 0                      | 0                      | 16.50                               |  | 9.95                   | 10.63    | 8.42             | 8.46             | 7.79            |  |
| 2030 | 0                                 | 0                      | 0                      | 16.72                               |  | 9.90                   | 10.81    | 8.41             | 8.43             | 7.77            |  |
| 2031 | 0                                 | 0                      | 0                      | 16.94                               |  | 9.85                   | 10.84    | 8.40             | 8.42             | 7.77            |  |
| 2032 | 0                                 | 0                      | 0                      | 17.16                               |  | 9.85                   | 10.99    | 8.42             | 8.43             | 7.80            |  |
| 2033 | 0                                 | 0                      | 0                      | 17.38                               |  | 9.83                   | 10.93    | 8.32             | 8.35             | 7.72            |  |
| 2034 | 0                                 | 0                      | 0                      | 17.60                               |  | 9.48                   | 9.97     | 8.31             | 8.32             | 7.71            |  |
| 2035 | 0                                 | 0                      | 0                      | 17.84                               |  | 9.48                   | 10.08    | 8.30             | 8.31             | 7.71            |  |

| Year | Capacity Prices (\$/MW-day) -<br>Nominal \$'s |          | Renewable Energy<br>Subsidies ** (\$/MWh)<br>Nominal \$'s |       | Inflation Factor |
|------|-----------------------------------------------|----------|-----------------------------------------------------------|-------|------------------|
|      | AEP GEN HUB Hub Cap.                          | SPP Cap. |                                                           |       |                  |
| 2013 | 23.03                                         | 25.00    | 48.40                                                     | 2.10% | 2.10%            |
| 2014 | 85.05                                         | 25.00    | 48.60                                                     | 2.10% | 2.10%            |
| 2015 | 131.83                                        | 26.47    | 49.20                                                     | 2.50% | 2.50%            |
| 2016 | 91.80                                         | 33.73    | 45.40                                                     | 2.60% | 2.60%            |
| 2017 | 132.49                                        | 41.30    | 46.60                                                     | 2.50% | 2.50%            |
| 2018 | 199.74                                        | 49.16    | 47.60                                                     | 2.30% | 2.30%            |
| 2019 | 215.54                                        | 57.40    | 48.60                                                     | 2.30% | 2.30%            |
| 2020 | 231.74                                        | 65.93    | 49.50                                                     | 2.30% | 2.30%            |
| 2021 | 248.55                                        | 74.80    | 50.60                                                     | 2.20% | 2.20%            |
| 2022 | 265.99                                        | 84.04    | 51.70                                                     | 2.30% | 2.30%            |
| 2023 | 284.08                                        | 93.64    | 52.80                                                     | 2.20% | 2.20%            |
| 2024 | 302.83                                        | 103.63   | 53.90                                                     | 2.20% | 2.20%            |
| 2025 | 321.95                                        | 113.90   | 55.00                                                     | 2.20% | 2.20%            |
| 2026 | 341.74                                        | 124.55   | 56.10                                                     | 2.20% | 2.20%            |
| 2027 | 362.23                                        | 135.60   | 57.10                                                     | 2.20% | 2.20%            |
| 2028 | 383.42                                        | 147.06   | 58.10                                                     | 2.10% | 2.10%            |
| 2029 | 394.85                                        | 158.95   | 59.30                                                     | 2.10% | 2.10%            |
| 2030 | 403.15                                        | 171.26   | 60.10                                                     | 2.10% | 2.10%            |
| 2031 | 411.61                                        | 184.03   | 0.00                                                      | 2.10% | 2.10%            |
| 2032 | 420.26                                        | 197.25   | 0.00                                                      | 2.10% | 2.10%            |
| 2033 | 429.08                                        | 210.95   | 0.00                                                      | 2.10% | 2.10%            |
| 2034 | 438.09                                        | 224.92   | 0.00                                                      | 2.10% | 2.10%            |
| 2035 | 447.29                                        | 239.59   | 0.00                                                      | 2.10% | 2.10%            |

| Year | SO2 Prices by State |      |      |      |      |      |      |      |      |      |      |      |
|------|---------------------|------|------|------|------|------|------|------|------|------|------|------|
|      | SO2 Prices          | AL   | AR   | CT   | DC   | DE   | FL   | GA   | IA   | IL   | IN   | KS   |
| 2013 | 2013                | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2014 | 2014                | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2015 | 2015                | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2016 | 2016                | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2017 | 2017                | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2018 | 2018                | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2019 | 2019                | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2020 | 2020                | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2021 | 2021                | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2022 | 2022                | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2023 | 2023                | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2024 | 2024                | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2025 | 2025                | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2026 | 2026                | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2027 | 2027                | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2028 | 2028                | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2029 | 2029                | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2030 | 2030                | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2031 | 0                   | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2032 | State Price         | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2033 |                     |      |      |      |      |      |      |      |      |      |      |      |
| 2034 |                     |      |      |      |      |      |      |      |      |      |      |      |
| 2035 |                     |      |      |      |      |      |      |      |      |      |      |      |

| Year | KY   | LA   | MA   | MD   | ME   | MI   | MN   | MO   | MS   | MT   | NC   | ND   | NE   |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 2013 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2014 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2015 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2016 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2017 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2018 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2019 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2020 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2021 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2022 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2023 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2024 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2025 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2026 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2027 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2028 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2029 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2030 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2031 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2032 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2033 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2034 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2035 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| Year | NH   | NJ   | NM   | NS   | NY   | OH   | OK   | PA   | RI   | SC   | SD   | TN   | TX   | VA   | VT   | WI   | WV   |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 2013 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2014 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2015 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2016 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2017 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2018 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2019 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2020 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2021 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2022 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2023 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2024 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2025 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2026 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2027 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2028 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2029 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2030 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2031 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2032 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2033 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2034 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2035 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| Month  | Power Prices (\$/MWh) -Nominal \$'s |          |         |          |             |          |             |          |            |          |
|--------|-------------------------------------|----------|---------|----------|-------------|----------|-------------|----------|------------|----------|
|        | PJM - AEP GEN HUB                   |          | SPP     |          | ERCOT-North |          | ERCOT-South |          | ERCOT-West |          |
|        | On-Peak                             | Off-Peak | On-Peak | Off-Peak | On-Peak     | Off-Peak | On-Peak     | Off-Peak | On-Peak    | Off-Peak |
| Jan-13 | 31.57                               | 24.07    | 28.91   | 21.94    | 25.58       | 24.86    | 25.61       | 25.05    | 24.79      | 24.01    |
| Feb-13 | 30.19                               | 24.20    | 27.18   | 21.51    | 24.77       | 24.33    | 24.93       | 24.52    | 23.96      | 23.45    |
| Mar-13 | 31.24                               | 24.03    | 27.73   | 20.89    | 25.55       | 25.03    | 25.57       | 25.22    | 24.62      | 24.16    |
| Apr-13 | 32.03                               | 22.19    | 30.59   | 21.05    | 29.38       | 28.35    | 29.60       | 28.77    | 28.53      | 27.62    |
| May-13 | 32.71                               | 21.76    | 33.11   | 21.94    | 31.08       | 29.56    | 31.57       | 29.86    | 30.33      | 28.78    |
| Jun-13 | 35.38                               | 23.12    | 36.16   | 24.66    | 31.11       | 30.20    | 31.52       | 30.56    | 30.43      | 29.45    |
| Jul-13 | 37.66                               | 22.60    | 37.86   | 25.00    | 30.10       | 28.52    | 30.41       | 28.73    | 29.61      | 27.73    |
| Aug-13 | 42.45                               | 24.94    | 44.66   | 28.38    | 33.47       | 31.14    | 33.65       | 31.41    | 32.85      | 30.38    |
| Sep-13 | 37.18                               | 24.16    | 34.86   | 23.69    | 35.02       | 32.59    | 35.42       | 32.97    | 34.32      | 31.82    |
| Oct-13 | 33.66                               | 21.52    | 34.68   | 22.37    | 33.27       | 31.84    | 33.85       | 32.40    | 32.61      | 31.22    |
| Nov-13 | 33.73                               | 23.42    | 35.63   | 24.45    | 34.09       | 31.67    | 34.29       | 31.73    | 33.15      | 30.79    |
| Dec-13 | 34.45                               | 24.69    | 36.36   | 25.73    | 34.81       | 33.50    | 34.77       | 33.64    | 33.77      | 32.59    |
| Jan-14 | 41.91                               | 26.89    | 43.25   | 26.98    | 39.46       | 37.66    | 39.26       | 37.71    | 38.27      | 36.69    |
| Feb-14 | 38.06                               | 27.22    | 41.35   | 27.81    | 38.47       | 37.39    | 38.29       | 37.32    | 37.32      | 36.36    |
| Mar-14 | 38.14                               | 24.87    | 38.41   | 22.71    | 36.86       | 34.75    | 36.66       | 34.96    | 35.69      | 33.88    |
| Apr-14 | 34.39                               | 23.70    | 35.97   | 23.10    | 36.00       | 33.75    | 36.01       | 33.97    | 34.93      | 32.91    |
| May-14 | 35.82                               | 22.22    | 38.42   | 23.86    | 35.90       | 33.96    | 36.28       | 34.32    | 35.04      | 33.22    |
| Jun-14 | 38.85                               | 24.22    | 41.96   | 28.58    | 36.30       | 35.06    | 36.76       | 35.41    | 35.55      | 34.29    |
| Jul-14 | 39.31                               | 23.90    | 44.59   | 30.43    | 39.63       | 37.12    | 40.06       | 37.39    | 39.03      | 36.29    |
| Aug-14 | 40.83                               | 24.65    | 53.65   | 34.51    | 39.38       | 36.75    | 39.61       | 37.07    | 38.70      | 36.00    |
| Sep-14 | 36.13                               | 22.85    | 39.49   | 26.28    | 39.89       | 36.87    | 39.98       | 36.86    | 39.02      | 35.86    |
| Oct-14 | 35.78                               | 22.30    | 36.97   | 23.70    | 36.91       | 35.51    | 37.41       | 35.88    | 36.09      | 34.68    |
| Nov-14 | 38.70                               | 25.84    | 39.89   | 26.82    | 37.57       | 34.37    | 38.05       | 34.64    | 36.68      | 33.56    |
| Dec-14 | 37.49                               | 25.44    | 40.30   | 28.38    | 38.03       | 36.27    | 38.14       | 36.64    | 37.01      | 35.47    |
| Jan-15 | 52.33                               | 32.34    | 49.52   | 32.68    | 43.21       | 41.76    | 43.19       | 41.78    | 41.99      | 40.65    |
| Feb-15 | 47.27                               | 30.04    | 47.32   | 31.82    | 42.19       | 41.44    | 42.21       | 41.36    | 41.03      | 40.29    |
| Mar-15 | 45.04                               | 28.30    | 43.72   | 27.51    | 40.49       | 38.76    | 39.98       | 38.76    | 39.16      | 37.68    |
| Apr-15 | 42.11                               | 26.54    | 41.85   | 26.38    | 39.39       | 37.52    | 39.62       | 37.88    | 38.37      | 36.69    |
| May-15 | 42.71                               | 25.31    | 42.46   | 27.62    | 39.76       | 37.80    | 40.29       | 38.36    | 38.86      | 36.98    |
| Jun-15 | 51.15                               | 28.33    | 49.94   | 31.89    | 40.21       | 38.91    | 40.55       | 39.08    | 39.34      | 37.92    |
| Jul-15 | 56.58                               | 29.17    | 59.10   | 36.08    | 44.58       | 41.07    | 44.79       | 41.12    | 43.77      | 40.04    |
| Aug-15 | 61.55                               | 30.84    | 63.07   | 38.81    | 44.31       | 40.78    | 44.24       | 40.85    | 43.45      | 39.80    |
| Sep-15 | 45.45                               | 26.29    | 44.97   | 28.18    | 43.29       | 39.94    | 43.42       | 40.01    | 42.40      | 38.90    |
| Oct-15 | 42.31                               | 26.03    | 41.32   | 28.02    | 40.01       | 38.40    | 40.32       | 38.50    | 39.08      | 37.39    |
| Nov-15 | 46.27                               | 28.49    | 45.23   | 30.60    | 40.98       | 38.40    | 41.38       | 38.49    | 39.95      | 37.42    |
| Dec-15 | 47.53                               | 30.61    | 46.39   | 31.90    | 41.57       | 40.53    | 41.65       | 40.73    | 40.42      | 39.49    |
| Jan-16 | 57.72                               | 39.41    | 53.44   | 38.01    | 46.16       | 45.00    | 46.77       | 45.64    | 45.09      | 44.09    |
| Feb-16 | 52.69                               | 36.47    | 51.56   | 36.77    | 45.07       | 44.36    | 45.69       | 44.90    | 44.07      | 43.42    |
| Mar-16 | 51.08                               | 34.19    | 47.99   | 31.31    | 43.40       | 42.16    | 43.81       | 42.93    | 42.26      | 41.40    |
| Apr-16 | 47.01                               | 31.28    | 46.10   | 31.92    | 42.38       | 41.04    | 42.98       | 41.69    | 41.39      | 40.24    |
| May-16 | 46.47                               | 28.99    | 46.41   | 30.45    | 44.08       | 41.51    | 45.06       | 42.21    | 43.15      | 40.56    |
| Jun-16 | 63.03                               | 33.80    | 56.67   | 36.90    | 44.38       | 42.36    | 45.45       | 43.22    | 43.64      | 41.55    |
| Jul-16 | 72.54                               | 36.85    | 67.57   | 43.22    | 50.48       | 44.72    | 51.05       | 45.35    | 49.72      | 43.87    |
| Aug-16 | 74.82                               | 35.41    | 70.48   | 43.87    | 49.09       | 44.63    | 49.52       | 45.38    | 48.25      | 43.79    |
| Sep-16 | 51.19                               | 29.42    | 49.91   | 31.02    | 47.30       | 43.35    | 47.90       | 43.84    | 46.43      | 42.35    |
| Oct-16 | 47.52                               | 31.47    | 45.09   | 31.33    | 43.04       | 41.56    | 43.91       | 42.21    | 42.29      | 40.71    |
| Nov-16 | 51.24                               | 34.06    | 49.01   | 33.24    | 43.84       | 42.31    | 44.74       | 42.98    | 42.79      | 41.43    |
| Dec-16 | 54.95                               | 37.48    | 51.12   | 37.51    | 44.54       | 44.19    | 45.37       | 45.10    | 43.57      | 43.42    |
| Jan-17 | 59.43                               | 43.08    | 56.46   | 40.17    | 47.73       | 46.66    | 48.48       | 47.45    | 46.67      | 45.81    |
| Feb-17 | 54.18                               | 40.29    | 52.48   | 39.31    | 46.61       | 45.89    | 47.03       | 46.27    | 45.49      | 44.81    |
| Mar-17 | 52.65                               | 38.27    | 49.33   | 33.57    | 44.79       | 43.72    | 44.92       | 44.21    | 43.54      | 42.76    |
| Apr-17 | 48.78                               | 34.94    | 47.41   | 33.15    | 43.89       | 42.45    | 44.30       | 43.03    | 42.65      | 41.54    |
| May-17 | 48.07                               | 31.17    | 47.92   | 31.70    | 44.46       | 42.38    | 45.27       | 43.05    | 43.52      | 41.43    |
| Jun-17 | 66.18                               | 36.34    | 62.04   | 39.83    | 46.51       | 43.85    | 47.40       | 44.56    | 45.70      | 43.01    |
| Jul-17 | 78.69                               | 39.53    | 74.96   | 46.75    | 52.48       | 46.69    | 52.77       | 47.12    | 51.51      | 45.71    |
| Aug-17 | 79.09                               | 38.54    | 75.38   | 48.30    | 51.97       | 46.61    | 52.12       | 47.25    | 50.94      | 45.66    |
| Sep-17 | 53.94                               | 32.81    | 51.93   | 33.28    | 49.07       | 45.02    | 49.60       | 45.36    | 48.16      | 43.92    |

|        |       |       |       |       |       |       |       |       |       |       |
|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Oct-17 | 49.10 | 34.70 | 46.25 | 32.68 | 44.53 | 42.96 | 45.28 | 43.41 | 43.69 | 41.95 |
| Nov-17 | 53.22 | 37.31 | 52.73 | 36.98 | 45.30 | 44.09 | 48.18 | 44.62 | 44.28 | 43.07 |
| Dec-17 | 55.74 | 40.83 | 53.26 | 39.91 | 46.44 | 46.26 | 46.83 | 46.69 | 45.26 | 45.18 |
| Jan-18 | 58.88 | 42.77 | 55.83 | 40.62 | 48.88 | 47.78 | 49.21 | 48.23 | 47.66 | 46.73 |
| Feb-18 | 55.71 | 42.79 | 53.89 | 41.37 | 47.39 | 46.75 | 47.94 | 47.15 | 46.36 | 45.69 |
| Mar-18 | 53.59 | 40.14 | 50.83 | 36.74 | 45.50 | 44.64 | 45.58 | 44.98 | 44.22 | 43.55 |
| Apr-18 | 49.65 | 35.29 | 48.28 | 33.80 | 44.22 | 43.16 | 44.52 | 43.60 | 43.07 | 42.15 |
| May-18 | 49.27 | 33.47 | 49.25 | 33.04 | 45.21 | 43.10 | 45.92 | 43.59 | 44.20 | 42.04 |
| Jun-18 | 62.67 | 35.74 | 60.55 | 38.47 | 46.23 | 44.42 | 47.15 | 45.09 | 45.41 | 43.54 |
| Jul-18 | 74.04 | 39.73 | 73.85 | 47.90 | 52.26 | 47.40 | 52.55 | 47.70 | 51.32 | 46.30 |
| Aug-18 | 82.41 | 39.99 | 78.48 | 51.55 | 53.46 | 47.03 | 54.13 | 47.96 | 52.60 | 46.18 |
| Sep-18 | 60.83 | 35.88 | 57.97 | 38.24 | 51.63 | 46.54 | 52.13 | 47.04 | 50.64 | 45.45 |
| Oct-18 | 50.11 | 34.89 | 47.96 | 33.52 | 45.43 | 43.79 | 46.02 | 43.98 | 44.44 | 42.62 |
| Nov-18 | 53.44 | 38.22 | 51.58 | 36.75 | 45.98 | 44.84 | 46.41 | 45.04 | 44.77 | 43.63 |
| Dec-18 | 56.94 | 41.68 | 54.31 | 41.44 | 46.75 | 46.45 | 47.14 | 46.93 | 45.56 | 45.37 |
| Jan-19 | 59.45 | 43.14 | 56.56 | 41.78 | 48.92 | 47.80 | 49.03 | 47.96 | 47.62 | 46.68 |
| Feb-19 | 55.86 | 43.34 | 55.05 | 41.92 | 47.82 | 47.24 | 47.95 | 47.26 | 46.58 | 45.96 |
| Mar-19 | 53.45 | 41.10 | 50.60 | 37.95 | 46.04 | 45.19 | 46.14 | 45.48 | 44.74 | 44.06 |
| Apr-19 | 50.40 | 36.07 | 48.72 | 34.28 | 44.77 | 43.73 | 44.86 | 43.93 | 43.51 | 42.57 |
| May-19 | 49.93 | 34.51 | 49.47 | 33.95 | 45.76 | 43.67 | 46.46 | 44.11 | 44.74 | 42.59 |
| Jun-19 | 64.89 | 37.30 | 64.91 | 42.28 | 46.66 | 44.96 | 47.44 | 45.36 | 45.77 | 43.89 |
| Jul-19 | 76.54 | 40.34 | 81.84 | 53.07 | 53.57 | 48.16 | 53.58 | 48.27 | 52.52 | 46.96 |
| Aug-19 | 83.23 | 41.44 | 78.33 | 54.92 | 56.19 | 49.02 | 55.81 | 49.17 | 54.89 | 47.75 |
| Sep-19 | 60.89 | 36.06 | 58.84 | 37.40 | 52.01 | 46.68 | 52.33 | 47.00 | 50.94 | 45.52 |
| Oct-19 | 50.16 | 36.25 | 48.52 | 34.87 | 45.93 | 44.30 | 46.28 | 44.26 | 44.86 | 43.02 |
| Nov-19 | 54.47 | 39.03 | 53.07 | 38.64 | 46.48 | 45.46 | 46.70 | 45.47 | 45.18 | 44.15 |
| Dec-19 | 56.83 | 42.39 | 53.85 | 41.83 | 47.21 | 46.87 | 47.37 | 47.05 | 45.95 | 45.63 |
| Jan-20 | 61.07 | 45.13 | 58.91 | 44.86 | 50.63 | 49.49 | 50.71 | 49.63 | 49.29 | 48.22 |
| Feb-20 | 57.60 | 44.59 | 57.13 | 43.43 | 49.60 | 48.95 | 49.79 | 49.04 | 48.34 | 47.68 |
| Mar-20 | 55.31 | 42.05 | 53.06 | 38.84 | 47.82 | 46.87 | 48.20 | 47.39 | 46.59 | 45.84 |
| Apr-20 | 51.98 | 37.58 | 51.07 | 36.07 | 46.66 | 45.50 | 47.19 | 45.96 | 45.50 | 44.40 |
| May-20 | 51.99 | 36.68 | 52.65 | 36.48 | 47.52 | 45.48 | 48.17 | 45.83 | 46.44 | 44.30 |
| Jun-20 | 68.41 | 40.29 | 66.22 | 46.07 | 48.38 | 46.72 | 49.19 | 47.10 | 47.45 | 45.59 |
| Jul-20 | 80.57 | 41.14 | 83.05 | 53.53 | 55.20 | 49.74 | 55.55 | 50.08 | 54.27 | 48.58 |
| Aug-20 | 82.23 | 42.04 | 83.22 | 57.31 | 54.29 | 49.27 | 54.43 | 49.57 | 53.27 | 48.16 |
| Sep-20 | 60.38 | 36.83 | 58.58 | 39.04 | 52.50 | 47.91 | 52.83 | 48.02 | 51.42 | 46.65 |
| Oct-20 | 52.98 | 37.87 | 52.38 | 36.95 | 47.66 | 46.05 | 47.98 | 45.95 | 46.53 | 44.71 |
| Nov-20 | 55.49 | 40.68 | 53.58 | 39.96 | 48.14 | 47.16 | 48.35 | 47.10 | 46.81 | 45.79 |
| Dec-20 | 59.21 | 44.45 | 56.62 | 43.69 | 48.93 | 48.60 | 48.85 | 48.67 | 47.56 | 47.26 |

| Month  | Coal (\$/ton) FOB -Nominal \$'s |                          |                          |                           |                        |                        |                          |                         |                         |                          |
|--------|---------------------------------|--------------------------|--------------------------|---------------------------|------------------------|------------------------|--------------------------|-------------------------|-------------------------|--------------------------|
|        | 12395 Btu/lb<br>1.6# SO2        | 12500 Btu/lb<br>1.6# SO2 | 12000 Btu/lb<br>1.2# SO2 | 12000 Btu/lb<br>1.67# SO2 | 12500 Btu/lb<br>6# SO2 | 13000 Btu/lb<br>4# SO2 | 11512 Btu/lb<br>4.3# SO2 | 8800 Btu/lb<br>0.8# SO2 | 8400 Btu/lb<br>0.8# SO2 | 11700 Btu/lb<br>0.9# SO2 |
|        | CAPP                            | CAPP CSX-Rail            | CAPP Compliance          | CAPP NYMEX                | NAPP High Sulfur       | NAPP Med Sulfur        | I-Basin                  | PRB 8800                | PRB 8400                | Colorado                 |
| Jan-13 | 64.15                           | 64.41                    | 72.40                    | 63.74                     | 59.93                  | 63.14                  | 51.92                    | 13.48                   | 11.95                   | 38.13                    |
| Feb-13 | 64.01                           | 64.33                    | 72.91                    | 63.56                     | 58.12                  | 62.21                  | 51.42                    | 13.00                   | 11.58                   | 37.61                    |
| Mar-13 | 63.87                           | 64.25                    | 73.43                    | 63.38                     | 57.32                  | 61.30                  | 50.92                    | 12.54                   | 11.19                   | 37.09                    |
| Apr-13 | 63.74                           | 64.17                    | 73.95                    | 63.20                     | 56.54                  | 60.41                  | 50.43                    | 12.09                   | 10.81                   | 36.58                    |
| May-13 | 63.60                           | 64.08                    | 74.47                    | 63.03                     | 55.76                  | 59.52                  | 49.94                    | 11.66                   | 10.45                   | 36.08                    |
| Jun-13 | 63.46                           | 64.00                    | 75.00                    | 62.85                     | 55.00                  | 58.65                  | 49.45                    | 11.25                   | 10.10                   | 35.59                    |
| Jul-13 | 63.86                           | 64.40                    | 75.16                    | 63.15                     | 55.16                  | 58.95                  | 49.61                    | 11.35                   | 10.15                   | 35.61                    |
| Aug-13 | 64.26                           | 64.81                    | 75.39                    | 63.44                     | 55.33                  | 59.26                  | 49.78                    | 11.45                   | 10.20                   | 35.63                    |
| Sep-13 | 64.67                           | 65.21                    | 75.50                    | 63.74                     | 55.49                  | 59.57                  | 49.94                    | 11.55                   | 10.25                   | 35.65                    |
| Oct-13 | 65.07                           | 65.63                    | 75.66                    | 64.04                     | 55.66                  | 59.87                  | 50.11                    | 11.65                   | 10.30                   | 35.67                    |
| Nov-13 | 65.48                           | 66.04                    | 75.83                    | 64.35                     | 55.82                  | 60.18                  | 50.27                    | 11.75                   | 10.35                   | 35.69                    |
| Dec-13 | 65.89                           | 66.45                    | 75.99                    | 64.65                     | 55.99                  | 60.50                  | 50.44                    | 11.86                   | 10.40                   | 35.71                    |
| Jan-14 | 66.31                           | 66.87                    | 76.16                    | 64.95                     | 56.16                  | 60.81                  | 50.61                    | 11.96                   | 10.45                   | 35.73                    |
| Feb-14 | 66.73                           | 67.29                    | 76.33                    | 65.26                     | 56.33                  | 61.12                  | 50.78                    | 12.07                   | 10.50                   | 35.75                    |
| Mar-14 | 67.15                           | 67.71                    | 76.50                    | 65.57                     | 56.49                  | 61.44                  | 50.94                    | 12.18                   | 10.55                   | 35.77                    |
| Apr-14 | 67.57                           | 68.14                    | 76.66                    | 65.88                     | 56.66                  | 61.76                  | 51.11                    | 12.28                   | 10.60                   | 35.79                    |
| May-14 | 67.99                           | 68.57                    | 76.83                    | 66.19                     | 56.83                  | 62.08                  | 51.28                    | 12.39                   | 10.65                   | 35.81                    |
| Jun-14 | 68.42                           | 69.00                    | 77.00                    | 66.50                     | 57.00                  | 62.40                  | 51.45                    | 12.50                   | 10.70                   | 35.83                    |
| Jul-14 | 68.74                           | 69.32                    | 77.08                    | 66.86                     | 57.16                  | 62.60                  | 51.62                    | 12.58                   | 10.75                   | 36.03                    |
| Aug-14 | 69.07                           | 69.65                    | 77.17                    | 67.23                     | 57.33                  | 62.81                  | 51.78                    | 12.66                   | 10.81                   | 36.23                    |
| Sep-14 | 69.39                           | 69.98                    | 77.25                    | 67.60                     | 57.49                  | 63.02                  | 51.95                    | 12.74                   | 10.86                   | 36.43                    |
| Oct-14 | 69.72                           | 70.31                    | 77.33                    | 67.97                     | 57.66                  | 63.22                  | 52.11                    | 12.82                   | 10.91                   | 36.63                    |
| Nov-14 | 70.05                           | 70.64                    | 77.42                    | 68.34                     | 57.82                  | 63.43                  | 52.28                    | 12.91                   | 10.97                   | 36.83                    |
| Dec-14 | 70.38                           | 70.97                    | 77.50                    | 68.71                     | 57.99                  | 63.64                  | 52.44                    | 12.99                   | 11.02                   | 37.03                    |
| Jan-15 | 70.71                           | 71.31                    | 77.58                    | 69.09                     | 58.16                  | 63.85                  | 52.61                    | 13.07                   | 11.07                   | 37.23                    |
| Feb-15 | 71.04                           | 71.64                    | 77.67                    | 69.47                     | 58.33                  | 64.06                  | 52.78                    | 13.16                   | 11.13                   | 37.44                    |
| Mar-15 | 71.37                           | 71.98                    | 77.75                    | 69.85                     | 58.49                  | 64.27                  | 52.95                    | 13.24                   | 11.18                   | 37.64                    |
| Apr-15 | 71.71                           | 72.32                    | 77.83                    | 70.23                     | 58.66                  | 64.48                  | 53.12                    | 13.33                   | 11.24                   | 37.85                    |
| May-15 | 72.05                           | 72.66                    | 77.92                    | 70.61                     | 58.83                  | 64.69                  | 53.28                    | 13.41                   | 11.29                   | 38.06                    |
| Jun-15 | 72.39                           | 73.03                    | 78.00                    | 71.00                     | 59.00                  | 64.90                  | 53.45                    | 13.50                   | 11.35                   | 38.27                    |
| Jul-15 | 72.46                           | 73.07                    | 77.56                    | 71.02                     | 59.16                  | 65.08                  | 53.43                    | 13.47                   | 11.35                   | 38.28                    |
| Aug-15 | 72.53                           | 73.14                    | 77.13                    | 71.03                     | 59.33                  | 65.26                  | 53.40                    | 13.45                   | 11.35                   | 38.29                    |
| Sep-15 | 72.80                           | 73.22                    | 76.69                    | 71.05                     | 59.49                  | 65.44                  | 53.38                    | 13.42                   | 11.35                   | 38.31                    |
| Oct-15 | 72.67                           | 73.29                    | 76.26                    | 71.07                     | 59.65                  | 65.63                  | 53.35                    | 13.40                   | 11.35                   | 38.32                    |
| Nov-15 | 72.75                           | 73.36                    | 75.83                    | 71.08                     | 59.83                  | 65.81                  | 53.33                    | 13.37                   | 11.35                   | 38.33                    |
| Dec-15 | 72.92                           | 73.43                    | 75.41                    | 71.10                     | 59.99                  | 65.99                  | 53.30                    | 13.35                   | 11.35                   | 38.34                    |
| Jan-16 | 72.89                           | 73.51                    | 74.98                    | 71.12                     | 60.16                  | 66.18                  | 53.28                    | 13.32                   | 11.35                   | 38.35                    |
| Feb-16 | 72.96                           | 73.58                    | 74.56                    | 71.13                     | 60.33                  | 66.36                  | 53.25                    | 13.30                   | 11.35                   | 38.37                    |
| Mar-16 | 73.03                           | 73.65                    | 74.14                    | 71.15                     | 60.49                  | 66.55                  | 53.23                    | 13.27                   | 11.35                   | 38.38                    |
| Apr-16 | 73.10                           | 73.72                    | 73.73                    | 71.17                     | 60.66                  | 66.73                  | 53.20                    | 13.25                   | 11.35                   | 38.39                    |
| May-16 | 73.18                           | 73.80                    | 73.31                    | 71.18                     | 60.83                  | 66.92                  | 53.18                    | 13.22                   | 11.35                   | 38.40                    |
| Jun-16 | 73.25                           | 73.87                    | 72.90                    | 71.20                     | 61.00                  | 67.10                  | 53.15                    | 13.20                   | 11.35                   | 38.42                    |
| Jul-16 | 73.36                           | 73.98                    | 72.87                    | 71.26                     | 61.79                  | 67.30                  | 53.22                    | 13.22                   | 11.38                   | 38.47                    |
| Aug-16 | 73.47                           | 74.09                    | 72.85                    | 71.32                     | 62.58                  | 67.50                  | 53.29                    | 13.24                   | 11.42                   | 38.53                    |
| Sep-16 | 73.58                           | 74.21                    | 72.82                    | 71.37                     | 63.39                  | 67.69                  | 53.35                    | 13.26                   | 11.45                   | 38.58                    |
| Oct-16 | 73.70                           | 74.32                    | 72.80                    | 71.43                     | 64.21                  | 67.89                  | 53.42                    | 13.28                   | 11.48                   | 38.64                    |
| Nov-16 | 73.81                           | 74.43                    | 72.77                    | 71.49                     | 65.03                  | 68.09                  | 53.49                    | 13.30                   | 11.51                   | 38.70                    |
| Dec-16 | 73.92                           | 74.55                    | 72.75                    | 71.55                     | 65.87                  | 68.29                  | 53.55                    | 13.32                   | 11.55                   | 38.75                    |
| Jan-17 | 74.03                           | 74.66                    | 72.72                    | 71.61                     | 66.72                  | 68.49                  | 53.62                    | 13.34                   | 11.58                   | 38.81                    |
| Feb-17 | 74.15                           | 74.77                    | 72.70                    | 71.67                     | 67.58                  | 68.69                  | 53.69                    | 13.36                   | 11.62                   | 38.87                    |
| Mar-17 | 74.26                           | 74.89                    | 72.67                    | 71.72                     | 68.45                  | 68.89                  | 53.75                    | 13.38                   | 11.65                   | 38.93                    |
| Apr-17 | 74.37                           | 75.00                    | 72.65                    | 71.78                     | 69.34                  | 69.09                  | 53.82                    | 13.40                   | 11.68                   | 38.98                    |
| May-17 | 74.48                           | 75.12                    | 72.62                    | 71.84                     | 70.23                  | 69.29                  | 53.89                    | 13.42                   | 11.72                   | 39.04                    |
| Jun-17 | 74.60                           | 75.23                    | 72.60                    | 71.90                     | 71.14                  | 69.49                  | 53.95                    | 13.44                   | 11.75                   | 39.10                    |
| Jul-17 | 74.83                           | 75.46                    | 72.60                    | 71.92                     | 71.45                  | 69.84                  | 54.20                    | 13.46                   | 11.77                   | 39.11                    |
| Aug-17 | 75.03                           | 75.69                    | 72.60                    | 71.93                     | 71.76                  | 70.20                  | 54.44                    | 13.48                   | 11.78                   | 39.11                    |
| Sep-17 | 75.29                           | 75.92                    | 72.60                    | 71.95                     | 72.10                  | 70.55                  | 54.68                    | 13.50                   | 11.80                   | 39.12                    |
| Oct-17 | 75.52                           | 76.16                    | 72.60                    | 71.97                     | 72.42                  | 70.91                  | 54.92                    | 13.52                   | 11.82                   | 39.13                    |
| Nov-17 | 75.75                           | 76.39                    | 72.60                    | 71.98                     | 72.75                  | 71.27                  | 55.17                    | 13.54                   | 11.84                   | 39.14                    |
| Dec-17 | 75.98                           | 76.62                    | 72.60                    | 72.00                     | 73.07                  | 71.63                  | 55.41                    | 13.56                   | 11.85                   | 39.15                    |
| Jan-18 | 76.21                           | 76.86                    | 72.60                    | 72.02                     | 73.40                  | 71.99                  | 55.66                    | 13.58                   | 11.87                   | 39.15                    |
| Feb-18 | 76.44                           | 77.09                    | 72.60                    | 72.03                     | 73.73                  | 72.35                  | 55.91                    | 13.60                   | 11.89                   | 39.16                    |
| Mar-18 | 76.68                           | 77.33                    | 72.60                    | 72.05                     | 74.06                  | 72.72                  | 56.16                    | 13.62                   | 11.91                   | 39.17                    |
| Apr-18 | 76.91                           | 77.56                    | 72.60                    | 72.07                     | 74.39                  | 73.08                  | 56.41                    | 13.64                   | 11.92                   | 39.18                    |
| May-18 | 77.15                           | 77.80                    | 72.60                    | 72.08                     | 74.73                  | 73.45                  | 56.66                    | 13.66                   | 11.94                   | 39.19                    |
| Jun-18 | 77.38                           | 78.04                    | 72.60                    | 72.10                     | 75.06                  | 73.82                  | 56.91                    | 13.68                   | 11.96                   | 39.19                    |
| Jul-18 | 77.74                           | 78.40                    | 72.60                    | 72.10                     | 75.45                  | 74.25                  | 57.21                    | 13.74                   | 12.00                   | 39.21                    |
| Aug-18 | 78.10                           | 78.76                    | 72.60                    | 72.10                     | 75.84                  | 74.69                  | 57.52                    | 13.80                   | 12.04                   | 39.23                    |
| Sep-18 | 78.46                           | 79.12                    | 72.60                    | 72.10                     | 76.23                  | 75.12                  | 57.82                    | 13.86                   | 12.08                   | 39.24                    |
| Oct-18 | 78.82                           | 79.49                    | 72.60                    | 72.10                     | 76.62                  | 75.56                  | 58.13                    | 13.92                   | 12.12                   | 39.26                    |

|        |       |       |       |       |       |       |       |       |       |       |
|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Nov-18 | 79.18 | 79.85 | 72.60 | 72.10 | 77.01 | 76.00 | 58.44 | 13.98 | 12.16 | 39.28 |
| Dec-18 | 79.55 | 80.22 | 72.60 | 72.10 | 77.41 | 76.44 | 58.75 | 14.05 | 12.20 | 39.29 |
| Jan-19 | 79.91 | 80.59 | 72.60 | 72.10 | 77.81 | 76.89 | 59.06 | 14.11 | 12.24 | 39.31 |
| Feb-19 | 80.28 | 80.96 | 72.60 | 72.10 | 78.21 | 77.33 | 59.37 | 14.17 | 12.28 | 39.32 |
| Mar-19 | 80.65 | 81.33 | 72.60 | 72.10 | 78.61 | 77.78 | 59.69 | 14.23 | 12.33 | 39.34 |
| Apr-19 | 81.02 | 81.71 | 72.60 | 72.10 | 79.02 | 78.24 | 60.01 | 14.29 | 12.37 | 39.36 |
| May-19 | 81.39 | 82.08 | 72.60 | 72.10 | 79.42 | 78.69 | 60.32 | 14.36 | 12.41 | 39.37 |
| Jun-19 | 81.77 | 82.46 | 72.60 | 72.10 | 79.83 | 79.15 | 60.65 | 14.42 | 12.45 | 39.39 |
| Jul-19 | 82.13 | 82.83 | 72.80 | 72.27 | 80.12 | 79.56 | 60.87 | 14.51 | 12.51 | 39.38 |
| Aug-19 | 82.50 | 83.20 | 72.93 | 72.45 | 80.42 | 79.98 | 61.10 | 14.59 | 12.58 | 39.37 |
| Sep-19 | 82.88 | 83.58 | 73.19 | 72.62 | 80.71 | 80.40 | 61.33 | 14.68 | 12.64 | 39.37 |
| Oct-19 | 83.25 | 83.95 | 73.39 | 72.79 | 81.00 | 80.82 | 61.56 | 14.77 | 12.70 | 39.36 |
| Nov-19 | 83.62 | 84.33 | 73.59 | 72.97 | 81.30 | 81.24 | 61.79 | 14.86 | 12.77 | 39.35 |
| Dec-19 | 84.00 | 84.71 | 73.79 | 73.14 | 81.60 | 81.66 | 62.02 | 14.95 | 12.83 | 39.34 |
| Jan-20 | 84.38 | 85.09 | 73.99 | 73.32 | 81.90 | 82.09 | 62.25 | 15.03 | 12.90 | 39.33 |
| Feb-20 | 84.75 | 85.47 | 74.19 | 73.49 | 82.19 | 82.52 | 62.48 | 15.12 | 12.96 | 39.32 |
| Mar-20 | 85.14 | 85.86 | 74.39 | 73.67 | 82.49 | 82.95 | 62.71 | 15.22 | 13.03 | 39.32 |
| Apr-20 | 85.52 | 86.24 | 74.59 | 73.85 | 82.80 | 83.38 | 62.95 | 15.31 | 13.10 | 39.31 |
| May-20 | 85.90 | 86.63 | 74.80 | 74.02 | 83.10 | 83.81 | 63.18 | 15.40 | 13.16 | 39.30 |
| Jun-20 | 86.29 | 87.02 | 75.00 | 74.20 | 83.40 | 84.25 | 63.42 | 15.49 | 13.23 | 39.29 |
| Jul-20 | 86.29 | 87.03 | 75.10 | 74.25 | 83.41 | 84.18 | 63.43 | 15.49 | 13.23 | 39.39 |
| Aug-20 | 86.30 | 87.03 | 75.20 | 74.30 | 83.42 | 84.11 | 63.44 | 15.48 | 13.22 | 39.49 |
| Sep-20 | 86.30 | 87.03 | 75.30 | 74.35 | 83.43 | 84.04 | 63.46 | 15.48 | 13.22 | 39.58 |
| Oct-20 | 86.31 | 87.04 | 75.40 | 74.40 | 83.43 | 83.98 | 63.47 | 15.47 | 13.22 | 39.68 |
| Nov-20 | 86.31 | 87.04 | 75.50 | 74.45 | 83.44 | 83.91 | 63.48 | 15.47 | 13.21 | 39.78 |
| Dec-20 | 86.32 | 87.05 | 75.60 | 74.50 | 83.45 | 83.84 | 63.49 | 15.46 | 13.21 | 39.87 |

| Natural Gas (\$/mmbtu) -Nominal \$'s |           |          |                   |           |      |            |                        |  |
|--------------------------------------|-----------|----------|-------------------|-----------|------|------------|------------------------|--|
| Month                                | Henry Hub | TCO Pool | Union South Point | TCO Deliv | HSC  | PEPL TX-OK | Swing Service<br>Adder |  |
| Jan-13                               | 3.35      | 3.45     | 3.46              | 3.72      | 3.20 | 3.13       | 0.25                   |  |
| Feb-13                               | 3.23      | 3.32     | 3.33              | 3.59      | 3.07 | 3.00       | 0.25                   |  |
| Mar-13                               | 3.43      | 3.52     | 3.48              | 3.80      | 3.27 | 3.20       | 0.25                   |  |
| Apr-13                               | 3.98      | 4.03     | 3.99              | 4.32      | 3.86 | 3.71       | 0.25                   |  |
| May-13                               | 4.15      | 4.21     | 4.17              | 4.49      | 4.03 | 3.89       | 0.25                   |  |
| Jun-13                               | 4.15      | 4.20     | 4.16              | 4.49      | 4.03 | 3.89       | 0.25                   |  |
| Jul-13                               | 3.71      | 3.76     | 3.72              | 4.04      | 3.59 | 3.44       | 0.25                   |  |
| Aug-13                               | 4.16      | 4.21     | 4.17              | 4.49      | 4.03 | 3.89       | 0.25                   |  |
| Sep-13                               | 4.35      | 4.41     | 4.37              | 4.70      | 4.23 | 4.09       | 0.25                   |  |
| Oct-13                               | 4.48      | 4.54     | 4.50              | 4.83      | 4.36 | 4.22       | 0.25                   |  |
| Nov-13                               | 4.68      | 4.75     | 4.71              | 5.05      | 4.53 | 4.44       | 0.25                   |  |
| Dec-13                               | 4.84      | 4.91     | 4.87              | 5.21      | 4.69 | 4.60       | 0.25                   |  |
| Jan-14                               | 5.46      | 5.53     | 5.49              | 5.85      | 5.31 | 5.23       | 0.25                   |  |
| Feb-14                               | 5.37      | 5.44     | 5.40              | 5.75      | 5.21 | 5.13       | 0.25                   |  |
| Mar-14                               | 5.13      | 5.20     | 5.16              | 5.51      | 4.98 | 4.90       | 0.25                   |  |
| Apr-14                               | 4.90      | 4.94     | 4.90              | 5.24      | 4.82 | 4.64       | 0.25                   |  |
| May-14                               | 4.83      | 4.87     | 4.83              | 5.17      | 4.74 | 4.57       | 0.25                   |  |
| Jun-14                               | 4.84      | 4.88     | 4.84              | 5.18      | 4.76 | 4.58       | 0.25                   |  |
| Jul-14                               | 4.93      | 4.97     | 4.93              | 5.28      | 4.85 | 4.67       | 0.25                   |  |
| Aug-14                               | 4.92      | 4.96     | 4.92              | 5.26      | 4.84 | 4.66       | 0.25                   |  |
| Sep-14                               | 4.86      | 4.90     | 4.86              | 5.20      | 4.78 | 4.60       | 0.25                   |  |
| Oct-14                               | 4.92      | 4.96     | 4.92              | 5.26      | 4.84 | 4.66       | 0.25                   |  |
| Nov-14                               | 5.15      | 5.19     | 5.15              | 5.50      | 5.01 | 4.92       | 0.25                   |  |
| Dec-14                               | 5.29      | 5.33     | 5.29              | 5.64      | 5.15 | 5.06       | 0.25                   |  |
| Jan-15                               | 5.88      | 5.92     | 5.91              | 6.25      | 5.75 | 5.66       | 0.25                   |  |
| Feb-15                               | 5.79      | 5.83     | 5.82              | 6.15      | 5.65 | 5.56       | 0.25                   |  |
| Mar-15                               | 5.55      | 5.58     | 5.58              | 5.90      | 5.42 | 5.33       | 0.25                   |  |
| Apr-15                               | 5.32      | 5.32     | 5.32              | 5.63      | 5.23 | 5.05       | 0.25                   |  |
| May-15                               | 5.25      | 5.25     | 5.25              | 5.56      | 5.16 | 4.98       | 0.25                   |  |
| Jun-15                               | 5.26      | 5.26     | 5.26              | 5.57      | 5.18 | 4.99       | 0.25                   |  |
| Jul-15                               | 5.35      | 5.35     | 5.35              | 5.66      | 5.27 | 5.08       | 0.25                   |  |
| Aug-15                               | 5.34      | 5.34     | 5.34              | 5.65      | 5.26 | 5.07       | 0.25                   |  |
| Sep-15                               | 5.28      | 5.28     | 5.28              | 5.59      | 5.20 | 5.01       | 0.25                   |  |
| Oct-15                               | 5.34      | 5.34     | 5.34              | 5.65      | 5.26 | 5.07       | 0.25                   |  |
| Nov-15                               | 5.57      | 5.60     | 5.57              | 5.91      | 5.43 | 5.34       | 0.25                   |  |
| Dec-15                               | 5.71      | 5.75     | 5.71              | 6.07      | 5.57 | 5.48       | 0.25                   |  |
| Jan-16                               | 6.24      | 6.28     | 6.27              | 6.61      | 6.11 | 6.02       | 0.25                   |  |
| Feb-16                               | 6.15      | 6.19     | 6.18              | 6.52      | 6.01 | 5.92       | 0.25                   |  |
| Mar-16                               | 5.91      | 5.94     | 5.94              | 6.27      | 5.78 | 5.69       | 0.25                   |  |
| Apr-16                               | 5.68      | 5.68     | 5.68              | 6.00      | 5.59 | 5.41       | 0.25                   |  |
| May-16                               | 5.61      | 5.61     | 5.61              | 5.92      | 5.52 | 5.34       | 0.25                   |  |
| Jun-16                               | 5.62      | 5.62     | 5.62              | 5.94      | 5.54 | 5.35       | 0.25                   |  |
| Jul-16                               | 5.71      | 5.71     | 5.71              | 6.03      | 5.63 | 5.44       | 0.25                   |  |
| Aug-16                               | 5.70      | 5.70     | 5.70              | 6.02      | 5.62 | 5.43       | 0.25                   |  |
| Sep-16                               | 5.64      | 5.64     | 5.64              | 5.96      | 5.56 | 5.37       | 0.25                   |  |
| Oct-16                               | 5.70      | 5.70     | 5.70              | 6.02      | 5.62 | 5.43       | 0.25                   |  |
| Nov-16                               | 5.93      | 5.96     | 5.93              | 6.28      | 5.79 | 5.70       | 0.25                   |  |
| Dec-16                               | 6.07      | 6.11     | 6.07              | 6.43      | 5.93 | 5.84       | 0.25                   |  |
| Jan-17                               | 6.42      | 6.46     | 6.45              | 6.80      | 6.29 | 6.20       | 0.25                   |  |
| Feb-17                               | 6.33      | 6.37     | 6.36              | 6.70      | 6.19 | 6.10       | 0.25                   |  |
| Mar-17                               | 6.09      | 6.12     | 6.12              | 6.45      | 5.96 | 5.87       | 0.25                   |  |
| Apr-17                               | 5.86      | 5.86     | 5.86              | 6.18      | 5.77 | 5.69       | 0.25                   |  |

|        |      |      |      |      |      |      |      |
|--------|------|------|------|------|------|------|------|
| May-17 | 5.79 | 5.79 | 5.79 | 6.11 | 5.70 | 5.52 | 0.25 |
| Jun-17 | 5.80 | 5.80 | 5.80 | 6.12 | 5.72 | 5.53 | 0.25 |
| Jul-17 | 5.89 | 5.89 | 5.89 | 6.22 | 5.81 | 5.62 | 0.25 |
| Aug-17 | 5.88 | 5.88 | 5.88 | 6.20 | 5.80 | 5.61 | 0.25 |
| Sep-17 | 5.82 | 5.82 | 5.82 | 6.14 | 5.74 | 5.55 | 0.25 |
| Oct-17 | 5.88 | 5.88 | 5.88 | 6.20 | 5.80 | 5.61 | 0.25 |
| Nov-17 | 6.11 | 6.14 | 6.11 | 6.46 | 5.97 | 5.88 | 0.25 |
| Dec-17 | 6.25 | 6.29 | 6.25 | 6.62 | 6.11 | 6.02 | 0.25 |
| Jan-18 | 6.53 | 6.57 | 6.56 | 6.91 | 6.40 | 6.31 | 0.25 |
| Feb-18 | 6.44 | 6.48 | 6.47 | 6.81 | 6.30 | 6.21 | 0.25 |
| Mar-18 | 6.20 | 6.23 | 6.23 | 6.56 | 6.07 | 5.98 | 0.25 |
| Apr-18 | 5.97 | 5.97 | 5.97 | 6.29 | 5.88 | 5.70 | 0.25 |
| May-18 | 5.90 | 5.90 | 5.90 | 6.22 | 5.81 | 5.63 | 0.25 |
| Jun-18 | 5.91 | 5.91 | 5.91 | 6.23 | 5.83 | 5.64 | 0.25 |
| Jul-18 | 6.00 | 6.00 | 6.00 | 6.33 | 5.92 | 5.73 | 0.25 |
| Aug-18 | 5.99 | 5.99 | 5.99 | 6.32 | 5.91 | 5.72 | 0.25 |
| Sep-18 | 5.93 | 5.93 | 5.93 | 6.26 | 5.85 | 5.66 | 0.25 |
| Oct-18 | 5.99 | 5.99 | 5.99 | 6.32 | 5.91 | 5.72 | 0.25 |
| Nov-18 | 6.22 | 6.25 | 6.22 | 6.57 | 6.08 | 5.99 | 0.25 |
| Dec-18 | 6.36 | 6.40 | 6.36 | 6.73 | 6.22 | 6.13 | 0.25 |
| Jan-19 | 6.60 | 6.64 | 6.63 | 6.98 | 6.47 | 6.38 | 0.25 |
| Feb-19 | 6.51 | 6.55 | 6.54 | 6.89 | 6.37 | 6.28 | 0.25 |
| Mar-19 | 6.27 | 6.30 | 6.30 | 6.63 | 6.14 | 6.05 | 0.25 |
| Apr-19 | 6.04 | 6.04 | 6.04 | 6.36 | 5.95 | 5.77 | 0.25 |
| May-19 | 5.97 | 5.97 | 5.97 | 6.29 | 5.88 | 5.70 | 0.25 |
| Jun-19 | 5.98 | 5.98 | 5.98 | 6.30 | 5.90 | 5.71 | 0.25 |
| Jul-19 | 6.07 | 6.07 | 6.07 | 6.40 | 5.99 | 5.80 | 0.25 |
| Aug-19 | 6.06 | 6.06 | 6.06 | 6.39 | 5.98 | 5.79 | 0.25 |
| Sep-19 | 6.00 | 6.00 | 6.00 | 6.33 | 5.92 | 5.73 | 0.25 |
| Oct-19 | 6.06 | 6.06 | 6.06 | 6.39 | 5.98 | 5.79 | 0.25 |
| Nov-19 | 6.29 | 6.32 | 6.29 | 6.65 | 6.15 | 6.06 | 0.25 |
| Dec-19 | 6.43 | 6.47 | 6.43 | 6.80 | 6.29 | 6.20 | 0.25 |
| Jan-20 | 6.84 | 6.88 | 6.87 | 7.23 | 6.71 | 6.62 | 0.25 |
| Feb-20 | 6.75 | 6.79 | 6.78 | 7.13 | 6.61 | 6.52 | 0.25 |
| Mar-20 | 6.51 | 6.54 | 6.54 | 6.88 | 6.38 | 6.29 | 0.25 |
| Apr-20 | 6.28 | 6.28 | 6.28 | 6.61 | 6.19 | 6.01 | 0.25 |
| May-20 | 6.21 | 6.21 | 6.21 | 6.54 | 6.12 | 5.94 | 0.25 |
| Jun-20 | 6.22 | 6.22 | 6.22 | 6.55 | 6.14 | 5.95 | 0.25 |
| Jul-20 | 6.31 | 6.31 | 6.31 | 6.64 | 6.23 | 6.04 | 0.25 |
| Aug-20 | 6.30 | 6.30 | 6.30 | 6.63 | 6.22 | 6.03 | 0.25 |
| Sep-20 | 6.24 | 6.24 | 6.24 | 6.57 | 6.16 | 5.97 | 0.25 |
| Oct-20 | 6.30 | 6.30 | 6.30 | 6.63 | 6.22 | 6.03 | 0.25 |
| Nov-20 | 6.53 | 6.56 | 6.53 | 6.89 | 6.39 | 6.30 | 0.25 |
| Dec-20 | 6.67 | 6.71 | 6.67 | 7.05 | 6.53 | 6.44 | 0.25 |

| Month  | Uranium Fuel UO2<br>(\$/mmbtu) -<br>Nominal \$'s | Emissions (\$/ton) -Nominal \$'s |                     |                        |                            |                        |                                     | CO <sub>2</sub> |
|--------|--------------------------------------------------|----------------------------------|---------------------|------------------------|----------------------------|------------------------|-------------------------------------|-----------------|
|        |                                                  |                                  |                     |                        |                            |                        | (\$/metric tonne) -<br>Nominal \$'s |                 |
|        |                                                  | SO <sub>2</sub>                  | AEP SO <sub>2</sub> | NO <sub>x</sub> Annual | AEP NO <sub>x</sub> Annual | NO <sub>x</sub> Summer |                                     |                 |
| Jan-13 | 0.82                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| Feb-13 | 0.82                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| Mar-13 | 0.82                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| Apr-13 | 0.82                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| May-13 | 0.82                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| Jun-13 | 0.82                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| Jul-13 | 0.82                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| Aug-13 | 0.82                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| Sep-13 | 0.82                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| Oct-13 | 0.82                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| Nov-13 | 0.82                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| Dec-13 | 0.82                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| Jan-14 | 0.84                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| Feb-14 | 0.84                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| Mar-14 | 0.84                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| Apr-14 | 0.84                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| May-14 | 0.84                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| Jun-14 | 0.84                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| Jul-14 | 0.84                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| Aug-14 | 0.84                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| Sep-14 | 0.84                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| Oct-14 | 0.84                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| Nov-14 | 0.84                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| Dec-14 | 0.84                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| Jan-15 | 0.85                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| Feb-15 | 0.85                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| Mar-15 | 0.85                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| Apr-15 | 0.85                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| May-15 | 0.85                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| Jun-15 | 0.85                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| Jul-15 | 0.85                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| Aug-15 | 0.85                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| Sep-15 | 0.85                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| Oct-15 | 0.85                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| Nov-15 | 0.85                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| Dec-15 | 0.85                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| Jan-16 | 0.87                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| Feb-16 | 0.87                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| Mar-16 | 0.87                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| Apr-16 | 0.87                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| May-16 | 0.87                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| Jun-16 | 0.87                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| Jul-16 | 0.87                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| Aug-16 | 0.87                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| Sep-16 | 0.87                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| Oct-16 | 0.87                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| Nov-16 | 0.87                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| Dec-16 | 0.87                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| Jan-17 | 0.89                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| Feb-17 | 0.89                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| Mar-17 | 0.89                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| Apr-17 | 0.89                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| May-17 | 0.89                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| Jun-17 | 0.89                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| Jul-17 | 0.89                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| Aug-17 | 0.89                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| Sep-17 | 0.89                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| Oct-17 | 0.89                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |
| Nov-17 | 0.89                                             | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |                 |

|        |      |      |      |   |   |   |      |
|--------|------|------|------|---|---|---|------|
| Dec-17 | 0.89 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Jan-18 | 0.91 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Feb-18 | 0.91 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Mar-18 | 0.91 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Apr-18 | 0.91 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| May-18 | 0.91 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Jun-18 | 0.91 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Jul-18 | 0.91 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Aug-18 | 0.91 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Sep-18 | 0.91 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Oct-18 | 0.91 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Nov-18 | 0.91 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Dec-18 | 0.91 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Jan-19 | 0.92 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Feb-19 | 0.92 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Mar-19 | 0.92 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Apr-19 | 0.92 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| May-19 | 0.92 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Jun-19 | 0.92 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Jul-19 | 0.92 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Aug-19 | 0.92 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Sep-19 | 0.92 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Oct-19 | 0.92 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Nov-19 | 0.92 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Dec-19 | 0.92 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Jan-20 | 0.94 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Feb-20 | 0.94 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Mar-20 | 0.94 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Apr-20 | 0.94 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| May-20 | 0.94 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Jun-20 | 0.94 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Jul-20 | 0.94 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Aug-20 | 0.94 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Sep-20 | 0.94 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Oct-20 | 0.94 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Nov-20 | 0.94 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Dec-20 | 0.94 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |

| Month  | Heat Rates (mmbtu/MWh) |          |                  |                  |                 |
|--------|------------------------|----------|------------------|------------------|-----------------|
|        | AEP GEN HUB - HR       | SPP - HR | ERCOT North - HR | ERCOT South - HR | ERCOT West - HR |
| Jan-13 | 9.15                   | 9.24     | 7.99             | 8.00             | 6.66            |
| Feb-13 | 9.09                   | 9.06     | 8.07             | 8.12             | 6.67            |
| Mar-13 | 8.87                   | 8.67     | 7.81             | 7.82             | 6.48            |
| Apr-13 | 7.95                   | 8.25     | 7.61             | 7.67             | 6.60            |
| May-13 | 7.77                   | 8.51     | 7.71             | 7.83             | 6.75            |
| Jun-13 | 8.42                   | 9.30     | 7.72             | 7.82             | 6.78            |
| Jul-13 | 10.02                  | 11.01    | 8.38             | 8.47             | 7.33            |
| Aug-13 | 10.08                  | 11.48    | 8.31             | 8.35             | 7.32            |
| Sep-13 | 8.43                   | 8.52     | 8.28             | 8.37             | 7.30            |
| Oct-13 | 7.41                   | 8.22     | 7.63             | 7.76             | 6.75            |
| Nov-13 | 7.10                   | 8.03     | 7.52             | 7.57             | 6.56            |
| Dec-13 | 7.02                   | 7.90     | 7.42             | 7.41             | 6.48            |
| Jan-14 | 7.58                   | 8.27     | 7.43             | 7.39             | 6.54            |
| Feb-14 | 7.00                   | 8.06     | 7.38             | 7.35             | 6.49            |
| Mar-14 | 7.33                   | 7.84     | 7.40             | 7.36             | 6.48            |
| Apr-14 | 6.96                   | 7.75     | 7.47             | 7.47             | 6.67            |
| May-14 | 7.36                   | 8.41     | 7.57             | 7.65             | 6.78            |
| Jun-14 | 7.96                   | 9.16     | 7.63             | 7.72             | 6.86            |
| Jul-14 | 7.91                   | 9.55     | 8.17             | 8.26             | 7.39            |
| Aug-14 | 8.23                   | 11.51    | 8.14             | 8.18             | 7.36            |
| Sep-14 | 7.37                   | 8.59     | 8.34             | 8.36             | 7.50            |
| Oct-14 | 7.21                   | 7.93     | 7.63             | 7.73             | 6.86            |
| Nov-14 | 7.46                   | 8.11     | 7.50             | 7.59             | 6.67            |
| Dec-14 | 7.03                   | 7.97     | 7.39             | 7.41             | 6.56            |
| Jan-15 | 8.84                   | 8.75     | 7.51             | 7.51             | 6.72            |
| Feb-15 | 8.11                   | 8.51     | 7.47             | 7.47             | 6.67            |
| Mar-15 | 8.07                   | 8.20     | 7.47             | 7.38             | 6.64            |
| Apr-15 | 7.92                   | 8.31     | 7.53             | 7.58             | 6.81            |
| May-15 | 8.13                   | 8.53     | 7.71             | 7.81             | 6.99            |
| Jun-15 | 9.72                   | 10.01    | 7.76             | 7.83             | 7.06            |
| Jul-15 | 10.58                  | 11.63    | 8.46             | 8.50             | 7.73            |
| Aug-15 | 11.53                  | 12.44    | 8.42             | 8.41             | 7.69            |
| Sep-15 | 8.61                   | 8.98     | 8.33             | 8.35             | 7.58            |
| Oct-15 | 7.92                   | 8.15     | 7.61             | 7.66             | 6.92            |
| Nov-15 | 8.26                   | 8.47     | 7.55             | 7.62             | 6.76            |
| Dec-15 | 8.27                   | 8.47     | 7.46             | 7.48             | 6.66            |
| Jan-16 | 9.19                   | 8.88     | 7.55             | 7.65             | 6.82            |
| Feb-16 | 8.51                   | 8.71     | 7.50             | 7.60             | 6.76            |
| Mar-16 | 8.60                   | 8.43     | 7.51             | 7.58             | 6.74            |
| Apr-16 | 8.28                   | 8.52     | 7.58             | 7.69             | 6.90            |
| May-16 | 8.28                   | 8.69     | 7.99             | 8.16             | 7.29            |
| Jun-16 | 11.22                  | 10.59    | 8.01             | 8.20             | 7.35            |

|        |       |       |      |      |      |
|--------|-------|-------|------|------|------|
| Jul-16 | 12.70 | 12.42 | 8.97 | 9.07 | 8.25 |
| Aug-16 | 13.13 | 12.98 | 8.74 | 8.81 | 8.01 |
| Sep-16 | 9.08  | 9.29  | 8.51 | 8.62 | 7.79 |
| Oct-16 | 8.34  | 8.30  | 7.66 | 7.81 | 7.03 |
| Nov-16 | 8.60  | 8.60  | 7.57 | 7.73 | 6.81 |
| Dec-16 | 8.99  | 8.75  | 7.51 | 7.65 | 6.78 |
| Jan-17 | 9.20  | 9.11  | 7.59 | 7.71 | 6.86 |
| Feb-17 | 8.51  | 8.60  | 7.53 | 7.60 | 6.79 |
| Mar-17 | 8.60  | 8.40  | 7.52 | 7.54 | 6.75 |
| Apr-17 | 8.32  | 8.48  | 7.57 | 7.68 | 6.90 |
| May-17 | 8.30  | 8.68  | 7.80 | 7.94 | 7.12 |
| Jun-17 | 11.41 | 11.22 | 8.13 | 8.29 | 7.47 |
| Jul-17 | 13.36 | 13.34 | 9.03 | 9.08 | 8.28 |
| Aug-17 | 13.45 | 13.44 | 8.96 | 8.99 | 8.22 |
| Sep-17 | 9.27  | 9.36  | 8.55 | 8.64 | 7.84 |
| Oct-17 | 8.35  | 8.24  | 7.68 | 7.81 | 7.05 |
| Nov-17 | 8.67  | 8.97  | 7.59 | 7.73 | 6.86 |
| Dec-17 | 8.86  | 8.85  | 7.60 | 7.67 | 6.84 |
| Jan-18 | 8.96  | 8.85  | 7.64 | 7.69 | 6.90 |
| Feb-18 | 8.60  | 8.68  | 7.52 | 7.61 | 6.81 |
| Mar-18 | 8.60  | 8.50  | 7.50 | 7.51 | 6.74 |
| Apr-18 | 8.32  | 8.47  | 7.52 | 7.57 | 6.85 |
| May-18 | 8.35  | 8.75  | 7.78 | 7.90 | 7.11 |
| Jun-18 | 10.60 | 10.74 | 7.93 | 8.09 | 7.29 |
| Jul-18 | 12.34 | 12.89 | 8.83 | 8.88 | 8.11 |
| Aug-18 | 13.76 | 13.72 | 9.05 | 9.16 | 8.32 |
| Sep-18 | 10.26 | 10.24 | 8.83 | 8.91 | 8.09 |
| Oct-18 | 8.37  | 8.38  | 7.69 | 7.79 | 7.03 |
| Nov-18 | 8.55  | 8.61  | 7.56 | 7.63 | 6.81 |
| Dec-18 | 8.90  | 8.86  | 7.52 | 7.58 | 6.77 |
| Jan-19 | 8.95  | 8.86  | 7.56 | 7.58 | 6.82 |
| Feb-19 | 8.53  | 8.77  | 7.51 | 7.53 | 6.76 |
| Mar-19 | 8.48  | 8.36  | 7.50 | 7.51 | 6.75 |
| Apr-19 | 8.34  | 8.44  | 7.52 | 7.54 | 6.84 |
| May-19 | 8.36  | 8.68  | 7.78 | 7.90 | 7.11 |
| Jun-19 | 10.85 | 11.37 | 7.91 | 8.04 | 7.27 |
| Jul-19 | 12.61 | 14.11 | 8.94 | 8.94 | 8.21 |
| Aug-19 | 13.73 | 13.53 | 9.40 | 9.33 | 8.59 |
| Sep-19 | 10.15 | 10.27 | 8.79 | 8.84 | 8.05 |
| Oct-19 | 8.28  | 8.38  | 7.68 | 7.74 | 7.02 |
| Nov-19 | 8.62  | 8.76  | 7.56 | 7.59 | 6.79 |
| Dec-19 | 8.78  | 8.69  | 7.51 | 7.53 | 6.76 |
| Jan-20 | 8.88  | 8.90  | 7.55 | 7.56 | 6.82 |
| Feb-20 | 8.48  | 8.76  | 7.50 | 7.53 | 6.78 |
| Mar-20 | 8.46  | 8.44  | 7.50 | 7.55 | 6.77 |
| Apr-20 | 8.28  | 8.50  | 7.54 | 7.62 | 6.88 |
| May-20 | 8.37  | 8.86  | 7.77 | 7.87 | 7.10 |

|        |       |       |      |      |      |
|--------|-------|-------|------|------|------|
| Jun-20 | 11.00 | 11.13 | 7.88 | 8.01 | 7.24 |
| Jul-20 | 12.77 | 13.75 | 8.86 | 8.92 | 8.17 |
| Aug-20 | 13.05 | 13.80 | 8.73 | 8.75 | 8.03 |
| Sep-20 | 9.68  | 9.81  | 8.52 | 8.58 | 7.83 |
| Oct-20 | 8.41  | 8.69  | 7.66 | 7.71 | 7.02 |
| Nov-20 | 8.46  | 8.50  | 7.53 | 7.57 | 6.79 |
| Dec-20 | 8.82  | 8.79  | 7.49 | 7.48 | 6.75 |

| Month  | Capacity Prices (\$/MW-day) -<br>Nominal \$'s |                   | Renewable Energy<br>Subsidies ** (\$/MWh)<br>-Nominal \$'s | Inflation Factor | AEP Hub | SPP  | Convert to<br>Real 2011 \$'s | Cumulative<br>Factor | Year   | -Nominal |
|--------|-----------------------------------------------|-------------------|------------------------------------------------------------|------------------|---------|------|------------------------------|----------------------|--------|----------|
|        | AEP GEN HUB                                   | Hub Cap. SPP Cap. |                                                            |                  |         |      |                              |                      |        |          |
| Jan-13 | 16.46                                         | 25.00             | 48.40                                                      | 2.10%            |         |      | FALSE                        | 1.0000               | 1.0493 | 2013     |
| Feb-13 | 16.46                                         | 25.00             | 48.40                                                      | 2.10%            |         |      |                              | 1.0000               | 1.0511 | 2013     |
| Mar-13 | 16.46                                         | 25.00             | 48.40                                                      | 2.10%            |         |      |                              | 1.0000               | 1.0530 | 2013     |
| Apr-13 | 16.46                                         | 25.00             | 48.40                                                      | 2.10%            |         |      |                              | 1.0000               | 1.0548 | 2013     |
| May-13 | 16.46                                         | 25.00             | 48.40                                                      | 2.10%            |         |      |                              | 1.0000               | 1.0566 | 2013     |
| Jun-13 | 27.73                                         | 25.00             | 48.40                                                      | 2.10%            |         |      |                              | 1.0000               | 1.0584 | 2013     |
| Jul-13 | 27.73                                         | 25.00             | 48.40                                                      | 2.10%            |         |      |                              | 1.0000               | 1.0603 | 2013     |
| Aug-13 | 27.73                                         | 25.00             | 48.40                                                      | 2.10%            |         |      |                              | 1.0000               | 1.0621 | 2013     |
| Sep-13 | 27.73                                         | 25.00             | 48.40                                                      | 2.10%            |         |      |                              | 1.0000               | 1.0640 | 2013     |
| Oct-13 | 27.73                                         | 25.00             | 48.40                                                      | 2.10%            |         |      |                              | 1.0000               | 1.0658 | 2013     |
| Nov-13 | 27.73                                         | 25.00             | 48.40                                                      | 2.10%            |         |      |                              | 1.0000               | 1.0676 | 2013     |
| Dec-13 | 27.73                                         | 25.00             | 48.40                                                      | 2.10%            |         |      |                              | 1.0000               | 1.0695 | 2013     |
| Jan-14 | 27.73                                         | 25.00             | 48.60                                                      | 2.10%            |         |      |                              | 1.0000               | 1.0713 | 2014     |
| Feb-14 | 27.73                                         | 25.00             | 48.60                                                      | 2.10%            |         |      |                              | 1.0000               | 1.0732 | 2014     |
| Mar-14 | 27.73                                         | 25.00             | 48.60                                                      | 2.10%            |         |      |                              | 1.0000               | 1.0751 | 2014     |
| Apr-14 | 27.73                                         | 25.00             | 48.60                                                      | 2.10%            |         |      |                              | 1.0000               | 1.0769 | 2014     |
| May-14 | 27.73                                         | 25.00             | 48.60                                                      | 2.10%            |         |      |                              | 1.0000               | 1.0788 | 2014     |
| Jun-14 | 125.99                                        | 25.00             | 48.60                                                      | 2.10%            |         |      |                              | 1.0000               | 1.0807 | 2014     |
| Jul-14 | 125.99                                        | 25.00             | 48.60                                                      | 2.10%            |         |      |                              | 1.0000               | 1.0825 | 2014     |
| Aug-14 | 125.99                                        | 25.00             | 48.60                                                      | 2.10%            |         |      |                              | 1.0000               | 1.0844 | 2014     |
| Sep-14 | 125.99                                        | 25.00             | 48.60                                                      | 2.10%            |         |      |                              | 1.0000               | 1.0863 | 2014     |
| Oct-14 | 125.99                                        | 25.00             | 48.60                                                      | 2.10%            |         |      |                              | 1.0000               | 1.0882 | 2014     |
| Nov-14 | 125.99                                        | 25.00             | 48.60                                                      | 2.10%            |         |      |                              | 1.0000               | 1.0901 | 2014     |
| Dec-14 | 125.99                                        | 25.00             | 48.60                                                      | 2.10%            |         |      |                              | 1.0000               | 1.0920 | 2014     |
| Jan-15 | 125.99                                        | 26.47             | 49.20                                                      | 2.50%            |         |      |                              | 1.0000               | 1.0942 | 2015     |
| Feb-15 | 125.99                                        | 26.47             | 49.20                                                      | 2.50%            |         |      |                              | 1.0000               | 1.0965 | 2015     |
| Mar-15 | 125.99                                        | 26.47             | 49.20                                                      | 2.50%            |         |      |                              | 1.0000               | 1.0987 | 2015     |
| Apr-15 | 125.99                                        | 26.47             | 49.20                                                      | 2.50%            |         |      |                              | 1.0000               | 1.1010 | 2015     |
| May-15 | 125.99                                        | 26.47             | 49.20                                                      | 2.50%            |         |      |                              | 1.0000               | 1.1032 | 2015     |
| Jun-15 | 136.00                                        | 26.47             | 49.20                                                      | 2.50%            |         |      |                              | 1.0000               | 1.1055 | 2015     |
| Jul-15 | 136.00                                        | 26.47             | 49.20                                                      | 2.50%            |         |      |                              | 1.0000               | 1.1078 | 2015     |
| Aug-15 | 136.00                                        | 26.47             | 49.20                                                      | 2.50%            |         |      |                              | 1.0000               | 1.1101 | 2015     |
| Sep-15 | 136.00                                        | 26.47             | 49.20                                                      | 2.50%            |         |      |                              | 1.0000               | 1.1124 | 2015     |
| Oct-15 | 136.00                                        | 26.47             | 49.20                                                      | 2.50%            |         |      |                              | 1.0000               | 1.1147 | 2015     |
| Nov-15 | 136.00                                        | 26.47             | 49.20                                                      | 2.50%            |         |      |                              | 1.0000               | 1.1170 | 2015     |
| Dec-15 | 136.00                                        | 26.47             | 49.20                                                      | 2.50%            |         | 0.00 |                              | 1.0000               | 1.1193 | 2015     |
| Jan-16 | 136.00                                        | 33.73             | 45.40                                                      | 2.60%            | 0.00    |      |                              | 1.0000               | 1.1215 | 2016     |
| Feb-16 | 136.00                                        | 33.73             | 45.40                                                      | 2.60%            | 0.00    |      |                              | 1.0000               | 1.1240 | 2016     |
| Mar-16 | 136.00                                        | 33.73             | 45.40                                                      | 2.60%            | 0.00    |      |                              | 1.0000               | 1.1265 | 2016     |
| Apr-16 | 136.00                                        | 33.73             | 45.40                                                      | 2.60%            | 0.00    |      |                              | 1.0000               | 1.1289 | 2016     |
| May-16 | 136.00                                        | 33.73             | 45.40                                                      | 2.60%            | 0.00    |      |                              | 1.0000               | 1.1313 | 2016     |
| Jun-16 | 59.37                                         | 33.73             | 45.40                                                      | 2.60%            | 0.00    |      |                              | 1.0000               | 1.1337 | 2016     |
| Jul-16 | 59.37                                         | 33.73             | 45.40                                                      | 2.60%            | 0.00    |      |                              | 1.0000               | 1.1361 | 2016     |
| Aug-16 | 59.37                                         | 33.73             | 45.40                                                      | 2.60%            | 0.00    |      |                              | 1.0000               | 1.1386 | 2016     |
| Sep-16 | 59.37                                         | 33.73             | 45.40                                                      | 2.60%            | 0.00    |      |                              | 1.0000               | 1.1410 | 2016     |
| Oct-16 | 59.37                                         | 33.73             | 45.40                                                      | 2.60%            | 0.00    |      |                              | 1.0000               | 1.1435 | 2016     |
| Nov-16 | 59.37                                         | 33.73             | 45.40                                                      | 2.60%            | 0.00    |      |                              | 1.0000               | 1.1459 | 2016     |
| Dec-16 | 59.37                                         | 33.73             | 45.40                                                      | 2.60%            | 0.00    |      |                              | 1.0000               | 1.1484 | 2016     |
| Jan-17 | 59.37                                         | 41.30             | 46.60                                                      | 2.50%            | 0.00    |      |                              | 1.0000               | 1.1507 | 2017     |
| Feb-17 | 59.37                                         | 41.30             | 46.60                                                      | 2.50%            | 0.00    |      |                              | 1.0000               | 1.1531 | 2017     |
| Mar-17 | 59.37                                         | 41.30             | 46.60                                                      | 2.50%            | 0.00    |      |                              | 1.0000               | 1.1555 | 2017     |
| Apr-17 | 59.37                                         | 41.30             | 46.60                                                      | 2.50%            | 0.00    |      |                              | 1.0000               | 1.1578 | 2017     |
| May-17 | 59.37                                         | 41.30             | 46.60                                                      | 2.50%            | 0.00    |      |                              | 1.0000               | 1.1602 | 2017     |
| Jun-17 | 184.71                                        | 41.30             | 46.60                                                      | 2.50%            | 0.00    |      |                              | 1.0000               | 1.1626 | 2017     |
| Jul-17 | 184.71                                        | 41.30             | 46.60                                                      | 2.50%            | 0.00    |      |                              | 1.0000               | 1.1650 | 2017     |
| Aug-17 | 184.71                                        | 41.30             | 46.60                                                      | 2.50%            | 0.00    |      |                              | 1.0000               | 1.1674 | 2017     |
| Sep-17 | 184.71                                        | 41.30             | 46.60                                                      | 2.50%            | 0.00    |      |                              | 1.0000               | 1.1698 | 2017     |
| Oct-17 | 184.71                                        | 41.30             | 46.60                                                      | 2.50%            | 0.00    |      |                              | 1.0000               | 1.1722 | 2017     |
| Nov-17 | 184.71                                        | 41.30             | 46.60                                                      | 2.50%            | 0.00    |      |                              | 1.0000               | 1.1746 | 2017     |
| Dec-17 | 184.71                                        | 41.30             | 46.60                                                      | 2.50%            | 0.00    |      |                              | 1.0000               | 1.1771 | 2017     |
| Jan-18 | 199.74                                        | 49.16             | 47.60                                                      | 2.30%            | 0.00    |      |                              | 1.0000               | 1.1793 | 2018     |
| Feb-18 | 199.74                                        | 49.16             | 47.60                                                      | 2.30%            | 0.00    |      |                              | 1.0000               | 1.1815 | 2018     |
| Mar-18 | 199.74                                        | 49.16             | 47.60                                                      | 2.30%            | 0.00    |      |                              | 1.0000               | 1.1838 | 2018     |
| Apr-18 | 199.74                                        | 49.16             | 47.60                                                      | 2.30%            | 0.00    |      |                              | 1.0000               | 1.1860 | 2018     |
| May-18 | 199.74                                        | 49.16             | 47.60                                                      | 2.30%            | 0.00    |      |                              | 1.0000               | 1.1883 | 2018     |
| Jun-18 | 199.74                                        | 49.16             | 47.60                                                      | 2.30%            | 0.00    |      |                              | 1.0000               | 1.1905 | 2018     |
| Jul-18 | 199.74                                        | 49.16             | 47.60                                                      | 2.30%            | 0.00    |      |                              | 1.0000               | 1.1928 | 2018     |
| Aug-18 | 199.74                                        | 49.16             | 47.60                                                      | 2.30%            | 0.00    |      |                              | 1.0000               | 1.1950 | 2018     |
| Sep-18 | 199.74                                        | 49.16             | 47.60                                                      | 2.30%            | 0.00    |      |                              | 1.0000               | 1.1973 | 2018     |
| Oct-18 | 199.74                                        | 49.16             | 47.60                                                      | 2.30%            | 0.00    |      |                              | 1.0000               | 1.1996 | 2018     |
| Nov-18 | 199.74                                        | 49.16             | 47.60                                                      | 2.30%            | 0.00    |      |                              | 1.0000               | 1.2019 | 2018     |
| Dec-18 | 199.74                                        | 49.16             | 47.60                                                      | 2.30%            | 0.00    |      |                              | 1.0000               | 1.2041 | 2018     |
| Jan-19 | 215.54                                        | 57.40             | 48.60                                                      | 2.30%            | 0.00    |      |                              | 1.0000               | 1.2064 | 2019     |
| Feb-19 | 215.54                                        | 57.40             | 48.60                                                      | 2.30%            | 0.00    |      |                              | 1.0000               | 1.2087 | 2019     |
| Mar-19 | 215.54                                        | 57.40             | 48.60                                                      | 2.30%            | 0.00    |      |                              | 1.0000               | 1.2110 | 2019     |
| Apr-19 | 215.54                                        | 57.40             | 48.60                                                      | 2.30%            | 0.00    |      |                              | 1.0000               | 1.2133 | 2019     |
| May-19 | 215.54                                        | 57.40             | 48.60                                                      | 2.30%            | 0.00    |      |                              | 1.0000               | 1.2156 | 2019     |
| Jun-19 | 215.54                                        | 57.40             | 48.60                                                      | 2.30%            | 0.00    |      |                              | 1.0000               | 1.2179 | 2019     |

|        |        |       |       |       |      |        |        |      |
|--------|--------|-------|-------|-------|------|--------|--------|------|
| Jul-19 | 215.54 | 57.40 | 48.60 | 2.30% | 0.00 | 1.0000 | 1.2202 | 2019 |
| Aug-19 | 215.54 | 57.40 | 48.60 | 2.30% | 0.00 | 1.0000 | 1.2225 | 2019 |
| Sep-19 | 215.54 | 57.40 | 48.60 | 2.30% | 0.00 | 1.0000 | 1.2248 | 2019 |
| Oct-19 | 215.54 | 57.40 | 48.60 | 2.30% | 0.00 | 1.0000 | 1.2272 | 2019 |
| Nov-19 | 215.54 | 57.40 | 48.60 | 2.30% | 0.00 | 1.0000 | 1.2295 | 2019 |
| Dec-19 | 215.54 | 57.40 | 48.60 | 2.30% | 0.00 | 1.0000 | 1.2318 | 2019 |
| Jan-20 | 231.74 | 65.93 | 49.50 | 2.30% | 0.00 | 1.0000 | 1.2342 | 2020 |
| Feb-20 | 231.74 | 65.93 | 49.50 | 2.30% | 0.00 | 1.0000 | 1.2365 | 2020 |
| Mar-20 | 231.74 | 65.93 | 49.50 | 2.30% | 0.00 | 1.0000 | 1.2389 | 2020 |
| Apr-20 | 231.74 | 65.93 | 49.50 | 2.30% | 0.00 | 1.0000 | 1.2412 | 2020 |
| May-20 | 231.74 | 65.93 | 49.50 | 2.30% | 0.00 | 1.0000 | 1.2436 | 2020 |
| Jun-20 | 231.74 | 65.93 | 49.50 | 2.30% | 0.00 | 1.0000 | 1.2459 | 2020 |
| Jul-20 | 231.74 | 65.93 | 49.50 | 2.30% | 0.00 | 1.0000 | 1.2483 | 2020 |
| Aug-20 | 231.74 | 65.93 | 49.50 | 2.30% | 0.00 | 1.0000 | 1.2506 | 2020 |
| Sep-20 | 231.74 | 65.93 | 49.50 | 2.30% | 0.00 | 1.0000 | 1.2530 | 2020 |
| Oct-20 | 231.74 | 65.93 | 49.50 | 2.30% | 0.00 | 1.0000 | 1.2554 | 2020 |
| Nov-20 | 231.74 | 65.93 | 49.50 | 2.30% | 0.00 | 1.0000 | 1.2578 | 2020 |
| Dec-20 | 231.74 | 65.93 | 49.50 | 2.30% | 0.00 | 1.0000 | 1.2602 | 2020 |

| PJM - AEP GEN HUB - Nominal \$'s |        |         |              |                  |                |  |
|----------------------------------|--------|---------|--------------|------------------|----------------|--|
| Month                            | Nights | Weekend | Weekend Peak | PROMOD Weeknight | PROMOD Weekend |  |
| Jan-13                           | 22.79  | 25.30   | 26.55        | 22.71            | 24.99          |  |
| Feb-13                           | 23.35  | 24.61   | 25.68        | 23.66            | 24.50          |  |
| Mar-13                           | 22.44  | 24.95   | 26.50        | 22.58            | 24.74          |  |
| Apr-13                           | 20.08  | 23.76   | 26.13        | 20.50            | 23.20          |  |
| May-13                           | 18.99  | 24.39   | 27.13        | 18.80            | 23.73          |  |
| Jun-13                           | 19.01  | 25.92   | 29.29        | 18.45            | 25.32          |  |
| Jul-13                           | 18.95  | 25.43   | 29.68        | 19.61            | 24.51          |  |
| Aug-13                           | 20.26  | 28.34   | 33.00        | 20.17            | 27.65          |  |
| Sep-13                           | 19.21  | 28.34   | 32.43        | 18.56            | 27.03          |  |
| Oct-13                           | 18.26  | 24.47   | 27.84        | 18.37            | 23.66          |  |
| Nov-13                           | 20.78  | 24.71   | 27.81        | 21.97            | 24.20          |  |
| Dec-13                           | 21.68  | 26.96   | 29.87        | 21.82            | 26.25          |  |
| Jan-14                           | 24.48  | 29.01   | 31.55        | 24.76            | 28.30          |  |
| Feb-14                           | 24.23  | 29.66   | 32.44        | 24.06            | 29.03          |  |
| Mar-14                           | 22.98  | 25.79   | 27.81        | 23.76            | 25.39          |  |
| Apr-14                           | 20.64  | 26.34   | 29.45        | 20.50            | 25.76          |  |
| May-14                           | 18.76  | 24.79   | 28.17        | 19.11            | 23.98          |  |
| Jun-14                           | 19.80  | 27.58   | 31.59        | 19.61            | 26.58          |  |
| Jul-14                           | 19.57  | 27.38   | 32.30        | 20.24            | 26.39          |  |
| Aug-14                           | 20.13  | 27.20   | 31.67        | 20.99            | 26.44          |  |
| Sep-14                           | 18.79  | 26.24   | 30.47        | 18.93            | 25.20          |  |
| Oct-14                           | 19.00  | 24.89   | 28.69        | 19.51            | 24.15          |  |
| Nov-14                           | 22.55  | 27.73   | 30.77        | 23.14            | 27.11          |  |
| Dec-14                           | 22.76  | 27.74   | 30.62        | 22.96            | 27.01          |  |
| Jan-15                           | 28.48  | 34.94   | 38.99        | 29.40            | 34.01          |  |
| Feb-15                           | 27.91  | 31.73   | 34.82        | 28.00            | 31.21          |  |
| Mar-15                           | 25.62  | 29.96   | 32.92        | 26.45            | 29.31          |  |
| Apr-15                           | 23.26  | 28.95   | 32.69        | 24.07            | 28.12          |  |
| May-15                           | 21.11  | 27.76   | 31.81        | 21.78            | 27.04          |  |
| Jun-15                           | 23.42  | 32.62   | 37.54        | 23.74            | 31.09          |  |
| Jul-15                           | 23.84  | 33.39   | 39.50        | 24.75            | 32.10          |  |
| Aug-15                           | 25.09  | 34.14   | 39.76        | 26.72            | 32.77          |  |
| Sep-15                           | 21.96  | 29.59   | 34.40        | 22.45            | 28.75          |  |
| Oct-15                           | 22.03  | 28.54   | 32.92        | 23.02            | 27.74          |  |
| Nov-15                           | 24.56  | 30.88   | 35.05        | 25.91            | 29.82          |  |
| Dec-15                           | 27.12  | 33.33   | 37.37        | 27.77            | 32.54          |  |
| Jan-16                           | 34.41  | 41.86   | 47.17        | 36.35            | 40.91          |  |
| Feb-16                           | 32.12  | 39.13   | 44.36        | 33.87            | 37.94          |  |
| Mar-16                           | 30.51  | 36.81   | 41.32        | 31.61            | 35.94          |  |
| Apr-16                           | 27.39  | 33.59   | 37.76        | 28.33            | 32.86          |  |
| May-16                           | 24.33  | 32.05   | 37.00        | 25.75            | 30.74          |  |
| Jun-16                           | 28.75  | 37.94   | 43.28        | 29.05            | 36.86          |  |
| Jul-16                           | 29.40  | 41.50   | 48.41        | 30.22            | 40.09          |  |
| Aug-16                           | 30.73  | 38.64   | 44.50        | 32.15            | 37.49          |  |
| Sep-16                           | 24.64  | 33.21   | 38.38        | 25.31            | 32.00          |  |
| Oct-16                           | 26.54  | 33.91   | 39.12        | 28.29            | 32.96          |  |
| Nov-16                           | 29.39  | 37.38   | 42.81        | 30.77            | 36.17          |  |
| Dec-16                           | 32.60  | 40.75   | 45.89        | 33.40            | 39.80          |  |
| Jan-17                           | 38.79  | 45.90   | 50.48        | 40.38            | 44.55          |  |
| Feb-17                           | 36.02  | 42.66   | 47.76        | 37.78            | 41.73          |  |
| Mar-17                           | 34.51  | 40.98   | 45.57        | 35.55            | 40.08          |  |
| Apr-17                           | 30.23  | 37.26   | 42.01        | 31.69            | 36.48          |  |
| May-17                           | 26.58  | 34.45   | 40.06        | 28.29            | 32.99          |  |
| Jun-17                           | 32.12  | 40.40   | 45.70        | 32.82            | 39.36          |  |
| Jul-17                           | 33.07  | 43.22   | 49.55        | 34.68            | 41.80          |  |
| Aug-17                           | 33.89  | 41.67   | 47.53        | 35.48            | 40.61          |  |
| Sep-17                           | 27.21  | 36.40   | 42.16        | 28.30            | 35.23          |  |
| Oct-17                           | 30.06  | 37.26   | 42.70        | 31.96            | 36.19          |  |

|        |       |       |       |       |       |
|--------|-------|-------|-------|-------|-------|
| Nov-17 | 32.83 | 40.43 | 45.69 | 34.30 | 39.24 |
| Dec-17 | 35.90 | 43.65 | 48.47 | 36.66 | 42.87 |
| Jan-18 | 39.10 | 45.62 | 49.89 | 40.35 | 44.31 |
| Feb-18 | 39.23 | 44.65 | 49.03 | 40.92 | 43.86 |
| Mar-18 | 36.32 | 42.33 | 46.71 | 37.50 | 41.64 |
| Apr-18 | 31.11 | 37.45 | 42.26 | 33.06 | 36.43 |
| May-18 | 29.04 | 36.75 | 42.04 | 30.38 | 35.56 |
| Jun-18 | 30.45 | 39.24 | 44.57 | 31.33 | 38.11 |
| Jul-18 | 34.01 | 42.98 | 49.60 | 36.55 | 41.46 |
| Aug-18 | 35.08 | 43.74 | 49.50 | 35.78 | 42.78 |
| Sep-18 | 29.80 | 39.17 | 44.99 | 31.21 | 38.07 |
| Oct-18 | 30.42 | 38.06 | 43.54 | 31.82 | 36.84 |
| Nov-18 | 33.97 | 40.99 | 46.18 | 35.36 | 40.02 |
| Dec-18 | 36.43 | 44.55 | 49.81 | 38.09 | 43.36 |
| Jan-19 | 39.83 | 45.49 | 49.55 | 41.04 | 44.56 |
| Feb-19 | 39.70 | 45.36 | 49.70 | 41.11 | 44.61 |
| Mar-19 | 37.11 | 43.02 | 47.28 | 38.33 | 42.45 |
| Apr-19 | 32.44 | 38.25 | 42.89 | 34.13 | 37.24 |
| May-19 | 30.17 | 37.81 | 42.93 | 31.32 | 36.63 |
| Jun-19 | 31.74 | 40.38 | 45.63 | 32.79 | 39.42 |
| Jul-19 | 34.95 | 44.09 | 50.77 | 37.01 | 42.45 |
| Aug-19 | 35.94 | 44.82 | 50.90 | 36.96 | 43.98 |
| Sep-19 | 31.17 | 38.80 | 44.22 | 33.22 | 37.51 |
| Oct-19 | 31.86 | 39.31 | 44.74 | 33.19 | 38.32 |
| Nov-19 | 34.43 | 41.54 | 46.69 | 35.97 | 40.66 |
| Dec-19 | 37.76 | 45.53 | 50.36 | 38.89 | 44.29 |
| Jan-20 | 41.66 | 47.59 | 51.87 | 42.85 | 46.64 |
| Feb-20 | 40.62 | 46.49 | 50.97 | 42.19 | 45.82 |
| Mar-20 | 38.24 | 44.21 | 48.62 | 39.90 | 43.22 |
| Apr-20 | 33.89 | 39.76 | 44.50 | 35.51 | 38.91 |
| May-20 | 31.38 | 39.52 | 44.90 | 32.77 | 38.59 |
| Jun-20 | 35.40 | 44.41 | 49.47 | 35.99 | 42.88 |
| Jul-20 | 35.63 | 45.07 | 51.80 | 37.31 | 43.67 |
| Aug-20 | 36.01 | 45.48 | 51.38 | 37.70 | 44.07 |
| Sep-20 | 31.79 | 40.48 | 46.27 | 33.19 | 39.16 |
| Oct-20 | 33.06 | 40.64 | 46.15 | 34.47 | 39.80 |
| Nov-20 | 36.18 | 43.09 | 48.19 | 38.31 | 41.89 |
| Dec-20 | 40.32 | 47.69 | 52.45 | 41.08 | 46.74 |

| Month  | SPP -Nominal \$'s |         |              |                  |                |  |
|--------|-------------------|---------|--------------|------------------|----------------|--|
|        | Nights            | Weekend | Weekend Peak | PROMOD Weeknight | PROMOD Weekend |  |
| Jan-13 | 19.99             | 23.89   | 25.73        | 19.86            | 23.35          |  |
| Feb-13 | 19.94             | 22.75   | 24.27        | 20.01            | 22.38          |  |
| Mar-13 | 18.81             | 22.32   | 24.10        | 18.66            | 21.97          |  |
| Apr-13 | 18.62             | 23.18   | 25.61        | 18.75            | 22.43          |  |
| May-13 | 18.73             | 24.94   | 28.16        | 18.73            | 24.07          |  |
| Jun-13 | 20.10             | 27.64   | 31.50        | 20.21            | 26.75          |  |
| Jul-13 | 20.89             | 28.74   | 32.95        | 21.25            | 27.38          |  |
| Aug-13 | 23.75             | 31.69   | 36.36        | 23.97            | 30.88          |  |
| Sep-13 | 18.67             | 27.44   | 32.05        | 19.04            | 26.06          |  |
| Oct-13 | 17.91             | 26.61   | 31.02        | 17.92            | 25.39          |  |
| Nov-13 | 20.13             | 27.62   | 31.66        | 20.48            | 26.58          |  |
| Dec-13 | 21.20             | 29.52   | 33.54        | 21.08            | 28.26          |  |
| Jan-14 | 22.75             | 31.00   | 35.18        | 22.77            | 29.78          |  |
| Feb-14 | 22.69             | 32.14   | 36.76        | 22.63            | 30.76          |  |
| Mar-14 | 20.01             | 24.49   | 26.91        | 20.25            | 23.87          |  |
| Apr-14 | 19.88             | 25.92   | 29.15        | 20.02            | 25.09          |  |
| May-14 | 19.39             | 27.25   | 31.56        | 19.78            | 26.19          |  |
| Jun-14 | 23.38             | 31.90   | 37.24        | 25.13            | 30.34          |  |
| Jul-14 | 24.99             | 35.55   | 40.98        | 25.32            | 33.90          |  |
| Aug-14 | 27.93             | 38.66   | 44.71        | 28.57            | 37.41          |  |
| Sep-14 | 21.02             | 30.66   | 36.15        | 21.08            | 29.40          |  |
| Oct-14 | 18.81             | 28.21   | 33.18        | 18.89            | 26.90          |  |
| Nov-14 | 21.63             | 30.49   | 34.61        | 21.50            | 29.33          |  |
| Dec-14 | 22.88             | 33.68   | 39.05        | 22.99            | 31.81          |  |
| Jan-15 | 27.12             | 36.82   | 42.24        | 27.92            | 35.37          |  |
| Feb-15 | 26.23             | 36.21   | 41.61        | 26.57            | 34.82          |  |
| Mar-15 | 23.20             | 30.74   | 34.93        | 23.77            | 29.54          |  |
| Apr-15 | 22.45             | 29.65   | 33.75        | 22.99            | 28.56          |  |
| May-15 | 21.78             | 31.38   | 36.67        | 22.35            | 30.19          |  |
| Jun-15 | 26.28             | 36.66   | 42.42        | 26.65            | 35.04          |  |
| Jul-15 | 30.76             | 40.90   | 46.38        | 30.46            | 39.80          |  |
| Aug-15 | 31.73             | 42.96   | 49.80        | 33.96            | 41.08          |  |
| Sep-15 | 22.83             | 32.58   | 38.22        | 22.97            | 31.53          |  |
| Oct-15 | 21.49             | 33.20   | 39.26        | 21.65            | 31.63          |  |
| Nov-15 | 23.82             | 35.70   | 41.91        | 24.29            | 33.83          |  |
| Dec-15 | 26.90             | 36.47   | 41.58        | 27.17            | 35.11          |  |
| Jan-16 | 32.13             | 41.59   | 47.14        | 33.20            | 40.37          |  |
| Feb-16 | 30.17             | 41.86   | 48.74        | 31.35            | 39.84          |  |
| Mar-16 | 26.51             | 35.32   | 40.62        | 27.35            | 34.00          |  |
| Apr-16 | 26.38             | 35.90   | 41.14        | 26.96            | 34.57          |  |
| May-16 | 24.47             | 35.04   | 40.76        | 25.14            | 33.34          |  |
| Jun-16 | 31.25             | 41.53   | 47.49        | 32.49            | 39.73          |  |
| Jul-16 | 34.28             | 49.21   | 57.08        | 33.94            | 47.76          |  |
| Aug-16 | 35.62             | 50.78   | 59.87        | 36.31            | 48.68          |  |
| Sep-16 | 24.99             | 36.06   | 42.33        | 25.75            | 34.33          |  |
| Oct-16 | 23.99             | 36.33   | 42.71        | 24.38            | 34.59          |  |
| Nov-16 | 26.96             | 38.74   | 45.03        | 27.40            | 37.00          |  |
| Dec-16 | 30.72             | 42.67   | 49.19        | 31.09            | 41.15          |  |
| Jan-17 | 34.92             | 44.22   | 49.23        | 36.09            | 42.39          |  |
| Feb-17 | 32.92             | 44.01   | 50.50        | 33.77            | 42.47          |  |
| Mar-17 | 28.76             | 37.73   | 42.91        | 29.22            | 36.47          |  |
| Apr-17 | 27.10             | 36.67   | 42.21        | 28.25            | 35.45          |  |
| May-17 | 26.23             | 36.34   | 42.29        | 27.46            | 34.39          |  |
| Jun-17 | 33.44             | 45.11   | 51.80        | 34.10            | 43.43          |  |
| Jul-17 | 37.36             | 52.86   | 61.30        | 37.96            | 50.86          |  |
| Aug-17 | 39.60             | 57.17   | 65.17        | 38.89            | 54.69          |  |
| Sep-17 | 26.38             | 38.15   | 44.79        | 27.13            | 36.58          |  |
| Oct-17 | 26.47             | 37.33   | 43.37        | 27.20            | 35.65          |  |

|        |       |       |       |       |       |
|--------|-------|-------|-------|-------|-------|
| Nov-17 | 31.24 | 42.02 | 47.73 | 31.66 | 40.40 |
| Dec-17 | 33.47 | 44.32 | 49.89 | 33.32 | 43.13 |
| Jan-18 | 35.76 | 45.06 | 50.04 | 36.52 | 43.23 |
| Feb-18 | 36.21 | 45.22 | 50.39 | 37.11 | 43.80 |
| Mar-18 | 31.02 | 40.90 | 46.59 | 31.55 | 39.69 |
| Apr-18 | 27.91 | 37.85 | 43.62 | 28.96 | 36.28 |
| May-18 | 27.36 | 37.94 | 44.05 | 28.27 | 36.28 |
| Jun-18 | 32.08 | 42.57 | 49.13 | 34.04 | 40.85 |
| Jul-18 | 39.39 | 54.27 | 62.58 | 40.79 | 51.77 |
| Aug-18 | 41.26 | 62.57 | 71.50 | 39.89 | 59.29 |
| Sep-18 | 30.39 | 43.00 | 50.01 | 32.01 | 41.18 |
| Oct-18 | 27.10 | 39.25 | 45.97 | 27.80 | 37.16 |
| Nov-18 | 30.49 | 42.18 | 48.48 | 30.86 | 40.45 |
| Dec-18 | 34.35 | 46.15 | 52.44 | 35.07 | 44.42 |
| Jan-19 | 37.13 | 46.07 | 50.79 | 37.73 | 44.53 |
| Feb-19 | 36.13 | 46.21 | 52.06 | 37.02 | 44.72 |
| Mar-19 | 32.12 | 41.56 | 46.98 | 32.72 | 40.51 |
| Apr-19 | 28.96 | 38.72 | 44.25 | 29.74 | 37.01 |
| May-19 | 28.41 | 38.80 | 44.68 | 29.01 | 37.23 |
| Jun-19 | 32.96 | 48.15 | 56.26 | 33.26 | 46.53 |
| Jul-19 | 43.09 | 62.26 | 72.41 | 44.72 | 58.37 |
| Aug-19 | 45.21 | 63.25 | 71.65 | 43.37 | 61.48 |
| Sep-19 | 30.84 | 41.54 | 48.34 | 33.41 | 39.45 |
| Oct-19 | 28.40 | 40.54 | 47.40 | 28.95 | 38.88 |
| Nov-19 | 31.87 | 43.64 | 49.92 | 32.30 | 42.04 |
| Dec-19 | 35.69 | 46.86 | 52.41 | 35.96 | 45.02 |
| Jan-20 | 39.32 | 49.77 | 55.59 | 40.10 | 48.02 |
| Feb-20 | 37.92 | 47.08 | 52.32 | 38.63 | 45.91 |
| Mar-20 | 33.01 | 42.99 | 48.87 | 34.14 | 41.39 |
| Apr-20 | 30.74 | 40.26 | 46.05 | 31.77 | 38.83 |
| May-20 | 29.60 | 40.86 | 47.13 | 30.39 | 39.45 |
| Jun-20 | 37.48 | 53.82 | 62.19 | 38.86 | 50.41 |
| Jul-20 | 44.29 | 62.33 | 71.44 | 44.85 | 59.30 |
| Aug-20 | 45.41 | 65.31 | 75.75 | 46.82 | 62.21 |
| Sep-20 | 32.69 | 43.50 | 50.96 | 34.27 | 42.11 |
| Oct-20 | 29.81 | 42.32 | 49.24 | 30.23 | 40.77 |
| Nov-20 | 33.56 | 44.63 | 50.62 | 34.40 | 42.80 |
| Dec-20 | 37.52 | 49.28 | 55.63 | 37.87 | 47.63 |

| ERCOT North -Nominal \$'s |        |         |              |                  |                |  |
|---------------------------|--------|---------|--------------|------------------|----------------|--|
| Month                     | Nights | Weekend | Weekend Peak | PROMOD Weeknight | PROMOD Weekend |  |
| Jan-13                    | 24.76  | 24.93   | 25.06        | 24.76            | 24.93          |  |
| Feb-13                    | 24.20  | 24.42   | 24.55        | 24.18            | 24.41          |  |
| Mar-13                    | 24.74  | 25.24   | 25.48        | 24.72            | 25.18          |  |
| Apr-13                    | 27.91  | 28.75   | 29.18        | 27.91            | 28.62          |  |
| May-13                    | 29.15  | 29.80   | 30.36        | 29.40            | 29.67          |  |
| Jun-13                    | 29.55  | 30.69   | 31.18        | 29.45            | 30.55          |  |
| Jul-13                    | 27.37  | 29.64   | 30.75        | 27.37            | 29.25          |  |
| Aug-13                    | 30.05  | 32.05   | 33.02        | 30.02            | 31.78          |  |
| Sep-13                    | 31.56  | 33.36   | 34.30        | 31.60            | 33.09          |  |
| Oct-13                    | 31.31  | 32.31   | 32.85        | 31.35            | 32.16          |  |
| Nov-13                    | 30.38  | 32.30   | 33.81        | 31.11            | 31.96          |  |
| Dec-13                    | 32.56  | 34.54   | 35.12        | 32.15            | 34.24          |  |
| Jan-14                    | 37.11  | 38.33   | 38.71        | 36.90            | 38.16          |  |
| Feb-14                    | 36.91  | 37.81   | 38.22        | 36.73            | 37.76          |  |
| Mar-14                    | 33.52  | 35.41   | 36.64        | 34.06            | 35.07          |  |
| Apr-14                    | 32.70  | 34.72   | 35.72        | 32.82            | 34.36          |  |
| May-14                    | 33.17  | 34.43   | 35.32        | 33.54            | 34.20          |  |
| Jun-14                    | 34.28  | 35.69   | 36.35        | 34.24            | 35.47          |  |
| Jul-14                    | 35.83  | 38.37   | 39.62        | 35.83            | 38.00          |  |
| Aug-14                    | 35.40  | 37.72   | 38.86        | 35.36            | 37.44          |  |
| Sep-14                    | 35.61  | 38.02   | 39.23        | 35.59            | 37.64          |  |
| Oct-14                    | 34.99  | 35.98   | 36.52        | 35.05            | 35.81          |  |
| Nov-14                    | 32.47  | 35.22   | 37.23        | 33.53            | 34.77          |  |
| Dec-14                    | 35.12  | 37.95   | 38.48        | 34.38            | 37.46          |  |
| Jan-15                    | 41.33  | 42.28   | 42.51        | 41.06            | 42.16          |  |
| Feb-15                    | 41.17  | 41.75   | 41.91        | 40.98            | 41.69          |  |
| Mar-15                    | 37.87  | 39.26   | 40.29        | 38.27            | 39.03          |  |
| Apr-15                    | 36.68  | 38.39   | 39.10        | 36.50            | 38.17          |  |
| May-15                    | 37.14  | 38.16   | 38.83        | 37.38            | 38.01          |  |
| Jun-15                    | 38.00  | 39.86   | 40.61        | 37.85            | 39.55          |  |
| Jul-15                    | 39.22  | 42.86   | 44.66        | 39.20            | 42.31          |  |
| Aug-15                    | 39.00  | 42.02   | 43.55        | 39.02            | 41.61          |  |
| Sep-15                    | 38.59  | 41.18   | 42.48        | 38.56            | 40.83          |  |
| Oct-15                    | 37.73  | 38.87   | 39.56        | 37.85            | 38.71          |  |
| Nov-15                    | 37.04  | 38.86   | 40.66        | 38.25            | 38.47          |  |
| Dec-15                    | 39.71  | 41.68   | 42.11        | 39.13            | 41.47          |  |
| Jan-16                    | 44.72  | 45.18   | 45.43        | 44.72            | 45.13          |  |
| Feb-16                    | 44.21  | 44.50   | 44.62        | 44.15            | 44.47          |  |
| Mar-16                    | 41.65  | 42.57   | 43.16        | 41.76            | 42.44          |  |
| Apr-16                    | 40.40  | 41.58   | 42.12        | 40.35            | 41.41          |  |
| May-16                    | 41.03  | 41.85   | 42.33        | 41.16            | 41.70          |  |
| Jun-16                    | 41.10  | 43.57   | 44.74        | 41.01            | 43.23          |  |
| Jul-16                    | 42.12  | 46.51   | 48.74        | 42.13            | 45.98          |  |
| Aug-16                    | 41.92  | 47.26   | 49.87        | 41.88            | 46.37          |  |
| Sep-16                    | 41.48  | 45.07   | 46.85        | 41.42            | 44.56          |  |
| Oct-16                    | 41.00  | 41.91   | 42.42        | 41.12            | 41.76          |  |
| Nov-16                    | 41.63  | 42.61   | 43.60        | 42.00            | 42.51          |  |
| Dec-16                    | 43.61  | 44.82   | 45.19        | 43.39            | 44.65          |  |
| Jan-17                    | 46.33  | 46.95   | 47.22        | 46.32            | 46.85          |  |
| Feb-17                    | 45.75  | 46.01   | 46.14        | 45.71            | 46.00          |  |
| Mar-17                    | 43.27  | 44.12   | 44.59        | 43.33            | 43.98          |  |
| Apr-17                    | 41.88  | 42.81   | 43.30        | 41.94            | 42.68          |  |
| May-17                    | 41.90  | 42.79   | 43.30        | 41.99            | 42.62          |  |
| Jun-17                    | 42.62  | 44.98   | 46.15        | 42.60            | 44.63          |  |
| Jul-17                    | 43.75  | 48.74   | 51.26        | 43.81            | 48.04          |  |
| Aug-17                    | 43.57  | 49.53   | 52.48        | 43.53            | 48.69          |  |
| Sep-17                    | 42.98  | 46.59   | 48.41        | 42.93            | 46.14          |  |
| Oct-17                    | 42.50  | 43.30   | 43.75        | 42.58            | 43.16          |  |

|        |       |       |       |       |       |
|--------|-------|-------|-------|-------|-------|
| Nov-17 | 43.55 | 44.52 | 45.11 | 43.66 | 44.37 |
| Dec-17 | 45.63 | 46.84 | 47.23 | 45.41 | 46.67 |
| Jan-18 | 47.55 | 48.04 | 48.24 | 47.54 | 47.94 |
| Feb-18 | 46.48 | 47.03 | 47.23 | 46.36 | 46.98 |
| Mar-18 | 44.25 | 44.94 | 45.31 | 44.31 | 44.83 |
| Apr-18 | 42.66 | 43.55 | 44.00 | 42.66 | 43.41 |
| May-18 | 42.67 | 43.46 | 43.95 | 42.76 | 43.33 |
| Jun-18 | 43.25 | 45.34 | 46.37 | 43.23 | 45.06 |
| Jul-18 | 44.57 | 49.72 | 52.27 | 44.57 | 48.93 |
| Aug-18 | 44.49 | 49.45 | 51.96 | 44.50 | 48.72 |
| Sep-18 | 44.00 | 48.22 | 50.34 | 43.99 | 47.74 |
| Oct-18 | 43.35 | 44.17 | 44.64 | 43.40 | 44.03 |
| Nov-18 | 44.35 | 45.23 | 45.77 | 44.44 | 45.09 |
| Dec-18 | 45.75 | 47.06 | 47.52 | 45.57 | 46.86 |
| Jan-19 | 47.60 | 47.98 | 48.19 | 47.59 | 47.95 |
| Feb-19 | 47.00 | 47.47 | 47.66 | 46.89 | 47.44 |
| Mar-19 | 44.78 | 45.45 | 45.82 | 44.86 | 45.35 |
| Apr-19 | 43.27 | 44.16 | 44.59 | 43.25 | 44.02 |
| May-19 | 43.25 | 44.01 | 44.49 | 43.34 | 43.89 |
| Jun-19 | 43.82 | 45.73 | 46.67 | 43.81 | 45.50 |
| Jul-19 | 45.25 | 50.97 | 53.81 | 45.28 | 49.99 |
| Aug-19 | 45.55 | 51.83 | 55.00 | 45.53 | 51.01 |
| Sep-19 | 44.53 | 48.32 | 50.28 | 44.58 | 47.76 |
| Oct-19 | 43.88 | 44.67 | 45.11 | 43.93 | 44.55 |
| Nov-19 | 44.90 | 45.86 | 46.39 | 44.97 | 45.72 |
| Dec-19 | 46.30 | 47.48 | 47.85 | 46.12 | 47.28 |
| Jan-20 | 49.29 | 49.68 | 49.87 | 49.26 | 49.63 |
| Feb-20 | 48.73 | 49.10 | 49.30 | 48.66 | 49.10 |
| Mar-20 | 46.49 | 47.14 | 47.53 | 46.59 | 47.02 |
| Apr-20 | 45.06 | 45.92 | 46.34 | 45.08 | 45.78 |
| May-20 | 44.98 | 45.79 | 46.27 | 45.09 | 45.68 |
| Jun-20 | 45.61 | 47.78 | 48.80 | 45.57 | 47.41 |
| Jul-20 | 46.88 | 52.50 | 55.27 | 46.87 | 51.65 |
| Aug-20 | 46.56 | 51.16 | 53.47 | 46.58 | 50.53 |
| Sep-20 | 46.07 | 49.60 | 51.37 | 46.04 | 49.12 |
| Oct-20 | 45.58 | 46.40 | 46.84 | 45.62 | 46.29 |
| Nov-20 | 46.63 | 47.54 | 48.06 | 46.70 | 47.40 |
| Dec-20 | 48.00 | 49.34 | 49.77 | 47.82 | 49.14 |

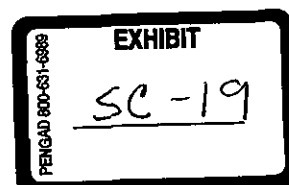
| Power Prices (\$/M)       |        |         |              |                  |                |  |
|---------------------------|--------|---------|--------------|------------------|----------------|--|
| ERCOT South -Nominal \$'s |        |         |              |                  |                |  |
| Month                     | Nights | Weekend | Weekend Peak | PROMOD Weeknight | PROMOD Weekend |  |
| Jan-13                    | 24.95  | 25.17   | 25.25        | 24.92            | 25.14          |  |
| Feb-13                    | 24.40  | 24.64   | 24.74        | 24.35            | 24.62          |  |
| Mar-13                    | 25.01  | 25.38   | 25.54        | 24.98            | 25.34          |  |
| Apr-13                    | 28.44  | 29.04   | 29.38        | 28.52            | 28.92          |  |
| May-13                    | 29.48  | 30.12   | 30.60        | 29.69            | 29.97          |  |
| Jun-13                    | 29.82  | 31.12   | 31.66        | 29.68            | 30.97          |  |
| Jul-13                    | 27.57  | 29.88   | 30.99        | 27.54            | 29.49          |  |
| Aug-13                    | 30.34  | 32.29   | 33.26        | 30.34            | 32.02          |  |
| Sep-13                    | 31.92  | 33.75   | 34.71        | 31.96            | 33.48          |  |
| Oct-13                    | 31.89  | 32.90   | 33.37        | 31.88            | 32.75          |  |
| Nov-13                    | 30.40  | 32.33   | 33.95        | 31.23            | 32.00          |  |
| Dec-13                    | 32.68  | 34.69   | 35.28        | 32.24            | 34.40          |  |
| Jan-14                    | 37.23  | 38.41   | 38.64        | 36.93            | 38.23          |  |
| Feb-14                    | 36.98  | 37.67   | 37.92        | 36.78            | 37.63          |  |
| Mar-14                    | 33.91  | 35.56   | 36.59        | 34.35            | 35.25          |  |
| Apr-14                    | 33.06  | 34.81   | 35.67        | 33.17            | 34.49          |  |
| May-14                    | 33.56  | 34.79   | 35.62        | 33.91            | 34.55          |  |
| Jun-14                    | 34.54  | 36.12   | 36.86        | 34.48            | 35.89          |  |
| Jul-14                    | 36.02  | 38.72   | 40.03        | 36.02            | 38.32          |  |
| Aug-14                    | 35.75  | 37.99   | 39.11        | 35.74            | 37.72          |  |
| Sep-14                    | 35.57  | 38.03   | 39.27        | 35.56            | 37.64          |  |
| Oct-14                    | 35.37  | 36.37   | 36.87        | 35.35            | 36.23          |  |
| Nov-14                    | 32.66  | 35.48   | 37.61        | 33.83            | 35.02          |  |
| Dec-14                    | 35.47  | 38.42   | 38.90        | 34.63            | 37.92          |  |
| Jan-15                    | 41.41  | 42.26   | 42.42        | 41.15            | 42.14          |  |
| Feb-15                    | 41.04  | 41.76   | 41.91        | 40.80            | 41.67          |  |
| Mar-15                    | 38.00  | 39.20   | 40.06        | 38.36            | 38.98          |  |
| Apr-15                    | 37.13  | 38.67   | 39.27        | 36.92            | 38.49          |  |
| May-15                    | 37.76  | 38.68   | 39.28        | 37.99            | 38.53          |  |
| Jun-15                    | 38.05  | 40.11   | 41.01        | 37.95            | 39.76          |  |
| Jul-15                    | 39.18  | 42.99   | 44.86        | 39.18            | 42.40          |  |
| Aug-15                    | 39.04  | 42.13   | 43.67        | 39.05            | 41.70          |  |
| Sep-15                    | 38.64  | 41.25   | 42.57        | 38.59            | 40.92          |  |
| Oct-15                    | 37.84  | 38.99   | 39.64        | 37.95            | 38.81          |  |
| Nov-15                    | 37.00  | 39.04   | 40.97        | 38.27            | 38.60          |  |
| Dec-15                    | 39.82  | 42.09   | 42.50        | 39.06            | 41.87          |  |
| Jan-16                    | 45.39  | 45.79   | 46.02        | 45.40            | 45.75          |  |
| Feb-16                    | 44.77  | 45.03   | 45.14        | 44.75            | 44.99          |  |
| Mar-16                    | 42.51  | 43.31   | 43.75        | 42.55            | 43.19          |  |
| Apr-16                    | 41.18  | 42.10   | 42.55        | 41.16            | 41.98          |  |
| May-16                    | 41.60  | 42.65   | 43.26        | 41.76            | 42.46          |  |
| Jun-16                    | 41.95  | 44.40   | 45.59        | 41.90            | 44.06          |  |
| Jul-16                    | 42.78  | 47.12   | 49.34        | 42.82            | 46.59          |  |
| Aug-16                    | 42.72  | 48.00   | 50.53        | 42.64            | 47.11          |  |
| Sep-16                    | 41.96  | 45.59   | 47.36        | 41.85            | 45.09          |  |
| Oct-16                    | 41.59  | 42.62   | 43.17        | 41.66            | 42.47          |  |
| Nov-16                    | 42.16  | 43.32   | 44.51        | 42.65            | 43.19          |  |
| Dec-16                    | 44.46  | 45.84   | 46.20        | 44.14            | 45.64          |  |
| Jan-17                    | 47.20  | 47.68   | 47.86        | 47.20            | 47.58          |  |
| Feb-17                    | 46.10  | 46.41   | 46.55        | 46.04            | 46.40          |  |
| Mar-17                    | 43.86  | 44.58   | 44.90        | 43.83            | 44.46          |  |
| Apr-17                    | 42.55  | 43.35   | 43.76        | 42.56            | 43.26          |  |
| May-17                    | 42.48  | 43.55   | 44.15        | 42.60            | 43.33          |  |
| Jun-17                    | 43.32  | 45.71   | 46.89        | 43.27            | 45.37          |  |
| Jul-17                    | 44.25  | 49.12   | 51.56        | 44.31            | 48.43          |  |
| Aug-17                    | 44.30  | 50.15   | 52.95        | 44.19            | 49.32          |  |
| Sep-17                    | 43.28  | 46.98   | 48.83        | 43.18            | 46.53          |  |
| Oct-17                    | 42.85  | 43.83   | 44.36        | 42.92            | 43.67          |  |

|        |       |       |       |       |       |
|--------|-------|-------|-------|-------|-------|
| Nov-17 | 43.85 | 45.20 | 46.05 | 44.03 | 44.99 |
| Dec-17 | 45.98 | 47.40 | 47.78 | 45.62 | 47.21 |
| Jan-18 | 47.93 | 48.63 | 48.81 | 47.83 | 48.48 |
| Feb-18 | 46.92 | 47.34 | 47.55 | 46.85 | 47.32 |
| Mar-18 | 44.64 | 45.28 | 45.56 | 44.61 | 45.19 |
| Apr-18 | 43.20 | 43.91 | 44.27 | 43.22 | 43.80 |
| May-18 | 43.05 | 44.04 | 44.63 | 43.17 | 43.87 |
| Jun-18 | 43.89 | 46.05 | 47.10 | 43.84 | 45.76 |
| Jul-18 | 44.86 | 50.03 | 52.59 | 44.87 | 49.24 |
| Aug-18 | 45.42 | 50.37 | 52.89 | 45.43 | 49.64 |
| Sep-18 | 44.48 | 48.73 | 50.88 | 44.46 | 48.25 |
| Oct-18 | 43.43 | 44.47 | 45.04 | 43.47 | 44.31 |
| Nov-18 | 44.39 | 45.51 | 46.25 | 44.55 | 45.34 |
| Dec-18 | 46.11 | 47.69 | 48.20 | 45.80 | 47.46 |
| Jan-19 | 47.76 | 48.19 | 48.33 | 47.71 | 48.13 |
| Feb-19 | 47.06 | 47.44 | 47.63 | 47.02 | 47.40 |
| Mar-19 | 45.14 | 45.75 | 46.02 | 45.14 | 45.65 |
| Apr-19 | 43.54 | 44.28 | 44.66 | 43.57 | 44.15 |
| May-19 | 43.59 | 44.54 | 45.12 | 43.70 | 44.38 |
| Jun-19 | 44.13 | 46.17 | 47.19 | 44.13 | 45.93 |
| Jul-19 | 45.39 | 51.06 | 53.86 | 45.41 | 50.09 |
| Aug-19 | 45.90 | 51.85 | 54.81 | 45.85 | 51.06 |
| Sep-19 | 44.85 | 48.63 | 50.59 | 44.91 | 48.07 |
| Oct-19 | 43.67 | 44.79 | 45.39 | 43.73 | 44.62 |
| Nov-19 | 44.70 | 45.98 | 46.75 | 44.67 | 45.80 |
| Dec-19 | 46.40 | 47.77 | 48.16 | 46.17 | 47.52 |
| Jan-20 | 49.45 | 49.83 | 49.98 | 49.46 | 49.74 |
| Feb-20 | 48.84 | 49.18 | 49.36 | 48.81 | 49.15 |
| Mar-20 | 47.05 | 47.68 | 47.99 | 47.09 | 47.56 |
| Apr-20 | 45.52 | 46.36 | 46.77 | 45.52 | 46.24 |
| May-20 | 45.21 | 46.18 | 46.79 | 45.37 | 46.05 |
| Jun-20 | 45.85 | 48.29 | 49.44 | 45.80 | 47.88 |
| Jul-20 | 47.19 | 52.89 | 55.70 | 47.17 | 52.02 |
| Aug-20 | 46.85 | 51.47 | 53.77 | 46.87 | 50.83 |
| Sep-20 | 46.09 | 49.77 | 51.64 | 46.05 | 49.29 |
| Oct-20 | 45.29 | 46.46 | 47.08 | 45.34 | 46.29 |
| Nov-20 | 46.31 | 47.64 | 48.40 | 46.48 | 47.41 |
| Dec-20 | 47.98 | 49.56 | 50.00 | 47.71 | 49.32 |

| Power Prices (\$/MWh) -Nominal \$'s |        |         |              |                  |                |  |
|-------------------------------------|--------|---------|--------------|------------------|----------------|--|
| ERCOT West -Nominal \$'s            |        |         |              |                  |                |  |
| Month                               | Nights | Weekend | Weekend Peak | PROMOD Weeknight | PROMOD Weekend |  |
| Jan-13                              | 23.89  | 24.11   | 24.26        | 23.89            | 24.10          |  |
| Feb-13                              | 23.31  | 23.56   | 23.69        | 23.29            | 23.54          |  |
| Mar-13                              | 23.91  | 24.35   | 24.54        | 23.88            | 24.29          |  |
| Apr-13                              | 27.24  | 27.93   | 28.31        | 27.28            | 27.82          |  |
| May-13                              | 28.39  | 29.02   | 29.53        | 28.61            | 28.89          |  |
| Jun-13                              | 28.74  | 29.98   | 30.50        | 28.62            | 29.83          |  |
| Jul-13                              | 26.52  | 28.92   | 30.07        | 26.50            | 28.51          |  |
| Aug-13                              | 29.23  | 31.34   | 32.38        | 29.21            | 31.05          |  |
| Sep-13                              | 30.75  | 32.62   | 33.60        | 30.80            | 32.35          |  |
| Oct-13                              | 30.73  | 31.68   | 32.17        | 30.75            | 31.54          |  |
| Nov-13                              | 29.55  | 31.37   | 32.86        | 30.32            | 31.04          |  |
| Dec-13                              | 31.71  | 33.57   | 34.12        | 31.31            | 33.29          |  |
| Jan-14                              | 36.22  | 37.32   | 37.60        | 35.98            | 37.16          |  |
| Feb-14                              | 35.97  | 36.74   | 37.04        | 35.78            | 36.69          |  |
| Mar-14                              | 32.82  | 34.46   | 35.52        | 33.31            | 34.15          |  |
| Apr-14                              | 32.00  | 33.74   | 34.62        | 32.12            | 33.42          |  |
| May-14                              | 32.50  | 33.65   | 34.45        | 32.85            | 33.43          |  |
| Jun-14                              | 33.46  | 34.95   | 35.67        | 33.43            | 34.73          |  |
| Jul-14                              | 34.91  | 37.63   | 38.95        | 34.92            | 37.22          |  |
| Aug-14                              | 34.59  | 37.00   | 38.19        | 34.56            | 36.70          |  |
| Sep-14                              | 34.52  | 37.07   | 38.35        | 34.52            | 36.66          |  |
| Oct-14                              | 34.20  | 35.14   | 35.62        | 34.21            | 35.00          |  |
| Nov-14                              | 31.71  | 34.36   | 36.33        | 32.80            | 33.92          |  |
| Dec-14                              | 34.40  | 37.11   | 37.55        | 33.62            | 36.65          |  |
| Jan-15                              | 40.29  | 41.09   | 41.28        | 40.05            | 41.00          |  |
| Feb-15                              | 40.04  | 40.60   | 40.72        | 39.86            | 40.54          |  |
| Mar-15                              | 36.89  | 38.13   | 39.05        | 37.26            | 37.91          |  |
| Apr-15                              | 35.97  | 37.45   | 38.04        | 35.78            | 37.27          |  |
| May-15                              | 36.43  | 37.27   | 37.83        | 36.65            | 37.14          |  |
| Jun-15                              | 36.94  | 38.91   | 39.76        | 36.83            | 38.58          |  |
| Jul-15                              | 38.10  | 41.94   | 43.82        | 38.08            | 41.35          |  |
| Aug-15                              | 37.90  | 41.11   | 42.73        | 37.93            | 40.67          |  |
| Sep-15                              | 37.50  | 40.18   | 41.54        | 37.47            | 39.83          |  |
| Oct-15                              | 36.77  | 37.85   | 38.47        | 36.87            | 37.69          |  |
| Nov-15                              | 36.10  | 37.85   | 39.63        | 37.33            | 37.47          |  |
| Dec-15                              | 38.69  | 40.68   | 41.04        | 38.03            | 40.48          |  |
| Jan-16                              | 43.92  | 44.18   | 44.36        | 43.95            | 44.16          |  |
| Feb-16                              | 43.33  | 43.52   | 43.58        | 43.29            | 43.49          |  |
| Mar-16                              | 41.03  | 41.72   | 42.12        | 41.09            | 41.62          |  |
| Apr-16                              | 39.75  | 40.63   | 41.07        | 39.73            | 40.51          |  |
| May-16                              | 40.12  | 40.87   | 41.32        | 40.25            | 40.73          |  |
| Jun-16                              | 40.29  | 42.73   | 43.91        | 40.25            | 42.39          |  |
| Jul-16                              | 41.21  | 45.72   | 48.01        | 41.22            | 45.17          |  |
| Aug-16                              | 41.08  | 46.44   | 49.06        | 41.04            | 45.54          |  |
| Sep-16                              | 40.45  | 44.11   | 45.92        | 40.36            | 43.60          |  |
| Oct-16                              | 40.16  | 41.07   | 41.57        | 40.23            | 40.93          |  |
| Nov-16                              | 40.82  | 41.64   | 42.59        | 41.25            | 41.55          |  |
| Dec-16                              | 42.92  | 44.01   | 44.28        | 42.64            | 43.86          |  |
| Jan-17                              | 45.60  | 46.00   | 46.16        | 45.60            | 45.92          |  |
| Feb-17                              | 44.69  | 44.93   | 45.03        | 44.64            | 44.92          |  |
| Mar-17                              | 42.42  | 43.10   | 43.41        | 42.41            | 42.99          |  |
| Apr-17                              | 41.08  | 41.84   | 42.24        | 41.09            | 41.75          |  |
| May-17                              | 40.99  | 41.82   | 42.29        | 41.10            | 41.65          |  |
| Jun-17                              | 41.75  | 44.17   | 45.36        | 41.71            | 43.82          |  |
| Jul-17                              | 42.68  | 47.82   | 50.40        | 42.74            | 47.10          |  |
| Aug-17                              | 42.63  | 48.60   | 51.54        | 42.58            | 47.75          |  |
| Sep-17                              | 41.82  | 45.56   | 47.43        | 41.74            | 45.09          |  |
| Oct-17                              | 41.47  | 42.32   | 42.79        | 41.53            | 42.18          |  |

|        |       |       |       |       |       |
|--------|-------|-------|-------|-------|-------|
| Nov-17 | 42.50 | 43.49 | 44.12 | 42.65 | 43.34 |
| Dec-17 | 44.58 | 45.78 | 46.12 | 44.29 | 45.62 |
| Jan-18 | 46.52 | 47.02 | 47.15 | 46.47 | 46.90 |
| Feb-18 | 45.47 | 45.89 | 46.06 | 45.39 | 45.86 |
| Mar-18 | 43.23 | 43.83 | 44.10 | 43.23 | 43.74 |
| Apr-18 | 41.73 | 42.48 | 42.85 | 41.73 | 42.36 |
| May-18 | 41.62 | 42.38 | 42.85 | 41.73 | 42.25 |
| Jun-18 | 42.33 | 44.50 | 45.57 | 42.29 | 44.21 |
| Jul-18 | 43.41 | 48.68 | 51.28 | 43.41 | 47.87 |
| Aug-18 | 43.52 | 48.70 | 51.31 | 43.53 | 47.93 |
| Sep-18 | 42.85 | 47.18 | 49.35 | 42.80 | 46.69 |
| Oct-18 | 42.14 | 43.05 | 43.55 | 42.18 | 42.90 |
| Nov-18 | 43.13 | 44.02 | 44.58 | 43.25 | 43.88 |
| Dec-18 | 44.70 | 46.00 | 46.41 | 44.45 | 45.80 |
| Jan-19 | 46.40 | 46.78 | 46.93 | 46.36 | 46.73 |
| Feb-19 | 45.74 | 46.16 | 46.33 | 45.66 | 46.12 |
| Mar-19 | 43.73 | 44.30 | 44.57 | 43.75 | 44.21 |
| Apr-19 | 42.16 | 42.95 | 43.34 | 42.18 | 42.80 |
| May-19 | 42.16 | 42.92 | 43.41 | 42.27 | 42.80 |
| Jun-19 | 42.68 | 44.70 | 45.71 | 42.68 | 44.46 |
| Jul-19 | 43.99 | 49.82 | 52.72 | 44.02 | 48.83 |
| Aug-19 | 44.26 | 50.58 | 53.76 | 44.23 | 49.75 |
| Sep-19 | 43.30 | 47.22 | 49.23 | 43.34 | 46.64 |
| Oct-19 | 42.51 | 43.48 | 44.01 | 42.55 | 43.34 |
| Nov-19 | 43.55 | 44.56 | 45.15 | 43.65 | 44.42 |
| Dec-19 | 45.07 | 46.25 | 46.61 | 44.88 | 46.04 |
| Jan-20 | 48.04 | 48.41 | 48.56 | 48.03 | 48.34 |
| Feb-20 | 47.48 | 47.83 | 47.99 | 47.42 | 47.81 |
| Mar-20 | 45.56 | 46.08 | 46.33 | 45.60 | 45.98 |
| Apr-20 | 44.01 | 44.77 | 45.14 | 44.02 | 44.65 |
| May-20 | 43.80 | 44.59 | 45.08 | 43.93 | 44.49 |
| Jun-20 | 44.37 | 46.74 | 47.86 | 44.34 | 46.34 |
| Jul-20 | 45.64 | 51.41 | 54.26 | 45.62 | 50.54 |
| Aug-20 | 45.31 | 50.14 | 52.57 | 45.33 | 49.48 |
| Sep-20 | 44.71 | 48.42 | 50.29 | 44.68 | 47.92 |
| Oct-20 | 44.14 | 45.14 | 45.68 | 44.19 | 45.00 |
| Nov-20 | 45.18 | 46.22 | 46.81 | 45.28 | 46.05 |
| Dec-20 | 46.64 | 48.02 | 48.45 | 46.44 | 47.81 |

| Year | Fleet Transition Carbon Adjusted |                      |                       |                           | FTCA - CSAPR    |                      |                       |
|------|----------------------------------|----------------------|-----------------------|---------------------------|-----------------|----------------------|-----------------------|
|      | Growth Rate (%)                  | Real Growth Rate (%) | Implied Inflation (%) | Exchange Rate (Euro/\$US) | Growth Rate (%) | Real Growth Rate (%) | Implied Inflation (%) |
| 2009 | -1.7                             | -2.6                 | 0.9                   | 1.39                      | -2.4            | -3.5                 | 1.0                   |
| 2010 | 3.4                              | 2.7                  | 0.7                   | 1.30                      | 4.2             | 3.0                  | 1.1                   |
| 2011 | 3.8                              | 3.1                  | 0.8                   | 1.19                      | 3.4             | 1.7                  | 1.8                   |
| 2012 | 6.6                              | 5.0                  | 1.6                   | 1.12                      | 5.0             | 3.3                  | 1.7                   |
| 2013 | 6.3                              | 4.2                  | 2.1                   | 1.12                      | 7.2             | 4.4                  | 2.7                   |
| 2014 | 4.5                              | 2.8                  | 1.6                   | 1.17                      | 6.3             | 3.9                  | 2.4                   |
| 2015 | 3.7                              | 2.3                  | 1.4                   | 1.23                      | 4.5             | 2.9                  | 1.7                   |
| 2016 | 3.6                              | 2.2                  | 1.4                   | 1.29                      | 3.5             | 2.1                  | 1.5                   |
| 2017 | 3.6                              | 2.2                  | 1.4                   | 1.31                      | 3.6             | 2.1                  | 1.6                   |
| 2018 | 3.5                              | 2.1                  | 1.4                   | 1.31                      | 3.7             | 2.2                  | 1.5                   |
| 2019 | 3.4                              | 2.1                  | 1.4                   | 1.31                      | 3.6             | 2.1                  | 1.5                   |
| 2020 | 3.4                              | 2.1                  | 1.3                   | 1.31                      | 3.6             | 2.2                  | 1.5                   |
| 2021 | 3.4                              | 2.1                  | 1.3                   | 1.31                      | 3.7             | 2.2                  | 1.5                   |
| 2022 | 2.5                              | 1.2                  | 1.3                   | 1.31                      | 3.7             | 2.1                  | 1.5                   |
| 2023 | 3.4                              | 2.0                  | 1.3                   | 1.31                      | 3.6             | 2.1                  | 1.5                   |
| 2024 | 3.3                              | 2.0                  | 1.3                   | 1.31                      | 3.6             | 2.1                  | 1.5                   |
| 2025 | 3.3                              | 2.0                  | 1.3                   | 1.31                      | 3.6             | 2.1                  | 1.5                   |
| 2026 | 3.2                              | 1.9                  | 1.3                   | 1.31                      | 3.5             | 2.0                  | 1.5                   |
| 2027 | 3.2                              | 1.9                  | 1.3                   | 1.31                      | 3.5             | 2.0                  | 1.5                   |
| 2028 | 3.2                              | 1.9                  | 1.3                   | 1.31                      | 3.5             | 2.0                  | 1.5                   |
| 2029 | 3.2                              | 1.9                  | 1.3                   | 1.31                      | 3.5             | 2.0                  | 1.4                   |
| 2030 | 3.2                              | 1.9                  | 1.2                   | 1.31                      | 3.5             | 2.0                  | 1.4                   |



| Power Prices (\$/MWh) - Nominal \$'s |                   |          |         |          |             |          |             |          |            |          |         |          |
|--------------------------------------|-------------------|----------|---------|----------|-------------|----------|-------------|----------|------------|----------|---------|----------|
| Year                                 | PJM - AEP GEN HUB |          | SPP     |          | ERCOT North |          | ERCOT South |          | ERCOT West |          | On-Peak | Off-Peak |
|                                      | On-Peak           | Off-Peak | On-Peak | Off-Peak | On-Peak     | Off-Peak | On-Peak     | Off-Peak | On-Peak    | Off-Peak |         |          |
| 2013                                 | 45.84             | 27.27    | 49.34   | 33.39    | 36.88       | 35.00    | 37.20       | 35.27    | 36.06      | 34.14    |         |          |
| 2014                                 | 47.52             | 28.21    | 54.00   | 36.79    | 40.17       | 37.89    | 40.53       | 38.20    | 39.31      | 37.01    |         |          |
| 2015                                 | 55.18             | 32.05    | 58.46   | 40.64    | 41.93       | 39.67    | 42.66       | 40.40    | 41.17      | 38.96    |         |          |
| 2016                                 | 62.79             | 38.33    | 63.81   | 45.09    | 47.00       | 44.46    | 47.74       | 45.30    | 46.15      | 43.71    |         |          |
| 2017                                 | 63.59             | 41.27    | 66.14   | 47.21    | 48.61       | 46.06    | 49.02       | 46.50    | 47.57      | 45.02    |         |          |
| 2018                                 | 64.20             | 42.57    | 66.83   | 48.47    | 50.14       | 47.46    | 50.52       | 47.83    | 49.05      | 46.35    |         |          |
| 2019                                 | 65.15             | 43.52    | 67.43   | 49.34    | 51.36       | 48.54    | 51.50       | 48.67    | 50.14      | 47.28    |         |          |
| 2020                                 | 66.33             | 44.18    | 68.87   | 48.80    | 51.27       | 48.75    | 51.41       | 48.82    | 50.05      | 47.47    |         |          |
| 2021                                 | 67.64             | 45.76    | 68.52   | 50.78    | 53.02       | 50.55    | 53.03       | 50.44    | 51.71      | 49.15    |         |          |
| 2022                                 | 76.79             | 55.93    | 75.69   | 59.13    | 60.56       | 57.81    | 60.64       | 57.78    | 59.20      | 56.38    |         |          |
| 2023                                 | 78.33             | 56.84    | 76.53   | 60.17    | 62.14       | 59.28    | 62.34       | 59.35    | 60.80      | 57.86    |         |          |
| 2024                                 | 80.34             | 58.85    | 78.76   | 62.40    | 64.92       | 61.32    | 64.28       | 61.13    | 62.89      | 59.79    |         |          |
| 2025                                 | 82.18             | 60.37    | 80.50   | 63.83    | 65.64       | 62.82    | 65.64       | 62.62    | 64.20      | 61.28    |         |          |
| 2026                                 | 83.29             | 61.06    | 81.13   | 64.33    | 66.80       | 63.88    | 66.86       | 63.73    | 65.36      | 62.33    |         |          |
| 2027                                 | 84.57             | 62.64    | 83.15   | 66.12    | 68.28       | 65.35    | 68.17       | 65.02    | 66.75      | 63.73    |         |          |
| 2028                                 | 86.25             | 64.05    | 84.15   | 67.56    | 69.41       | 66.58    | 69.30       | 66.21    | 67.88      | 64.94    |         |          |
| 2029                                 | 87.64             | 65.66    | 85.57   | 69.56    | 70.91       | 68.06    | 70.65       | 67.50    | 69.31      | 66.34    |         |          |
| 2030                                 | 89.34             | 67.49    | 86.60   | 70.45    | 71.74       | 68.94    | 71.47       | 68.86    | 70.13      | 67.20    |         |          |

| Year | 12395 Btu/lb<br>1.6# SO2<br>CAPP | 12500 Btu/lb<br>1.6# SO2<br>CAPP CSX-Rail | 12000 Btu/lb<br>1.2# SO2<br>CAPP Compliance | 12000 Btu/lb<br>1.67# SO2<br>CAPP NYMEX | 12500 Btu/lb<br>6# SO2<br>NAPP High Sulfur | 13000 Btu/lb<br>4# SO2<br>NAPP Med Sulfur | 11512 Btu/lb<br>4.3# SO2<br>I-Basin | 8800 Btu/lb<br>0.8# SO2<br>PRB 8800 | 8400 Btu/lb<br>0.8# SO2<br>PRB 8400 | 11700 Btu/lb<br>0.9# SO2<br>Colorado |
|------|----------------------------------|-------------------------------------------|---------------------------------------------|-----------------------------------------|--------------------------------------------|-------------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------------------|
| 2013 | 83.46                            | 83.50                                     | 85.00                                       | 83.00                                   | 58.00                                      | 68.00                                     | 53.74                               | 16.95                               | 13.95                               | 42.90                                |
| 2014 | 84.83                            | 85.00                                     | 86.33                                       | 83.83                                   | 60.00                                      | 68.00                                     | 54.33                               | 17.50                               | 14.49                               | 43.91                                |
| 2015 | 85.21                            | 85.50                                     | 85.83                                       | 83.83                                   | 62.36                                      | 70.33                                     | 54.98                               | 17.50                               | 14.49                               | 44.86                                |
| 2016 | 85.52                            | 85.91                                     | 85.83                                       | 83.83                                   | 64.72                                      | 72.00                                     | 56.34                               | 17.40                               | 14.84                               | 45.82                                |
| 2017 | 85.31                            | 85.91                                     | 84.81                                       | 82.77                                   | 65.92                                      | 73.37                                     | 57.16                               | 17.30                               | 15.19                               | 46.89                                |
| 2018 | 86.94                            | 87.55                                     | 86.43                                       | 84.35                                   | 67.18                                      | 74.77                                     | 58.07                               | 17.72                               | 15.66                               | 47.58                                |
| 2019 | 88.58                            | 89.20                                     | 88.06                                       | 85.94                                   | 68.45                                      | 76.18                                     | 58.91                               | 18.14                               | 15.93                               | 48.26                                |
| 2020 | 90.22                            | 90.85                                     | 89.69                                       | 87.53                                   | 69.71                                      | 77.59                                     | 59.74                               | 18.57                               | 16.31                               | 48.93                                |
| 2021 | 92.07                            | 92.71                                     | 91.52                                       | 89.32                                   | 71.18                                      | 79.22                                     | 61.00                               | 19.00                               | 16.70                               | 49.94                                |
| 2022 | 91.66                            | 92.30                                     | 91.12                                       | 88.93                                   | 70.90                                      | 78.90                                     | 60.76                               | 19.07                               | 16.75                               | 49.72                                |
| 2023 | 93.52                            | 94.18                                     | 92.97                                       | 90.73                                   | 72.37                                      | 80.55                                     | 62.02                               | 19.51                               | 17.15                               | 50.73                                |
| 2024 | 95.41                            | 96.08                                     | 94.85                                       | 92.56                                   | 73.87                                      | 82.21                                     | 63.30                               | 19.96                               | 17.55                               | 51.75                                |
| 2025 | 97.31                            | 97.99                                     | 96.74                                       | 94.41                                   | 75.38                                      | 83.89                                     | 64.60                               | 20.42                               | 17.95                               | 52.78                                |
| 2026 | 99.24                            | 99.94                                     | 98.66                                       | 96.28                                   | 76.91                                      | 85.60                                     | 65.91                               | 20.89                               | 18.36                               | 53.83                                |
| 2027 | 101.19                           | 101.90                                    | 100.60                                      | 98.18                                   | 78.46                                      | 87.33                                     | 67.24                               | 21.36                               | 18.78                               | 54.89                                |
| 2028 | 103.18                           | 103.90                                    | 102.57                                      | 100.10                                  | 80.04                                      | 89.08                                     | 68.59                               | 21.84                               | 19.21                               | 55.96                                |
| 2029 | 105.19                           | 105.93                                    | 104.57                                      | 102.06                                  | 81.65                                      | 90.87                                     | 69.97                               | 22.34                               | 19.64                               | 57.06                                |
| 2030 | 107.24                           | 107.99                                    | 106.61                                      | 104.04                                  | 83.27                                      | 92.68                                     | 71.36                               | 22.84                               | 20.09                               | 58.17                                |

| Year |
|------|
| 2013 |
| 2014 |
| 2015 |
| 2016 |
| 2017 |
| 2018 |
| 2019 |
| 2020 |
| 2021 |
| 2022 |
| 2023 |
| 2024 |
| 2025 |
| 2026 |
| 2027 |
| 2028 |
| 2029 |
| 2030 |

| Natural Gas (\$/mmbtu) -Nominal \$'s |          |                   |           |      |            |                     |
|--------------------------------------|----------|-------------------|-----------|------|------------|---------------------|
| Henry Hub                            | TCO Pool | Union South Point | TCO Deliv | HSC  | PEPL TX-OK | Swing Service Adder |
| 4.84                                 | 4.91     | 4.92              | 5.22      | 4.71 | 4.59       | 0.25                |
| 5.26                                 | 5.31     | 5.31              | 5.62      | 5.15 | 5.01       | 0.25                |
| 5.44                                 | 5.46     | 5.49              | 5.78      | 5.34 | 5.19       | 0.25                |
| 5.97                                 | 5.98     | 6.02              | 6.32      | 5.86 | 5.72       | 0.25                |
| 6.13                                 | 6.14     | 6.18              | 6.48      | 6.02 | 5.88       | 0.25                |
| 6.32                                 | 6.34     | 6.37              | 6.68      | 6.22 | 6.07       | 0.25                |
| 6.46                                 | 6.47     | 6.51              | 6.82      | 6.35 | 6.21       | 0.25                |
| 6.52                                 | 6.53     | 6.56              | 6.88      | 6.41 | 6.26       | 0.25                |
| 6.75                                 | 6.77     | 6.80              | 7.12      | 6.65 | 6.50       | 0.25                |
| 7.07                                 | 7.08     | 7.11              | 7.44      | 6.96 | 6.81       | 0.25                |
| 7.26                                 | 7.28     | 7.31              | 7.64      | 7.16 | 7.01       | 0.25                |
| 7.51                                 | 7.52     | 7.56              | 7.89      | 7.40 | 7.26       | 0.25                |
| 7.75                                 | 7.76     | 7.79              | 8.13      | 7.64 | 7.49       | 0.25                |
| 7.85                                 | 7.86     | 7.90              | 8.24      | 7.74 | 7.60       | 0.26                |
| 8.04                                 | 8.06     | 8.09              | 8.43      | 7.94 | 7.79       | 0.26                |
| 8.22                                 | 8.24     | 8.27              | 8.62      | 8.12 | 7.97       | 0.27                |
| 8.41                                 | 8.42     | 8.45              | 8.80      | 8.30 | 8.15       | 0.27                |
| 8.52                                 | 8.54     | 8.57              | 8.92      | 8.42 | 8.27       | 0.28                |

| Uranium Fuel UO2 (\$/mmbtu) - Nominal \$'s |
|--------------------------------------------|
| 0.82                                       |
| 0.84                                       |
| 0.85                                       |
| 0.87                                       |
| 0.89                                       |
| 0.91                                       |
| 0.92                                       |
| 0.94                                       |
| 0.96                                       |
| 0.98                                       |
| 1.00                                       |
| 1.02                                       |
| 1.04                                       |
| 1.06                                       |
| 1.08                                       |
| 1.10                                       |
| 1.13                                       |
| 1.15                                       |

| Year | Emissions (\$/ton) -Nominal \$'s |                        |                        |                              | Heat Rates (mmbtu/MWh) |          |                  |                  |                 |    |  |  |
|------|----------------------------------|------------------------|------------------------|------------------------------|------------------------|----------|------------------|------------------|-----------------|----|--|--|
|      | SO <sub>2</sub>                  | NO <sub>x</sub> Annual | NO <sub>x</sub> Summer | Nominal \$'s CO <sub>2</sub> | AEP GEN HUB - HR       | SPP - HR | ERCOT North - HR | ERCOT South - HR | ERCOT West - HR | HR |  |  |
| 2013 | 0                                | 0                      | 0                      | 0.00                         | 9.36                   | 10.78    | 7.84             | 7.91             | 6.92            |    |  |  |
| 2014 | 0                                | 0                      | 0                      | 0.00                         | 8.97                   | 10.82    | 7.81             | 7.88             | 7.00            |    |  |  |
| 2015 | 0                                | 0                      | 0                      | 0.00                         | 10.13                  | 11.29    | 7.86             | 8.00             | 7.13            |    |  |  |
| 2016 | 0                                | 0                      | 0                      | 0.00                         | 10.51                  | 11.19    | 8.03             | 8.15             | 7.32            |    |  |  |
| 2017 | 0                                | 0                      | 0                      | 0.00                         | 10.36                  | 11.27    | 8.08             | 8.15             | 7.35            |    |  |  |
| 2018 | 0                                | 0                      | 0                      | 0.00                         | 10.15                  | 11.05    | 8.07             | 8.14             | 7.36            |    |  |  |
| 2019 | 0                                | 0                      | 0                      | 0.00                         | 10.09                  | 10.90    | 8.09             | 8.11             | 7.36            |    |  |  |
| 2020 | 0                                | 0                      | 0                      | 0.00                         | 10.17                  | 10.70    | 8.01             | 8.03             | 7.29            |    |  |  |
| 2021 | 0                                | 0                      | 0                      | 0.00                         | 10.00                  | 10.56    | 7.98             | 7.99             | 7.27            |    |  |  |
| 2022 | 0                                | 0                      | 0                      | 15.08                        | 10.86                  | 11.13    | 8.71             | 8.72             | 7.97            |    |  |  |
| 2023 | 0                                | 0                      | 0                      | 15.28                        | 10.78                  | 10.94    | 8.69             | 8.72             | 7.97            |    |  |  |
| 2024 | 0                                | 0                      | 0                      | 15.48                        | 10.71                  | 10.88    | 8.69             | 8.69             | 7.98            |    |  |  |
| 2025 | 0                                | 0                      | 0                      | 15.67                        | 10.61                  | 10.77    | 8.60             | 8.60             | 7.90            |    |  |  |
| 2026 | 0                                | 0                      | 0                      | 15.88                        | 10.60                  | 10.70    | 8.63             | 8.64             | 7.94            |    |  |  |
| 2027 | 0                                | 0                      | 0                      | 16.08                        | 10.51                  | 10.69    | 8.61             | 8.60             | 7.92            |    |  |  |
| 2028 | 0                                | 0                      | 0                      | 16.29                        | 10.49                  | 10.58    | 8.56             | 8.54             | 7.89            |    |  |  |
| 2029 | 0                                | 0                      | 0                      | 16.50                        | 10.42                  | 10.51    | 8.55             | 8.52             | 7.88            |    |  |  |
| 2030 | 0                                | 0                      | 0                      | 16.72                        | 10.48                  | 10.49    | 8.53             | 8.49             | 7.86            |    |  |  |

Note: NOx prices apply only to those states included in the Cross State Air Pollution Rule  
All others are \$0 (zero).

| Year | AEP Adjusted | Capacity Prices (\$/MW-day) -<br>Nominal \$'s |        |          | PP Adjusted | Renewable Energy<br>Subsidies ** (\$/MWh)<br>-Nominal \$'s | Inflation Factor |
|------|--------------|-----------------------------------------------|--------|----------|-------------|------------------------------------------------------------|------------------|
| 2013 |              | AEP GEN HUB                                   | Cap.   | SPP Cap. | 25.00       | 47.20                                                      | 1.70%            |
| 2014 |              | 23.03                                         | 25.00  | 25.00    | 25.00       | 47.70                                                      | 2.70%            |
| 2015 |              | 85.05                                         | 25.00  | 25.00    | 25.00       | 48.20                                                      | 2.40%            |
| 2016 |              | 215.25                                        | 25.00  | 25.00    | 25.00       | 44.10                                                      | 1.70%            |
| 2017 |              | 281.92                                        | 25.00  | 25.00    | 227.1548    | 44.80                                                      | 1.50%            |
| 2018 |              | 235.98                                        | 25.00  | 25.00    | 232.5098    | 45.50                                                      | 1.60%            |
| 2019 |              | 200.39                                        | 359.22 |          | 238.8755    | 46.10                                                      | 1.50%            |
| 2020 |              | 224.57                                        | 365.81 |          | 246.5223    | 46.60                                                      | 1.50%            |
| 2021 |              | 253.47                                        | 371.74 |          | 255.4973    | 47.20                                                      | 1.50%            |
| 2022 |              | 280.05                                        | 376.99 |          | 265.8489    | 47.90                                                      | 1.50%            |
| 2023 |              | 304.18                                        | 381.51 |          | 277.627     | 48.60                                                      | 1.50%            |
| 2024 |              | 325.73                                        | 385.29 |          | 290.8824    | 49.30                                                      | 1.50%            |
| 2025 |              | 344.58                                        | 388.27 |          | 305.6673    | 49.90                                                      | 1.50%            |
| 2026 |              | 360.58                                        | 390.42 |          | 322.0353    | 50.60                                                      | 1.50%            |
| 2027 |              | 373.61                                        | 391.71 |          | 340.0413    | 51.10                                                      | 1.50%            |
| 2028 |              | 383.50                                        | 392.10 |          | 359.7415    | 51.70                                                      | 1.50%            |
| 2029 |              | 390.13                                        | 391.54 |          | 380.8173    | 52.50                                                      | 1.50%            |
| 2030 |              | 392.94                                        | 389.61 |          | 403.6586    | 52.80                                                      | 1.40%            |
|      |              | 392.16                                        | 386.65 |          |             |                                                            |                  |

\*\* Reporting PTC's and  
REC's. PTC's expire  
after 2015.

| Year |
|------|
| 2013 |
| 2014 |
| 2015 |
| 2016 |
| 2017 |
| 2018 |
| 2019 |
| 2020 |
| 2021 |
| 2022 |
| 2023 |
| 2024 |
| 2025 |
| 2026 |
| 2027 |
| 2028 |
| 2029 |
| 2030 |

| Year / State | AL   | AR   | CT   | DC   | DE   | FL   | GA   | IA   | IL   | IN   | KS   |
|--------------|------|------|------|------|------|------|------|------|------|------|------|
| 2013         | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2014         | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2015         | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2016         | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2017         | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2018         | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2019         | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2020         | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2021         | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2022         | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2023         | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2024         | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2025         | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2026         | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2027         | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2028         | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2029         | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2030         | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| Year | KY | LA | MA | MD | ME | MI | MN | MO | MS | MT | NC | ND |
|------|----|----|----|----|----|----|----|----|----|----|----|----|
|------|----|----|----|----|----|----|----|----|----|----|----|----|

|      |      |      |      |      |      |      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 2013 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2014 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2015 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2016 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2017 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2018 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2019 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2020 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2021 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2022 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2023 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2024 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2025 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2026 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2027 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2028 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2029 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2030 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| Year | NE | NH | NJ | NM | NS | NY | OH | OK | PA | RI | SC | SD | TN | TX | VA | VT | WI | WV |
|------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
|------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|

|      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 2013 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2014 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2015 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2016 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2017 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2018 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2019 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2020 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2021 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2022 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2023 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2024 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2025 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2026 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2027 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2028 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2029 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2030 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| Power Prices (\$/MWh) -Nominal \$'s |                   |          |         |          |             |          |             |          |            |          |
|-------------------------------------|-------------------|----------|---------|----------|-------------|----------|-------------|----------|------------|----------|
| Month                               | PJM - AEP GEN HUB |          | SPP     |          | ERCOT-North |          | ERCOT-South |          | ERCOT-West |          |
|                                     | On-Peak           | Off-Peak | On-Peak | Off-Peak | On-Peak     | Off-Peak | On-Peak     | Off-Peak | On-Peak    | Off-Peak |
| Jan-13                              | 47.69             | 28.84    | 51.34   | 33.92    | 38.66       | 37.72    | 38.77       | 37.74    | 37.62      | 36.68    |
| Feb-13                              | 42.81             | 28.10    | 46.93   | 33.10    | 38.08       | 37.43    | 38.23       | 37.44    | 37.06      | 36.31    |
| Mar-13                              | 42.65             | 27.62    | 42.61   | 29.67    | 36.02       | 34.54    | 36.13       | 34.86    | 34.98      | 33.66    |
| Apr-13                              | 41.41             | 24.82    | 40.50   | 27.69    | 34.75       | 33.11    | 34.97       | 33.30    | 33.79      | 32.20    |
| May-13                              | 40.70             | 23.91    | 40.39   | 27.11    | 34.61       | 32.97    | 35.31       | 33.32    | 33.98      | 32.15    |
| Jun-13                              | 47.09             | 26.61    | 54.99   | 34.65    | 35.18       | 33.99    | 35.81       | 34.49    | 34.55      | 33.30    |
| Jul-13                              | 53.95             | 29.90    | 66.75   | 43.43    | 38.94       | 36.18    | 39.22       | 36.50    | 38.37      | 35.35    |
| Aug-13                              | 54.30             | 29.31    | 66.58   | 46.92    | 38.95       | 35.82    | 38.99       | 36.13    | 38.32      | 35.08    |
| Sep-13                              | 52.64             | 27.96    | 52.34   | 33.29    | 38.65       | 35.50    | 39.08       | 35.93    | 37.93      | 34.68    |
| Oct-13                              | 41.32             | 24.83    | 40.13   | 27.28    | 35.42       | 34.00    | 36.15       | 34.50    | 34.85      | 33.28    |
| Nov-13                              | 41.92             | 26.27    | 44.11   | 30.27    | 36.94       | 33.57    | 36.69       | 33.62    | 35.44      | 32.65    |
| Dec-13                              | 43.37             | 28.93    | 45.30   | 32.97    | 36.77       | 35.39    | 36.97       | 35.58    | 35.79      | 34.46    |
| Jan-14                              | 49.72             | 30.64    | 53.20   | 35.30    | 41.35       | 39.81    | 41.55       | 40.05    | 40.30      | 38.86    |
| Feb-14                              | 45.23             | 29.36    | 50.31   | 35.28    | 40.41       | 39.50    | 40.60       | 39.48    | 39.41      | 38.45    |
| Mar-14                              | 45.25             | 28.80    | 46.91   | 31.65    | 38.80       | 36.92    | 38.94       | 37.19    | 37.74      | 36.00    |
| Apr-14                              | 43.88             | 26.42    | 44.61   | 29.68    | 37.90       | 35.66    | 38.15       | 35.95    | 36.92      | 34.78    |
| May-14                              | 42.93             | 24.96    | 44.03   | 30.25    | 38.02       | 35.96    | 38.57       | 36.35    | 37.13      | 35.13    |
| Jun-14                              | 49.68             | 27.27    | 59.35   | 37.78    | 38.45       | 37.13    | 39.16       | 37.67    | 37.79      | 36.39    |
| Jul-14                              | 54.35             | 28.09    | 73.22   | 50.40    | 42.73       | 39.51    | 43.17       | 39.90    | 42.16      | 38.65    |
| Aug-14                              | 56.79             | 31.34    | 77.44   | 54.23    | 42.33       | 39.17    | 42.52       | 39.51    | 41.65      | 38.38    |
| Sep-14                              | 48.45             | 27.25    | 56.17   | 36.33    | 43.30       | 39.30    | 43.43       | 39.48    | 42.37      | 38.31    |
| Oct-14                              | 43.63             | 26.45    | 44.39   | 29.73    | 39.01       | 37.50    | 39.65       | 37.86    | 38.28      | 36.59    |
| Nov-14                              | 44.61             | 28.23    | 48.83   | 34.14    | 39.60       | 36.18    | 40.17       | 36.45    | 38.76      | 35.33    |
| Dec-14                              | 45.53             | 29.52    | 49.53   | 35.82    | 40.00       | 38.31    | 40.27       | 38.71    | 39.00      | 37.46    |
| Jan-15                              | 58.12             | 35.85    | 60.67   | 41.17    | 43.18       | 41.67    | 43.84       | 42.45    | 42.36      | 40.97    |
| Feb-15                              | 51.61             | 34.16    | 53.81   | 39.50    | 42.18       | 41.31    | 42.82       | 42.10    | 41.40      | 40.60    |
| Mar-15                              | 50.15             | 31.77    | 49.19   | 34.67    | 40.43       | 38.67    | 40.66       | 39.28    | 39.37      | 37.89    |
| Apr-15                              | 47.61             | 29.83    | 47.12   | 34.03    | 39.50       | 37.68    | 40.20       | 38.56    | 38.75      | 37.14    |
| May-15                              | 47.53             | 27.76    | 46.70   | 33.59    | 39.67       | 37.93    | 41.17       | 38.85    | 39.01      | 37.30    |
| Jun-15                              | 61.02             | 30.97    | 68.48   | 42.74    | 40.49       | 39.06    | 41.44       | 39.75    | 39.82      | 38.28    |
| Jul-15                              | 65.26             | 33.28    | 78.41   | 55.60    | 45.52       | 41.42    | 46.15       | 41.92    | 44.86      | 40.55    |
| Aug-15                              | 72.47             | 34.65    | 83.20   | 58.04    | 45.11       | 41.15    | 45.56       | 41.79    | 44.38      | 40.41    |
| Sep-15                              | 57.60             | 30.16    | 59.24   | 37.83    | 44.01       | 40.19    | 44.69       | 40.80    | 43.32      | 39.39    |
| Oct-15                              | 46.25             | 28.89    | 48.11   | 33.65    | 40.11       | 38.45    | 40.98       | 39.17    | 39.51      | 37.80    |
| Nov-15                              | 50.01             | 32.45    | 52.45   | 37.20    | 41.03       | 38.09    | 42.01       | 38.85    | 40.32      | 37.44    |
| Dec-15                              | 53.99             | 35.01    | 53.38   | 39.08    | 41.58       | 40.49    | 42.25       | 41.44    | 40.76      | 39.87    |
| Jan-16                              | 66.66             | 43.48    | 67.94   | 45.84    | 47.43       | 46.27    | 48.25       | 47.25    | 46.52      | 45.57    |
| Feb-16                              | 58.15             | 40.84    | 58.16   | 43.27    | 46.31       | 45.59    | 47.02       | 46.39    | 45.43      | 44.78    |
| Mar-16                              | 55.94             | 38.57    | 53.34   | 38.73    | 44.54       | 43.21    | 45.17       | 44.28    | 43.60      | 42.65    |
| Apr-16                              | 52.03             | 35.00    | 51.85   | 39.35    | 43.76       | 42.22    | 44.41       | 43.03    | 42.87      | 41.49    |
| May-16                              | 51.79             | 32.01    | 53.43   | 36.84    | 45.96       | 42.81    | 46.82       | 43.72    | 45.05      | 42.06    |
| Jun-16                              | 72.13             | 36.35    | 79.26   | 49.10    | 46.34       | 43.97    | 47.28       | 44.70    | 45.58      | 43.13    |
| Jul-16                              | 81.41             | 42.01    | 85.31   | 60.26    | 52.96       | 46.49    | 53.47       | 47.05    | 52.12      | 45.64    |
| Aug-16                              | 84.88             | 40.62    | 88.16   | 60.93    | 51.49       | 46.37    | 51.91       | 47.19    | 50.61      | 45.62    |
| Sep-16                              | 60.69             | 33.67    | 62.11   | 41.93    | 49.57       | 44.99    | 50.15       | 45.53    | 48.71      | 44.04    |
| Oct-16                              | 52.17             | 35.04    | 51.41   | 37.80    | 44.44       | 42.61    | 45.36       | 43.49    | 43.80      | 41.94    |
| Nov-16                              | 56.66             | 38.33    | 56.37   | 41.14    | 45.25       | 43.44    | 46.17       | 44.20    | 44.35      | 42.64    |
| Dec-16                              | 60.10             | 41.79    | 57.50   | 45.49    | 45.82       | 45.47    | 46.81       | 46.66    | 45.08      | 44.88    |
| Jan-17                              | 64.32             | 47.55    | 68.96   | 48.05    | 48.98       | 47.93    | 49.82       | 48.91    | 47.97      | 47.17    |
| Feb-17                              | 58.98             | 44.67    | 61.29   | 45.56    | 47.88       | 47.19    | 48.16       | 47.54    | 46.71      | 46.07    |
| Mar-17                              | 57.16             | 41.87    | 54.64   | 40.43    | 46.06       | 44.83    | 46.09       | 45.29    | 44.78      | 43.80    |
| Apr-17                              | 52.68             | 39.01    | 53.01   | 40.66    | 44.97       | 43.59    | 45.58       | 44.13    | 43.98      | 42.59    |
| May-17                              | 52.48             | 34.14    | 57.72   | 38.31    | 46.09       | 43.63    | 46.61       | 44.00    | 45.07      | 42.56    |
| Jun-17                              | 74.21             | 40.07    | 83.86   | 51.37    | 48.49       | 45.33    | 49.10       | 45.76    | 47.61      | 44.32    |
| Jul-17                              | 84.06             | 44.45    | 87.05   | 65.12    | 54.67       | 48.30    | 54.82       | 48.58    | 53.68      | 47.25    |
| Aug-17                              | 96.69             | 42.24    | 91.30   | 61.98    | 54.37       | 48.25    | 54.35       | 48.80    | 53.31      | 47.28    |
| Sep-17                              | 60.39             | 36.73    | 63.88   | 42.58    | 51.40       | 46.63    | 51.59       | 46.78    | 50.36      | 45.46    |
| Oct-17                              | 53.41             | 38.04    | 53.96   | 39.37    | 45.95       | 44.13    | 46.57       | 44.45    | 45.08      | 43.04    |
| Nov-17                              | 57.45             | 41.16    | 58.47   | 44.63    | 46.66       | 45.30    | 47.41       | 45.69    | 45.70      | 44.22    |
| Dec-17                              | 60.19             | 45.01    | 68.21   | 47.62    | 47.72       | 47.52    | 48.03       | 47.98    | 46.52      | 46.40    |
| Jan-18                              | 63.67             | 46.76    | 64.18   | 47.56    | 50.82       | 49.77    | 51.28       | 50.27    | 49.61      | 48.70    |
| Feb-18                              | 60.70             | 47.42    | 60.86   | 47.82    | 49.41       | 48.63    | 49.97       | 49.14    | 48.41      | 47.60    |
| Mar-18                              | 58.47             | 44.26    | 56.51   | 43.27    | 47.43       | 46.39    | 47.32       | 46.63    | 46.06      | 45.21    |
| Apr-18                              | 53.92             | 38.95    | 53.94   | 40.19    | 46.09       | 44.84    | 46.49       | 45.28    | 44.99      | 43.78    |
| May-18                              | 53.53             | 36.82    | 55.28   | 40.07    | 47.61       | 44.96    | 48.14       | 45.28    | 46.57      | 43.81    |
| Jun-18                              | 68.79             | 39.77    | 77.52   | 49.43    | 48.78       | 46.48    | 49.40       | 46.94    | 47.88      | 45.48    |

|        |       |       |       |       |       |       |       |       |       |       |
|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Jul-18 | 81.70 | 42.55 | 92.77 | 61.94 | 55.60 | 49.74 | 55.73 | 49.88 | 54.62 | 48.53 |
| Aug-18 | 87.88 | 47.58 | 93.10 | 66.93 | 56.73 | 49.30 | 57.23 | 50.21 | 55.80 | 48.51 |
| Sep-18 | 68.10 | 40.62 | 74.50 | 50.53 | 55.12 | 48.99 | 55.34 | 49.33 | 54.04 | 47.89 |
| Oct-18 | 54.36 | 38.05 | 56.06 | 40.30 | 47.46 | 45.54 | 47.99 | 45.62 | 46.47 | 44.28 |
| Nov-18 | 57.76 | 42.16 | 57.67 | 43.76 | 47.94 | 46.58 | 48.35 | 46.63 | 46.71 | 45.25 |
| Dec-18 | 61.07 | 46.03 | 59.22 | 49.29 | 48.64 | 46.24 | 48.95 | 48.68 | 47.43 | 47.11 |
| Jan-19 | 64.50 | 47.28 | 64.20 | 48.03 | 51.36 | 50.24 | 51.60 | 50.70 | 50.06 | 49.14 |
| Feb-19 | 61.40 | 47.79 | 61.92 | 48.07 | 50.30 | 49.54 | 50.30 | 49.50 | 48.97 | 48.20 |
| Mar-19 | 58.46 | 44.92 | 55.98 | 44.26 | 48.55 | 47.48 | 48.48 | 47.70 | 47.20 | 46.28 |
| Apr-19 | 54.99 | 39.60 | 54.94 | 40.58 | 47.15 | 45.90 | 47.37 | 46.07 | 45.91 | 44.66 |
| May-19 | 54.40 | 37.80 | 55.48 | 41.11 | 48.62 | 45.95 | 49.17 | 46.26 | 47.58 | 44.79 |
| Jun-19 | 70.75 | 41.31 | 80.31 | 51.87 | 49.59 | 47.42 | 50.13 | 47.71 | 48.63 | 46.29 |
| Jul-19 | 84.37 | 44.95 | 96.87 | 64.04 | 57.35 | 50.99 | 57.34 | 51.04 | 56.26 | 49.73 |
| Aug-19 | 87.56 | 49.22 | 90.65 | 69.28 | 60.27 | 51.97 | 59.82 | 52.10 | 58.87 | 50.66 |
| Sep-19 | 69.59 | 39.96 | 74.15 | 47.21 | 55.85 | 49.57 | 55.98 | 49.77 | 54.71 | 48.38 |
| Oct-19 | 55.04 | 39.36 | 58.09 | 42.16 | 48.41 | 46.58 | 48.74 | 48.37 | 47.31 | 45.17 |
| Nov-19 | 58.03 | 43.07 | 57.46 | 44.96 | 48.91 | 47.66 | 49.10 | 47.50 | 47.56 | 46.21 |
| Dec-19 | 62.57 | 46.86 | 60.86 | 49.82 | 49.64 | 49.19 | 49.71 | 49.34 | 48.30 | 47.86 |
| Jan-20 | 65.14 | 48.84 | 66.87 | 48.91 | 51.66 | 50.59 | 51.71 | 50.84 | 50.28 | 49.36 |
| Feb-20 | 61.83 | 48.30 | 61.70 | 48.57 | 50.80 | 50.06 | 50.84 | 49.97 | 49.48 | 48.67 |
| Mar-20 | 59.30 | 45.09 | 56.67 | 43.64 | 48.96 | 47.83 | 49.08 | 48.23 | 47.69 | 46.72 |
| Apr-20 | 55.22 | 40.59 | 54.29 | 41.31 | 47.73 | 46.38 | 48.28 | 46.81 | 46.62 | 45.29 |
| May-20 | 54.76 | 39.30 | 55.14 | 41.47 | 49.06 | 46.49 | 49.59 | 46.64 | 47.98 | 45.23 |
| Jun-20 | 75.05 | 43.43 | 80.14 | 51.33 | 50.00 | 47.93 | 50.49 | 48.12 | 49.01 | 46.72 |
| Jul-20 | 86.39 | 44.96 | 90.90 | 62.51 | 57.50 | 51.18 | 57.61 | 51.30 | 56.45 | 49.94 |
| Aug-20 | 91.32 | 46.54 | 94.28 | 65.89 | 56.42 | 50.70 | 56.38 | 50.94 | 55.32 | 49.57 |
| Sep-20 | 67.99 | 41.10 | 66.79 | 45.82 | 54.78 | 49.32 | 54.77 | 49.25 | 53.61 | 48.03 |
| Oct-20 | 55.53 | 40.22 | 56.09 | 41.63 | 48.71 | 46.98 | 48.94 | 46.68 | 47.53 | 45.53 |
| Nov-20 | 59.70 | 44.15 | 58.05 | 45.74 | 49.27 | 48.05 | 49.26 | 47.69 | 47.84 | 46.51 |
| Dec-20 | 62.95 | 47.76 | 60.50 | 48.36 | 50.08 | 49.60 | 49.71 | 49.42 | 48.56 | 48.12 |

| Month  | Coal (\$/ton) FOB -Nominal S's |                          |                          |                           |                        |                        |                          |                         |                         |                          |
|--------|--------------------------------|--------------------------|--------------------------|---------------------------|------------------------|------------------------|--------------------------|-------------------------|-------------------------|--------------------------|
|        | 12395 Btu/lb<br>1.6# SO2       | 12500 Btu/lb<br>1.6# SO2 | 12000 Btu/lb<br>1.2# SO2 | 12000 Btu/lb<br>1.67# SO2 | 12500 Btu/lb<br>5# SO2 | 13000 Btu/lb<br>4# SO2 | 11512 Btu/lb<br>4.3# SO2 | 8800 Btu/lb<br>0.8# SO2 | 8400 Btu/lb<br>0.8# SO2 | 11700 Btu/lb<br>0.9# SO2 |
|        | CAPP                           | CAPP CSX-Rail            | CAPP Compliance          | CAPP NYMEX                | NAPP High Sulfur       | NAPP Med Sulfur        | I-Basin                  | PRB 8800                | PRB 8400                | Colorado                 |
| Jan-13 | 81.98                          | 82.02                    | 83.74                    | 81.52                     | 57.48                  | 68.83                  | 53.20                    | 16.44                   | 13.48                   | 42.31                    |
| Feb-13 | 82.28                          | 82.32                    | 83.99                    | 81.82                     | 57.58                  | 68.66                  | 53.31                    | 16.54                   | 13.57                   | 42.43                    |
| Mar-13 | 82.57                          | 82.61                    | 84.24                    | 82.11                     | 57.68                  | 68.49                  | 53.42                    | 16.64                   | 13.67                   | 42.55                    |
| Apr-13 | 82.86                          | 82.91                    | 84.49                    | 82.41                     | 57.79                  | 68.33                  | 53.52                    | 16.74                   | 13.76                   | 42.66                    |
| May-13 | 83.16                          | 83.20                    | 84.75                    | 82.70                     | 57.89                  | 68.16                  | 53.63                    | 16.85                   | 13.85                   | 42.78                    |
| Jun-13 | 83.46                          | 83.50                    | 85.00                    | 83.00                     | 58.00                  | 68.00                  | 53.74                    | 16.95                   | 13.95                   | 42.90                    |
| Jul-13 | 83.57                          | 83.62                    | 85.11                    | 83.07                     | 58.16                  | 68.00                  | 53.78                    | 17.00                   | 13.99                   | 42.98                    |
| Aug-13 | 83.68                          | 83.75                    | 85.22                    | 83.14                     | 58.33                  | 68.00                  | 53.83                    | 17.04                   | 14.04                   | 43.07                    |
| Sep-13 | 83.80                          | 83.87                    | 85.33                    | 83.21                     | 58.49                  | 68.00                  | 53.88                    | 17.09                   | 14.08                   | 43.15                    |
| Oct-13 | 83.91                          | 84.00                    | 85.44                    | 83.28                     | 58.66                  | 68.00                  | 53.93                    | 17.13                   | 14.13                   | 43.24                    |
| Nov-13 | 84.02                          | 84.12                    | 85.55                    | 83.34                     | 58.83                  | 68.00                  | 53.98                    | 17.18                   | 14.17                   | 43.32                    |
| Dec-13 | 84.14                          | 84.25                    | 85.66                    | 83.41                     | 58.99                  | 68.00                  | 54.03                    | 17.22                   | 14.22                   | 43.40                    |
| Jan-14 | 84.25                          | 84.37                    | 85.77                    | 83.48                     | 59.16                  | 68.00                  | 54.08                    | 17.27                   | 14.26                   | 43.49                    |
| Feb-14 | 84.37                          | 84.50                    | 85.88                    | 83.55                     | 59.33                  | 68.00                  | 54.13                    | 17.31                   | 14.31                   | 43.57                    |
| Mar-14 | 84.48                          | 84.62                    | 86.00                    | 83.62                     | 59.49                  | 68.00                  | 54.18                    | 17.36                   | 14.35                   | 43.66                    |
| Apr-14 | 84.60                          | 84.75                    | 86.11                    | 83.69                     | 59.66                  | 68.00                  | 54.23                    | 17.41                   | 14.40                   | 43.74                    |
| May-14 | 84.71                          | 84.87                    | 86.22                    | 83.76                     | 59.83                  | 68.00                  | 54.28                    | 17.45                   | 14.44                   | 43.83                    |
| Jun-14 | 84.83                          | 85.00                    | 86.33                    | 83.83                     | 60.00                  | 68.00                  | 54.33                    | 17.50                   | 14.49                   | 43.91                    |
| Jul-14 | 84.86                          | 85.04                    | 86.29                    | 83.83                     | 60.19                  | 68.19                  | 54.39                    | 17.50                   | 14.49                   | 43.99                    |
| Aug-14 | 84.89                          | 85.08                    | 86.25                    | 83.83                     | 60.39                  | 68.38                  | 54.44                    | 17.50                   | 14.49                   | 44.07                    |
| Sep-14 | 84.92                          | 85.12                    | 86.20                    | 83.83                     | 60.58                  | 68.57                  | 54.49                    | 17.50                   | 14.49                   | 44.15                    |
| Oct-14 | 84.96                          | 85.17                    | 86.16                    | 83.83                     | 60.78                  | 68.77                  | 54.55                    | 17.50                   | 14.49                   | 44.23                    |
| Nov-14 | 84.99                          | 85.21                    | 86.12                    | 83.83                     | 60.97                  | 68.96                  | 54.60                    | 17.50                   | 14.49                   | 44.31                    |
| Dec-14 | 85.02                          | 85.25                    | 86.08                    | 83.83                     | 61.17                  | 69.15                  | 54.66                    | 17.50                   | 14.49                   | 44.39                    |
| Jan-15 | 85.05                          | 85.29                    | 86.04                    | 83.83                     | 61.37                  | 69.35                  | 54.71                    | 17.50                   | 14.49                   | 44.46                    |
| Feb-15 | 85.08                          | 85.33                    | 86.00                    | 83.83                     | 61.56                  | 69.54                  | 54.77                    | 17.50                   | 14.49                   | 44.54                    |
| Mar-15 | 85.11                          | 85.37                    | 85.95                    | 83.83                     | 61.76                  | 69.74                  | 54.82                    | 17.50                   | 14.49                   | 44.62                    |
| Apr-15 | 85.15                          | 85.42                    | 85.91                    | 83.83                     | 61.96                  | 69.94                  | 54.87                    | 17.50                   | 14.49                   | 44.70                    |
| May-15 | 85.18                          | 85.46                    | 85.87                    | 83.83                     | 62.16                  | 70.13                  | 54.93                    | 17.50                   | 14.49                   | 44.78                    |
| Jun-15 | 85.21                          | 85.50                    | 85.83                    | 83.83                     | 62.36                  | 70.33                  | 54.98                    | 17.50                   | 14.49                   | 44.86                    |
| Jul-15 | 85.24                          | 85.53                    | 85.79                    | 83.83                     | 62.55                  | 70.47                  | 55.09                    | 17.49                   | 14.52                   | 44.94                    |
| Aug-15 | 85.26                          | 85.57                    | 85.75                    | 83.83                     | 62.75                  | 70.60                  | 55.21                    | 17.48                   | 14.55                   | 45.02                    |
| Sep-15 | 85.29                          | 85.60                    | 85.70                    | 83.83                     | 62.94                  | 70.74                  | 55.32                    | 17.47                   | 14.58                   | 45.10                    |
| Oct-15 | 85.31                          | 85.64                    | 85.65                    | 83.83                     | 63.14                  | 70.88                  | 55.43                    | 17.47                   | 14.60                   | 45.18                    |
| Nov-15 | 85.34                          | 85.67                    | 85.62                    | 83.83                     | 63.33                  | 71.02                  | 55.54                    | 17.46                   | 14.63                   | 45.26                    |
| Dec-15 | 85.36                          | 85.70                    | 85.58                    | 83.83                     | 63.53                  | 71.16                  | 55.65                    | 17.45                   | 14.66                   | 45.34                    |
| Jan-16 | 85.39                          | 85.74                    | 85.54                    | 83.83                     | 63.73                  | 71.30                  | 55.77                    | 17.44                   | 14.69                   | 45.42                    |
| Feb-16 | 85.42                          | 85.77                    | 85.50                    | 83.83                     | 63.93                  | 71.44                  | 55.88                    | 17.43                   | 14.72                   | 45.50                    |
| Mar-16 | 85.44                          | 85.81                    | 85.45                    | 83.83                     | 64.12                  | 71.58                  | 55.99                    | 17.42                   | 14.75                   | 45.58                    |
| Apr-16 | 85.47                          | 85.84                    | 85.41                    | 83.83                     | 64.32                  | 71.72                  | 56.11                    | 17.42                   | 14.78                   | 45.66                    |
| May-16 | 85.49                          | 85.88                    | 85.37                    | 83.83                     | 64.52                  | 71.86                  | 56.22                    | 17.41                   | 14.81                   | 45.74                    |
| Jun-16 | 85.52                          | 85.91                    | 85.33                    | 83.83                     | 64.72                  | 72.00                  | 56.34                    | 17.40                   | 14.84                   | 45.82                    |
| Jul-16 | 85.50                          | 85.91                    | 85.29                    | 83.74                     | 64.92                  | 72.11                  | 56.40                    | 17.39                   | 14.87                   | 45.91                    |
| Aug-16 | 85.48                          | 85.91                    | 85.24                    | 83.65                     | 64.92                  | 72.23                  | 56.47                    | 17.38                   | 14.90                   | 46.00                    |
| Sep-16 | 85.47                          | 85.91                    | 85.20                    | 83.56                     | 65.02                  | 72.34                  | 56.54                    | 17.37                   | 14.93                   | 46.09                    |
| Oct-16 | 85.45                          | 85.91                    | 85.16                    | 83.48                     | 65.12                  | 72.45                  | 56.61                    | 17.37                   | 14.96                   | 46.18                    |
| Nov-16 | 85.43                          | 85.91                    | 85.11                    | 83.39                     | 65.22                  | 72.57                  | 56.68                    | 17.36                   | 14.98                   | 46.26                    |
| Dec-16 | 85.41                          | 85.91                    | 85.07                    | 83.30                     | 65.32                  | 72.68                  | 56.74                    | 17.35                   | 15.01                   | 46.35                    |
| Jan-17 | 85.40                          | 85.91                    | 85.03                    | 83.21                     | 65.42                  | 72.79                  | 56.81                    | 17.34                   | 15.04                   | 46.44                    |
| Feb-17 | 85.38                          | 85.91                    | 84.98                    | 83.12                     | 65.52                  | 72.91                  | 56.88                    | 17.33                   | 15.07                   | 46.53                    |
| Mar-17 | 85.36                          | 85.91                    | 84.94                    | 83.03                     | 65.62                  | 73.02                  | 56.95                    | 17.32                   | 15.10                   | 46.62                    |
| Apr-17 | 85.35                          | 85.91                    | 84.90                    | 82.95                     | 65.72                  | 73.14                  | 57.02                    | 17.32                   | 15.13                   | 46.71                    |
| May-17 | 85.33                          | 85.91                    | 84.85                    | 82.86                     | 65.82                  | 73.25                  | 57.09                    | 17.31                   | 15.16                   | 46.80                    |
| Jun-17 | 85.31                          | 85.91                    | 84.81                    | 82.77                     | 65.92                  | 73.37                  | 57.16                    | 17.30                   | 15.19                   | 46.89                    |
| Jul-17 | 85.45                          | 86.05                    | 84.94                    | 82.90                     | 66.03                  | 73.48                  | 57.23                    | 17.33                   | 15.22                   | 46.95                    |
| Aug-17 | 85.58                          | 86.18                    | 85.08                    | 83.03                     | 66.13                  | 73.60                  | 57.31                    | 17.37                   | 15.25                   | 47.00                    |
| Sep-17 | 85.72                          | 86.32                    | 85.21                    | 83.16                     | 66.24                  | 73.72                  | 57.38                    | 17.40                   | 15.28                   | 47.06                    |
| Oct-17 | 85.85                          | 86.45                    | 85.35                    | 83.29                     | 66.34                  | 73.83                  | 57.46                    | 17.44                   | 15.31                   | 47.12                    |
| Nov-17 | 85.99                          | 86.59                    | 85.48                    | 83.42                     | 66.44                  | 73.95                  | 57.54                    | 17.47                   | 15.34                   | 47.18                    |
| Dec-17 | 86.12                          | 86.73                    | 85.62                    | 83.56                     | 66.55                  | 74.06                  | 57.61                    | 17.51                   | 15.37                   | 47.23                    |
| Jan-18 | 86.26                          | 86.86                    | 85.75                    | 83.69                     | 66.65                  | 74.18                  | 57.69                    | 17.54                   | 15.40                   | 47.29                    |
| Feb-18 | 86.39                          | 87.00                    | 85.89                    | 83.82                     | 66.76                  | 74.30                  | 57.76                    | 17.58                   | 15.43                   | 47.35                    |
| Mar-18 | 86.53                          | 87.14                    | 86.02                    | 83.95                     | 66.86                  | 74.42                  | 57.84                    | 17.61                   | 15.47                   | 47.40                    |
| Apr-18 | 86.67                          | 87.27                    | 86.16                    | 84.08                     | 66.97                  | 74.53                  | 57.92                    | 17.65                   | 15.50                   | 47.46                    |
| May-18 | 86.80                          | 87.41                    | 86.29                    | 84.22                     | 67.08                  | 74.65                  | 57.99                    | 17.68                   | 15.53                   | 47.52                    |
| Jun-18 | 86.94                          | 87.55                    | 86.43                    | 84.35                     | 67.18                  | 74.77                  | 58.07                    | 17.72                   | 15.56                   | 47.58                    |
| Jul-18 | 87.08                          | 87.69                    | 86.56                    | 84.48                     | 67.29                  | 74.88                  | 58.14                    | 17.75                   | 15.59                   | 47.63                    |
| Aug-18 | 87.21                          | 87.82                    | 86.70                    | 84.61                     | 67.39                  | 75.00                  | 58.21                    | 17.79                   | 15.62                   | 47.69                    |
| Sep-18 | 87.35                          | 87.96                    | 86.83                    | 84.74                     | 67.50                  | 75.12                  | 58.28                    | 17.82                   | 15.65                   | 47.75                    |
| Oct-18 | 87.48                          | 88.10                    | 86.97                    | 84.88                     | 67.60                  | 75.24                  | 58.35                    | 17.86                   | 15.68                   | 47.80                    |
| Nov-18 | 87.62                          | 88.23                    | 87.10                    | 85.01                     | 67.71                  | 75.35                  | 58.42                    | 17.89                   | 15.71                   | 47.86                    |
| Dec-18 | 87.76                          | 88.37                    | 87.24                    | 85.14                     | 67.81                  | 75.47                  | 58.49                    | 17.93                   | 15.74                   | 47.92                    |
| Jan-19 | 87.89                          | 88.51                    | 87.38                    | 85.27                     | 67.92                  | 75.59                  | 58.56                    | 17.96                   | 15.77                   | 47.97                    |
| Feb-19 | 88.03                          | 88.65                    | 87.51                    | 85.41                     | 68.02                  | 75.71                  | 58.63                    | 18.00                   | 15.81                   | 48.03                    |
| Mar-19 | 88.17                          | 88.79                    | 87.65                    | 85.54                     | 68.13                  | 75.82                  | 58.70                    | 18.03                   | 15.84                   | 48.09                    |
| Apr-19 | 88.31                          | 88.92                    | 87.79                    | 85.67                     | 68.24                  | 75.94                  | 58.77                    | 18.07                   | 15.87                   | 48.14                    |
| May-19 | 88.44                          | 89.06                    | 87.92                    | 85.81                     | 68.34                  | 76.06                  | 58.84                    | 18.10                   | 15.90                   | 48.20                    |

|        |       |       |       |       |       |       |       |       |       |       |
|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Jun-19 | 88.58 | 89.20 | 88.06 | 85.94 | 68.45 | 76.18 | 58.91 | 18.14 | 15.98 | 48.26 |
| Jul-19 | 88.72 | 89.34 | 88.19 | 86.07 | 68.55 | 76.30 | 58.98 | 18.17 | 15.96 | 48.32 |
| Aug-19 | 88.85 | 89.48 | 88.33 | 86.20 | 68.66 | 76.41 | 59.05 | 18.21 | 15.99 | 48.37 |
| Sep-19 | 88.99 | 89.61 | 88.46 | 86.34 | 68.76 | 76.53 | 59.12 | 18.25 | 16.03 | 48.43 |
| Oct-19 | 89.12 | 89.75 | 88.60 | 86.47 | 68.87 | 76.65 | 59.18 | 18.28 | 16.06 | 48.48 |
| Nov-19 | 89.26 | 89.89 | 88.73 | 86.60 | 68.97 | 76.76 | 59.25 | 18.32 | 16.09 | 48.54 |
| Dec-19 | 89.40 | 89.02 | 88.87 | 86.73 | 69.08 | 76.88 | 59.32 | 18.35 | 16.12 | 48.60 |
| Jan-20 | 89.53 | 90.16 | 89.01 | 86.87 | 69.18 | 77.00 | 59.39 | 18.39 | 16.15 | 48.65 |
| Feb-20 | 89.67 | 90.30 | 89.14 | 87.00 | 69.29 | 77.12 | 59.46 | 18.42 | 16.18 | 48.71 |
| Mar-20 | 89.81 | 90.44 | 89.28 | 87.13 | 69.40 | 77.23 | 59.53 | 18.46 | 16.22 | 48.76 |
| Apr-20 | 89.94 | 90.57 | 89.41 | 87.26 | 69.50 | 77.35 | 59.60 | 18.49 | 16.25 | 48.82 |
| May-20 | 90.08 | 90.71 | 89.55 | 87.40 | 69.61 | 77.47 | 59.67 | 18.53 | 16.28 | 48.88 |
| Jun-20 | 90.22 | 90.85 | 89.69 | 87.53 | 69.71 | 77.59 | 59.74 | 18.57 | 16.31 | 48.93 |
| Jul-20 | 90.37 | 91.00 | 89.84 | 87.66 | 69.84 | 77.72 | 59.84 | 18.60 | 16.34 | 49.02 |
| Aug-20 | 90.52 | 91.16 | 89.99 | 87.83 | 69.96 | 77.85 | 59.95 | 18.64 | 16.38 | 49.10 |
| Sep-20 | 90.68 | 91.31 | 90.14 | 87.98 | 70.08 | 77.99 | 60.05 | 18.67 | 16.41 | 49.18 |
| Oct-20 | 90.83 | 91.47 | 90.30 | 88.12 | 70.20 | 78.13 | 60.15 | 18.71 | 16.44 | 49.27 |
| Nov-20 | 90.98 | 91.62 | 90.45 | 88.27 | 70.32 | 78.26 | 60.26 | 18.75 | 16.47 | 49.35 |
| Dec-20 | 91.14 | 91.78 | 90.60 | 88.42 | 70.44 | 78.40 | 60.36 | 18.78 | 16.50 | 49.43 |

| Month  | Natural Gas (\$/mmbtu) -Nominal \$'s |          |                   |           |      |            |                     | Uranium Fuel UO2 (\$/mmbtu) - Nominal \$'s |
|--------|--------------------------------------|----------|-------------------|-----------|------|------------|---------------------|--------------------------------------------|
|        | Henry Hub                            | TCO Pool | Union South Point | TCO Deliv | HSC  | PEPL TX-OK | Swing Service Adder |                                            |
| Jan-13 | 5.25                                 | 5.35     | 5.40              | 5.67      | 5.10 | 5.03       | 0.25                | 0.82                                       |
| Feb-13 | 5.16                                 | 5.25     | 5.30              | 5.57      | 5.01 | 4.93       | 0.25                | 0.82                                       |
| Mar-13 | 4.92                                 | 5.02     | 5.02              | 5.33      | 4.77 | 4.70       | 0.25                | 0.82                                       |
| Apr-13 | 4.69                                 | 4.74     | 4.74              | 5.05      | 4.57 | 4.43       | 0.25                | 0.82                                       |
| May-13 | 4.62                                 | 4.67     | 4.67              | 4.98      | 4.50 | 4.35       | 0.25                | 0.82                                       |
| Jun-13 | 4.63                                 | 4.68     | 4.68              | 4.99      | 4.51 | 4.37       | 0.25                | 0.82                                       |
| Jul-13 | 4.72                                 | 4.78     | 4.78              | 5.09      | 4.61 | 4.46       | 0.25                | 0.82                                       |
| Aug-13 | 4.71                                 | 4.77     | 4.77              | 5.08      | 4.59 | 4.45       | 0.25                | 0.82                                       |
| Sep-13 | 4.65                                 | 4.71     | 4.71              | 5.02      | 4.53 | 4.39       | 0.25                | 0.82                                       |
| Oct-13 | 4.71                                 | 4.77     | 4.77              | 5.08      | 4.59 | 4.45       | 0.25                | 0.82                                       |
| Nov-13 | 4.94                                 | 5.01     | 5.01              | 5.32      | 4.78 | 4.70       | 0.25                | 0.82                                       |
| Dec-13 | 5.08                                 | 5.15     | 5.15              | 5.46      | 4.92 | 4.84       | 0.25                | 0.82                                       |
| Jan-14 | 5.67                                 | 5.74     | 5.74              | 6.07      | 5.51 | 5.43       | 0.25                | 0.84                                       |
| Feb-14 | 5.58                                 | 5.65     | 5.65              | 5.97      | 5.42 | 5.34       | 0.25                | 0.84                                       |
| Mar-14 | 5.34                                 | 5.41     | 5.41              | 5.73      | 5.18 | 5.10       | 0.25                | 0.84                                       |
| Apr-14 | 5.10                                 | 5.14     | 5.14              | 5.46      | 5.02 | 4.84       | 0.25                | 0.84                                       |
| May-14 | 5.03                                 | 5.07     | 5.07              | 5.39      | 4.95 | 4.77       | 0.25                | 0.84                                       |
| Jun-14 | 5.04                                 | 5.08     | 5.08              | 5.40      | 4.96 | 4.78       | 0.25                | 0.84                                       |
| Jul-14 | 5.14                                 | 5.18     | 5.18              | 5.50      | 5.06 | 4.88       | 0.25                | 0.84                                       |
| Aug-14 | 5.13                                 | 5.17     | 5.17              | 5.48      | 5.04 | 4.87       | 0.25                | 0.84                                       |
| Sep-14 | 5.07                                 | 5.11     | 5.11              | 5.42      | 4.99 | 4.81       | 0.25                | 0.84                                       |
| Oct-14 | 5.13                                 | 5.17     | 5.17              | 5.48      | 5.04 | 4.87       | 0.25                | 0.84                                       |
| Nov-14 | 5.35                                 | 5.40     | 5.40              | 5.72      | 5.22 | 5.13       | 0.25                | 0.84                                       |
| Dec-14 | 5.49                                 | 5.54     | 5.54              | 5.86      | 5.36 | 5.27       | 0.25                | 0.84                                       |
| Jan-15 | 5.86                                 | 5.90     | 5.93              | 6.23      | 5.72 | 5.63       | 0.25                | 0.85                                       |
| Feb-15 | 5.76                                 | 5.80     | 5.83              | 6.13      | 5.63 | 5.54       | 0.25                | 0.85                                       |
| Mar-15 | 5.53                                 | 5.56     | 5.60              | 5.88      | 5.39 | 5.30       | 0.25                | 0.85                                       |
| Apr-15 | 5.29                                 | 5.29     | 5.33              | 5.61      | 5.20 | 5.02       | 0.25                | 0.85                                       |
| May-15 | 5.22                                 | 5.22     | 5.26              | 5.54      | 5.14 | 4.95       | 0.25                | 0.85                                       |
| Jun-15 | 5.23                                 | 5.23     | 5.27              | 5.55      | 5.15 | 4.96       | 0.25                | 0.85                                       |
| Jul-15 | 5.33                                 | 5.33     | 5.37              | 5.65      | 5.24 | 5.06       | 0.25                | 0.85                                       |
| Aug-15 | 5.31                                 | 5.31     | 5.35              | 5.63      | 5.23 | 5.04       | 0.25                | 0.85                                       |
| Sep-15 | 5.25                                 | 5.26     | 5.29              | 5.57      | 5.17 | 4.98       | 0.25                | 0.85                                       |
| Oct-15 | 5.31                                 | 5.31     | 5.35              | 5.63      | 5.23 | 5.04       | 0.25                | 0.85                                       |
| Nov-15 | 5.64                                 | 5.67     | 5.68              | 5.89      | 5.40 | 5.31       | 0.25                | 0.85                                       |
| Dec-15 | 5.88                                 | 5.72     | 5.72              | 6.05      | 5.54 | 5.45       | 0.25                | 0.85                                       |
| Jan-16 | 6.38                                 | 6.42     | 6.45              | 6.76      | 6.25 | 6.16       | 0.25                | 0.87                                       |
| Feb-16 | 6.29                                 | 6.33     | 6.36              | 6.67      | 6.15 | 6.06       | 0.25                | 0.87                                       |
| Mar-16 | 6.05                                 | 6.08     | 6.12              | 6.42      | 5.91 | 5.82       | 0.25                | 0.87                                       |
| Apr-16 | 5.81                                 | 5.81     | 5.85              | 6.14      | 5.73 | 5.54       | 0.25                | 0.87                                       |
| May-16 | 5.74                                 | 5.74     | 5.78              | 6.07      | 5.66 | 5.47       | 0.25                | 0.87                                       |
| Jun-16 | 5.75                                 | 5.75     | 5.79              | 6.08      | 5.67 | 5.48       | 0.25                | 0.87                                       |
| Jul-16 | 5.85                                 | 5.85     | 5.89              | 6.18      | 5.77 | 5.58       | 0.25                | 0.87                                       |
| Aug-16 | 5.84                                 | 5.84     | 5.88              | 6.17      | 5.75 | 5.57       | 0.25                | 0.87                                       |
| Sep-16 | 5.78                                 | 5.78     | 5.82              | 6.11      | 5.70 | 5.51       | 0.25                | 0.87                                       |
| Oct-16 | 5.84                                 | 5.84     | 5.88              | 6.17      | 5.75 | 5.57       | 0.25                | 0.87                                       |
| Nov-16 | 6.06                                 | 6.09     | 6.11              | 6.43      | 5.93 | 5.84       | 0.25                | 0.87                                       |
| Dec-16 | 6.20                                 | 6.24     | 6.25              | 6.58      | 6.07 | 5.98       | 0.25                | 0.87                                       |
| Jan-17 | 6.54                                 | 6.58     | 6.61              | 6.93      | 6.41 | 6.32       | 0.25                | 0.89                                       |
| Feb-17 | 6.45                                 | 6.49     | 6.52              | 6.83      | 6.31 | 6.22       | 0.25                | 0.89                                       |
| Mar-17 | 6.21                                 | 6.24     | 6.28              | 6.59      | 6.08 | 5.99       | 0.25                | 0.89                                       |
| Apr-17 | 5.97                                 | 5.97     | 6.01              | 6.31      | 5.89 | 5.70       | 0.25                | 0.89                                       |
| May-17 | 5.90                                 | 5.90     | 5.94              | 6.24      | 5.82 | 5.63       | 0.25                | 0.89                                       |
| Jun-17 | 5.92                                 | 5.92     | 5.96              | 6.25      | 5.83 | 5.65       | 0.25                | 0.89                                       |
| Jul-17 | 6.01                                 | 6.01     | 6.05              | 6.34      | 5.93 | 5.74       | 0.25                | 0.89                                       |
| Aug-17 | 6.00                                 | 6.00     | 6.04              | 6.33      | 5.92 | 5.73       | 0.25                | 0.89                                       |
| Sep-17 | 5.94                                 | 5.94     | 5.98              | 6.27      | 5.86 | 5.67       | 0.25                | 0.89                                       |
| Oct-17 | 6.00                                 | 6.00     | 6.04              | 6.33      | 5.92 | 5.73       | 0.25                | 0.89                                       |
| Nov-17 | 6.22                                 | 6.25     | 6.27              | 6.59      | 6.09 | 6.00       | 0.25                | 0.89                                       |
| Dec-17 | 6.36                                 | 6.40     | 6.41              | 6.75      | 6.23 | 6.14       | 0.25                | 0.89                                       |
| Jan-18 | 6.73                                 | 6.77     | 6.80              | 7.13      | 6.60 | 6.51       | 0.25                | 0.91                                       |
| Feb-18 | 6.64                                 | 6.68     | 6.71              | 7.03      | 6.51 | 6.42       | 0.25                | 0.91                                       |
| Mar-18 | 6.40                                 | 6.43     | 6.47              | 6.78      | 6.27 | 6.18       | 0.25                | 0.91                                       |
| Apr-18 | 6.17                                 | 6.17     | 6.21              | 6.51      | 6.08 | 5.90       | 0.25                | 0.91                                       |
| May-18 | 6.10                                 | 6.10     | 6.14              | 6.43      | 6.02 | 5.83       | 0.25                | 0.91                                       |
| Jun-18 | 6.11                                 | 6.11     | 6.15              | 6.45      | 6.03 | 5.84       | 0.25                | 0.91                                       |
| Jul-18 | 6.20                                 | 6.20     | 6.24              | 6.54      | 6.12 | 5.93       | 0.25                | 0.91                                       |
| Aug-18 | 6.19                                 | 6.19     | 6.23              | 6.53      | 6.11 | 5.92       | 0.25                | 0.91                                       |
| Sep-18 | 6.13                                 | 6.13     | 6.17              | 6.47      | 6.05 | 5.86       | 0.25                | 0.91                                       |

|        |      |      |      |      |      |      |      |      |
|--------|------|------|------|------|------|------|------|------|
| Oct-18 | 6.19 | 6.19 | 6.23 | 6.53 | 6.11 | 5.92 | 0.25 | 0.91 |
| Nov-18 | 6.42 | 6.45 | 6.46 | 6.79 | 6.28 | 6.19 | 0.25 | 0.91 |
| Dec-18 | 6.56 | 6.60 | 6.60 | 6.94 | 6.42 | 6.33 | 0.25 | 0.91 |
| Jan-19 | 6.87 | 6.91 | 6.94 | 7.26 | 6.74 | 6.65 | 0.25 | 0.92 |
| Feb-19 | 6.78 | 6.82 | 6.85 | 7.17 | 6.64 | 6.55 | 0.25 | 0.92 |
| Mar-19 | 6.54 | 6.57 | 6.61 | 6.92 | 6.41 | 6.32 | 0.25 | 0.92 |
| Apr-19 | 6.31 | 6.31 | 6.35 | 6.65 | 6.22 | 6.04 | 0.25 | 0.92 |
| May-19 | 6.23 | 6.23 | 6.27 | 6.57 | 6.16 | 5.96 | 0.25 | 0.92 |
| Jun-19 | 6.25 | 6.25 | 6.29 | 6.59 | 6.16 | 5.98 | 0.25 | 0.92 |
| Jul-19 | 6.34 | 6.34 | 6.38 | 6.66 | 6.26 | 6.07 | 0.25 | 0.92 |
| Aug-19 | 6.33 | 6.33 | 6.37 | 6.67 | 6.25 | 6.06 | 0.25 | 0.92 |
| Sep-19 | 6.27 | 6.27 | 6.31 | 6.61 | 6.19 | 6.00 | 0.25 | 0.92 |
| Oct-19 | 6.33 | 6.33 | 6.37 | 6.67 | 6.25 | 6.06 | 0.25 | 0.92 |
| Nov-19 | 6.55 | 6.58 | 6.60 | 6.93 | 6.42 | 6.33 | 0.25 | 0.92 |
| Dec-19 | 6.69 | 6.73 | 6.74 | 7.08 | 6.56 | 6.47 | 0.25 | 0.92 |
| Jan-20 | 6.93 | 6.97 | 7.00 | 7.32 | 6.79 | 6.70 | 0.25 | 0.94 |
| Feb-20 | 6.83 | 6.87 | 6.90 | 7.23 | 6.70 | 6.61 | 0.25 | 0.94 |
| Mar-20 | 6.60 | 6.63 | 6.67 | 6.98 | 6.46 | 6.37 | 0.25 | 0.94 |
| Apr-20 | 6.36 | 6.36 | 6.40 | 6.70 | 6.27 | 6.09 | 0.25 | 0.94 |
| May-20 | 6.29 | 6.29 | 6.33 | 6.63 | 6.21 | 6.02 | 0.25 | 0.94 |
| Jun-20 | 6.30 | 6.30 | 6.34 | 6.64 | 6.22 | 6.03 | 0.25 | 0.94 |
| Jul-20 | 6.40 | 6.40 | 6.44 | 6.74 | 6.31 | 6.13 | 0.25 | 0.94 |
| Aug-20 | 6.39 | 6.39 | 6.43 | 6.73 | 6.30 | 6.12 | 0.25 | 0.94 |
| Sep-20 | 6.33 | 6.33 | 6.37 | 6.67 | 6.24 | 6.06 | 0.25 | 0.94 |
| Oct-20 | 6.39 | 6.39 | 6.43 | 6.73 | 6.30 | 6.12 | 0.25 | 0.94 |
| Nov-20 | 6.61 | 6.64 | 6.65 | 6.99 | 6.47 | 6.38 | 0.25 | 0.94 |
| Dec-20 | 6.75 | 6.79 | 6.80 | 7.14 | 6.62 | 6.53 | 0.25 | 0.94 |

| Month  | Emissions (\$/ton) -Nominal \$'s |                     |                        |                            |                        | (\$/metric tonne) -<br>Nominal \$'s |  |
|--------|----------------------------------|---------------------|------------------------|----------------------------|------------------------|-------------------------------------|--|
|        | SO <sub>2</sub>                  | AEP SO <sub>2</sub> | NO <sub>x</sub> Annual | AEP NO <sub>x</sub> Annual | NO <sub>x</sub> Summer | CO <sub>2</sub>                     |  |
|        |                                  |                     |                        |                            |                        |                                     |  |
| Jan-13 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Feb-13 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Mar-13 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Apr-13 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| May-13 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Jun-13 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Jul-13 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Aug-13 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Sep-13 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Oct-13 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Nov-13 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Dec-13 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Jan-14 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Feb-14 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Mar-14 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Apr-14 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| May-14 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Jun-14 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Jul-14 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Aug-14 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Sep-14 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Oct-14 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Nov-14 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Dec-14 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Jan-15 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Feb-15 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Mar-15 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Apr-15 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| May-15 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Jun-15 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Jul-15 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Aug-15 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Sep-15 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Oct-15 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Nov-15 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Dec-15 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Jan-16 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Feb-16 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Mar-16 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Apr-16 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| May-16 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Jun-16 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Jul-16 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Aug-16 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Sep-16 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Oct-16 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Nov-16 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Dec-16 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Jan-17 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Feb-17 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Mar-17 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Apr-17 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| May-17 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Jun-17 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Jul-17 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |

|        |      |      |   |   |   |      |
|--------|------|------|---|---|---|------|
| Aug-17 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Sep-17 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Oct-17 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Nov-17 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Dec-17 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Jan-18 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Feb-18 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Mar-18 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Apr-18 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| May-18 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Jun-18 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Jul-18 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Aug-18 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Sep-18 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Oct-18 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Nov-18 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Dec-18 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Jan-19 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Feb-19 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Mar-19 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Apr-19 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| May-19 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Jun-19 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Jul-19 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Aug-19 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Sep-19 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Oct-19 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Nov-19 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Dec-19 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Jan-20 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Feb-20 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Mar-20 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Apr-20 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| May-20 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Jun-20 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Jul-20 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Aug-20 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Sep-20 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Oct-20 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Nov-20 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Dec-20 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |

| Month  | Heat Rates (mmbtu/MWh) |          |                  |                  |                 |
|--------|------------------------|----------|------------------|------------------|-----------------|
|        | AEP GEN HUB - HR       | SPP - HR | ERCOT North - HR | ERCOT South - HR | ERCOT West - HR |
| Jan-13 | 8.91                   | 10.21    | 7.58             | 7.60             | 6.63            |
| Feb-13 | 8.15                   | 9.52     | 7.60             | 7.63             | 6.65            |
| Mar-13 | 8.50                   | 9.07     | 7.55             | 7.57             | 6.56            |
| Apr-13 | 8.74                   | 9.14     | 7.60             | 7.65             | 6.69            |
| May-13 | 8.72                   | 9.28     | 7.73             | 7.85             | 6.82            |
| Jun-13 | 10.06                  | 12.58    | 7.80             | 7.94             | 6.92            |
| Jul-13 | 11.29                  | 14.97    | 8.45             | 8.51             | 7.54            |
| Aug-13 | 11.38                  | 14.96    | 8.49             | 8.49             | 7.54            |
| Sep-13 | 11.18                  | 11.92    | 8.53             | 8.63             | 7.56            |
| Oct-13 | 8.66                   | 9.02     | 7.72             | 7.88             | 6.86            |
| Nov-13 | 8.37                   | 9.39     | 7.60             | 7.68             | 6.66            |
| Dec-13 | 8.42                   | 9.36     | 7.47             | 7.51             | 6.55            |
| Jan-14 | 8.66                   | 9.80     | 7.50             | 7.54             | 6.64            |
| Feb-14 | 8.00                   | 9.42     | 7.46             | 7.49             | 6.60            |
| Mar-14 | 8.36                   | 9.20     | 7.49             | 7.52             | 6.59            |
| Apr-14 | 8.54                   | 9.22     | 7.55             | 7.60             | 6.76            |
| May-14 | 8.47                   | 9.23     | 7.68             | 7.79             | 6.89            |
| Jun-14 | 9.78                   | 12.42    | 7.75             | 7.89             | 7.00            |
| Jul-14 | 10.49                  | 15.00    | 8.45             | 8.53             | 7.67            |
| Aug-14 | 10.98                  | 15.90    | 8.40             | 8.44             | 7.60            |
| Sep-14 | 9.48                   | 11.68    | 8.68             | 8.70             | 7.82            |
| Oct-14 | 8.44                   | 9.11     | 7.74             | 7.87             | 6.98            |
| Nov-14 | 8.26                   | 9.52     | 7.59             | 7.70             | 6.78            |
| Dec-14 | 8.22                   | 9.40     | 7.46             | 7.51             | 6.66            |
| Jan-15 | 9.85                   | 10.78    | 7.55             | 7.67             | 6.80            |
| Feb-15 | 8.90                   | 9.71     | 7.49             | 7.61             | 6.75            |
| Mar-15 | 9.02                   | 9.28     | 7.50             | 7.54             | 6.70            |
| Apr-15 | 9.00                   | 9.39     | 7.60             | 7.73             | 6.91            |
| May-15 | 9.11                   | 9.44     | 7.76             | 8.01             | 7.04            |
| Jun-15 | 11.67                  | 13.81    | 7.86             | 8.05             | 7.18            |
| Jul-15 | 12.24                  | 15.50    | 8.69             | 8.81             | 7.94            |
| Aug-15 | 13.65                  | 16.51    | 8.62             | 8.71             | 7.88            |
| Sep-15 | 10.97                  | 11.89    | 8.51             | 8.64             | 7.78            |
| Oct-15 | 8.71                   | 9.55     | 7.67             | 7.83             | 7.02            |
| Nov-15 | 8.98                   | 9.88     | 7.60             | 7.78             | 6.85            |
| Dec-15 | 9.44                   | 9.79     | 7.51             | 7.63             | 6.74            |
| Jan-16 | 10.38                  | 11.03    | 7.59             | 7.72             | 6.88            |
| Feb-16 | 9.19                   | 9.60     | 7.53             | 7.65             | 6.81            |
| Mar-16 | 9.20                   | 9.17     | 7.54             | 7.64             | 6.79            |
| Apr-16 | 8.96                   | 9.36     | 7.64             | 7.75             | 6.98            |
| May-16 | 9.02                   | 9.77     | 8.12             | 8.27             | 7.42            |
| Jun-16 | 12.54                  | 14.46    | 8.17             | 8.34             | 7.50            |
| Jul-16 | 13.92                  | 15.29    | 9.18             | 9.27             | 8.43            |
| Aug-16 | 14.53                  | 15.83    | 8.95             | 9.03             | 8.20            |
| Sep-16 | 10.50                  | 11.27    | 8.70             | 8.80             | 7.97            |
| Oct-16 | 8.93                   | 9.23     | 7.73             | 7.89             | 7.10            |
| Nov-16 | 9.30                   | 9.65     | 7.63             | 7.79             | 6.90            |
| Dec-16 | 9.63                   | 9.62     | 7.55             | 7.71             | 6.85            |

|        |       |       |      |      |      |
|--------|-------|-------|------|------|------|
| Jan-17 | 9.77  | 10.91 | 7.64 | 7.77 | 6.92 |
| Feb-17 | 9.09  | 9.85  | 7.59 | 7.63 | 6.84 |
| Mar-17 | 9.16  | 9.12  | 7.58 | 7.58 | 6.80 |
| Apr-17 | 8.82  | 9.30  | 7.63 | 7.74 | 6.97 |
| May-17 | 8.90  | 10.25 | 7.92 | 8.01 | 7.22 |
| Jun-17 | 12.54 | 14.84 | 8.32 | 8.42 | 7.62 |
| Jul-17 | 13.99 | 15.17 | 9.22 | 9.24 | 8.47 |
| Aug-17 | 14.45 | 15.93 | 9.18 | 9.18 | 8.42 |
| Sep-17 | 10.17 | 11.27 | 8.77 | 8.80 | 8.03 |
| Oct-17 | 8.90  | 9.42  | 7.76 | 7.87 | 7.12 |
| Nov-17 | 9.19  | 9.74  | 7.66 | 7.79 | 6.93 |
| Dec-17 | 9.40  | 9.48  | 7.66 | 7.71 | 6.89 |
| Jan-18 | 9.41  | 9.86  | 7.70 | 7.77 | 6.96 |
| Feb-18 | 9.09  | 9.48  | 7.59 | 7.68 | 6.89 |
| Mar-18 | 9.09  | 9.14  | 7.57 | 7.55 | 6.79 |
| Apr-18 | 8.74  | 9.14  | 7.58 | 7.65 | 6.91 |
| May-18 | 8.78  | 9.48  | 7.91 | 8.00 | 7.24 |
| Jun-18 | 11.26 | 13.27 | 8.09 | 8.19 | 7.42 |
| Jul-18 | 13.18 | 15.64 | 9.09 | 9.11 | 8.35 |
| Aug-18 | 14.20 | 15.73 | 9.29 | 9.37 | 8.55 |
| Sep-18 | 11.11 | 12.71 | 9.11 | 9.15 | 8.35 |
| Oct-18 | 8.78  | 9.47  | 7.77 | 7.85 | 7.12 |
| Nov-18 | 8.95  | 9.32  | 7.63 | 7.70 | 6.88 |
| Dec-18 | 9.25  | 9.35  | 7.58 | 7.63 | 6.83 |
| Jan-19 | 9.33  | 9.65  | 7.62 | 7.66 | 6.89 |
| Feb-19 | 9.00  | 9.45  | 7.58 | 7.58 | 6.83 |
| Mar-19 | 8.90  | 8.86  | 7.57 | 7.56 | 6.82 |
| Apr-19 | 8.71  | 9.10  | 7.58 | 7.62 | 6.90 |
| May-19 | 8.73  | 9.31  | 7.91 | 7.99 | 7.24 |
| Jun-19 | 11.32 | 13.43 | 8.05 | 8.14 | 7.38 |
| Jul-19 | 13.31 | 15.96 | 9.16 | 9.16 | 8.42 |
| Aug-19 | 13.83 | 14.96 | 9.64 | 9.57 | 8.83 |
| Sep-19 | 11.10 | 12.36 | 9.02 | 9.04 | 8.28 |
| Oct-19 | 8.69  | 9.26  | 7.75 | 7.80 | 7.09 |
| Nov-19 | 8.82  | 9.08  | 7.62 | 7.65 | 6.86 |
| Dec-19 | 9.30  | 9.42  | 7.57 | 7.58 | 6.82 |
| Jan-20 | 9.35  | 9.98  | 7.61 | 7.62 | 6.87 |
| Feb-20 | 9.00  | 9.33  | 7.58 | 7.59 | 6.84 |
| Mar-20 | 8.94  | 8.90  | 7.58 | 7.60 | 6.83 |
| Apr-20 | 8.68  | 8.92  | 7.61 | 7.70 | 6.96 |
| May-20 | 8.71  | 9.16  | 7.90 | 7.99 | 7.24 |
| Jun-20 | 11.91 | 13.29 | 8.04 | 8.12 | 7.38 |
| Jul-20 | 13.50 | 14.83 | 9.11 | 9.13 | 8.37 |
| Aug-20 | 14.29 | 15.41 | 8.96 | 8.95 | 8.22 |
| Sep-20 | 10.74 | 11.02 | 8.78 | 8.78 | 8.04 |
| Oct-20 | 8.69  | 9.17  | 7.73 | 7.77 | 7.06 |
| Nov-20 | 8.99  | 9.10  | 7.61 | 7.61 | 6.84 |
| Dec-20 | 9.27  | 9.27  | 7.56 | 7.51 | 6.80 |

| Month  | Capacity Prices (\$/MW-day) -<br>Nominal \$'s |                   | Renewable Energy<br>Subsidies ** (\$/MWh)<br>-Nominal \$'s | Inflation Factor |
|--------|-----------------------------------------------|-------------------|------------------------------------------------------------|------------------|
|        | AEP GEN HUB                                   | Hub Cap. SPP Cap. |                                                            |                  |
| Jan-13 | 16.46                                         | 25.00             | 47.20                                                      | 1.70%            |
| Feb-13 | 16.46                                         | 25.00             | 47.20                                                      | 1.70%            |
| Mar-13 | 16.46                                         | 25.00             | 47.20                                                      | 1.70%            |
| Apr-13 | 16.46                                         | 25.00             | 47.20                                                      | 1.70%            |
| May-13 | 16.46                                         | 25.00             | 47.20                                                      | 1.70%            |
| Jun-13 | 27.73                                         | 25.00             | 47.20                                                      | 1.70%            |
| Jul-13 | 27.73                                         | 25.00             | 47.20                                                      | 1.70%            |
| Aug-13 | 27.73                                         | 25.00             | 47.20                                                      | 1.70%            |
| Sep-13 | 27.73                                         | 25.00             | 47.20                                                      | 1.70%            |
| Oct-13 | 27.73                                         | 25.00             | 47.20                                                      | 1.70%            |
| Nov-13 | 27.73                                         | 25.00             | 47.20                                                      | 1.70%            |
| Dec-13 | 27.73                                         | 25.00             | 47.20                                                      | 1.70%            |
| Jan-14 | 27.73                                         | 25.00             | 47.70                                                      | 2.70%            |
| Feb-14 | 27.73                                         | 25.00             | 47.70                                                      | 2.70%            |
| Mar-14 | 27.73                                         | 25.00             | 47.70                                                      | 2.70%            |
| Apr-14 | 27.73                                         | 25.00             | 47.70                                                      | 2.70%            |
| May-14 | 27.73                                         | 25.00             | 47.70                                                      | 2.70%            |
| Jun-14 | 125.99                                        | 25.00             | 47.70                                                      | 2.70%            |
| Jul-14 | 125.99                                        | 25.00             | 47.70                                                      | 2.70%            |
| Aug-14 | 125.99                                        | 25.00             | 47.70                                                      | 2.70%            |
| Sep-14 | 125.99                                        | 25.00             | 47.70                                                      | 2.70%            |
| Oct-14 | 125.99                                        | 25.00             | 47.70                                                      | 2.70%            |
| Nov-14 | 125.99                                        | 25.00             | 47.70                                                      | 2.70%            |
| Dec-14 | 125.99                                        | 25.00             | 47.70                                                      | 2.70%            |
| Jan-15 | 125.99                                        | 25.00             | 48.20                                                      | 2.40%            |
| Feb-15 | 125.99                                        | 25.00             | 48.20                                                      | 2.40%            |
| Mar-15 | 125.99                                        | 25.00             | 48.20                                                      | 2.40%            |
| Apr-15 | 125.99                                        | 25.00             | 48.20                                                      | 2.40%            |
| May-15 | 125.99                                        | 25.00             | 48.20                                                      | 2.40%            |
| Jun-15 | 279.00                                        | 25.00             | 48.20                                                      | 2.40%            |
| Jul-15 | 279.00                                        | 25.00             | 48.20                                                      | 2.40%            |
| Aug-15 | 279.00                                        | 25.00             | 48.20                                                      | 2.40%            |
| Sep-15 | 279.00                                        | 25.00             | 48.20                                                      | 2.40%            |
| Oct-15 | 279.00                                        | 25.00             | 48.20                                                      | 2.40%            |
| Nov-15 | 279.00                                        | 25.00             | 48.20                                                      | 2.40%            |
| Dec-15 | 279.00                                        | 25.00             | 48.20                                                      | 2.40%            |
| Jan-16 | 279.00                                        | 25.00             | 44.10                                                      | 1.70%            |
| Feb-16 | 279.00                                        | 25.00             | 44.10                                                      | 1.70%            |
| Mar-16 | 279.00                                        | 25.00             | 44.10                                                      | 1.70%            |
| Apr-16 | 279.00                                        | 25.00             | 44.10                                                      | 1.70%            |
| May-16 | 279.00                                        | 25.00             | 44.10                                                      | 1.70%            |
| Jun-16 | 284.00                                        | 25.00             | 44.10                                                      | 1.70%            |
| Jul-16 | 284.00                                        | 25.00             | 44.10                                                      | 1.70%            |
| Aug-16 | 284.00                                        | 25.00             | 44.10                                                      | 1.70%            |
| Sep-16 | 284.00                                        | 25.00             | 44.10                                                      | 1.70%            |
| Oct-16 | 284.00                                        | 25.00             | 44.10                                                      | 1.70%            |
| Nov-16 | 284.00                                        | 25.00             | 44.10                                                      | 1.70%            |

|        |        |        |       |       |
|--------|--------|--------|-------|-------|
| Dec-16 | 284.00 | 25.00  | 44.10 | 1.70% |
| Jan-17 | 284.00 | 25.00  | 44.80 | 1.50% |
| Feb-17 | 284.00 | 25.00  | 44.80 | 1.50% |
| Mar-17 | 284.00 | 25.00  | 44.80 | 1.50% |
| Apr-17 | 284.00 | 25.00  | 44.80 | 1.50% |
| May-17 | 284.00 | 25.00  | 44.80 | 1.50% |
| Jun-17 | 201.68 | 25.00  | 44.80 | 1.50% |
| Jul-17 | 201.68 | 25.00  | 44.80 | 1.50% |
| Aug-17 | 201.68 | 25.00  | 44.80 | 1.50% |
| Sep-17 | 201.68 | 25.00  | 44.80 | 1.50% |
| Oct-17 | 201.68 | 25.00  | 44.80 | 1.50% |
| Nov-17 | 201.68 | 25.00  | 44.80 | 1.50% |
| Dec-17 | 201.68 | 25.00  | 44.80 | 1.50% |
| Jan-18 | 200.39 | 359.22 | 45.50 | 1.60% |
| Feb-18 | 200.39 | 359.22 | 45.50 | 1.60% |
| Mar-18 | 200.39 | 359.22 | 45.50 | 1.60% |
| Apr-18 | 200.39 | 359.22 | 45.50 | 1.60% |
| May-18 | 200.39 | 359.22 | 45.50 | 1.60% |
| Jun-18 | 200.39 | 359.22 | 45.50 | 1.60% |
| Jul-18 | 200.39 | 359.22 | 45.50 | 1.60% |
| Aug-18 | 200.39 | 359.22 | 45.50 | 1.60% |
| Sep-18 | 200.39 | 359.22 | 45.50 | 1.60% |
| Oct-18 | 200.39 | 359.22 | 45.50 | 1.60% |
| Nov-18 | 200.39 | 359.22 | 45.50 | 1.60% |
| Dec-18 | 200.39 | 359.22 | 45.50 | 1.60% |
| Jan-19 | 224.57 | 365.81 | 46.10 | 1.50% |
| Feb-19 | 224.57 | 365.81 | 46.10 | 1.50% |
| Mar-19 | 224.57 | 365.81 | 46.10 | 1.50% |
| Apr-19 | 224.57 | 365.81 | 46.10 | 1.50% |
| May-19 | 224.57 | 365.81 | 46.10 | 1.50% |
| Jun-19 | 224.57 | 365.81 | 46.10 | 1.50% |
| Jul-19 | 224.57 | 365.81 | 46.10 | 1.50% |
| Aug-19 | 224.57 | 365.81 | 46.10 | 1.50% |
| Sep-19 | 224.57 | 365.81 | 46.10 | 1.50% |
| Oct-19 | 224.57 | 365.81 | 46.10 | 1.50% |
| Nov-19 | 224.57 | 365.81 | 46.10 | 1.50% |
| Dec-19 | 224.57 | 365.81 | 46.10 | 1.50% |
| Jan-20 | 253.47 | 371.74 | 46.60 | 1.50% |
| Feb-20 | 253.47 | 371.74 | 46.60 | 1.50% |
| Mar-20 | 253.47 | 371.74 | 46.60 | 1.50% |
| Apr-20 | 253.47 | 371.74 | 46.60 | 1.50% |
| May-20 | 253.47 | 371.74 | 46.60 | 1.50% |
| Jun-20 | 253.47 | 371.74 | 46.60 | 1.50% |
| Jul-20 | 253.47 | 371.74 | 46.60 | 1.50% |
| Aug-20 | 253.47 | 371.74 | 46.60 | 1.50% |
| Sep-20 | 253.47 | 371.74 | 46.60 | 1.50% |
| Oct-20 | 253.47 | 371.74 | 46.60 | 1.50% |
| Nov-20 | 253.47 | 371.74 | 46.60 | 1.50% |
| Dec-20 | 253.47 | 371.74 | 46.60 | 1.50% |

| PJM - AEP GEN HUB -Nominal \$'s |        |         |              |                  |                |  |
|---------------------------------|--------|---------|--------------|------------------|----------------|--|
| Month                           | Nights | Weekend | Weekend Peak | PROMOD Weeknight | PROMOD Weekend |  |
| Jan-13                          | 25.83  | 31.75   | 34.68        | 25.89            | 30.84          |  |
| Feb-13                          | 25.72  | 29.89   | 32.25        | 25.84            | 29.39          |  |
| Mar-13                          | 23.65  | 30.25   | 33.77        | 23.81            | 29.48          |  |
| Apr-13                          | 20.11  | 29.28   | 33.65        | 20.46            | 27.43          |  |
| May-13                          | 18.89  | 28.92   | 33.63        | 18.58            | 27.44          |  |
| Jun-13                          | 20.88  | 30.56   | 35.19        | 20.38            | 29.54          |  |
| Jul-13                          | 22.28  | 36.76   | 44.66        | 22.34            | 34.70          |  |
| Aug-13                          | 23.10  | 34.05   | 40.01        | 23.76            | 32.46          |  |
| Sep-13                          | 22.38  | 31.87   | 37.27        | 23.63            | 30.18          |  |
| Oct-13                          | 18.81  | 30.54   | 36.49        | 18.86            | 28.88          |  |
| Nov-13                          | 21.35  | 29.95   | 34.46        | 21.68            | 28.73          |  |
| Dec-13                          | 24.13  | 32.95   | 37.19        | 24.00            | 31.60          |  |
| Jan-14                          | 27.32  | 33.70   | 37.07        | 27.60            | 32.65          |  |
| Feb-14                          | 26.49  | 31.45   | 34.36        | 26.75            | 30.85          |  |
| Mar-14                          | 24.37  | 31.84   | 35.66        | 24.72            | 30.71          |  |
| Apr-14                          | 21.05  | 31.40   | 36.48        | 21.26            | 29.74          |  |
| May-14                          | 18.76  | 30.05   | 35.64        | 18.58            | 28.59          |  |
| Jun-14                          | 21.61  | 31.66   | 36.69        | 21.43            | 30.26          |  |
| Jul-14                          | 22.30  | 32.89   | 39.32        | 23.33            | 31.32          |  |
| Aug-14                          | 25.54  | 34.56   | 40.32        | 27.27            | 33.33          |  |
| Sep-14                          | 21.85  | 32.01   | 37.38        | 21.08            | 30.95          |  |
| Oct-14                          | 20.56  | 32.04   | 37.85        | 20.35            | 30.50          |  |
| Nov-14                          | 22.88  | 31.39   | 36.25        | 24.19            | 30.13          |  |
| Dec-14                          | 25.30  | 33.36   | 37.69        | 25.44            | 32.11          |  |
| Jan-15                          | 31.60  | 38.91   | 43.17        | 32.24            | 37.90          |  |
| Feb-15                          | 30.52  | 36.55   | 40.60        | 31.36            | 35.79          |  |
| Mar-15                          | 27.93  | 34.38   | 38.39        | 28.79            | 33.39          |  |
| Apr-15                          | 24.48  | 33.87   | 39.86        | 25.88            | 32.37          |  |
| May-15                          | 21.99  | 31.32   | 36.68        | 22.87            | 30.14          |  |
| Jun-15                          | 25.28  | 36.20   | 41.63        | 25.41            | 34.30          |  |
| Jul-15                          | 26.97  | 38.04   | 45.51        | 28.65            | 36.36          |  |
| Aug-15                          | 28.26  | 38.64   | 44.55        | 29.49            | 37.06          |  |
| Sep-15                          | 24.09  | 35.33   | 41.54        | 24.45            | 33.83          |  |
| Oct-15                          | 23.25  | 32.76   | 38.59        | 24.17            | 31.56          |  |
| Nov-15                          | 27.12  | 35.84   | 41.34        | 28.58            | 34.43          |  |
| Dec-15                          | 29.97  | 39.33   | 44.75        | 30.43            | 38.11          |  |
| Jan-16                          | 38.39  | 46.36   | 51.36        | 39.82            | 45.26          |  |
| Feb-16                          | 36.13  | 43.92   | 49.37        | 37.89            | 42.51          |  |
| Mar-16                          | 34.11  | 42.21   | 47.22        | 34.95            | 41.03          |  |
| Apr-16                          | 29.23  | 38.66   | 44.61        | 30.59            | 37.36          |  |
| May-16                          | 25.83  | 36.43   | 42.65        | 27.41            | 34.51          |  |
| Jun-16                          | 31.24  | 44.54   | 51.70        | 31.48            | 42.77          |  |
| Jul-16                          | 33.18  | 47.60   | 55.70        | 34.21            | 45.82          |  |
| Aug-16                          | 34.53  | 45.41   | 52.42        | 36.39            | 43.30          |  |
| Sep-16                          | 28.63  | 37.67   | 43.13        | 29.44            | 36.33          |  |
| Oct-16                          | 28.91  | 38.12   | 44.55        | 30.94            | 36.96          |  |
| Nov-16                          | 33.39  | 41.76   | 47.58        | 34.99            | 40.48          |  |
| Dec-16                          | 36.36  | 45.51   | 51.13        | 37.17            | 44.42          |  |
| Jan-17                          | 44.04  | 50.95   | 53.60        | 44.01            | 49.47          |  |
| Feb-17                          | 40.49  | 47.01   | 51.97        | 42.25            | 46.05          |  |
| Mar-17                          | 38.03  | 44.79   | 49.32        | 38.86            | 43.87          |  |
| Apr-17                          | 33.09  | 42.22   | 47.89        | 34.47            | 41.14          |  |
| May-17                          | 28.51  | 38.38   | 45.03        | 30.25            | 36.60          |  |
| Jun-17                          | 34.77  | 44.43   | 50.03        | 35.23            | 43.12          |  |
| Jul-17                          | 36.61  | 49.15   | 56.60        | 38.24            | 47.35          |  |
| Aug-17                          | 36.90  | 46.48   | 52.60        | 38.47            | 44.81          |  |

|        |       |       |       |       |       |
|--------|-------|-------|-------|-------|-------|
| Sep-17 | 30.91 | 40.63 | 46.42 | 30.80 | 39.91 |
| Oct-17 | 32.79 | 41.00 | 47.09 | 34.78 | 39.82 |
| Nov-17 | 36.71 | 44.21 | 49.52 | 38.43 | 42.92 |
| Dec-17 | 40.46 | 47.56 | 52.05 | 41.38 | 46.81 |
| Jan-18 | 43.39 | 49.69 | 53.28 | 44.21 | 48.37 |
| Feb-18 | 44.11 | 49.03 | 53.21 | 45.98 | 48.24 |
| Mar-18 | 40.34 | 46.71 | 51.00 | 41.39 | 45.89 |
| Apr-18 | 33.64 | 41.85 | 47.80 | 35.84 | 40.54 |
| May-18 | 31.34 | 41.02 | 47.43 | 32.95 | 39.45 |
| Jun-18 | 33.79 | 43.95 | 49.73 | 34.52 | 42.59 |
| Jul-18 | 36.24 | 46.99 | 53.43 | 37.38 | 45.37 |
| Aug-18 | 39.88 | 54.61 | 62.51 | 40.80 | 52.08 |
| Sep-18 | 34.96 | 43.25 | 49.11 | 37.35 | 42.16 |
| Oct-18 | 32.94 | 41.65 | 47.95 | 34.54 | 40.28 |
| Nov-18 | 37.66 | 44.95 | 50.61 | 39.37 | 43.92 |
| Dec-18 | 40.69 | 49.14 | 54.32 | 41.89 | 47.97 |
| Jan-19 | 43.81 | 50.16 | 54.01 | 44.64 | 49.08 |
| Feb-19 | 44.33 | 49.70 | 53.83 | 45.67 | 49.00 |
| Mar-19 | 40.57 | 47.03 | 51.66 | 41.95 | 46.37 |
| Apr-19 | 34.48 | 43.12 | 49.19 | 36.29 | 41.58 |
| May-19 | 32.24 | 42.19 | 48.58 | 33.61 | 40.59 |
| Jun-19 | 34.98 | 45.04 | 50.81 | 35.97 | 43.82 |
| Jul-19 | 37.85 | 50.63 | 58.69 | 38.48 | 49.05 |
| Aug-19 | 41.46 | 54.69 | 62.58 | 42.64 | 52.95 |
| Sep-19 | 34.63 | 43.29 | 48.84 | 36.16 | 41.90 |
| Oct-19 | 34.35 | 42.79 | 49.08 | 35.89 | 41.73 |
| Nov-19 | 38.18 | 45.76 | 51.22 | 39.87 | 44.79 |
| Dec-19 | 42.11 | 50.09 | 55.03 | 43.17 | 48.86 |
| Jan-20 | 45.68 | 51.34 | 54.98 | 46.68 | 50.28 |
| Feb-20 | 44.59 | 50.05 | 54.29 | 46.13 | 49.42 |
| Mar-20 | 41.24 | 47.33 | 51.72 | 42.76 | 46.36 |
| Apr-20 | 35.60 | 43.84 | 49.94 | 37.48 | 42.59 |
| May-20 | 33.34 | 42.51 | 48.54 | 35.06 | 41.37 |
| Jun-20 | 37.77 | 48.42 | 54.05 | 38.27 | 46.53 |
| Jul-20 | 39.12 | 49.35 | 56.26 | 40.70 | 47.78 |
| Aug-20 | 39.05 | 51.20 | 58.15 | 40.64 | 49.30 |
| Sep-20 | 36.15 | 44.63 | 50.38 | 36.07 | 44.33 |
| Oct-20 | 35.18 | 43.11 | 48.91 | 36.68 | 42.23 |
| Nov-20 | 39.24 | 46.97 | 52.35 | 41.11 | 45.71 |
| Dec-20 | 44.09 | 50.68 | 54.89 | 44.53 | 49.95 |

| Month  | SPP -Nominal \$'s |         |              |                  |                |
|--------|-------------------|---------|--------------|------------------|----------------|
|        | Nights            | Weekend | Weekend Peak | PROMOD Weeknight | PROMOD Weekend |
| Jan-13 | 29.23             | 38.26   | 43.02        | 29.22            | 37.11          |
| Feb-13 | 28.13             | 37.30   | 41.80        | 27.84            | 36.11          |
| Mar-13 | 24.21             | 33.73   | 38.14        | 23.68            | 32.60          |
| Apr-13 | 21.97             | 33.27   | 38.40        | 21.85            | 31.19          |
| May-13 | 22.13             | 32.01   | 36.76        | 22.06            | 30.46          |
| Jun-13 | 27.74             | 38.85   | 45.02        | 28.37            | 37.61          |
| Jul-13 | 35.75             | 49.75   | 58.33        | 38.96            | 46.27          |
| Aug-13 | 35.81             | 55.83   | 66.06        | 36.04            | 53.10          |
| Sep-13 | 27.12             | 38.22   | 43.58        | 27.24            | 36.39          |
| Oct-13 | 21.18             | 33.29   | 39.09        | 20.94            | 31.58          |
| Nov-13 | 24.02             | 35.27   | 40.69        | 23.82            | 33.73          |
| Dec-13 | 26.93             | 38.07   | 43.37        | 26.78            | 36.33          |
| Jan-14 | 29.96             | 40.35   | 45.64        | 30.00            | 38.81          |
| Feb-14 | 29.81             | 39.79   | 44.85        | 29.76            | 38.43          |
| Mar-14 | 25.77             | 35.92   | 40.76        | 25.70            | 34.43          |
| Apr-14 | 24.02             | 34.99   | 40.29        | 23.99            | 33.34          |
| May-14 | 24.16             | 35.19   | 40.74        | 24.35            | 33.61          |
| Jun-14 | 29.78             | 43.35   | 51.10        | 30.95            | 41.28          |
| Jul-14 | 41.35             | 59.42   | 67.93        | 40.89            | 56.85          |
| Aug-14 | 43.31             | 61.57   | 71.14        | 42.37            | 60.03          |
| Sep-14 | 30.95             | 40.31   | 46.42        | 32.51            | 38.63          |
| Oct-14 | 23.57             | 35.92   | 41.66        | 23.17            | 34.08          |
| Nov-14 | 26.95             | 38.77   | 44.94        | 27.54            | 37.26          |
| Dec-14 | 29.84             | 42.11   | 47.41        | 29.37            | 39.92          |
| Jan-15 | 35.01             | 45.92   | 51.77        | 34.50            | 44.96          |
| Feb-15 | 33.49             | 44.14   | 50.04        | 33.92            | 42.70          |
| Mar-15 | 29.25             | 39.03   | 43.99        | 29.41            | 37.52          |
| Apr-15 | 28.72             | 38.19   | 44.01        | 30.24            | 36.48          |
| May-15 | 27.47             | 37.71   | 43.08        | 28.02            | 36.31          |
| Jun-15 | 34.58             | 51.57   | 58.04        | 32.98            | 48.59          |
| Jul-15 | 44.11             | 64.59   | 77.86        | 44.68            | 62.85          |
| Aug-15 | 45.01             | 68.45   | 78.24        | 43.33            | 64.92          |
| Sep-15 | 31.97             | 43.23   | 48.81        | 31.52            | 41.88          |
| Oct-15 | 27.12             | 39.25   | 44.91        | 26.66            | 37.63          |
| Nov-15 | 30.15             | 42.42   | 48.96        | 30.54            | 40.61          |
| Dec-15 | 33.15             | 44.68   | 50.56        | 33.31            | 42.99          |
| Jan-16 | 40.03             | 49.39   | 54.86        | 40.81            | 48.31          |
| Feb-16 | 37.58             | 47.50   | 53.58        | 38.68            | 45.86          |
| Mar-16 | 33.43             | 43.71   | 48.99        | 33.64            | 42.18          |
| Apr-16 | 33.42             | 43.20   | 49.24        | 34.28            | 42.07          |
| May-16 | 31.06             | 41.68   | 46.79        | 31.59            | 39.68          |
| Jun-16 | 39.76             | 58.01   | 66.62        | 38.62            | 55.84          |
| Jul-16 | 45.50             | 70.83   | 83.13        | 46.00            | 67.23          |
| Aug-16 | 49.92             | 73.93   | 82.28        | 48.10            | 69.08          |
| Sep-16 | 35.53             | 46.94   | 53.92        | 36.46            | 45.36          |
| Oct-16 | 30.64             | 42.46   | 48.92        | 31.46            | 40.77          |
| Nov-16 | 35.05             | 46.27   | 52.56        | 35.96            | 44.46          |
| Dec-16 | 39.38             | 50.19   | 56.00        | 39.38            | 48.96          |
| Jan-17 | 43.32             | 52.75   | 56.20        | 42.32            | 51.16          |
| Feb-17 | 40.47             | 49.03   | 54.46        | 41.83            | 47.68          |
| Mar-17 | 35.23             | 45.31   | 50.50        | 35.30            | 43.83          |
| Apr-17 | 35.06             | 43.52   | 49.06        | 37.25            | 42.26          |
| May-17 | 32.64             | 43.85   | 49.29        | 32.44            | 42.03          |
| Jun-17 | 42.42             | 59.30   | 68.17        | 42.24            | 57.11          |
| Jul-17 | 51.01             | 74.76   | 86.99        | 52.82            | 70.89          |
| Aug-17 | 50.84             | 72.96   | 83.57        | 50.23            | 69.96          |

|        |       |       |       |       |       |
|--------|-------|-------|-------|-------|-------|
| Sep-17 | 36.19 | 47.81 | 53.22 | 35.54 | 46.35 |
| Oct-17 | 32.61 | 44.44 | 51.02 | 33.41 | 42.61 |
| Nov-17 | 39.72 | 48.14 | 53.86 | 41.72 | 46.51 |
| Dec-17 | 42.01 | 51.13 | 56.32 | 42.75 | 50.01 |
| Jan-18 | 42.45 | 52.68 | 57.47 | 42.74 | 50.62 |
| Feb-18 | 43.46 | 50.93 | 55.43 | 44.39 | 49.77 |
| Mar-18 | 37.84 | 47.60 | 52.64 | 37.88 | 46.34 |
| Apr-18 | 33.80 | 44.79 | 50.84 | 34.58 | 43.06 |
| May-18 | 34.21 | 45.24 | 51.44 | 35.10 | 43.45 |
| Jun-18 | 40.26 | 56.23 | 64.72 | 40.94 | 53.98 |
| Jul-18 | 47.33 | 75.34 | 87.10 | 44.81 | 71.24 |
| Aug-18 | 54.20 | 80.84 | 91.59 | 53.40 | 75.91 |
| Sep-18 | 43.11 | 55.60 | 61.67 | 43.83 | 53.69 |
| Oct-18 | 34.29 | 45.93 | 51.93 | 34.71 | 43.84 |
| Nov-18 | 37.34 | 49.18 | 55.81 | 38.02 | 47.37 |
| Dec-18 | 42.31 | 54.34 | 60.11 | 42.30 | 52.57 |
| Jan-19 | 43.22 | 52.84 | 57.36 | 43.39 | 51.18 |
| Feb-19 | 43.52 | 51.52 | 56.02 | 43.91 | 50.45 |
| Mar-19 | 38.40 | 48.23 | 53.34 | 38.35 | 47.15 |
| Apr-19 | 34.79 | 45.62 | 51.44 | 35.45 | 43.66 |
| May-19 | 35.28 | 46.11 | 52.40 | 35.50 | 44.83 |
| Jun-19 | 41.73 | 58.52 | 67.09 | 42.99 | 56.05 |
| Jul-19 | 50.15 | 76.11 | 90.95 | 51.04 | 72.30 |
| Aug-19 | 56.74 | 79.63 | 90.90 | 57.19 | 76.15 |
| Sep-19 | 39.79 | 54.02 | 61.23 | 39.10 | 51.36 |
| Oct-19 | 35.37 | 47.84 | 55.31 | 36.60 | 45.93 |
| Nov-19 | 38.31 | 49.98 | 56.04 | 38.55 | 48.39 |
| Dec-19 | 44.21 | 53.98 | 59.47 | 45.25 | 52.29 |
| Jan-20 | 44.64 | 53.06 | 57.19 | 44.93 | 51.55 |
| Feb-20 | 43.85 | 51.62 | 56.17 | 44.44 | 50.70 |
| Mar-20 | 38.40 | 47.71 | 52.66 | 38.73 | 46.30 |
| Apr-20 | 36.01 | 45.52 | 51.25 | 37.07 | 44.04 |
| May-20 | 35.11 | 45.72 | 51.34 | 35.63 | 44.33 |
| Jun-20 | 41.64 | 60.55 | 69.51 | 41.93 | 56.97 |
| Jul-20 | 49.24 | 76.41 | 88.20 | 48.22 | 71.99 |
| Aug-20 | 51.21 | 75.78 | 88.65 | 51.54 | 72.60 |
| Sep-20 | 40.22 | 49.42 | 56.34 | 41.46 | 48.63 |
| Oct-20 | 35.01 | 46.74 | 53.03 | 35.17 | 45.30 |
| Nov-20 | 39.68 | 50.25 | 55.83 | 40.32 | 48.51 |
| Dec-20 | 44.19 | 52.24 | 56.43 | 44.05 | 51.29 |

| ERCOT North -Nominal \$'s |        |         |              |                  |                |  |
|---------------------------|--------|---------|--------------|------------------|----------------|--|
| Month                     | Nights | Weekend | Weekend Peak | PROMOD Weeknight | PROMOD Weekend |  |
| Jan-13                    | 37.53  | 37.93   | 38.11        | 37.45            | 37.91          |  |
| Feb-13                    | 37.16  | 37.74   | 37.90        | 36.94            | 37.71          |  |
| Mar-13                    | 33.69  | 34.88   | 35.87        | 34.21            | 34.70          |  |
| Apr-13                    | 32.34  | 33.83   | 34.55        | 32.40            | 33.54          |  |
| May-13                    | 32.40  | 33.32   | 34.08        | 32.75            | 33.12          |  |
| Jun-13                    | 33.23  | 34.52   | 35.14        | 33.18            | 34.38          |  |
| Jul-13                    | 34.67  | 37.65   | 39.11        | 34.65            | 37.15          |  |
| Aug-13                    | 34.38  | 36.99   | 38.29        | 34.39            | 36.83          |  |
| Sep-13                    | 34.16  | 36.52   | 37.74        | 34.19            | 36.18          |  |
| Oct-13                    | 33.52  | 34.42   | 34.93        | 33.58            | 34.28          |  |
| Nov-13                    | 32.07  | 34.09   | 36.08        | 33.23            | 33.76          |  |
| Dec-13                    | 34.36  | 36.53   | 37.17        | 33.90            | 36.20          |  |
| Jan-14                    | 39.37  | 40.47   | 40.68        | 39.01            | 40.35          |  |
| Feb-14                    | 39.12  | 39.94   | 40.18        | 38.87            | 39.87          |  |
| Mar-14                    | 35.84  | 37.37   | 38.59        | 36.49            | 37.12          |  |
| Apr-14                    | 34.60  | 36.66   | 37.64        | 34.68            | 36.29          |  |
| May-14                    | 35.18  | 36.43   | 37.32        | 35.60            | 36.17          |  |
| Jun-14                    | 36.33  | 37.76   | 38.47        | 36.29            | 37.56          |  |
| Jul-14                    | 37.84  | 41.12   | 42.73        | 37.83            | 40.65          |  |
| Aug-14                    | 37.51  | 40.35   | 41.75        | 37.48            | 40.00          |  |
| Sep-14                    | 37.62  | 40.84   | 42.45        | 37.59            | 40.32          |  |
| Oct-14                    | 37.00  | 37.98   | 38.48        | 37.01            | 37.83          |  |
| Nov-14                    | 34.13  | 36.86   | 39.26        | 35.66            | 36.42          |  |
| Dec-14                    | 37.16  | 40.05   | 40.55        | 36.42            | 39.51          |  |
| Jan-15                    | 41.23  | 42.18   | 42.44        | 40.96            | 42.08          |  |
| Feb-15                    | 40.99  | 41.68   | 41.86        | 40.78            | 41.61          |  |
| Mar-15                    | 37.75  | 39.15   | 40.27        | 38.25            | 38.90          |  |
| Apr-15                    | 36.92  | 38.47   | 39.12        | 36.79            | 38.26          |  |
| May-15                    | 37.29  | 38.27   | 38.91        | 37.57            | 38.10          |  |
| Jun-15                    | 38.10  | 40.05   | 40.87        | 37.97            | 39.72          |  |
| Jul-15                    | 39.31  | 43.48   | 45.52        | 39.28            | 42.85          |  |
| Aug-15                    | 39.10  | 42.58   | 44.33        | 39.12            | 42.10          |  |
| Sep-15                    | 38.63  | 41.60   | 43.11        | 38.60            | 41.21          |  |
| Oct-15                    | 37.83  | 38.89   | 39.50        | 37.93            | 38.74          |  |
| Nov-15                    | 36.57  | 38.49   | 40.62        | 38.08            | 38.09          |  |
| Dec-15                    | 39.67  | 41.63   | 42.08        | 39.09            | 41.44          |  |
| Jan-16                    | 45.95  | 46.50   | 46.76        | 45.92            | 46.44          |  |
| Feb-16                    | 45.38  | 45.81   | 45.97        | 45.30            | 45.75          |  |
| Mar-16                    | 42.62  | 43.64   | 44.34        | 42.76            | 43.51          |  |
| Apr-16                    | 41.54  | 42.76   | 43.35        | 41.51            | 42.60          |  |
| May-16                    | 42.22  | 43.22   | 43.82        | 42.39            | 43.04          |  |
| Jun-16                    | 42.45  | 45.41   | 46.81        | 42.36            | 45.00          |  |
| Jul-16                    | 43.60  | 48.49   | 50.99        | 43.64            | 47.89          |  |
| Aug-16                    | 43.30  | 49.34   | 52.32        | 43.27            | 48.33          |  |
| Sep-16                    | 42.78  | 47.03   | 49.13        | 42.69            | 46.42          |  |
| Oct-16                    | 41.96  | 43.02   | 43.63        | 42.10            | 42.85          |  |
| Nov-16                    | 42.60  | 43.76   | 45.01        | 43.13            | 43.64          |  |
| Dec-16                    | 44.87  | 46.13   | 46.50        | 44.63            | 45.94          |  |
| Jan-17                    | 47.61  | 48.26   | 48.49        | 47.53            | 48.15          |  |
| Feb-17                    | 47.00  | 47.35   | 47.51        | 46.95            | 47.32          |  |
| Mar-17                    | 44.32  | 45.23   | 45.80        | 44.43            | 45.09          |  |
| Apr-17                    | 42.96  | 43.97   | 44.53        | 43.08            | 43.82          |  |
| May-17                    | 43.14  | 44.04   | 44.58        | 43.28            | 43.85          |  |
| Jun-17                    | 43.87  | 46.69   | 48.07        | 43.81            | 46.28          |  |
| Jul-17                    | 45.07  | 50.55   | 53.30        | 45.15            | 49.77          |  |
| Aug-17                    | 44.87  | 51.50   | 54.79        | 44.82            | 50.58          |  |

|        |       |       |       |       |       |
|--------|-------|-------|-------|-------|-------|
| Sep-17 | 44.24 | 48.48 | 50.61 | 44.19 | 47.94 |
| Oct-17 | 43.63 | 44.49 | 44.98 | 43.73 | 44.35 |
| Nov-17 | 44.65 | 45.78 | 46.51 | 44.81 | 45.61 |
| Dec-17 | 46.89 | 48.07 | 48.48 | 46.70 | 47.91 |
| Jan-18 | 49.54 | 50.00 | 50.22 | 49.59 | 49.89 |
| Feb-18 | 48.36 | 48.91 | 49.12 | 48.25 | 48.85 |
| Mar-18 | 45.88 | 46.75 | 47.26 | 46.00 | 46.61 |
| Apr-18 | 44.25 | 45.29 | 45.82 | 44.30 | 45.12 |
| May-18 | 44.50 | 45.31 | 45.85 | 44.66 | 45.16 |
| Jun-18 | 45.03 | 47.63 | 48.89 | 44.97 | 47.28 |
| Jul-18 | 46.43 | 52.47 | 55.46 | 46.43 | 51.54 |
| Aug-18 | 46.37 | 52.09 | 54.98 | 46.36 | 51.25 |
| Sep-18 | 45.90 | 51.04 | 53.84 | 45.90 | 50.45 |
| Oct-18 | 45.04 | 45.98 | 46.52 | 45.09 | 45.83 |
| Nov-18 | 46.01 | 46.99 | 47.66 | 46.18 | 46.84 |
| Dec-18 | 47.56 | 48.86 | 49.30 | 47.34 | 48.66 |
| Jan-19 | 50.01 | 50.45 | 50.70 | 50.02 | 50.39 |
| Feb-19 | 49.27 | 49.81 | 50.01 | 49.15 | 49.76 |
| Mar-19 | 46.94 | 47.80 | 48.32 | 47.09 | 47.67 |
| Apr-19 | 45.35 | 46.43 | 46.94 | 45.35 | 46.23 |
| May-19 | 45.50 | 46.28 | 46.81 | 45.66 | 46.14 |
| Jun-19 | 45.96 | 48.42 | 49.62 | 45.92 | 48.13 |
| Jul-19 | 47.61 | 54.24 | 57.55 | 47.66 | 53.11 |
| Aug-19 | 48.05 | 55.13 | 58.72 | 48.02 | 54.21 |
| Sep-19 | 46.92 | 51.60 | 54.00 | 46.99 | 50.90 |
| Oct-19 | 46.08 | 47.02 | 47.55 | 46.14 | 46.88 |
| Nov-19 | 47.03 | 48.07 | 48.70 | 47.16 | 47.92 |
| Dec-19 | 48.57 | 49.86 | 50.26 | 48.34 | 49.65 |
| Jan-20 | 50.33 | 50.84 | 51.08 | 50.32 | 50.76 |
| Feb-20 | 49.82 | 50.24 | 50.44 | 49.75 | 50.22 |
| Mar-20 | 47.32 | 48.19 | 48.72 | 47.46 | 48.03 |
| Apr-20 | 45.84 | 46.87 | 47.38 | 45.87 | 46.70 |
| May-20 | 45.94 | 46.78 | 47.33 | 46.12 | 46.66 |
| Jun-20 | 46.48 | 49.31 | 50.63 | 46.42 | 48.83 |
| Jul-20 | 47.86 | 54.39 | 57.61 | 47.84 | 53.40 |
| Aug-20 | 47.55 | 52.90 | 55.60 | 47.55 | 52.18 |
| Sep-20 | 47.09 | 51.35 | 53.49 | 47.06 | 50.77 |
| Oct-20 | 46.44 | 47.39 | 47.91 | 46.50 | 47.26 |
| Nov-20 | 47.46 | 48.45 | 49.03 | 47.58 | 48.29 |
| Dec-20 | 49.01 | 50.36 | 50.73 | 48.78 | 50.15 |

| Power Prices (\$/M)       |        |         |              |                  |                |  |
|---------------------------|--------|---------|--------------|------------------|----------------|--|
| ERCOT South -Nominal \$'s |        |         |              |                  |                |  |
| Month                     | Nights | Weekend | Weekend Peak | PROMOD Weeknight | PROMOD Weekend |  |
| Jan-13                    | 37.50  | 38.06   | 38.22        | 37.34            | 38.02          |  |
| Feb-13                    | 37.20  | 37.71   | 37.86        | 37.01            | 37.68          |  |
| Mar-13                    | 34.06  | 35.20   | 36.09        | 34.50            | 35.09          |  |
| Apr-13                    | 32.52  | 34.04   | 34.75        | 32.56            | 33.74          |  |
| May-13                    | 32.74  | 33.71   | 34.44        | 33.07            | 33.48          |  |
| Jun-13                    | 33.59  | 35.12   | 35.84        | 33.51            | 34.94          |  |
| Jul-13                    | 34.98  | 37.99   | 39.45        | 34.99            | 37.47          |  |
| Aug-13                    | 34.74  | 37.25   | 38.51        | 34.74            | 36.91          |  |
| Sep-13                    | 34.56  | 36.96   | 38.21        | 34.59            | 36.61          |  |
| Oct-13                    | 33.98  | 34.98   | 35.50        | 33.99            | 34.84          |  |
| Nov-13                    | 32.00  | 34.23   | 36.33        | 33.18            | 33.86          |  |
| Dec-13                    | 34.49  | 36.79   | 37.47        | 33.99            | 36.45          |  |
| Jan-14                    | 39.57  | 40.79   | 40.97        | 39.12            | 40.66          |  |
| Feb-14                    | 39.06  | 39.94   | 40.22        | 38.80            | 39.87          |  |
| Mar-14                    | 36.17  | 37.64   | 38.77        | 36.73            | 37.40          |  |
| Apr-14                    | 34.96  | 36.91   | 37.81        | 34.99            | 36.58          |  |
| May-14                    | 35.53  | 36.84   | 37.76        | 35.97            | 36.56          |  |
| Jun-14                    | 36.72  | 38.42   | 39.24        | 36.66            | 38.18          |  |
| Jul-14                    | 38.18  | 41.57   | 43.24        | 38.18            | 41.07          |  |
| Aug-14                    | 37.87  | 40.65   | 42.07        | 37.86            | 40.32          |  |
| Sep-14                    | 37.76  | 41.04   | 42.71        | 37.76            | 40.51          |  |
| Oct-14                    | 37.30  | 38.40   | 38.95        | 37.28            | 38.25          |  |
| Nov-14                    | 34.25  | 37.22   | 39.76        | 35.81            | 36.76          |  |
| Dec-14                    | 37.54  | 40.50   | 40.98        | 36.72            | 39.98          |  |
| Jan-15                    | 42.05  | 42.93   | 43.14        | 41.77            | 42.84          |  |
| Feb-15                    | 41.83  | 42.47   | 42.57        | 41.55            | 42.41          |  |
| Mar-15                    | 38.47  | 39.71   | 40.69        | 38.91            | 39.49          |  |
| Apr-15                    | 37.90  | 39.27   | 39.81        | 37.73            | 39.10          |  |
| May-15                    | 38.21  | 39.22   | 39.85        | 38.47            | 39.04          |  |
| Jun-15                    | 38.65  | 40.83   | 41.81        | 38.55            | 40.47          |  |
| Jul-15                    | 39.74  | 44.02   | 46.12        | 39.72            | 43.37          |  |
| Aug-15                    | 39.67  | 43.28   | 45.09        | 39.69            | 42.78          |  |
| Sep-15                    | 39.22  | 42.24   | 43.77        | 39.17            | 41.85          |  |
| Oct-15                    | 38.56  | 39.64   | 40.22        | 38.62            | 39.49          |  |
| Nov-15                    | 37.28  | 39.20   | 41.46        | 38.96            | 38.79          |  |
| Dec-15                    | 40.61  | 42.62   | 43.05        | 39.98            | 42.43          |  |
| Jan-16                    | 46.97  | 47.47   | 47.68        | 46.90            | 47.42          |  |
| Feb-16                    | 46.25  | 46.55   | 46.66        | 46.22            | 46.49          |  |
| Mar-16                    | 43.82  | 44.65   | 45.17        | 43.91            | 44.54          |  |
| Apr-16                    | 42.49  | 43.45   | 43.91        | 42.48            | 43.32          |  |
| May-16                    | 43.12  | 44.17   | 44.76        | 43.26            | 43.97          |  |
| Jun-16                    | 43.18  | 46.11   | 47.55        | 43.14            | 45.70          |  |
| Jul-16                    | 44.17  | 49.03   | 51.52        | 44.21            | 48.44          |  |
| Aug-16                    | 44.13  | 50.19   | 53.14        | 44.06            | 49.18          |  |
| Sep-16                    | 43.29  | 47.61   | 49.74        | 43.17            | 47.02          |  |
| Oct-16                    | 42.83  | 43.92   | 44.50        | 42.93            | 43.75          |  |
| Nov-16                    | 43.34  | 44.45   | 45.82        | 44.00            | 44.33          |  |
| Dec-16                    | 46.02  | 47.43   | 47.77        | 45.65            | 47.24          |  |
| Jan-17                    | 48.57  | 49.31   | 49.51        | 48.42            | 49.19          |  |
| Feb-17                    | 47.39  | 47.69   | 47.81        | 47.33            | 47.66          |  |
| Mar-17                    | 44.90  | 45.67   | 46.04        | 44.92            | 45.54          |  |
| Apr-17                    | 43.59  | 44.46   | 44.94        | 43.65            | 44.35          |  |
| May-17                    | 43.42  | 44.51   | 45.13        | 43.56            | 44.28          |  |
| Jun-17                    | 44.28  | 47.11   | 48.54        | 44.25            | 46.71          |  |
| Jul-17                    | 45.42  | 50.78   | 53.48        | 45.48            | 50.03          |  |
| Aug-17                    | 45.44  | 52.09   | 55.31        | 45.34            | 51.15          |  |

|        |       |       |       |       |       |
|--------|-------|-------|-------|-------|-------|
| Sep-17 | 44.36 | 48.66 | 50.82 | 44.25 | 48.14 |
| Oct-17 | 43.85 | 44.90 | 45.48 | 43.93 | 44.73 |
| Nov-17 | 44.91 | 46.27 | 47.15 | 45.12 | 46.05 |
| Dec-17 | 47.31 | 48.66 | 49.03 | 46.93 | 48.50 |
| Jan-18 | 49.97 | 50.66 | 50.85 | 49.90 | 50.50 |
| Feb-18 | 48.90 | 49.37 | 49.57 | 48.81 | 49.33 |
| Mar-18 | 46.22 | 46.99 | 47.33 | 46.22 | 46.86 |
| Apr-18 | 44.79 | 45.64 | 46.10 | 44.89 | 45.48 |
| May-18 | 44.71 | 45.76 | 46.38 | 44.83 | 45.58 |
| Jun-18 | 45.47 | 48.08 | 49.39 | 45.46 | 47.73 |
| Jul-18 | 46.62 | 52.57 | 55.50 | 46.61 | 51.66 |
| Aug-18 | 47.27 | 53.01 | 55.90 | 47.24 | 52.18 |
| Sep-18 | 46.27 | 51.34 | 53.91 | 46.25 | 50.78 |
| Oct-18 | 45.00 | 46.15 | 46.81 | 45.03 | 45.99 |
| Nov-18 | 45.92 | 47.15 | 47.95 | 46.13 | 46.95 |
| Dec-18 | 47.94 | 49.41 | 49.84 | 47.62 | 49.18 |
| Jan-19 | 50.41 | 51.08 | 51.28 | 50.34 | 50.95 |
| Feb-19 | 49.30 | 49.71 | 49.86 | 49.20 | 49.67 |
| Mar-19 | 47.24 | 48.04 | 48.41 | 47.26 | 47.91 |
| Apr-19 | 45.59 | 46.50 | 46.98 | 45.68 | 46.31 |
| May-19 | 45.70 | 46.71 | 47.34 | 45.83 | 46.55 |
| Jun-19 | 46.18 | 48.72 | 49.99 | 46.19 | 48.42 |
| Jul-19 | 47.68 | 54.28 | 57.55 | 47.72 | 53.15 |
| Aug-19 | 48.32 | 55.16 | 58.59 | 48.28 | 54.26 |
| Sep-19 | 47.12 | 51.79 | 54.19 | 47.16 | 51.10 |
| Oct-19 | 45.72 | 46.96 | 47.64 | 45.78 | 46.78 |
| Nov-19 | 46.69 | 48.06 | 48.85 | 46.82 | 47.86 |
| Dec-19 | 48.64 | 50.15 | 50.54 | 48.32 | 49.89 |
| Jan-20 | 50.48 | 51.32 | 51.54 | 50.36 | 51.16 |
| Feb-20 | 49.76 | 50.16 | 50.31 | 49.66 | 50.13 |
| Mar-20 | 47.75 | 48.65 | 49.04 | 47.78 | 48.47 |
| Apr-20 | 46.32 | 47.27 | 47.74 | 46.33 | 47.12 |
| May-20 | 45.99 | 47.00 | 47.64 | 46.20 | 46.86 |
| Jun-20 | 46.59 | 49.57 | 50.99 | 46.54 | 49.07 |
| Jul-20 | 47.99 | 54.50 | 57.71 | 47.96 | 53.52 |
| Aug-20 | 47.71 | 53.19 | 55.93 | 47.74 | 52.43 |
| Sep-20 | 46.91 | 51.39 | 53.64 | 46.85 | 50.80 |
| Oct-20 | 45.96 | 47.22 | 47.91 | 46.02 | 47.05 |
| Nov-20 | 46.91 | 48.24 | 48.98 | 47.06 | 48.01 |
| Dec-20 | 48.73 | 50.38 | 50.75 | 48.35 | 50.14 |

| Month  | Power Prices (\$/MWh) -Nominal \$'s |         |              |                  |                |
|--------|-------------------------------------|---------|--------------|------------------|----------------|
|        | ERCOT West -Nominal \$'s            |         |              |                  |                |
|        | Nights                              | Weekend | Weekend Peak | PROMOD Weeknight | PROMOD Weekend |
| Jan-13 | 36.49                               | 36.90   | 37.06        | 36.40            | 36.87          |
| Feb-13 | 36.06                               | 36.61   | 36.75        | 35.86            | 36.57          |
| Mar-13 | 32.85                               | 34.00   | 34.91        | 33.31            | 33.83          |
| Apr-13 | 31.46                               | 32.89   | 33.59        | 31.52            | 32.61          |
| May-13 | 31.62                               | 32.49   | 33.18        | 31.94            | 32.29          |
| Jun-13 | 32.42                               | 33.90   | 34.61        | 32.39            | 33.73          |
| Jul-13 | 33.74                               | 36.92   | 38.47        | 33.74            | 36.38          |
| Aug-13 | 33.50                               | 36.35   | 37.79        | 33.51            | 35.97          |
| Sep-13 | 33.26                               | 35.76   | 37.06        | 33.29            | 35.40          |
| Oct-13 | 32.75                               | 33.78   | 34.31        | 32.76            | 33.63          |
| Nov-13 | 31.10                               | 33.22   | 35.23        | 32.25            | 32.86          |
| Dec-13 | 33.43                               | 35.59   | 36.23        | 32.97            | 35.27          |
| Jan-14 | 38.42                               | 39.51   | 39.70        | 38.05            | 39.39          |
| Feb-14 | 38.08                               | 38.86   | 39.09        | 37.83            | 38.80          |
| Mar-14 | 35.00                               | 36.41   | 37.56        | 35.60            | 36.19          |
| Apr-14 | 33.79                               | 35.71   | 36.63        | 33.86            | 35.37          |
| May-14 | 34.38                               | 35.57   | 36.42        | 34.79            | 35.32          |
| Jun-14 | 35.49                               | 37.10   | 37.89        | 35.45            | 36.87          |
| Jul-14 | 36.89                               | 40.38   | 42.07        | 36.86            | 39.87          |
| Aug-14 | 36.59                               | 39.63   | 41.16        | 36.57            | 39.26          |
| Sep-14 | 36.56                               | 39.91   | 41.60        | 36.54            | 39.37          |
| Oct-14 | 36.05                               | 37.11   | 37.65        | 36.04            | 36.96          |
| Nov-14 | 33.24                               | 36.02   | 38.46        | 34.80            | 35.58          |
| Dec-14 | 36.35                               | 39.15   | 39.61        | 35.60            | 38.64          |
| Jan-15 | 40.60                               | 41.40   | 41.60        | 40.38            | 41.33          |
| Feb-15 | 40.33                               | 40.96   | 41.08        | 40.06            | 40.91          |
| Mar-15 | 37.06                               | 38.29   | 39.30        | 37.55            | 38.07          |
| Apr-15 | 36.47                               | 37.85   | 38.39        | 36.31            | 37.67          |
| May-15 | 36.76                               | 37.59   | 38.12        | 37.01            | 37.44          |
| Jun-15 | 37.25                               | 39.30   | 40.20        | 37.16            | 38.95          |
| Jul-15 | 38.36                               | 42.67   | 44.78        | 38.33            | 42.02          |
| Aug-15 | 38.20                               | 41.94   | 43.82        | 38.22            | 41.43          |
| Sep-15 | 37.78                               | 40.87   | 42.41        | 37.73            | 40.46          |
| Oct-15 | 37.19                               | 38.27   | 38.86        | 37.24            | 38.12          |
| Nov-15 | 35.97                               | 37.78   | 39.89        | 37.54            | 37.38          |
| Dec-15 | 39.10                               | 40.97   | 41.35        | 38.50            | 40.80          |
| Jan-16 | 45.33                               | 45.77   | 45.93        | 45.25            | 45.72          |
| Feb-16 | 44.61                               | 44.97   | 45.10        | 44.57            | 44.91          |
| Mar-16 | 42.19                               | 43.01   | 43.52        | 42.27            | 42.90          |
| Apr-16 | 40.94                               | 41.93   | 42.41        | 40.92            | 41.80          |
| May-16 | 41.58                               | 42.41   | 42.90        | 41.71            | 42.25          |
| Jun-16 | 41.62                               | 44.55   | 45.98        | 41.57            | 44.14          |
| Jul-16 | 42.65                               | 47.70   | 50.26        | 42.68            | 47.08          |
| Aug-16 | 42.48                               | 48.66   | 51.69        | 42.44            | 47.63          |
| Sep-16 | 41.78                               | 46.14   | 48.27        | 41.67            | 45.53          |
| Oct-16 | 41.29                               | 42.36   | 42.95        | 41.41            | 42.19          |
| Nov-16 | 41.84                               | 42.87   | 44.12        | 42.43            | 42.77          |
| Dec-16 | 44.32                               | 45.52   | 45.84        | 44.03            | 45.36          |
| Jan-17 | 46.89                               | 47.49   | 47.65        | 46.75            | 47.39          |
| Feb-17 | 45.90                               | 46.24   | 46.37        | 45.83            | 46.20          |
| Mar-17 | 43.39                               | 44.20   | 44.61        | 43.42            | 44.06          |
| Apr-17 | 42.01                               | 42.94   | 43.45        | 42.09            | 42.82          |
| May-17 | 42.03                               | 43.01   | 43.58        | 42.18            | 42.80          |
| Jun-17 | 42.81                               | 45.71   | 47.16        | 42.77            | 45.30          |
| Jul-17 | 43.97                               | 49.55   | 52.35        | 44.05            | 48.75          |
| Aug-17 | 43.86                               | 50.59   | 53.89        | 43.79            | 49.64          |

|        |       |       |       |       |       |
|--------|-------|-------|-------|-------|-------|
| Sep-17 | 43.00 | 47.36 | 49.56 | 42.92 | 46.82 |
| Oct-17 | 42.47 | 43.47 | 44.03 | 42.55 | 43.31 |
| Nov-17 | 43.54 | 44.73 | 45.48 | 43.71 | 44.54 |
| Dec-17 | 45.78 | 46.98 | 47.35 | 45.49 | 46.84 |
| Jan-18 | 48.47 | 48.99 | 49.14 | 48.46 | 48.86 |
| Feb-18 | 47.35 | 47.85 | 48.04 | 47.25 | 47.80 |
| Mar-18 | 44.77 | 45.58 | 45.97 | 44.81 | 45.44 |
| Apr-18 | 43.26 | 44.16 | 44.65 | 43.36 | 44.00 |
| May-18 | 43.32 | 44.19 | 44.75 | 43.47 | 44.04 |
| Jun-18 | 43.98 | 46.65 | 47.98 | 43.96 | 46.30 |
| Jul-18 | 45.18 | 51.28 | 54.30 | 45.17 | 50.35 |
| Aug-18 | 45.50 | 51.35 | 54.33 | 45.50 | 50.50 |
| Sep-18 | 44.75 | 49.96 | 52.60 | 44.73 | 49.37 |
| Oct-18 | 43.70 | 44.79 | 45.39 | 43.74 | 44.62 |
| Nov-18 | 44.65 | 45.70 | 46.39 | 44.82 | 45.53 |
| Dec-18 | 46.44 | 47.76 | 48.16 | 46.17 | 47.56 |
| Jan-19 | 48.89 | 49.43 | 49.61 | 48.85 | 49.34 |
| Feb-19 | 47.95 | 48.47 | 48.64 | 47.83 | 48.41 |
| Mar-19 | 45.79 | 46.60 | 47.03 | 45.87 | 46.48 |
| Apr-19 | 44.15 | 45.11 | 45.60 | 44.21 | 44.92 |
| May-19 | 44.30 | 45.15 | 45.73 | 44.46 | 45.01 |
| Jun-19 | 44.74 | 47.33 | 48.61 | 44.72 | 47.03 |
| Jul-19 | 46.31 | 53.04 | 56.37 | 46.33 | 51.89 |
| Aug-19 | 46.74 | 53.83 | 57.42 | 46.71 | 52.90 |
| Sep-19 | 45.66 | 50.46 | 52.93 | 45.70 | 49.75 |
| Oct-19 | 44.57 | 45.70 | 46.32 | 44.63 | 45.53 |
| Nov-19 | 45.54 | 46.67 | 47.33 | 45.65 | 46.51 |
| Dec-19 | 47.24 | 48.58 | 48.95 | 46.97 | 48.35 |
| Jan-20 | 49.08 | 49.72 | 49.91 | 49.01 | 49.60 |
| Feb-20 | 48.44 | 48.87 | 49.06 | 48.35 | 48.84 |
| Mar-20 | 46.27 | 47.08 | 47.50 | 46.34 | 46.93 |
| Apr-20 | 44.78 | 45.74 | 46.24 | 44.81 | 45.59 |
| May-20 | 44.64 | 45.53 | 46.13 | 44.85 | 45.41 |
| Jun-20 | 45.18 | 48.18 | 49.60 | 45.12 | 47.68 |
| Jul-20 | 46.55 | 53.21 | 56.49 | 46.52 | 52.20 |
| Aug-20 | 46.26 | 51.88 | 54.71 | 46.27 | 51.12 |
| Sep-20 | 45.69 | 50.15 | 52.40 | 45.66 | 49.55 |
| Oct-20 | 44.88 | 46.01 | 46.63 | 44.94 | 45.86 |
| Nov-20 | 45.87 | 46.96 | 47.58 | 46.00 | 46.78 |
| Dec-20 | 47.49 | 48.96 | 49.35 | 47.21 | 48.74 |

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| Y2015H1 Base |                 |                      |                       |                           |
|--------------|-----------------|----------------------|-----------------------|---------------------------|
| Year         | Growth Rate (%) | Real Growth Rate (%) | Implied Inflation (%) | Exchange Rate (Euro/\$US) |
| 2016         | 4.2             | 2.5                  | 1.7                   | 0.94                      |
| 2017         | 5.0             | 2.6                  | 2.4                   | 0.93                      |
| 2018         | 5.2             | 2.7                  | 2.5                   | 0.93                      |
| 2019         | 5.1             | 2.6                  | 2.5                   | 0.95                      |
| 2020         | 4.5             | 2.3                  | 2.2                   | 0.98                      |
| 2021         | 4.3             | 2.2                  | 2.1                   | 1.01                      |
| 2022         | 4.3             | 2.2                  | 2.1                   | 1.03                      |
| 2023         | 4.2             | 2.1                  | 2.1                   | 1.04                      |
| 2024         | 4.1             | 2.1                  | 2.0                   | 1.06                      |
| 2025         | 4.1             | 2.1                  | 2.0                   | 1.06                      |
| 2026         | 3.9             | 2.0                  | 1.9                   | 1.07                      |
| 2027         | 3.9             | 2.0                  | 1.9                   | 1.07                      |
| 2028         | 3.9             | 2.0                  | 1.9                   | 1.07                      |
| 2029         | 3.9             | 2.0                  | 1.9                   | 1.07                      |
| 2030         | 3.9             | 2.0                  | 1.9                   | 1.07                      |
| 2031         | 3.8             | 2.0                  | 1.8                   | 1.07                      |
| 2032         | 3.9             | 2.0                  | 1.9                   | 1.07                      |
| 2033         | 3.8             | 1.9                  | 1.9                   | 1.07                      |
| 2034         | 3.8             | 1.9                  | 1.9                   | 1.07                      |
| 2035         | 3.9             | 2.0                  | 1.9                   | 1.07                      |
| 2036         | 3.8             | 2.0                  | 1.8                   | 1.07                      |
| 2037         | 3.8             | 2.0                  | 1.8                   | 1.07                      |
| 2038         | 3.8             | 1.9                  | 1.9                   | 1.07                      |
| 2039         | 3.8             | 1.9                  | 1.9                   | 1.07                      |
| 2040         | 3.7             | 1.9                  | 1.8                   | 1.07                      |
| 2041         | 3.7             | 1.9                  | 1.8                   | 1.07                      |
| 2042         | 3.7             | 1.9                  | 1.8                   | 1.07                      |
| 2043         | 3.5             | 1.8                  | 1.7                   | 1.07                      |
| 2044         | 3.5             | 1.8                  | 1.7                   | 1.07                      |
| 2045         | 3.5             | 1.8                  | 1.7                   | 1.07                      |
| 2046         | 3.5             | 1.8                  | 1.7                   | 1.07                      |

| Time Period      | Definition                                                           |
|------------------|----------------------------------------------------------------------|
| On-Peak          | normal peak hours: 5 days x 16 hours                                 |
| Off-Peak         | ALL hours not on-peak (5 days x 8 hours + 2 days x 24 hours weekend) |
| Nights           | ALL night hours: 7 days x 8 hours                                    |
| Weekends         | all weekend hours: 2 days x 24 hours                                 |
| Weekend Peak     | normal peak hours weekend only: 2 days x 16 hours                    |
| PROMOD Weeknight | 32 hrs (excludes Friday night)                                       |
| PROMOD Weekend   | 56 hrs (includes Friday night - Monday morning)                      |

#### 1.1023 Short ton to Metric Tonne conversion factor

| Power Prices (\$/MWh) -Nominal \$'s |                   |          |             |          |          |          |             |          |             |          |            |          |  |
|-------------------------------------|-------------------|----------|-------------|----------|----------|----------|-------------|----------|-------------|----------|------------|----------|--|
| Year                                | PJM - AEP Gen Hub |          | SPP_Central |          | SPP_KSMO |          | ERCOT_NORTH |          | ERCOT_South |          | ERCOT_West |          |  |
|                                     | On-Peak           | Off-Peak | On-Peak     | Off-Peak | On-Peak  | Off-Peak | On-Peak     | Off-Peak | On-Peak     | Off-Peak | On-Peak    | Off-Peak |  |
| 2016                                | 35.34             | 26.65    | 37.04       | 26.84    | 36.80    | 26.60    | 35.48       | 29.01    | 35.57       | 29.28    | 36.19      | 29.50    |  |
| 2017                                | 38.62             | 27.41    | 42.20       | 29.41    | 41.87    | 29.14    | 40.68       | 31.70    | 40.80       | 32.03    | 41.50      | 32.28    |  |
| 2018                                | 40.37             | 28.22    | 44.33       | 30.73    | 44.01    | 30.45    | 42.98       | 32.90    | 43.17       | 33.32    | 43.86      | 33.52    |  |
| 2019                                | 43.12             | 30.31    | 47.10       | 32.84    | 46.82    | 32.55    | 44.20       | 33.94    | 44.40       | 34.38    | 45.15      | 34.64    |  |
| 2020                                | 44.97             | 32.05    | 48.64       | 34.53    | 48.36    | 34.24    | 45.77       | 35.48    | 46.00       | 36.00    | 46.76      | 36.23    |  |
| 2021                                | 47.42             | 33.59    | 51.41       | 36.41    | 51.14    | 36.11    | 47.94       | 37.01    | 48.21       | 37.57    | 48.97      | 37.79    |  |
| 2022                                | 62.04             | 47.94    | 64.33       | 49.56    | 64.02    | 49.15    | 58.96       | 45.70    | 59.35       | 46.43    | 60.11      | 46.54    |  |
| 2023                                | 63.73             | 48.59    | 66.59       | 50.57    | 66.29    | 50.16    | 60.97       | 45.89    | 61.51       | 46.64    | 62.16      | 46.78    |  |
| 2024                                | 66.89             | 50.93    | 69.56       | 52.70    | 69.34    | 52.31    | 64.12       | 47.80    | 64.68       | 48.58    | 65.37      | 48.67    |  |
| 2025                                | 69.81             | 52.82    | 72.19       | 54.65    | 71.99    | 54.25    | 66.05       | 49.61    | 66.66       | 50.46    | 67.36      | 50.55    |  |
| 2026                                | 72.39             | 54.98    | 74.83       | 56.98    | 74.73    | 56.60    | 68.21       | 51.87    | 68.92       | 52.76    | 69.56      | 52.84    |  |
| 2027                                | 75.10             | 56.64    | 77.35       | 58.44    | 77.21    | 58.05    | 69.88       | 52.21    | 70.58       | 53.08    | 71.26      | 53.22    |  |
| 2028                                | 77.21             | 58.27    | 79.55       | 60.11    | 79.41    | 59.70    | 72.22       | 53.63    | 72.95       | 54.58    | 73.63      | 54.67    |  |
| 2029                                | 79.93             | 60.58    | 82.76       | 62.81    | 82.77    | 62.45    | 74.43       | 56.34    | 75.17       | 57.34    | 75.87      | 57.44    |  |
| 2030                                | 82.57             | 62.38    | 86.48       | 65.60    | 86.37    | 65.17    | 76.19       | 57.21    | 76.92       | 58.22    | 77.66      | 58.34    |  |
| 2031                                | 85.39             | 64.62    | 90.82       | 69.13    | 90.79    | 68.72    | 78.60       | 59.59    | 79.45       | 60.72    | 80.06      | 60.73    |  |
| 2032                                | 88.74             | 66.97    | 95.25       | 72.48    | 95.07    | 72.01    | 80.69       | 61.28    | 81.54       | 62.40    | 82.18      | 62.44    |  |
| 2033                                | 92.42             | 70.20    | 98.87       | 75.55    | 98.71    | 75.06    | 82.66       | 63.45    | 83.58       | 64.64    | 84.20      | 64.72    |  |
| 2034                                | 93.33             | 71.58    | 100.67      | 77.56    | 100.52   | 77.07    | 85.17       | 66.08    | 86.21       | 67.31    | 86.74      | 67.37    |  |
| 2035                                | 95.81             | 74.02    | 103.10      | 79.87    | 102.96   | 79.37    | 87.11       | 67.23    | 88.18       | 68.48    | 88.70      | 68.57    |  |
| 2036                                | 99.04             | 76.49    | 106.30      | 82.36    | 106.01   | 81.77    | 89.88       | 69.25    | 90.99       | 70.60    | 91.42      | 70.58    |  |
| 2037                                | 101.38            | 78.90    | 108.11      | 84.29    | 107.95   | 83.75    | 92.09       | 70.88    | 93.35       | 72.30    | 93.65      | 72.26    |  |
| 2038                                | 104.70            | 81.50    | 111.18      | 86.72    | 111.07   | 86.17    | 94.23       | 72.69    | 95.60       | 74.17    | 95.87      | 74.14    |  |
| 2039                                | 105.73            | 83.17    | 112.15      | 88.23    | 111.95   | 87.63    | 96.59       | 74.77    | 98.18       | 76.32    | 98.27      | 76.25    |  |
| 2040                                | 108.64            | 85.64    | 114.82      | 90.53    | 114.64   | 89.90    | 99.00       | 76.32    | 100.60      | 77.90    | 100.68     | 77.82    |  |
| 2041                                | 110.08            | 87.49    | 116.47      | 92.36    | 116.09   | 91.68    | 101.20      | 78.02    | 103.02      | 79.74    | 102.87     | 79.58    |  |
| 2042                                | 112.43            | 89.33    | 119.32      | 94.70    | 119.09   | 94.03    | 103.09      | 79.73    | 105.11      | 81.53    | 104.79     | 81.32    |  |
| 2043                                | 114.44            | 91.67    | 121.59      | 97.08    | 121.35   | 96.41    | 105.36      | 81.57    | 107.34      | 83.35    | 107.07     | 83.20    |  |
| 2044                                | 115.92            | 93.50    | 123.81      | 99.43    | 123.61   | 98.72    | 107.62      | 83.98    | 109.92      | 85.94    | 109.33     | 85.59    |  |
| 2045                                | 119.58            | 96.27    | 127.28      | 102.06   | 127.13   | 101.37   | 109.47      | 85.44    | 111.79      | 87.46    | 111.20     | 87.09    |  |
| 2046                                | 121.34            | 98.43    | 128.64      | 103.83   | 128.39   | 103.09   | 111.38      | 86.97    | 113.89      | 89.08    | 113.16     | 88.70    |  |

| Year | 12395 Btu/lb<br>1.6# SO2<br>CAPP | 12500 Btu/lb<br>1.6# SO2<br>CAPP CSX-Rail | 12000 Btu/lb<br>1.2# SO2<br>CAPP Compliance | 12000 Btu/lb<br>1.67# SO2<br>CAPP NYMEX | Coal (\$/ton) FOB<br>12500 Btu/lb<br>6# SO2<br>NAPP High Sulfur | -Nominal \$'s<br>13000 Btu/lb<br>4# SO2<br>NAPP Med Sulfur | 11512 Btu/lb<br>4.3# SO2<br>I-Basin | 8800 Btu/lb<br>0.8# SO2<br>PRB 8800 | 8400 Btu/lb<br>0.8# SO2<br>PRB 8400 | 11700 Btu/lb<br>0.9# SO2<br>Colorado |
|------|----------------------------------|-------------------------------------------|---------------------------------------------|-----------------------------------------|-----------------------------------------------------------------|------------------------------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------------------|
| 2016 | 65.50                            | 66.05                                     | 70.85                                       | 65.85                                   | 55.18                                                           | 61.51                                                      | 40.00                               | 15.05                               | 11.50                               | 34.86                                |
| 2017 | 67.83                            | 68.40                                     | 72.60                                       | 66.04                                   | 55.89                                                           | 62.25                                                      | 42.25                               | 16.11                               | 12.80                               | 36.81                                |
| 2018 | 68.58                            | 69.16                                     | 74.26                                       | 68.32                                   | 58.19                                                           | 64.64                                                      | 43.56                               | 17.28                               | 13.56                               | 37.16                                |
| 2019 | 68.48                            | 70.06                                     | 76.35                                       | 70.24                                   | 61.31                                                           | 67.89                                                      | 45.92                               | 18.81                               | 14.74                               | 39.42                                |
| 2020 | 73.14                            | 73.76                                     | 80.39                                       | 73.96                                   | 64.64                                                           | 71.34                                                      | 48.60                               | 21.38                               | 16.80                               | 42.50                                |
| 2021 | 75.62                            | 76.26                                     | 83.12                                       | 76.47                                   | 66.28                                                           | 73.05                                                      | 50.19                               | 22.86                               | 17.97                               | 44.26                                |
| 2022 | 79.42                            | 80.09                                     | 87.31                                       | 80.32                                   | 70.39                                                           | 77.32                                                      | 53.49                               | 23.49                               | 18.47                               | 48.46                                |
| 2023 | 81.64                            | 82.33                                     | 89.75                                       | 82.57                                   | 70.85                                                           | 77.80                                                      | 51.01                               | 21.62                               | 16.88                               | 48.15                                |
| 2024 | 84.77                            | 85.49                                     | 93.21                                       | 85.76                                   | 77.93                                                           | 85.17                                                      | 55.88                               | 22.51                               | 17.60                               | 50.15                                |
| 2025 | 87.76                            | 88.51                                     | 96.50                                       | 88.78                                   | 80.25                                                           | 87.58                                                      | 56.30                               | 24.10                               | 18.91                               | 53.85                                |
| 2026 | 90.36                            | 91.13                                     | 99.37                                       | 91.42                                   | 83.64                                                           | 91.11                                                      | 57.53                               | 26.99                               | 21.26                               | 53.59                                |
| 2027 | 93.80                            | 94.59                                     | 103.15                                      | 94.90                                   | 85.13                                                           | 92.66                                                      | 57.91                               | 26.82                               | 20.19                               | 56.34                                |
| 2028 | 97.98                            | 98.81                                     | 107.77                                      | 99.15                                   | 87.26                                                           | 94.87                                                      | 59.93                               | 26.60                               | 20.73                               | 59.61                                |
| 2029 | 100.66                           | 101.51                                    | 110.72                                      | 101.86                                  | 89.54                                                           | 97.24                                                      | 64.10                               | 30.95                               | 24.40                               | 65.58                                |
| 2030 | 104.34                           | 105.23                                    | 114.78                                      | 105.60                                  | 90.46                                                           | 98.19                                                      | 65.72                               | 30.05                               | 23.52                               | 68.73                                |
| 2031 | 105.31                           | 106.21                                    | 115.85                                      | 106.58                                  | 92.47                                                           | 100.29                                                     | 68.05                               | 33.82                               | 26.64                               | 69.19                                |
| 2032 | 108.46                           | 109.38                                    | 119.31                                      | 109.76                                  | 94.06                                                           | 101.94                                                     | 69.56                               | 35.56                               | 27.87                               | 70.19                                |
| 2033 | 111.36                           | 112.30                                    | 122.51                                      | 112.71                                  | 97.62                                                           | 105.54                                                     | 74.69                               | 38.63                               | 30.21                               | 72.54                                |
| 2034 | 114.29                           | 115.26                                    | 125.73                                      | 115.67                                  | 99.66                                                           | 107.77                                                     | 78.16                               | 41.10                               | 32.02                               | 75.69                                |
| 2035 | 117.88                           | 118.88                                    | 129.69                                      | 119.31                                  | 103.14                                                          | 111.39                                                     | 80.24                               | 46.67                               | 36.36                               | 79.69                                |
| 2036 | 120.82                           | 121.85                                    | 132.93                                      | 122.29                                  | 105.72                                                          | 114.17                                                     | 82.24                               | 47.53                               | 37.27                               | 81.68                                |
| 2037 | 123.84                           | 124.89                                    | 136.25                                      | 125.35                                  | 108.36                                                          | 117.03                                                     | 84.30                               | 48.72                               | 38.20                               | 83.72                                |
| 2038 | 126.94                           | 128.02                                    | 139.66                                      | 128.48                                  | 111.07                                                          | 119.95                                                     | 86.41                               | 49.93                               | 39.16                               | 85.81                                |
| 2039 | 130.11                           | 131.22                                    | 143.15                                      | 131.70                                  | 113.85                                                          | 122.95                                                     | 88.57                               | 51.18                               | 40.13                               | 87.96                                |
| 2040 | 133.37                           | 134.50                                    | 146.73                                      | 134.99                                  | 116.69                                                          | 126.02                                                     | 90.78                               | 52.46                               | 41.14                               | 90.16                                |
| 2041 | 136.70                           | 137.86                                    | 150.40                                      | 138.36                                  | 119.61                                                          | 129.17                                                     | 93.05                               | 53.77                               | 42.17                               | 92.41                                |
| 2042 | 140.12                           | 141.31                                    | 154.16                                      | 141.82                                  | 122.60                                                          | 132.40                                                     | 95.38                               | 55.12                               | 43.22                               | 94.72                                |
| 2043 | 142.92                           | 144.13                                    | 157.24                                      | 144.66                                  | 125.05                                                          | 135.05                                                     | 97.28                               | 56.22                               | 44.09                               | 96.62                                |
| 2044 | 145.78                           | 147.01                                    | 160.38                                      | 147.55                                  | 127.56                                                          | 137.75                                                     | 99.23                               | 57.34                               | 44.97                               | 98.55                                |
| 2045 | 148.69                           | 149.95                                    | 163.59                                      | 150.50                                  | 130.11                                                          | 140.51                                                     | 101.21                              | 58.49                               | 45.87                               | 100.52                               |
| 2046 | 151.67                           | 152.95                                    | 166.86                                      | 153.51                                  | 132.71                                                          | 143.32                                                     | 103.24                              | 59.66                               | 46.78                               | 102.53                               |

| Natural Gas (\$/mmbtu) -Nominal \$'s |           |          |                           |           |       |            |                     |  |  |
|--------------------------------------|-----------|----------|---------------------------|-----------|-------|------------|---------------------|--|--|
| Year                                 | Henry Hub | TCO Pool | Dominion South Point Pool | TCO Deliv | HSC   | PEPL TX-OK | Swing Service Adder |  |  |
| 2016                                 | 4.34      | 4.13     | 3.83                      | 4.39      | 4.42  | 4.25       | 0.25                |  |  |
| 2017                                 | 5.09      | 4.81     | 4.62                      | 5.08      | 5.18  | 5.01       | 0.25                |  |  |
| 2018                                 | 5.40      | 5.10     | 4.95                      | 5.37      | 5.49  | 5.30       | 0.25                |  |  |
| 2019                                 | 5.50      | 5.18     | 5.12                      | 5.46      | 5.59  | 5.39       | 0.25                |  |  |
| 2020                                 | 5.60      | 5.29     | 5.23                      | 5.56      | 5.69  | 5.48       | 0.25                |  |  |
| 2021                                 | 5.82      | 5.49     | 5.50                      | 5.77      | 5.91  | 5.75       | 0.25                |  |  |
| 2022                                 | 6.28      | 5.98     | 5.87                      | 6.28      | 6.37  | 6.20       | 0.25                |  |  |
| 2023                                 | 6.60      | 6.30     | 6.20                      | 6.59      | 6.69  | 6.52       | 0.25                |  |  |
| 2024                                 | 6.80      | 6.47     | 6.40                      | 6.77      | 6.88  | 6.68       | 0.25                |  |  |
| 2025                                 | 6.96      | 6.62     | 6.62                      | 6.92      | 7.05  | 6.83       | 0.25                |  |  |
| 2026                                 | 7.13      | 6.76     | 6.79                      | 7.06      | 7.22  | 6.97       | 0.26                |  |  |
| 2027                                 | 7.30      | 6.92     | 6.96                      | 7.23      | 7.39  | 7.13       | 0.26                |  |  |
| 2028                                 | 7.47      | 7.09     | 7.14                      | 7.40      | 7.56  | 7.30       | 0.27                |  |  |
| 2029                                 | 7.65      | 7.26     | 7.33                      | 7.57      | 7.74  | 7.47       | 0.27                |  |  |
| 2030                                 | 7.83      | 7.44     | 7.49                      | 7.76      | 7.91  | 7.66       | 0.28                |  |  |
| 2031                                 | 8.00      | 7.61     | 7.68                      | 7.93      | 8.09  | 7.85       | 0.28                |  |  |
| 2032                                 | 8.19      | 7.79     | 7.87                      | 8.12      | 8.28  | 8.04       | 0.28                |  |  |
| 2033                                 | 8.39      | 7.99     | 8.07                      | 8.32      | 8.48  | 8.26       | 0.28                |  |  |
| 2034                                 | 8.59      | 8.20     | 8.28                      | 8.53      | 8.68  | 8.47       | 0.28                |  |  |
| 2035                                 | 8.80      | 8.38     | 8.50                      | 8.72      | 8.89  | 8.69       | 0.28                |  |  |
| 2036                                 | 9.02      | 8.63     | 8.71                      | 8.97      | 9.11  | 8.89       | 0.28                |  |  |
| 2037                                 | 9.24      | 8.85     | 8.92                      | 9.20      | 9.32  | 9.09       | 0.28                |  |  |
| 2038                                 | 9.45      | 9.08     | 9.12                      | 9.43      | 9.53  | 9.30       | 0.28                |  |  |
| 2039                                 | 9.66      | 9.31     | 9.31                      | 9.66      | 9.75  | 9.49       | 0.28                |  |  |
| 2040                                 | 9.87      | 9.52     | 9.52                      | 9.89      | 9.96  | 9.69       | 0.28                |  |  |
| 2041                                 | 10.08     | 9.74     | 9.73                      | 10.10     | 10.17 | 9.90       | 0.28                |  |  |
| 2042                                 | 10.29     | 9.95     | 9.94                      | 10.31     | 10.38 | 10.11      | 0.28                |  |  |
| 2043                                 | 10.50     | 10.16    | 10.15                     | 10.53     | 10.59 | 10.32      | 0.28                |  |  |
| 2044                                 | 10.71     | 10.37    | 10.36                     | 10.74     | 10.80 | 10.53      | 0.28                |  |  |
| 2045                                 | 10.92     | 10.57    | 10.57                     | 10.96     | 11.00 | 10.73      | 0.28                |  |  |
| 2046                                 | 11.13     | 10.79    | 10.78                     | 11.17     | 11.22 | 10.95      | 0.28                |  |  |

| Uranium Fuel UO2 (\$/mmbtu) - Nominal \$'s |
|--------------------------------------------|
| 0.87                                       |
| 0.89                                       |
| 0.91                                       |
| 0.92                                       |
| 0.94                                       |
| 0.96                                       |
| 0.98                                       |
| 1.00                                       |
| 1.02                                       |
| 1.04                                       |
| 1.06                                       |
| 1.08                                       |
| 1.10                                       |
| 1.13                                       |
| 1.15                                       |
| 1.17                                       |
| 1.19                                       |
| 1.22                                       |
| 1.24                                       |
| 1.27                                       |
| 1.29                                       |
| 1.32                                       |
| 1.35                                       |
| 1.37                                       |
| 1.40                                       |
| 1.43                                       |
| 1.46                                       |
| 1.49                                       |
| 1.52                                       |
| 1.55                                       |
| 1.58                                       |

| Year | Emissions (\$/ton) - Nominal \$'s |                        |                        |                 | (\$/metric tonne) -<br>Nominal \$'s |                 | Heat Rates (mmBtu/MWh) |                  |                  |                  |                 |       |       |
|------|-----------------------------------|------------------------|------------------------|-----------------|-------------------------------------|-----------------|------------------------|------------------|------------------|------------------|-----------------|-------|-------|
|      | SO <sub>2</sub>                   | NO <sub>x</sub> Annual | NO <sub>x</sub> Summer | CO <sub>2</sub> | SO <sub>2</sub>                     | CO <sub>2</sub> | AEP GEN HUB - HR       | SPP_Central - HR | ERCOT North - HR | ERCOT South - HR | ERCOT West - HR | HR    | HR    |
| 2016 | 0                                 | 0                      | 0                      | 0.00            | 0.00                                | 8.59            | 8.59                   | 8.76             | 8.05             | 8.07             | 8.30            | 8.30  | 8.30  |
| 2017 | 0                                 | 0                      | 0                      | 0.00            | 0.00                                | 8.05            | 8.05                   | 8.45             | 7.88             | 7.90             | 8.20            | 8.20  | 8.20  |
| 2018 | 0                                 | 0                      | 0                      | 0.00            | 0.00                                | 7.95            | 7.95                   | 8.39             | 7.85             | 7.88             | 8.21            | 8.21  | 8.21  |
| 2019 | 0                                 | 0                      | 0                      | 0.00            | 0.00                                | 8.33            | 8.33                   | 8.75             | 7.92             | 7.96             | 8.31            | 8.31  | 8.31  |
| 2020 | 0                                 | 0                      | 0                      | 0.00            | 0.00                                | 8.52            | 8.52                   | 8.90             | 8.06             | 8.10             | 8.44            | 8.44  | 8.44  |
| 2021 | 0                                 | 0                      | 0                      | 0.00            | 0.00                                | 8.66            | 8.66                   | 8.97             | 8.13             | 8.16             | 8.52            | 8.52  | 8.52  |
| 2022 | 0                                 | 0                      | 0                      | 0.00            | 0.00                                | 10.40           | 10.40                  | 10.40            | 9.29             | 9.34             | 9.61            | 9.61  | 9.61  |
| 2023 | 0                                 | 0                      | 0                      | 15.29           | 15.29                               | 10.15           | 10.15                  | 10.25            | 9.14             | 9.22             | 9.46            | 9.46  | 9.46  |
| 2024 | 0                                 | 0                      | 0                      | 15.58           | 15.58                               | 10.36           | 10.36                  | 10.44            | 9.33             | 9.42             | 9.69            | 9.69  | 9.69  |
| 2025 | 0                                 | 0                      | 0                      | 15.88           | 15.88                               | 10.57           | 10.57                  | 10.58            | 9.39             | 9.48             | 9.77            | 9.77  | 9.77  |
| 2026 | 0                                 | 0                      | 0                      | 16.19           | 16.19                               | 10.73           | 10.73                  | 10.75            | 9.47             | 9.57             | 9.86            | 9.86  | 9.86  |
| 2027 | 0                                 | 0                      | 0                      | 16.51           | 16.51                               | 10.87           | 10.87                  | 10.88            | 9.49             | 9.58             | 9.89            | 9.89  | 9.89  |
| 2028 | 0                                 | 0                      | 0                      | 16.84           | 16.84                               | 10.92           | 10.92                  | 10.93            | 9.57             | 9.66             | 9.90            | 9.90  | 9.90  |
| 2029 | 0                                 | 0                      | 0                      | 17.17           | 17.17                               | 11.03           | 11.03                  | 11.10            | 9.63             | 9.73             | 10.05           | 10.05 | 10.05 |
| 2030 | 0                                 | 0                      | 0                      | 17.50           | 17.50                               | 11.11           | 11.11                  | 11.31            | 9.64             | 9.74             | 10.04           | 10.04 | 10.04 |
| 2031 | 0                                 | 0                      | 0                      | 17.85           | 17.85                               | 11.24           | 11.24                  | 11.60            | 9.74             | 9.84             | 10.13           | 10.13 | 10.13 |
| 2032 | 0                                 | 0                      | 0                      | 18.19           | 18.19                               | 11.41           | 11.41                  | 11.88            | 9.77             | 9.87             | 10.16           | 10.16 | 10.16 |
| 2033 | 0                                 | 0                      | 0                      | 18.54           | 18.54                               | 11.58           | 11.58                  | 12.00            | 9.76             | 9.87             | 10.16           | 10.16 | 10.16 |
| 2034 | 0                                 | 0                      | 0                      | 18.88           | 18.88                               | 11.40           | 11.40                  | 11.92            | 9.82             | 9.93             | 10.19           | 10.19 | 10.19 |
| 2035 | 0                                 | 0                      | 0                      | 19.24           | 19.24                               | 11.45           | 11.45                  | 11.89            | 9.81             | 9.93             | 10.21           | 10.21 | 10.21 |
| 2036 | 0                                 | 0                      | 0                      | 19.50           | 19.50                               | 11.50           | 11.50                  | 11.99            | 9.89             | 10.01            | 10.23           | 10.23 | 10.23 |
| 2037 | 0                                 | 0                      | 0                      | 19.95           | 19.95                               | 11.47           | 11.47                  | 11.91            | 9.89             | 10.03            | 10.21           | 10.21 | 10.21 |
| 2038 | 0                                 | 0                      | 0                      | 20.33           | 20.33                               | 11.56           | 11.56                  | 11.98            | 9.90             | 10.05            | 10.20           | 10.20 | 10.20 |
| 2039 | 0                                 | 0                      | 0                      | 20.69           | 20.69                               | 11.37           | 11.37                  | 11.83            | 9.92             | 10.09            | 10.19           | 10.19 | 10.19 |
| 2040 | 0                                 | 0                      | 0                      | 21.08           | 21.08                               | 11.41           | 11.41                  | 11.86            | 9.95             | 10.11            | 10.21           | 10.21 | 10.21 |
| 2041 | 0                                 | 0                      | 0                      | 21.48           | 21.48                               | 11.31           | 11.31                  | 11.78            | 9.97             | 10.15            | 10.21           | 10.21 | 10.21 |
| 2042 | 0                                 | 0                      | 0                      | 21.86           | 21.86                               | 11.31           | 11.31                  | 11.81            | 9.95             | 10.15            | 10.19           | 10.19 | 10.19 |
| 2043 | 0                                 | 0                      | 0                      | 22.26           | 22.26                               | 11.28           | 11.28                  | 11.80            | 9.96             | 10.15            | 10.19           | 10.19 | 10.19 |
| 2044 | 0                                 | 0                      | 0                      | 22.66           | 22.66                               | 11.19           | 11.19                  | 11.77            | 9.98             | 10.19            | 10.20           | 10.20 | 10.20 |
| 2045 | 0                                 | 0                      | 0                      | 23.06           | 23.06                               | 11.31           | 11.31                  | 11.87            | 9.95             | 10.16            | 10.16           | 10.16 | 10.16 |
| 2046 | 0                                 | 0                      | 0                      | 23.50           | 23.50                               | 11.26           | 11.26                  | 11.76            | 9.94             | 10.17            | 10.15           | 10.15 | 10.15 |



| Month  | Power Prices (\$/MWh) -Nominal \$'s |          |             |          |          |          |             |          |             |          |            |          |
|--------|-------------------------------------|----------|-------------|----------|----------|----------|-------------|----------|-------------|----------|------------|----------|
|        | PJM - AEP GEN HUB                   |          | SPP_CENTRAL |          | SPP_KSMO |          | ERCOT_North |          | ERCOT_South |          | ERCOT_West |          |
|        | On-Peak                             | Off-Peak | On-Peak     | Off-Peak | On-Peak  | Off-Peak | On-Peak     | Off-Peak | On-Peak     | Off-Peak | On-Peak    | Off-Peak |
| Jan-16 | 37.01                               | 29.06    | 37.74       | 27.61    | 37.36    | 27.33    | 36.67       | 29.67    | 36.47       | 29.66    | 37.52      | 30.38    |
| Feb-16 | 35.33                               | 28.53    | 35.98       | 26.93    | 35.62    | 26.66    | 34.34       | 27.20    | 34.22       | 27.27    | 35.07      | 27.77    |
| Mar-16 | 34.14                               | 26.36    | 33.41       | 23.85    | 33.08    | 23.62    | 31.04       | 26.06    | 31.12       | 26.26    | 31.25      | 26.30    |
| Apr-16 | 32.86                               | 25.86    | 34.20       | 24.67    | 33.86    | 24.43    | 32.67       | 27.88    | 32.84       | 28.11    | 32.78      | 27.66    |
| May-16 | 34.81                               | 25.10    | 36.62       | 25.97    | 36.43    | 25.74    | 35.90       | 28.96    | 36.45       | 29.63    | 36.59      | 29.40    |
| Jun-16 | 35.49                               | 25.66    | 38.40       | 27.23    | 38.28    | 27.03    | 37.11       | 30.59    | 37.30       | 31.01    | 38.07      | 31.18    |
| Jul-16 | 41.39                               | 28.97    | 43.86       | 31.60    | 44.04    | 31.47    | 39.24       | 32.12    | 39.25       | 32.34    | 40.19      | 32.74    |
| Aug-16 | 38.15                               | 26.49    | 42.20       | 29.61    | 42.04    | 29.38    | 39.46       | 31.88    | 39.49       | 32.17    | 40.44      | 32.57    |
| Sep-16 | 35.07                               | 24.87    | 37.75       | 26.62    | 37.48    | 26.40    | 35.85       | 29.62    | 35.97       | 30.02    | 36.76      | 30.25    |
| Oct-16 | 32.60                               | 24.90    | 34.83       | 25.33    | 34.51    | 25.08    | 34.52       | 28.02    | 34.73       | 28.40    | 35.25      | 28.49    |
| Nov-16 | 33.26                               | 26.83    | 34.53       | 26.24    | 34.20    | 25.98    | 34.41       | 26.69    | 34.40       | 26.84    | 35.09      | 27.19    |
| Dec-16 | 33.98                               | 27.00    | 35.00       | 26.13    | 34.66    | 25.87    | 34.52       | 29.17    | 34.63       | 29.33    | 35.33      | 29.77    |
| Jan-17 | 40.40                               | 30.36    | 42.23       | 30.10    | 41.82    | 29.80    | 42.67       | 33.68    | 42.62       | 33.91    | 43.64      | 34.35    |
| Feb-17 | 38.78                               | 30.15    | 40.47       | 29.84    | 40.07    | 29.55    | 38.89       | 27.74    | 38.79       | 27.90    | 39.64      | 28.43    |
| Mar-17 | 36.63                               | 26.01    | 37.28       | 25.05    | 36.89    | 24.80    | 35.37       | 27.41    | 35.46       | 27.74    | 35.52      | 27.61    |
| Apr-17 | 35.06                               | 25.52    | 38.09       | 26.25    | 37.71    | 25.99    | 38.52       | 29.45    | 38.84       | 29.84    | 38.76      | 29.38    |
| May-17 | 37.85                               | 23.99    | 41.10       | 26.89    | 40.70    | 26.63    | 40.48       | 31.86    | 40.94       | 32.45    | 41.42      | 32.49    |
| Jun-17 | 39.24                               | 26.66    | 43.65       | 29.90    | 43.30    | 29.63    | 43.51       | 34.40    | 43.66       | 34.74    | 44.56      | 35.20    |
| Jul-17 | 47.21                               | 32.10    | 51.94       | 36.66    | 52.18    | 36.47    | 45.77       | 36.63    | 45.78       | 36.81    | 46.84      | 37.45    |
| Aug-17 | 41.51                               | 27.46    | 48.43       | 33.05    | 48.13    | 32.74    | 45.66       | 36.23    | 45.72       | 36.53    | 46.73      | 37.12    |
| Sep-17 | 38.28                               | 25.67    | 43.34       | 29.59    | 42.97    | 29.32    | 41.43       | 33.06    | 41.67       | 33.54    | 42.44      | 33.79    |
| Oct-17 | 35.24                               | 24.99    | 40.13       | 27.30    | 39.73    | 27.03    | 39.42       | 29.98    | 39.65       | 30.45    | 40.26      | 30.40    |
| Nov-17 | 36.71                               | 27.59    | 40.38       | 28.85    | 39.97    | 28.56    | 37.73       | 27.92    | 37.78       | 28.21    | 38.65      | 28.46    |
| Dec-17 | 38.48                               | 28.28    | 39.17       | 29.13    | 38.80    | 28.85    | 38.58       | 31.47    | 38.65       | 31.62    | 39.39      | 32.15    |
| Jan-18 | 42.01                               | 30.99    | 44.74       | 31.62    | 44.31    | 31.30    | 43.38       | 34.40    | 43.35       | 34.77    | 44.27      | 35.23    |
| Feb-18 | 40.16                               | 31.06    | 42.88       | 31.73    | 42.46    | 31.42    | 41.95       | 29.23    | 41.82       | 29.52    | 42.75      | 29.96    |
| Mar-18 | 38.21                               | 27.77    | 39.57       | 27.91    | 39.18    | 27.63    | 36.39       | 28.41    | 36.56       | 28.72    | 36.60      | 28.74    |
| Apr-18 | 37.59                               | 25.83    | 40.37       | 26.77    | 39.96    | 26.51    | 37.67       | 28.88    | 38.05       | 29.37    | 38.00      | 28.82    |
| May-18 | 38.41                               | 24.66    | 42.39       | 27.48    | 41.98    | 27.21    | 42.34       | 32.01    | 42.87       | 32.66    | 43.30      | 32.57    |
| Jun-18 | 40.04                               | 27.10    | 45.31       | 30.72    | 44.92    | 30.43    | 45.54       | 36.27    | 45.67       | 36.72    | 46.63      | 37.04    |
| Jul-18 | 48.56                               | 32.66    | 54.11       | 37.63    | 54.31    | 37.43    | 48.96       | 38.57    | 48.98       | 38.76    | 50.07      | 39.43    |
| Aug-18 | 45.69                               | 30.01    | 53.37       | 36.91    | 53.22    | 36.60    | 51.56       | 39.51    | 51.80       | 40.01    | 52.69      | 40.33    |
| Sep-18 | 41.70                               | 28.46    | 46.77       | 32.47    | 46.43    | 32.19    | 45.69       | 36.12    | 46.03       | 36.73    | 46.76      | 36.87    |
| Oct-18 | 38.24                               | 25.18    | 43.03       | 27.99    | 42.60    | 27.71    | 42.08       | 31.83    | 42.35       | 32.36    | 43.00      | 32.37    |
| Nov-18 | 38.34                               | 27.12    | 39.12       | 28.32    | 38.73    | 28.03    | 40.19       | 28.24    | 40.40       | 28.62    | 41.09      | 28.76    |
| Dec-18 | 37.13                               | 27.85    | 39.81       | 29.20    | 39.44    | 28.92    | 39.50       | 30.91    | 39.63       | 31.25    | 40.45      | 31.75    |
| Jan-19 | 46.56                               | 33.74    | 47.55       | 33.48    | 47.08    | 33.15    | 44.46       | 33.77    | 44.31       | 33.94    | 45.47      | 34.67    |
| Feb-19 | 44.23                               | 33.62    | 45.94       | 33.65    | 45.48    | 33.31    | 43.32       | 31.49    | 43.31       | 31.66    | 44.28      | 32.31    |
| Mar-19 | 41.68                               | 29.77    | 43.07       | 29.89    | 42.64    | 29.59    | 36.99       | 29.24    | 37.14       | 29.66    | 37.50      | 29.72    |
| Apr-19 | 38.31                               | 27.08    | 41.41       | 28.29    | 40.99    | 28.01    | 39.18       | 30.11    | 39.72       | 30.69    | 39.67      | 30.20    |
| May-19 | 40.39                               | 26.22    | 44.43       | 28.82    | 44.01    | 28.54    | 43.58       | 33.32    | 44.16       | 34.13    | 44.60      | 33.96    |
| Jun-19 | 42.43                               | 29.37    | 47.76       | 33.60    | 47.35    | 33.30    | 47.35       | 37.45    | 47.45       | 37.82    | 48.47      | 38.31    |
| Jul-19 | 52.98                               | 35.36    | 57.92       | 39.76    | 58.43    | 39.61    | 50.86       | 39.27    | 50.88       | 39.47    | 62.02      | 40.18    |
| Aug-19 | 48.71                               | 32.62    | 56.70       | 39.60    | 56.90    | 39.38    | 53.71       | 41.22    | 53.91       | 41.76    | 54.88      | 42.09    |
| Sep-19 | 43.74                               | 29.76    | 48.95       | 34.02    | 48.70    | 33.76    | 46.32       | 36.84    | 46.63       | 37.48    | 47.38      | 37.61    |
| Oct-19 | 39.37                               | 26.83    | 45.28       | 30.12    | 44.84    | 29.82    | 44.41       | 32.40    | 44.76       | 32.95    | 45.38      | 32.96    |
| Nov-19 | 39.16                               | 29.68    | 42.37       | 31.13    | 41.96    | 30.82    | 39.53       | 29.94    | 39.61       | 30.26    | 40.45      | 30.63    |
| Dec-19 | 39.47                               | 29.82    | 43.21       | 31.59    | 42.79    | 31.28    | 40.20       | 31.90    | 40.31       | 32.22    | 41.20      | 32.74    |
| Jan-20 | 48.36                               | 35.39    | 50.03       | 36.05    | 49.54    | 35.69    | 46.13       | 34.21    | 46.09       | 34.74    | 47.24      | 35.16    |
| Feb-20 | 44.62                               | 34.39    | 47.00       | 35.29    | 46.55    | 34.93    | 44.34       | 33.47    | 44.24       | 33.75    | 45.23      | 34.23    |
| Mar-20 | 42.56                               | 29.96    | 44.49       | 30.43    | 44.05    | 30.13    | 40.51       | 31.38    | 40.80       | 31.90    | 41.12      | 31.85    |
| Apr-20 | 40.22                               | 28.56    | 43.50       | 30.00    | 43.07    | 29.70    | 43.28       | 34.49    | 44.14       | 35.31    | 43.65      | 34.67    |
| May-20 | 41.89                               | 29.39    | 46.03       | 32.29    | 45.60    | 31.98    | 45.33       | 35.90    | 46.00       | 36.71    | 46.41      | 36.64    |
| Jun-20 | 44.46                               | 30.51    | 49.29       | 34.61    | 48.93    | 34.33    | 48.68       | 38.20    | 48.89       | 38.70    | 49.81      | 39.04    |
| Jul-20 | 55.62                               | 36.95    | 60.00       | 41.32    | 60.71    | 41.20    | 51.96       | 40.22    | 51.98       | 40.51    | 53.14      | 41.19    |
| Aug-20 | 50.51                               | 34.69    | 57.57       | 40.66    | 57.61    | 40.40    | 52.97       | 41.25    | 53.02       | 41.62    | 54.17      | 42.26    |
| Sep-20 | 46.14                               | 31.40    | 50.08       | 34.67    | 49.79    | 34.40    | 46.35       | 37.00    | 46.58       | 37.62    | 47.47      | 37.84    |
| Oct-20 | 42.10                               | 30.32    | 46.15       | 32.55    | 45.72    | 32.23    | 44.58       | 34.10    | 44.90       | 34.65    | 45.58      | 34.71    |
| Nov-20 | 41.04                               | 31.36    | 44.33       | 33.08    | 43.91    | 32.76    | 42.92       | 31.87    | 43.06       | 32.37    | 43.90      | 32.49    |
| Dec-20 | 41.53                               | 31.73    | 44.70       | 33.28    | 44.30    | 32.96    | 42.09       | 33.58    | 42.17       | 33.96    | 43.09      | 34.52    |

| Month  | Coat (\$/ton) FOB -Nominal S's |                          |                          |                           |                        |                        |                          |                         |                         |                          |
|--------|--------------------------------|--------------------------|--------------------------|---------------------------|------------------------|------------------------|--------------------------|-------------------------|-------------------------|--------------------------|
|        | 12395 Btu/lb<br>1.6# SO2       | 12500 Btu/lb<br>1.6# SO2 | 12000 Btu/lb<br>1.2# SO2 | 12000 Btu/lb<br>1.67# SO2 | 12500 Btu/lb<br>6# SO2 | 13000 Btu/lb<br>4# SO2 | 11512 Btu/lb<br>4.3# SO2 | 8800 Btu/lb<br>0.8# SO2 | 8400 Btu/lb<br>0.8# SO2 | 11700 Btu/lb<br>0.9# SO2 |
|        | CAPP                           | CAPP CSX-Rail            | CAPP Compliance          | CAPP NYMEX                | NAPP High Sulfur       | NAPP Med Sulfur        | I-Basin                  | PRB 8800                | PRB 8400                | Colorado                 |
| Jan-16 | 64.73                          | 65.28                    | 70.15                    | 64.97                     | 55.90                  | 62.25                  | 39.06                    | 14.63                   | 11.31                   | 34.04                    |
| Feb-16 | 64.88                          | 65.43                    | 70.32                    | 65.15                     | 55.75                  | 62.10                  | 39.25                    | 14.72                   | 11.35                   | 34.21                    |
| Mar-16 | 65.04                          | 65.59                    | 70.45                    | 65.32                     | 55.61                  | 61.95                  | 39.44                    | 14.80                   | 11.39                   | 34.37                    |
| Apr-16 | 65.19                          | 65.74                    | 70.58                    | 65.50                     | 55.47                  | 61.81                  | 39.63                    | 14.88                   | 11.43                   | 34.53                    |
| May-16 | 65.34                          | 65.90                    | 70.72                    | 65.68                     | 55.32                  | 61.66                  | 39.81                    | 14.97                   | 11.46                   | 34.69                    |
| Jun-16 | 65.50                          | 66.05                    | 70.85                    | 65.85                     | 55.18                  | 61.51                  | 40.00                    | 15.05                   | 11.50                   | 34.86                    |
| Jul-16 | 65.69                          | 66.25                    | 71.00                    | 65.87                     | 55.24                  | 61.57                  | 40.19                    | 15.14                   | 11.57                   | 35.02                    |
| Aug-16 | 65.88                          | 66.44                    | 71.14                    | 65.88                     | 55.30                  | 61.63                  | 40.38                    | 15.23                   | 11.63                   | 35.18                    |
| Sep-16 | 66.08                          | 66.64                    | 71.29                    | 65.90                     | 55.36                  | 61.69                  | 40.56                    | 15.32                   | 11.70                   | 35.34                    |
| Oct-16 | 66.27                          | 66.83                    | 71.43                    | 65.91                     | 55.42                  | 61.75                  | 40.75                    | 15.40                   | 11.77                   | 35.51                    |
| Nov-16 | 66.47                          | 67.03                    | 71.58                    | 65.93                     | 55.48                  | 61.82                  | 40.94                    | 15.49                   | 11.83                   | 35.67                    |
| Dec-16 | 66.66                          | 67.22                    | 71.72                    | 65.94                     | 55.54                  | 61.88                  | 41.13                    | 15.58                   | 11.90                   | 35.83                    |
| Jan-17 | 66.85                          | 67.42                    | 71.87                    | 65.96                     | 55.60                  | 61.94                  | 41.31                    | 15.67                   | 11.97                   | 35.99                    |
| Feb-17 | 67.05                          | 67.62                    | 72.02                    | 65.97                     | 55.65                  | 62.00                  | 41.50                    | 15.76                   | 12.03                   | 36.16                    |
| Mar-17 | 67.24                          | 67.81                    | 72.16                    | 65.99                     | 55.71                  | 62.06                  | 41.69                    | 15.85                   | 12.10                   | 36.32                    |
| Apr-17 | 67.44                          | 68.01                    | 72.31                    | 66.01                     | 55.77                  | 62.12                  | 41.88                    | 15.93                   | 12.17                   | 36.48                    |
| May-17 | 67.63                          | 68.20                    | 72.45                    | 66.02                     | 55.83                  | 62.19                  | 42.06                    | 16.02                   | 12.23                   | 36.64                    |
| Jun-17 | 67.83                          | 68.40                    | 72.60                    | 66.04                     | 55.89                  | 62.25                  | 42.25                    | 16.11                   | 12.30                   | 36.81                    |
| Jul-17 | 67.89                          | 68.46                    | 72.74                    | 66.23                     | 56.08                  | 62.45                  | 42.36                    | 16.21                   | 12.40                   | 36.84                    |
| Aug-17 | 67.95                          | 68.53                    | 72.88                    | 66.42                     | 56.28                  | 62.65                  | 42.47                    | 16.31                   | 12.51                   | 36.87                    |
| Sep-17 | 68.01                          | 68.59                    | 73.01                    | 66.61                     | 56.47                  | 62.85                  | 42.58                    | 16.40                   | 12.61                   | 36.90                    |
| Oct-17 | 68.08                          | 68.65                    | 73.15                    | 66.80                     | 56.66                  | 63.05                  | 42.69                    | 16.50                   | 12.72                   | 36.93                    |
| Nov-17 | 68.14                          | 68.72                    | 73.29                    | 66.99                     | 56.85                  | 63.24                  | 42.79                    | 16.60                   | 12.82                   | 36.96                    |
| Dec-17 | 68.20                          | 68.78                    | 73.43                    | 67.18                     | 57.04                  | 63.44                  | 42.90                    | 16.70                   | 12.93                   | 36.98                    |
| Jan-18 | 68.27                          | 68.84                    | 73.57                    | 67.37                     | 57.23                  | 63.64                  | 43.01                    | 16.80                   | 13.03                   | 37.01                    |
| Feb-18 | 68.33                          | 68.91                    | 73.70                    | 67.56                     | 57.43                  | 63.84                  | 43.12                    | 16.89                   | 13.14                   | 37.04                    |
| Mar-18 | 68.39                          | 68.97                    | 73.84                    | 67.75                     | 57.62                  | 64.04                  | 43.23                    | 16.99                   | 13.24                   | 37.07                    |
| Apr-18 | 68.45                          | 69.03                    | 73.98                    | 67.94                     | 57.81                  | 64.24                  | 43.34                    | 17.09                   | 13.35                   | 37.10                    |
| May-18 | 68.52                          | 69.10                    | 74.12                    | 68.13                     | 58.00                  | 64.44                  | 43.45                    | 17.19                   | 13.45                   | 37.13                    |
| Jun-18 | 68.58                          | 69.16                    | 74.26                    | 68.32                     | 58.19                  | 64.64                  | 43.56                    | 17.28                   | 13.56                   | 37.16                    |
| Jul-18 | 68.65                          | 69.24                    | 74.43                    | 68.48                     | 58.45                  | 64.91                  | 43.75                    | 17.41                   | 13.66                   | 37.35                    |
| Aug-18 | 68.73                          | 69.31                    | 74.61                    | 68.64                     | 58.71                  | 65.18                  | 43.95                    | 17.54                   | 13.76                   | 37.54                    |
| Sep-18 | 68.80                          | 69.39                    | 74.78                    | 68.80                     | 58.97                  | 65.45                  | 44.15                    | 17.67                   | 13.85                   | 37.73                    |
| Oct-18 | 68.88                          | 69.46                    | 74.95                    | 68.96                     | 59.23                  | 65.72                  | 44.34                    | 17.79                   | 13.95                   | 37.91                    |
| Nov-18 | 68.95                          | 69.54                    | 75.13                    | 69.12                     | 59.49                  | 65.99                  | 44.54                    | 17.92                   | 14.05                   | 38.10                    |
| Dec-18 | 69.03                          | 69.61                    | 75.30                    | 69.28                     | 59.75                  | 66.26                  | 44.74                    | 18.05                   | 14.15                   | 38.29                    |
| Jan-19 | 69.10                          | 69.69                    | 75.48                    | 69.44                     | 60.01                  | 66.53                  | 44.93                    | 18.18                   | 14.25                   | 38.48                    |
| Feb-19 | 69.18                          | 69.76                    | 75.65                    | 69.60                     | 60.27                  | 66.80                  | 45.13                    | 18.30                   | 14.35                   | 38.67                    |
| Mar-19 | 69.25                          | 69.84                    | 75.83                    | 69.76                     | 60.53                  | 67.08                  | 45.33                    | 18.43                   | 14.44                   | 38.86                    |
| Apr-19 | 69.33                          | 69.91                    | 76.00                    | 69.92                     | 60.79                  | 67.35                  | 45.52                    | 18.56                   | 14.54                   | 39.04                    |
| May-19 | 69.40                          | 69.99                    | 76.17                    | 70.08                     | 61.05                  | 67.62                  | 45.72                    | 18.69                   | 14.64                   | 39.23                    |
| Jun-19 | 69.48                          | 70.06                    | 76.35                    | 70.24                     | 61.31                  | 67.89                  | 45.92                    | 18.81                   | 14.74                   | 39.42                    |
| Jul-19 | 69.78                          | 70.37                    | 76.68                    | 70.55                     | 61.59                  | 68.17                  | 46.14                    | 19.03                   | 14.91                   | 39.68                    |
| Aug-19 | 70.09                          | 70.68                    | 77.02                    | 70.86                     | 61.87                  | 68.46                  | 46.36                    | 19.24                   | 15.08                   | 39.93                    |
| Sep-19 | 70.39                          | 70.99                    | 77.36                    | 71.17                     | 62.14                  | 68.75                  | 46.59                    | 19.46                   | 15.26                   | 40.19                    |
| Oct-19 | 70.70                          | 71.30                    | 77.70                    | 71.48                     | 62.42                  | 69.04                  | 46.81                    | 19.67                   | 15.43                   | 40.45                    |
| Nov-19 | 71.00                          | 71.60                    | 78.03                    | 71.79                     | 62.70                  | 69.33                  | 47.04                    | 19.88                   | 15.60                   | 40.70                    |
| Dec-19 | 71.31                          | 71.91                    | 78.37                    | 72.10                     | 62.98                  | 69.62                  | 47.26                    | 20.10                   | 15.77                   | 40.96                    |
| Jan-20 | 71.61                          | 72.22                    | 78.71                    | 72.41                     | 63.25                  | 69.90                  | 47.48                    | 20.31                   | 15.94                   | 41.22                    |
| Feb-20 | 71.92                          | 72.53                    | 79.04                    | 72.72                     | 63.53                  | 70.19                  | 47.71                    | 20.52                   | 16.11                   | 41.47                    |
| Mar-20 | 72.22                          | 72.84                    | 79.38                    | 73.03                     | 63.81                  | 70.48                  | 47.93                    | 20.74                   | 16.28                   | 41.73                    |
| Apr-20 | 72.53                          | 73.14                    | 79.72                    | 73.34                     | 64.08                  | 70.77                  | 48.16                    | 20.95                   | 16.46                   | 41.98                    |
| May-20 | 72.84                          | 73.45                    | 80.05                    | 73.65                     | 64.36                  | 71.06                  | 48.38                    | 21.16                   | 16.63                   | 42.24                    |
| Jun-20 | 73.14                          | 73.76                    | 80.39                    | 73.96                     | 64.64                  | 71.34                  | 48.60                    | 21.36                   | 16.80                   | 42.50                    |
| Jul-20 | 73.35                          | 73.97                    | 80.62                    | 74.17                     | 64.78                  | 71.49                  | 48.74                    | 21.50                   | 16.90                   | 42.64                    |
| Aug-20 | 73.55                          | 74.18                    | 80.84                    | 74.38                     | 64.91                  | 71.63                  | 48.87                    | 21.63                   | 17.00                   | 42.79                    |
| Sep-20 | 73.76                          | 74.39                    | 81.07                    | 74.59                     | 65.05                  | 71.77                  | 49.00                    | 21.75                   | 17.09                   | 42.94                    |
| Oct-20 | 73.97                          | 74.59                    | 81.30                    | 74.79                     | 65.18                  | 71.91                  | 49.13                    | 21.87                   | 17.19                   | 43.09                    |
| Nov-20 | 74.17                          | 74.80                    | 81.53                    | 75.00                     | 65.32                  | 72.05                  | 49.26                    | 22.00                   | 17.29                   | 43.23                    |
| Dec-20 | 74.38                          | 75.01                    | 81.75                    | 75.21                     | 65.46                  | 72.20                  | 49.40                    | 22.12                   | 17.39                   | 43.38                    |

| Month  | Natural Gas (\$/mmbtu) -Nominal \$'s |          |                   |           |      |            |                        | Uranium Fuel UO2<br>(\$/mmbtu) -<br>Nominal \$'s |
|--------|--------------------------------------|----------|-------------------|-----------|------|------------|------------------------|--------------------------------------------------|
|        | Henry Hub                            | TCO Pool | Union South Point | TCO Deliv | HSC  | PEPL TX-OK | Swing Service<br>Adder |                                                  |
| Jan-16 | 4.81                                 | 4.66     | 4.33              | 4.96      | 4.86 | 4.74       | 0.25                   | 0.87                                             |
| Feb-16 | 4.70                                 | 4.54     | 4.21              | 4.84      | 4.73 | 4.65       | 0.25                   | 0.87                                             |
| Mar-16 | 4.43                                 | 4.25     | 3.93              | 4.55      | 4.46 | 4.36       | 0.25                   | 0.87                                             |
| Apr-16 | 4.16                                 | 3.96     | 3.65              | 4.18      | 4.26 | 4.07       | 0.25                   | 0.87                                             |
| May-16 | 4.08                                 | 3.88     | 3.59              | 4.10      | 4.18 | 3.99       | 0.25                   | 0.87                                             |
| Jun-16 | 4.09                                 | 3.88     | 3.60              | 4.11      | 4.19 | 4.00       | 0.25                   | 0.87                                             |
| Jul-16 | 4.20                                 | 4.00     | 3.72              | 4.22      | 4.34 | 4.07       | 0.25                   | 0.87                                             |
| Aug-16 | 4.19                                 | 3.98     | 3.69              | 4.20      | 4.33 | 4.13       | 0.25                   | 0.87                                             |
| Sep-16 | 4.12                                 | 3.90     | 3.63              | 4.13      | 4.24 | 4.03       | 0.25                   | 0.87                                             |
| Oct-16 | 4.19                                 | 3.95     | 3.65              | 4.17      | 4.28 | 4.09       | 0.25                   | 0.87                                             |
| Nov-16 | 4.45                                 | 4.20     | 3.91              | 4.50      | 4.53 | 4.36       | 0.25                   | 0.87                                             |
| Dec-16 | 4.61                                 | 4.38     | 4.09              | 4.68      | 4.67 | 4.53       | 0.25                   | 0.87                                             |
| Jan-17 | 5.67                                 | 5.36     | 5.12              | 5.68      | 5.62 | 5.52       | 0.25                   | 0.89                                             |
| Feb-17 | 5.46                                 | 5.21     | 5.00              | 5.52      | 5.49 | 5.41       | 0.25                   | 0.89                                             |
| Mar-17 | 5.19                                 | 4.94     | 4.72              | 5.25      | 5.22 | 5.09       | 0.25                   | 0.89                                             |
| Apr-17 | 4.91                                 | 4.63     | 4.44              | 4.87      | 5.01 | 4.81       | 0.25                   | 0.89                                             |
| May-17 | 4.83                                 | 4.54     | 4.37              | 4.77      | 4.93 | 4.73       | 0.25                   | 0.89                                             |
| Jun-17 | 4.84                                 | 4.55     | 4.38              | 4.79      | 4.94 | 4.76       | 0.25                   | 0.89                                             |
| Jul-17 | 4.95                                 | 4.68     | 4.49              | 4.91      | 5.09 | 4.89       | 0.25                   | 0.89                                             |
| Aug-17 | 4.94                                 | 4.65     | 4.47              | 4.89      | 5.08 | 4.88       | 0.25                   | 0.89                                             |
| Sep-17 | 4.87                                 | 4.61     | 4.42              | 4.84      | 4.99 | 4.81       | 0.25                   | 0.89                                             |
| Oct-17 | 4.94                                 | 4.62     | 4.42              | 4.85      | 5.03 | 4.85       | 0.25                   | 0.89                                             |
| Nov-17 | 5.20                                 | 4.88     | 4.70              | 5.19      | 5.28 | 5.10       | 0.25                   | 0.89                                             |
| Dec-17 | 5.37                                 | 5.10     | 4.93              | 5.42      | 5.43 | 5.30       | 0.25                   | 0.89                                             |
| Jan-18 | 5.89                                 | 5.64     | 5.50              | 5.97      | 5.94 | 5.85       | 0.25                   | 0.91                                             |
| Feb-18 | 5.78                                 | 5.53     | 5.38              | 5.85      | 5.81 | 5.73       | 0.25                   | 0.91                                             |
| Mar-18 | 5.50                                 | 5.23     | 5.09              | 5.55      | 5.53 | 5.36       | 0.25                   | 0.91                                             |
| Apr-18 | 5.22                                 | 4.93     | 4.74              | 5.17      | 5.32 | 5.13       | 0.25                   | 0.91                                             |
| May-18 | 5.14                                 | 4.83     | 4.67              | 5.07      | 5.24 | 5.04       | 0.25                   | 0.91                                             |
| Jun-18 | 5.15                                 | 4.82     | 4.68              | 5.06      | 5.25 | 5.00       | 0.25                   | 0.91                                             |
| Jul-18 | 5.26                                 | 4.91     | 4.78              | 5.16      | 5.40 | 5.16       | 0.25                   | 0.91                                             |
| Aug-18 | 5.25                                 | 4.90     | 4.77              | 5.14      | 5.39 | 5.18       | 0.25                   | 0.91                                             |
| Sep-18 | 5.18                                 | 4.84     | 4.71              | 5.08      | 5.30 | 5.11       | 0.25                   | 0.91                                             |
| Oct-18 | 5.25                                 | 4.88     | 4.74              | 5.12      | 5.34 | 5.14       | 0.25                   | 0.91                                             |
| Nov-18 | 5.51                                 | 5.21     | 5.06              | 5.52      | 5.59 | 5.35       | 0.25                   | 0.91                                             |
| Dec-18 | 5.68                                 | 5.43     | 5.27              | 5.75      | 5.74 | 5.55       | 0.25                   | 0.91                                             |
| Jan-19 | 5.89                                 | 5.71     | 5.62              | 6.03      | 6.04 | 5.88       | 0.25                   | 0.92                                             |
| Feb-19 | 5.88                                 | 5.58     | 5.50              | 5.90      | 5.91 | 5.80       | 0.25                   | 0.92                                             |
| Mar-19 | 5.60                                 | 5.31     | 5.22              | 5.62      | 5.63 | 5.50       | 0.25                   | 0.92                                             |
| Apr-19 | 5.32                                 | 5.02     | 4.94              | 5.28      | 5.42 | 5.23       | 0.25                   | 0.92                                             |
| May-19 | 5.24                                 | 4.94     | 4.88              | 5.18      | 5.34 | 5.12       | 0.25                   | 0.92                                             |
| Jun-19 | 5.25                                 | 4.92     | 4.88              | 5.17      | 5.35 | 5.14       | 0.25                   | 0.92                                             |
| Jul-19 | 5.37                                 | 5.02     | 4.98              | 5.26      | 5.51 | 5.27       | 0.25                   | 0.92                                             |
| Aug-19 | 5.35                                 | 5.01     | 4.97              | 5.26      | 5.49 | 5.27       | 0.25                   | 0.92                                             |
| Sep-19 | 5.28                                 | 4.96     | 4.91              | 5.20      | 5.40 | 5.16       | 0.25                   | 0.92                                             |
| Oct-19 | 5.35                                 | 5.00     | 4.96              | 5.25      | 5.44 | 5.23       | 0.25                   | 0.92                                             |
| Nov-19 | 5.62                                 | 5.27     | 5.21              | 5.58      | 5.70 | 5.51       | 0.25                   | 0.92                                             |
| Dec-19 | 5.78                                 | 5.44     | 5.38              | 5.78      | 5.84 | 5.61       | 0.25                   | 0.92                                             |
| Jan-20 | 6.10                                 | 5.78     | 5.73              | 6.11      | 6.15 | 6.00       | 0.25                   | 0.94                                             |
| Feb-20 | 5.98                                 | 5.65     | 5.61              | 5.98      | 6.01 | 5.87       | 0.25                   | 0.94                                             |
| Mar-20 | 5.70                                 | 5.39     | 5.34              | 5.71      | 5.73 | 5.58       | 0.25                   | 0.94                                             |
| Apr-20 | 5.42                                 | 5.11     | 5.05              | 5.36      | 5.52 | 5.30       | 0.25                   | 0.94                                             |
| May-20 | 5.34                                 | 5.00     | 4.96              | 5.25      | 5.44 | 5.19       | 0.25                   | 0.94                                             |
| Jun-20 | 5.35                                 | 5.01     | 4.96              | 5.26      | 5.45 | 5.20       | 0.25                   | 0.94                                             |
| Jul-20 | 5.47                                 | 5.12     | 5.07              | 5.36      | 5.61 | 5.33       | 0.25                   | 0.94                                             |
| Aug-20 | 5.45                                 | 5.13     | 5.06              | 5.38      | 5.59 | 5.33       | 0.25                   | 0.94                                             |
| Sep-20 | 5.38                                 | 5.08     | 5.01              | 5.33      | 5.50 | 5.26       | 0.25                   | 0.94                                             |
| Oct-20 | 5.45                                 | 5.14     | 5.07              | 5.39      | 5.54 | 5.33       | 0.25                   | 0.94                                             |
| Nov-20 | 5.72                                 | 5.42     | 5.35              | 5.73      | 5.80 | 5.63       | 0.25                   | 0.94                                             |
| Dec-20 | 5.89                                 | 5.59     | 5.52              | 5.91      | 5.95 | 5.75       | 0.25                   | 0.94                                             |

| Month  | Emissions (\$/ton) -Nominal \$'s |                     |                        |                            |                        | (\$/metric tonne) -<br>Nominal \$'s |  |
|--------|----------------------------------|---------------------|------------------------|----------------------------|------------------------|-------------------------------------|--|
|        | SO <sub>2</sub>                  | AEP SO <sub>2</sub> | NO <sub>x</sub> Annual | AEP NO <sub>x</sub> Annual | NO <sub>x</sub> Summer | CO <sub>2</sub>                     |  |
|        |                                  |                     |                        |                            |                        |                                     |  |
| Jan-16 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Feb-16 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Mar-16 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Apr-16 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| May-16 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Jun-16 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Jul-16 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Aug-16 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Sep-16 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Oct-16 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Nov-16 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Dec-16 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Jan-17 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Feb-17 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Mar-17 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Apr-17 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| May-17 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Jun-17 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Jul-17 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Aug-17 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Sep-17 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Oct-17 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Nov-17 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Dec-17 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Jan-18 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Feb-18 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Mar-18 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Apr-18 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| May-18 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Jun-18 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Jul-18 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Aug-18 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Sep-18 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Oct-18 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Nov-18 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Dec-18 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Jan-19 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Feb-19 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Mar-19 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Apr-19 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| May-19 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Jun-19 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Jul-19 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Aug-19 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Sep-19 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Oct-19 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Nov-19 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Dec-19 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Jan-20 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Feb-20 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Mar-20 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Apr-20 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| May-20 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |
| Jun-20 | 0.00                             | 0.00                | 0                      | 0                          | 0                      | 0.00                                |  |

|        |      |      |   |   |   |      |
|--------|------|------|---|---|---|------|
| Jul-20 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Aug-20 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Sep-20 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Oct-20 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Nov-20 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |
| Dec-20 | 0.00 | 0.00 | 0 | 0 | 0 | 0.00 |

| Month  | Heat Rates (mmbtu/MWh) |                  |               |                  |                  |                 |
|--------|------------------------|------------------|---------------|------------------|------------------|-----------------|
|        | AEP GEN HUB - HR       | SPP Central - HR | SPP KSMO - HR | ERCOT North - HR | ERCOT South - HR | ERCOT West - HR |
| Jan-16 | 7.94                   | 7.96             | 7.88          | 7.54             | 7.50             | 7.56            |
| Feb-16 | 7.78                   | 7.74             | 7.66          | 7.26             | 7.23             | 7.24            |
| Mar-16 | 8.03                   | 7.66             | 7.59          | 6.96             | 6.98             | 6.87            |
| Apr-16 | 8.30                   | 8.40             | 8.32          | 7.67             | 7.71             | 7.84            |
| May-16 | 8.97                   | 9.18             | 9.13          | 8.59             | 8.72             | 8.92            |
| Jun-16 | 9.15                   | 9.60             | 9.57          | 8.86             | 8.90             | 9.26            |
| Jul-16 | 10.35                  | 10.78            | 10.82         | 9.04             | 9.04             | 9.52            |
| Aug-16 | 9.59                   | 10.22            | 10.18         | 9.11             | 9.12             | 9.63            |
| Sep-16 | 8.99                   | 9.37             | 9.30          | 8.45             | 8.48             | 8.91            |
| Oct-16 | 8.25                   | 8.52             | 8.44          | 8.07             | 8.12             | 8.45            |
| Nov-16 | 7.92                   | 7.92             | 7.84          | 7.60             | 7.59             | 7.80            |
| Dec-16 | 7.76                   | 7.73             | 7.65          | 7.39             | 7.42             | 7.55            |
| Jan-17 | 7.54                   | 7.65             | 7.58          | 7.59             | 7.58             | 7.68            |
| Feb-17 | 7.44                   | 7.48             | 7.41          | 7.08             | 7.07             | 7.18            |
| Mar-17 | 7.42                   | 7.32             | 7.25          | 6.77             | 6.79             | 6.77            |
| Apr-17 | 7.57                   | 7.92             | 7.84          | 7.69             | 7.75             | 7.96            |
| May-17 | 8.34                   | 8.69             | 8.61          | 8.21             | 8.30             | 8.68            |
| Jun-17 | 8.63                   | 9.17             | 9.10          | 8.81             | 8.82             | 9.30            |
| Jul-17 | 10.09                  | 10.62            | 10.67         | 8.99             | 8.99             | 9.54            |
| Aug-17 | 8.93                   | 9.93             | 9.86          | 8.99             | 9.00             | 9.56            |
| Sep-17 | 8.30                   | 9.01             | 8.93          | 8.30             | 8.35             | 8.77            |
| Oct-17 | 7.63                   | 8.27             | 8.19          | 7.84             | 7.88             | 8.30            |
| Nov-17 | 7.52                   | 7.91             | 7.84          | 7.15             | 7.15             | 7.43            |
| Dec-17 | 7.15                   | 7.39             | 7.32          | 7.11             | 7.12             | 7.27            |
| Jan-18 | 7.45                   | 7.65             | 7.57          | 7.30             | 7.30             | 7.42            |
| Feb-18 | 7.26                   | 7.48             | 7.41          | 7.22             | 7.20             | 7.31            |
| Mar-18 | 7.31                   | 7.38             | 7.31          | 6.58             | 6.61             | 6.63            |
| Apr-18 | 7.63                   | 7.87             | 7.79          | 7.08             | 7.15             | 7.35            |
| May-18 | 7.95                   | 8.41             | 8.33          | 8.08             | 8.18             | 8.54            |
| Jun-18 | 8.31                   | 9.06             | 8.98          | 8.67             | 8.70             | 9.21            |
| Jul-18 | 9.89                   | 10.49            | 10.52         | 9.07             | 9.07             | 9.70            |
| Aug-18 | 9.32                   | 10.30            | 10.27         | 9.57             | 9.61             | 10.25           |
| Sep-18 | 8.62                   | 9.15             | 9.09          | 8.62             | 8.68             | 9.21            |
| Oct-18 | 7.84                   | 8.37             | 8.29          | 7.88             | 7.93             | 8.40            |
| Nov-18 | 6.98                   | 7.31             | 7.24          | 7.19             | 7.23             | 7.44            |
| Dec-18 | 6.84                   | 7.17             | 7.11          | 6.88             | 6.90             | 7.03            |
| Jan-19 | 8.15                   | 8.09             | 8.01          | 7.36             | 7.34             | 7.54            |
| Feb-19 | 7.93                   | 7.92             | 7.84          | 7.33             | 7.33             | 7.50            |
| Mar-19 | 7.85                   | 7.83             | 7.75          | 6.57             | 6.60             | 6.67            |
| Apr-19 | 7.63                   | 7.92             | 7.84          | 7.23             | 7.33             | 7.54            |
| May-19 | 8.18                   | 8.68             | 8.59          | 8.16             | 8.27             | 8.61            |
| Jun-19 | 8.62                   | 9.29             | 9.21          | 8.85             | 8.87             | 9.37            |
| Jul-19 | 10.55                  | 10.99            | 11.09         | 9.23             | 9.23             | 9.89            |
| Aug-19 | 9.72                   | 10.76            | 10.80         | 9.78             | 9.82             | 10.43           |
| Sep-19 | 8.82                   | 9.49             | 9.44          | 8.58             | 8.64             | 9.11            |
| Oct-19 | 7.87                   | 8.66             | 8.57          | 8.16             | 8.23             | 8.64            |
| Nov-19 | 7.43                   | 7.69             | 7.61          | 6.93             | 6.95             | 7.25            |
| Dec-19 | 7.26                   | 7.70             | 7.63          | 6.88             | 6.90             | 7.15            |
| Jan-20 | 8.37                   | 8.34             | 8.26          | 7.50             | 7.49             | 7.73            |
| Feb-20 | 7.90                   | 8.01             | 7.93          | 7.38             | 7.36             | 7.56            |
| Mar-20 | 7.90                   | 7.97             | 7.89          | 7.07             | 7.12             | 7.20            |
| Apr-20 | 7.87                   | 8.21             | 8.13          | 7.84             | 8.00             | 8.18            |
| May-20 | 8.38                   | 8.87             | 8.79          | 8.33             | 8.46             | 8.84            |
| Jun-20 | 8.87                   | 9.48             | 9.41          | 8.93             | 8.97             | 9.47            |
| Jul-20 | 10.86                  | 11.26            | 11.39         | 9.26             | 9.26             | 9.91            |
| Aug-20 | 9.85                   | 10.80            | 10.81         | 9.48             | 9.49             | 10.07           |
| Sep-20 | 9.08                   | 9.52             | 9.46          | 8.43             | 8.47             | 8.91            |
| Oct-20 | 8.19                   | 8.66             | 8.58          | 8.05             | 8.11             | 8.46            |
| Nov-20 | 7.57                   | 7.87             | 7.80          | 7.40             | 7.42             | 7.66            |
| Dec-20 | 7.43                   | 7.77             | 7.70          | 7.07             | 7.09             | 7.29            |

| Month  | Capacity Prices (\$/MW-day) -<br>Nominal \$'s |                   | Renewable Energy<br>Subsidies ** (\$/MWh)<br>-Nominal \$'s | Inflation Factor | AEP Hub | SPP | Convert to<br>Real 2011 \$'s | Cumulative<br>Factor | Year | -Nominal \$'s |
|--------|-----------------------------------------------|-------------------|------------------------------------------------------------|------------------|---------|-----|------------------------------|----------------------|------|---------------|
|        | AEP GEN HUB                                   | Hub Cap. SPP Cap. |                                                            |                  |         |     | FALSE                        |                      |      |               |
| Jan-16 | 136.00                                        | 72.66             | 43.30                                                      | 0.70%            | 8.30    |     | 1.0000                       | 1.1035               | 2016 |               |
| Feb-16 | 136.00                                        | 72.66             | 43.30                                                      | 0.70%            | 8.30    |     | 1.0000                       | 1.1042               | 2016 |               |
| Mar-16 | 136.00                                        | 72.66             | 43.30                                                      | 0.70%            | 8.30    |     | 1.0000                       | 1.1048               | 2016 |               |
| Apr-16 | 136.00                                        | 72.66             | 43.30                                                      | 0.70%            | 8.30    |     | 1.0000                       | 1.1055               | 2016 |               |
| May-16 | 136.00                                        | 72.66             | 43.30                                                      | 0.70%            | 8.30    |     | 1.0000                       | 1.1061               | 2016 |               |
| Jun-16 | 59.37                                         | 72.66             | 43.30                                                      | 0.70%            | 8.30    |     | 1.0000                       | 1.1068               | 2016 |               |
| Jul-16 | 59.37                                         | 72.66             | 43.30                                                      | 0.70%            | 8.30    |     | 1.0000                       | 1.1074               | 2016 |               |
| Aug-16 | 59.37                                         | 72.66             | 43.30                                                      | 0.70%            | 8.30    |     | 1.0000                       | 1.1080               | 2016 |               |
| Sep-16 | 59.37                                         | 72.66             | 43.30                                                      | 0.70%            | 8.30    |     | 1.0000                       | 1.1087               | 2016 |               |
| Oct-16 | 59.37                                         | 72.66             | 43.30                                                      | 0.70%            | 8.30    |     | 1.0000                       | 1.1093               | 2016 |               |
| Nov-16 | 59.37                                         | 72.66             | 43.30                                                      | 0.70%            | 8.30    |     | 1.0000                       | 1.1100               | 2016 |               |
| Dec-16 | 59.37                                         | 72.66             | 43.30                                                      | 0.70%            | 8.30    |     | 1.0000                       | 1.1106               | 2016 |               |
| Jan-17 | 59.37                                         | 103.82            | 32.60                                                      | 2.50%            | 8.20    |     | 1.0000                       | 1.1129               | 2017 |               |
| Feb-17 | 59.37                                         | 103.82            | 32.60                                                      | 2.50%            | 8.20    |     | 1.0000                       | 1.1152               | 2017 |               |
| Mar-17 | 59.37                                         | 103.82            | 32.60                                                      | 2.50%            | 8.20    |     | 1.0000                       | 1.1175               | 2017 |               |
| Apr-17 | 59.37                                         | 103.82            | 32.60                                                      | 2.50%            | 8.20    |     | 1.0000                       | 1.1198               | 2017 |               |
| May-17 | 59.37                                         | 103.82            | 32.60                                                      | 2.50%            | 8.20    |     | 1.0000                       | 1.1221               | 2017 |               |
| Jun-17 | 120.00                                        | 103.82            | 32.60                                                      | 2.50%            | 8.20    |     | 1.0000                       | 1.1244               | 2017 |               |
| Jul-17 | 120.00                                        | 103.82            | 32.60                                                      | 2.50%            | 8.20    |     | 1.0000                       | 1.1267               | 2017 |               |
| Aug-17 | 120.00                                        | 103.82            | 32.60                                                      | 2.50%            | 8.20    |     | 1.0000                       | 1.1291               | 2017 |               |
| Sep-17 | 120.00                                        | 103.82            | 32.60                                                      | 2.50%            | 8.20    |     | 1.0000                       | 1.1314               | 2017 |               |
| Oct-17 | 120.00                                        | 103.82            | 32.60                                                      | 2.50%            | 8.20    |     | 1.0000                       | 1.1337               | 2017 |               |
| Nov-17 | 120.00                                        | 103.82            | 32.60                                                      | 2.50%            | 8.20    |     | 1.0000                       | 1.1361               | 2017 |               |
| Dec-17 | 120.00                                        | 103.82            | 32.60                                                      | 2.50%            | 8.20    |     | 1.0000                       | 1.1384               | 2017 |               |
| Jan-18 | 120.00                                        | 160.48            | 21.80                                                      | 2.60%            | 8.21    |     | 1.0000                       | 1.1408               | 2018 |               |
| Feb-18 | 120.00                                        | 160.48            | 21.80                                                      | 2.60%            | 8.21    |     | 1.0000                       | 1.1433               | 2018 |               |
| Mar-18 | 120.00                                        | 160.48            | 21.80                                                      | 2.60%            | 8.21    |     | 1.0000                       | 1.1457               | 2018 |               |
| Apr-18 | 120.00                                        | 160.48            | 21.80                                                      | 2.60%            | 8.21    |     | 1.0000                       | 1.1482               | 2018 |               |
| May-18 | 120.00                                        | 160.48            | 21.80                                                      | 2.60%            | 8.21    |     | 1.0000                       | 1.1506               | 2018 |               |
| Jun-18 | 235.50                                        | 160.48            | 21.80                                                      | 2.60%            |         |     | 1.0000                       | 1.1531               | 2018 |               |
| Jul-18 | 235.50                                        | 160.48            | 21.80                                                      | 2.60%            |         |     | 1.0000                       | 1.1556               | 2018 |               |
| Aug-18 | 235.50                                        | 160.48            | 21.80                                                      | 2.60%            |         |     | 1.0000                       | 1.1580               | 2018 |               |
| Sep-18 | 235.50                                        | 160.48            | 21.80                                                      | 2.60%            |         |     | 1.0000                       | 1.1605               | 2018 |               |
| Oct-18 | 235.50                                        | 160.48            | 21.80                                                      | 2.60%            |         |     | 1.0000                       | 1.1630               | 2018 |               |
| Nov-18 | 235.50                                        | 160.48            | 21.80                                                      | 2.60%            |         |     | 1.0000                       | 1.1655               | 2018 |               |
| Dec-18 | 235.50                                        | 160.48            | 21.80                                                      | 2.60%            |         |     | 1.0000                       | 1.1680               | 2018 |               |
| Jan-19 | 260.32                                        | 218.21            | 11.00                                                      | 2.70%            |         |     | 1.0000                       | 1.1706               | 2019 |               |
| Feb-19 | 260.32                                        | 218.21            | 11.00                                                      | 2.70%            |         |     | 1.0000                       | 1.1732               | 2019 |               |
| Mar-19 | 260.32                                        | 218.21            | 11.00                                                      | 2.70%            |         |     | 1.0000                       | 1.1758               | 2019 |               |
| Apr-19 | 260.32                                        | 218.21            | 11.00                                                      | 2.70%            |         |     | 1.0000                       | 1.1784               | 2019 |               |
| May-19 | 260.32                                        | 218.21            | 11.00                                                      | 2.70%            |         |     | 1.0000                       | 1.1810               | 2019 |               |
| Jun-19 | 260.32                                        | 218.21            | 11.00                                                      | 2.70%            |         |     | 1.0000                       | 1.1837               | 2019 |               |
| Jul-19 | 260.32                                        | 218.21            | 11.00                                                      | 2.70%            |         |     | 1.0000                       | 1.1863               | 2019 |               |
| Aug-19 | 260.32                                        | 218.21            | 11.00                                                      | 2.70%            |         |     | 1.0000                       | 1.1889               | 2019 |               |
| Sep-19 | 260.32                                        | 218.21            | 11.00                                                      | 2.70%            |         |     | 1.0000                       | 1.1916               | 2019 |               |
| Oct-19 | 260.32                                        | 218.21            | 11.00                                                      | 2.70%            |         |     | 1.0000                       | 1.1942               | 2019 |               |
| Nov-19 | 260.32                                        | 218.21            | 11.00                                                      | 2.70%            |         |     | 1.0000                       | 1.1969               | 2019 |               |
| Dec-19 | 260.32                                        | 218.21            | 11.00                                                      | 2.70%            |         |     | 1.0000                       | 1.1995               | 2019 |               |
| Jan-20 | 287.24                                        | 276.27            | 0.00                                                       | 2.60%            |         |     | 1.0000                       | 1.2021               | 2020 |               |
| Feb-20 | 287.24                                        | 276.27            | 0.00                                                       | 2.60%            |         |     | 1.0000                       | 1.2047               | 2020 |               |
| Mar-20 | 287.24                                        | 276.27            | 0.00                                                       | 2.60%            |         |     | 1.0000                       | 1.2072               | 2020 |               |
| Apr-20 | 287.24                                        | 276.27            | 0.00                                                       | 2.60%            |         |     | 1.0000                       | 1.2098               | 2020 |               |
| May-20 | 287.24                                        | 276.27            | 0.00                                                       | 2.60%            |         |     | 1.0000                       | 1.2124               | 2020 |               |
| Jun-20 | 287.24                                        | 276.27            | 0.00                                                       | 2.60%            |         |     | 1.0000                       | 1.2150               | 2020 |               |
| Jul-20 | 287.24                                        | 276.27            | 0.00                                                       | 2.60%            |         |     | 1.0000                       | 1.2176               | 2020 |               |
| Aug-20 | 287.24                                        | 276.27            | 0.00                                                       | 2.60%            |         |     | 1.0000                       | 1.2202               | 2020 |               |
| Sep-20 | 287.24                                        | 276.27            | 0.00                                                       | 2.60%            |         |     | 1.0000                       | 1.2228               | 2020 |               |
| Oct-20 | 287.24                                        | 276.27            | 0.00                                                       | 2.60%            |         |     | 1.0000                       | 1.2255               | 2020 |               |
| Nov-20 | 287.24                                        | 276.27            | 0.00                                                       | 2.60%            |         |     | 1.0000                       | 1.2281               | 2020 |               |
| Dec-20 | 287.24                                        | 276.27            | 0.00                                                       | 2.60%            |         |     | 1.0000                       | 1.2307               | 2020 |               |

| Power Prices (\$/MWh) -Nominal \$'s |                   |          |             |          |          |          |             |          |             |          |            |          |  |
|-------------------------------------|-------------------|----------|-------------|----------|----------|----------|-------------|----------|-------------|----------|------------|----------|--|
| Year                                | PJM - AEP Gen Hub |          | SPP_Central |          | SPP_KSMO |          | ERCOT_NORTH |          | ERCOT_South |          | ERCOT_West |          |  |
|                                     | On-Peak           | Off-Peak | On-Peak     | Off-Peak | On-Peak  | Off-Peak | On-Peak     | Off-Peak | On-Peak     | Off-Peak | On-Peak    | Off-Peak |  |
| 2016                                | 35.34             | 26.65    | 37.04       | 26.84    | 36.80    | 26.60    | 35.48       | 29.01    | 35.57       | 29.28    | 36.19      | 29.50    |  |
| 2017                                | 38.82             | 27.41    | 42.20       | 29.41    | 41.87    | 29.14    | 40.68       | 31.70    | 40.80       | 32.03    | 41.50      | 32.28    |  |
| 2018                                | 40.37             | 28.22    | 44.33       | 30.73    | 44.01    | 30.45    | 42.98       | 32.90    | 43.17       | 33.32    | 43.86      | 33.52    |  |
| 2019                                | 48.12             | 30.31    | 47.10       | 32.84    | 46.82    | 32.55    | 44.20       | 33.84    | 44.40       | 34.36    | 45.15      | 34.64    |  |
| 2020                                | 44.97             | 32.05    | 48.64       | 34.53    | 48.36    | 34.24    | 45.77       | 35.48    | 46.00       | 36.00    | 46.76      | 36.23    |  |
| 2021                                | 47.42             | 33.59    | 51.41       | 36.41    | 51.14    | 36.11    | 47.94       | 37.01    | 48.21       | 37.57    | 48.97      | 37.79    |  |
| 2022                                | 62.04             | 47.94    | 64.33       | 49.56    | 64.02    | 49.15    | 58.96       | 45.70    | 59.35       | 46.43    | 60.11      | 46.54    |  |
| 2023                                | 63.73             | 48.59    | 66.59       | 50.57    | 66.29    | 50.16    | 60.97       | 45.89    | 61.51       | 46.64    | 62.16      | 46.78    |  |
| 2024                                | 66.89             | 50.93    | 69.56       | 52.70    | 69.34    | 52.31    | 64.12       | 47.80    | 64.68       | 48.58    | 65.37      | 48.67    |  |
| 2025                                | 69.81             | 52.82    | 72.19       | 54.65    | 71.99    | 54.25    | 66.05       | 49.61    | 66.66       | 50.46    | 67.36      | 50.55    |  |
| 2026                                | 72.39             | 54.98    | 74.83       | 56.98    | 74.73    | 56.60    | 68.21       | 51.87    | 68.92       | 52.76    | 69.56      | 52.84    |  |
| 2027                                | 75.10             | 56.64    | 77.35       | 58.44    | 77.21    | 58.05    | 69.88       | 52.21    | 70.59       | 53.08    | 71.26      | 53.22    |  |
| 2028                                | 77.21             | 58.27    | 79.55       | 60.11    | 79.41    | 59.70    | 72.22       | 53.63    | 72.95       | 54.59    | 73.63      | 54.67    |  |
| 2029                                | 79.93             | 60.58    | 82.76       | 62.81    | 82.77    | 62.45    | 74.43       | 56.34    | 75.17       | 57.34    | 75.87      | 57.44    |  |
| 2030                                | 82.57             | 62.38    | 86.48       | 65.60    | 86.37    | 65.17    | 76.19       | 57.21    | 76.92       | 58.22    | 77.66      | 58.34    |  |
| 2031                                | 85.39             | 64.62    | 90.82       | 69.13    | 90.79    | 68.72    | 78.60       | 59.59    | 79.45       | 60.72    | 80.06      | 60.78    |  |
| 2032                                | 88.74             | 66.97    | 95.25       | 72.48    | 95.07    | 72.01    | 80.69       | 61.28    | 81.54       | 62.40    | 82.18      | 62.44    |  |
| 2033                                | 92.42             | 70.20    | 98.87       | 75.55    | 98.71    | 75.06    | 82.66       | 63.45    | 83.58       | 64.64    | 84.20      | 64.72    |  |
| 2034                                | 93.33             | 71.58    | 100.67      | 77.56    | 100.52   | 77.07    | 85.17       | 66.08    | 86.21       | 67.31    | 86.74      | 67.37    |  |
| 2035                                | 95.81             | 74.02    | 103.10      | 79.87    | 102.96   | 79.37    | 87.11       | 67.23    | 88.18       | 68.48    | 88.70      | 68.57    |  |
| 2036                                | 99.04             | 76.49    | 106.30      | 82.36    | 106.01   | 81.77    | 89.88       | 69.25    | 90.99       | 70.60    | 91.42      | 70.58    |  |
| 2037                                | 101.38            | 78.90    | 108.11      | 84.29    | 107.95   | 83.75    | 92.09       | 70.88    | 93.35       | 72.30    | 93.65      | 72.26    |  |
| 2038                                | 104.70            | 81.50    | 111.18      | 86.72    | 111.07   | 85.17    | 94.23       | 72.69    | 95.60       | 74.17    | 95.87      | 74.14    |  |
| 2039                                | 105.78            | 83.17    | 112.16      | 88.23    | 111.95   | 87.63    | 96.59       | 74.77    | 98.18       | 76.32    | 98.27      | 76.25    |  |
| 2040                                | 108.64            | 85.64    | 114.82      | 90.53    | 114.64   | 89.90    | 99.00       | 76.32    | 100.60      | 77.90    | 100.68     | 77.82    |  |
| 2041                                | 110.08            | 87.49    | 116.47      | 92.36    | 116.09   | 91.68    | 101.20      | 78.02    | 103.02      | 79.74    | 102.87     | 79.58    |  |
| 2042                                | 112.43            | 89.33    | 119.32      | 94.70    | 118.09   | 94.03    | 103.09      | 79.73    | 105.11      | 81.53    | 104.79     | 81.32    |  |
| 2043                                | 114.44            | 91.67    | 121.59      | 97.08    | 121.35   | 96.41    | 105.36      | 81.57    | 107.34      | 83.35    | 107.07     | 83.20    |  |
| 2044                                | 115.92            | 93.50    | 123.81      | 99.43    | 123.61   | 98.72    | 107.62      | 83.98    | 109.92      | 85.94    | 109.33     | 85.59    |  |
| 2045                                | 119.58            | 96.27    | 127.28      | 102.06   | 127.13   | 101.37   | 109.47      | 85.44    | 111.79      | 87.46    | 111.20     | 87.09    |  |
| 2046                                | 121.34            | 98.43    | 128.64      | 103.83   | 128.39   | 103.09   | 111.38      | 86.97    | 113.89      | 89.08    | 113.16     | 88.70    |  |

| Year | Coal (\$/ton) FOB -Nominal S's |                          |                          |                           |                        |                        |                          |                         |                         |                          |
|------|--------------------------------|--------------------------|--------------------------|---------------------------|------------------------|------------------------|--------------------------|-------------------------|-------------------------|--------------------------|
|      | 12395 Btu/lb<br>1.6# SO2       | 12500 Btu/lb<br>1.6# SO2 | 12000 Btu/lb<br>1.2# SO2 | 12000 Btu/lb<br>1.67# SO2 | 12500 Btu/lb<br>6# SO2 | 13000 Btu/lb<br>4# SO2 | 11512 Btu/lb<br>4.3# SO2 | 8800 Btu/lb<br>0.8# SO2 | 8400 Btu/lb<br>0.8# SO2 | 11700 Btu/lb<br>0.9# SO2 |
|      | CAPP                           | CAPP CSX-Rail            | CAPP Compliance          | CAPP NYMEX                | NAPP High Sulfur       | NAPP Med Sulfur        | I-Basin                  | PRB 8800                | PRB 8400                | Colorado                 |
| 2015 | 65.50                          | 66.05                    | 70.85                    | 65.85                     | 55.18                  | 61.51                  | 40.00                    | 15.05                   | 11.50                   | 34.86                    |
| 2017 | 57.83                          | 68.40                    | 72.60                    | 66.04                     | 55.89                  | 62.25                  | 42.25                    | 16.11                   | 12.30                   | 36.81                    |
| 2018 | 68.58                          | 69.16                    | 74.26                    | 68.32                     | 58.19                  | 64.64                  | 43.56                    | 17.28                   | 13.56                   | 37.16                    |
| 2019 | 69.48                          | 70.06                    | 76.35                    | 70.24                     | 61.31                  | 67.69                  | 45.92                    | 18.81                   | 14.74                   | 39.42                    |
| 2020 | 73.14                          | 73.76                    | 80.39                    | 73.96                     | 64.64                  | 71.34                  | 48.60                    | 21.38                   | 16.80                   | 42.50                    |
| 2021 | 75.62                          | 76.26                    | 83.12                    | 76.47                     | 66.26                  | 73.05                  | 50.19                    | 22.86                   | 17.97                   | 44.26                    |
| 2022 | 79.42                          | 80.09                    | 87.31                    | 80.32                     | 70.39                  | 77.32                  | 53.49                    | 23.49                   | 18.47                   | 48.48                    |
| 2023 | 81.64                          | 82.33                    | 89.75                    | 82.57                     | 70.85                  | 77.80                  | 51.01                    | 21.62                   | 16.88                   | 48.15                    |
| 2024 | 84.77                          | 85.49                    | 93.21                    | 85.76                     | 77.93                  | 85.17                  | 55.88                    | 22.51                   | 17.60                   | 50.15                    |
| 2025 | 87.76                          | 88.51                    | 96.50                    | 88.78                     | 80.25                  | 87.58                  | 56.30                    | 24.10                   | 18.91                   | 53.85                    |
| 2026 | 90.36                          | 91.13                    | 99.37                    | 91.42                     | 83.84                  | 91.11                  | 57.53                    | 26.99                   | 21.26                   | 53.99                    |
| 2027 | 93.80                          | 94.59                    | 103.15                   | 94.90                     | 85.13                  | 92.66                  | 57.91                    | 25.82                   | 20.19                   | 56.34                    |
| 2028 | 97.98                          | 98.81                    | 107.77                   | 99.15                     | 87.26                  | 94.87                  | 59.93                    | 26.60                   | 20.73                   | 59.61                    |
| 2029 | 100.65                         | 101.51                   | 110.72                   | 101.86                    | 89.54                  | 97.24                  | 64.10                    | 30.95                   | 24.40                   | 65.58                    |
| 2030 | 104.34                         | 105.23                   | 114.78                   | 105.60                    | 90.46                  | 98.19                  | 65.72                    | 30.05                   | 23.52                   | 68.73                    |
| 2031 | 105.31                         | 106.21                   | 115.85                   | 106.58                    | 92.47                  | 100.29                 | 68.05                    | 33.82                   | 26.64                   | 69.19                    |
| 2032 | 108.46                         | 109.38                   | 119.31                   | 109.76                    | 94.08                  | 101.84                 | 69.56                    | 35.56                   | 27.87                   | 70.19                    |
| 2033 | 111.86                         | 112.30                   | 122.51                   | 112.71                    | 97.52                  | 105.54                 | 74.69                    | 38.63                   | 30.21                   | 72.54                    |
| 2034 | 114.29                         | 115.26                   | 125.73                   | 115.67                    | 99.66                  | 107.77                 | 78.16                    | 41.10                   | 32.02                   | 75.69                    |
| 2035 | 117.88                         | 118.88                   | 129.69                   | 119.31                    | 103.14                 | 111.39                 | 80.24                    | 46.37                   | 36.36                   | 79.69                    |
| 2036 | 120.82                         | 121.85                   | 132.93                   | 122.29                    | 105.72                 | 114.17                 | 82.24                    | 47.53                   | 37.27                   | 81.68                    |
| 2037 | 123.84                         | 124.89                   | 136.25                   | 125.35                    | 108.36                 | 117.03                 | 84.30                    | 48.72                   | 38.20                   | 83.72                    |
| 2038 | 126.94                         | 128.02                   | 139.66                   | 128.48                    | 111.07                 | 119.95                 | 86.41                    | 49.93                   | 39.16                   | 85.81                    |
| 2039 | 130.11                         | 131.22                   | 143.15                   | 131.70                    | 113.85                 | 122.95                 | 88.57                    | 51.18                   | 40.18                   | 87.98                    |
| 2040 | 133.37                         | 134.50                   | 146.73                   | 134.99                    | 116.69                 | 126.02                 | 90.78                    | 52.46                   | 41.14                   | 90.16                    |
| 2041 | 136.70                         | 137.86                   | 150.40                   | 138.36                    | 119.61                 | 129.17                 | 93.05                    | 53.77                   | 42.17                   | 92.41                    |
| 2042 | 140.12                         | 141.31                   | 154.16                   | 141.82                    | 122.60                 | 132.40                 | 95.38                    | 55.12                   | 43.22                   | 94.72                    |
| 2043 | 142.92                         | 144.13                   | 157.24                   | 144.66                    | 125.05                 | 135.05                 | 97.28                    | 56.22                   | 44.09                   | 96.62                    |
| 2044 | 145.78                         | 147.01                   | 160.35                   | 147.55                    | 127.56                 | 137.75                 | 99.23                    | 57.34                   | 44.97                   | 98.55                    |
| 2045 | 148.69                         | 149.95                   | 163.59                   | 150.50                    | 130.11                 | 140.51                 | 101.21                   | 58.49                   | 45.87                   | 100.52                   |
| 2046 | 151.67                         | 152.95                   | 166.86                   | 153.51                    | 132.71                 | 143.32                 | 103.24                   | 59.66                   | 46.78                   | 102.53                   |

|      | Natural Gas (\$/mmbtu) -Nominal \$'s |          |                           |           |       |            |                     |      | Uranium Fuel UO2 (\$/mmbtu) - Nominal \$'s |
|------|--------------------------------------|----------|---------------------------|-----------|-------|------------|---------------------|------|--------------------------------------------|
| Year | Henry Hub                            | TCO Pool | Dominion South Point Pool | TCO Deliv | HSC   | PEPL TX-OK | Swing Service Adder |      |                                            |
| 2016 | 4.34                                 | 4.13     | 3.83                      | 4.39      | 4.42  | 4.25       | 0.25                | 0.87 |                                            |
| 2017 | 5.09                                 | 4.81     | 4.62                      | 5.08      | 5.18  | 5.01       | 0.25                | 0.89 |                                            |
| 2018 | 5.40                                 | 5.10     | 4.95                      | 5.37      | 5.49  | 5.30       | 0.25                | 0.91 |                                            |
| 2019 | 5.50                                 | 5.18     | 5.12                      | 5.46      | 5.59  | 5.39       | 0.25                | 0.92 |                                            |
| 2020 | 5.60                                 | 5.29     | 5.23                      | 5.56      | 5.69  | 5.48       | 0.25                | 0.94 |                                            |
| 2021 | 5.82                                 | 5.49     | 5.50                      | 5.77      | 5.91  | 5.75       | 0.25                | 0.96 |                                            |
| 2022 | 6.28                                 | 5.98     | 5.87                      | 6.28      | 6.37  | 6.20       | 0.25                | 0.98 |                                            |
| 2023 | 6.60                                 | 6.30     | 6.20                      | 6.59      | 6.69  | 6.52       | 0.25                | 1.00 |                                            |
| 2024 | 6.80                                 | 6.47     | 6.40                      | 6.77      | 6.88  | 6.68       | 0.25                | 1.02 |                                            |
| 2025 | 6.96                                 | 6.62     | 6.62                      | 6.92      | 7.05  | 6.83       | 0.25                | 1.04 |                                            |
| 2026 | 7.13                                 | 6.76     | 6.79                      | 7.06      | 7.22  | 6.97       | 0.26                | 1.06 |                                            |
| 2027 | 7.30                                 | 6.92     | 6.96                      | 7.23      | 7.39  | 7.13       | 0.26                | 1.08 |                                            |
| 2028 | 7.47                                 | 7.09     | 7.14                      | 7.40      | 7.56  | 7.30       | 0.27                | 1.10 |                                            |
| 2029 | 7.65                                 | 7.26     | 7.33                      | 7.57      | 7.74  | 7.47       | 0.27                | 1.13 |                                            |
| 2030 | 7.83                                 | 7.44     | 7.49                      | 7.76      | 7.91  | 7.66       | 0.28                | 1.15 |                                            |
| 2031 | 8.00                                 | 7.61     | 7.68                      | 7.93      | 8.09  | 7.85       | 0.28                | 1.17 |                                            |
| 2032 | 8.19                                 | 7.79     | 7.87                      | 8.12      | 8.28  | 8.04       | 0.28                | 1.19 |                                            |
| 2033 | 8.39                                 | 7.99     | 8.07                      | 8.32      | 8.48  | 8.26       | 0.28                | 1.22 |                                            |
| 2034 | 8.59                                 | 8.20     | 8.28                      | 8.53      | 8.68  | 8.47       | 0.28                | 1.24 |                                            |
| 2035 | 8.80                                 | 8.38     | 8.50                      | 8.72      | 8.89  | 8.69       | 0.28                | 1.27 |                                            |
| 2036 | 9.02                                 | 8.63     | 8.71                      | 8.97      | 9.11  | 8.89       | 0.28                | 1.29 |                                            |
| 2037 | 9.24                                 | 8.85     | 8.92                      | 9.20      | 9.32  | 9.09       | 0.28                | 1.32 |                                            |
| 2038 | 9.45                                 | 9.08     | 9.12                      | 9.43      | 9.53  | 9.30       | 0.28                | 1.35 |                                            |
| 2039 | 9.66                                 | 9.31     | 9.31                      | 9.66      | 9.75  | 9.49       | 0.28                | 1.37 |                                            |
| 2040 | 9.87                                 | 9.52     | 9.52                      | 9.89      | 9.96  | 9.69       | 0.28                | 1.40 |                                            |
| 2041 | 10.08                                | 9.74     | 9.73                      | 10.10     | 10.17 | 9.90       | 0.28                | 1.43 |                                            |
| 2042 | 10.29                                | 9.95     | 9.94                      | 10.31     | 10.38 | 10.11      | 0.28                | 1.46 |                                            |
| 2043 | 10.50                                | 10.16    | 10.15                     | 10.53     | 10.59 | 10.32      | 0.28                | 1.49 |                                            |
| 2044 | 10.71                                | 10.37    | 10.36                     | 10.74     | 10.80 | 10.53      | 0.28                | 1.52 |                                            |
| 2045 | 10.92                                | 10.57    | 10.57                     | 10.96     | 11.00 | 10.73      | 0.28                | 1.55 |                                            |
| 2046 | 11.13                                | 10.79    | 10.78                     | 11.17     | 11.22 | 10.95      | 0.28                | 1.58 |                                            |

| Year | Emissions (\$/ton) - Nominal \$'s |                        |                        |                                                        | Heat Rates (mmbtu/MWh) |                  |                  |                  |                 |
|------|-----------------------------------|------------------------|------------------------|--------------------------------------------------------|------------------------|------------------|------------------|------------------|-----------------|
|      | SO <sub>2</sub>                   | NO <sub>x</sub> Annual | NO <sub>x</sub> Summer | (\$/metric tonne) -<br>Nominal \$'s<br>CO <sub>2</sub> | AEP GEN HUB - HR       | SPP_Central - HR | ERCOT North - HR | ERCOT South - HR | ERCOT West - HR |
| 2016 | 0                                 | 0                      | 0                      | 0.00                                                   | 8.59                   | 8.75             | 8.05             | 8.07             | 8.30            |
| 2017 | 0                                 | 0                      | 0                      | 0.00                                                   | 8.05                   | 8.45             | 7.88             | 7.90             | 8.20            |
| 2018 | 0                                 | 0                      | 0                      | 0.00                                                   | 7.95                   | 8.39             | 7.85             | 7.88             | 8.21            |
| 2019 | 0                                 | 0                      | 0                      | 0.00                                                   | 8.33                   | 8.75             | 7.92             | 7.96             | 8.31            |
| 2020 | 0                                 | 0                      | 0                      | 0.00                                                   | 8.52                   | 8.90             | 8.06             | 8.10             | 8.44            |
| 2021 | 0                                 | 0                      | 0                      | 0.00                                                   | 8.66                   | 8.97             | 8.13             | 8.18             | 8.52            |
| 2022 | 0                                 | 0                      | 0                      | 15.00                                                  | 10.40                  | 10.40            | 9.26             | 9.34             | 9.61            |
| 2023 | 0                                 | 0                      | 0                      | 15.29                                                  | 10.15                  | 10.25            | 9.14             | 9.22             | 9.46            |
| 2024 | 0                                 | 0                      | 0                      | 15.56                                                  | 10.35                  | 10.44            | 9.33             | 9.42             | 9.69            |
| 2025 | 0                                 | 0                      | 0                      | 15.86                                                  | 10.57                  | 10.58            | 9.39             | 9.48             | 9.77            |
| 2026 | 0                                 | 0                      | 0                      | 16.19                                                  | 10.73                  | 10.75            | 9.47             | 9.57             | 9.88            |
| 2027 | 0                                 | 0                      | 0                      | 16.51                                                  | 10.87                  | 10.88            | 9.49             | 9.58             | 9.89            |
| 2028 | 0                                 | 0                      | 0                      | 16.84                                                  | 10.92                  | 10.93            | 9.57             | 9.66             | 9.98            |
| 2029 | 0                                 | 0                      | 0                      | 17.17                                                  | 11.03                  | 11.10            | 9.63             | 9.73             | 10.05           |
| 2030 | 0                                 | 0                      | 0                      | 17.50                                                  | 11.11                  | 11.31            | 9.64             | 9.74             | 10.04           |
| 2031 | 0                                 | 0                      | 0                      | 17.85                                                  | 11.24                  | 11.60            | 9.74             | 9.84             | 10.13           |
| 2032 | 0                                 | 0                      | 0                      | 18.19                                                  | 11.41                  | 11.88            | 9.77             | 9.87             | 10.16           |
| 2033 | 0                                 | 0                      | 0                      | 18.54                                                  | 11.59                  | 12.00            | 9.76             | 9.87             | 10.15           |
| 2034 | 0                                 | 0                      | 0                      | 18.88                                                  | 11.40                  | 11.92            | 9.82             | 9.95             | 10.19           |
| 2035 | 0                                 | 0                      | 0                      | 19.24                                                  | 11.45                  | 11.89            | 9.81             | 9.93             | 10.21           |
| 2036 | 0                                 | 0                      | 0                      | 19.60                                                  | 11.50                  | 11.99            | 9.89             | 10.01            | 10.23           |
| 2037 | 0                                 | 0                      | 0                      | 19.95                                                  | 11.47                  | 11.91            | 9.89             | 10.03            | 10.21           |
| 2038 | 0                                 | 0                      | 0                      | 20.33                                                  | 11.56                  | 11.98            | 9.90             | 10.05            | 10.20           |
| 2039 | 0                                 | 0                      | 0                      | 20.69                                                  | 11.37                  | 11.83            | 9.92             | 10.09            | 10.19           |
| 2040 | 0                                 | 0                      | 0                      | 21.08                                                  | 11.41                  | 11.85            | 9.95             | 10.11            | 10.21           |
| 2041 | 0                                 | 0                      | 0                      | 21.46                                                  | 11.31                  | 11.78            | 9.97             | 10.15            | 10.21           |
| 2042 | 0                                 | 0                      | 0                      | 21.86                                                  | 11.31                  | 11.81            | 9.95             | 10.15            | 10.19           |
| 2043 | 0                                 | 0                      | 0                      | 22.26                                                  | 11.28                  | 11.80            | 9.96             | 10.15            | 10.19           |
| 2044 | 0                                 | 0                      | 0                      | 22.66                                                  | 11.19                  | 11.77            | 9.98             | 10.19            | 10.20           |
| 2045 | 0                                 | 0                      | 0                      | 23.08                                                  | 11.31                  | 11.87            | 9.95             | 10.16            | 10.16           |
| 2046 | 0                                 | 0                      | 0                      | 23.50                                                  | 11.26                  | 11.76            | 9.94             | 10.17            | 10.15           |

| Year | Capacity Prices (\$/MW-day) -Nominal \$'s |                       | Renewable Energy<br>Subsidies ** (\$/MWh)<br>-Nominal \$'s | Inflation Factor |
|------|-------------------------------------------|-----------------------|------------------------------------------------------------|------------------|
|      | AEP GEN HUB Hub Cap.                      | SPP_Central/KSMO Cap. |                                                            |                  |
| 2016 | 91.30                                     | 72.66                 | 43.30                                                      | 0.70%            |
| 2017 | 94.74                                     | 103.82                | 32.60                                                      | 2.50%            |
| 2018 | 187.37                                    | 160.48                | 21.80                                                      | 2.60%            |
| 2019 | 260.32                                    | 218.21                | 11.00                                                      | 2.70%            |
| 2020 | 287.24                                    | 276.27                | 0.00                                                       | 2.60%            |
| 2021 | 314.48                                    | 324.65                | 0.00                                                       | 2.30%            |
| 2022 | 331.79                                    | 331.79                | 0.00                                                       | 2.20%            |
| 2023 | 339.09                                    | 339.09                | 0.00                                                       | 2.20%            |
| 2024 | 346.21                                    | 346.21                | 0.00                                                       | 2.10%            |
| 2025 | 353.48                                    | 353.48                | 0.00                                                       | 2.10%            |
| 2026 | 360.90                                    | 360.90                | 0.00                                                       | 2.10%            |
| 2027 | 368.12                                    | 368.12                | 0.00                                                       | 2.00%            |
| 2028 | 375.48                                    | 375.48                | 0.00                                                       | 2.00%            |
| 2029 | 382.99                                    | 382.99                | 0.00                                                       | 2.00%            |
| 2030 | 390.65                                    | 390.65                | 0.00                                                       | 2.00%            |
| 2031 | 398.47                                    | 398.47                | 0.00                                                       | 2.00%            |
| 2032 | 406.44                                    | 406.44                | 0.00                                                       | 2.00%            |
| 2033 | 414.56                                    | 414.56                | 0.00                                                       | 2.00%            |
| 2034 | 422.44                                    | 422.44                | 0.00                                                       | 1.90%            |
| 2035 | 430.47                                    | 430.47                | 0.00                                                       | 1.90%            |
| 2036 | 439.08                                    | 439.08                | 0.00                                                       | 2.00%            |
| 2037 | 447.86                                    | 447.86                | 0.00                                                       | 2.00%            |
| 2038 | 456.81                                    | 456.81                | 0.00                                                       | 2.00%            |
| 2039 | 465.95                                    | 465.95                | 0.00                                                       | 1.90%            |
| 2040 | 475.27                                    | 475.27                | 0.00                                                       | 1.90%            |
| 2041 | 484.78                                    | 484.78                | 0.00                                                       | 1.90%            |
| 2042 | 494.47                                    | 494.47                | 0.00                                                       | 1.90%            |
| 2043 | 504.36                                    | 504.36                | 0.00                                                       | 1.90%            |
| 2044 | 514.45                                    | 514.45                | 0.00                                                       | 1.80%            |
| 2045 | 524.74                                    | 524.74                | 0.00                                                       | 1.80%            |
| 2046 | 535.23                                    | 535.23                | 0.00                                                       | 1.80%            |

| PJM - AEP GEN HUB -Nominal \$'s |        |         |              |                  |                |  |
|---------------------------------|--------|---------|--------------|------------------|----------------|--|
| Month                           | Nights | Weekend | Weekend Peak | PROMOD Weeknight | PROMOD Weekend |  |
| Jan-16                          | 26.67  | 30.46   | 32.76        | 27.18            | 29.97          |  |
| Feb-16                          | 26.40  | 30.46   | 32.40        | 26.23            | 29.84          |  |
| Mar-16                          | 23.58  | 29.28   | 31.75        | 23.40            | 28.37          |  |
| Apr-16                          | 22.37  | 28.53   | 31.68        | 22.36            | 27.74          |  |
| May-16                          | 20.73  | 28.73   | 32.62        | 20.60            | 27.54          |  |
| Jun-16                          | 21.32  | 29.55   | 33.80        | 21.37            | 28.41          |  |
| Jul-16                          | 23.76  | 32.44   | 37.04        | 24.25            | 31.27          |  |
| Aug-16                          | 22.07  | 30.58   | 35.06        | 22.47            | 29.04          |  |
| Sep-16                          | 20.50  | 28.86   | 33.08        | 20.48            | 27.63          |  |
| Oct-16                          | 21.23  | 27.32   | 30.60        | 21.66            | 26.42          |  |
| Nov-16                          | 24.36  | 29.05   | 31.47        | 24.60            | 28.27          |  |
| Dec-16                          | 24.46  | 29.19   | 31.38        | 24.41            | 28.47          |  |
| Jan-17                          | 27.28  | 32.93   | 35.66        | 27.31            | 32.02          |  |
| Feb-17                          | 27.02  | 32.88   | 35.64        | 26.65            | 32.16          |  |
| Mar-17                          | 22.84  | 29.12   | 32.15        | 23.00            | 28.00          |  |
| Apr-17                          | 20.07  | 29.28   | 33.69        | 19.91            | 28.16          |  |
| May-17                          | 18.55  | 28.90   | 34.54        | 18.96            | 27.19          |  |
| Jun-17                          | 21.50  | 31.09   | 36.34        | 21.93            | 29.63          |  |
| Jul-17                          | 25.93  | 36.01   | 41.65        | 26.98            | 34.49          |  |
| Aug-17                          | 22.32  | 32.07   | 37.40        | 22.91            | 30.54          |  |
| Sep-17                          | 19.83  | 30.06   | 35.39        | 19.96            | 28.73          |  |
| Oct-17                          | 20.22  | 28.68   | 33.22        | 20.72            | 27.31          |  |
| Nov-17                          | 24.56  | 30.20   | 33.24        | 24.92            | 29.28          |  |
| Dec-17                          | 24.66  | 30.93   | 33.90        | 24.42            | 30.17          |  |
| Jan-18                          | 27.75  | 33.86   | 37.25        | 28.02            | 32.87          |  |
| Feb-18                          | 27.44  | 34.20   | 37.38        | 26.87            | 33.45          |  |
| Mar-18                          | 23.63  | 31.44   | 34.89        | 23.28            | 30.32          |  |
| Apr-18                          | 21.19  | 29.18   | 33.57        | 21.89            | 27.85          |  |
| May-18                          | 19.13  | 29.84   | 35.37        | 19.30            | 28.30          |  |
| Jun-18                          | 20.62  | 31.83   | 37.88        | 21.08            | 30.32          |  |
| Jul-18                          | 26.51  | 37.27   | 43.25        | 27.29            | 35.58          |  |
| Aug-18                          | 24.38  | 35.03   | 40.92        | 25.00            | 33.33          |  |
| Sep-18                          | 22.02  | 32.68   | 38.11        | 22.26            | 31.37          |  |
| Oct-18                          | 20.69  | 29.16   | 33.87        | 21.33            | 27.62          |  |
| Nov-18                          | 23.63  | 30.30   | 33.67        | 23.82            | 29.19          |  |
| Dec-18                          | 23.56  | 30.81   | 34.50        | 23.68            | 29.80          |  |
| Jan-19                          | 29.83  | 37.15   | 41.30        | 30.36            | 36.03          |  |
| Feb-19                          | 29.46  | 37.18   | 40.91        | 29.16            | 36.17          |  |
| Mar-19                          | 25.00  | 33.27   | 37.15        | 24.77            | 32.21          |  |
| Apr-19                          | 21.85  | 31.77   | 36.88        | 22.30            | 29.95          |  |
| May-19                          | 20.61  | 31.56   | 37.09        | 20.43            | 30.06          |  |
| Jun-19                          | 22.57  | 33.72   | 39.58        | 23.13            | 32.31          |  |
| Jul-19                          | 29.21  | 40.96   | 47.27        | 29.74            | 38.93          |  |
| Aug-19                          | 26.47  | 37.43   | 43.21        | 26.86            | 35.90          |  |
| Sep-19                          | 23.74  | 34.36   | 39.81        | 24.17            | 32.63          |  |
| Oct-19                          | 22.10  | 31.02   | 35.99        | 22.66            | 29.66          |  |
| Nov-19                          | 25.74  | 32.69   | 36.25        | 26.14            | 31.58          |  |
| Dec-19                          | 25.42  | 33.51   | 37.40        | 25.45            | 32.19          |  |
| Jan-20                          | 31.35  | 38.95   | 43.21        | 31.84            | 37.74          |  |
| Feb-20                          | 30.32  | 37.47   | 40.95        | 30.03            | 36.64          |  |
| Mar-20                          | 25.87  | 33.41   | 36.99        | 26.07            | 32.07          |  |
| Apr-20                          | 23.68  | 32.72   | 37.70        | 24.28            | 31.31          |  |
| May-20                          | 22.70  | 34.10   | 39.77        | 22.63            | 32.70          |  |
| Jun-20                          | 24.63  | 35.58   | 41.53        | 25.23            | 33.68          |  |
| Jul-20                          | 30.69  | 42.57   | 49.07        | 31.15            | 40.79          |  |
| Aug-20                          | 28.41  | 38.92   | 44.42        | 29.02            | 37.33          |  |

|        |       |       |       |       |       |
|--------|-------|-------|-------|-------|-------|
| Sep-20 | 25.96 | 36.24 | 41.60 | 26.41 | 34.61 |
| Oct-20 | 25.63 | 33.91 | 38.39 | 26.17 | 32.67 |
| Nov-20 | 27.42 | 34.38 | 37.93 | 27.89 | 33.14 |
| Dec-20 | 27.84 | 35.46 | 39.25 | 28.04 | 34.23 |

| Month  | SPP_CENTRAL -Nominal \$'s |         |              |                  |                |
|--------|---------------------------|---------|--------------|------------------|----------------|
|        | Nights                    | Weekend | Weekend Peak | PROMOD Weeknight | PROMOD Weekend |
| Jan-16 | 24.32                     | 29.64   | 32.71        | 24.95            | 28.91          |
| Feb-16 | 24.10                     | 29.36   | 32.06        | 24.26            | 28.44          |
| Mar-16 | 21.02                     | 26.44   | 29.35        | 21.38            | 25.53          |
| Apr-16 | 20.57                     | 27.76   | 31.52        | 20.76            | 26.77          |
| May-16 | 21.26                     | 29.82   | 34.09        | 21.42            | 28.45          |
| Jun-16 | 22.42                     | 31.51   | 36.24        | 22.63            | 30.19          |
| Jul-16 | 25.26                     | 35.96   | 41.44        | 25.44            | 34.62          |
| Aug-16 | 24.62                     | 34.21   | 39.28        | 25.05            | 32.50          |
| Sep-16 | 21.57                     | 31.30   | 36.07        | 21.51            | 29.82          |
| Oct-16 | 20.83                     | 28.25   | 32.31        | 21.52            | 27.11          |
| Nov-16 | 23.09                     | 29.00   | 32.15        | 23.41            | 28.07          |
| Dec-16 | 23.05                     | 28.49   | 31.43        | 23.27            | 27.76          |
| Jan-17 | 26.21                     | 33.11   | 36.81        | 26.59            | 32.01          |
| Feb-17 | 26.01                     | 33.01   | 36.56        | 26.11            | 31.98          |
| Mar-17 | 21.62                     | 28.25   | 31.70        | 22.11            | 27.00          |
| Apr-17 | 20.52                     | 30.00   | 34.86        | 20.78            | 28.83          |
| May-17 | 21.11                     | 32.15   | 38.10        | 21.76            | 30.16          |
| Jun-17 | 23.82                     | 35.20   | 41.29        | 24.22            | 33.46          |
| Jul-17 | 29.13                     | 41.69   | 48.34        | 29.83            | 39.86          |
| Aug-17 | 27.27                     | 38.32   | 44.24        | 27.82            | 36.60          |
| Sep-17 | 23.06                     | 34.48   | 40.47        | 23.27            | 32.98          |
| Oct-17 | 21.75                     | 31.61   | 36.86        | 22.45            | 29.94          |
| Nov-17 | 25.07                     | 32.14   | 35.94        | 25.45            | 31.04          |
| Dec-17 | 25.12                     | 31.78   | 35.35        | 25.35            | 30.99          |
| Jan-18 | 27.45                     | 35.39   | 39.70        | 27.86            | 34.01          |
| Feb-18 | 27.34                     | 35.41   | 39.42        | 27.10            | 34.38          |
| Mar-18 | 23.59                     | 31.54   | 35.35        | 23.64            | 30.33          |
| Apr-18 | 21.67                     | 30.43   | 35.28        | 22.37            | 29.03          |
| May-18 | 21.54                     | 32.92   | 38.99        | 22.05            | 31.17          |
| Jun-18 | 23.77                     | 35.75   | 42.32        | 24.38            | 34.13          |
| Jul-18 | 30.08                     | 43.58   | 50.64        | 30.69            | 41.40          |
| Aug-18 | 30.44                     | 42.90   | 49.45        | 30.77            | 40.99          |
| Sep-18 | 25.06                     | 37.32   | 43.58        | 25.31            | 35.83          |
| Oct-18 | 22.54                     | 32.79   | 38.53        | 23.32            | 30.95          |
| Nov-18 | 24.28                     | 31.94   | 35.89        | 24.56            | 30.68          |
| Dec-18 | 24.69                     | 32.21   | 36.19        | 25.06            | 31.14          |
| Jan-19 | 28.75                     | 37.65   | 42.66        | 29.39            | 36.26          |
| Feb-19 | 28.75                     | 37.72   | 42.23        | 28.73            | 36.46          |
| Mar-19 | 24.84                     | 33.48   | 37.72        | 24.94            | 32.32          |
| Apr-19 | 22.78                     | 33.23   | 38.63        | 23.28            | 31.30          |
| May-19 | 22.99                     | 33.98   | 40.12        | 23.51            | 32.35          |
| Jun-19 | 26.15                     | 38.37   | 44.76        | 26.68            | 36.85          |
| Jul-19 | 32.25                     | 46.73   | 54.33        | 32.91            | 44.11          |
| Aug-19 | 32.29                     | 45.35   | 52.18        | 32.63            | 43.55          |
| Sep-19 | 27.03                     | 39.28   | 45.68        | 27.62            | 37.30          |
| Oct-19 | 24.06                     | 35.53   | 41.86        | 24.80            | 33.72          |
| Nov-19 | 26.35                     | 34.76   | 39.09        | 26.77            | 33.46          |
| Dec-19 | 26.93                     | 35.33   | 39.62        | 27.22            | 33.97          |
| Jan-20 | 31.33                     | 40.26   | 45.19        | 31.82            | 38.86          |
| Feb-20 | 30.34                     | 38.94   | 43.26        | 30.35            | 37.83          |
| Mar-20 | 26.04                     | 34.02   | 38.00        | 26.54            | 32.54          |
| Apr-20 | 24.73                     | 34.65   | 39.90        | 25.20            | 33.09          |
| May-20 | 25.32                     | 37.16   | 43.09        | 25.50            | 35.60          |
| Jun-20 | 28.02                     | 40.43   | 46.96        | 28.56            | 38.23          |
| Jul-20 | 33.69                     | 48.43   | 56.10        | 33.95            | 46.21          |
| Aug-20 | 33.07                     | 45.78   | 52.44        | 33.88            | 43.84          |

|        |       |       |       |       |       |
|--------|-------|-------|-------|-------|-------|
| Sep-20 | 28.38 | 40.26 | 46.46 | 28.74 | 38.48 |
| Oct-20 | 26.50 | 37.24 | 42.97 | 27.07 | 35.67 |
| Nov-20 | 28.34 | 36.70 | 40.98 | 28.82 | 35.26 |
| Dec-20 | 28.94 | 37.40 | 41.70 | 29.09 | 36.13 |

| SPP_KSMO -Nominal S's |        |         |              |                  |                |  |
|-----------------------|--------|---------|--------------|------------------|----------------|--|
| Month                 | Nights | Weekend | Weekend Peak | PROMOD Weeknight | PROMOD Weekend |  |
| Jan-16                | 24.08  | 29.34   | 32.38        | 24.70            | 28.62          |  |
| Feb-16                | 23.86  | 29.07   | 31.74        | 24.02            | 28.15          |  |
| Mar-16                | 20.81  | 26.18   | 29.06        | 21.17            | 25.27          |  |
| Apr-16                | 20.36  | 27.48   | 31.20        | 20.55            | 26.50          |  |
| May-16                | 21.05  | 29.57   | 33.82        | 21.21            | 28.20          |  |
| Jun-16                | 22.20  | 31.34   | 36.08        | 22.40            | 30.00          |  |
| Jul-16                | 25.02  | 35.91   | 41.48        | 25.19            | 34.55          |  |
| Aug-16                | 24.37  | 34.00   | 39.08        | 24.80            | 32.29          |  |
| Sep-16                | 21.36  | 31.09   | 35.87        | 21.30            | 29.61          |  |
| Oct-16                | 20.62  | 27.97   | 31.99        | 21.30            | 26.84          |  |
| Nov-16                | 22.86  | 28.71   | 31.84        | 23.17            | 27.79          |  |
| Dec-16                | 22.82  | 28.20   | 31.12        | 23.04            | 27.48          |  |
| Jan-17                | 25.95  | 32.78   | 36.44        | 26.32            | 31.69          |  |
| Feb-17                | 25.75  | 32.68   | 36.19        | 25.85            | 31.66          |  |
| Mar-17                | 21.40  | 27.97   | 31.38        | 21.89            | 26.73          |  |
| Apr-17                | 20.31  | 29.70   | 34.52        | 20.57            | 28.54          |  |
| May-17                | 20.90  | 31.83   | 37.72        | 21.54            | 29.86          |  |
| Jun-17                | 23.58  | 34.91   | 40.96        | 23.98            | 33.18          |  |
| Jul-17                | 28.84  | 41.56   | 48.29        | 29.53            | 39.71          |  |
| Aug-17                | 27.00  | 37.99   | 43.88        | 27.54            | 36.27          |  |
| Sep-17                | 22.83  | 34.18   | 40.13        | 23.03            | 32.68          |  |
| Oct-17                | 21.54  | 31.29   | 36.49        | 22.22            | 29.64          |  |
| Nov-17                | 24.82  | 31.82   | 35.58        | 25.20            | 30.73          |  |
| Dec-17                | 24.87  | 31.47   | 35.01        | 25.09            | 30.68          |  |
| Jan-18                | 27.17  | 35.04   | 39.30        | 27.58            | 33.67          |  |
| Feb-18                | 27.06  | 35.06   | 39.03        | 26.83            | 34.04          |  |
| Mar-18                | 23.35  | 31.23   | 35.01        | 23.40            | 30.04          |  |
| Apr-18                | 21.45  | 30.13   | 34.93        | 22.14            | 28.74          |  |
| May-18                | 21.33  | 32.59   | 38.60        | 21.83            | 30.86          |  |
| Jun-18                | 23.53  | 35.42   | 41.94        | 24.13            | 33.81          |  |
| Jul-18                | 29.78  | 43.46   | 50.61        | 30.38            | 41.26          |  |
| Aug-18                | 30.14  | 42.59   | 49.13        | 30.47            | 40.68          |  |
| Sep-18                | 24.81  | 37.03   | 43.28        | 25.06            | 35.55          |  |
| Oct-18                | 22.32  | 32.46   | 38.15        | 23.09            | 30.64          |  |
| Nov-18                | 24.03  | 31.62   | 35.53        | 24.31            | 30.37          |  |
| Dec-18                | 24.44  | 31.91   | 35.86        | 24.81            | 30.84          |  |
| Jan-19                | 28.46  | 37.27   | 42.23        | 29.09            | 35.90          |  |
| Feb-19                | 28.46  | 37.34   | 41.81        | 28.45            | 36.09          |  |
| Mar-19                | 24.59  | 33.15   | 37.34        | 24.69            | 31.99          |  |
| Apr-19                | 22.55  | 32.89   | 38.24        | 23.05            | 30.99          |  |
| May-19                | 22.76  | 33.65   | 39.73        | 23.27            | 32.03          |  |
| Jun-19                | 25.89  | 38.05   | 44.41        | 26.42            | 36.54          |  |
| Jul-19                | 31.93  | 46.73   | 54.48        | 32.59            | 44.06          |  |
| Aug-19                | 31.97  | 45.23   | 52.14        | 32.31            | 43.40          |  |
| Sep-19                | 26.76  | 39.03   | 45.44        | 27.35            | 37.05          |  |
| Oct-19                | 23.82  | 35.17   | 41.44        | 24.55            | 33.39          |  |
| Nov-19                | 26.09  | 34.41   | 38.70        | 26.51            | 33.13          |  |
| Dec-19                | 26.66  | 34.99   | 39.24        | 26.95            | 33.64          |  |
| Jan-20                | 31.02  | 39.86   | 44.74        | 31.50            | 38.47          |  |
| Feb-20                | 30.03  | 38.55   | 42.83        | 30.05            | 37.45          |  |
| Mar-20                | 25.78  | 33.68   | 37.62        | 26.28            | 32.22          |  |
| Apr-20                | 24.48  | 34.30   | 39.50        | 24.95            | 32.76          |  |
| May-20                | 25.07  | 36.81   | 42.69        | 25.25            | 35.27          |  |
| Jun-20                | 27.74  | 40.16   | 46.69        | 28.28            | 37.96          |  |
| Jul-20                | 33.36  | 48.51   | 56.39        | 33.62            | 46.23          |  |
| Aug-20                | 32.74  | 45.57   | 52.29        | 33.54            | 43.61          |  |

|        |       |       |       |       |       |
|--------|-------|-------|-------|-------|-------|
| Sep-20 | 28.09 | 40.01 | 46.23 | 28.45 | 38.22 |
| Oct-20 | 26.24 | 36.87 | 42.55 | 26.80 | 35.31 |
| Nov-20 | 28.06 | 36.34 | 40.58 | 28.53 | 34.92 |
| Dec-20 | 28.65 | 37.04 | 41.31 | 28.80 | 35.79 |

| ERCOT North -Nominal \$'s |        |         |              |                  |                |  |
|---------------------------|--------|---------|--------------|------------------|----------------|--|
| Month                     | Nights | Weekend | Weekend Peak | PROMOD Weeknight | PROMOD Weekend |  |
| Jan-16                    | 27.83  | 30.72   | 32.53        | 28.16            | 30.41          |  |
| Feb-16                    | 26.14  | 27.90   | 29.13        | 26.87            | 27.39          |  |
| Mar-16                    | 25.39  | 26.70   | 27.36        | 25.53            | 26.42          |  |
| Apr-16                    | 26.07  | 28.99   | 30.89        | 26.61            | 28.56          |  |
| May-16                    | 26.32  | 31.22   | 33.49        | 26.33            | 30.39          |  |
| Jun-16                    | 27.35  | 33.57   | 36.63        | 27.25            | 32.72          |  |
| Jul-16                    | 28.49  | 34.48   | 37.76        | 28.70            | 33.80          |  |
| Aug-16                    | 28.95  | 34.73   | 37.55        | 28.99            | 33.70          |  |
| Sep-16                    | 26.50  | 32.29   | 35.46        | 26.79            | 31.40          |  |
| Oct-16                    | 25.25  | 29.88   | 32.31        | 25.44            | 29.23          |  |
| Nov-16                    | 25.52  | 27.39   | 28.86        | 26.18            | 27.01          |  |
| Dec-16                    | 27.13  | 30.84   | 32.70        | 27.09            | 30.35          |  |
| Jan-17                    | 31.24  | 35.73   | 37.89        | 31.39            | 34.93          |  |
| Feb-17                    | 27.14  | 27.61   | 28.80        | 28.39            | 27.37          |  |
| Mar-17                    | 26.04  | 28.20   | 30.06        | 26.51            | 28.01          |  |
| Apr-17                    | 26.77  | 31.19   | 33.46        | 27.05            | 30.58          |  |
| May-17                    | 28.27  | 35.26   | 38.82        | 28.34            | 34.09          |  |
| Jun-17                    | 30.57  | 37.82   | 41.58        | 30.56            | 36.81          |  |
| Jul-17                    | 31.78  | 40.08   | 44.15        | 31.92            | 38.83          |  |
| Aug-17                    | 32.45  | 39.92   | 43.55        | 32.30            | 38.89          |  |
| Sep-17                    | 28.62  | 36.29   | 40.46        | 28.84            | 35.32          |  |
| Oct-17                    | 26.72  | 32.68   | 35.58        | 26.59            | 31.82          |  |
| Nov-17                    | 26.85  | 28.13   | 29.94        | 28.41            | 27.61          |  |
| Dec-17                    | 28.87  | 33.21   | 35.51        | 28.15            | 33.10          |  |
| Jan-18                    | 31.74  | 36.11   | 39.55        | 32.71            | 35.47          |  |
| Feb-18                    | 28.83  | 29.81   | 29.95        | 28.79            | 29.49          |  |
| Mar-18                    | 27.41  | 29.19   | 30.13        | 27.43            | 28.97          |  |
| Apr-18                    | 26.79  | 29.83   | 32.36        | 28.09            | 29.29          |  |
| May-18                    | 28.64  | 34.82   | 38.52        | 29.14            | 33.95          |  |
| Jun-18                    | 31.34  | 40.23   | 44.49        | 31.04            | 39.07          |  |
| Jul-18                    | 33.91  | 42.46   | 46.60        | 33.95            | 41.08          |  |
| Aug-18                    | 34.91  | 44.28   | 48.42        | 34.52            | 42.82          |  |
| Sep-18                    | 31.14  | 39.25   | 43.60        | 31.58            | 38.26          |  |
| Oct-18                    | 28.74  | 34.71   | 37.83        | 28.99            | 33.64          |  |
| Nov-18                    | 26.46  | 29.61   | 31.57        | 27.05            | 28.98          |  |
| Dec-18                    | 29.32  | 31.75   | 33.37        | 29.73            | 31.46          |  |
| Jan-19                    | 30.94  | 35.71   | 39.26        | 31.66            | 35.20          |  |
| Feb-19                    | 30.89  | 32.18   | 32.91        | 31.38            | 31.56          |  |
| Mar-19                    | 28.12  | 30.15   | 30.98        | 27.74            | 29.98          |  |
| Apr-19                    | 28.37  | 31.41   | 33.38        | 28.71            | 30.96          |  |
| May-19                    | 30.07  | 36.50   | 39.63        | 29.98            | 35.54          |  |
| Jun-19                    | 32.28  | 40.78   | 45.19        | 32.61            | 39.72          |  |
| Jul-19                    | 35.06  | 43.58   | 47.44        | 34.86            | 42.07          |  |
| Aug-19                    | 35.98  | 45.50   | 50.23        | 35.85            | 44.26          |  |
| Sep-19                    | 32.12  | 40.19   | 44.71        | 32.77            | 38.92          |  |
| Oct-19                    | 28.61  | 36.06   | 39.75        | 28.71            | 34.91          |  |
| Nov-19                    | 28.20  | 30.65   | 32.84        | 29.05            | 30.42          |  |
| Dec-19                    | 29.84  | 33.91   | 35.45        | 29.78            | 33.05          |  |
| Jan-20                    | 32.30  | 35.42   | 37.92        | 33.07            | 34.97          |  |
| Feb-20                    | 32.05  | 34.26   | 35.77        | 33.07            | 33.68          |  |
| Mar-20                    | 29.57  | 32.72   | 34.48        | 29.70            | 32.29          |  |
| Apr-20                    | 31.15  | 37.39   | 40.75        | 31.20            | 36.60          |  |
| May-20                    | 31.70  | 38.61   | 42.41        | 32.16            | 37.73          |  |
| Jun-20                    | 33.39  | 42.70   | 47.21        | 33.46            | 41.04          |  |
| Jul-20                    | 36.01  | 44.37   | 48.37        | 35.75            | 43.18          |  |
| Aug-20                    | 35.90  | 45.09   | 49.54        | 35.84            | 43.78          |  |

|        |       |       |       |       |       |
|--------|-------|-------|-------|-------|-------|
| Sep-20 | 32.85 | 40.23 | 44.77 | 33.69 | 39.12 |
| Oct-20 | 30.58 | 37.00 | 40.15 | 30.27 | 36.27 |
| Nov-20 | 29.39 | 33.49 | 36.01 | 29.94 | 32.86 |
| Dec-20 | 31.59 | 35.27 | 37.43 | 31.92 | 34.71 |

| Power Prices (\$/M)       |        |         |              |                  |                |  |
|---------------------------|--------|---------|--------------|------------------|----------------|--|
| ERCOT South -Nominal \$'s |        |         |              |                  |                |  |
| Month                     | Nights | Weekend | Weekend Peak | PROMOD Weeknight | PROMOD Weekend |  |
| Jan-16                    | 27.92  | 30.63   | 32.36        | 28.28            | 30.34          |  |
| Feb-16                    | 26.20  | 27.99   | 29.22        | 26.87            | 27.50          |  |
| Mar-16                    | 25.49  | 27.04   | 27.75        | 25.59            | 26.72          |  |
| Apr-16                    | 26.23  | 29.31   | 31.25        | 26.75            | 28.84          |  |
| May-16                    | 27.00  | 31.90   | 34.15        | 27.00            | 31.05          |  |
| Jun-16                    | 27.93  | 33.90   | 36.79        | 27.81            | 33.07          |  |
| Jul-16                    | 28.80  | 34.64   | 37.82        | 29.03            | 33.96          |  |
| Aug-16                    | 29.35  | 34.92   | 37.63        | 29.42            | 33.91          |  |
| Sep-16                    | 27.02  | 32.64   | 35.64        | 27.24            | 31.76          |  |
| Oct-16                    | 25.66  | 30.21   | 32.64        | 25.93            | 29.55          |  |
| Nov-16                    | 25.64  | 27.61   | 29.11        | 26.27            | 27.22          |  |
| Dec-16                    | 27.34  | 30.95   | 32.75        | 27.31            | 30.47          |  |
| Jan-17                    | 31.54  | 35.94   | 37.98        | 31.60            | 35.16          |  |
| Feb-17                    | 27.27  | 27.82   | 28.99        | 28.46            | 27.57          |  |
| Mar-17                    | 26.33  | 28.62   | 30.49        | 26.78            | 28.38          |  |
| Apr-17                    | 27.16  | 31.78   | 34.11        | 27.40            | 31.13          |  |
| May-17                    | 28.87  | 35.85   | 39.38        | 28.93            | 34.68          |  |
| Jun-17                    | 31.03  | 38.04   | 41.68        | 31.00            | 37.09          |  |
| Jul-17                    | 32.01  | 40.27   | 44.25        | 32.07            | 39.03          |  |
| Aug-17                    | 32.85  | 40.13   | 43.65        | 32.72            | 39.11          |  |
| Sep-17                    | 29.22  | 36.67   | 40.73        | 29.44            | 35.73          |  |
| Oct-17                    | 27.16  | 33.13   | 36.10        | 27.12            | 32.25          |  |
| Nov-17                    | 27.06  | 28.51   | 30.35        | 28.61            | 27.94          |  |
| Dec-17                    | 29.08  | 33.30   | 35.55        | 28.38            | 33.20          |  |
| Jan-18                    | 32.17  | 36.50   | 39.81        | 33.03            | 35.87          |  |
| Feb-18                    | 29.03  | 30.16   | 30.37        | 28.97            | 29.83          |  |
| Mar-18                    | 27.60  | 29.61   | 30.65        | 27.61            | 29.35          |  |
| Apr-18                    | 27.14  | 30.43   | 33.10        | 28.48            | 29.83          |  |
| May-18                    | 29.31  | 35.48   | 39.15        | 29.79            | 34.60          |  |
| Jun-18                    | 31.93  | 40.58   | 44.71        | 31.60            | 39.47          |  |
| Jul-18                    | 34.18  | 42.58   | 46.67        | 34.26            | 41.21          |  |
| Aug-18                    | 35.55  | 44.65   | 48.65        | 35.18            | 43.21          |  |
| Sep-18                    | 31.84  | 39.80   | 44.05        | 32.26            | 38.83          |  |
| Oct-18                    | 29.28  | 35.19   | 38.31        | 29.55            | 34.14          |  |
| Nov-18                    | 26.73  | 30.11   | 32.18        | 27.33            | 29.44          |  |
| Dec-18                    | 29.64  | 32.15   | 33.76        | 29.98            | 31.85          |  |
| Jan-19                    | 31.12  | 35.92   | 39.41        | 31.76            | 35.42          |  |
| Feb-19                    | 31.06  | 32.58   | 33.26        | 31.67            | 31.97          |  |
| Mar-19                    | 28.40  | 30.66   | 31.62        | 27.99            | 30.48          |  |
| Apr-19                    | 28.83  | 32.09   | 34.16        | 29.21            | 31.57          |  |
| May-19                    | 30.88  | 37.33   | 40.44        | 30.79            | 36.35          |  |
| Jun-19                    | 32.79  | 41.07   | 45.38        | 33.12            | 40.04          |  |
| Jul-19                    | 35.32  | 43.68   | 47.49        | 35.13            | 42.22          |  |
| Aug-19                    | 36.69  | 45.90   | 50.50        | 36.62            | 44.68          |  |
| Sep-19                    | 32.87  | 40.75   | 45.17        | 33.51            | 39.52          |  |
| Oct-19                    | 29.24  | 36.49   | 40.14        | 29.40            | 35.36          |  |
| Nov-19                    | 28.41  | 31.08   | 33.35        | 29.23            | 30.81          |  |
| Dec-19                    | 30.18  | 34.24   | 35.73        | 30.07            | 33.39          |  |
| Jan-20                    | 32.75  | 36.16   | 38.59        | 33.29            | 35.70          |  |
| Feb-20                    | 32.36  | 34.54   | 36.01        | 33.37            | 33.96          |  |
| Mar-20                    | 30.03  | 33.31   | 35.12        | 30.15            | 32.85          |  |
| Apr-20                    | 31.90  | 38.32   | 41.71        | 31.90            | 37.51          |  |
| May-20                    | 32.53  | 39.41   | 43.19        | 32.99            | 38.54          |  |
| Jun-20                    | 34.07  | 43.05   | 47.38        | 34.14            | 41.43          |  |
| Jul-20                    | 36.42  | 44.56   | 48.44        | 36.17            | 43.39          |  |
| Aug-20                    | 36.44  | 45.35   | 49.66        | 36.43            | 44.06          |  |

|        |       |       |       |       |       |
|--------|-------|-------|-------|-------|-------|
| Sep-20 | 33.53 | 40.85 | 45.30 | 34.34 | 39.73 |
| Oct-20 | 31.18 | 37.48 | 40.63 | 30.96 | 36.75 |
| Nov-20 | 29.83 | 34.07 | 36.61 | 30.37 | 33.40 |
| Dec-20 | 31.95 | 35.72 | 37.85 | 32.22 | 35.14 |

| Power Prices (\$/MWh) -Nominal \$'s |                          |         |              |                  |                |  |
|-------------------------------------|--------------------------|---------|--------------|------------------|----------------|--|
| Month                               | ERCOT West -Nominal \$'s |         |              |                  |                |  |
|                                     | Nights                   | Weekend | Weekend Peak | PROMOD Weeknight | PROMOD Weekend |  |
| Jan-16                              | 28.57                    | 31.42   | 33.18        | 28.88            | 31.11          |  |
| Feb-16                              | 26.64                    | 28.51   | 29.81        | 27.39            | 27.98          |  |
| Mar-16                              | 25.57                    | 26.97   | 27.72        | 25.74            | 26.68          |  |
| Apr-16                              | 25.70                    | 28.89   | 30.93        | 26.28            | 28.40          |  |
| May-16                              | 26.65                    | 31.77   | 34.14        | 26.68            | 30.88          |  |
| Jun-16                              | 27.75                    | 34.37   | 37.59        | 27.66            | 33.44          |  |
| Jul-16                              | 28.89                    | 35.31   | 38.72        | 29.08            | 34.53          |  |
| Aug-16                              | 29.50                    | 35.57   | 38.51        | 29.52            | 34.50          |  |
| Sep-16                              | 26.97                    | 33.09   | 36.40        | 27.28            | 32.12          |  |
| Oct-16                              | 25.49                    | 30.53   | 33.16        | 25.73            | 29.78          |  |
| Nov-16                              | 25.91                    | 28.04   | 29.59        | 26.62            | 27.56          |  |
| Dec-16                              | 27.64                    | 31.55   | 33.45        | 27.59            | 31.02          |  |
| Jan-17                              | 31.90                    | 36.36   | 38.55        | 32.11            | 35.56          |  |
| Feb-17                              | 27.76                    | 28.36   | 29.60        | 29.03            | 28.09          |  |
| Mar-17                              | 26.12                    | 28.53   | 30.50        | 26.65            | 28.26          |  |
| Apr-17                              | 26.52                    | 31.25   | 33.66        | 26.85            | 30.57          |  |
| May-17                              | 28.75                    | 36.04   | 39.72        | 28.82            | 34.82          |  |
| Jun-17                              | 31.24                    | 38.75   | 42.61        | 31.23            | 37.69          |  |
| Jul-17                              | 32.45                    | 40.97   | 45.21        | 32.69            | 39.68          |  |
| Aug-17                              | 33.26                    | 40.91   | 44.60        | 33.09            | 39.85          |  |
| Sep-17                              | 29.17                    | 37.15   | 41.47        | 29.42            | 36.13          |  |
| Oct-17                              | 26.89                    | 33.34   | 36.45        | 26.75            | 32.39          |  |
| Nov-17                              | 27.21                    | 28.82   | 30.80        | 28.87            | 28.20          |  |
| Dec-17                              | 29.49                    | 33.91   | 36.28        | 28.82            | 33.78          |  |
| Jan-18                              | 32.53                    | 36.98   | 40.45        | 33.52            | 36.32          |  |
| Feb-18                              | 29.49                    | 30.62   | 30.78        | 29.41            | 30.27          |  |
| Mar-18                              | 27.59                    | 29.67   | 30.72        | 27.67            | 29.34          |  |
| Apr-18                              | 26.45                    | 30.00   | 32.76        | 27.76            | 29.35          |  |
| May-18                              | 29.03                    | 35.52   | 39.44        | 29.63            | 34.57          |  |
| Jun-18                              | 31.92                    | 41.11   | 45.55        | 31.81            | 39.94          |  |
| Jul-18                              | 34.63                    | 43.42   | 47.68        | 34.71            | 41.99          |  |
| Aug-18                              | 35.59                    | 45.25   | 49.53        | 35.19            | 43.75          |  |
| Sep-18                              | 31.68                    | 40.15   | 44.66        | 32.08            | 39.13          |  |
| Oct-18                              | 29.05                    | 35.46   | 38.78        | 29.32            | 34.30          |  |
| Nov-18                              | 26.80                    | 30.23   | 32.42        | 27.46            | 29.57          |  |
| Dec-18                              | 30.11                    | 32.63   | 34.30        | 30.51            | 32.34          |  |
| Jan-19                              | 31.83                    | 36.63   | 40.18        | 32.54            | 36.12          |  |
| Feb-19                              | 31.46                    | 33.05   | 33.78        | 32.14            | 32.40          |  |
| Mar-19                              | 28.50                    | 30.67   | 31.61        | 28.18            | 30.48          |  |
| Apr-19                              | 28.24                    | 31.73   | 33.88        | 28.60            | 31.15          |  |
| May-19                              | 30.54                    | 37.24   | 40.60        | 30.54            | 36.24          |  |
| Jun-19                              | 32.99                    | 41.72   | 46.29        | 33.33            | 40.65          |  |
| Jul-19                              | 35.86                    | 44.59   | 48.56        | 35.67            | 43.05          |  |
| Aug-19                              | 36.70                    | 46.52   | 51.37        | 36.52            | 45.25          |  |
| Sep-19                              | 32.71                    | 41.11   | 45.79        | 33.37            | 39.79          |  |
| Oct-19                              | 28.94                    | 36.89   | 40.74        | 28.98            | 35.65          |  |
| Nov-19                              | 28.75                    | 31.41   | 33.76        | 29.76            | 31.09          |  |
| Dec-19                              | 30.62                    | 34.85   | 36.39        | 30.46            | 33.98          |  |
| Jan-20                              | 33.20                    | 36.42   | 38.95        | 33.95            | 35.96          |  |
| Feb-20                              | 32.70                    | 35.05   | 36.69        | 33.80            | 34.45          |  |
| Mar-20                              | 29.90                    | 33.32   | 35.21        | 30.09            | 32.81          |  |
| Apr-20                              | 31.16                    | 37.77   | 41.27        | 31.20            | 36.90          |  |
| May-20                              | 32.25                    | 39.46   | 43.46        | 32.80            | 38.53          |  |
| Jun-20                              | 34.07                    | 43.67   | 48.34        | 34.10            | 42.00          |  |
| Jul-20                              | 36.89                    | 45.46   | 49.51        | 36.59            | 44.24          |  |
| Aug-20                              | 36.81                    | 46.16   | 50.70        | 36.78            | 44.82          |  |

|        |       |       |       |       |       |
|--------|-------|-------|-------|-------|-------|
| Sep-20 | 33.55 | 41.19 | 45.86 | 34.41 | 40.04 |
| Oct-20 | 30.97 | 37.82 | 41.15 | 30.69 | 36.99 |
| Nov-20 | 29.81 | 34.27 | 36.97 | 30.39 | 33.57 |
| Dec-20 | 32.49 | 36.25 | 38.44 | 32.79 | 35.69 |



## 2018/2019 RPM Base Residual Auction Results

### Executive Summary

The 2018/2019 Reliability Pricing Model (RPM) Base Residual Auction (BRA) cleared 166,836.9 MW of unforced capacity in the RTO. Accounting for load and resource commitments under the Fixed Resource Requirement (FRR) the reserve margin for the entire RTO for the 2018/2019 Delivery Year as procured in the BRA is 19.8%, or 4.1% higher than the target reserve margin of 15.7%.

The 2018/2019 RPM BRA was conducted under several new RPM design elements that were approved by FERC since last year's BRA. On June 9, 2015, in Docket No. ER15-623, FERC accepted a series of tariff reforms proposed in PJM's Capacity Performance ("CP") filing of December 12, 2014, to establish Capacity Performance Resources to ensure PJM's capacity market provides adequate incentive for resource performance. Also, on November 28, 2014, in Docket No. ER14-2940, FERC approved revisions to the Variable Resource Requirement (VRR) curve shape and Gross Cost of New Entry (CONE) values as proposed in PJM's September 25, 2014 filing. This filing was made following last year's stakeholder review of the shape of the VRR curve and key inputs to that curve, where such review is required by PJM Tariff on a specified periodic basis. The impact of Tariff revisions associated with these two filings as they relate to the setup and clearing of the 2018/2019 BRA are discussed in more detail in the "Discussion of Factors Impacting the RPM Clearing Prices" section of this report.

Under the CP provisions, for the 2018/2019 Delivery Year, PJM will procure two capacity product types through RPM auctions, Capacity Performance and Base Capacity. CP Resources must be capable of sustained, predictable operation, and are expected to be available and capable of providing energy and reserves when needed throughout the entire Delivery Year; whereas, Base Capacity Resources may not be capable of sustained, predictable operation and/or may not be expected to provide energy and reserves outside of the summer period. Base Capacity Resources include Base Capacity Demand Resources (DR), which are expected to be available only during the summer months, and Base Capacity Energy Efficiency (EE) Resources, which are expected to provide permanent continuous load reduction only during the summer months. Base Capacity Resources also include Base Capacity Generation Resources, which are expected to be available throughout the Delivery Year like all Capacity Performance Resources. But, unlike Capacity Performance Resources, Base Capacity Generation Resources will be subject to non-performance charges only when they fail to perform when needed during the summer months.

Base Capacity Resources do not provide the same level of availability as CP Resources, therefore constraints are imposed on the quantity of Base Capacity Resources that can be procured in each RPM auction. A Base Capacity DR Constraint which places a maximum limit on the total quantity of Base Capacity DR and Base Capacity EE that can be procured in the auction is established for the entire RTO and each modeled LDA. A Base Capacity Resource Constraint which places a maximum limit on the total quantity of Base Capacity DR, Base Capacity EE and Base Capacity Generation Resources that can be procured in the auction is established for the entire RTO and each modeled LDA. If these constraints are reached in the auction then these less-available resources will clear the auction at a lower clearing price than the clearing price associated with similarly located more-available resources.



## 2018/2019 RPM Base Residual Auction Results

### 2018/2019 BRA Resource Clearing Prices

Resource Clearing Prices (RCPs) for the 2018/2019 BRA are shown in the table below. The EMAAC LDA and ComEd LDA were constrained LDAs in the 2018/2019 BRA. The RCP for CP Resources located in the rest of RTO outside of these LDAs is \$164.77/MW-day. The RCP for CP Resources in the EMAAC LDA is \$225.42/MW-day and RCP for CP Resources in the COMED LDA is \$215.00 /MW-day. For comparison purposes, the Annual RCP in the 2017/2018 BRA across the entire RTO was \$120/MW-day with the exception of the PSEG LDA where the Annual RCP was \$215/MW-day.

| Capacity Type        | 2018/2019 BRA Resource Clearing Prices (\$/MW-day) |          |          |          |          |          |
|----------------------|----------------------------------------------------|----------|----------|----------|----------|----------|
|                      | Rest of RTO                                        | EMAAC    | SWMAAC   | PEPCO    | COMED    | PPL      |
| Capacity Performance | \$164.77                                           | \$225.42 | \$164.77 | \$164.77 | \$215.00 | \$164.77 |
| Base Generation      | \$149.98                                           | \$210.63 | \$149.98 | \$149.98 | \$200.21 | \$75.00  |
| Base DR/E            | \$149.98                                           | \$210.63 | \$59.95  | \$41.09  | \$200.21 | \$75.00  |

The Base Capacity Resource Constraint is a binding constraint in the auction for the PPL LDA, as well as, for the overall RTO, resulting in a price decrement for Base Capacity Generation located in PPL of \$89.77/MW-day relative to the RCP of CP resources located in the PPL LDA, and a price decrement of \$14.79/MW-day for Base Capacity Generation located in the rest of RTO outside of the PPL LDA. Additionally, the Base Capacity DR Constraint is a binding constraint in the BGE LDA and the PEPCO LDA resulting in price decrements for Base Capacity DR and EE located in the BGE LDA and the PEPCO LDA of \$90.03/MW-day and \$108.89/MW-day, respectively. These price decrements for Base Capacity DR and EE are relative to the RCP of Base Capacity Generation Resource located in these LDAs

The RCP for Base Capacity Resources located in the rest of RTO outside of the EMAAC, SWMAAC and COMED LDAs is \$149.98/MW-day. The RCP for Base Capacity Resources located in the EMAAC LDA is \$210.63/MW-day. The RCP for Base Capacity DR & EE Resources, Base Capacity Generation Resources and CP Resources located in the SWMAAC LDA outside of the PEPCO LDA is \$59.95/MW-day, \$149.98/MW-day and \$164.77/MW-day, respectively. The RCP for Base Capacity DR & EE Resources, Base Capacity Generation Resources and CP Resources located in the PEPCO LDA is \$41.09/MW-day, \$149.98/MW-day and \$164.77/MW-day, respectively. The RCP for Base Capacity Resources located in the COMED LDA is \$200.21/MW-day. The RCP for Base Capacity Resources and CP Resources located in the PPL LDA is \$75.00/MW-day and \$164.77/MW-day, respectively.

### 2018/2019 BRA Cleared Capacity Resources

As seen in the table below, the 2018/2019 BRA procured 2,919.3 MW of capacity from new generation and 587.8 MW from uprates to existing or planned generation. The quantity of capacity procured from external Generation Capacity Resources in the 2018/2019



## 2018/2019 RPM Base Residual Auction Results

BRA is 4,687.9 MW which is an increase of 162.4 MW from that procured in last year's BRA when Capacity Import Limits (CIL) were first implemented. All external generation capacity that has cleared in the 2018/19 BRA has met the requirements for the CIL exception. The total quantity of DR procured in the 2018/2019 BRA is 11,084.4 MW which is an increase of 109.6 MW from that procured in last year's BRA; and, the total quantity of EE procured in the 2018/2019 BRA is 1,246.5 MW which is a decrease of 92.4 MW from that procured in last year's BRA.

### Megawatts of Unforced Capacity Procured by Type

| BRA Delivery Year | New Generation | Generation Imports | Imports | Demand Response | Energy Efficiency |
|-------------------|----------------|--------------------|---------|-----------------|-------------------|
| 2018/2019         | 2,919.3        | 587.6              | 4,887.9 | 11,084.4        | 1,246.5           |
| 2017/2018         | 5,927.4        | 339.9              | 4,925.5 | 10,974.8        | 1,338.9           |
| 2016/2017         | 4,281.6        | 1,181.3            | 7,482.7 | 12,408.1        | 1,117.3           |
| 2015/2016         | 4,898.9        | 447.4              | 3,935.3 | 14,832.8        | 922.5             |
| 2014/2015         | 415.5          | 341.1              | 3,016.5 | 14,118.4        | 822.1             |



## **2018/2019 RPM Base Residual Auction Results**

### **Introduction**

This document provides information for PJM stakeholders regarding the results of the 2018/2019 Reliability Pricing Model (RPM) Base Residual Auction (BRA). The 2018/2019 BRA opened on August 10, 2015, and the results were posted on August 21, 2015.

In each BRA, PJM seeks to procure a target capacity reserve level for the RTO in a least cost manner while recognizing the following reliability-based constraints on the location and type of capacity that can be committed:

- Internal PJM locational constraints are established by setting up Locational Deliverability Areas (LDAs) with each LDA having a separate target capacity reserve level and a maximum limit on the amount of capacity that it can import from resources located outside of the LDA.
- Constraints on the procurement of the more limited capacity product types are established for the RTO and each modeled LDA. The Base Capacity DR Constraint limits the quantity of Base Capacity DR and EE that can be procured in each LDA or in total across the entire RTO; and the Base Capacity Resource Constraint limits the quantity of the sum of Base Capacity DR and EE and Base Capacity Generation Resources that can be procured in each LDA or in total across the entire RTO.
- Capacity Import Limits (CILs) are established on the amount of external generation capacity that can be reliably committed to PJM. A separate CIL is established for each of five external source-zones and a single total CIL is established for the overall RTO. As described in more detail later in this report, external generation resources may seek exception to the CIL by meeting all three of the following conditions prior to the start of the auction: (1) they are committed to being pseudo-tied generation resources prior to the start of the Delivery Year; that is, they will be treated like internal generation, subject to redispatch and locational pricing; (2) they have long-term firm transmission service confirmed on the complete transmission path from such resource into PJM; and (3) they agree to be subject to the same capacity must-offer requirement as PJM's internal resources.

The auction clearing process commits capacity resources to procure a target capacity reserve level for the RTO in a least-cost manner while recognizing and enforcing these reliability-based constraints. The clearing solution may be required to commit capacity resource out-of-merit order but again in a least-cost manner to ensure that all of these constraints are respected. In those cases where one or more of the constraints results in out-of-merit commitment in the auction solution, resource clearing prices will be reflective of the price of resources selected out of merit order to meet the necessary requirements.

This document begins with a high-level summary of the BRA results followed by sections containing detailed descriptions of the 2018/2019 BRA results and a discussion of the results in the context of the ten previous BRAs.



## **2018/2019 RPM Base Residual Auction Results**

### **Summary of Results**

The 2018/2019 Reliability Pricing Model (RPM) Base Residual Auction (BRA) cleared 166,836.9 MW of unforced capacity in the RTO representing a 20.2% reserve margin. The reserve margin for the entire RTO is 19.8%, or 4.1% higher than the target reserve margin of 15.7%, when the Fixed Resource Requirement (FRR) load and resources are considered.

Resource Clearing Prices (RCPs) for the 2018/2019 BRA are shown in Table 4. The RCP for CP Resources is \$164.77/MW-day for CP Resources located in the rest of RTO outside of the EMAAC LDA and the ComEd LDA. The EMAAC LDA and ComEd LDA were constrained LDAs in the 2018/2019 BRA. The RCP for CP Resources in the EMAAC LDA is \$225.42/MW-day and the RCP for CP Resources in the ComEd LDA is \$215.00 /MW-day. For comparison purposes, the Annual RCP in the 2017/2018 BRA across the entire RTO was \$120/MW-day with the exception of the PSEG LDA where the Annual RCP was \$215/MW-day.

The Base Capacity Resource Constraint is a binding constraint in the auction for the PPL LDA, as well as, for the overall RTO, resulting in a price decrement (relative to the RCP of similarly located CP Resources) for Base Capacity Generation located in the PPL of \$89.77/MW-day, and a price decrement for Base Capacity Generation located in the rest of RTO outside of the PPL LDA of \$14.79/MW-day. Additionally, the Base Capacity DR Constraint is a binding constraint in the SWMAAC LDA and the PEPCO LDA resulting in price decrements (relative to the RCP of similarly located Base Capacity Generation Resources) for Base Capacity DR and EE located in the SWMAAC LDA and the PEPCO LDA of \$90.03/MW-day and \$108.89/MW-day, respectively.

The RCP for Base Capacity Resources and CP Resources located in the rest of RTO outside of the EMAAC, SWMAAC and COMED LDAs is \$149.98/MW-day and \$164.77/MW-day, respectively. The RCP for Base Capacity Resources and CP Resources located in the EMAAC LDA is \$210.63/MW-day and \$225.42/MW-day, respectively. The RCP for Base Capacity DR & EE Resources, Base Capacity Generation Resources and CP Resources located in the SWMAAC LDA outside of the PEPCO LDA is \$59.95/MW-day, \$149.98/MW-day and \$164.77/MW-day, respectively. The RCP for Base Capacity DR & EE Resources, Base Capacity Generation Resources and CP Resources located in the PEPCO LDA is \$41.09/MW-day, \$149.98/MW-day and \$164.77/MW-day, respectively. The RCP for Base Capacity Resources and CP Resources located in the COMED LDA is \$200.21/MW-day and \$215.00/MW-day, respectively. The RCP for Base Capacity Resources and CP Resources located in the PPL LDA is \$75.00/MW-day and \$164.77/MW-day, respectively.

The total quantity of new Generation Capacity Resources offered into the auction was 4,132.6 MW (UCAP) comprised of 3,447.4 MW of new generation units and 685.2 MW of uprates to existing generation units. The quantity of new Generation Capacity Resources cleared was 3,506.9 MW (UCAP) comprised of 2,919.3 MW (UCAP) from new generation units and 587.6 MW from uprates to existing generation units.



## **2018/2019 RPM Base Residual Auction Results**

The quantity of capacity procured from external Generation Capacity Resources in the 2018/2019 BRA is 4,687.9 MW which is an increase of 162.4 MW from that procured in last year's BRA when Capacity Import Limits (CIL) were first implemented. All external generation capacity that has cleared in the 2018/19 BRA has met the requirements for CIL exception. These requirements help to ensure that external resources offering into the RPM auction have reasonable expectation of physically delivering on any RPM commitment and have high likelihood of being available for PJM when needed. External generation resources may seek exception to the CIL by meeting three requirements prior to the start of the auction: (i) they are committed to being pseudo-tied generation resources prior to the start of the Delivery Year; that is, they will be treated like internal generation, subject to redispatch and locational pricing; (ii) they have long-term firm transmission service confirmed on the complete transmission path from such resource into PJM; and (iii) they agree to be subject to the same capacity must-offer requirement as PJM's internal resources. These requirements help to ensure that external resources offering into the RPM auction have reasonable expectation of physically delivering on any RPM commitment and have high likelihood of being available for PJM when needed.

The total quantity of DR procured in the 2018/2019 BRA is 11,084 MW which is an increase of 109.6 MW from that procured in last year's BRA; and, the total quantity of EE procured in the 2018/2019 BRA is 1,246.5 MW which is a decrease of 92.4 MW from that procured in last year's BRA.

All existing generation sell offers into the 2018/2019 BRA were subject to market power mitigation through the application of the Market Structure Test (i.e., the Three-Pivotal Supplier Test). The RTO as a whole failed the Market Structure Test, resulting in mitigation of any existing generation resources. Mitigation was applied to a supplier's existing generation resources resulting in utilizing the lesser of the supplier's approved offer cap for such resource or the supplier's submitted offer price for such resource in the RPM Auction clearing.

All Generation Capacity Resources (including updates to existing resources) of 20 MW or greater that are based on combustion turbine, combined cycle and integrated gasification combined cycle technologies that have not cleared an RPM Auction prior to February 1, 2013 are subject to the Minimum Offer Price Rule (MOPR). External Generation Capacity Resources meeting the above criteria and that have entered commercial operation on or after January 1, 2013 and that require sufficient transmission investment for delivery into PJM are also subject to MOPR. To avoid application of the MOPR, Capacity Market Sellers may request exemption through either a Competitive Entry Exemption request or a Self-Supply Exemption request. The table below shows the requested, granted and cleared aggregate quantity (in ICAP MW) of each exemption type received and processed by PJM. While there were over 13,000 MW of MOPR exemption requests, making a request does not obligate a resource to offer into the BRA.



## 2018/2019 RPM Base Residual Auction Results

| LBA   | Exemption Type    | Requested Quantity<br>(ICAP MW) | Granted Quantity<br>(ICAP MW) | Cleared Quantity<br>(ICAP MW) |
|-------|-------------------|---------------------------------|-------------------------------|-------------------------------|
| RTO*  | Competitive Entry | 7,177.0                         | 7,177.0                       | 2,311.2                       |
| RTO*  | Self-Supply       | 0.0                             | 0.0                           | 0.0                           |
| MAAC  | Competitive Entry | 6,353.5                         | 6,353.5                       | 1,206.8                       |
| MAAC  | Self-Supply       | 0.0                             | 0.0                           | 0.0                           |
| Total |                   | 13,530.5                        | 13,530.5                      | 3,518.0                       |

\*RTO values exclude MAAC

A further discussion of the 2018/2019 BRA results and additional information regarding the 2018/2019 RPM BRA are detailed in the body of this report. The discussion also provides a comparison of the 2018/2019 auction results to the results from the 2007/2008 through 2017/2018 RPM Auctions.



## 2018/2019 RPM Base Residual Auction Results

### 2018/2019 Base Residual Auction Results Discussion

Table 1 contains a summary of the RTO clearing prices resulting from the 2018/2019 RPM BRA in comparison to those from 2007/2008 through 2017/2018 RPM BRAs.

**Table 1 –RPM Base Residual Auction Resource Clearing Price Results in the RTO**

| Auction Results         | RTO       |           |           |           |           |           |           |           |           |           |           |           |  |  |
|-------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|--|--|
|                         | 2007/2008 | 2008/2009 | 2009/2010 | 2010/2011 | 2011/2012 | 2012/2013 | 2013/2014 | 2014/2015 | 2015/2016 | 2016/2017 | 2017/2018 | 2018/2019 |  |  |
| Resource Clearing Price | \$40.80   | \$111.92  | \$162.04  | \$174.29  | \$110.00  | \$16.45   | \$27.73   | \$125.99  | \$136.09  | \$59.97   | \$720.00  | \$184.77  |  |  |
| Cleared UCAP (MW)       | 129,408.2 | 128,597.6 | 132,231.8 | 132,190.4 | 132,221.5 | 136,143.5 | 152,743.3 | 149,874.7 | 164,561.2 | 169,158.7 | 167,083.7 | 168,836.9 |  |  |
| Reserve Margin          | 19.1%     | 17.4%     | 17.8%     | 16.4%     | 17.9%     | 20.5%     | 19.7%     | 18.8%     | 19.3%     | 20.3%     | 19.7%     | 19.8%     |  |  |

- 1) 2011/2012 BRA was conducted without Duquesne zone load.  
2) 2013/2014 BRA includes ATSI zone  
3) 2014/2015 BRA includes Duke zone  
4) 2015/2016 BRA includes a significant portion of AEP and DEOK zone load previously under the FRR Alternative  
5) 2016/2017 BRA includes EKPC zone

The 2018/2019 Reliability Pricing Model (RPM) Base Residual Auction cleared 166,836.9 MW of unforced capacity in the RTO representing a 20.2% reserve margin. The reserve margin for the entire RTO is 19.8%, or 4.1% higher than the target reserve margin of 15.7%, when the Fixed Resource Requirement (FRR) load and resources are considered. The Reserve Margin presented in Table 1 represents the percentage of installed capacity cleared in RPM and committed by FRR entities in excess of the RTO load (including load served under the Fixed Resource Requirement alternative).

### **New Generation Resource Participation**

The 2018/2019 Base Residual Auction results reflect a continuation of strong participation by new Generation Capacity Resources mostly in the form of new (or uprates to existing) gas-fired combustion turbine and combined cycle generation units. The total quantity of new Generation Capacity Resources offered into the auction was 4,132.6 MW (UCAP) comprised of 3,447.4 MW of new generation units and 685.2 MW of uprates to existing generation units. The quantity of new Generation Capacity Resources cleared was 3,506.9 MW (UCAP) comprised of 2,919.3 MW (UCAP) from new generation units, predominantly natural gas combined cycle and combustion turbines, and 587.6 MW from uprates to existing generation units.

Table 2A shows the breakdown, by major LDA, of capacity in UCAP terms of new units and uprates at existing units offered in the auction and capacity actually clearing in the auction. 84.9% of the new generation capacity that offered into the 2018/2019BRA cleared the auction.



## 2018/2019 RPM Base Residual Auction Results

Table 2A – Offered and Cleared New Generation Capacity by LDA (in UCAP MW)

| LDA       | Offered |          |         | Cleared |          |         |
|-----------|---------|----------|---------|---------|----------|---------|
|           | Uprate  | New Unit | Total   | Uprate  | New Unit | Total   |
| EMAC      | 79.7    | 1,086.1  | 1,115.8 | 79.8    | 561.7    | 641.3   |
| MAAC      | 439.9   | 1,054.8  | 1,494.7 | 439.8   | 561.7    | 1,001.3 |
| Total RTO | 685.2   | 3,447.4  | 4,132.6 | 587.8   | 2,854.3  | 3,541.9 |

\*All MW values are in UCAP Terms

\*MAAC includes EMAC

\*\*RTO includes MAAC

### Capacity Import Participation

The quantity of capacity imports cleared in the 2018/2019 BRA was 4,687.9 MW (UCAP) which represents an increase of 162.4 MW from the imports that cleared in the 2017/2018 BRA. The majority of the imports are from resources located in regions west of the PJM RTO. All external generation capacity that has cleared in the 2018/19 BRA has met the requirements for the CIL exception.

Table 2B – Offered and Cleared Capacity Imports (in UCAP MW)

|                                     | External Source Zones |         |         |         |         |         |
|-------------------------------------|-----------------------|---------|---------|---------|---------|---------|
|                                     | NORTH                 | WEST 1  | WEST 2  | SOUTH 1 | SOUTH 2 | Total   |
| Offered MW (UCAP)                   | 252.0                 | 1,238.5 | 2,729.9 | 656.5   | 258.9   | 5,135.8 |
| Cleared MW (UCAP)                   | 252.0                 | 1,163.2 | 2,459.8 | 656.5   | 258.3   | 4,587.9 |
| Resource Clearing Price (\$/MW-day) | \$0.00                | \$0.00  | \$0.00  | \$0.00  | \$0.00  |         |

Note: All Cleared MW quantities include resources that received CIL exception and those associated with pre-OAT1 grandfathered transmission; therefore, clearing at RTO clearing price

### Demand Resource Participation

The total quantity of DR offered into the 2018/2019 BRA was 11,675.5 MW (UCAP), representing an increase of 3.4% over the DR that offered into the 2017/2018 BRA. Of the 11,675.5 MW of total DR that offered in this auction, 11,084.4 MW cleared. The cleared



## **2018/2019 RPM Base Residual Auction Results**

DR is 109.6 MW more than that which cleared in the 2017/2018 BRA. Table 3A contains a comparison of the DR Offered and Cleared in 2017/2018 BRA & 2018/2019 BRA represented in UCAP.

### **Energy Efficiency Resource Participation**

An EE resource is a project that involves the installation of more efficient devices/equipment or the implementation of more efficient processes/systems exceeding then-current building codes, appliance standards, or other relevant standards at the time of installation as known at the time of commitment. The EE resource must achieve a permanent, continuous reduction in electric energy consumption (during the defined EE performance hours) that is not reflected in the peak load forecast used for the BRA for the Delivery Year for which the EE resource is proposed. The EE resource must be fully implemented at all times during the Delivery Year, without any requirement of notice, dispatch, or operator intervention. Of the 1,306.1 MW of energy efficiency that offered into the 2018/2019 BRA, 1,246.5 MW of EE resources cleared in the auction.

Table 3B contains a summary of the DR and EE resources that offered and cleared by zone in the 2018/2019 BRA. Approximately 94.9% of the demand resources and 95.4% of the energy efficiency resources that were offered into the BRA cleared. The uncleared resources were offered at a price above the applicable clearing price for the LDA in which the resource was offered.

Figure 1 illustrates the demand side participation in the PJM Capacity Market from 2005/2006 Delivery Year to the 2018/2019 Delivery Year. Demand side participation includes active load management (ALM) prior to 2007/2008 Delivery Year, Interruptible Load for Reliability (ILR) and DR offered into each BRA and nominated in FRR Plans, and EE resources starting with the 2012/2013 Delivery Year. The demand side participation in the capacity market has increased dramatically since the inception of RPM in the 2007/2008 Delivery Year through the 2015/2016 BRA, but as shown in Figure 1, total demand side participation and cleared resources for the 2018/2019 BRA have fallen below the levels seen in the 2014/2015 BRA.



## 2018/2019 RPM Base Residual Auction Results

Table 3A – Comparison of Demand Resources Offered and Cleared in 2017/18 BRA & 2018/19 BRA represented in UCAP

|                 |        | Offered MW (UCAP) |           | Cleared MW (UCAP)      |                        |
|-----------------|--------|-------------------|-----------|------------------------|------------------------|
| LDA             | Zone   | 2017/2018         | 2018/2019 | Increase in Offered MW | Increase in Cleared MW |
| EMAAC           | AECO   | 1348              | 1651      | 30.3                   | 27.4                   |
| EMAAC/DPLS      | DPL    | 372.9             | 422.7     | 49.8                   | 48.5                   |
| EMAAC           | JGRL   | 169.8             | 206.4     | 36.6                   | 40.7                   |
| EMAAC           | PECO   | 494.1             | 513.0     | 18.9                   | 24.5                   |
| PECO/PS-N       | PS-EG  | 392.7             | 386.6     | (6.1)                  | (6.2)                  |
| EMAAC           | RECO   | 3.4               | 7.6       | 4.2                    | 4.1                    |
| EMAAC Sub Total |        | 1,567.7           | 1,701.4   | 133.7                  | 139.0                  |
| PEPCO           | PEPCO  | 619.8             | 667.1     | 47.3                   | (85.3)                 |
| BGE             | BGE    | 803.2             | 813.9     | 10.7                   | (131.2)                |
| MAAC            | METED  | 306.8             | 334.9     | 28.3                   | 28.5                   |
| MAAC            | PENNEL | 367.7             | 392.6     | 24.9                   | 27.9                   |
| PPL             | PPL    | 812.7             | 873.6     | 60.9                   | 30.0                   |
| MAAC* Sub Total |        | 4,477.7           | 4,783.5   | 305.8                  | 8.9                    |
| RTO             | AEP    | 1,445.5           | 1,441.5   | (4.0)                  | (8.5)                  |
| RTO             | APS    | 940.8             | 990.7     | 49.9                   | 47.9                   |
| ATS/ATS-SC      | ATS-I  | 1,064.4           | 891.9     | (172.5)                | (143.2)                |
| COMED           | COMED  | 1,499.6           | 1,301.2   | 401.6                  | 398.6                  |
| RTO             | DAY    | 211.9             | 234.9     | 23.0                   | 22.2                   |
| RTO             | DEOK   | 194.0             | 205.7     | 11.7                   | 11.4                   |
| RTO             | DDM    | 1,157.8           | 827.8     | (330.0)                | (323.8)                |
| RTO             | DUG    | 161.9             | 263.0     | 101.1                  | 100.9                  |
| RTO             | EXPC   | 140.1             | 138.3     | (4.8)                  | (4.8)                  |
| Grand Total     |        | 11,293.7          | 11,675.5  | 381.8                  | 109.5                  |

\*MAAC sub-total includes all MAAC Zones



## 2018/2019 RPM Base Residual Auction Results

Table 3B – Comparison of Demand Resources and Energy Efficiency Resources Offered versus Cleared in the 2018/19 BRA

| LDA              | Zone    | Offered MW (UCAP) |         |          | Cleared MW (UCAP) |         |          |
|------------------|---------|-------------------|---------|----------|-------------------|---------|----------|
|                  |         | DR                | EE      | Total    | DR                | EE      | Total    |
| EMAAC            | AE00    | 165.1             | 3.0     | 168.1    | 162.1             | 3.0     | 165.1    |
| EMAAC/DPL-S      | DPL     | 422.7             | 11.3    | 434.0    | 418.2             | 11.0    | 429.2    |
| EMAAC            | JCP     | 206.4             | 11.4    | 217.8    | 200.1             | 11.4    | 211.5    |
| EMAAC            | PECO    | 513.0             | 14.7    | 527.7    | 504.5             | 14.7    | 519.2    |
| PSEG/PSN         | PSEG    | 385.6             | 14.5    | 400.1    | 382.2             | 14.1    | 396.3    |
| EMAAC            | RECO    | 7.6               | 0.1     | 7.7      | 7.5               | 0.1     | 7.6      |
| EMAAC Sub Total  |         | 1,704.4           | 55.0    | 1,759.4  | 1,674.6           | 54.3    | 1,728.9  |
| PEPCO            | PEPCO   | 667.1             | 67.3    | 734.4    | 523.1             | 66.4    | 589.5    |
| BGE              | BGE     | 813.9             | 34.1    | 948.0    | 660.0             | 36.9    | 755.9    |
| MAAC             | METED   | 334.9             | 4.6     | 339.5    | 327.4             | 4.6     | 332.0    |
| MAAC             | PENELEC | 392.6             | 12.4    | 405.0    | 384.7             | 12.4    | 397.1    |
| PPL              | PPL     | 673.6             | 25.0    | 698.6    | 716.2             | 25.0    | 741.2    |
| MAAC** Sub Total |         | 4,783.5           | 298.4   | 5,081.9  | 4,286.0           | 258.6   | 4,544.6  |
| RTO              | AP      | 1,441.5           | 106.5   | 1,548.0  | 1,417.6           | 106.5   | 1,524.1  |
| RTO              | APS     | 990.7             | 10.5    | 1,001.2  | 976.8             | 10.5    | 987.3    |
| ATIS/ATSK        | ATSI    | 691.9             | 38.8    | 930.7    | 877.0             | 38.6    | 915.6    |
| COMED            | COMED   | 1,901.2           | 74.4    | 2,645.6  | 1,876.7           | 74.4    | 2,621.1  |
| RTO              | DAY     | 234.9             | 52.7    | 267.6    | 231.5             | 32.9    | 264.5    |
| RTO              | DEOK    | 205.7             | 18.5    | 224.2    | 203.8             | 18.5    | 222.3    |
| RTO              | DOM     | 827.8             | 12.9    | 840.7    | 817.3             | 12.9    | 830.2    |
| RTO              | DUQ     | 263.0             | 23.4    | 286.4    | 262.3             | 23.4    | 285.7    |
| RTO              | EXPC    | 135.3             | -       | 135.3    | 135.3             | -       | 135.3    |
| Grand Total      |         | 11,675.5          | 1,306.1 | 12,981.6 | 11,084.4          | 1,246.5 | 12,330.9 |

\*\*MAAC sub-total includes all MAAC Zones

Any resource that can qualify as a CP Resource may submit separate but coupled sell offers for CP and Base Capacity product types. When sell offer segments of both capacity product types are coupled with different offer prices, the auction clearing engine will clear only one of the products at most and will clear the product that results in the lowest cost solution for the system. Any Generation Capacity Resource with a unit-specific MSOC above the CP default MSOC must submit separate but coupled sell offers for CP and Base Capacity product types. Table 3C shows a breakdown of offered and cleared capacity for each resource type grouped by



## 2018/2019 RPM Base Residual Auction Results

coupling scenario. As shown on Table 3C, 138,228.9 MW or 89.5% of the total cleared generation capacity cleared as CP; 1,484.2 MW or 13.4% of the total cleared DR capacity cleared as CP; and, 887.3 MW or 71.2% of total cleared EE capacity cleared as CP.

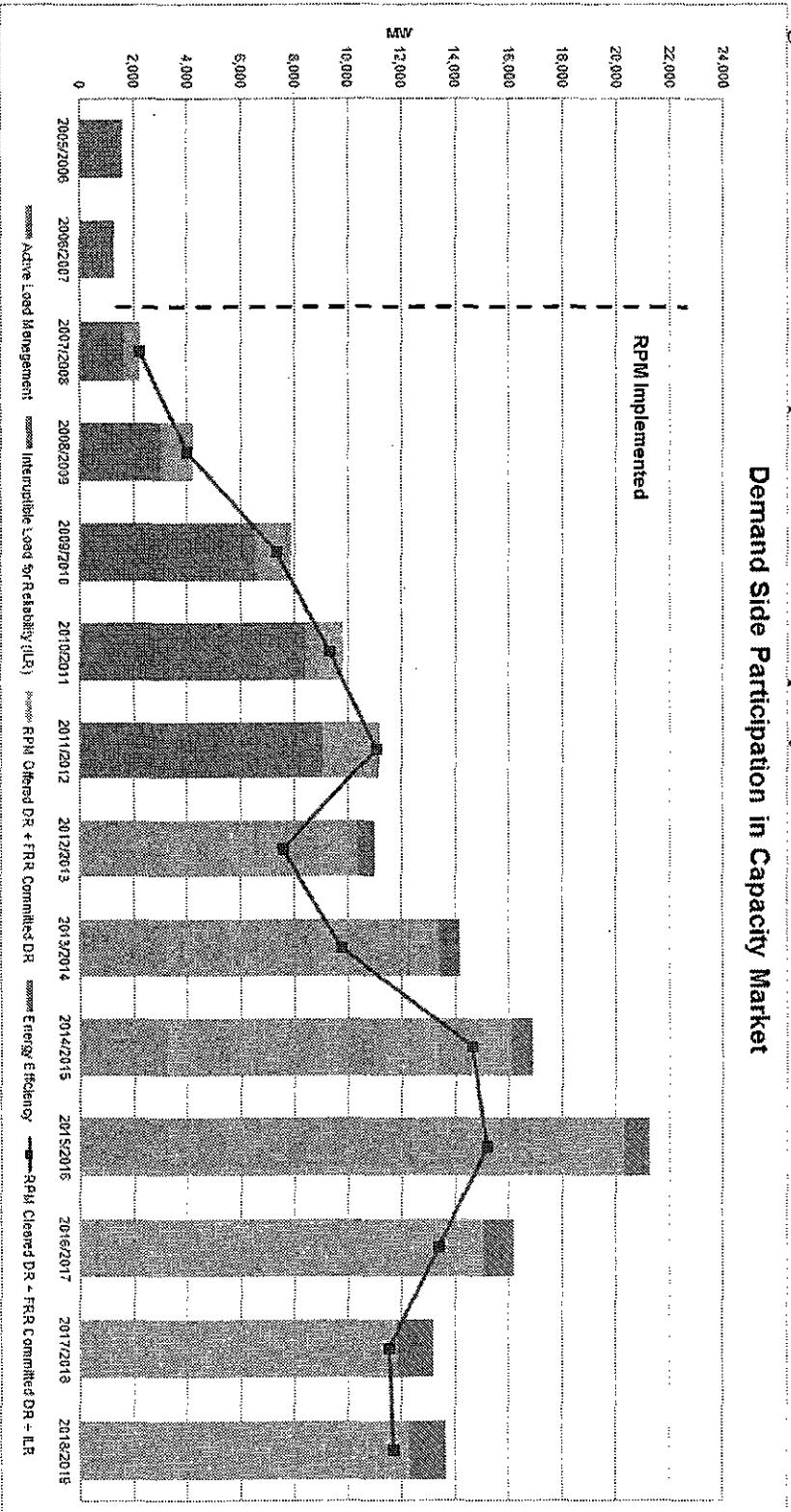
Table 3C – Breakdown of Demand Resources Offered versus Cleared by Product Type in the 2018/19 BRA in UCAP

| Resource Type | Product Coupling Scenario     | Offered MW (UCAP) |                                   | Cleared MW (UCAP) |                                   |
|---------------|-------------------------------|-------------------|-----------------------------------|-------------------|-----------------------------------|
|               |                               | Base Product Type | Capacity Performance Product Type | Base Product Type | Capacity Performance Product Type |
| GEN           | Capacity Performance and Base | 22,255.8          | 22,477.7                          | 11,194.3          | 9,554.7                           |
| GEN           | Capacity Performance Only     | -                 | 139,204.5                         | -                 | 128,674.2                         |
| GEN           | Base Only                     | 5,224.2           | -                                 | 5,082.8           | -                                 |
| GEN Sub Total |                               | 27,480.0          | 161,682.2                         | 16,277.1          | 138,228.9                         |
| DR            | Capacity Performance and Base | 4,467.5           | 3,528.5                           | 3,688.8           | 548.2                             |
| DR            | Capacity Performance Only     | -                 | 935.0                             | -                 | 936.0                             |
| DR            | Base Only                     | 6,252.4           | -                                 | 5,911.4           | -                                 |
| DR Sub Total  |                               | 10,719.9          | 4,464.5                           | 9,600.2           | 1,484.2                           |
| EE            | Capacity Performance and Base | 852.9             | 857.4                             | 65.1              | 592.4                             |
| EE            | Capacity Performance Only     | -                 | 3,147                             | -                 | 294.9                             |
| EE            | Base Only                     | 332.7             | -                                 | 284.1             | -                                 |
| EE Sub Total  |                               | 985.6             | 972.1                             | 359.2             | 887.3                             |
| Grand Total   |                               | 39,185.5          | 167,116.8                         | 26,236.5          | 140,600.4                         |



## 2018/2019 RPM Base Residual Auction Results

**Figure 1 – Demand Side Participation in the PJM Capacity Market**  
**Demand Side Participation in Capacity Market**





## **2018/2019 RPM Base Residual Auction Results**

### **Renewable Resource Participation**

857.2 MW of wind resources were offered into and cleared the 2018/2019 BRA as compared to 803.7 MW of wind resources that offered into and cleared the 2017/2018 BRA. The capacity factor applied to wind resources is 13%, meaning that for every 100 MW of wind energy, 13 MW are eligible to meet capacity requirements. The 857.2 MW of cleared wind capacity translates to 6,593.8 MW of wind energy nameplate capability that is expected to be available in the 2018/2019 Delivery Year.

183.7 MW of solar resources were offered into and cleared the 2018/2019 BRA as compared to 116.4 MW of solar resources that offered into and cleared the 2017/2018 BRA. The capacity factor applied to solar resources is 38%, meaning that for every 100 MW of solar energy, 38 MW are eligible to meet capacity requirements. The 183.7 MW of cleared solar capacity translates to 484.4 MW of solar energy that is expected to be available in the 2018/2019 Delivery Year.

### **LDA Results**

An LDA was modeled in the BRA and had a separate VRR Curve if (1) the LDA has a CETO/CETL margin that is less than 115%; or (2) the LDA had a locational price adder in any of the three immediately preceding Base Residual Auctions; or (3) the LDA is likely to have a locational price adder based on a PJM analysis using historic offer price levels; or (4) the LDA is EMAAC, SWMAAC, and MAAC.

As a result of the above criteria, MAAC, EMAAC, SWMAAC, PSEG, PS-NORTH, DPL-SOUTH, PEPCO, ATSI, ATSI-Cleveland, COMED, BGE and PL were modeled as LDAs in the 2018/2019 RPM Base Residual Auction. The EMAAC LDA and the ComEd LDA were binding constraints in the auction resulting in a Locational Price Adder for these LDAs. A Locational Price Adder represents the difference in Resource Clearing Prices for the Limited capacity product between a resource in a constrained LDA and the immediate higher level LDA. The EMAAC CETL for the 2018/2019 BRA is 940 MW lower than the 2017/2018 BRA CETL value. This reduction is primarily attributable to the addition of a significant amount of planned generation capacity in the Peach Bottom/Rock Springs area contributing to increased loading on the Rocks Spring-Keeney 500 kV line which aggravates the post-contingency voltage profile in the EMAAC area for the loss of the line. The ComEd CETL for the 2018/2019 BRA is 1,793 MW lower than the 2017/2018 BRA CETL. This reduction is primarily due to external system limitations that reduced the import capability into ComEd from outside of PJM. These external system limitations were caused by changes to the transmission system configuration anticipated for the 2018/2019 Delivery Year as well as changes to Firm transmission service reservations. The reduction in the ability to import from outside of PJM required that the imports in the CETL test for the ComEd LDA were sourced increasingly from inside PJM, resulting in the identification of transmission limitations at a lower overall transfer value.



## 2018/2019 RPM Base Residual Auction Results

Table 4 contains a summary of the clearing results in the LDAs from the 2018/2019 RPM Base Residual Auction.

**Table 4 –RPM Base Residual Auction Clearing Results in the LDAs**

| Auction Results                                      | RTO       | MAC       | SWMAC     | PEPCO      | BGE       | EMAC      | DPL-SOUTH | PSEG      | PS-NORTH  | ATSI      | ATSI-CLEVELAND | PPL       | COMED     |
|------------------------------------------------------|-----------|-----------|-----------|------------|-----------|-----------|-----------|-----------|-----------|-----------|----------------|-----------|-----------|
| Offered MW (UCAP)                                    | 179,891.2 | 73,545.7  | 12,621.2  | 5,991.2    | 4,224.9   | 33,840.8  | 1,693.9   | 6,939.3   | 3,645.3   | 11,085.7  | 2,590.4        | 11,157.6  | 26,275.6  |
| Clearing MW (UCAP)                                   | 168,836.9 | 68,071.2  | 11,180.7  | 5,475.7    | 3,296.9   | 31,069.0  | 1,693.5   | 5,800.8   | 3,168.0   | 10,174.6  | 2,438.1        | 9,576.9   | 23,320.4  |
| System Marginal Price                                | \$164.77  | \$164.77  | \$164.77  | \$164.77   | \$164.77  | \$164.77  | \$164.77  | \$164.77  | \$164.77  | \$164.77  | \$164.77       | \$164.77  | \$164.77  |
| Locational Price Adder <sup>1</sup>                  |           |           |           |            |           | \$80.85   |           |           |           |           |                |           | \$80.23   |
| Base Capacity Resource Price Decrement <sup>**</sup> | (\$14.79) | (\$14.79) | (\$14.79) | (\$14.79)  | (\$14.79) | (\$14.79) | (\$14.79) | (\$14.79) | (\$14.79) | (\$14.79) | (\$14.79)      | (\$14.79) | (\$14.79) |
| Base DR/E Capacity Price Decrement                   |           |           | (\$50.03) | (\$100.88) | (\$90.03) |           |           |           |           |           |                |           |           |
| RCP for Base DR/E Resources                          | \$149.98  | \$149.98  | \$59.95   | \$41.09    | \$39.95   | \$210.63  | \$210.63  | \$210.63  | \$210.63  | \$149.98  | \$149.98       | \$149.98  | \$200.21  |
| RCP for Base Generation Resources                    | \$169.68  | \$149.98  | \$149.98  | \$149.98   | \$149.98  | \$210.63  | \$210.63  | \$210.63  | \$210.63  | \$149.98  | \$149.98       | \$149.98  | \$200.21  |
| RCP for Capacity Performance Resources               | \$164.77  | \$164.77  | \$164.77  | \$164.77   | \$164.77  | \$225.42  | \$225.42  | \$225.42  | \$225.42  | \$164.77  | \$164.77       | \$164.77  | \$215.00  |

<sup>1</sup>Locational Price Adder is with respect to the immediate parent LDA

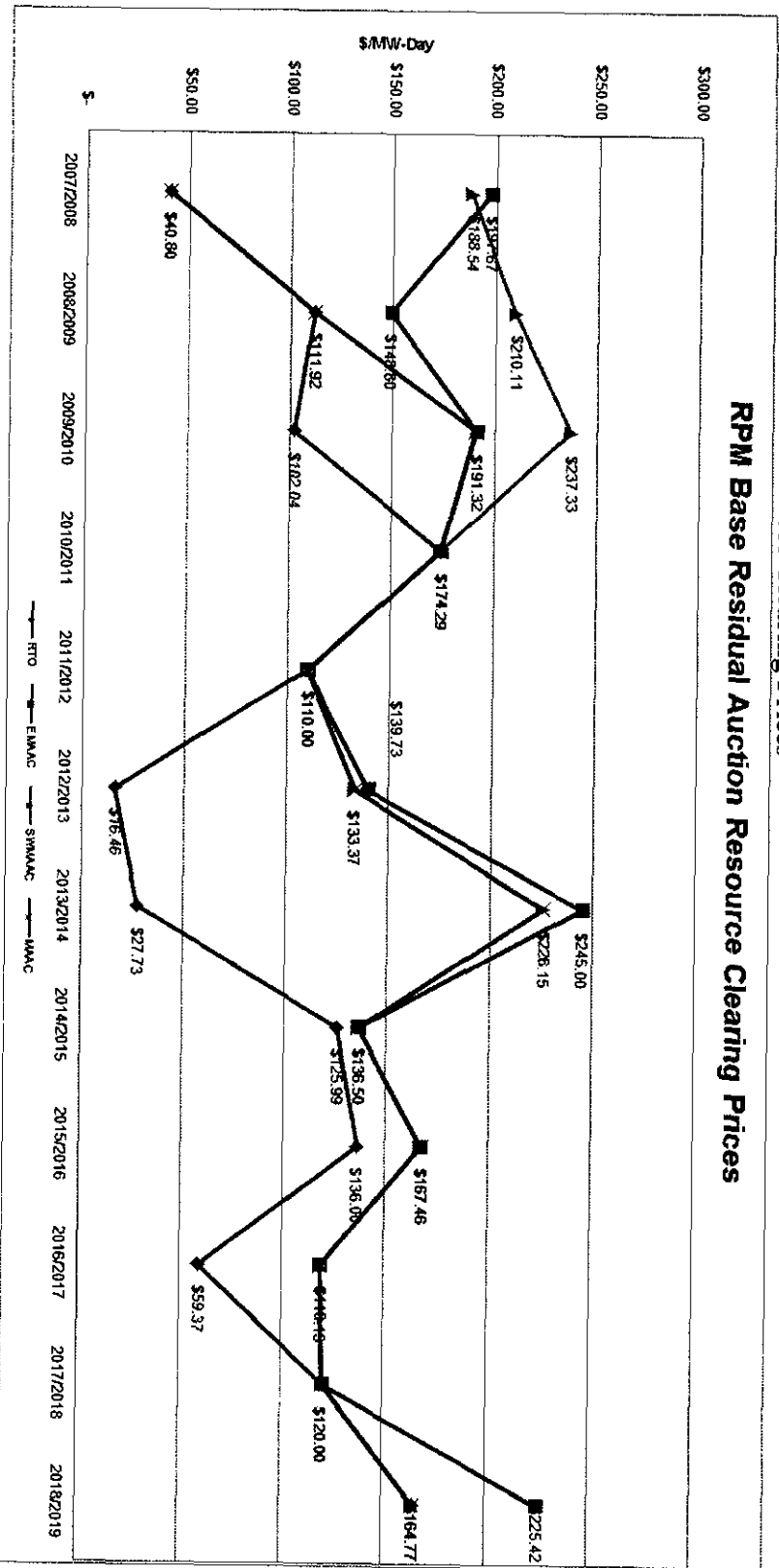
<sup>\*\*</sup>Base Generation and Base DR/E receive the Base Capacity Resource Price Decrement

Since the EMAC LDA and ComEd LDA were constrained LDAs, Capacity Transfer Rights (CTRs) will be allocated to loads in these constrained LDA for the 2018/2019 Delivery Year. CTRs are allocated by load ratio share to all Load Serving Entities (LSEs) in a constrained LDA that has a higher clearing price than the unconstrained region. CTRs serve as a credit back to the LSEs in the constrained LDA for use of the transmission system to import less expensive capacity into that constrained LDA and are valued at the difference in the clearing prices of the constrained and unconstrained regions.



## 2018/2019 RPM Base Residual Auction Results

Figure 2 – Base Residual Auction Resource Clearing Prices



\*2014/2015 through 2018/2019 Prices reflect the Annual Resource Clearing Prices.



## **2018/2019 RPM Base Residual Auction Results**

Table 5 contains a summary of the RTO resources for each cleared BRA from 2008/2009 through the 2018/2019 Delivery Years. The summary includes all resources located in the RTO (including FRR Capacity Plans).

A total of 209,025.2 MW of installed capacity was eligible to be offered into the 2018/2019 Base Residual Auction, with 5,724.6 MW from external resources. As illustrated in Table 5, the amount of capacity exports in the 2018/2019 auction increased by 90.2 MW from that of the previous auction and FRR commitments increased by 16.9 MW from the 2017/2018 Delivery Year to 15,793 MW.

A total of 189,570.4 MW of capacity was offered into the Base Residual Auction. This is an increase of 2,096.7 MW from that which was eligible to be offered into the 2017/2018 BRA. A total of 19,454.8 MW was eligible, but not offered due to either (1) inclusion in an FRR Capacity Plan, (2) export of the resource, or (3) having been excused from offering into the auction. Resources were excused from the must offer requirement for the following reasons: approved retirement requests not yet reflected in eRPM, and excess capacity owned by an FRR entity.



## 2018/2019 RPM Base Residual Auction Results

Table 5 – RPM Base Residual Auction Generation, Demand, and Energy Efficiency Resource Information in the RTO

| Auction Supply (all values in MW)     | RTO <sup>1</sup> |           |           |           |           |           |           |           |           |           |           |  |  |  |  |  |
|---------------------------------------|------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|--|--|--|--|--|
|                                       | 2008/2009        | 2009/2010 | 2010/2011 | 2011/2012 | 2012/2013 | 2013/2014 | 2014/2015 | 2015/2016 | 2016/2017 | 2017/2018 | 2018/2019 |  |  |  |  |  |
| Internal PJM Capacity                 | 168,027.9        | 167,026.2 | 168,457.0 | 169,241.6 | 179,791.2 | 195,633.4 | 199,376.9 | 207,559.1 | 208,098.0 | 202,477.4 | 203,300.6 |  |  |  |  |  |
| Imports Offered                       | 2,612.0          | 2,563.2   | 2,982.4   | 6,814.2   | 4,152.4   | 4,766.1   | 7,620.2   | 4,649.7   | 8,412.2   | 6,300.9   | 5,724.6   |  |  |  |  |  |
| Total Eligible RPM Capacity           | 168,649.9        | 169,589.5 | 171,439.7 | 176,055.8 | 183,943.6 | 200,399.5 | 206,995.7 | 212,208.8 | 216,510.2 | 208,778.3 | 209,025.2 |  |  |  |  |  |
| Exports - Deliveries                  | 4,205.8          | 2,240.9   | 3,376.2   | 3,385.2   | 2,783.9   | 2,824.5   | 1,230.1   | 1,218.8   | 216.8     | 1,223.2   | 1,313.4   |  |  |  |  |  |
| FRR Commitments                       | 24,953.5         | 25,316.2  | 26,305.7  | 25,921.2  | 26,302.1  | 25,793.1  | 33,612.7  | 15,997.9  | 15,576.6  | 15,776.1  | 15,793.0  |  |  |  |  |  |
| Excused                               | 722.0            | 1,121.9   | 1,290.7   | 1,580.0   | 1,732.2   | 1,825.7   | 3,255.2   | 8,712.9   | 8,524.0   | 4,395.3   | 2,348.4   |  |  |  |  |  |
| Total Eligible RPM Capacity - Excused | 29,881.3         | 28,679.0  | 30,974.6  | 30,890.4  | 30,816.2  | 30,243.3  | 38,098.0  | 25,929.6  | 25,319.4  | 21,204.8  | 19,444.8  |  |  |  |  |  |
| Remaining Eligible RPM Capacity       | 138,768.6        | 140,910.5 | 140,465.1 | 145,165.4 | 153,125.4 | 170,156.2 | 168,897.7 | 186,279.2 | 191,190.8 | 187,473.7 | 189,570.4 |  |  |  |  |  |
| Generation Offered                    | 138,076.7        | 140,003.6 | 139,528.5 | 143,568.1 | 142,957.7 | 156,894.1 | 153,048.1 | 166,127.8 | 176,145.8 | 175,329.5 | 177,592.1 |  |  |  |  |  |
| DR Offered                            | 691.9            | 906.9     | 935.6     | 1,597.3   | 9,535.4   | 12,528.7  | 15,043.1  | 19,243.6  | 13,932.9  | 10,855.2  | 10,772.8  |  |  |  |  |  |
| EE Offered                            | 0.0              | 0.0       | 0.0       | 0.0       | 632.9     | 733.4     | 806.3     | 907.6     | 1,112.6   | 1,289.0   | 1,205.5   |  |  |  |  |  |
| Total Eligible RPM Capacity Offered   | 138,768.6        | 140,910.5 | 140,466.1 | 145,166.4 | 153,125.4 | 170,156.2 | 168,897.7 | 186,279.2 | 191,190.8 | 187,473.7 | 189,570.4 |  |  |  |  |  |
| Total Eligible RPM Capacity Unoffered | 0.0              | 0.0       | 0.0       | 0.0       | 0.0       | 0.0       | 0.0       | 0.0       | 0.0       | 0.0       | 0.0       |  |  |  |  |  |

<sup>1</sup> RTO numbers include all LDAs.

<sup>2</sup> All generation in the Duquesne zone is considered external to PJM for the 2011/2012 BRA.

<sup>3</sup> 2013/2014 includes ATSI zone and generation

<sup>4</sup> 2014/2015 includes Duke zone and generation

<sup>5</sup> 2015/2016 includes a significant portion of AEP and DEOK zone load previously under the FRR Alternative

<sup>6</sup> 2016/2017 includes EKPC zone



## 2018/2019 RPM Base Residual Auction Results

Table 6 shows the Generation, DR, and EE Resources Offered and Cleared in the RTO translated into Unforced Capacity (UCAP) MW amounts. Participants' sell offer EFORd values were used to translate the generation installed capacity values into unforced capacity (UCAP) values. DR sell offers and EE sell offers were converted into UCAP using the appropriate DR Factor and Forecast Pool Requirement (FPR) for the Delivery Year.

In UCAP terms, a total of 179,891.2 MW were offered into the 2018/2019 BRA, comprised of 166,909.6 MW of generation capacity, 11,675.5 MW of capacity from DR, and 1,306.1 MW of capacity from EE resources. Of those offered, a total of 166,836.9 MW of capacity was cleared in the BRA.

Of the 166,836.9 MW of capacity that cleared in the auction, 154,506 MW were from Generation Capacity Resources, 11,084.4 MW were from DR, and 1,246.5 MW were from EE resources. Capacity that was offered but not cleared in the BRA Auction will be eligible to offer into the First, Second and Third Incremental Auctions for the 2018/2019 Delivery Year.

**Table 6 – Generation, Demand Resources, and Energy Efficiency Resources Offered and Cleared in UCAP MW**

| Auction Results (all values in UCAP-MW) | RTO*      |           |           |           |           |           |           |           |           |           |           |  |
|-----------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|--|
|                                         | 2008/2009 | 2009/2010 | 2010/2011 | 2011/2012 | 2012/2013 | 2013/2014 | 2014/2015 | 2015/2016 | 2016/2017 | 2017/2018 | 2018/2019 |  |
| Generation Offered                      | 181,164.8 | 132,614.2 | 132,124.3 | 138,057.9 | 134,673.0 | 147,163.6 | 144,108.8 | 157,691.1 | 168,716.0 | 166,218.8 | 166,909.6 |  |
| DR Offered                              | 715.8     | 936.8     | 967.9     | 1,852.4   | 9,847.6   | 12,952.7  | 15,545.6  | 19,958.3  | 14,507.2  | 11,293.7  | 11,675.5  |  |
| EE Offered                              |           |           |           |           | 652.7     | 756.6     | 831.9     | 940.3     | 1,196.8   | 1,340.0   | 1,306.1   |  |
| Total Offered                           | 181,880.6 | 133,551.0 | 133,092.2 | 137,720.3 | 145,373.3 | 160,898.1 | 160,486.3 | 178,597.7 | 184,380.0 | 178,858.5 | 179,891.2 |  |
| Generation Cleared                      | 129,161.4 | 131,336.9 | 131,251.5 | 130,856.6 | 128,527.4 | 142,762.0 | 135,034.2 | 148,805.9 | 155,834.3 | 154,691.0 | 154,506.0 |  |
| DR Cleared                              | 536.2     | 892.9     | 939.0     | 1,364.9   | 7,047.2   | 9,281.9   | 14,118.4  | 14,832.8  | 12,408.1  | 10,974.8  | 11,084.4  |  |
| EE Cleared                              | 0.0       | 0.0       | 0.0       | 0.0       | 568.9     | 678.4     | 822.1     | 922.6     | 1,117.3   | 1,338.9   | 1,246.5   |  |
| Total Cleared                           | 129,697.6 | 132,231.8 | 132,190.5 | 132,221.5 | 136,143.5 | 152,743.3 | 149,974.7 | 164,561.2 | 169,159.7 | 167,003.7 | 166,836.9 |  |
| Uncleared                               | 2,283.0   | 1,319.2   | 902.2     | 5,498.8   | 9,229.8   | 8,154.8   | 10,511.6  | 14,028.5  | 15,220.3  | 11,854.8  | 13,054.3  |  |

\* RTO numbers include all LDAs

\*\* UCAP calculated using sell offer EFORd for Generation Resources. DR and EE UCAP values include appropriate FPR and DR Factor.

Table 7 contains a summary of capacity additions and reductions from the 2007/2008 BRA to the 2018/2019 BRA. A total of 5,055.6 MW of incrementally new capacity in PJM was available for the 2018/2019 BRA. This incrementally new capacity includes new Generation Capacity Resources and capacity upgrades to existing Generation Capacity Resources. The increase is offset by generation



## 2018/2019 RPM Base Residual Auction Results

capacity deratings on existing Generation Capacity Resources and a reduction in the quantity of offered DR and EE to yield a net increase of 1,268.9 MW of installed capacity.

Table 7 also illustrates the total amount of resource additions and reductions over eleven Delivery Years since the implementation of the RPM construct. Over the period covering the first twelve RPM BRAs, 40,206.7 MW of new generation capacity was added which was partially offset by 33,700.3 MW of capacity de-ratings or retirements over the same period. Additionally, 11,210.6 MW of new DR and 1,205.5 MW of new EE resources were offered over the course of the twelve Delivery Years since RPM's inception. The total net increase in installed capacity in PJM over the period of the last twelve RPM auctions was 18,922.5 MW.

**Table 7 – Incremental Capacity Resource Additions and Reductions to Date**

| Capacity Changes (in MW)            | 2007/2008 | 2008/2009 | 2009/2010 | 2010/2011 | 2011/2012 | 2012/2013 | 2013/2014 | 2014/2015 | 2015/2016 | 2016/2017 | 2017/2018 | 2018/2019 | Total     |
|-------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Net Increase in Generation Capacity | 8,120     | 7,242     | 2,223     | 1,052     | 3,576.3   | 1,933     | 1,075     | 1,522.8   | 8,201.0   | 3,808.0   | 6,973.3   | 5,055.6   | 40,206.7  |
| Decrease in Generation Capacity     | -874.6    | -375.4    | -550.2    | -301.8    | -264.7    | -3,253.9  | -1,924.1  | -1,550.1  | -5,432.6  | -4,992.0  | -9,780.1  | -3,620.8  | -33,700.3 |
| Net Increase in Demand Resource     | 555.0     | 574.7     | 295.0     | 28.7      | 651.7     | 7,938.1   | 2,553.3   | 2,514.4   | 4,200.5   | 5,610.7   | 3,077.7   | -82.4     | 11,210.6  |
| Net Increase in Energy Efficiency   | 0.0       | 0.0       | 0.0       | 0.0       | 0.0       | 832.3     | 101.1     | 73.1      | 101.3     | 204.8     | 175.4     | -83.5     | 1,205.5   |
| Net Increase in Installed Capacity  | 482.4     | 923.5     | 937.1     | 1503.4    | 3893.3    | 7,210.0   | 2,607.8   | 2,620.2   | 6,678.2   | 3,281.9   | 5,688.1   | 1,268.9   | 18,922.5  |

\* RTO numbers include all LDAs

\*\* Values are with respect to the quantity offered in the previous year's Base Residual Auction.

1) Does not include Existing Generation located in ATSI Zone

2) Does not include Existing Generation located in Duke Zone

3) Does not include Existing Generation located in EKPC Zone

Table 7A provides a further breakdown of the generation increases and decreases for the 2018/2019 Delivery Year on an LDA basis.

**Table 7A – Generation Increases and Decreases by LDA Effective 2018/2019 Delivery Year**

| LDA Name  | Increases | Decreases |
|-----------|-----------|-----------|
| EMAAC     | 1,172.9   | 1,931.9   |
| MAAC      | 1,568.8   | (248.8)   |
| Total RTO | 5,055.6   | (3,620.8) |

All Values in ICAP terms

\*MAAC includes EMAAC

\*\*RTO includes MAAC



## **2018/2019 RPM Base Residual Auction Results**

Table 8 provides a breakdown of the new capacity offered into the each BRA into the categories of new resources, reactivated units, and uprates to existing capacity, and then further down into resource type. As shown in this table, there was a significant quantity of generating capacity from new resources and uprates to existing resources offered into the 2018/2019 BRA. The capacity offered in the 2018/2019 BRA resulted from both new generating resources and uprates to existing resources including gas, diesel, coal, wind, and nuclear resources. The largest growth remains in gas turbines and combined cycle plants.



## 2018/2019 RPM Base Residual Auction Results

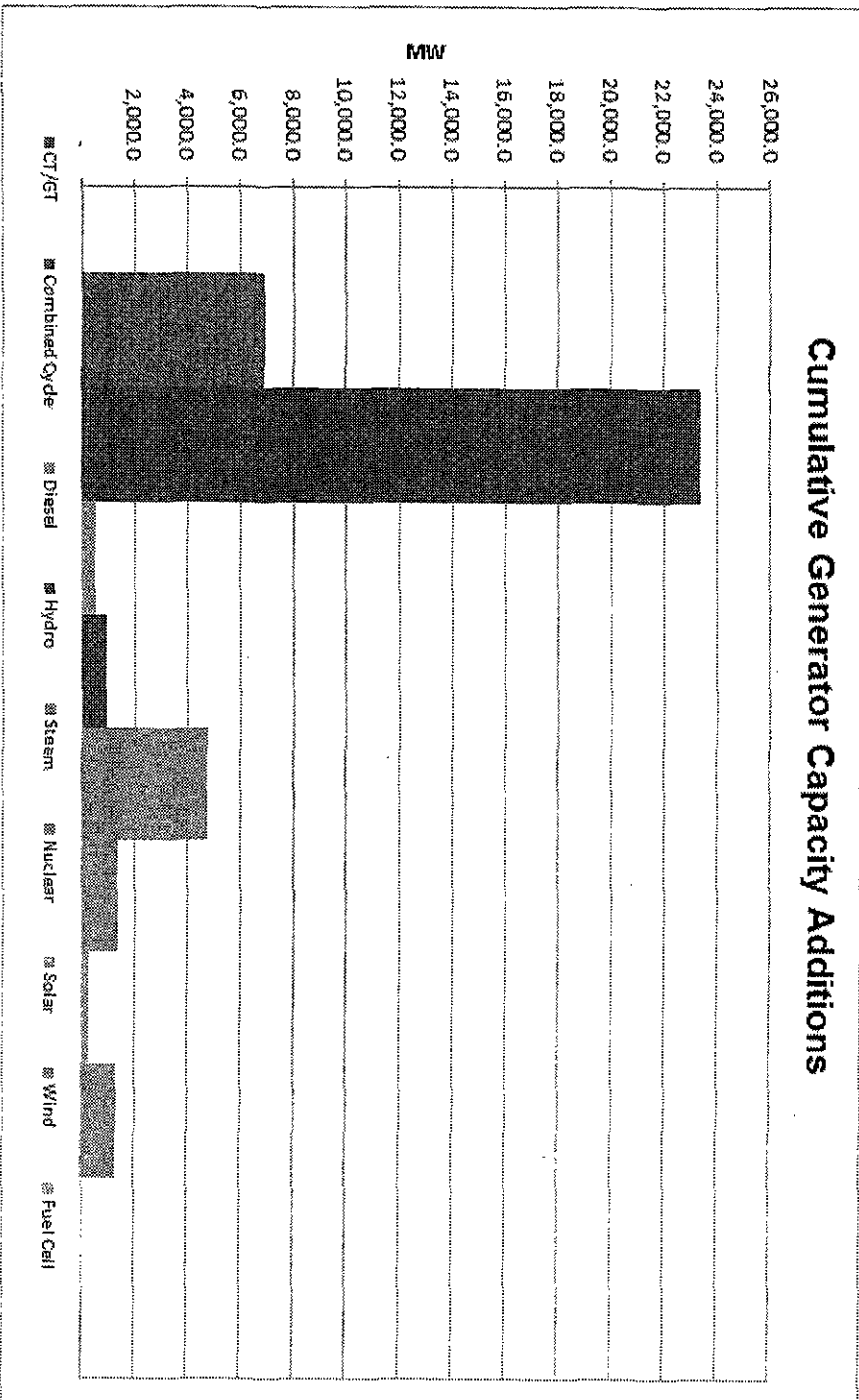
Table 8 – Further Breakdown of Incremental Capacity Resource Additions from 2007/2008 to 2018/2019

| Delivery Year | CT/GT   | Combined Cycle | Diesel | Hydro | Steam   | Nuclear | Solar | Wind    | Fuel Cell | Total    |
|---------------|---------|----------------|--------|-------|---------|---------|-------|---------|-----------|----------|
| 2007/2008     |         |                | 18.7   | 0.3   |         |         |       |         |           | 19.0     |
| 2008/2009     |         |                | 27.0   |       |         |         |       | 66.1    |           | 93.1     |
| 2009/2010     | 389.5   |                | 23.8   |       | 53.0    |         |       |         |           | 475.3    |
| 2010/2011     | 283.3   | 580.0          | 23.0   |       |         |         |       | 141.4   |           | 1,027.7  |
| 2011/2012     | 416.4   | 1,135.0        |        |       | 704.8   |         | 1.1   | 75.2    |           | 2,332.5  |
| 2012/2013     | 403.8   |                | 7.8    |       | 621.3   |         |       | 75.1    |           | 1,108.0  |
| 2013/2014     | 329.0   | 705.0          | 6.0    |       | 25.0    |         | 9.5   | 245.7   |           | 1,320.2  |
| 2014/2015     | 108.0   | 650.0          | 35.1   | 132.9 |         |         | 28.0  | 146.5   |           | 1,100.5  |
| 2015/2016     | 1,382.5 | 5,914.5        | 19.4   | 148.4 | 45.4    |         | 13.8  | 104.9   | 30.0      | 7,658.9  |
| 2016/2017     | 171.1   | 4,984.5        | 38.3   |       | 24.0    |         | 32.1  | 54.3    |           | 5,314.3  |
| 2017/2018     | 131.0   | 5,010.0        | 124.8  | 6.0   | 90.0    |         | 27.0  |         |           | 5,388.8  |
| 2018/2019     | 1,092.5 | 2,352.3        | 29.9   |       |         |         | 82.8  | 127.1   |           | 3,624.6  |
| 2007/2008     |         |                |        |       | 47.0    |         |       |         |           | 47.0     |
| 2008/2009     |         |                |        |       | 131.0   |         |       |         |           | 131.0    |
| 2009/2010     |         |                |        |       |         |         |       |         |           |          |
| 2010/2011     | 160.0   |                | 10.7   |       |         |         |       |         |           | 170.7    |
| 2011/2012     | 80.0    |                |        |       | 101.0   |         |       |         |           | 181.0    |
| 2012/2013     |         |                |        |       |         |         |       |         |           |          |
| 2013/2014     |         |                |        |       |         |         |       |         |           |          |
| 2014/2015     |         |                | 9.0    |       |         |         |       |         |           | 9.0      |
| 2015/2016     |         |                |        |       | 21.0    |         |       |         |           | 21.0     |
| 2016/2017     |         |                |        |       | 98.0    |         |       |         |           | 98.0     |
| 2017/2018     |         |                |        |       |         |         |       |         |           |          |
| 2018/2019     |         |                |        |       |         |         |       |         |           |          |
| 2007/2008     | 114.5   |                | 13.9   | 80.0  | 235.6   | 92.0    |       |         |           | 536.0    |
| 2008/2009     | 108.2   | 34.0           | 18.0   | 105.5 | 196.0   | 38.4    |       |         |           | 500.1    |
| 2009/2010     | 152.2   | 206.0          |        | 162.5 | 61.4    | 197.4   |       |         |           | 796.6    |
| 2010/2011     | 117.3   | 163.0          |        | 48.0  | 89.2    | 160.3   |       |         |           | 517.8    |
| 2011/2012     | 369.2   | 148.6          | 57.4   |       |         | 292.1   |       | 0.7     |           | 1,062.8  |
| 2012/2013     | 231.2   | 164.3          | 14.2   |       | 193.0   | 126.0   |       | 56.8    |           | 785.5    |
| 2013/2014     | 56.4    | 59.0           | 0.3    |       | 215.0   | 47.0    |       | 36.6    |           | 417.3    |
| 2014/2015     | 104.9   |                | 0.5    | 41.5  | 138.6   | 107.0   | 7.1   | 73.6    |           | 475.2    |
| 2015/2016     | 216.8   | 72.0           | 4.7    | 15.7  | 63.4    | 149.2   | 2.2   | 24.1    |           | 548.1    |
| 2016/2017     | 436.8   | 420.0          | 3.3    | 7.4   | 484.3   | 102.6   | 1.7   | 14.8    |           | 1,470.7  |
| 2017/2018     | 71.9    | 212.5          | 5.1    | 105.9 | 64.8    | 11.0    | 0.4   | 2.1     |           | 472.8    |
| 2018/2019     | 33.4    | 548.0          | 2.4    | 22.9  | 14.9    | 79.3    |       | 14.9    |           | 712.8    |
| Total         | 6,899.7 | 23,368.7       | 493.3  | 877.0 | 4,784.5 | 1,402.3 | 205.7 | 1,281.5 | 30.0      | 38,377.7 |



2018/2019 RPM Base Residual Auction Results

Figure 4: Cumulative Generation Capacity Increases by Fuel Type





## 2018/2019 RPM Base Residual Auction Results

Table 9 shows the changes that have occurred regarding resource deactivation and retirement since the RPM was approved by FERC. The MW values shown in Table 9 represent the quantity of unforced capacity cleared in the 2018/2019 Base Residual Auction that came from resources that have either withdrawn their request to deactivate, postponed retirement, or been reactivated (i.e., came out of retirement or mothball state for the RPM auctions) since the inception of RPM. This total accounts for 4,938.4 MW of cleared UCAP in the 2018/2019 BRA which equates to 7,067.5 MW of ICAP Offered.

**Table 9 – Changes to Generation Retirement Decisions since Commencement of RPM in 2007/2008**

| Generation Resource Decision Changes | RTO*         |              |
|--------------------------------------|--------------|--------------|
|                                      | ICAP Offered | UCAP Cleared |
| Withdrawn Deactivation Requests      | 2,202.7      | 1,085.4      |
| Postponed or Cancelled Retirement    | 3,574.7      | 3,138.5      |
| Reactivation                         | 1,280.1      | 714.5        |
| Total                                | 7,067.5      | 4,938.4      |

### **RPM Impact to Date**

As illustrated in Table 5, for the 2018/2019 auction, the capacity exports were 1,313.4 MW and the offered capacity imports were 5,724.6 MW. The difference between the capacity imports and exports results is a net capacity import of 4,711.2 MW. In the planning year preceding the RPM auction implementation, 2006/2007, there was a net capacity export of 2,616.0 MW. In this auction, PJM is now a net importer of 4,711.2 MW. Therefore, RPM's impact on PJM capacity interchange is 7,027.2 MW.

The minimum net impact of the RPM implementation on the availability of Installed Capacity resources for the 2018/2019 planning year can be estimated by adding the net change in capacity imports and exports over the period, the forward demand and energy efficiency resources, the increase in Installed Capacity over the RPM implementation period from Table 8 and the net change in generation retirements from Table 9. Therefore, as illustrated in Table 10, the minimum estimated net impact of the RPM implementation on the availability of capacity in the 2018/2019 compared to what would have happened absent this implementation is 63,441.0 MW.



## 2018/2019 RPM Base Residual Auction Results

Table 10 shows the details on RPM's impact to date in ICAP terms.

**Table 10 – RPM's Impact to Date**

| Change in Capacity Availability                                         | Installed Capacity MW |
|-------------------------------------------------------------------------|-----------------------|
| New Generation                                                          | 29,464.0              |
| Generation Upgrades (not including reactivations)                       | 8,354.0               |
| Generation Reactivation                                                 | 1,539.7               |
| Forward Demand and Energy Efficiency Resources                          | 12,416.1              |
| Cleared ICAP from Withdrawn or Cancelled Retirements                    | 4,620.0               |
| Net increase in capacity imports                                        | 7,027.2               |
| <b>Total Impact on Capacity Availability in 2018/2019 Delivery Year</b> | <b>63,441.0</b>       |



## 2018/2019 RPM Base Residual Auction Results

### **Discussion of Factors Impacting the RPM Clearing Prices**

The main factors impacting 2018/2019 RPM BRA clearing prices relative to 2017/2018 BRA clearing prices are provided below, separated out by significant changes to the market design and effects on the demand-side and supply-side of the market.

#### *Significant Changes to RPM Design for the 2018/2019 Base Residual Auction*

On June 9, 2015, in Docket No. ER15-623, FERC accepted a series of tariff reforms proposed in PJM's Capacity Performance (CP) filing of December 12, 2014, to establish Capacity Performance Resources to ensure PJM's capacity market provides adequate incentive for resource performance. CP Resources must be capable of sustained, predictable operation, and are expected to be available and capable of providing energy and reserves when needed throughout the entire Delivery Year, particularly during emergency conditions resulting in Performance Assessment Hours (PAH). Base Capacity Resources are not capable of sustained, predictable operation and/or are not expected to provide energy and reserves outside of the summer period. CP Resources are subject to a significant non-performance charge when they fail to perform under emergency conditions at any time during the Delivery Year; whereas, Base Capacity Resources are subject to a non-performance charge only when they fail to perform under emergency conditions during the summer period (at a charge rate that is lower than that for a CP Resource). The key CP filing provisions most directly related to the setup and clearing of the 2018/2019 BRA include:

- All Internal and External Generation Capacity Resources with the exception of Intermittent Resources and Capacity Storage Resources are required to offer as a CP Resource.
- Intermittent and Capacity Storage Resource are categorically exempt from the CP must-offer requirement, but may offer all or a portion of their capability as CP. For purposes of the exemption, Intermittent Resources include wind, solar, landfill gas, run of river hydroelectric power and other renewable resources.
- Exceptions to the CP Resource must-offer requirement are permitted if it is demonstrated that the Generation Capacity Resource is physically incapable of satisfying the requirements of a CP Resource.
- The default Market Seller Offer Cap (MSOC) for a CP Generation Capacity Resource is 85% of the Net CONE for the zone in which the resource resides. Generation Capacity Resource owners may qualify for a unit-specific MSOC above the default CP MSOC by submitting unit-specific Avoidable Cost Rate (ACR) data and information to support such offer cap.



## **2018/2019 RPM Base Residual Auction Results**

- Any resource that can qualify as a CP Resource may submit separate but coupled sell offers for CP and Base Capacity product types. When sell offer segments of both capacity product types are coupled with different offer prices, the auction clearing engine will clear only one of the products at most and will clear the product that results in the lowest cost solution for the system. Any Generation Capacity Resource with a unit-specific MSOC above the CP default MSOC **must** submit separate but coupled sell offers for CP and Base Capacity product types.
- A Base Capacity DR Constraint which places a maximum limit on the total quantity of Base Capacity DR and Base Capacity EE that can be procured in the auction is established for the entire RTO and each modeled LDA. A Base Capacity Resource Constraint which places a maximum limit on the total quantity of Base Capacity DR, Base Capacity EE and Base Capacity Generation Resources that can be procured in the auction is established for the entire RTO and each modeled LDA.
- The Short-Term Resource Procurement Target of 2.5% has been eliminated; therefore, 2.5% of the target reliability requirement is no longer held back from the target procurement quantity of the BRA.
- The UCAP MW value of DR and EE is no longer discounted by the DR Factor which has historically been about 95%. Therefore the UCAP MW value is about 5% greater for each ICAP MW of DR and EE cleared in the auction.

On November 28, 2014, in Docket No. ER14-2940, FERC approved revisions to the Variable Resource Requirement ("VRR") curve shape and Gross Cost of New Entry ("CONE") values as proposed in a PJM filing of September 25, 2014. This filing was made following last year's stakeholder review of the shape of the VRR curve and key inputs to that curve, where such review is required by PJM Tariff on a specified periodic basis. The new shape of the VRR Curve relative to the VRR curve shape used in the prior BRA for the 2017/2018 Delivery Year is best seen in Figure 2 on page 21 of PJM's September 25, 2014 filing (located at <http://www.pjm.com/media/documents/etariff/FercDockets/1304/20140925-er14-2940-000.pdf>). The new Gross CONE values used in the development of the VRR curve range depending on the LDA from 13% to 18.2% lower than values that would otherwise been used in the 2018/2019 BRA (see page 26 of PJM's September 25, 2014 filing).



## **2018/2019 RPM Base Residual Auction Results**

### *Changes that impacted the Demand Curve:*

- The target reliability requirement for the 2018/2019 BRA is 160,607.4 MW, which is 275 MW (0.2%) lower than the target reliability requirement of the 2017/2018 BRA. The target reliability requirement for the 2017/2018 BRA was 160,882 MW which was based on an actual reliability requirement of 165,007 MW minus a short-term resource procurement target quantity of 4,125 MW.
- The Net CONE applicable to the RTO VRR curve is about 15% lower than the RTO Net CONE value used in the 2017/2018 BRA. Relative to the LDA Net CONE values used in the 2017/2018 BRA, the 2018/2019 LDA Net CONE values are lower for all LDAs ranging from a 14% decrease for the MAAC LDA to a 30% decrease for the DPL-South LDA. The reduction in Net CONE values are due to the lower Gross CONE values for the 2018/2019 BRA resulting from PJM's September 25, 2014 filing as described above, as well as, higher Net E&AS Offset values relative to those used last year due to an update of the 3-year period for which the reference resource E&AS revenues were determined (the 2018/2019 values are based on LMPs from calendar years 2012 through 2014 whereas the 2017/2018 values were based on LMPs from calendar years 2011 through 2013).

- The changes to the VRR Curve shape discussed in prior section shifted the VRR Curve to the right (increasing the demand for capacity all else equal).

### *Changes that impacted the Supply Curve:*

- With the transition to the Capacity Performance product, the implied costs of committing to be a Capacity Resource increases due to the need to make improvements in generator performance during Performance Assessment Hours. These increased costs could be related weatherization, improved maintenance, and costs for fuel assurance. This shifts the supply curve for resources up and leads to higher capacity market prices overall.
- Low natural gas and therefore energy market prices have largely led to lower net energy market revenues across the PJM system especially for coal and oil steam units as well as nuclear units which leads to higher capacity market offers from these resources.



## 2018/2019 RPM Base Residual Auction Results

### Revision History

- 8/21/2015: Original version posted
- 8/28/2015: updated typos found in original version:
  - MOPR-related data table of page 7: cleared quantities for RTO and MAAC were corrected; values were reversed in original version.
  - Table 2A: Offered quantity of New Units in MAAC was corrected. Cleared quantities for New Units in EMAAC, MAAC and Total RTO were corrected.
  - Titles of Table 3B and 3C changed to correctly describe data as "2018/2019" BRA



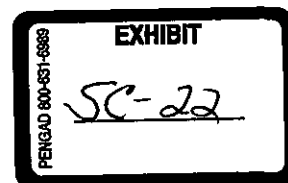
*A unit of American Electric Power*

**INTEGRATED RESOURCE PLANNING REPORT  
TO THE  
COMMONWEALTH OF VIRGINIA  
STATE CORPORATION COMMISSION**

**PUE-2015-00036**

**PUBLIC VERSION**

**July 1, 2015**



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## Executive Summary

The Integrated Resource Plan (IRP or Plan), including Appalachian Power's (APCo or Company) Five-Year Action Plan, is based upon the best available information at the time of preparation. However, changes that may impact this Plan can and will occur, both with and without notice. Therefore this Plan is not a commitment to specific resource additions or other courses of action, since the future is highly uncertain, particularly in light of current economic conditions, the movement towards increasing use of renewable generation and end-use efficiency, as well as current and future environmental regulations, including the U.S. Environmental Protection Agency's (EPA) Clean Power Plan (CPP). In addition, APCo faced a number of other dynamic circumstances as it developed the assumptions and analyses outlined in this IRP Report. Over the next several months, various court orders and agency rules that will likely impact the PJM market, especially with regard to capacity, are expected to be issued. Each of these items may have an impact on the assumptions and analyses within this document and consequently the results. For example, on June 9, 2015, the Federal Energy Regulatory Commission (FERC) issued its Capacity Performance Order providing guidance to PJM on its capacity market proposals. While the Company incorporated its expectations regarding Capacity Performance into this Report, APCo is still evaluating the FERC order, the full impact of which will not be known until tariffs are filed and accepted by the FERC. Thus, this IRP and the action items described herein are subject to change as new information becomes available or as circumstances warrant. The Company notes that the required IRP to be filed in West Virginia in January 2016, and its next Virginia IRP, which is required to be filed on May 1, 2016, are likely to reflect updated assumptions, analyses, and results.

An IRP explains how a utility company plans to meet the projected capacity (*i.e.*, peak demand) and energy requirements of its customers. By Virginia rule, APCo is required to provide an IRP that encompasses a 15-year forecast period (2015-2029). APCo's 2015 IRP has been developed using the Company's current assumptions for:

- Customer load requirements – peak demand and energy;
- Commodity prices – coal, natural gas, on-peak and off-peak power prices, capacity and emission prices;
- Supply-side alternative costs – including fossil fuel and renewable generation

resources; and

- Demand-side program costs and analysis.

In addition, APCo must consider the impact of proposed environmental rules, specifically associated with greenhouse gas (GHG) emissions that, in their current form, would add significant costs and operational challenges. These rules are still being developed, and individual state plans may not be finalized and approved for a number of years. Even so, APCo has considered a portfolio of resources that will provide a path to reduce the intensity of its carbon emissions.

To meet its customers' future energy requirements, APCo will continue operation and the ongoing investment in its existing fleet of generation resources including its base-load coal plants at Amos and Mountaineer, and its combined-cycle and combustion turbine plants. Another consideration in this 2015 IRP is the increased adoption of distributed rooftop solar resources by APCo's customers. While APCo does not have control over how, and to what extent this resource is deployed, it recognizes that distributed rooftop solar will reduce APCo's capacity and energy requirements. From a capacity viewpoint, the 2020/2021 planning year is when PJM's new Capacity Performance rule will take full effect, limiting the capacity value of intermittent resources (hydro, wind, solar and pumped storage)<sup>1</sup> and thereby creating a need within APCo for additional capacity. Keeping these considerations in mind, APCo has developed an IRP that provides adequate supply and demand resources to meet its peak load obligations for the next fifteen years. The key components of this Plan are for APCo to:

- Finish the conversion of Clinch River Units 1 and 2 from coal to natural gas fuel.
- Diversify its mix of supply-side resources through the addition of cost-effective wind, utility-scale solar, and natural gas-fired generation resources, as necessary;
- Implement demand-side resources in the form of additional energy efficiency programs and Volt-VAR Optimization (VVO) installations;
- Recognize that residential and commercial customers will add distributed resources, primarily in the form of residential and commercial rooftop solar.

---

<sup>1</sup>The FERC's June 9, 2015 CP order indicates that there may be a further opportunity to aggregate the capacity value of some of these intermittent resources.

## **Environmental Compliance Issues**

This 2015 IRP considers the impacts of final and proposed EPA regulations on APCo generating facilities. In addition, the IRP development process conservatively assumes there may be future regulation of GHG/carbon dioxide (CO<sub>2</sub>) emissions which will, if established, become effective at some point in the 2020-2025 timeframe. Environmental compliance requirements have a major influence on the consideration of new supply-side resources for inclusion in the IRP because of the potential significant effects on both capital and operational costs. While a proposed GHG/CO<sub>2</sub> rule applicable to existing fossil-fired units has been published by the EPA, there is significant uncertainty regarding how any final rule will be implemented by individual states. This 2015 IRP includes a tax on CO<sub>2</sub> beginning in 2022, which is a reasonable proxy for future CO<sub>2</sub> regulation at this time. The Company will not be able to reasonably model the impact of any final rule until such a rule is promulgated, and states have the opportunity to create implementation plans for compliance with such a rulemaking.

## **Virginia IRP Process**

This IRP report is being filed in July of 2015 in compliance with Virginia Senate Bill 1349. Senate Bill 1349 amends Section 56-599 of the Code of Virginia by requiring electric utilities to file an IRP by July 1, 2015, followed by an annual IRP's due each year on May 1. The amended code also requires electric utilities to consider the following additional factors in each IRP:

- Options for maintaining and enhancing rate stability
- Options for maintaining and enhancing energy independence
- Options for maintaining and enhancing economic development including retention and expansion of energy-intensive industries
- Options for maintaining and enhancing service reliability
- The effect of current and pending state and federal environmental regulations upon the continued operation of existing electric generation facilities or options for construction of new electric generation facilities
- The most cost effective means of complying with current and pending state and federal environmental regulations, including compliance options to minimize

effects on customer rates of such regulations

APCo's IRP process both takes into account and attempts to strike a reasonable balance among these various factors.

### **Summary of APCo Resource Plan**

APCo's total internal energy requirements are forecasted to increase at a compound average growth rate (CAGR) of 0.17% over the IRP planning period (through 2029). APCo's corresponding summer and winter peak internal demands are forecasted to increase at CAGRs of 0.19% and 0.09%, respectively, with annual peak demand expected to continue to occur in the winter season through 2029. Figure ES-1, below, shows APCo's "going-in" (i.e. *before* resource additions) capacity position over the planning period. Through 2019 APCo has resources to meet its internal demand; however, in 2020 APCo is anticipated to experience a capacity shortfall based upon APCo's assumptions regarding the timing and parameters of PJM's Capacity Performance rule, which is evident from the gap between the stacked bar of available resources and the black line representing APCo's load demand plus reserve margin requirements.

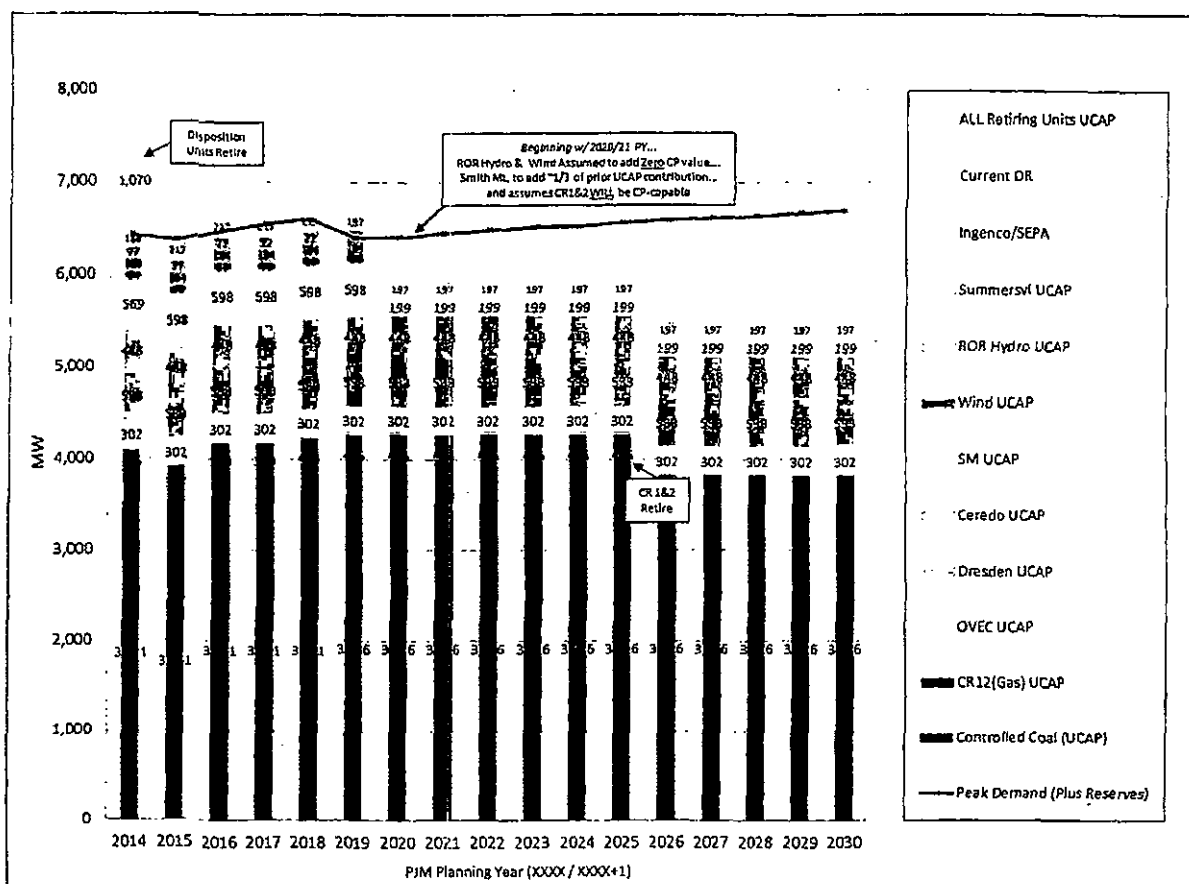


Figure ES-1. APCo "Going-In" PJM Capacity Position (MW)

To determine the appropriate level and mix of incremental supply and demand-side resources required to address the indicated going-in capacity deficiencies, APCo utilized the *Plexos*® Linear Program (LP) optimization model to develop least cost resource portfolios under a variety of pricing and load scenarios. Although the IRP planning period is limited to 15 years (through 2029), the *Plexos*® modeling was performed through the year 2045 so as to properly consider various cost-based "end-effects" for the resource alternatives being considered.

APCo used the results of the modeling to develop a "Hybrid Plan". To arrive at the Hybrid Plan composition, APCo developed *Plexos*®-derived, "optimum" portfolios under five long-term commodity price forecasts and two "load sensitivity" forecasts. The Hybrid Plan is presented as an option that attempts to balance cost and other factors, including the requirements of Senate Bill 1349, to cost effectively meet APCo's peak load obligations. In addition, this IRP considers environmental constraints, while also reflecting an emerging preference for, and the viability of customer self-generation.

Specific APCo capacity and energy production changes over the 15-year planning period associated with the Hybrid Plan are shown in Figure ES-2 through Figure ES-5 respectively, and their relative impacts to APCo's annual capacity and energy position are shown in Figure ES-6 and Figure ES-7 respectively.

In summary, the Hybrid Plan:

#### **APCo's Hybrid Plan**

- Addresses expected PJM Capacity Performance rule impacts on APCo's capacity position. (Note 1)
- Adds 10 MW of utility-scale solar energy in 2016, followed by 50 MW per year beginning in 2020; for a total of 510 MW (nameplate) of utility-scale solar over the 15-year planning period. (Note 2)
- Adds 150 MW wind energy in 2016, followed by 150 MW per year beginning in 2022; for a total of 1,350 MW (nameplate) of wind over the 15-year planning period. (Note 2)
- Implements customer and grid energy efficiency, including VVO programs reducing energy requirements by 419 GWh (or 1% of projected energy needs) and capacity requirements by 109 MW by 2029.
- Assumes APCo's customers add distributed solar capacity, starting in 2015, of more than 0.5 MW (nameplate) per year for a total of 25 MW (nameplate) total by 2029. (Note 3)
- Adds 835 MW of natural gas combined-cycle resources over the 15-year planning period.
- Continues operation of APCo's solid fuel facilities: Amos Units 1-3, Mountaineer Unit 1. Maintains APCo's stake in Ohio Valley Electric Company (OVEC) solid-fuel facilities: Clifty Creek Units 1-6 and Kyger Creek Units 1-5.
- Retires Clinch River (Natural Gas) Units 1 and 2 in 2026.

Note 1: The modeling for this IRP was conducted prior to the issuance of FERC's June 9, 2015 order regarding PJM's Capacity Performance Proposal. That order may result in changes in future IRPs

Note 2: These renewable resources are timed to take advantage of current federal tax incentives, which are reduced or expire at the end of 2016. It is uncertain whether suitable opportunities exist, and any decisions to proceed would be subject to applicable regulatory approvals.

Note 3: APCo does not have control over the amount or timing of these additions.

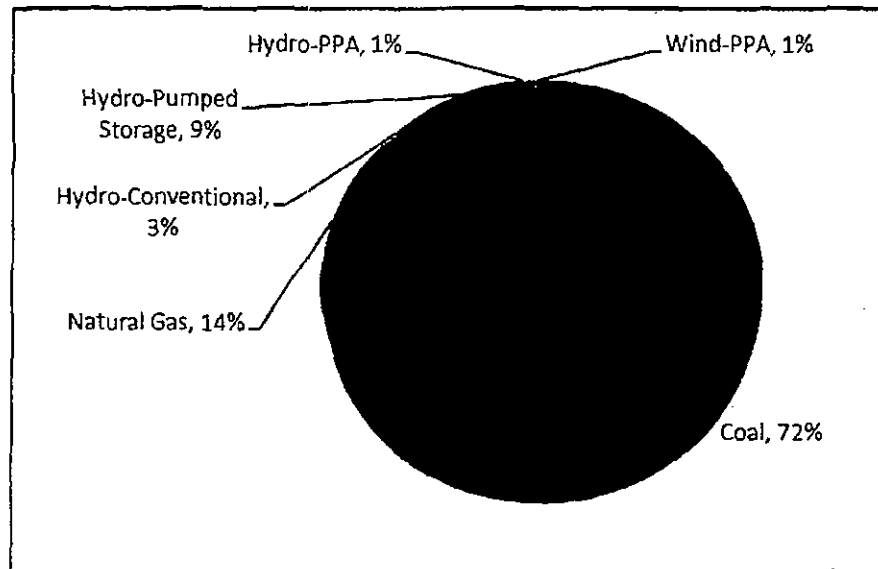


Figure ES-2. 2015 APCo Nameplate Capacity Mix

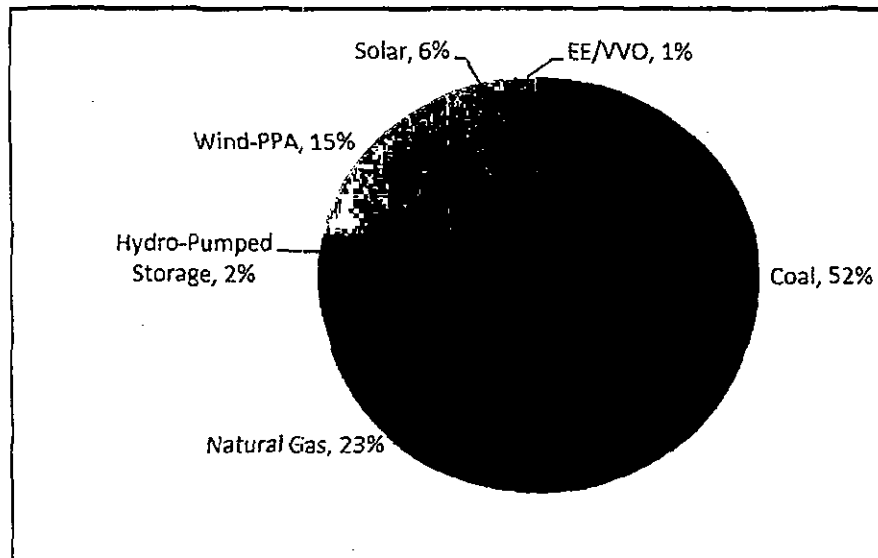
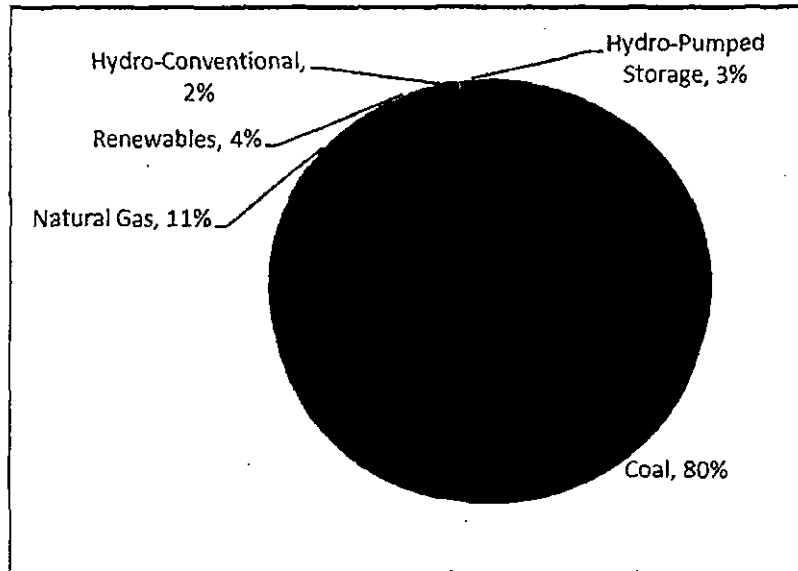
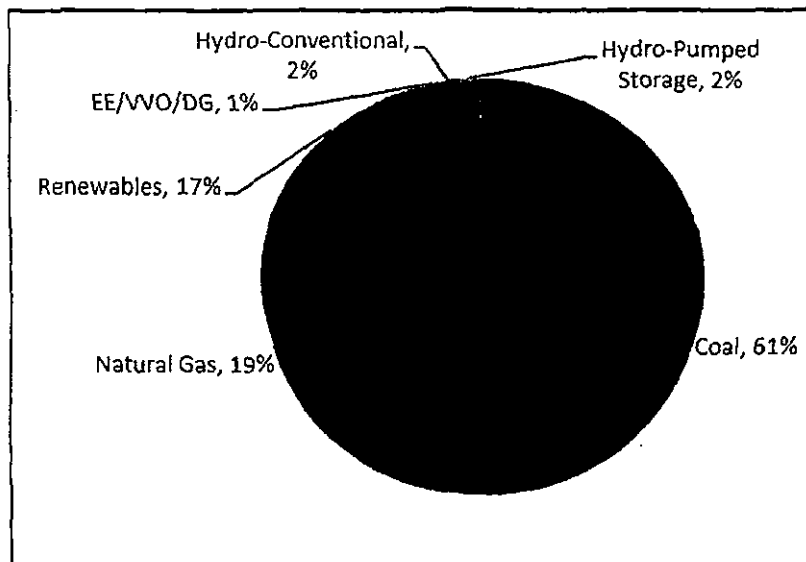


Figure ES-3. 2029 APCo Nameplate Capacity Mix



**Figure ES-4. 2015 APCo Energy Mix**



**Figure ES-5. 2029 APCo Energy Mix**

Figure ES-2 through Figure ES-5 indicate that this Hybrid Plan would reduce APCo's reliance on solid fuel-based generation, and increase reliance on demand-side, natural gas, and renewable resources, improving fuel diversity. Specifically, over the 15-year planning horizon the Company's nameplate capacity mix attributable to solid fuel-fired assets would decline from 72% to 52%, and natural gas assets would increase from 14% to 23%. Renewable assets (wind and

solar) climb from 1% to 21%, and demand-side and energy-efficiency measures increase from 0% to 1% over the planning period.

APCo's energy output attributable to solid fuel-fired generation shows a substantial decrease from 80% to 61% over the period, while energy from natural gas resources increases from 11% to 19%. The Hybrid Plan shows a significant increase in renewable energy, from 4% to 17%. Energy from these renewable resources, combined with EE and VVO energy savings serve to reduce APCo's exposure to energy, fuel and potential carbon prices.

Figure ES-6 and Figure ES-7 show the changes in capacity and energy mix, respectively, on an annual basis, relative to capacity and energy requirements. The capacity contribution from renewable resources is fairly modest; however, those resources provide a significant volume of energy, particularly wind resources. APCo's model selected those wind resources because they add more value (lowered APCo cost) than alternative resources.

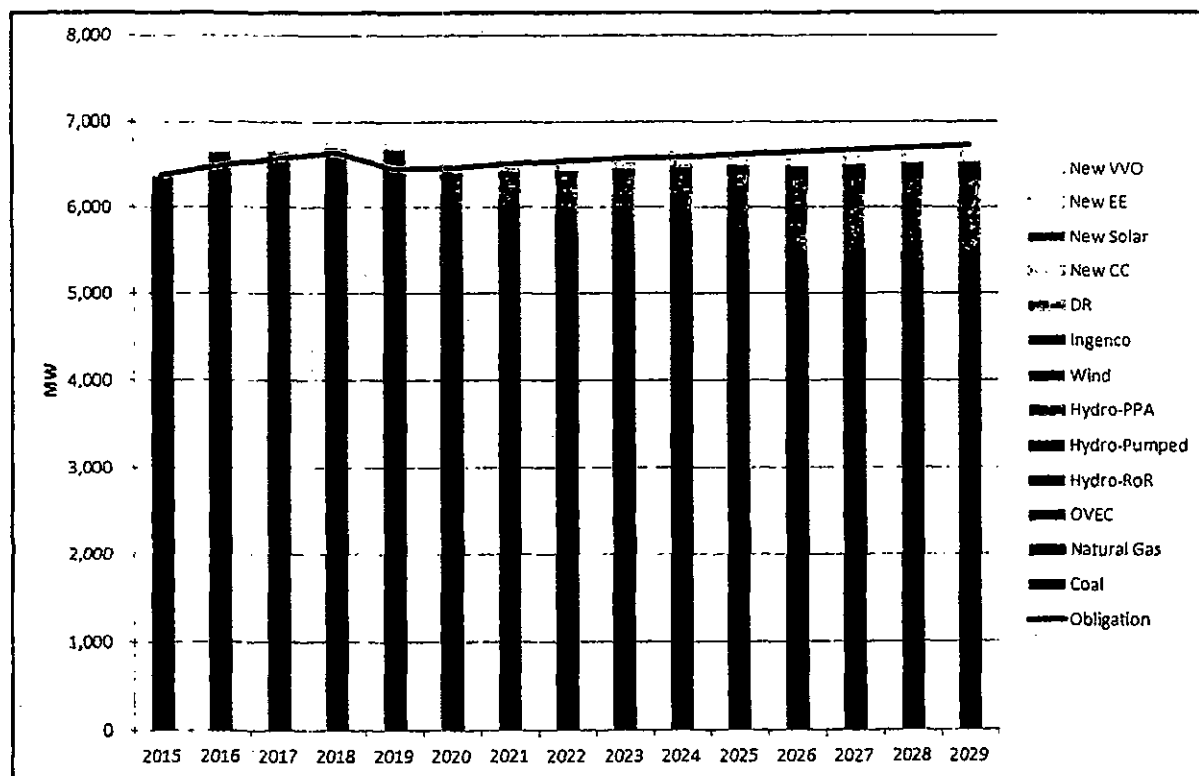
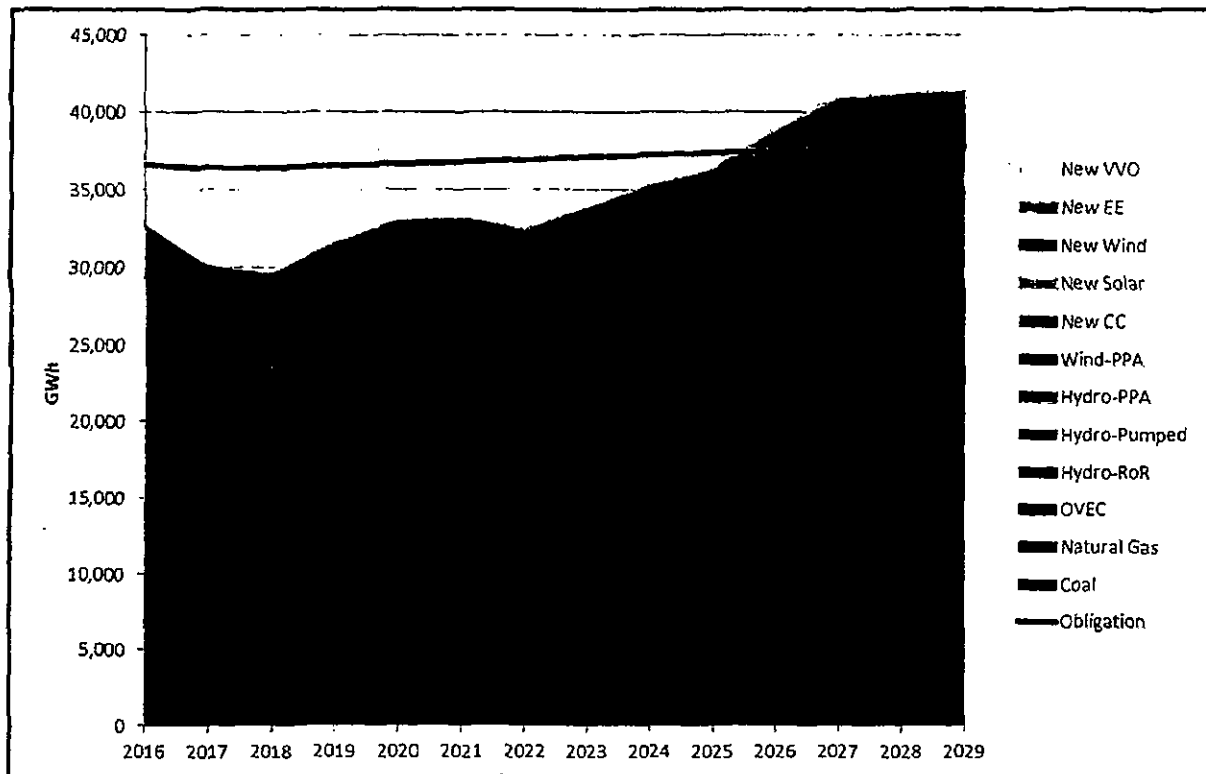


Figure ES-6. APCo Annual PJM Capacity Position (MW)



**Figure ES-7. 2029 APCo Annual Energy Position (GWh)**

Table ES-1 provides a summary of the Hybrid Plan, which resulted from analysis of optimization modeling under the load and commodity pricing scenarios:

**Table ES-1. Summary of APCo Hybrid Plan Resource Additions from a Capacity (MW) Viewpoint**

| Appalachian Power Company<br>2015 Integrated Resource Plan<br>Cumulative Capacity Resource Changes |                 |                        |                                                          |      |       |                                                          |             |                    |                                                 |                                      |               |                                   |    |      |               |             |                      |                                                    |    |
|----------------------------------------------------------------------------------------------------|-----------------|------------------------|----------------------------------------------------------|------|-------|----------------------------------------------------------|-------------|--------------------|-------------------------------------------------|--------------------------------------|---------------|-----------------------------------|----|------|---------------|-------------|----------------------|----------------------------------------------------|----|
| Hybrid Plan                                                                                        |                 |                        |                                                          |      |       |                                                          |             |                    |                                                 |                                      |               |                                   |    |      |               |             |                      |                                                    |    |
| MW                                                                                                 | (NA) IRP Period | Year                   | (Cumulative) PIM Capacity Performance Resource Additions |      |       |                                                          |             |                    |                                                 |                                      |               |                                   |    |      |               |             |                      |                                                    |    |
|                                                                                                    |                 |                        | RETIREMENTS                                              |      |       | (Cumulative) PIM Capacity Performance Resource Additions |             | New-Build Capacity |                                                 | Energy Efficiency (EE)               |               | VVO                               |    | DR   |               | Wind        |                      | Solar                                              |    |
|                                                                                                    |                 |                        | Coal & Gas Steam                                         | Wind | Hydro | CC                                                       | (Frame) CTS | (Flat) CTS         | Embedded Federal EE Regulations <sup>(10)</sup> | Anticipated Programs <sup>(11)</sup> | Now (Post-18) | Existing Programs <sup>(12)</sup> | DB | Wind | Utility-Scale | Distributed | CHANGING NET (11/11) | APCO Resources resulting Above Minimum Requirement |    |
|                                                                                                    |                 |                        | MW                                                       | MW   | MW    | MW                                                       | MW          | MW                 | MW                                              | MW                                   | MW            | MW                                | MW | MW   | MW            | MW          | MW                   | MW                                                 | MW |
| 0                                                                                                  | 2014            | (1,237) <sup>(1)</sup> | -                                                        | -    | -     | -                                                        | -           | 405                | 27                                              | 1                                    | 209           | -                                 | -  | -    | -             | -           | 38.4%                |                                                    |    |
| 1                                                                                                  | 2015            | (1,237)                | -                                                        | -    | -     | -                                                        | -           | 426                | 50                                              | 1                                    | 209           | -                                 | -  | 4    | 0.8           | 15.3%       |                      |                                                    |    |
| 2                                                                                                  | 2016            | (1,237)                | -                                                        | -    | -     | -                                                        | -           | 432                | 73                                              | 1                                    | 209           | -                                 | -  | 4    | 1.1           | 18.0%       |                      |                                                    |    |
| 3                                                                                                  | 2017            | (1,237)                | -                                                        | -    | -     | -                                                        | -           | 436                | 94                                              | 1                                    | 209           | -                                 | -  | 4    | 1.9           | 17.2%       |                      |                                                    |    |
| 4                                                                                                  | 2018            | (1,237)                | -                                                        | -    | -     | -                                                        | -           | 451                | 94                                              | 2                                    | 191           | -                                 | -  | 4    | 2.3           | 17.3%       |                      |                                                    |    |
| 5                                                                                                  | 2019            | (1,237)                | -                                                        | -    | -     | -                                                        | -           | 468                | 94                                              | 4                                    | 191           | -                                 | -  | 23   | 3.0           | 21.0%       |                      |                                                    |    |
| 6                                                                                                  | 2020            | (1,237)                | -                                                        | -    | -     | -                                                        | -           | 487                | 94                                              | 7                                    | 191           | -                                 | -  | 42   | 3.4           | 16.1%       |                      |                                                    |    |
| 7                                                                                                  | 2021            | (1,237)                | -                                                        | -    | -     | -                                                        | -           | 503                | 94                                              | 9                                    | 191           | -                                 | -  | 61   | 4.2           | 17.6%       |                      |                                                    |    |
| 8                                                                                                  | 2022            | (1,237)                | -                                                        | -    | -     | -                                                        | -           | 516                | 94                                              | 11                                   | 191           | -                                 | -  | 80   | 4.9           | 16.3%       |                      |                                                    |    |
| 9                                                                                                  | 2023            | (1,237)                | -                                                        | -    | -     | -                                                        | -           | 526                | 94                                              | 13                                   | 191           | -                                 | -  | 99   | 5.7           | 16.5%       |                      |                                                    |    |
| 10                                                                                                 | 2024            | (1,237)                | -                                                        | -    | -     | -                                                        | -           | 538                | 94                                              | 15                                   | 191           | -                                 | -  | 118  | 6.5           | 17.7%       |                      |                                                    |    |
| 11                                                                                                 | 2025            | (1,237) <sup>(1)</sup> | -                                                        | -    | -     | -                                                        | -           | 529                | 94                                              | 22                                   | 191           | -                                 | -  | 137  | 7.2           | 17.2%       |                      |                                                    |    |
| 12                                                                                                 | 2026            | (1,711) <sup>(1)</sup> | -                                                        | -    | -     | -                                                        | -           | 533                | 94                                              | 25                                   | 191           | -                                 | -  | 156  | 8.0           | 17.1%       |                      |                                                    |    |
| 13                                                                                                 | 2027            | (1,711)                | -                                                        | -    | -     | -                                                        | -           | 545                | 94                                              | 26                                   | 191           | -                                 | -  | 175  | 8.7           | 17.3%       |                      |                                                    |    |
| 14                                                                                                 | 2028            | (1,711)                | -                                                        | -    | -     | -                                                        | -           | 558                | 94                                              | 27                                   | 191           | -                                 | -  | 194  | 9.5           | 16.9%       |                      |                                                    |    |
| 15                                                                                                 | 2029            | (1,711)                | -                                                        | -    | -     | -                                                        | -           | 558                | 94                                              | 27                                   | 191           | -                                 | -  | 194  | 9.5           | 16.9%       |                      |                                                    |    |
| TOTAL Energy Efficiency                                                                            |                 |                        |                                                          |      |       |                                                          |             |                    |                                                 |                                      |               |                                   |    |      | TOTAL Solar   |             |                      |                                                    |    |
| 6.7%                                                                                               |                 |                        |                                                          |      |       |                                                          |             |                    |                                                 |                                      |               |                                   |    |      | 595           |             |                      |                                                    |    |

(1) PIM Planning Year is effective 6/1/2000 thru 5/31/2000-11

(2) Represents "2025" estimated energy efficiency levels already "embedded" into APCO's long-term (S&L) load & peak demand forecasts based on emergence of NERC-ESTABLISHED Federal efficiency standards (starting w/ EPCAC 2005; then 2007 EISA; then AERRA of 2009).

(3) Represents estimated contribution from current/anticipated APCO DSM-EE (N and VVO) and Demand Response (e.g. Interruptible program activity).

(4) Due to the intermittency of wind resources and the proposed PIM-APM "Capacity Performance" construct, it is assumed logic of the wind resource "nameplate" MW rating are included for capacity resource determination purposes.

(5) Due to the intermittency of solar resources, only 30% of solar resource "nameplate" MW rating are included for capacity resource determination purposes. Further, it is assumed that such amount would continue to qualify as a "Capacity Performance" resource in the new construct.

(6) ANTICIPATED RETIREMENTS & (PIM) CAPACITY PERFORMANCE IMPACTS:

(7) Spin Units 1&3, Glenlyn Units 5&6, Kanawha River Units 1&2, Clinch River Unit 3

(8) Effective with the 2020/21 PIM yr, reflects the PIM-proposed "CP" construct elimination of all "non-qualifying" capacity: Non-qualifying capacity (785 MW), all wind capacity credits in PIM (56 MW), and an estimated "2/3 of the LCOE value of Smith Mt. pumped storage (410 MW) in Clinch River 1&2 (Gas-Steam)

(9) Relative changes in such "CP" disallowances are a function of the expiration of APCO's current wind REPA's over the course of the next decade.

(1) PIM Planning Year is effective 6/1/2008 thru 5/31/2008+1

(2) Represents 'base-2005' estimated energy efficiency levels already 'embedded' into APCo's long-term (S&P) load & peak demand forecast based on emergence of PRIOR-ESTABLISHED Federal efficiency standards (starting w/ EPA 2002; then 2007 EISA; then 408A of 2009).

(3) Represents estimated contribution from current and updated APCo DSM/E (V&W) and Demand Response (e.g., interruptible) program activity.

(4) Due to the intermittency of wind resources and the proposed PIM-APM Capacity Performance construct, it is assumed 100% of the wind resource 'nameplate' MW rating are included for capacity resource determination purposes.

(5) Due to the intermittency of solar resources, only 35% of solar resource 'nameplate' MW rating are included for capacity resource determination purposes. Further, it is assumed that such amounts would continue to qualify as a 'Capacity Performance' resource in the new construct.

(6) ANTICIPATED RETIREMENTS & (PIM) CAPACITY PERFORMANCE IMPACTS:

(a) Spin Units 1&3, Glenlyn Unit 3&5, Kanawha River Units 1&2; Clinch River Unit 3

(b) Effective with the 2020/21 PIM FY, reflects the PIM-proposed 'CP' construct elimination of all 'non-qualifying' capacity: Run-of-river hydro capacity (285 MW), all wind capacity credits in PIM (56 MW), and an estimated ~2/3 of the UCAP value of Smith Mt. pumped storage (410 MW)

(c) Clinch River 1&2 (Gas-Steam)

(d) Negative changes in each CP 'disallowances' are a function of the expiration of APCo's current wind RPPs over the course of the next decade.

### Clean Power Plan Implications

The EPA published proposed rules in June 2014 to address how states may reduce GHG/CO<sub>2</sub> emissions. The proposed rule, known as the Clean Power Plan (CPP), sets state-specific interim CO<sub>2</sub> emission rate targets beginning in 2020, with final target achievement by 2030. Targets were set based on four building blocks that include plant efficiency improvements, the increased dispatch of natural gas combined cycle plants, additional renewable (including no retirement of at-risk nuclear) resources, and incremental energy efficiency. The comment period for the CPP ran through December 1, 2014, and EPA now expects to issue a final rule during the summer, 2015. EPA has received over four million comments on the rule, including critical comments from various public agencies in the states served by APCo, reliability organizations including PJM, and research organizations such as the Electric Power Research Institute (EPRI) in addition to APCo's parent American Electric Power Company, Inc. (AEP). These criticisms question the scope, timing and legality of the CPP based on EPA's authority under the Clean Air Act, the reliability impacts associated with the timeline to implement the rule, and technical errors made by EPA in calculating the state-specific CO<sub>2</sub> rates resulting from the application of the four building blocks.

APCo cannot reasonably predict what form the final rule will take, or what will be required of the Company in state plans that are developed by the states and ultimately approved by the EPA. It is not practical for APCo to identify a CPP compliance strategy at this time, because it is not yet clear how any actions the Company may take would count toward compliance with a rulemaking that is not yet final. As a proxy for modeling the effect of, and a cost-effective means of complying with, this pending environmental regulation, this IRP utilizes a carbon tax, in conjunction with an "Early Coal Retirement" scenario.

### Conclusion

This IRP, based upon various assumptions, provides for adequate capacity resources, at reasonable cost, through a combination of supply-side resources, renewable supply- and demand-side programs throughout the forecast period.

Moreover, this IRP also recognizes APCo's *energy* position prospectively. The Hybrid Plan offers incremental resources that will provide—in addition to the needed PJM installed *capacity* to achieve mandatory PJM (summer) peak demand requirements—additional *energy* to reduce

the exposure of the Company's customers to PJM energy markets that could be influenced by many external factors, including the impact of carbon regulation, going-forward.

The portfolios discussed in this report attribute no capacity value for certain intermittent resources (run-of-river hydro and wind). It is possible that intermittent resources can be combined, or "coupled", and offered into the PJM market as Capacity Performance resources. Once the final PJM Capacity Performance tariffs are published, the Company will investigate methods to maximize the utilization of its current (and future) intermittent resource portfolio within that construct. An example could be the additional coupling of run-of-river hydro and Smith Mountain pumped-storage capability in a manner that would mitigate non-performance risk. The potential exists that an offer strategy could be formulated such that a portion of the approximate 670 MW of hydro/pumped storage generating capability, which is not currently recognized in this IRP as being 'Capacity Performance-eligible', could count as capacity in future PJM planning years. If that were to occur, then there is a reasonable prospect that the need for incremental capacity resources set forth in the various portfolios in this report could be deferred beyond the end of the planning period.

The IRP process is a continuous activity; assumptions and plans are reviewed as new information becomes available and modified as appropriate. Indeed, the capacity and energy resource portfolios reported herein reflect, to a large extent, assumptions that are subject to change; it is simply a snapshot of the future at this time. As noted previously, this IRP is not a commitment to specific resource additions or other courses of action, as the future is highly uncertain. The resource planning process is becoming increasingly complex when considering pending regulatory restrictions, technology advancement, changing energy supply pricing fundamentals, uncertainty of demand and end-use efficiency improvements. These complexities necessitate the need for flexibility and adaptability in any ongoing planning activity and resource planning processes. To that end, APCo intends to pursue the following Five-Year Action Plan:

1. Continue the planning and regulatory actions necessary to implement economic energy efficiency programs in Virginia and West Virginia.
2. Continue to monitor market prices for renewable resources, particularly wind, and if economically advantageous, pursue appropriate Power Purchase Agreements (PPAs).

3. Investigate opportunities to install utility-scale solar projects in the near future to take advantage of the 30% Investment Tax Credit.
4. Monitor status of PJM's Capacity Performance rule and, if necessary, begin planning activities to formulate a Request for Proposal (RFP) for natural gas generation.<sup>2</sup>
5. Monitor the status of GHG rules and state plans.
6. Be ready to adjust this Action Plan and future IRPs to reflect changing circumstances.

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<sup>2</sup> Capacity additions in excess of 100MW require APCo to issue a Request for Proposal (RFP) in accordance with a settlement agreement approved by the Public Service Commission of West Virginia in Case No. 14-0546-E-PC

## 4.0 Modeling Parameters

### 4.1 Modeling and Planning Process – An Overview

The objective of a resource planning effort is to recommend a system resource expansion plan that balances “least-cost” objectives with planning flexibility, asset mix considerations, adaptability to risk, conformance with applicable North American Electric Reliability Corporation (NERC) and RTO criteria. In addition, given the unique impact of fossil-fired generation on the environment, the planning effort must ultimately be in concert with anticipated long-term requirements as established by the EPA-driven environmental compliance planning process.

The information presented with this IRP includes descriptions of assumptions, study parameters, methodologies, and results, including the integration of supply-side resources and DSM programs.

In general, assumptions and plans are continually reviewed and modified as new information becomes available. Such continuous analysis is required by multiple disciplines across APCo and AEP to ensure that market structures and governances, technical parameters, regulatory constructs, capacity supply, energy adequacy and operational reliability, and environmental mandate requirements are constantly reassessed to ensure optimal capacity resource planning.

Further impacting this process are a growing number of federal and state initiatives that address many issues relating to industry restructuring, customer choice, and reliability planning. Currently, fulfilling a regulatory obligation to serve native load customers represents one of the cornerstones of the APCo IRP process. Therefore, as a result, the “objective function” of the modeling applications utilized in this process is the development of a least-cost plan, with *cost* being more accurately described as *revenue requirement* under a traditional ratemaking construct.

That does not mean, however, that the most appropriate plan is the one with the absolute least cost over the planning horizon evaluated. Other factors were considered in the determination of the Plan. To challenge the robustness of the IRP, sensitivity analyses were performed to address these factors.

This overall process reflects consideration of options for maintaining and enhancing rate stability; energy independence; economic development; and service reliability.

#### 4.2 Methodology

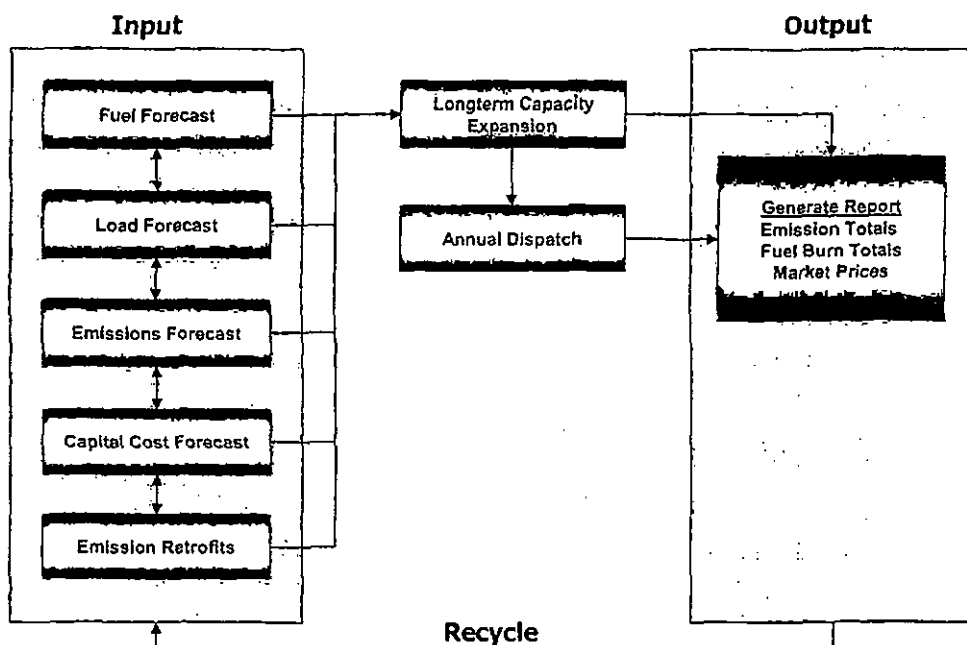
The IRP process aims to address the long-term “gap” between resource needs and current resources. Given the various assets and resources that can satisfy this expected long-term gap, a tool is needed to sort through the myriad of potential combinations and return an optimum solution—or portfolio—subject to constraints. *Plexos*® is the primary modeling application used by APCo for identifying and ranking portfolios that address the gap between needs and current available resources.<sup>12</sup> Given the cost and performance parameters around sets of potentially available proxy resources—both supply and demand side—and a scenario of economic conditions that include long-term fuel prices, capacity costs, energy costs, emission-based pricing proxies including CO<sub>2</sub>, as well as projections of energy usage and peak demand, *Plexos*® will return the optimal suite of proxy resources (portfolio) that meet the resource need. Portfolios created under similar pricing scenarios may be ranked on the basis of cost, or the “cumulative present worth” (CPW), of the resulting stream of revenue requirements. The least cost option is considered the “optimum” portfolio for that unique input parameter scenario.

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<sup>12</sup> *Plexos*® is a production cost-based resource optimization model, which was developed and supported by Energy Exemplar, LLC. The *Plexos*® model is currently licensed for use in 37 countries throughout the world.

### 4.3 Fundamental Modeling Input Parameters

The AEP Fundamental Analysis group derives long-term power (energy) price forecasts from a proprietary model known as AURORA<sup>xmp</sup>. Having similarities to *Plexos*®, AURORA<sup>xmp</sup> is a long-term fundamental production cost-based energy and capacity price forecasting tool developed by EPIS, Inc., that is driven by comprehensive, user-defined commodity input parameters. For example, nearer-term unit-specific fuel delivery and emission allowance price forecasts which are established by AEP Fundamental Analysis and AEP Fuel, Emissions and Logistics (FEL), are fed into AURORA<sup>xmp</sup>. Estimates of longer-term natural gas and coal pricing are provided by AEP Fundamental Analysis in conjunction with input received from outside consulting services. Similarly, capital costs and performance parameters for various new-build generating options, by duty-type are vetted through AEP Engineering Services and incorporated into the tool. Other information specific to the thousands of generating units being modeled is researched from "Velocity Suite," an on-line information database maintained by Ventyx, an ABB Company. This includes data such as unit capacity, heat rates, retirement dates and emission controls status. Finally, the model maintains and determines region-specific resource adequacy based on regional load estimates provided by AEP Economic Forecasting, as well as current regional reserve margin criterion. AEP uses AURORA<sup>xmp</sup> to model long-term (market) energy and capacity prices for the entire U.S. eastern synchronous interconnect as well as ERCOT. The projection of a CO<sub>2</sub> pricing proxy is based on assumptions developed in conjunction with the AEP Strategic Policy Analysis organization. Figure 14 shows the Fundamentals process flow for solution of the long-term (power) commodity forecast. The input assumptions are initially used to generate the output report. The output is used as "feedback" to change the base input assumptions. This iterative process is repeated until the output is congruent with the input assumptions (e.g., level of natural gas consumption is suitable for the established price and all emission constraints are met).



**Figure 14.** Long-term Power Price Forecast Process Flow

#### 4.3.1 Commodity Pricing Scenarios

Five commodity pricing “scenarios” were developed by AEP Fundamental Analysis for APCo to enable *Plexos*® to construct resource plans under various long-term pricing conditions. In this report, the five distinct long-term commodity pricing scenarios that were developed for *Plexos*® are: a “Base” scenario view, a plausible “Lower Band” view, a plausible “Higher Band” View; a “High CO<sub>2</sub>” view; and a “No Carbon” view. The scenarios are described below with the results shown in Figure 15 through Figure 21.

##### 4.3.1.1 “Base” Scenario

This scenario recognizes the following major assumptions:

- MATS Rule effective beginning in 2015;
- Initially lower natural gas price due to the emergence of shale gas plays; and

- CO<sub>2</sub> emission pricing proxy begins in 2022 and was assumed to be at \$15 per metric ton, growing with inflation.

The specific effects of the MATS Rule are modeled in the development of the long-term commodity forecast by retiring the smaller, older solid-fuel (i.e., coal and lignite) units which would not be economic to retrofit with emission control equipment. The retirement time frame modeled is 2015 through 2017. Those remaining solid-fuel generating units will have some combination of controls necessary to comply with the EPA's rules. Incremental regional capacity and reserve requirements will largely be addressed with new natural gas plants. One effect of the expected retirements on the emission control retrofit scenario is an over-compliance of the previous CSAPR emission limits. This will drive the emission allowance prices for SO<sub>2</sub> and NO<sub>x</sub> to zero by 2018 or 2019.

#### 4.3.1.2 "Lower Band" Scenario

This scenario is best viewed as a plausible lower natural gas/solid-fuel/energy price profile compared to the Base view. In the near term, Lower Band natural gas prices largely track the Base but, in the longer term, natural gas prices represent an even more significant infusion of shale gas. From a statistical perspective, this long-term pricing scenario is approximately one (negative) standard deviation (~1.0 SD) from the Base Case and illustrates the effects of coal-to-gas substitution at plausibly lower gas prices. Like the Base Case scenario, proxied CO<sub>2</sub> mitigation/pricing is assumed to start in 2022 at a \$15 per metric ton (real dollars).

#### 4.3.1.3 "Higher Band" Scenario

Alternatively, this Higher Band scenario offers a plausible, higher natural gas/solid-fuel/energy price profile compared to the Base scenario. Higher Band natural gas prices reflect certain impediments to shale gas developments including stalled technological advances (drilling and completion techniques) and as yet unseen environmental costs. The pace of environmental regulation implementation is in line with the Base Scenario and Lower Band. Analogous to the Lower Band scenario, this Higher Band view, from a statistical perspective, is approximately,

one (positive) standard deviation (+1.0 SD) from the Base. Also, like the Base and Lower Band scenarios, CO<sub>2</sub> pricing is assumed to begin in 2022 at the same \$15 per metric ton pricing proxy.

#### **4.3.1.4 "High CO<sub>2</sub>" Scenario**

Built upon the assumption of a \$25 per metric ton (66% higher than the base case) CO<sub>2</sub> mitigation pricing proxy beginning in 2022, the High CO<sub>2</sub> scenario includes correlative price adjustments to natural gas and solid-fuel due to changes in consumption that such heightened CO<sub>2</sub> pricing levels would create. This results in some additional retirements of coal-fired generating units around the implementation period. Natural gas and, to a lesser degree, renewable generation is built as replacement capacity.

#### **4.3.1.5 "No CO<sub>2</sub>" Scenario**

This "business as usual" scenario does not consider the prospects of a carbon tax. While also including the necessary correlative fuel price adjustments, it serves as a baseline to understand the impact on unit dispatch and, with that, the attendant impact on energy prices associated with the Base and High CO<sub>2</sub> scenarios.

The following set of figures illustrates the range of such long-term pricing projections, on a nominal dollar basis, by major commodity through the year 2030.

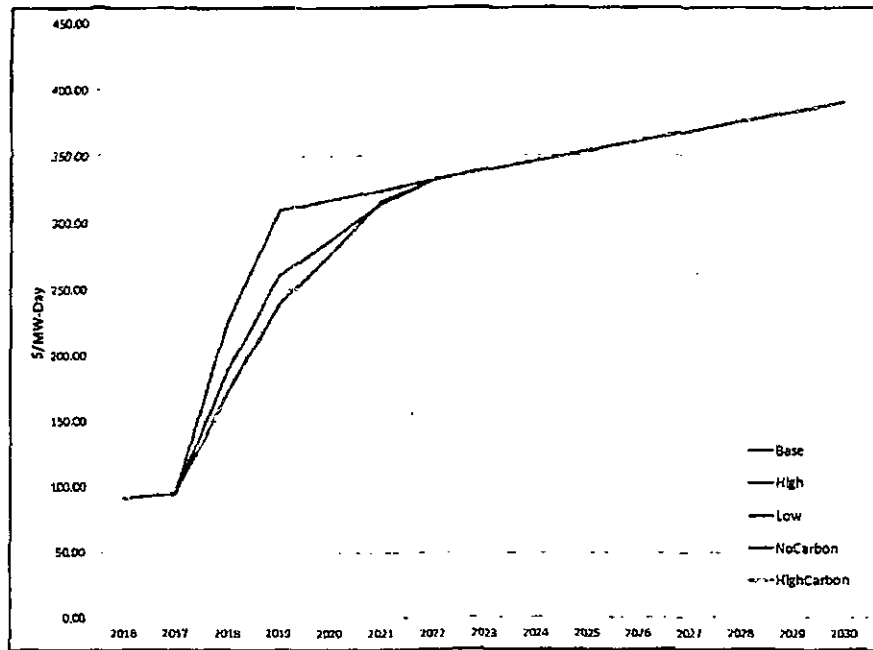


Figure 15. PJM Capacity Prices (Nominal \$/MW-Day)

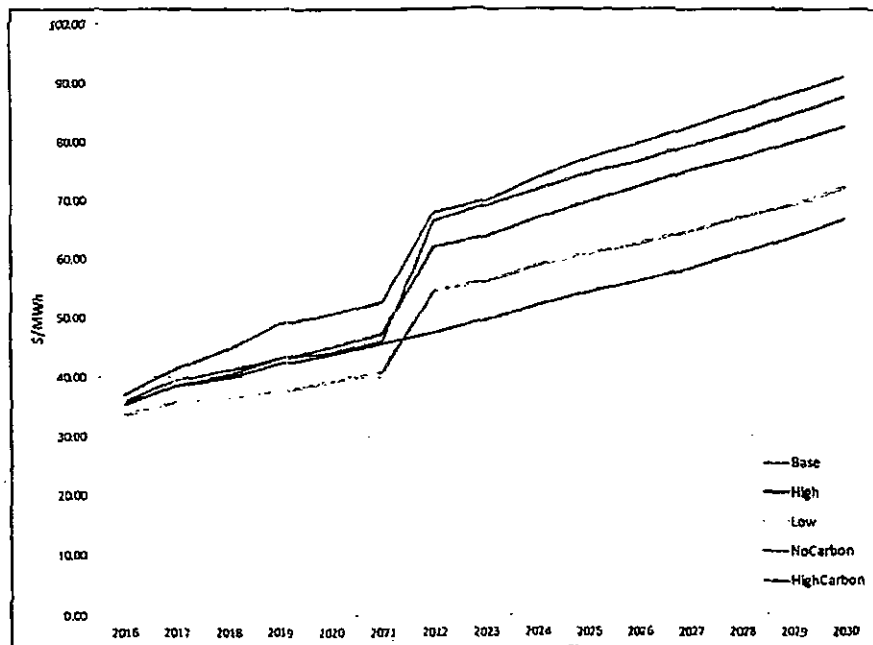


Figure 16. PJM On-Peak Energy Prices (Nominal \$/MWh)

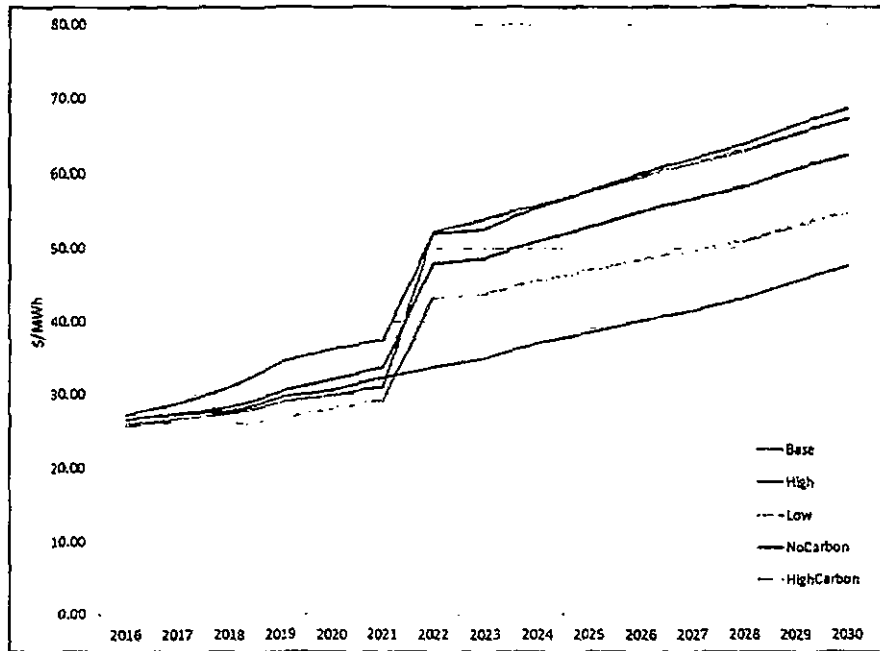


Figure 17. PJM Off-Peak Energy Prices (Nominal \$/MWh)

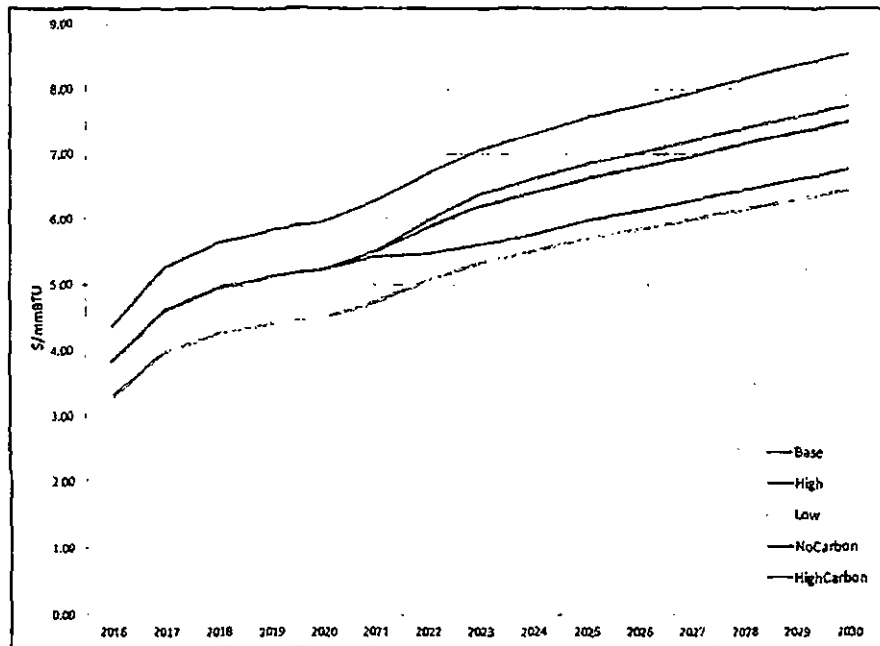
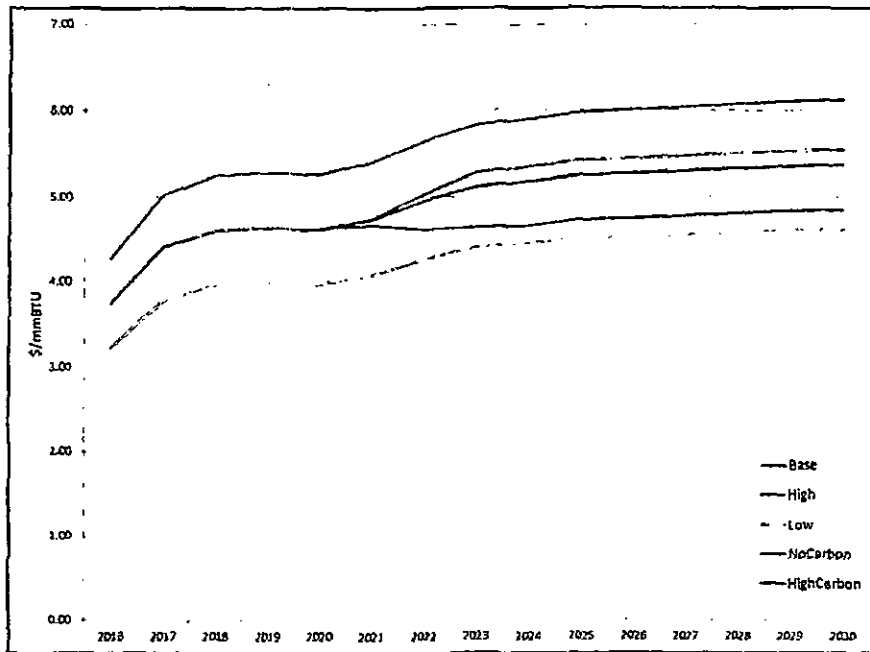
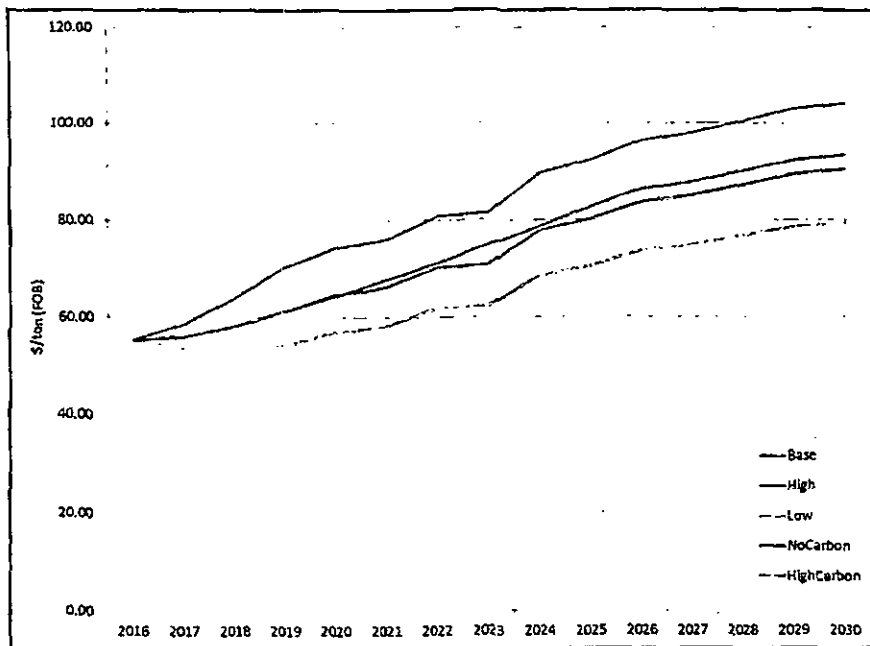


Figure 18. Dominion South Natural Gas Prices (Nominal \$/mmBTU)



**Figure 19.** Dominion South Natural Gas Prices (2014 Real \$/mmBTU)



**Figure 20.** NAPP High Sulfur Coal Prices (Nominal \$/ton, FOB)

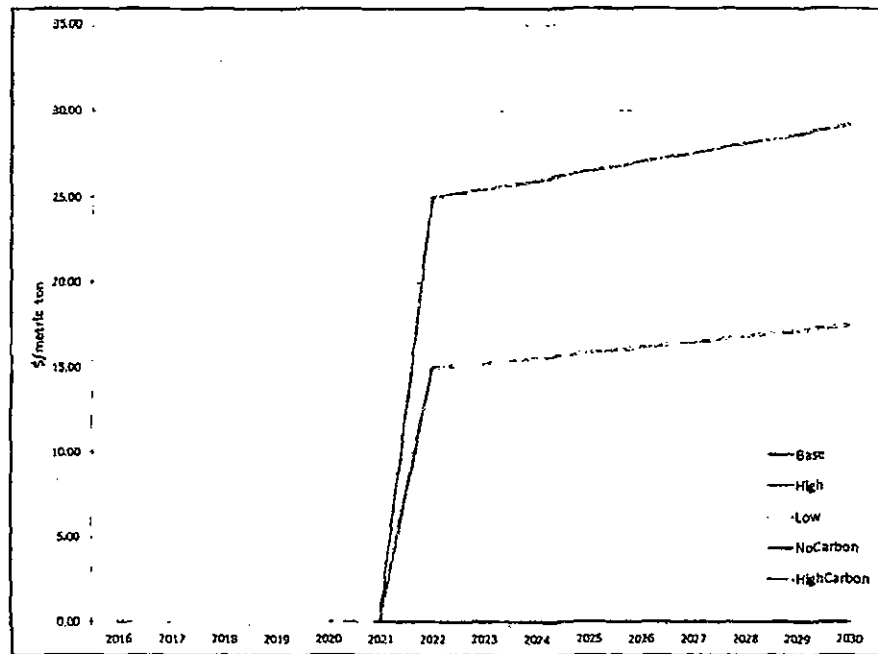
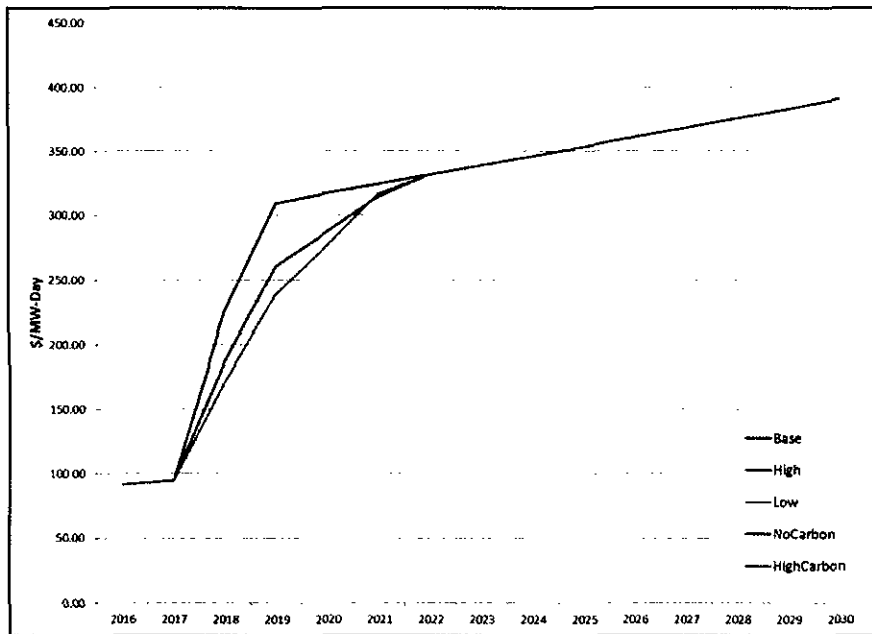


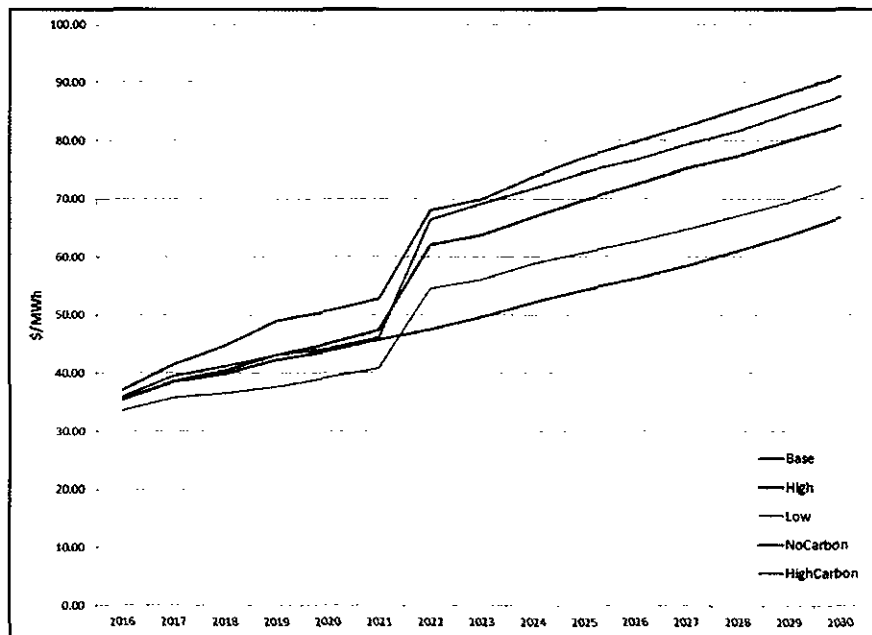
Figure 21. CO<sub>2</sub> Prices (Nominal \$/metric ton)

#### 4.3.2 Long-Term CO<sub>2</sub> Forecast “Proxies”

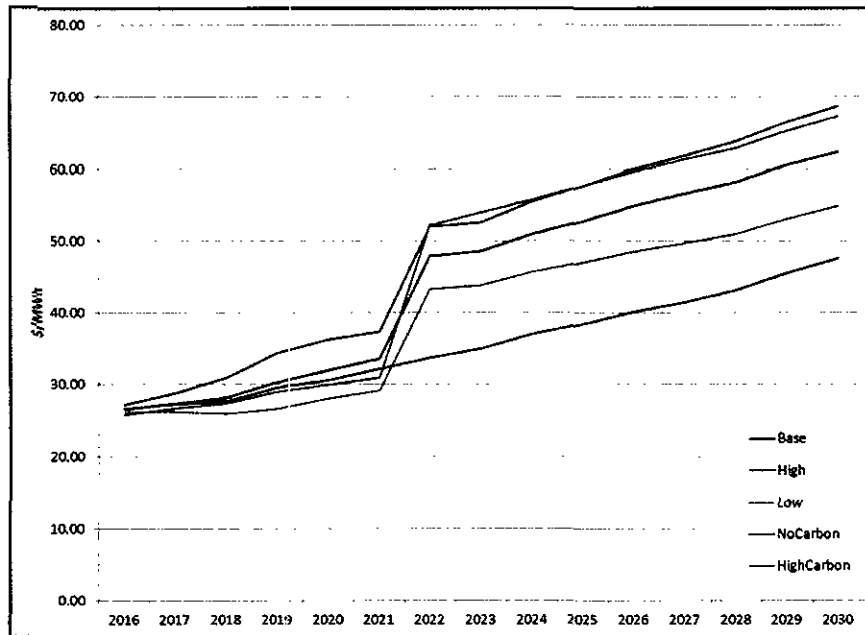
Each of the pricing forecasts includes a CO<sub>2</sub>/carbon impact as a result of the implementation of any prospective carbon-reduction rules or legislation. The “Base”, “Higher Band” and “Lower Band” long-term pricing scenarios each reflect the fundamental view that a CO<sub>2</sub> penalty could be “proxied” with a \$15 per metric ton dispatch cost “burden” applicable to fossil-fired generating units’ dispatch beginning in 2022. By contrast, the “High Carbon” scenario includes a higher, \$25 per metric ton dispatch cost burden which also commences in 2022. Recognizing the relative higher carbon emission from a solid-fuel unit versus a natural gas-fired unit, the relative *Plexos*<sup>®</sup>-modeled impact on variable/dispatch costs was reflected.



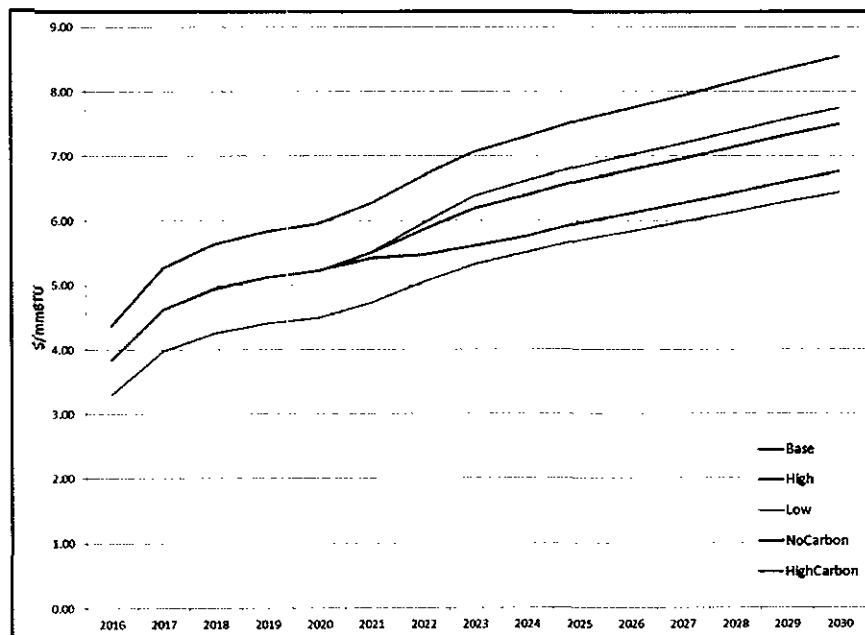
**Figure 15. PJM Capacity Prices (Nominal \$/MW-Day)**



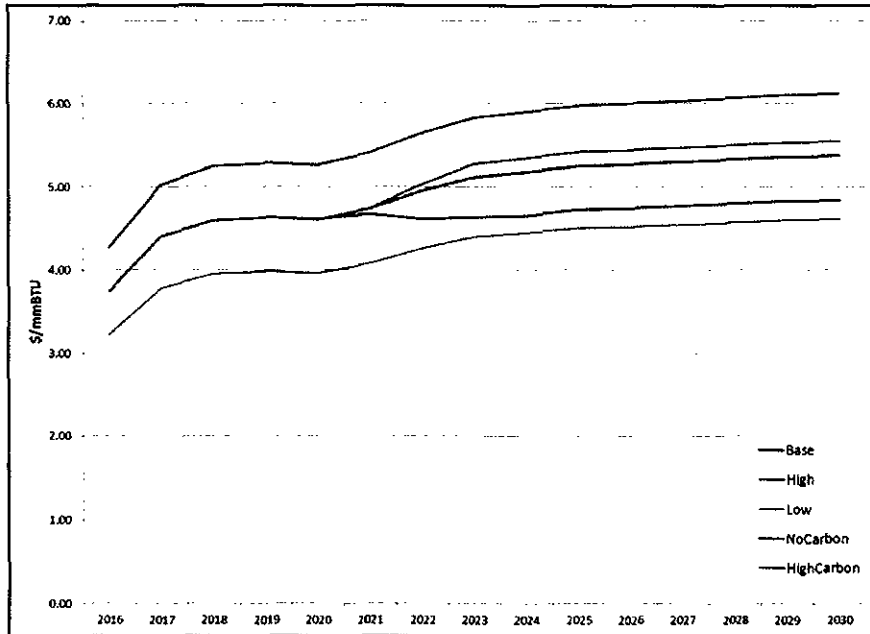
**Figure 16. PJM On-Peak Energy Prices (Nominal \$/MWh)**



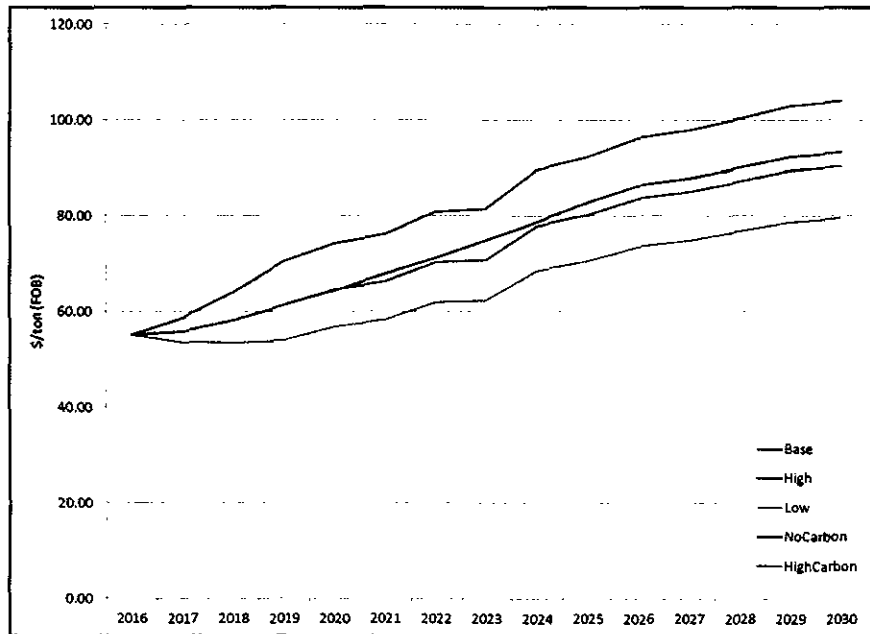
**Figure 17. PJM Off-Peak Energy Prices (Nominal \$/MWh)**



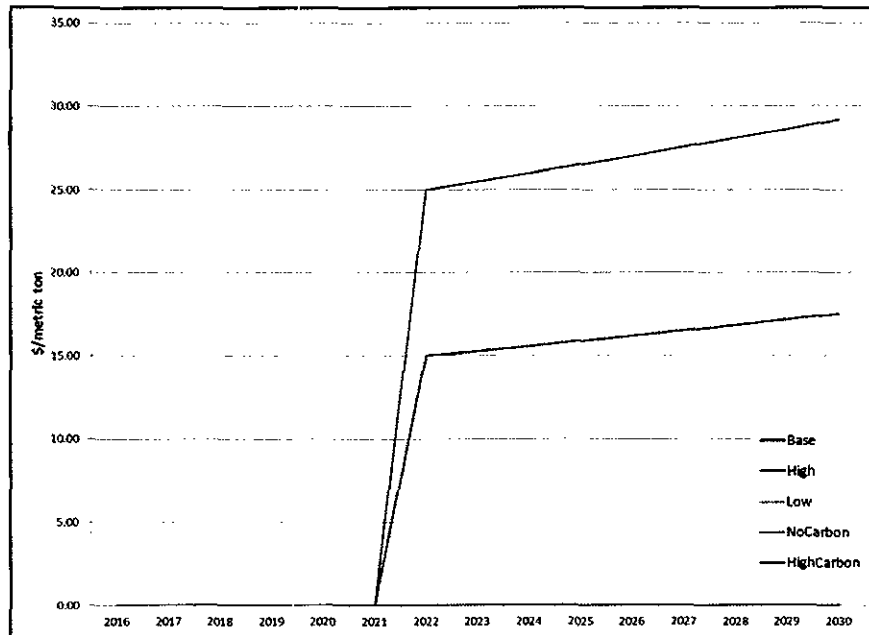
**Figure 18. Dominion South Natural Gas Prices (Nominal \$/mmBTU)**



**Figure 19. Dominion South Natural Gas Prices (2014 Real \$/mmBTU)**



**Figure 20. NAPP High Sulfur Coal Prices (Nominal \$/ton, FOB)**



**Figure 21.** CO<sub>2</sub> Prices (Nominal \$/metric ton)

#### 4.3.2 Long-Term CO<sub>2</sub> Forecast “Proxies”

Each of the pricing forecasts includes a CO<sub>2</sub>/carbon impact as a result of the implementation of any prospective carbon-reduction rules or legislation. The “Base”, “Higher Band” and “Lower Band” long-term pricing scenarios each reflect the fundamental view that a CO<sub>2</sub> penalty could be “proxied” with a \$15 per metric ton dispatch cost “burden” applicable to fossil-fired generating units’ dispatch beginning in 2022. By contrast, the “High Carbon” scenario includes a higher, \$25 per metric ton dispatch cost burden which also commences in 2022. Recognizing the relative higher carbon emission from a solid-fuel unit versus a natural gas-fired unit, the relative *Plexos*<sup>®</sup>-modeled impact on variable/dispatch costs was reflected.