

**BEFORE
THE PUBLIC UTILITIES COMMISSION OF OHIO**

In the Matter of the Joint Application)	
of Ohio Power Company and)	Case No. 14-2296-EL-EEC
Solvay Specialty Polymers for Approval)	
of a Special Arrangement Agreement)	

**JOINT APPLICATION FOR APPROVAL OF A SPECIAL ARRANGEMENT
AGREEMENT BETWEEN OHIO POWER COMPANY AND
SOLVAY SPECIALTY POLYMERS**

Pursuant to Ohio Revised Code (“R.C.”) sections 4928.66 and 4905.31(E) and Rule 4901:1-39-05(G), Ohio Administrative Code (“O.A.C.”), Ohio Power Company d/b/a AEP Ohio (“Company”) and Solvay Specialty Polymers (“Customer”) (collectively, “Applicants”) submit this Joint Application for Commission approval of the special arrangement described in this Joint Application and accompanying attachments whereby Customer allows combined heat and power (“CHP”) energy efficiency (“EE”) resources to count toward the Company’s compliance with the EE benchmarks set forth in Amended Substitute Senate Bill 221.

Amended Substitute Senate Bill 221 sets forth in R.C. 4928.66 EE benchmarks that electric distribution utilities shall be required to meet or exceed. The statute allows utilities to include EE resources committed by mercantile customers for integration into the utilities programs to be counted toward compliance with a utility’s EE benchmarks. The statute also enables the Commission to approve special arrangements for mercantile customers that commit EE resources to be counted toward compliance with a utility’s EE benchmarks. Further, the statute specifically allows CHP to be an eligible EE resource

and requires the Commission to estimate or approve the estimation methodology herein of the CHP project EE savings, the approved EE Plan allows the CHP project to be counted as a Custom Program project with incentives determined by the Company and the statute authorizes the Commission to take actions necessary to administer the implementation of existing portfolio plans as this Joint Application is requesting. The Company is an electric distribution utility as defined in R. C. 4928.01(A). The Customer is a Mercantile customer as defined in R.C. 4928.01(A)(19).

In its application to the Company, the Customer has agreed to commit the EE resources identified in this Joint Application to the Company's compliance toward the EE benchmarks in Amended Substitute Senate Bill 221.

The Company has worked with the Customer extensively to develop this project beginning in late 2013 and over the last year to support the Customer's decision to move forward and implement this project in 2015 (the project is not yet in service). The Company has reviewed the details submitted in this Joint Application and based upon a thorough review of the available records believes that the project planned in this Joint Application satisfies the requirements in R.C. 4928.66, meets all existing Company EE Plan requirements as a custom program project and furthers the State of Ohio's policy goals of reducing energy costs in a highly cost effective manner. Further, approval of this application can help reduce costs to all customers due to the project's relative size, energy and demand savings and associated net benefits generated.

This CHP project is a prospective Custom Program project and part of the Company's existing approved EE Plan and as such the project and costs are already allowed and approved. The Company has the flexibility in the Custom Program to

incorporate cost effective technologies and adjust incentive levels to improve program participation, attract new promising technologies that are not covered by other programs and improve cost effectiveness of the program and the overall portfolio. CHP is allowed by statute to count as an EE resource. This cost effective technology is clearly allowed in the Custom program, subject to the Commission's approval of the methodology for and estimation of energy savings as required by statute. In the Custom Program, the incentive amounts and strategy provided by the Joint Applicants is determined by the Company based on energy savings and approved by the Commission through the EEC Application process.

Exhibit 1 with attachments (Application to Commit Combined Heat and Power System) to this Joint Application includes a project overview that outlines the project, customer size, project installation date, estimated EE savings resulting from the project, eligible incentive, and the cost effectiveness of the project. Exhibit 1 also provides the signature of the Customer indicating the validity and acceptance of the information, the Customer's support of this Joint Application, and the Customer's intent to participate in the program. The Applicants attest to the fact that the program in this Joint Application complies with the presumption that the mercantile projects are part of a demand response, energy efficiency, or peak demand reduction program to the extent the project either provides for early retirement of functioning equipment which is not yet fully depreciated, or achieves reductions in energy use and peak demand that exceed the reductions that would have occurred had the customer used standard new equipment, to the extent standard is defined by current code or statute.

Consistent with the requirements of Rule 4901:1-39-05(G), O.A.C., Applicants agree that approval by the Commission of the Joint Application will result in an arrangement that: 1) addresses coordination requirements between the electric utility and the mercantile customer with regard to voluntary reductions in load by the mercantile customer, which are not part of an electric utility program, including specific communication procedures, if necessary; 2) grants permission to the electric utility and Commission staff to measure and verify the EE savings resulting from customer-sited projects and resources; and 3) identifies all consequences of noncompliance by the customer with the terms of the commitment. Exhibit 2 (Energy Efficiency Resource Commitment Agreement) is a copy of the formal agreement that commits the Customer's project for integration into the Company's programs to be counted toward compliance with the Company's EE benchmarks and reflects the "Rules and Requirements" agreed to by the Customer.

The Customer has provided the Company documentation necessary to calculate energy and demand savings resulting from the project described in Exhibit 1 and the accompanying attachments. The Company uses methodologies, protocols and/or practices that conform to the general principles of the International Performance Measurement Verification Protocol (IPMVP) in order to justify the energy savings. In the case of this Combined Heat and Power (CHP) project submittal, the Company will rely on the initial estimate of electricity produced by the CHP system and verify those as savings to be counted using the metered electricity production as the measurement of the energy efficiency and demand reduction savings committed to Company.

As shown in Exhibit 1, the Customer must comply with any Commission requirement to provide an annual report on the energy savings and electric utility peak-demand reduction. However, the Customer has agreed and the Company will file as part of its annual EE/PDR Portfolio Status report each year the metered electrical demand and energy production which is equivalent to the energy and demand savings from this project, relieving the Customer of a separate filing requirement if the Commission so approves.

Due to the large size of this project and potential for reducing opportunities other customers may have to participate in energy efficiency programs and to reduce total portfolio program costs over the next two years, the Company requests to count half of the energy and demand savings toward its EE compliance benchmark in 2015 and the remaining half counted toward its EE compliance benchmark in 2016. In addition, splitting the energy efficiency and demand reductions in two years is supported by revised code 4928.66 (B), which states: “For purposes of a waste energy recovery or combined heat and power system, an electric distribution utility shall not apply more than the total annual percentage of the electric distribution utility's industrial-customer load, relative to the electric distribution utility's total load, to the annual energy efficiency savings requirement.” The Company’s industrial load is approximately 37% of the total. The Company’s energy efficiency savings requirement at 1% is approximately 400 GWh. 37% of this goal is approximately 148 GWh in each year. Since this project is nearly 58 GWh representing approximately 39% of the maximum allowable in a year, the Company believes it is prudent to split the 58 GWh in annual savings between 2015 and 2016, counting approximately 29 GWh each year to provide opportunities for other

customers' CHP projects. The Company expects to file additional projects based on interest received. Approval of this project by the Commission may also further spur interest. Allowing the counting of this large project in this manner maintains opportunities for other customers. The Company believes it to be unnecessary to request further split counting of CHP Project EE savings between 2015 and 2016 unless the CHP project is more than 20% of the maximum allowable and is also completed in 2015. The Company has limited prospects for other large CHP projects that fit these criteria and would likely be aware of those given the long lead time requirements of these types of complex systems, so only one additional request for split counting is anticipated. One other project fits this description and will be filed (and it is being filed contemporaneously with this Application). It represents 22% of the maximum annual allowable CHP contribution to Company EE savings goals. Adding the Customer project to the other filed project, the Company will have reached 61% of its total annual allowable without splitting the savings between two years. Splitting the savings reduces the allowable savings to 30% per year, maintaining significant opportunities for other customers in 2015 and 2016. Further, splitting the EE savings provides overall cost saving opportunities for all commercial and industrial customers in each year. In Case No. 11-5568-EL-POR, the Stipulation allows counting of EE savings only one time (no double counting) and splitting the EE savings conforms to that requirement. The Company can also support not splitting the EE savings and will adjust its goal achievement and spending plans accordingly.

Shared Savings for this prospective Custom Program project is clearly allowed and will be counted in the same manner as approved in Case No. 11-5568-EL-POR,

recognizing that the Company is electing to extend its 2012-2014 energy efficiency plan in accordance with amended substitute SB 310. The Company is requesting that the Commission affirm the Company's interpretation that shared savings is allowed for this project. Further, the Company is requesting that shared savings be split in a similar manner as the EE savings with half the shared savings from this project counted in 2015 and the remaining half counted in 2016, in order to directly lower overall energy efficiency plan costs in both 2015 and 2016 for commercial and industrial customers specifically and all customers generally. If all the EE savings and shared savings are counted in 2015 for this large project, the opportunity is lost to also reduce costs overall in 2016, as the Company will continue to work toward reaching EE savings goals and meeting shared savings goals. Further, opportunities for other commercial and industrial customers will be more limited in 2015 due to the size of this project. Without a split of EE savings and shared savings in 2015 and 2016, the Company will need to spend more than necessary to meet EE savings requirements and achieve shared savings goals in 2016. In addition, counting this large project one hundred percent in 2015 can lead to ramping down commercial and industrial programs in 2015 and then ramping back up to reach goals in 2016, which could raise acquisition costs unnecessarily. This outcome would not be favorable for customers and can be avoided with the requested split.

In Case No. 11-5568-EL-POR, the Stipulation allows counting of shared savings only one time and in the year in which the savings are generated. Shared savings will only be counted once (no double counting) and the CHP project does physically generate the savings each year, providing the Commission flexibility to count the shared savings in a method other than in the year in which the project is completed for this limited

exception due to the benefits it provides for all customers. Splitting the shared savings between 2015 and 2016 conforms to all requirements of the Stipulation. The Company can also support not splitting the shared savings and will adjust its goal achievement and spending plans accordingly.

The Company also requests that twenty percent of the shared savings calculated not be subject to the shared savings cap provided in Case 11-5568-EL-POR to recognize the Company's efforts to reduce overall costs for customers and encourage the Company to pursue additional highly cost effective CHP opportunities with its customers.

Approval of this project with the customer incentives provided and inclusive of shared savings has the potential to reduce overall costs to achieve energy and demand savings for 2015 and 2016 as compared to spending in 2013 and 2014, thereby reducing costs for all customers. Exhibit 4a provides a high level estimate of the potential favorable impacts from splitting the EE savings and shared savings between 2015 and 2016, including allowing 20% of the shared savings outside the \$20 million cap per year. Exhibit 4b provides a high level estimate of the potential favorable impacts from splitting the EE savings and shared savings between 2015 and 2016, excluding allowing 20% of the shared savings outside the \$20 million cap per year. This Joint Application is contingent upon the Company receiving approval of shared savings at a minimum 100% subject to the cap, calculations shown in Exhibit 3.

For these reasons, the Applicants request that the Commission approve the Joint Application and the Company's methodology for estimating EE savings and applying the Customer's energy efficiency resources to the Company's energy and demand benchmarks as identified in SB 221 and support the Company's authority to determine

and pay the Custom program incentive payment as defined in Exhibit 2 and the EE savings and shared savings split counting methodology outlined in the Joint Application.

Under Substitute SB 310, an electric utility had the opportunity to either amend its existing Portfolio Plan or leave its current plan in place through 2016. Section 6 of the uncodified provisions of Sub. SB 310 specifically required any utility seeking to amend its plan to file an Application within 30 days of the effective date of the Act – which would have been by October 12, 2014. Thus, it is too late to file an amendment of AEP Ohio's Portfolio Plan and its current plan remains in effect by operation of law until the end of 2016. In any case, AEP Ohio does not want to amend its plan and nothing in this Application should be construed as an amendment. If the Commission were to somehow conclude that this Application constitutes a request for amendment of AEP Ohio's Portfolio Plan, then the Application should be deemed withdrawn because the Company does not consent to approval under those circumstances. Setting aside the issue of whether this Application could be considered as seeking an amendment of the Portfolio Plan, the real issue presented is whether the proposal reflected in this Application is permitted under the current plan.

As demonstrated above, approval of this Application (including the shared savings method reflected in Exhibit 4a) is permitted under the Custom Program of the Company's existing EE/PDR Portfolio Plan. Because the proposed incentives are permissible under the Custom Program and are cost-effective and within the approved level of spending, the Commission should approve the proposal as reflected in Exhibit 4a. More specifically, all costs associated with this Application will be recovered as a part of the already approved costs in the Custom Program for the 2012-2014 EE/PDR Portfolio

Plan, which is being extended for 2015 and 2016. The costs recovered in this Application will reduce program costs in the Business programs portion of the EE/PDR Portfolio Plan. Upon approval, the agreement will be implemented and the Company will reflect the cost recovery and any cost savings as part of the EE/PDR Rider.

While the Company retains the right to respond to any objections or comments that maintain otherwise, if and only if the Commission ultimately determines that the proposed incentives in Exhibit 4a are not permitted, in that case the incentives in Exhibit 4b are acceptable to the Company and the Customer and should be considered for approval by the Commission.

Respectfully submitted,

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EXHIBIT 1

Case No.: 14 - EL-EEC

Mercantile Customer: Solvay Specialty Polymers

Electric Utility: Ohio Power Company

Program Title or

Description: Combined Heat and Power System

Ohio Revised Code (O.R.C.) 4928.66 (A) (1) (a), allows that an electric utility's energy efficiency program may include a combined heat and power (CHP) system. The following application form is to be used by mercantile customers, either individually or jointly with their electric utility, to apply for commitment of such programs.

Complete a separate application for each customer program. Projects undertaken by a customer as a single program at a single location or at various locations within the same service territory should be submitted together as a single program filing, when possible. Check all boxes that are applicable to your program. For each box checked, be sure to complete all subparts of the question, and provide all requested additional information. Submittal of incomplete applications may result in a suspension of the automatic approval process or denial of the application.

Any confidential or trade secret information may be submitted to Staff on disc or via email at ee-pdr@puc.state.oh.us.

Section 1: Mercantile Customer Information

Name:

Principal Address:

Address of facility for which this energy efficiency program applies:

Solvay Specialty Polymers
17005 State Route 7
Marietta, OH 45750

Name and telephone number for responses to questions:

Alan Wanosky – Udel/Utilities Operations Manager
Office: (740)376-6081
Mobile: (740)516-3711

Electricity use by the customer (check the box(es) that apply):

- ☒ The customer uses more than seven hundred thousand kilowatt hours per year at the above facility. (Please attach documentation.)
- ☐ The customer is part of a national account involving multiple facilities in one or more states. (Please attach documentation.)

Section2: Application Information

A) The customer is filing this application (choose which applies):

- ☐ Individually, without electric utility participation.
- ☒ Jointly with the electric utility.

B) The electric utility is: __Ohio Power Company__

Section 3: Request for Cash Payment Reasonable Arrangement (Option 1) or Exemption from Rider (Option 2)

Under this section, check the box that applies and fill in all blanks relating to that choice.

A) The customer is applying for:

☒ Option 1: A cash payment reasonable arrangement.

OR

☐ Option 2: An exemption from the energy efficiency cost recovery mechanism implemented by the electric utility.

B) The value of the option that the customer is seeking is:

Option 1:

☒ An estimated cash payment of \$289,025/year for 5 years = \$1,445,125. (subject to Exhibit 2 – Energy Efficiency Resource Commitment.)

Option 2: An exemption from payment of the electric utility's energy efficiency/peak demand reduction rider.

☐ An exemption from payment of the electric utility's energy efficiency/peak demand reduction rider for ____ months (not to exceed 24 months). (Attach calculations showing how this time period was determined.)

OR

☐ Ongoing exemption from payment of the electric utility's energy efficiency/peak demand reduction rider for an initial period of 24 months because this program is part of the customer's ongoing efficiency program. (Attach documentation that establishes the ongoing nature of the program.) In order to continue the exemption beyond the initial 24 month period, the customer will need to provide a future application establishing additional energy savings and the continuance of the organization's energy efficiency program.)

Section 4: Cost Effectiveness

The CHP system is cost effective because it has a benefit/cost ratio greater than 1 using the (choose which applies):

1. Total Resource Cost Test (TRC). The calculated TRC value is: _____
(Continue to Subsection 1, then skip Subsection 2)
2. Utility Cost Test (UCT). The calculated UCT value is: ____37.3____
(Skip to Subsection 2.)

Subsection 1: TRC Test Used (please fill in all blanks).

The TRC value of the CHP system is calculated by dividing the value of our avoided supply costs (generation capacity, energy, and any transmission or distribution) by the sum of our program overhead and installation costs and any incremental measure costs paid by either the customer or the electric utility.

Subsection 2: UCT Used (please fill in all blanks).

We calculated the UCT value of our CHP system by dividing the value of our avoided supply costs (capacity and energy) by the costs to our electric utility (including administrative costs and incentives paid or rider exemption costs) to obtain our commitment.

Section 5: Combined Heat and Power System Information

Additional information to clarify or supplement this Application may also be requested by Staff. Please fill out this form and attach the following supporting documentation to this application:

Criteria 1: CHP Efficiency Level

Ohio Revised Code (ORC) Sec. 4928.01(40)

- 1) State the overall combined heat and power (CHP) systems' efficiency level and describe how it was determined.

79.4% overall CHP efficiency, based on LHV (Lower Heating Value). See Attachment 1 (end of this application) for calculation.

Criteria 2: Amount of Useful Thermal Energy

Ohio Revised Code (ORC) Sec. 4928.01(40)

- 1) State the systems' amount of thermal energy produced.

Steam Produced: 697,112 klb/yr steam

Steam provided at 1,204 Btu/lb, Solvay returns 65% at 185°F or 153 Btu/lb, the remaining 35% make-up water is supplied from community water supply at 60°F or 28 Btu/lb.

MMBtu provided = $697,112 \times 1204 / 1000 = 817,651$ MMBtu/yr

MMBtu returned = $697,112 \times .65 \times 153 / 1000 = 69,328$ MMBtu/yr

MMBtu supplied Make-up Water = $697,112 \times .35 \times 28 / 1000 = 6,832$ MMBtu/yr

Useful Therm Energy Supplied = $817651 - 69328 - 6832 = 741,491$ MMBtu/yr

- 2) State the systems' use for that thermal energy (e.g. domestic hot water, process hot water, process steam, space heating, absorption chiller, etc.)

Providing electricity needs for the Solvay polymers plant. Also, provide steam for the Solvay polymers plant for process heat and building heat.

Criteria 3: Service Date

Ohio Revised Code (ORC) Sec. 4928.66 (A)(1)(a)

- 1) Provide the date that the system was or will be placed into service.

The CHP System plant commissioning date is expected to be on or about January, 2015.

- 2) Provide the date that the system was retrofitted and describe the retrofit (if applicable).

N/A

Section 6: Additional Information

Please attach the following supporting documentation to this application:

- A copy of the formal declaration or agreement that commits the program or measure to the electric utility, including:
 - 1) any confidentiality requirements associated with the agreement;
 - 2) a description of any consequences of noncompliance with the terms of the commitment;
 - 3) permission by the customer to the electric utility and Commission staff and consultants to measure and verify energy savings and/or peak-demand reductions resulting from your program; and
 - 4) a commitment by the customer to provide an annual report on your energy savings and electric utility peak-demand reductions achieved.
- A description of all methodologies, protocols, and practices used or proposed to be used in measuring and verifying program results. Additionally, identify and explain all deviations from any program measurement and verification guidelines that may be published by the Commission.

1. SYSTEM DESCRIPTION

Provide a description of the Combined Heat and Power (CHP) system.

- a. Describe the technology/configuration, e.g. Combustion Gas Turbine, Power Boiler with Steam Turbine, Reciprocating engine(s) or other.

This natural gas-fired cogeneration (COGEN) plant will consist of a Solar Taurus 70 gas turbine (GT) that will exhaust into a heat recovery steam generator (HRSG) capable of duct firing to produce 150,000 lb/hr of Steam. The HRSG duct burners will be capable of operating in the fresh air mode to provide 100,000 lb/hr Steam using the combustion controls to modulate the duct burner fuel flow control valve to maintain the desired Steam header pressure. HRSG will have integral selective catalytic reduction (SCR) and duct space allocated for future CO catalyst if this becomes necessary. An aqueous ammonia system will supply 19% aqueous ammonia to the SCR. A predictive emissions monitoring system (PEMS) will continuously monitor COGEN's NOx emissions. Natural gas compression to boost the natural gas to the required GT inlet pressure will be provided through a single compressor. Two (2) natural gas-fired 80,000 lb/hr package boilers will be installed for back-up Steam supply.

- b. Describe the type of business/facility that will benefit from the useful thermal energy to be supplied by the cogeneration. Include a description of how the thermal energy will be used throughout a representative year and whether there are any hourly, daily or seasonal variations in thermal demand. If applicable, describe the system replaced by the CHP facility.

Solvay Specialty Polymers in Marietta, OH produces high-performance polymers that are specifically engineered to address the challenges that design engineers face every day, meeting critical performance requirements for key markets: automotive, advanced transportation, energy, electrical & electronics, consumer goods, construction, industrial, smart devices, healthcare and water.

2. EQUIPMENT DESCRIPTION

Provide a complete equipment description for all major components including: Combustion Turbine Generator, Steam Turbine Generator, HRSG, plant control system, air emissions control equipment, cooling system, major pumps, water treatment system, fuel storage facilities, etc.

a. Equipment manufacturer/model/date of manufacturer.

Gas Turbine (GT): The gas turbine is a nominally 7.9MW Solar Taurus 70. The gas turbine was manufactured in 2013.

Gas Compressor: A single screw gas compressor is provided by Vilter to compress incoming gas from 200 psig up to 375 psig. The compressor, Model VSG-301-VVFR-G-HP-EMD-24H-NEC-REM-AIR, was manufactured in 2014.

Heat Recovery Steam Generator (HRSG): The HRSG was constructed by Rentech Boilers, serial number 2013-26. Construction of the boiler was completed in 2014. The HRSG is a duct fired HRSG capable of providing 150,000 lb/hr of 315 psig saturated steam when operating in turbine exhaust mode and fully fired. The HRSG will be provided with a fresh air fan allowing the HRSG to operate as a stand-alone boiler when the GT is down. In fresh air firing mode, the HRSG will be able to supply 100,000 lb/hr of steam. The HRSG will come with an integral selective catalytic reduction (SCR) system. The SCR is designed to reduce NOx emissions by approximately 40%. The catalyst will be supplied by Cormetech. 19% aqueous ammonia will be used as the reductant in the SCR system.

Plant Control System: The DCS controllers are redundant 2014 Rockwell Automation ControlLogix 1756-L72 processors. The Human-Machine Interface (HMI) subsystem is based upon the Wonderware System Platform 2014 family of products.

Water Treatment Equipment: The water treatment system is provided by US Water and was manufactured in 2014. A set of three (3) softeners, each with a diameter of 4.0 feet are proposed to remove hardness prior to the reverse osmosis (RO) system. Two, single-pass RO trains are proposed to reduce the concentration of incoming dissolved solids in the plant service water. Each RO is capable of providing 75 gpm to the permeate storage tanks.

Boiler Feedwater System: The boiler feedwater equipment will consist of a Industrial Steam spray tray deaerator, manufactured in 2014 and four (4) vertical centrifugal Gould's pumps supplied by Industrial Steam model number VCG220 manufactured in 2014.

Package Boilers: Two package boilers will provide steam to Solvay when the gas turbine is down for maintenance. The packaged boilers are Indeck model number KD3.00-68L manufactured in 2014. Each packaged boiler can supply up to 80,000 lb/hr of 315 psig saturated steam.

3. OPERATION MODES

- a. Describe and list the major operating modes of the CHP system and projected time period (per annum) that each mode will be utilized.

The CHP system will operate in normal operations 95% of the year. In this mode the Gas Turbine will supply the lesser of Solvay's electrical demand or the Gas Turbine capacity at the ambient conditions. The HRSG will duct fire to supply all of Solvay's steam demand. The remaining 5% of the year the CHP will be down for maintenance and the boiler facility will supply steam while electrical power will be supplied from the grid.

- b. Will the system include a "thermal dump"?
 - i. A "thermal dump" refers to a sub-system of the CHP that rejects heat allowing the system to generate electricity during periods when the full useful thermal output of the heat recovery system cannot be transferred due to insufficient demand.

No thermal dump system is expected to be required; however, a steam vent is provided on the main steam header in the cogeneration facility. The minimum steam production from the cogeneration facility will be approximately 35,000 lb/hr from the unfired HRSG. The minimum plant demand is expected to be approximately 40,000 lb/hr.

4. PROCESS FLOW DIAGRAM

- a. Provide a process flow diagram for each major operating mode.
See Attachment 2 (separate file)
- b. Include locations for all meters.
See Attachment 2 (separate file)

5. MATERIALS AND ENERGY BALANCE DIAGRAMS

- a. For each fuel, include the flow (lb/hr), temperature (F), pressure (psia), and enthalpy (BTU/lb) for all water, steam combustion air, and fuel streams entering and exiting the boundaries of the generating unit and of each major equipment component.
See Attachment 3 (separate file)

6. ELECTRICAL

a. ELECTRICAL GENERATOR

i. Manufacturer/Model Number/Output Volts/Capacity

The generator supplied by Solar will be a Hyundai Ideal generator, model SAB, frame No. 21320-41. The generator is rated for 7200kW, 9000kVA, 13,800 Volts.

b. Is the generation unit designed or approved to export power onto the electric grid?

This gas turbine is NOT designed to export power onto the electric grid.

c. Does the generation unit have either an approved interconnection plan or submitted an application to the local distribution utility company requesting permission for an interconnection?

Yes, an interconnection plan/application has been submitted and approved. An interconnection agreement is being prepared for final approval.

d. Provide a single line electrical distribution and interconnection diagram.

See Attachments 4a/4b (separate files)

7. METERING

Provide the following information for each meter of the CHP facility. Include locations for all meters on process flow diagram.

a. Fuel Meters

- i. Meter Type: Annubar Flowmeter
- ii. Manufacturer: Rosemount
- iii. Model: 3051SFA
- iv. Is it a revenue grade meter?: Yes
- v. What is the guaranteed accuracy (in %) of the meter?: 1.15% flow rate accuracy.

b. BTU Meters (N/A – cogeneration plant is not providing hot exhaust gas or hot water)

- i. Meter Type
- ii. Manufacturer
- iii. Model
- iv. Is it a revenue grade meter?
- v. What is the guaranteed accuracy (in %) of the meter?

c. Steam Meters

- i. Meter Type: Annubar Flowmeter
- ii. Manufacturer: Rosemount
- iii. Model: 3051SFA
- iv. Is it a revenue grade meter?: Yes
- v. What is the guaranteed accuracy (in %) of the meter?: 0.8% flow rate accuracy.

d. Electric Meters

- i. Meter Type: See Attachment 3, also located at –
http://www.powerlogic.com/literature/3000BR0604R1010_ION7550ION7650.pdf
- ii. Manufacturer: PowerLogic
- iii. Model: ION7650
- iv. Is it a utility grade meter? (i.e. in compliance with paragraph B of rule 4901:1-10-05 of the Ohio Administrative Code): Yes
- v. What is the guaranteed accuracy (in %) of the meter?:

Measurement specifications ⁽¹⁾	
Parameter	Accuracy ± (% reading)
Voltage (line-line, line-neutral); per phase, min./max., unbalance	0.1%
Frequency: present, min./max.	±0.005 Hz
Current (I1, I2, I3)	0.1%
Current (I4, I5)	0.4%
Power: real (kW), reactive (kVAR), apparent (kVA), per-phase, total	IEC 62053-22 Class 0.2S ⁽²⁾
Energy: real (kWh), reactive (kVAh), apparent (kVAh), in/out	IEC 62053-22 Class 0.2S ⁽²⁾
kVA, kVA demand calculations	IEC 62053-22 Class 0.2S ⁽²⁾
Power factor (at Unity PF)	0.2%

⁽¹⁾ Refer to user's manual for valid measurement ranges.

⁽²⁾ Refer to compliance section. Not applicable for NICT meters, contact factory for measurement specifications.



Public Utilities Commission

Application to Commit
Combine Heat and Power System
(Mercantile Customers Only)

Case No.: 14 - 3 - EL-EEC

State of OHIO :

W. J. KANDEL

, Affiant, being duly sworn according to law, deposes and says that:

1. I am the duly authorized representative of:

Solvay Specialty Polymers
(insert customer or EDU company name and any applicable name(s) doing business as)

2. I have personally examined all the information contained in the foregoing application, including any exhibits and attachments. Based upon my examination and inquiry of those persons immediately responsible for obtaining the information contained in the application, I believe that the information is true, accurate and complete.

W. J. Kandel SR. VP. MARIETTA SITE MGR.
Signature of Affiant & Title

Sworn and subscribed before me this 24 day of October, 2014 Month/Year

Nancy M. Horner
Signature of official administering oath

Nancy M. Horner, Notary
Print Name and Title

My commission expires on 10/28/17

EXHIBIT 1

ATTACHMENT 1

Attachment 1 (COGEN Facility Efficiency)

Base Efficiency:

The current facility has steam supplied by package natural gas boiler and power supplied by the local utility. The current package boilers provide steam at 75% efficiency. Power supplied by the grid is assumed to be at efficiency of 45%. Below the effective efficiency of steam and power is calculated:

Annual Steam Supply = 741,491 MMBtu/yr

Annual Power Supply = 57,805 MWh = 197,231 MMBtu/yr

$$\text{Effective Efficiency} = \frac{\text{Steam Supply} \times \text{Efficiency} + \text{Power Supply} \times \text{Efficiency}}{\text{Total Energy Supply}}$$
$$\frac{741,491 \frac{\text{MMBtu}}{\text{yr}} \times 75\% + 197,231 \frac{\text{MMBtu}}{\text{yr}} \times 45\%}{(741,491 + 197,231) \frac{\text{MMBtu}}{\text{yr}}}$$

Effective Efficiency = 68.6%

Improved Efficiency:

The new cogeneration facility will provide steam and power from one facility. Power will be produced from a gas turbine. The exhaust gas from the gas turbine is further heated with supplemental firing natural gas burners and is used to produce steam for industrial process. The cogeneration efficiency is calculated below:

Annual Steam Supply = 741,491 MMBtu/yr

Annual Power Supply = 57,805 MWh = 197,231 MMBtu/yr

Natural Gas Consumed = 1,182,995 MMBtu/yr

$$\text{Efficiency} = \frac{\text{Steam Supply} + \text{Power Supply}}{\text{Fuel Input}} = \frac{741,491 \frac{\text{MMBtu}}{\text{yr}} + 197,231 \frac{\text{MMBtu}}{\text{yr}}}{1,200,000 \frac{\text{MMBtu}}{\text{yr}}}$$

Effective Efficiency = 79.4%

Improved Efficiency = 11%

EXHIBIT 1

ATTACHMENT 2

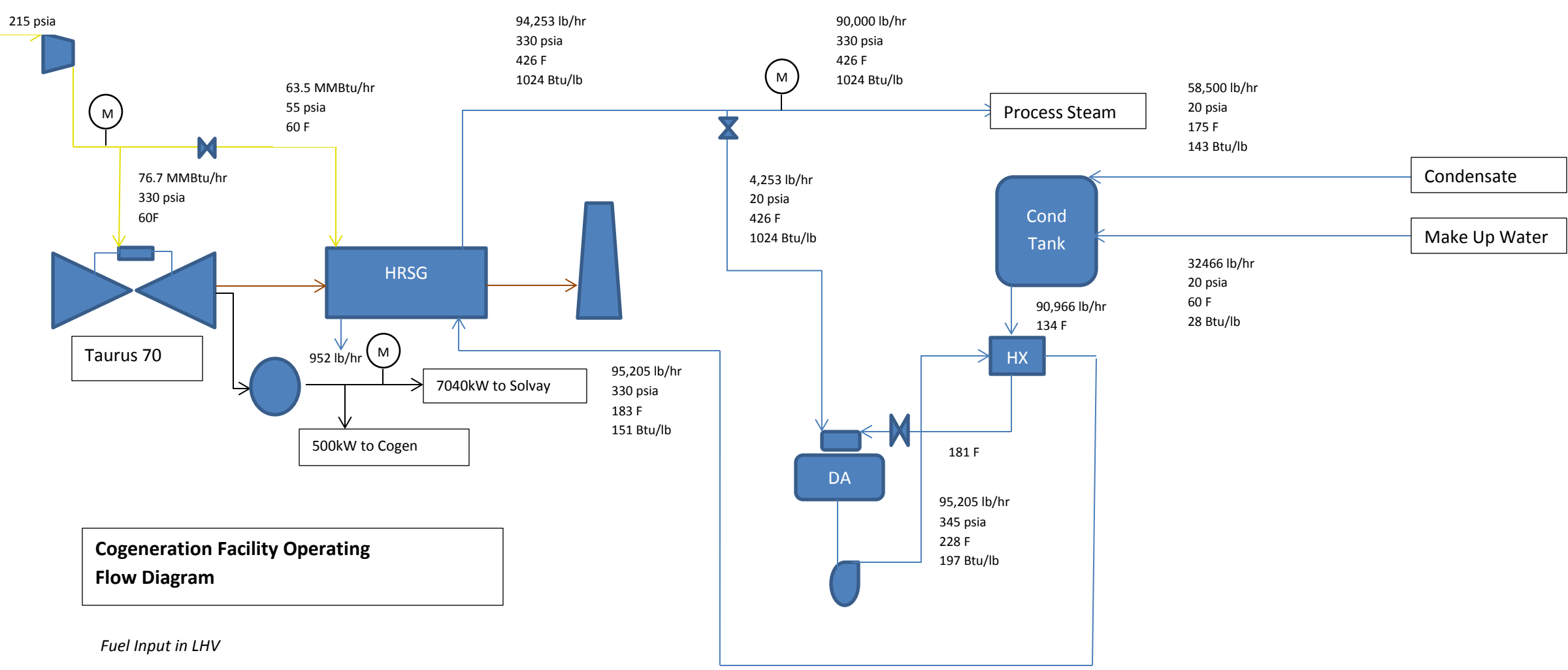


EXHIBIT 1

ATTACHMENT 3

Cogeneration Facility – 59F, GT Full load & 90,000 lb/hr Process Steam

MODEL: SOLVA
CASE: SOLVA

POWER: 7.54
HR: 18602.9

EFF:	18.34
------	-------

S14 3761.5 W

Natural Gas:
Heating Value (LHV) = 20,400 Btu/lb

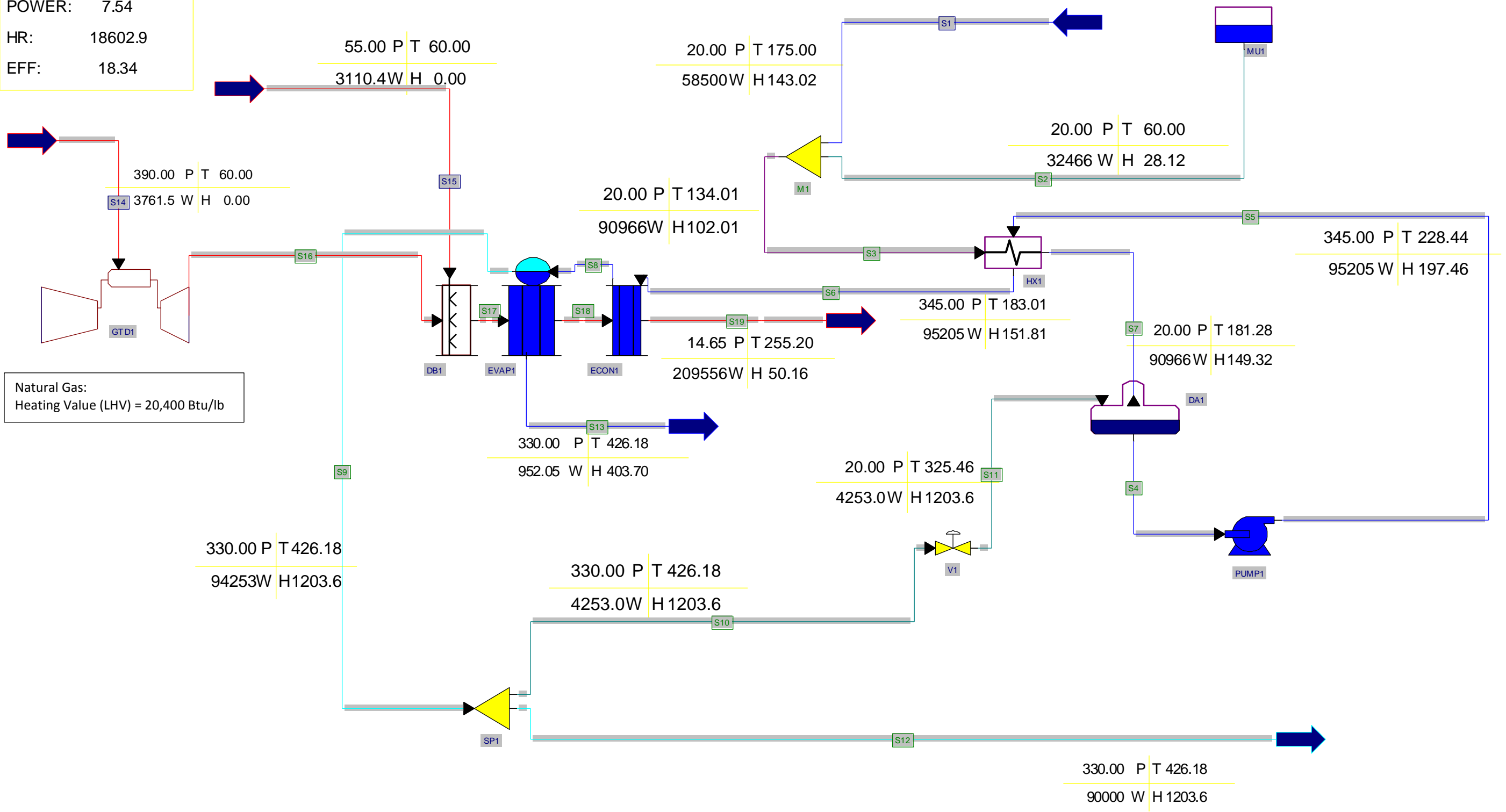
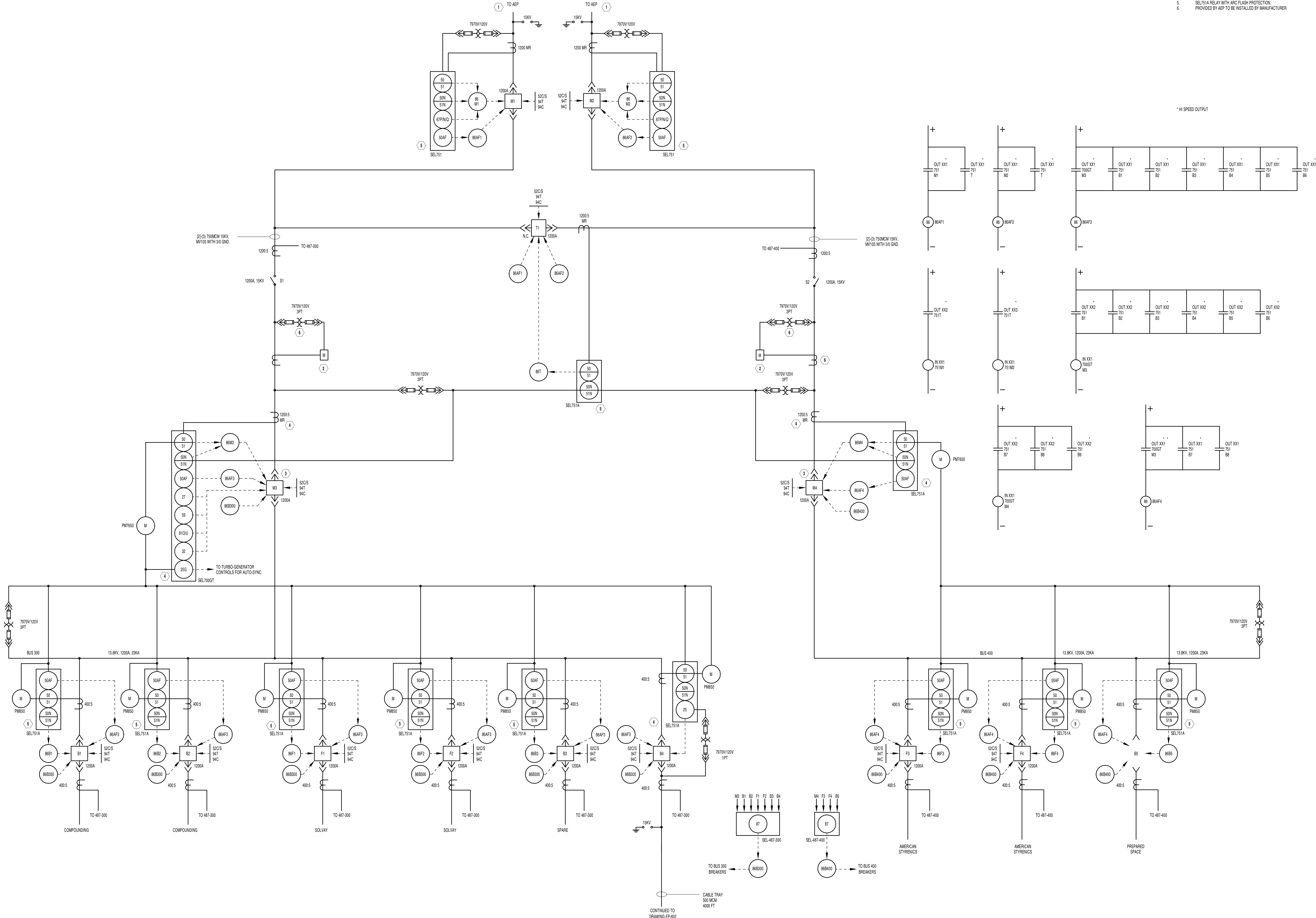


EXHIBIT 1

ATTACHMENT 4a



- DRAWING NOTES:**
- EXISTING 13.8KV SWITCHGEAR TO BE UPGRADED WITH NEW SEL RELAYS
 - NEW METERING FOR SOLVAY FACILITIES
 - SYNCHRONIZING CAPABILITY AT THIS POINT
 - SEL751A RELAY WITH 25, 27, 32, 59, 67, 81 PROTECTIVE FEATURES
 - SEL751A RELAY WITH ARC FLASH PROTECTION
 - PROVIDED BY AEP TO BE INSTALLED BY MANUFACTURER.



FOSDICK & HILMER CONSULTING ENGINEERS
309 VINE STREET, SUITE 50 CINCINNATI, OHIO 45202
TELEPHONE (513) 241-5640 FAX (513) 241-3659
WWW.FHENG.COM

ISSUES AND REVISIONS	
ENGINEER	GO
DESIGNER	ML
CHECKED BY	GO
A 04/02/2014 ISSUED FOR PERMIT	
B 04/11/2014 ISSUED FOR CONSTRUCTION	

DTE MARIETTA
COGENERATION FACILITY
MARIETTA, OHIO

DRAWING TITLE
BUILDING 16 SINGLE LINE

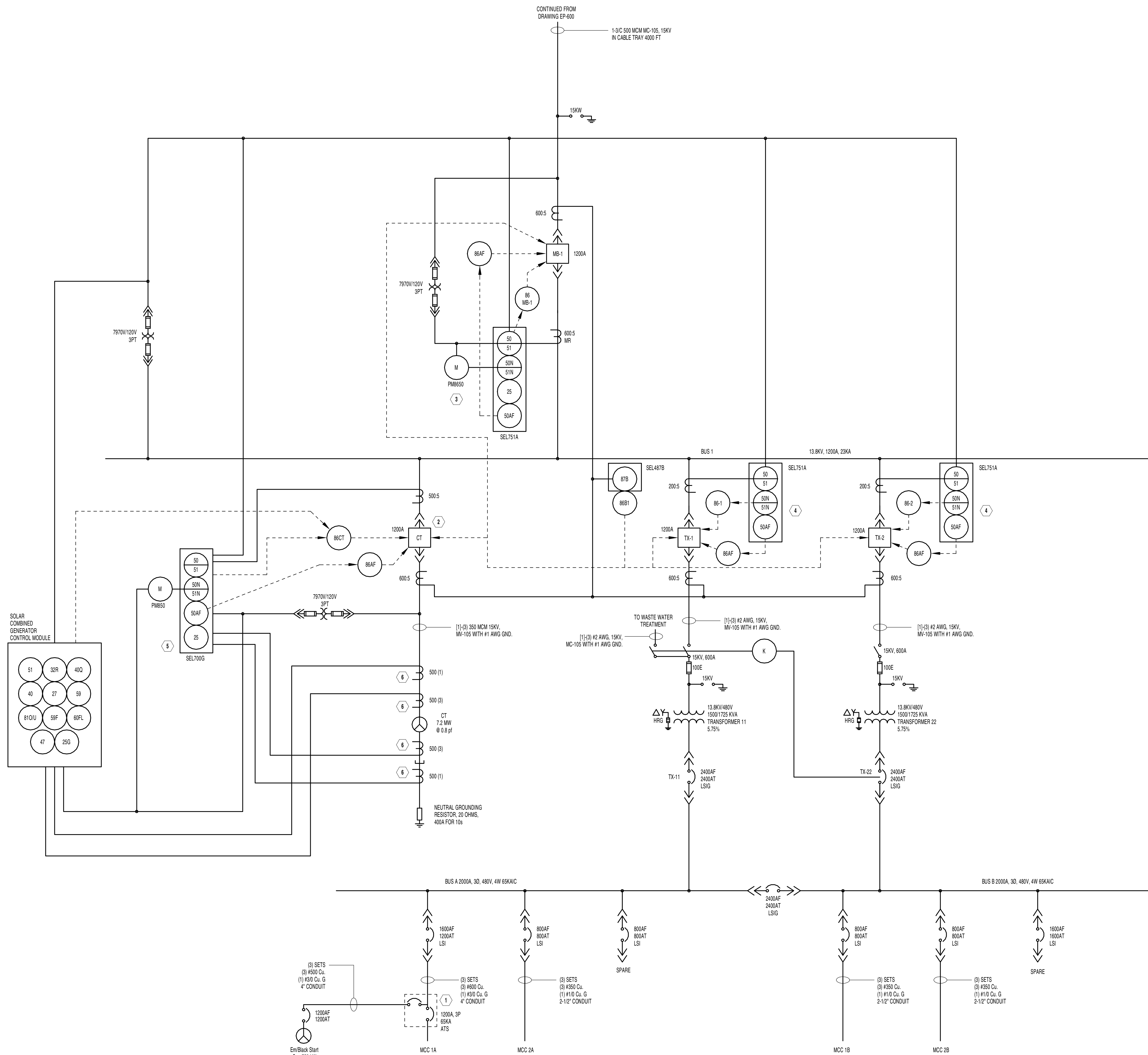
DATE
02/28/2013

PROJECT NUMBER
DTE01-290600

DRAWING NUMBER
EP-600

EXHIBIT 1

ATTACHMENT 4b



- DRAWING NOTES:**
1. EMERGENCY/BLACK START GENERATOR AUTOMATIC TRANSFER SWITCH.
 2. SYNCHRONIZING CAPABILITY AT THIS POINT.
 3. SEL700G RELAY WITH 27, 50, 81, 87 PROTECTIVE FEATURES.
 4. SEL751A RELAY.
 5. SEL700G RELAY.
 6. CURRENT TRANSFORMER SUPPLIED BY OTHERS.



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SEAL

ISSUES AND REVISIONS

NO.	DATE	DESCRIPTION
A	04/04/2014	ISSUED FOR PERMIT
B	04/11/2014	ISSUED FOR CONSTRUCTION

ENGINEER
GO
DESIGNER
ML
CHECKED BY
GO

DTE MARIETTA
COGENERATION FACILITY
MARIETTA, OHIO

DRAWING TITLE
COGEN SINGLE LINE

DATE
02/28/2013
PROJECT NUMBER
DTE01-290600
DRAWING NUMBER

EP-602

EXHIBIT 2

CUSTOMER COMBINED HEAT AND POWER
ENERGY EFFICIENCY AND PEAK DEMAND REDUCTION
RESOURCE COMMITMENT AGREEMENT

This Customer Combined Heat and Power Resource ("CHP") Energy Efficiency and Peak Demand Reduction ("EE/PDR") Commitment Agreement ("Agreement") is entered into by and between Ohio Power Company ("Company") and Solvay Specialty Polymers ("Customer").

In consideration of the mutual covenants, terms and conditions set forth herein, Company and Customer hereto agree as follows:

1. **Commitment:** Customer agrees to commit their prospective planned CHP System electricity generation to Company's energy efficiency and peak demand reduction requirements. CHP projects may count toward meeting energy efficiency and peak demand reduction requirements as allowed under Ohio Amended Substitute Senate Bill 221.
2. **CHP System Description:** This natural gas-fired cogeneration (COGEN) plant will consist of a Solar Taurus 70 gas turbine (GT) that will exhaust into a heat recovery steam generator (HRSG) capable of duct firing to produce 150,000 lb/hr of Steam. The HRSG duct burners will be capable of operating in the fresh air mode to provide 100,000 lb/hr Steam using the combustion controls to modulate the duct burner fuel flow control valve to maintain the desired Steam header pressure. HRSG will have integral selective catalytic reduction (SCR) and duct space allocated for future CO catalyst if this becomes necessary. An aqueous ammonia system will supply 19% aqueous ammonia to the SCR. A predictive emissions monitoring system (PEMS) will continuously monitor COGEN's NOx emissions. Natural gas compression to boost the natural gas to the required GT inlet pressure will be provided through a single compressor. Two (2) natural gas-fired 80,000 lb/hr package boilers will be installed for back-up Steam supply. Make Up Water, Steam Condensate, Fuel, Back-Up Electricity, and receipt/disposal of Wastewater from operation of the COGEN unit will be provided by Solvay. Equipment for treatment of Make Up Water and Steam Condensate needed to operate the COGEN unit and other ancillary equipment will be provided by DTE-Marietta.
3. **Economic Analysis:** Incremental capital cost for the CHP system is approximately \$34 million. Expected Customer savings over the life of this project is \$6 million (net present value). This cost savings is for both steam and electricity usage for the plant over the term of this service contract with DTE-Marietta.
4. **CHP System Life or CHP supplier Contract Term:** 20 years (contract life with DTE-Marietta)

5. **CHP System efficiency and expected % availability:** Overall CHP efficiency is ~79.4% (total Btu out (in the form of usable thermal and electric energy) divided by total Btu in (in the form of consumed natural gas)). Gas Turbine “Generator Availability” – 96%
6. **Percentage of total usage offset by the CHP system:** 100% of current steam usage (provided by on-site temporary boilers) will be replaced by this new COGEN installation. 97% of current electrical usage (provided by electrical grid through AEP transmission/distribution lines) will be replaced by this new COGEN installation.
7. **Planned annual MWh and MW generation provided from the CHP system and counted as 100% energy and demand savings committed to AEP Ohio:** The estimated annual Solvay usage of steam is 650,000,000 lbs. The estimated Customer electricity generation is 57,805 MWh, 7MW generation.
8. **Economic Benefits:** Utility Cost Test benefit/cost ratio is 37.3. Total net benefits of this project are \$48.4 million in avoided generation and transmission costs net of Company costs. See confidential Exhibit 3 for calculations. This project is highly cost effective and compares very favorably to other energy efficiency projects by delivering energy and demand savings at a significantly lower cost than typical projects and the portfolio plan as a whole. The Company will count half the annualized MWh savings in 2015 and the remaining half of the annualized MWh savings in 2016 towards its goals each year as well as half the corresponding calculated shared savings in each year. All actual and estimated incentive and administrative Company costs will be included in the shared savings calculation, shown in confidential Exhibit 3. The Company avoided costs and calculation methodology used to calculate the 20 year CHP system net benefits are the same used as approved for the 2012-2014 EE/PDR Portfolio Plan in case 11-1568-EL-POR.
9. **Contract Term:** 5 years.
10. **Anticipated commissioning date and full scale start-up of operation that will initiate contract start date:** Full-scale COGEN plant start-up planned January, 2015. If start-up is delayed, Customer will communicate in writing to Company actual full scale start-up date for contract initiation.
11. **Non-energy Benefits:** DTE-Marietta COGEN plant will provide the primary electrical supply for the Solvay Specialty Polymers Marietta, OH plant. Solvay will still be connected to the electrical grid for back-up power. At present, the electrical grid is Solvay’s only source of electricity with the main AEP substation residing in the 60-year flood plain. In 2004, this same Solvay plant was forced to shut down when this substation was flooded by the Ohio River. Both the COGEN’s generated

electricity (for power) and steam (for process heat requirements) are vital to the continued operation of the Solvay Marietta site. Solvay Marietta's high-performance polymers are specifically engineered to address the challenges that design engineers face every day, meeting critical performance requirements for key markets: automotive, advanced transportation, energy, electrical & electronics, consumer goods, construction, industrial, smart devices, healthcare and water. Solvay Specialty Polymers Marietta, Ohio plant employees approximately 270 full time employees. The DTE-Marietta COGEN plant will employ another 10-15 permanent employees. The steam supplied by the DTE-Marietta COGEN plant also provides steam to the Americas Styrenics Marietta plant – employing approximately 50 more permanent jobs. In addition to supporting over 300 permanent employees with high-paying jobs, Solvay alone pays more than \$300,000 in property/sale and use taxes to the local community and state of Ohio. With the addition of the COGEN plant, DTE-Marietta will be contributing an additional \$100,000 in annual tax payments. Solvay is also an active participant in the local community. Participation includes Responsible Care Group of Washington County (Household Hazardous Waste Collection Day, Paint Swap Day), Young Engineers and Scientist Field Day, Rotary Club, Chamber of Commerce, Mid-Ohio Valley Safety Council, United Way Campaign participant. Solvay Specialty Polymers earns the public trust by communicating openly about our plant policies, programs and performance, which build strong, credible relationships with our community. The plant is an active member of the Washington County Local Emergency Planning Committee (LEPC) which helps prepare the community to respond effectively to natural or man-made disasters. We strive to minimize the environmental impact of our operations by preventing pollution, reducing waste and conserving energy. Health, Safety and Environmental performance is given a high priority in all phases of our operations. Presently, Solvay uses leased temporary natural gas-fired boilers. These temporary boilers were installed after the shutdown of AMP-Ohio's closure of the Gorsuch Power Station across the road from the Solvay Marietta plant. The new DTE-Marietta COGEN facility will be approximately 79% efficient, representing an overall improvement in efficiency of 11%.

- 12. CHP system generator output measurement, reporting and auditing:** Customer at their sole cost utilizing utility grade metering and in accordance with Company specifications shall measure the generator output and provide monthly readings via e-mail to designated Company personnel. After providing reasonable notice, Company has the right to inspect and validate the meter readings of the CHP system. Company will provide Customer, upon written request, a copy of any report generated as a result of the inspection and audit. Notwithstanding the foregoing, it shall be the sole responsibility of Customer to operate, maintain, repair, and inspect the CHP system to ensure its proper working order during the entire term of the agreement. Customer shall complete an Annual Affidavit of CHP Performance, attached hereto as Attachment A. Customer hereby agrees to submit the Annual Affidavit of CHP Performance to the Company no later than fifteen (15) business days following the

end of the CHP systems' previous twelve months' generation, attesting to its annual generation of energy and demand in MWhs and MW, respectively, as well as the overall system efficiency for the previous year and current condition of the CHP system.

13. Incentives:

- a. Payments are based on annual metered kWhs produced by the CHP system for internal plant use and documented through the Annual Affidavit of CHP Performance.
- b. Payments = \$.005 per kWh
- c. Annual payments commencing twelve months following Customer selected formal commissioning date to full operation and are made for 5 consecutive years.
- d. Estimated annual payments beginning in 2015 are \$289,025 and total payments over 5 years are estimated at \$1,445,125.

14. EE/PDR rider and EE/PDR program participation: Customer agrees to continue paying EE/PDR rider until the end of the incentive payment term in this agreement, and Customer can continue to participate in any EE/PDR programs available to them.

15. Interconnection requirements: Customer application for interconnection has been approved by the Company and the interconnection agreement will be executed upon completion of the CHP System installation. This agreement is subject to Customer and Company execution of the interconnection agreement.

16. Standby service requirements: Customer is responsible for any standby service needs or requirements.

17. Invoicing for Incentives: Customer shall invoice Company annually for incentives following the end of the twelve month period and Company receipt of the Annual Affidavit of CHP Performance. Company shall pay all such properly submitted incentive invoices within fifteen (15) business days after receipt.

18. Penalty: Customer could be subject to forfeit of annual incentive payment at the sole discretion of the Company if the Annual Affidavit of CHP Performance is not submitted by the due date, monthly meter readings are not provided in a timely manner or reasonable advance notice requests for inspection of the project and validation of meter readings are not allowed by the Customer.

19. Contacts and Notices: Contacts for each party. All Notices relating to this contract must be effectuated in writing and sent by ordinary US mail, postage prepaid, to:

Customer: Wally Kandel
Marietta Site Manager
Solvay Specialty Polymer
17005 State Route 7
Marietta, Ohio USA 45750
Office Telephone: (740)376-6219
Mobile Telephone: (740)236-2170

Company: Jon Williams
Manager, Energy Efficiency and Demand Response
301 Cleveland Avenue
Canton, Ohio 44701
330-438-7742

- 20. MODIFICATION.** No modification of this Agreement is effective unless reduced to writing, signed by both parties.
- 21. SUCCESSORS AND ASSIGNS.** This Agreement shall be binding upon and inure to the benefit of the parties hereto, and their respective successors and/or assigns, but Customer shall not transfer or assign any of the rights hereby granted to any non-affiliated third-party without the prior written consent of AEP Ohio.
- 22. REGULATORY APPROVAL.** The Customer and Company have worked extensively on this project over the last year and agree that we have shown that it provides significant benefits to not only the Customer but to all customers due to its size and high level of cost effectiveness compared to other projects. Both parties request expedited review and approval of the agreement. This contract is dependent upon approval of a mercantile arrangement along with cost recovery including shared savings through the EE/PDR rider based on the terms of this contract by the Public Utilities Commission of Ohio (Commission). The parties agree that the goal of the agreement is to help the Customer achieve greater energy efficiency in its operations and help the Company meet its energy efficiency and peak demand reduction goals for 2015 and 2016, while improving the overall cost effectiveness of the approved EE/PDR Plan in each year.

OHIO POWER COMPANY

By: Karen Stoner

Name: Karen Stoner

Title: Director, Customer Services & Marketing

Date: 10/27/14

CUSTOMER: SOLVAY SPECIALTY POLYMERS USA LLC

By: WJ Kandel

Name: W.J. KANDEL

Title: SR VP, MARIETTA SITE MGR

Date: 10/24/14

EXHIBIT 2

Attachment A

ANNUAL AFFIDAVIT OF CHP PERFORMANCE

State of Ohio:

County of _____:

_____, Affiant, being duly sworn, affirmed according to law,
deposes and says that:

1. I am the duly authorized representative for purposes of this agreement of the Solvay Specialty Polymers DTE-Marietta CHP generating facility.
2. I have personally examined and am familiar with all information contained in the foregoing Agreement, including any exhibits and attachments, and that based upon my inquiry of those persons immediately responsible for obtaining the information contained in the Agreement; I believe that the information is true, accurate and complete.
3. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

The Statement:

For the twelve month period identified by the Meter Read Dates below, this CHP generating facility continued to be in good working order with no material corrective actions pertaining to safety and/or operation warranting major attention and significant down time. Further, this CHP generating facility delivered _____ MWhs in the twelve month period.

Meter Read Dates (mo/day/yr)

Readings

Start: _____

End: _____

The calculated average annual total system efficiency for the twelve month period of the CHP generating facility is _____%

Signature of Affiant & Title

Sworn and subscribed before me this ____ day of _____, _____ Month/Year

Notary Signature

Print Name and Title

My commission expires on _____

EXHIBIT 3

Program **CHP**
Utility **OPC**
Jurisdiction **OH**
Market Segment **Industrial**
Area **East**
 Program Benefits

Participant Benefits

Customer **Solvay Specialty Polymers**

Year	MWH Program Energy Savings	Program Capacity Saving kW	Energy T&D Losses	Avoided Energy Costs (\$)	T&D Demand Losses	Avoided Demand Costs (\$)	Capacity (\$)	Avoided Energy Charges (\$)
2015	57,805	7,200	4,783.94	2,836,908	666	617,962	1,137,647	3,466,268
2016	57,805	7,200	4,783.94	3,243,522	666	809,371	1,137,647	3,466,268
2017	57,805	7,200	4,783.94	3,310,105	666	677,481	1,137,647	3,466,268
2018	57,805	7,200	4,783.94	3,358,862	666	575,315	1,137,647	3,466,268
2019	57,805	7,200	4,783.94	3,430,898	666	644,722	1,137,647	3,466,268
2020	57,805	7,200	4,783.94	3,481,089	666	727,702	1,137,647	3,466,268
2021	57,805	7,200	4,783.94	3,571,733	666	804,006	1,137,647	3,466,268
2022	57,805	7,200	4,783.94	4,183,387	666	873,281	1,137,647	3,466,268
2023	57,805	7,200	4,783.94	4,263,758	666	935,162	1,137,647	3,466,268
2024	57,805	7,200	4,783.94	4,386,645	666	989,271	1,137,647	3,466,268
2025	57,805	7,200	4,783.94	4,493,229	666	1,035,220	1,137,647	3,466,268
2026	57,805	7,200	4,783.94	4,546,396	666	1,072,609	1,137,647	3,466,268
2027	57,805	7,200	4,783.94	4,641,434	666	1,101,024	1,137,647	3,466,268
2028	57,805	7,200	4,783.94	4,742,582	666	1,120,041	1,137,647	3,466,268
2029	57,805	7,200	4,783.94	4,832,774	666	1,128,107	1,137,647	3,466,268
2030	57,805	7,200	4,783.94	4,945,688	666	1,125,888	1,137,647	3,466,268
2031	57,805	7,200	4,783.94	5,014,927	666	1,141,651	1,137,647	3,466,268
2032	57,805	7,200	4,783.94	5,165,375	666	1,175,900	1,137,647	3,466,268
2033	57,805	7,200	4,783.94	5,320,337	666	1,211,177	1,137,647	3,466,268
2034	57,805	7,200	4,783.94	5,479,947	666	1,247,512	1,137,647	3,466,268
2035	-	-	-	-	-	-	-	-
2036	-	-	-	-	-	-	-	-
2037	-	-	-	-	-	-	-	-
2038	-	-	-	-	-	-	-	-
2039	-	-	-	-	-	-	-	-
2040	-	-	-	-	-	-	-	-
2041	-	-	-	-	-	-	-	-
2042	-	-	-	-	-	-	-	-
2043	-	-	-	-	-	-	-	-
2044	-	-	-	-	-	-	-	-
2045	-	-	-	-	-	-	-	-
2046	-	-	-	-	-	-	-	-
2047	-	-	-	-	-	-	-	-
2048	-	-	-	-	-	-	-	-
Nominal	1,156,100	144,000	95,679	85,249,596	13,313	19,013,402	22,752,939	69,325,352
PV	601,161	74,879	49,752	40,791,692	6,923	8,954,982	11,831,309	36,048,514
PV(Soc)	817,012	101,764	67,616	\$ 57,824,873	9,408	\$ 12,796,949	\$ 16,079,433	\$ 48,992,016

Test	NPV	Benefit/Cost Ratio
Total Resource	\$ 16,612,477	1.5
Participant	\$ 16,079,797	1.5
RIM	\$ 532,680	1.0
Utility	\$ 48,412,503	37.3
Societal	\$ 37,487,626	2.1

PV Benefits	PV Costs	Levelized Cost/kWh	Levelized Cost/kW
49,746,673	33,134,196	0.055	443
49,119,778	33,039,981	0.055	441
49,746,673	49,213,993	0.082	657
49,746,673	1,334,170	0.002	18
70,621,823	1,334,170	0.002	18

Measure /Program Life 20.0 years
Free Ridership 0%
Utility Discount Rate 8.30%
Participant Discount Rate 8.30%
Energy Adjustment to Generator 0.08276
Demand Adjustment to Generator 0.09245
Societal Discount Rate 4%

NPV/kWh \$ 0.8375
Shared Savings per kWh \$ 0.1089

Shared Savings \$ 6,293,625

Program Costs

Participant Costs

Lost Revenues

Avoided Costs

Program Costs	Customer Incentives	Incremental Participant Costs	Participant energy Rate	Lost Margin	Lost Revenues Energy	Annual Customer Demand Charge	Lost Margin	Lost Revenues Demand		Avoided Energy Costs/\$ MWh	Avoided Demand \$/kW/Year
(\$21,961)	(\$289,025)	(\$32,100,000)	\$0.060	\$0.01	(\$3,466,267.59)	\$158.01	(\$846,197)	(\$1,137,647)	2015	45.33	78.56
(\$21,961)	(\$289,025)	(\$100,000)	\$0.060	\$0.01	(\$3,466,267.59)	\$158.01	(\$470,662)	(\$1,137,647)	2016	51.82	102.90
(\$21,961)	(\$289,025)	(\$100,000)	\$0.060	\$0.01	(\$3,466,267.59)	\$158.01	(\$409,168)	(\$1,137,647)	2017	52.89	86.13
(\$21,961)	(\$289,025)	(\$100,000)	\$0.060	\$0.01	(\$3,466,267.59)	\$158.01	(\$364,138)	(\$1,137,647)	2018	53.67	73.14
(\$21,961)	(\$289,025)	(\$100,000)	\$0.060	\$0.01	(\$3,466,267.59)	\$158.01	(\$297,608)	(\$1,137,647)	2019	54.82	81.97
\$0	\$0	(\$100,000)	\$0.060	\$0.00	(\$3,466,267.59)	\$158.01	(\$251,253)	(\$1,137,647)	2020	55.62	92.52
\$0	\$0	(\$100,000)	\$0.060	\$0.00	(\$3,466,267.59)	\$158.01	(\$167,537)	(\$1,137,647)	2021	57.07	102.22
\$0	\$0	(\$100,000)	\$0.060	(\$0.01)	(\$3,466,267.59)	\$158.01	\$397,365	(\$1,137,647)	2022	66.84	111.02
\$0	\$0	(\$100,000)	\$0.060	(\$0.01)	(\$3,466,267.59)	\$158.01	\$471,593	(\$1,137,647)	2023	68.12	118.89
\$0	\$0	(\$100,000)	\$0.060	(\$0.01)	(\$3,466,267.59)	\$158.01	\$585,087	(\$1,137,647)	2024	70.09	125.77
\$0	\$0	(\$100,000)	\$0.060	(\$0.01)	(\$3,466,267.59)	\$158.01	\$683,524	(\$1,137,647)	2025	71.79	131.61
\$0	\$0	(\$100,000)	\$0.060	(\$0.01)	(\$3,466,267.59)	\$158.01	\$732,628	(\$1,137,647)	2026	72.64	136.37
\$0	\$0	(\$100,000)	\$0.060	(\$0.01)	(\$3,466,267.59)	\$158.01	\$820,402	(\$1,137,647)	2027	74.16	139.98
\$0	\$0	(\$100,000)	\$0.060	(\$0.02)	(\$3,466,267.59)	\$158.01	\$913,818	(\$1,137,647)	2028	75.77	142.40
\$0	\$0	(\$100,000)	\$0.060	(\$0.02)	(\$3,466,267.59)	\$158.01	\$997,117	(\$1,137,647)	2029	77.21	143.42
\$0	\$0	(\$100,000)	\$0.060	(\$0.02)	(\$3,466,267.59)	\$158.01	\$1,101,400	(\$1,137,647)	2030	79.02	143.14
\$0	\$0	(\$100,000)	\$0.060	(\$0.02)	(\$3,466,267.59)	\$158.01	\$1,165,347	(\$1,137,647)	2031	80.12	145.14
\$0	\$0	(\$100,000)	\$0.060	(\$0.02)	(\$3,466,267.59)	\$158.01	\$1,304,296	(\$1,137,647)	2032	82.53	149.50
\$0	\$0	(\$100,000)	\$0.060	(\$0.03)	(\$3,466,267.59)	\$158.01	\$1,447,413	(\$1,137,647)	2033	85.00	153.98
\$0	\$0	(\$100,000)	\$0.060	(\$0.03)	(\$3,466,267.59)	\$158.01	\$1,594,823	(\$1,137,647)	2034	87.55	158.60
\$0	\$0	\$0	\$0.060	(\$0.03)	\$0.00	\$158.01	\$0	\$0	2035	90.18	163.36
\$0	\$0	\$0	\$0.060	(\$0.03)	\$0.00	\$158.01	\$0	\$0	2036	92.89	168.26
\$0	\$0	\$0	\$0.060	(\$0.04)	\$0.00	\$158.01	\$0	\$0	2037	95.67	173.31
\$0	\$0	\$0	\$0.060	(\$0.04)	\$0.00	\$158.01	\$0	\$0	2038	98.54	178.51
\$0	\$0	\$0	\$0.060	(\$0.04)	\$0.00	\$158.01	\$0	\$0	2039	101.50	183.86
\$0	\$0	\$0	\$0.060	(\$0.04)	\$0.00	\$158.01	\$0	\$0	2040	104.54	189.38
\$0	\$0	\$0	\$0.060	(\$0.05)	\$0.00	\$158.01	\$0	\$0	2041	107.68	195.06
\$0	\$0	\$0	\$0.060	(\$0.05)	\$0.00	\$158.01	\$0	\$0	2042	110.91	200.91
\$0	\$0	\$0	\$0.060	(\$0.05)	\$0.00	\$158.01	\$0	\$0	2043	114.24	206.94
\$0	\$0	\$0	\$0.060	(\$0.06)	\$0.00	\$158.01	\$0	\$0	2044	117.67	213.15
\$0	\$0	\$0	\$0.060	(\$0.06)	\$0.00	\$158.01	\$0	\$0	2045	121.20	219.54
\$0	\$0	\$0	\$0.060	(\$0.06)	\$0.00	\$158.01	\$0	\$0	2046	124.83	226.13
\$0	\$0	\$0	\$0.060	(\$0.07)	\$0.00	\$158.01	\$0	\$0	2047	128.58	232.91
\$0	\$0	\$0	\$0.060	(\$0.07)	\$0.00	\$158.01	\$0	\$0	2048	132.43	239.90
(\$109,805)	(\$1,445,125)	(\$34,000,000)			(\$69,325,352)	\$5,372	\$9,408,251	(\$22,752,939)			
(94,216)	(1,239,955)	(33,039,981)			(36,048,514)	1,925	1,625,293	(11,831,309)			
\$ (94,216)	\$ (1,239,955)	\$ (33,039,981)			\$ (48,992,016)	\$	4,413,054	\$ (16,079,433)			

Percent DemandPV	0.18
Percent EnergyPV	0.82

EXHIBIT 4a

Exhibit 4a - CHP project potential benefits: 80% of shared savings subject to cap, 20% NOT subject to cap
High Level Estimates of CHP Projects' Cost Benefits to Portfolio

Year	Approved Portfolio Budget	Portfolio Cost**	Total Estimated Net Benefits	All Customers' Share Net Benefits 87%	AEP Ohio Share Net Benefits 13% capped at \$20M	Portfolio Total Cost including AEP Ohio share of savings	Estimated cost savings if CHP projects approved as filed*
2013	\$91,500,000	\$78,000,000	\$169,000,000	\$149,000,000	\$20,000,000	\$109,200,000	
2014e	\$97,500,000	\$74,000,000	\$184,000,000	\$164,000,000	\$20,000,000	\$105,200,000	
2015e w/o CHP	\$97,500,000	\$75,000,000	\$184,000,000	\$164,000,000	\$20,000,000	\$106,200,000	
2015e with CHP incl.	\$97,500,000	\$66,471,340	\$184,000,000	\$163,028,200	\$20,971,800	\$99,187,348	\$7,012,652
2016e w/o CHP	\$97,500,000	\$76,000,000	\$184,000,000	\$164,000,000	\$20,000,000	\$107,200,000	
2016e with CHP incl.	\$97,500,000	\$67,341,431	\$184,000,000	\$163,028,200	\$20,971,800	\$100,057,439	\$7,142,561

*While future costs are difficult to predict, the opportunity for significant cost savings is clear if these CHP projects are approved.

**Portfolio costs are high level estimates only and depend on other programs' actual performance and cost effectiveness.

	Overall Custom Program Budget	Custom Program Cost	Total Net Benefits	All Customers' Share Net Benefits 87%	AEP Ohio Share Net Benefits 13% capped at \$20M	Total Cost
<u>CHP Projects filed</u>						
Solvay	\$8,700,000	\$1,554,800	\$48,412,500	\$42,112,500	\$6,300,000	\$11,382,800
- half counted each year	\$8,700,000	\$777,400	\$24,206,250	\$21,056,250	\$3,150,000	\$5,691,400
Kraton	\$8,700,000	\$874,200	\$26,292,500	\$22,874,500	\$3,418,000	\$6,206,280
- half counted each year	\$8,700,000	\$437,100	\$13,146,250	\$11,437,250	\$1,709,000	\$3,103,140

CHP Project costs are included in the overall Portfolio cost estimates above.

EXHIBIT 4b

Exhibit 4b - CHP projects potential benefits: 100% of shared savings subject to cap
High Level Estimates of CHP Projects' Cost Benefits to Portfolio

Year	Approved Portfolio Budget	Portfolio Cost**	Total Estimated Net Benefits	All Customers' Share Net Benefits 87%	AEP Ohio Share Net Benefits 13% capped at \$20M	Portfolio Total Cost including AEP Ohio share of savings	Estimated cost savings if CHP projects approved as filed*
2013	\$91,500,000	\$78,000,000	\$169,000,000	\$149,000,000	\$20,000,000	\$109,200,000	
2014e	\$97,500,000	\$74,000,000	\$184,000,000	\$164,000,000	\$20,000,000	\$105,200,000	
2015e w/o CHP	\$97,500,000	\$75,000,000	\$184,000,000	\$164,000,000	\$20,000,000	\$106,200,000	
2015e with CHP incl.	\$97,500,000	\$66,510,063	\$184,000,000	\$164,000,000	\$20,000,000	\$97,710,063	\$8,489,938
2016e w/o CHP	\$97,500,000	\$76,000,000	\$184,000,000	\$164,000,000	\$20,000,000	\$107,200,000	
2016e with CHP incl.	\$97,500,000	\$67,380,670	\$184,000,000	\$164,000,000	\$20,000,000	\$98,580,670	\$8,619,330

*While future costs are difficult to predict, the opportunity for significant cost savings is clear if these CHP projects are approved.

**Portfolio costs are high level estimates only and depend on other programs' actual performance and cost effectiveness.

	Overall Custom Program Budget	Custom Program Cost	Total Net Benefits	All Customers' Share Net Benefits 87%	AEP Ohio Share Net Benefits 13% capped at \$20M	Total Cost
<u>CHP Projects filed</u>						
Solvay	\$8,700,000	\$1,554,800	\$48,412,500	\$42,112,500	\$6,300,000	\$11,382,800
- half counted each year	\$8,700,000	\$777,400	\$24,206,250	\$21,056,250	\$3,150,000	\$5,691,400
Kraton	\$8,700,000	\$874,200	\$26,292,500	\$22,874,500	\$3,418,000	\$6,206,280
- half counted each year	\$8,700,000	\$437,100	\$13,146,250	\$11,437,250	\$1,709,000	\$3,103,140

CHP Project costs are included in the overall Portfolio cost estimates above.

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Case No(s). 14-2296-EL-EEC

Summary: Application electronically filed by Mr. Matthew J Satterwhite on behalf of Ohio Power Company