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September 1, 2016

Barcy F. McNeal
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Public Utilities Commission of Ohio
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RE: *In the Matter of the Application of Ohio Edison Company, The Cleveland Electric Illuminating Company, and The Toledo Edison Company for Authority to Provide for a Standard Service Offer Pursuant to R.C. §4928.143 in the Form of an Electric Security Plan*, Case No. 14-1297-EL-SSO, *et seq.*

To the Public Utilities Commission of Ohio:

Pursuant to Section V. C. 2 of the Third Supplemental Stipulation and Recommendation approved by the Commission on March 31, 2016, Ohio Edison Company, The Cleveland Electric Illuminating Company and The Toledo Edison Company ("Companies") hereby file their quarterly update to the Commission on the state of the wholesale electricity markets from the Companies' perspective.

Very truly yours,

/s/ Carrie M. Dunn

Carrie M. Dunn

FirstEnergy's Perspective on PJM's Wholesale Electricity Markets: 2016

1 EXECUTIVE SUMMARY

Ohio Edison Company, The Cleveland Electric Illuminating Company, and The Toledo Edison Company (collectively, "FirstEnergy" or the "Companies") submit this report pursuant to the terms of the Third Supplemental Stipulation and Recommendation concerning the Companies' fourth Electric Security Plan. Specifically, the Third Supplemental Stipulation states "Beginning June 1, 2016, and continuing through May 31, 2024, the Companies shall provide a public, quarterly update to the Commission on the state of wholesale electricity markets from the Companies' perspective."

It is the Companies' intent that this report will help inform the Commission on how wholesale electric market developments affect Ohio electricity providers' ability to deliver safe, clean, reliable and affordable energy to customers and to support economic development in the state.

Despite certain necessary PJM design modifications, it is clear that at the present time PJM wholesale electricity markets are delivering low prices to consumers while maintaining a stable and reliable electric grid. PJM's recent Capacity Performance auction procured an additional 5,074 MW of natural gas generation and has a forecasted 22.4% reserve margin in 2019/2020. Improvements in natural gas production technology have revolutionized the industry and provided lower cost electricity to consumers. However, while this data appears to indicate a well-functioning market, the reality is that the current low prices are largely attributable to an unprecedented supply of low-cost natural gas, and industry participants have become increasingly concerned with the size and speed of the portfolio transition to gas. Low and uncertain prices are resulting in premature retirements of baseload power plants which have served as the backbone of our energy infrastructure. These baseload nuclear and coal resources have traditionally been located near load pockets, coordinated with transmission infrastructure and rely on established supply chains. A continuation of this trend could lead to a period of uncertainty as the portfolio works to solidify a new equilibrium. FirstEnergy recommends pursuing an energy policy that supports a fuel-diverse portfolio which will maintain environmental, reliability, and economic value to customers.

As explained in detail in the discussion section of this report, FirstEnergy has four key observations regarding PJM's current wholesale electricity markets:

1) PJM's energy and capacity prices have been volatile, which translates into significant price uncertainty both for customers and existing suppliers
2) PJM is indifferent as to whether resources to serve Ohioans are located in Ohio or another state
3) The current market design may not be a sustainable, optimal solution for Ohio customers
4) Net revenues are inadequate for a number of resources leading to premature retirements

There are significant price and operational concerns regarding wholesale markets over the long-term. Capacity prices are volatile and suppressed, with an average trend that is far below the Net Cost of New

Entry (Net CONE) – a critical benchmark price for investment – in any given year. Energy prices are currently low, and have been historically volatile. Both markets continue to be subject to numerous rule changes, further contributing to the price uncertainty for customers and generators.

Meanwhile, PJM's generation fuel mix is in a state of transition, moving toward heavy reliance on gas. Traditional baseload coal and nuclear generation, which provides grid support critical to reliability and provides more fuel security than gas, is retiring at an unprecedented pace. While PJM has yet to study the impacts of reduced fuel diversity due to this transition, IHS estimates that the U.S. fuel mix provides customers an astounding $93 billion in savings.

PJM's wholesale market models do not incorporate public policy considerations important to Ohio and its customers. In addition to not recognizing the value of fuel diversity, PJM's wholesale markets do not consider required transmission investment, local economics (jobs, wages, state and local taxes), long term price stability, or environmental impacts when determining which resources make economic sense. PJM has acknowledged these shortcomings, referring to its mission to: "provide for a reliable and efficient wholesale power supply." [1] PJM further states that "[t]he markets it designs and administers to accomplish this mission do not necessarily promote and may even conflict with other valid public policy interests that state and federal lawmakers and regulators may pursue to meet environmental, social and political interests distinct from the markets' singular mission to deliver the most cost-efficient resources needed to serve customers reliably."[2] This approach could lead to unintended consequences, including lost value for customers.

Because PJM's wholesale markets send price signals related to generation investment without holistically considering the cost of transmission, there is no long-term plan that focuses on the optimal solution for customers. FirstEnergy Corp. does not believe the PJM wholesale markets are designed to accommodate Ohio's policy interests or to provide long-term certainty for Ohio customers, and therefore, Ohio must carefully consider the right energy path for the long term.

FirstEnergy suggests that both PJM and the Commission take a holistic approach with respect to the cost of reliability for customers, and consider approaches which properly value resources for fuel diversity, contribution to climate and economic development along with all reliability services they provide.

2 BACKGROUND

The purpose of this section is to provide a brief overview of PJM markets including pricing trends and regulatory changes, a discussion of the evolving fuel mix in PJM, and information about how Ohio compares to the rest of PJM.

PJM has responsibility for organizing and administering the capacity, energy, ancillary services and Financial Transmission Rights (FTR) markets, and managing the reliability of the transmission grid. PJM provides open access to the transmission grid and ensures performance via long-term planning.

[1] *See* PJM Interconnection, LLC, *Resource Investment in Competitive Markets* iii (2016), *available at* http://www.pjm.com/~/media/documents/reports/20160505-resource-investment-in-competitive-markets-paper.ashx

[2] *Id*.

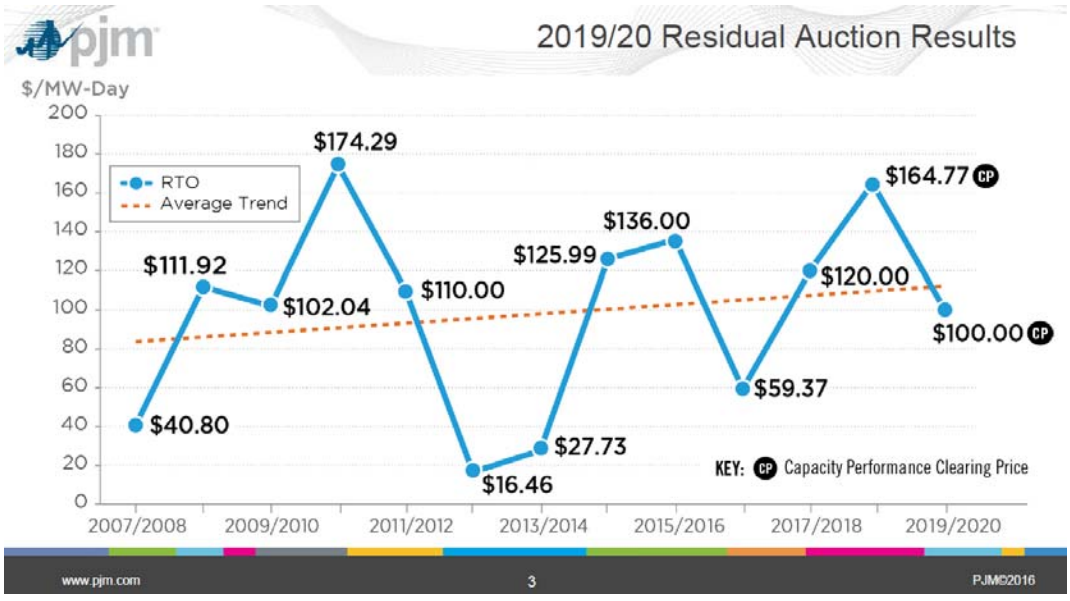
Capacity Market

PJM's capacity market, called the Reliability Pricing Model (RPM), is intended to ensure long-term resource adequacy by procuring the amount of power supply resources needed to meet forecasted peak demand and reserve margin for a period three years into the future. RPM is a regulatory construct which includes price controls such as offer caps and an administratively derived demand curve.

From 2014-2015, as a result of an unprecedented amount of unavailable generation during the Polar Vortex of 2015,[3] PJM and its stakeholders worked on revising the capacity market rules to ensure reliability by adding an enhanced capacity product, known as Capacity Performance, and imposing penalties for non-performance during times of system emergency. In the order approving the Capacity Performance construct, FERC found that Net CONE continues to be a reasonable estimate for the cost of providing new capacity.[4]

While theoretically, capacity prices should trend towards Net CONE over time, this has not historically been the case. Figure 1 below[5] shows that the average trend (orange dotted line), which has ranged from $82/MW-day to $115/MW-day from 2007/2008 to 2019/2020, is well below Net CONE, which has ranged from $161/MW-day to $351/MW-day during that time period.[6] Much like PJM's energy markets, in addition to suppressed prices, PJM's capacity markets have been extremely volatile, with up to 354% increases and 85% decreases from one year to the next.

Figure 1.



[3] AD14-8, Statement of Michael J. Kormos, April 1, 2014, *available at* http://www.ferc.gov/CalendarFiles/20140401084122-Kormos,%20PJM.pdf

[4] PJM Capacity Performance Order; 151 FERC ¶ 61,208 at P 159.

[5] *See* PJM Interconnection, LLC, *2019/2020 Base Residual Auction Results IRS Briefing* slide 3 (June 16, 2016), *available at* http://www.pjm.com/~/media/committees-groups/subcommittees/irs/20160606/20160606-item-05-rpm-auction-briefing.ashx

[6] *See planning parameters for each delivery year, available at* http://www.pjm.com/markets-and-operations/rpm.aspx

The most recent capacity auction for the 2019/2020 delivery year marks the first occasion in recent memory where PJM has operated under the same set of market rules for two consecutive Base Residual Auctions. A review of FERC filings since RPM was instituted in 2007 demonstrates that there have been over 30 capacity-related rule changes.

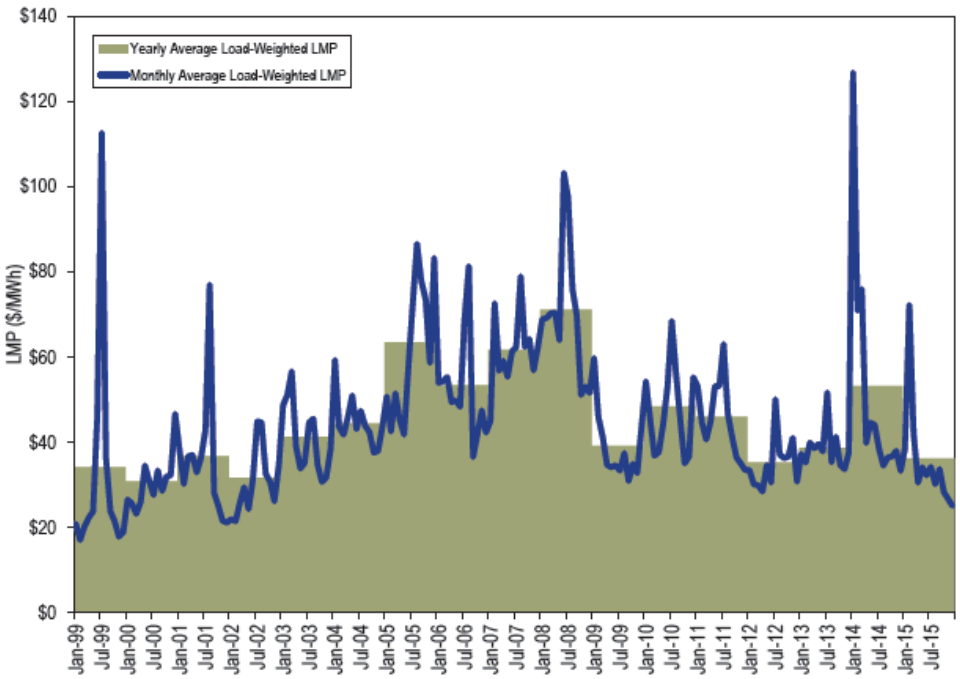
Energy Market

The PJM Energy Market procures electric supply to meet consumers' demands using an algorithm which dispatches the lower marginal cost resources adjusted for physical transmission constraints. It includes the sale or purchase of energy in PJM's Day-Ahead Market (one day forward) and Real-Time Energy Market (five minutes forward).

Current energy market prices are low compared to historical prices, which have also demonstrated a great deal of volatility. While sustained periods of low and volatile energy prices may benefit Ohio customers on the short-term, they send uncertainty to the market and can produce uncertainty in customers' retail rates over the long-term.

Figure 2 below shows a history of PJM's real-time load-weighted Locational Marginal Prices (LMP) for 1999 through 2015, as reported by Monitoring Analytics, the PJM Independent Market Monitor (Market Monitor).[7]

Figure 2.



[7] Monitoring Analytics, LLC, *2015 State of the Market Report* 129 (2015), *available at* http://www.monitoringanalytics.com/reports/PJM_State_of_the_Market/2015.shtml *("* 2015 State of the Market Report").

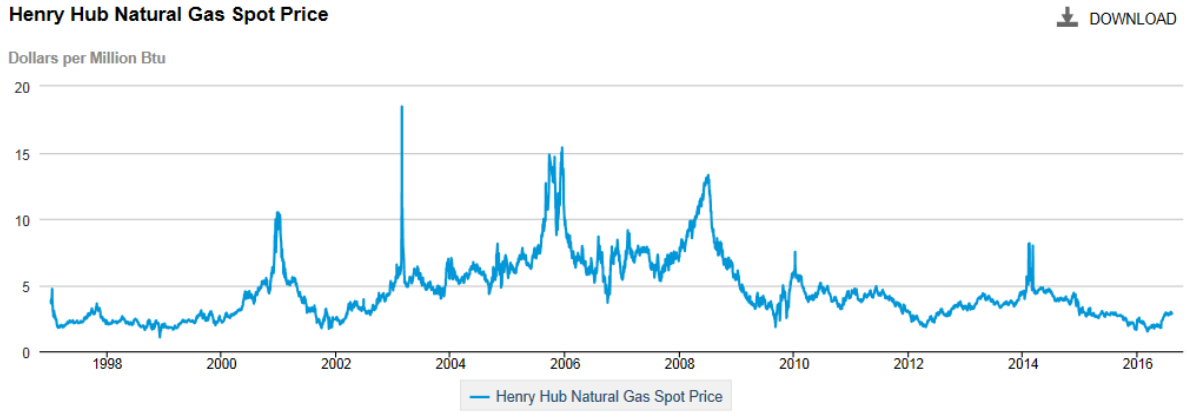
Figure 3 shows the year-over-year change in these LMPs, demonstrating a significant amount of volatility in prices.[8] Prices have swung more than 20% in nearly half of the years examined, with a 37.4% increase in 2014 followed by a 31.9% decline in 2015.

Figure 3.

	Real-Time, Load-Weighted, Average LMP			Year-to-Year Change		
	Average	Median	Standard Deviation	Average	Median	Standard Deviation
1998	$24.16	$17.60	$39.29	NA	NA	NA
1999	$34.07	$19.02	$91.49	41.0%	8.1%	132.8%
2000	$30.72	$20.51	$28.38	(9.8%)	7.9%	(69.0%)
2001	$36.65	$25.08	$57.26	19.3%	22.3%	101.8%
2002	$31.60	$23.40	$26.75	(13.8%)	(6.7%)	(53.3%)
2003	$41.23	$34.96	$25.40	30.5%	49.4%	(5.0%)
2004	$44.34	$40.16	$21.25	7.5%	14.9%	(16.3%)
2005	$63.46	$52.93	$38.10	43.1%	31.8%	79.3%
2006	$53.35	$44.40	$37.81	(15.9%)	(16.1%)	(0.7%)
2007	$61.66	$54.66	$36.94	15.6%	23.1%	(2.3%)
2008	$71.13	$59.54	$40.97	15.4%	8.9%	10.9%
2009	$39.05	$34.23	$18.21	(45.1%)	(42.5%)	(55.6%)
2010	$48.35	$39.13	$28.90	23.8%	14.3%	58.7%
2011	$45.94	$36.54	$33.47	(5.0%)	(6.6%)	15.8%
2012	$35.23	$30.43	$23.66	(23.3%)	(16.7%)	(29.3%)
2013	$38.66	$33.25	$23.78	9.7%	9.3%	0.5%
2014	$53.14	$36.20	$76.20	37.4%	8.9%	220.4%
2015	$36.16	$27.66	$31.06	(31.9%)	(23.6%)	(59.2%)

Energy prices generally track closely to the price of gas, which has also been volatile and trending downward.[9] Of the most highly traded commodities on the NYMEX (including S&P 500, corn, coffee and gold), natural gas prices had the highest volatility on average from 2000 to 2015.[10]

Figure 4.



[8] *Id.,* p. 128.

[9] U.S. Energy Information Administration *Henry Hub Natural Gas Spot Price* (accessed August 1, 2016), *available at* https://www.eia.gov/dnav/ng/hist/rngwhhdD.htm

[10] Case No. 14-1297-EL-SSO *Rebuttal Testimony of Judah L. Rose* 30 (2015).

Ancillary Services Markets

Ancillary services help balance the transmission system as it moves electricity from generators to customers. PJM operates several markets for ancillary services including the Synchronized Reserve Market, Non-Synchronized Reserve Market, Day-Ahead Scheduling Reserve Market, and Regulation Market.

Certain ancillary services that are key to system reliability remain uncompensated. FirstEnergy expects the appropriate level of compensation for ancillary services to remain a topic at FERC in the near future. FirstEnergy supports compensation of these resources for inertia and primary frequency response, as they are essential services for system reliability.

Financial Transmission Rights Market

Financial Transmission Rights (FTRs) are a financial instrument that allows market participants to offset or hedge potential losses related to congestion.

Issues regarding FTRs-specifically, FTR underfunding-have been extensively litigated at FERC in recent years, but the issue remains unresolved.[11] While PJM has made changes on its own authority that have improved FTR underfunding, as the Organization of PJM States recently confirmed,[12] these changes were done at the expense of Auction Revenue Rights (ARR) allocation.[13]

As shown in Figure 5 below, while revenue adequacy was greatly improved, this came at a price to Load Serving Entities which rely on allocation of ARRs as part of the firm transmission they obtain to serve load. The reduced allocation of ARRs (26,514 MW to 2,390 MW) has degraded the hedging efficacy offered by FTRs to firm transmission customers.

Figure 5.

Table 1: Historical FTR Revenue Adequacy

Planning Period	Revenue Adequacy	Total Surplus ($ millions)	Stage 1B Allocated ARR MWs	% of Stage 1B cleared	Modeled ARR Transmission Outages	Stage 1B ARRs Unallocated Value($ millions)
2009/2010	97%	-$28	26,514	100%	2	$0
2010/2011	85%	-$254	27,850	100%	2	$0
2011/2012	81%	-$192	22,208	81%	7	$60.4
2012/2013	69%	-$288	18,432	61%	36	$80.0
2013/2014	72%	-$677	15,782	48%	145	$259.5
2014/2015	110%	$130	2,390	7%	199	$257.7

[11] For example, FERC Docket EL16-6

[12] *See* Organization of PJM States August 23, 2016 letter to PJM President and CEO Andrew Ott, *available at* http://www.pjm.com/~/media/about-pjm/who-we-are/public-disclosures/20160826-opsi-letter-and-resolution-regarding-ftr-construct.ashx

[13] *See* PJM Interconnection, LLC, *FTRSTF* slide 1 (March 5, 2015), *available at* https://www.pjm.com/~/media/committees-groups/task-forces/ftrstf/20150311/20150311-pjm-solution-package-presentation.ashx

Changing Fuel Mix

One of the key challenges that PJM will face in the near future is the impact of the changing fuel mix on the system.

The Market Monitor's August 2016 report shows that from 2007/2008 to 2015/2016, capacity has increased from 164 GW to 182 GW.[14] This increase includes new generation and uprates (~21 GW), changes in imports and exports (~8 GW), and integrated assets[15] primarily developed under a historical regulated paradigm (~18 GW). These increases were partially offset by deactivations and derates (~29 GW), for a total increase of approximately 18 GW.

While capacity has increased, the quality of resources has changed significantly. For example, multiple aspects of imports, including pseudo-ties, have recently been called into question for their impacts to markets, reliability and planning. In particular, questions have arisen around their reliability and deliverability during emergency conditions as well as the implications to markets including congestion, FTR and ARR impacts. These issues are currently under discussion and evaluation in the PJM stakeholder process, as well as the joint-stakeholder process between PJM and MISO.

PJM's press release for the 2019/2020 auction indicated that the auction attracted 5,074 MW of new gas-fired generation.[16] PJM noted in the same press release that the capacity procured is a reserve margin of 22.4 percent. However, a closer look at the new reserve margin reveals that non-physical and external generation make-up ~9.4 percent of the 2019/2020 cleared capacity compared to 2.4% in 2007/2008[17], demonstrating that the composition of the reserve margin has changed dramatically over the years.

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[14] Monitoring Analytics, LLC, *2016 Quarterly State of the Market Report for January through June* 212 (August 2016), *available at* http://www.monitoringanalytics.com/reports/PJM_State_of_the_Market/2016/2016q2-som-pjm-sec5.pdf

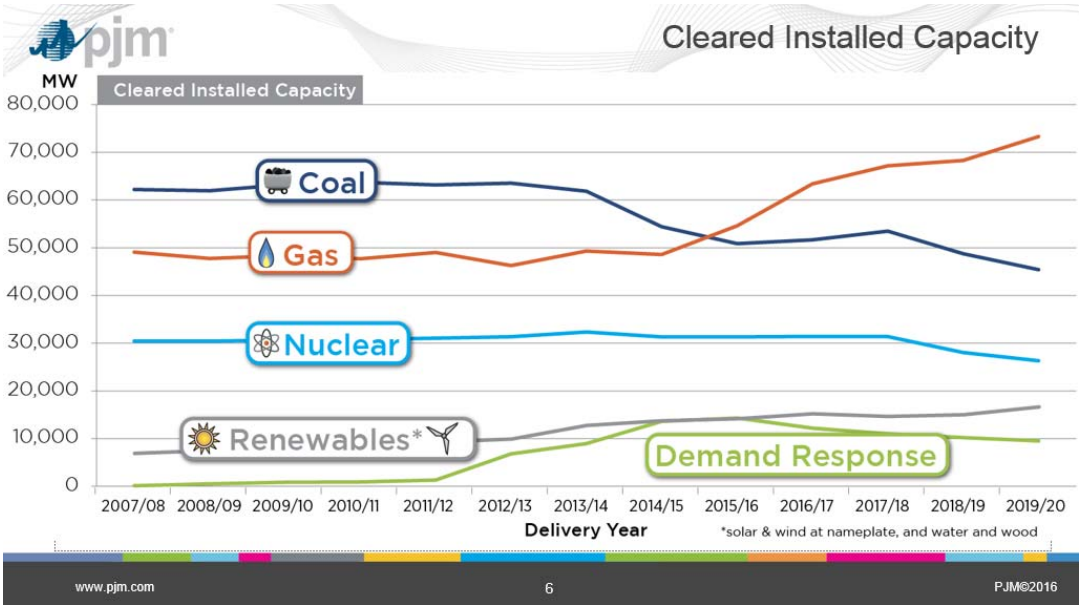
[15] ATSI, Duke, and Eastern Kentucky integrations

[16] PJM Interconnection, LLC press release *PJM Capacity Auction Continues to Attract New Resources at Competitive Prices* (May 24, 2016), *available at* http://www.pjm.com/~/media/about-pjm/newsroom/2016-releases/20160524-rpm-auction-results-for-2019-20-news-release.ashx

[17] 2007/2008 cleared 129,409MW while imports offered and demand response cleared were 2,984MW and 128MW, respectively. 2019/2020 cleared 167,305MW while imports, demand response and energy efficiency cleared were 3,876MW, 1,515MW and 10,348MW, respectively. This information can be found in the Base Residual Auction Reports for the 2007/2008 and 2019/2020 auctions at http://www.pjm.com/markets-and-operations/rpm.aspx

Figure 6 shows how the proportions of various resource types have shifted in recent years, with coal and nuclear resources declining, while gas and renewables are on the rise.[18]

Figure 6.

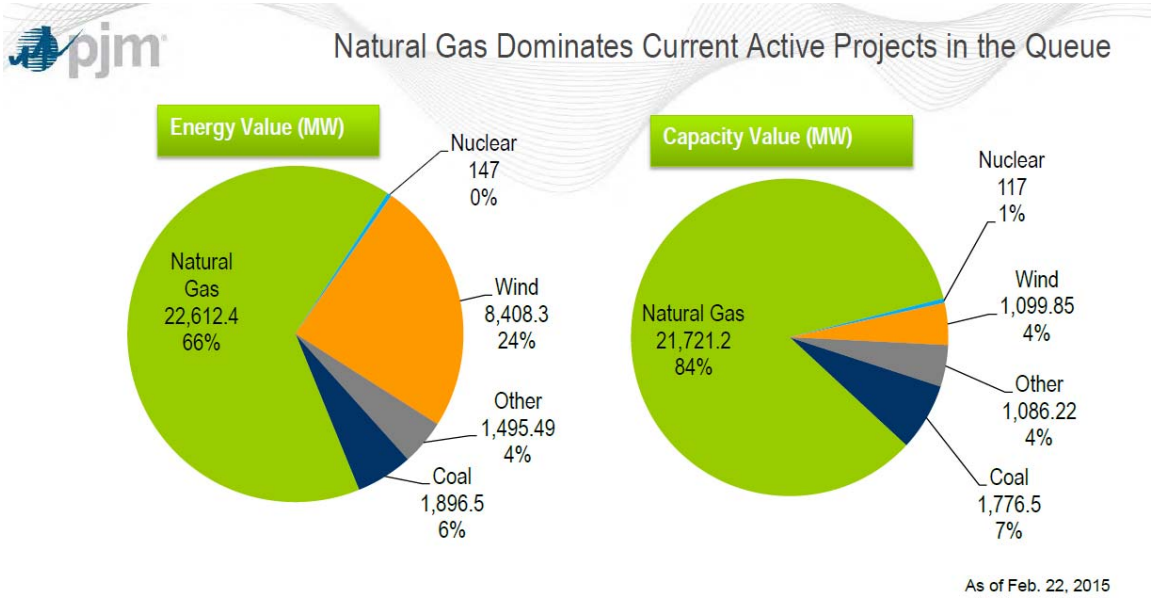


Further, capacity imports from outside the PJM region make up ~2.3 percent of the resource mix in 2019/2020 or ~10 percent of the reserve margin. As noted above, there is an ongoing stakeholder process in PJM and within the joint-stakeholder process between PJM and MISO to evaluate multiple challenges associated with imports.

[18]Raab Associates Energy Policy Roundtable in the PJM Footprint *Investment Efficiency: Resource Exit/Entry in Organized Electricity Markets* (Duane, June 29, 2016), *available at* http://pjm.raabassociates.org/main/roundtable.asp?sel=143

The resource mix is expected to continue to be in a state of flux. Natural gas resources are the predominant replacement generation source. Figure 7 demonstrates that natural gas resources dominate the PJM's queue for resources under development. Natural gas resources comprise 66% of the energy value and 84% of the capacity value in terms of MW.[19] While these resources are active in the queue, timing of in-service remains a concern. In fact, only about 10% of the queue has historically reached production.[20]

Figure 7.



As gas dominates the development queue, it should be noted that vulnerabilities exist. The potential consequences of relying too heavily on natural gas-fired resources were displayed during the 2014 Polar Vortex, an extreme cold weather event that exposed major vulnerabilities in the natural gas system, including an inadequate pipeline system. These and other factors led to severe spikes in the cost of wholesale power. On January 7, 2014, more than 15,000 megawatts, a startling 30 percent of gas-fired capacity in PJM, experienced outages.[21] It is widely accepted that the reliable performance of essential baseload generating units – the very units that are being forced out of the market – helped prevent widespread power outages.

The risks of fuel supply transition could be further revealed by the Aliso Canyon gas leak in California on October 23, 2015. SoCalGas employees discovered a major gas leak from a well within the Aliso Canyon's underground storage facility in the Santa Susana Mountains near Porter Ranch, Los Angeles. A

[19] *See* PJM Interconnection, LLC, *Evolution of Supply: Managing the Evolving Fuel Mix in Markets and Operations* 5 (2015), *available at* http://www.pjm.com/~/media/documents/presentations/markets-and-ops-evolution-of-supply.ashx

[20] PJM Interconnection, LLC, *Ohio State Report* (June 17, 2016).

[21] *See* PJM Interconnection, LLC, *Winter Operations, January 2014* (February 4, 2014), *available at* http://www.pjm.com/~/media/committees-groups/committees/oc/20140204/20140204-item-03-winter-operations.ashx

study[22] found that millions of customers could have service interruptions for up to 14-days in the summer of 2016 based on the facility's performance during the leak and the large number of natural gas resources that rely on the Aliso Canyon storage facility.[23]

As a result of these and other related observations, PJM has recently committed to studying the impacts of relying too heavily on gas resources, and has committed to report back to stakeholders in the first quarter of 2017.[24] FirstEnergy views this as an important first step towards properly valuing fuel diversity, but notes that PJM has more questions than answers at this juncture.

State of Ohio[25]

PJM has indicated that as of December 21, 2015, Ohio's existing installed capacity is approximately 25,650 MW, while its summer peak load is about 30,583 MW. The installed capacity therefore falls about 16% short of the Ohio summer peak load forecast.

[22] Staff of the California Public Utilities Commission, California Energy Commission, California Independent System Operator, and Los Angeles Department of Water and Power, *Aliso Canyon Action Plan to Preserve Gas and Electric Reliability for the Los Angeles Basin*, *available at* http://www.energy.ca.gov/2016_energypolicy/documents/2016-04-08_joint_agency_workshop/Aliso_Canyon_Action_Plan_to_Preserve_Gas_and_Electric_Reliability_for_the_Los_Angeles_Basin.pdf

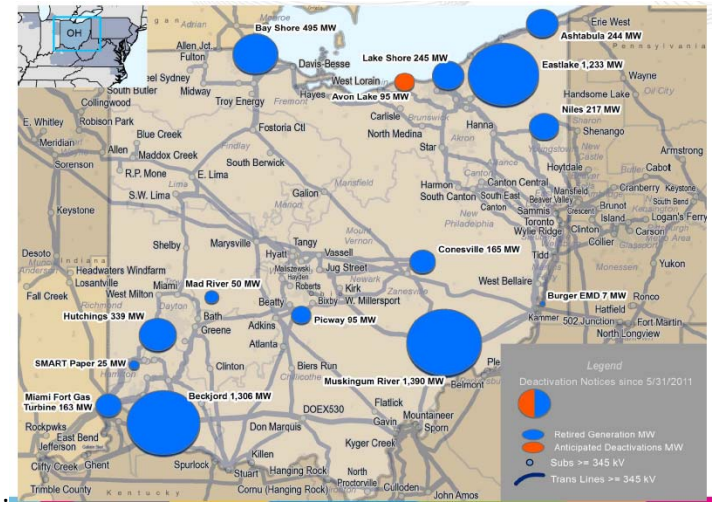
[23] The Aliso Canyon Action Plan states that 17 gas-fired plants with a combined capacity of over 9,800 MW heavily relied on Aliso Canyon.

[24] Letter from Andrew L. Ott to Stakeholders dated July 8, 2016, *available at* http://www.pjm.com/~/media/about-pjm/who-we-are/public-disclosures/20160708-correspondence-from-alo-resource-investment-in-competitive-markets.ashx

[25] PJM Interconnection, LLC, *Ohio State Report,* June 17, 2016.

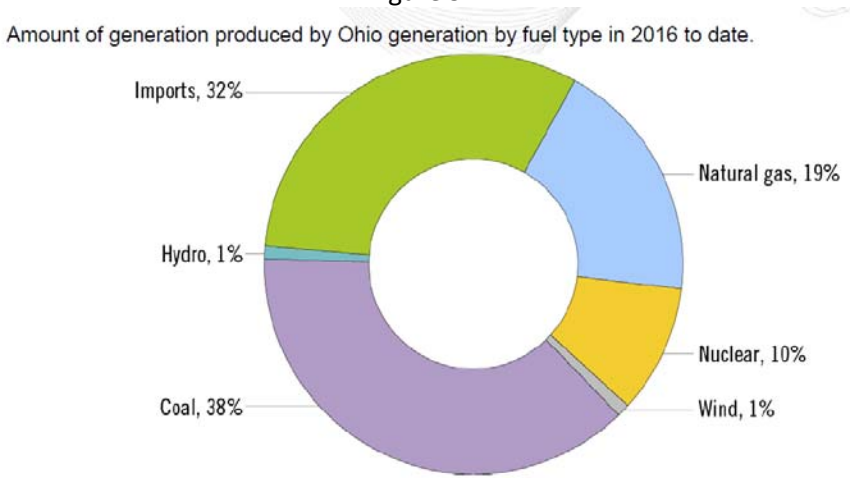
According to PJM, Ohio deactivated 5,974 MWs of generation from January 2011 – 2015. In 2015 alone, approximately 2,800 MWs were deactivated in Ohio, which constituted 27% of all deactivations in PJM. A map of the existing and planned retired generation in Ohio is shown in Figure 8 below. Note that this map does not include FirstEnergy's recent announcement regarding the Bay Shore and Sammis plants.[26]

Figure 8



A large portion of Ohio's energy consumption is met by out of state generation. From January 2016 to May 2016, Ohio supplied 68% of its energy demand, relying on imports for 32%. The generation by fuel type for that time period is shown in Figure 9 below.

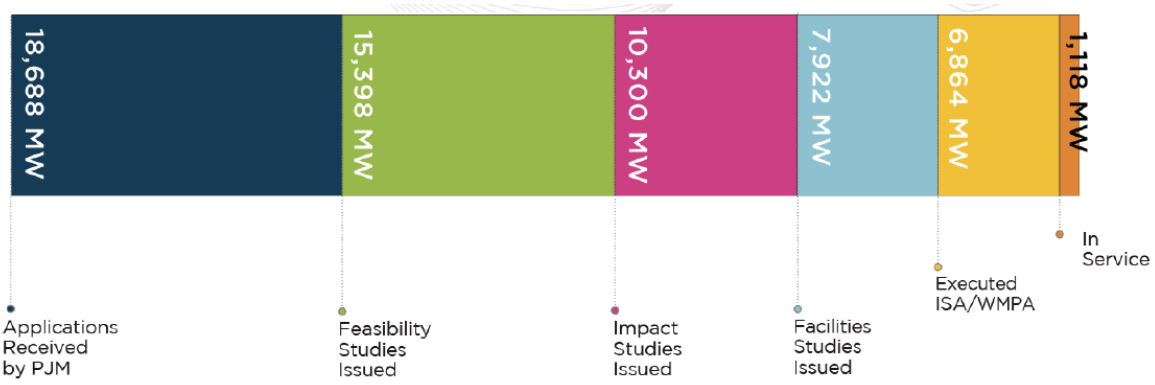
Figure 9.



[26]FirstEnergy press release *FirstEnergy to Deactivate Units at Two Ohio Power Plants* (July 22, 2016) *available at* https://www.firstenergycorp.com/newsroom/news_releases/firstenergy-to-deactivate-units-at-two-ohio-power-plants-.html

Currently, over 7,200 MW of proposed new natural gas generation resources located in Ohio are in the PJM queue. This represents 90 percent of new interconnection requests in Ohio. However, as shown in Figure 10, when considering the entire 2004-2015 time period only 6% of the 18,688 MWs of requested capacity has reached commercial operation in Ohio. It is therefore reasonable to expect that risk of timely in-service gas generation should be a key consideration for the future state of Ohio's markets.

Figure 10.



3 DISCUSSION

The purpose of this section is to discuss FirstEnergy's observations based on the background information provided above and FirstEnergy's experience as a PJM market participant. This section also includes an overview of key advocacy efforts for 2016.

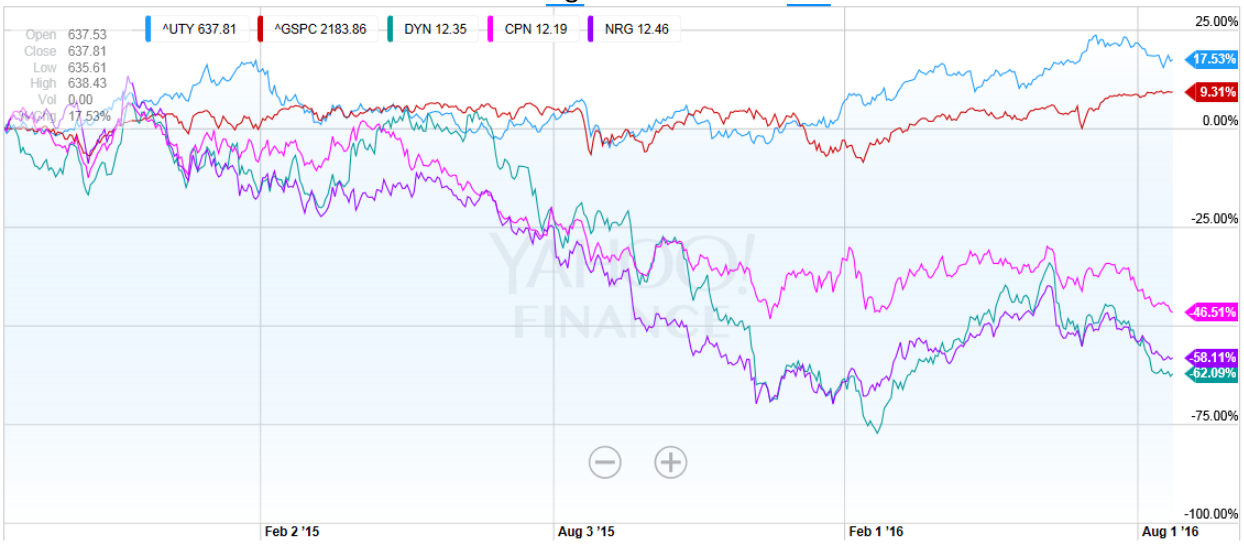
Key Observations

Volatile Market Prices Increase Risks to Ohio Customers Over the Long Term

As shown in Figures 1 and 3 above, since markets were established, LMP prices have fluctuated from $0 to $1,800/MWh, while RTO capacity prices have ranged from $16 to $174/MW-day. This volatility sends inconsistent signals to market participants and to investors, and creates uncertainty and cost for customers. Changes at the wholesale level and regulatory uncertainty can also impact prices. Current PJM stakeholder process discussions include potential changes to market rules concerning energy market uplift charges, capacity performance rules, development of a seasonal capacity product, changes to settlement issues and shortage pricing, and biddable locations for virtual transactions. These challenges are further exacerbated by regulatory changes outside of the PJM and FERC process, including the Environmental Protection Agency's Clean Power Plan.

The industry segment exposed to competitive/merchant generation has seen monumental capital churn as businesses restructure through mergers, bankruptcy and exits to cope with unpredictable and suppressed prices. Examples include Gen-on, Reliant, Mirant, Dynegy, Constellation, and others. Figure 11 highlights the stock price volatility for several Independent Power Producers as a result of volatile Energy, Capacity and Ancillary prices.[27]

Figure 11.



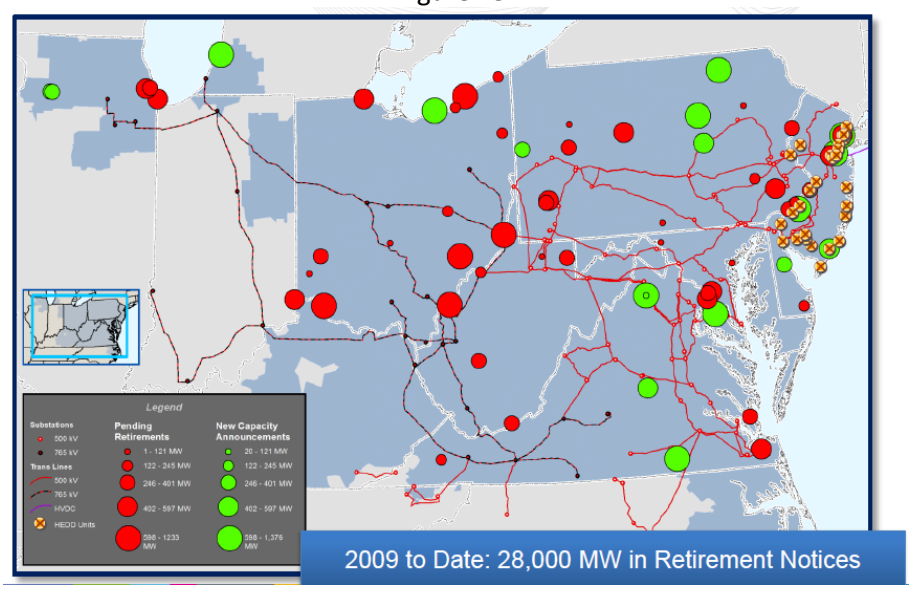
Investor Owned Utilities are seeking more favorable investment options (e.g., a regulated business model including natural gas and electric distribution and transmission). As a result, experienced industry players with strong balance sheets and proven operational experience have decided to exit the competitive/merchant generation business environments due to unpredictable investment characteristics. Examples include PPL, Duke, Ameren, Dominion, and TransCanada. In addition, this significant energy and capacity price volatility and generation supply risk ultimately translates to price uncertainty for Ohio customers. Stable, predictable markets lead to stable, predictable rates for customers.

[27] https://finance.yahoo.com/ - represents two year performance as of August 22, 2016

PJM is indifferent as to whether retiring units are replaced in Ohio or somewhere else; PJM does not use a holistic view which considers transmission costs, the economy, jobs, or taxes when sending investment signals.

The PJM model is agnostic to where new resource investment is physically located. The overwhelming trend has been for retirements in the west to be replaced with new units in rate-regulated Virginia and the east, as illustrated for example in Figure 15[28] from June 12, 2014. While additional new generation and plant deactivation announcements have occurred since this presentation, the trend remains. This shift in resource location requires additional transmission and reactive power investment, which comes at a cost to customers.

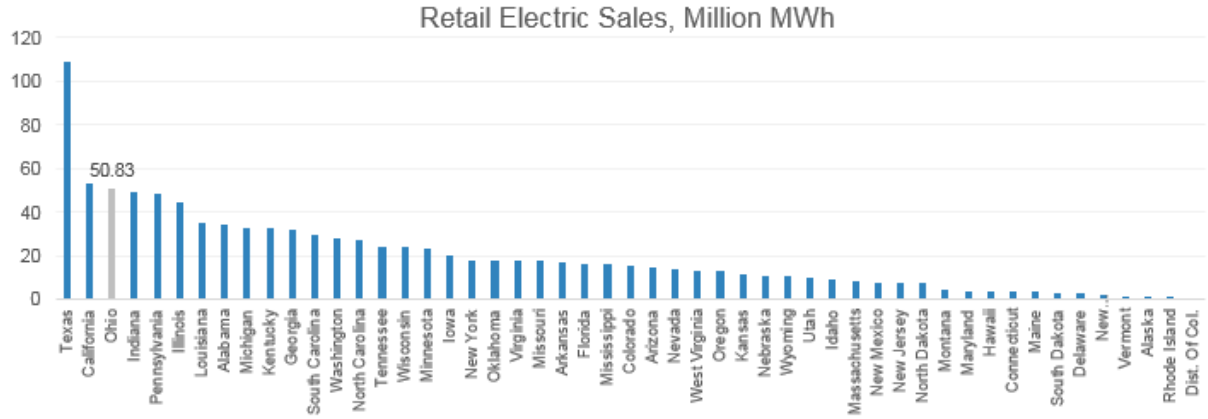
Figure 15.



[28] IEA Electricity Security Advisory Panel, Andrew Ott Presentation on Capacity Market Evolution of Supply available at https://www.iea.org/media/workshops/2014/esapplenary/PJM.pdf

Ohio is a very energy intensive state, as shown in Figure 16.[29] In fact, Ohio is third, only behind Texas and California, in the amount of energy consumed by industrial customers. Ohio's commercial and residential customers rank 8th and 7th, respectively.

Figure 16



Under the current market rules, it appears that energy-intensive Ohio is destined to continue to be a net importer of power and the situation will only worsen as more units retire. See Figure 17 for details.[30]

Figure 17.

Year	Generation M MWH	Retail M MWH	Export / (Imports)
2014	134	151	(17)
2013	137	150	(13)
2012	130	152	(22)
2011	136	155	(19)
2010	144	154	(10)
2009	136	146	(10)
2008	153	159	(6)
2007	155	162	(7)
2006	155	153	(2)
2005	157	160	(3)
2004	148	154	(6)

[29] U.S Energy Information Administration data, *available at* https://www.eia.gov/electricity/data/state/sales_annual.xls

[30] U.S Energy Information Administration data, *available at* https://www.eia.gov/electricity/data/state/annual_generation_state.xls and https://www.eia.gov/electricity/data/state/sales_annual.xls

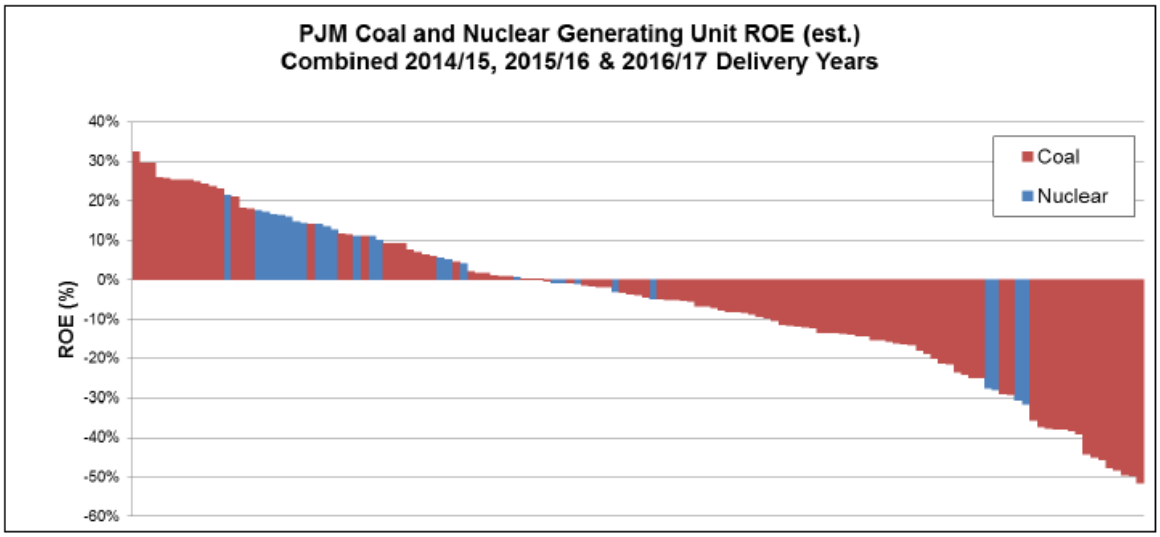
States that import electricity are subject to the policy decisions of other states regarding generation resources. This means that as Ohio relies on neighboring states for a large percentage of its energy, Ohio customers could see costs fluctuations based on decisions that are made by states other than Ohio. Ohio is the only state concerned with protecting Ohio customers and furthering Ohio's policy choices.

PJM's market design is not necessarily a sustainable, optimal solution for Ohio customers. Large baseload generation is retiring before the end of its useful life as PJM's market design does not consider the full value of these resources. A continuation of this trend will diminish resource diversity and create concerns related to the future cost of reliability

The entire cost of providing reliability must be a key focus for Ohio going forward. Without linking capacity market outcomes that drive generators' decisions with the cost of transmission to maintain reliability, the true cost to customers is disguised. Baseload coal and nuclear generation is not able to compete effectively without consideration of its contribution to reliability, both from a fuel security perspective as well as a locational benefit, situated near Ohio load pockets.

PJM's capacity markets continue to be plagued with issues. RPM sends a price signal for a single delivery year, with no protection against sharp price declines in future years. The volatile clearing prices do not provide long-term certainty needed for capital investments to baseload capacity resources. Timing also affects this uncertainty. Because auctions are held three years in advance, changes in the market design are not immediately impactful. Moreover, the market design does not take into account the benefits provided by fuel diversity or climate. An analysis conducted by Michael Rutkowski of Navigant Consulting, Inc. underscores how seriously the price suppression problem threatens the ability of essential resources to continue operating. Navigant analyzed the ability of merchant nuclear and coal units in PJM – *i.e.*, baseload units with on-site fuel – to achieve a satisfactory return based on current energy price forecasts and capacity prices for the 2014/2015, 2015/2016, and 2016/2017 Delivery Years. The results are illustrated in Figure 12 below.

Figure 12.



According to Navigant's analysis, approximately 59% of the total units evaluated (79 out of a total of 133 units) will earn a negative average annual return on equity ("ROE") over this three-year period. Approximately 38% of the total units evaluated (51 out of 133 units, totaling 17,151 MW) are predicted to earn a negative ROE in all three Delivery Years. Mr. Rutkowski estimates that owners of merchant generating units should expect a minimum of a 10% annual ROE, a figure that Mr. Rutkowski considers to be on the "low end of a reasonable financial performance."[31]

Consistent with Navigant's conclusions, PJM's Market Monitor has reported that certain units could not achieve full recovery of avoidable costs through net revenues from energy and capacity markets. The report stated the "net revenue results show that 28 units with 11,908 MW of capacity in PJM are at risk of retirement in addition to the units that are currently planning to retire. Of the 28 units, 23 are coal units and account for 99 percent of the capacity at risk."[32]

Figure 13 below shows the fuel type of the units that could not recover avoidable costs.

Figure 13.

Table 7-31 Profile of units that did not recover avoidable costs from total market revenues in two of the last three years or did not clear the 16/17 BRA or 17/18 BRA but cleared in previous auctions

Technology	No. Units	ICAP (MW)	Avg. 2015 Run Hrs	Avg. Heat Rate	Avg. Unit Age (Yrs)
CT	3	139	403	11,295	21
Coal	23	11,736	5,697	10,291	47
Diesel	1	4	191	10,550	46
Oil or Gas Steam	1	30	4,765	14,226	28
Total	28	11,908	3,197	11,391	34

The Market Monitor's analysis does not include MW associated with the recently announced Quad Cities nuclear plant deactivation[33] or the possibility of other nuclear plant retirements. Exelon has stated that other nuclear resources in Illinois (Byron - 2,347 MW) and Pennsylvania (TMI-1 - 837 MW) are at risk of retirement.[34]

These baseload coal and nuclear plants are expected to be replaced over time by new natural gas and renewable resources. This shift in fuel mix will limit resource diversity and will require significant infrastructure enhancements. The scale and speed of new build-out may not match the speed of retirements, as transmission enhancements (power flows and reactive support) and pipeline infrastructure are capital intensive projects which take significant time and resources to build. Additionally, renewable resources are weather dependent and intermittent. Onsite fuel storage for coal (30 days) and nuclear (multiple months) mitigates supply chain disruption risk. In comparison, a significant portion of natural gas generation relies on interruptible gas contracts and are dependent on a

[31] See Rutkowski Affidavit attached to January 21, 2015 comments of the PJM Utilities Coalition in ER15-623. Note that Capacity Performance has since been implemented, but the fact that the 2019/2020 auction cleared lower than pre-CP prices indicates that this problem will persist.

[32] Monitoring Analytics, LLC, *2015 State of the Market Report* 251 (2015), *available at* http://www.monitoringanalytics.com/reports/PJM_State_of_the_Market/2015/2015-som-pjm-volume2-sec7.pdf

[33] Exelon Corp. press release *Exelon Announces Early Retirement of Clinton and Quad Cities Nuclear Plants* (June 2, 2016) *available at* http://www.exeloncorp.com/newsroom/clinton-and-quad-cities-retirement

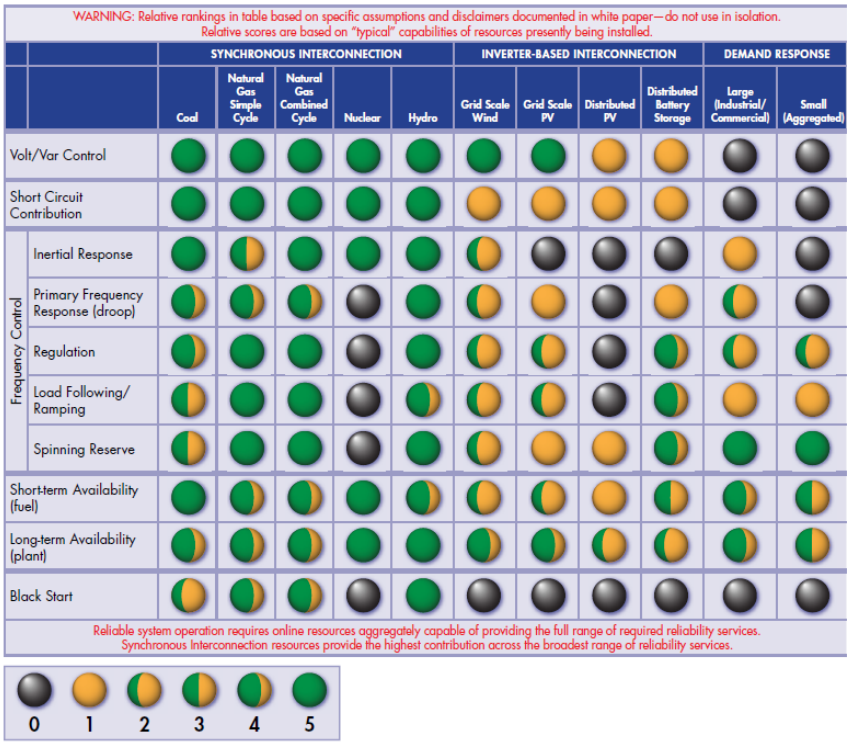
[34] Overton, Thomas. *Byron, Three Mile Island Nuclear Plants at Risk, Exelon Says. POWER* (June 7, 2016), *available at* http://www.powermag.com/byron-three-mile-island-nuclear-plants-at-risk-exelon-says/

single pipeline. Gas generation behind the local distribution company has a lower priority to firm contracted residential heating in the winter. While we acknowledge several gas generators have dual fuel capabilities, this backup has very limited duration. These concerns have recently been acknowledged by actions taken by the State of New York to retain nuclear units as part of its plan to increase renewables in the State, recognizing the value provided by these resources and the challenges they face getting compensation in markets that do not value these attributes.[35]

Another issue caused by the changing fuel mix concerns ancillary services, as grid support through reactive, frequency control and availability also differs across resources. Voltage support of the grid is locational and cannot be transferred; when baseload units that provide these services are prematurely retired, transmission costs for static VAR compensators and/or synchronous condensers[36] could be incrementally required at a cost to the customer. This cost is to simply maintain reliability, not enhance it.

Figure 14 below, which was developed by EPRI, classifies the extent to which necessary reliability services are provided by resources with different operational characteristics.[37] The fact that different resources have unique operational characteristics demonstrates that a MW is not just a MW; all resources contribute to reliability differently.

Figure 14.



[35] Case 15-E-0302 and Case 15-E-0270, State of New York Public Service Commission Order Adopting a Clean Energy Standard.

[36] Note: Static VAR compensators and synchronous condensers support local reactive power (i.e. voltage) requirements and power quality which can be lost when generation retires.

[37] EPRI, *Contributions of Supply and Demand Resources to Required Power System Reliability Services*, May 2015, p.21.

Resource diversity produces an optimal power production mix. Putting all of your eggs in one basket (*i.e.* relying too heavily on gas) exposes customers to price volatility of just one fuel type. In one study, IHS indicates that diversity enables the flexibility to respond to dynamic fuel prices by substituting lower cost resources with more expensive resources, which results in $93 billion in savings for U.S. customers per year.[38] A less diverse fuel mix will lead to greater short-term, seasonal and multi-year volatility, and a reduction in zero-emissions resources, at a cost to customers. Resource diversity mitigates risks and enhances the reliability of the system.

Without a balanced consideration of all costs to customers, Ohio could lose the economic and climate benefits of its resources, and increase risk through dependence on other states, all at a higher customer cost.

FirstEnergy continues to advocate for solutions that will benefit Ohio customers and enhance reliability.

FirstEnergy continues to advocate for a long-term capacity product at FERC and PJM. One such mechanism that would have the added benefit of greater resource diversity is to auction off capacity in separate segments for baseload, peaking, and intermediate units. Alternatively, segmented auctions recognizing reliability differences between fuel security of resources during system stress could be held. These segments could be cleared with bilateral arrangements to provide price certainty for key resources.

FirstEnergy, along with other Ohio utilities, recently responded to PJM's resource investment white paper, calling for a fact-based discussion of the risks and benefits associated with different market and regulatory paradigms.[39] The letter recommended PJM focus on a market design that accounts for transmission costs, ensures both robust competition and adequate compensation for diverse capacity resources, and respects the roles and responsibilities of the States in providing a comprehensive approach to least-cost reliability for consumers.

FirstEnergy is encouraged to see PJM exploring opportunities to incorporate state policy within market design at the recent Grid 20/20 on August 18, 2016.[40] We look forward to continuing the conversation on this important topic.

Finally, FirstEnergy continues to advocate for proper price formation as part of FERC's energy price formation efforts and related rulemakings.

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[38] IHS Energy, *The Value of U.S. Power Supply Diversity*, July 2014.

[39] AEP, FirstEnergy, Buckeye Power, AES Corporation, Eastern Kentucky Power Cooperative, and Duke Energy Letter to PJM Board of Managers, May 19, 2016, *available at* http://www.pjm.com/~/media/about-pjm/who-we-are/public-disclosures/20160519-coalition-pjm-board-letter.ashx

[40] PJM Grid 20/20, Stu Bresler Presentation on *Potential Alternative Approaches to Expanding the Minimum Offer Price Rule to Existing Resources*, August 18, 2016, *available at* http://www.pjm.com/~/media/committees-groups/stakeholder-meetings/grid-2020-focus-on-public-policy-market-efficiency/meeting-materials/20160816-potential-alt-solution-to-the-min-offer-price-rule-for-existing-resources.ashx

4 CONCLUSION

A continuation in the premature retirement of Ohio's baseload nuclear and coal facilities due to a cyclically low-priced gas environment will have serious regional economic implications, limit fuel diversity and climate benefits, require extensive transmission enhancements and result in an even greater reliance on out of state resources. The Commission should be cautious when the energy infrastructure begins to make monumental long lead time changes – to both the generation and transmission – based on price signals from an evolving administrative construct which is currently heavily influenced by gas's single-contingency, volatile commodity.

Prominent reliance on gas resources is relatively untested in PJM markets. Fuel diversity is paramount given that low gas prices could quickly change as a result of worldwide demand for natural gas, unanticipated environmental disturbances and/or infrastructure delays/limitations. Diversity enhances reliability and provides significant economic value to customers. Preserving a diverse portfolio of generation assets allows the option to substitute commodities as cycles change and will mitigate consumer price uncertainty as well as provide additional reliability enhancements.

FirstEnergy suggests that both PJM and the Commission take a holistic approach with respect to the cost of reliability for customers, and consider approaches which properly value resources for fuel diversity, contribution to climate and economic development along with all reliability services they provide.

The electrical infrastructure's impact on Ohio customers is far-reaching, and should not be characterized by uncertainty, but by a carefully balanced and orderly evolution.

5 ADDENDUM: Q3 2016 ISSUES

This section will be updated on a quarterly basis (December 1, March 1, June 1, and September 1), whereas the main body of the report will be updated annually on September 1. The purpose of this section is to provide an overview of key FERC and PJM initiatives active in each quarter.

Energy Market Initiatives

FERC Price Formation Docket (AD14-14): FERC opened this docket in June 2014 to evaluate issues regarding price formation in the energy and ancillary services markets operated by RTOs and ISOs. Two rulemakings have come out of this effort to date - settlement intervals and shortage pricing (RM15-24) and offer caps (RM16-5). FERC has focused on the following issues:

- Uplift: Use of uplift payments can undermine the market's ability to send accurate price signals. Actions to reduce the amount of uplift and to ensure that remaining uplift is properly allocated need to be considered.
- Offer price mitigation and price caps: Protocols to identify resources with market power and ensure that resources are bidding consistent with their marginal cost must be accurate, and offer caps must be high enough to allow resources to fully reflect their marginal costs in its bid.
- Settlement intervals and shortage pricing: Final rule requires RTOs and ISOs to align settlement intervals with dispatch in real-time energy and ancillary services markets, and will require RTOs and ISOs to trigger scarcity pricing in any interval in which there is a shortage of reserves.
- Operator actions: RTO/ISO operators regularly commit resources that are not economic to address reliability issues or un-modeled system constraints, which may artificially suppress prices.
- Fast Start Resources: Block loaded resources typically do not set LMP, even if they can come online quickly.
- Managing Multiple Contingencies: Solutions to address N-1-1 and N-2 contingencies may result in committing a resource at its operating minimum for an extended period of time, resulting in significant uplift payments.
- Look-Ahead Modeling: Using look-ahead modeling to make actual commitment and dispatch decisions rather than solely as an advisory tool for operators could reduce out-of-market actions and uplift.
- Transparency: There are numerous causes of uplift and operator actions that affect market outcomes, some of which may not be apparent to the market.

Settlement Intervals and Shortage Pricing (RM15-24): On June 16, 2016, FERC issued a final rule on settlement interval and shortage pricing (Order No. 825). The rule will require RTOs and ISOs to align settlement intervals with dispatch in real-time energy and ancillary services markets, and will require RTOs and ISOs to trigger scarcity pricing in any interval in which there is a shortage of reserves. RTOs/ISOs have 4 months to submit a compliance filing. The scarcity pricing reform will be effective 4 months after the compliance filing, and the settlement reform will be effective 12 months after the compliance filing. PJM has started communicating with stakeholders on implementation of this final rule. PJM has indicated they will request that the changes in settlement intervals and shortage pricing be implemented simultaneously.

Uplift / Virtual Trading (EMUSTF): PJM's Energy Market Uplift Senior Task Force met on June 10 and July 7, 2016. The group is moving away from discussions on the allocation of uplift and beginning Phase 3,

which is discussion of recommendations made in PJM's October 12, 2015 whitepaper on virtual transactions. PJM recommends changing the eligible trading points and biddable locations for these transactions to better align the use of virtual transactions with the physical nature of the real time market, and to allocate uplift to Up-To-Congestion transactions (UTCs).

Generator Offer Flexibility / Fuel Cost Policy (ER16-372): On June 17, 2016, FERC issued an Order rejecting PJM's November 20, 2015 compliance filing to the Commission's June 9, 2015 Order requiring PJM to allow generators to update offers in real time. FERC stated concerns that PJM does not have provisions for a sufficient review of cost-based offers, and ordered PJM to require that generators have PJM-approved fuel cost policies in place before submitting an offer. PJM has been working with stakeholders on the fuel cost policy issue, and held a special session of the Market Implementation Committee to address the issue on July 27, 2016. PJM submitted a compliance filing on this issue on August 16.

Capacity Market Initiatives

Seasonal Capacity (SCRSTF): The Seasonal Capacity Resources Senior Task Force (SCRSTF) met on June 6, June 21, July 11, August 1, August 12, and August 26, 2016. The SCRSTF was created to address the concern that certain resource types with different seasonal availabilities, such as but not limited to demand response, energy efficiency, and renewables, are unable to meaningfully participate as capacity resources in PJM's reliability pricing model (capacity market).

Underperformance Risk Management (URMSTF): The Underperformance Risk Management Senior Task Force (URMSTF) met June 2, June 16, June 28, July 15, July 29, August 17, and August 31, 2016. This task force addresses two problems: 1) the fact that current capacity rules may not provide adequate options to manage the risk of underperformance during capacity performance compliance hour(s) and 2) any operational, markets, planning and seams coordination challenges associated with the integration of external Capacity Performance resources into PJM.

Ancillary Services Market Initiatives

Reactive (No docket): On June 30, 2016, FERC hosted a technical conference on reactive and voltage control compensation. Panelists discussed current compensation mechanisms for synchronous and non-synchronous generators, and whether changes are needed. FERC Staff was especially interested in whether it would be appropriate to change the level of compensation if it was determined that there was a degradation in capability.

Regulation (RMISTF): PJM's Regulation Market Issues Senior Task Force (RMISTF) met on June 1, June 22, July 19, and August 30, 2016. The RMISTF was formed to evaluate the application of the marginal benefit factor in pricing and settlement in the Regulation Market.

Summary: Text Quarterly Update Pursuant to Section V.C.2. of the Third Supplemental Stipulation and Recommendation electronically filed by Ms. Carrie M Dunn on behalf of The Toledo Edison Company and The Cleveland Electric Illuminating Company and Ohio Edison Company