

**UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION**

State Policies and Wholesale Markets)
Operated by ISO New England Inc.,)
New York Independent System Operator, Inc.,)
and PJM Interconnection, L.L.C.)

Docket No. AD17-11-000

**POST-TECHNICAL CONFERENCE COMMENTS OF
THE NUCLEAR ENERGY INSTITUTE**

The Nuclear Energy Institute (NEI)¹ submits these comments in accordance with the Commission's notice inviting post-technical conference comments on the interplay between state policy goals and wholesale markets.² NEI appreciates the Commission's efforts to adapt wholesale markets to achieve state public policies, including policies that value the benefits provided by nuclear and other key generation sources.

Nuclear plants are essential to our nation's energy future. The risk of premature retirement of these critical assets must be addressed. Nuclear plants help maintain a highly reliable electric grid, retain a diversified energy portfolio to manage inherent production cost risks, and substantially and sustainably reduce carbon and other emissions in the face of a growing economy. A number of merchant nuclear plants have prematurely and permanently retired, and NEI members are considering shuttering additional merchant nuclear facilities if wholesale market structures do not support their continued operation. NEI has a strong interest in

¹ NEI is the policy organization representing the commercial nuclear power industry. NEI's mission is to foster the beneficial uses of nuclear technology and to communicate accurate information about the importance of nuclear energy and technology. NEI is responsible for developing industry positions and advocating on legal, regulatory, and policy matters affecting the nuclear energy industry. NEI has about 300 members, spread across 17 countries, and its membership includes all the companies licensed to operate commercial nuclear power plants in the United States, as well as nuclear plant designers, major architectural and engineering firms, entities that process nuclear fuel, and other organizations involved in the nuclear industry.

² State Policies and Wholesale Markets Operated by ISO New England Inc., New York Independent System Operator, Inc., and PJM Interconnection, L.L.C.; Notice Inviting Post-Technical Conference Comments, 82 Fed. Reg. 24,966 (May 31, 2017).

ensuring the Commission—either through its action or inaction—does not contribute to further premature closures.

In addition to inviting other proposals, Commission staff outlined five potential paths forward to address the interplay between state policy goals and wholesale markets: (1) limited or no minimum offer price rule; (2) accommodation of state actions; (3) status quo; (4) pricing state policy choices; and (5) expanded minimum offer price rule. In charting the path forward, the Commission should ensure its actions do not interfere with legitimate state public policies, particularly policies in which the states separately value and pay for attributes not recognized in the wholesale power market (*i.e.*, follow Path 1 and reject Path 5). An accommodation path (Path 2) should only be followed if there is actual and specific demonstration of a generator being paid twice for the same power, which certainly is not the case where particular attributes are valued and paid for separately from the power. The Commission also should allow and encourage independent system operators and regional transmission organizations (ISOs/RTOs) to develop market design structures to achieve state public policy goals (*i.e.*, embrace Path 4).

Current market designs fail to value nuclear generation's significant contributions to system resiliency and energy security. The prospect of losing these undervalued attributes provided by nuclear generation's contributions to a diverse portfolio justify, if not compel, Commission policy changes to monetize the value of these attributes. This goes well beyond incorporating state policy choices in wholesale markets. Because the rules that currently govern the nation's wholesale markets are unjust and unreasonable insofar as they do not value these important attributes, the Commission should direct ISOs/RTOs to develop mechanisms to

provide additional revenues for baseload generating resources now providing benefits such as long-term rate stability, system resiliency, and fuel diversity.³

I. BACKGROUND

Ninety-nine nuclear power plants supply approximately 20 percent of the nation's electricity and approximately two-thirds of the nation's carbon-free electricity. These units provide a uniquely valuable set of attributes:

- Nuclear energy generation produces no criteria pollutants or carbon dioxide. The emissions avoided by nuclear energy reduce the compliance burden that would otherwise fall on emitting generating capacity.
- Nuclear power plants produce large quantities of electricity around the clock, safely and reliably. They operate regardless of weather, and keep 12 to 24 months of fuel onsite, avoiding reliance on just-in-time fuel deliveries.
- Nuclear plants provide price stability. Low marginal cost production plays an important role in energy markets based upon security-constrained economic dispatch.
- Nuclear power plants have portfolio value, contributing to the fuel and technology diversity that is a bedrock characteristic of a reliable, resilient electric sector.

Other sources of electricity have some of these attributes. None of the other sources has them all.

According to an analysis by The Brattle Group,⁴ nuclear energy also has additional attributes that are well worth preserving as it:

- contributes approximately \$60 billion annually to gross domestic product;
- accounts for about 475,000 full time jobs (direct and secondary);
- helps keep electricity prices low. Without nuclear generation, retail rates would be about 6 percent higher on average; and
- provides nearly \$10 billion annually in federal tax revenues and \$2.2 billion in state tax revenues.

³ NEI also encourages the Commission to swiftly complete the energy market price formation efforts currently underway and discusses below some further actions that should be taken to further improve price formation.

⁴ The Brattle Group, *The Nuclear Industry's Contribution to the U.S. Economy at 1* (July 7, 2015), *available at* http://www.brattle.com/system/news/pdfs/000/000/895/original/The_Nuclear_Industry's_Contribution_to_the_U.S._Economy.pdf?1436280444.

Nuclear energy is America's largest source of carbon-free electricity. In 2016, nuclear energy produced 20 percent of U.S. electricity supply (805 billion kilowatt-hours) and prevented 554 million metric tons of carbon dioxide emissions.⁵ Nuclear energy accounted for 60 percent of America's carbon-free electricity in 2016—three times more than hydropower and three times more than wind energy. The amount of carbon dioxide emissions *avoided* by U.S. nuclear energy facilities is equal to the carbon dioxide emissions *produced* from 118 million passenger cars—more than all the passenger cars in the United States. Without nuclear power plants operating in 30 states, carbon emissions from the U.S. electric sector would be about 30 percent higher.

In addition to providing valuable environmental attributes by producing energy without emitting carbon, nuclear facilities also provide energy security by producing electricity around-the-clock and maintaining onsite fuel for 12 to 24 months of operation. Because ISO/RTO markets do not value these attributes, nuclear facilities continue to prematurely shut down. To date, more than 8,000 megawatts of nuclear capacity have or plan to shut down prematurely, with additional facilities at risk.⁶ With each merchant nuclear facility that shuts down prematurely, the nation permanently loses a reliable source of baseload generation and, with it, the stability of energy diversity and the many other societal benefits provided by merchant nuclear power, including thousands of highly skilled and high paying jobs.

The current structure of the competitive markets also is reducing energy diversity. Natural gas has become a fuel of choice in part because of its abundant supply and relatively low cost, but as the electric grid becomes increasingly reliant on natural gas, the onsite fuel security

⁵ See NEI, US Nuclear Power Plants, General U.S. Nuclear Info, <https://www.nei.org/Knowledge-Center/Nuclear-Statistics/US-Nuclear-Power-Plants> (last visited June 22, 2017); NEI, Environment: Emissions Prevented, <https://www.nei.org/Knowledge-Center/Nuclear-Statistics/Environment-Emissions-Prevented> (last visited June 22, 2017).

⁶ See NEI, Nuclear Energy Institute Comments on the Department of Energy's Quadrennial Energy Review at 24 (July 1, 2016), *available at* https://www.eenews.net/assets/2016/07/08/document_pm_01.pdf; U.S. Energy Information Administration, Three Mile Island is the Latest Nuclear Power Plant to Announce Retirement Plans (June 13, 2017), <https://www.eia.gov/todayinenergy/detail.php?id=31612#>.

and fuel diversity offered by nuclear power becomes even more important. A diverse portfolio of fuels and technologies—nuclear, coal, natural gas, hydro, non-hydro renewables, efficiency—is the core strength of the U.S. electric power supply system. This fuel and technology diversity serves as a hedge against price volatility and supply disruptions. Simply, risks are lower with a diversified mix of assets.

When market shortcomings like those described above cause nuclear plants to close prematurely, the bulk power system becomes even more reliant on natural gas-fired generation that must be available when wind and solar generation are unavailable. Because approximately 90 percent of the cost of electricity from a gas-fired combined cycle plant is the cost of fuel, this form of generation is necessarily sensitive to fuel price volatility. Additionally, natural gas is widely used outside the power sector. The demand from other sectors—particularly coincident end-user gas peak demand during cold winter weather—critically affects the gas providers’ ability to deliver gas to the power sector, which relies on interruptible transportation service to get its fuel. The abundance of natural gas resources aside, infrastructure constraints in parts of the country increase the systemic risk of relying too much on natural gas. With the ever-increasing dependence on natural gas-fired generation, any interruption in the infrastructure can result in reduced energy generation and outages.

In sum, the premature closing of productive nuclear facilities compromises environmental goals, and fuel and technology diversity. That resulting shortage of diverse, round-the-clock production decreases the resiliency of the electric grid and increases the price volatility experienced by consumers. Such an outcome demonstrates that the status quo is neither just nor reasonable.

II. RECOMMENDED COMMISSION ACTIONS

A. **The Commission should make retaining nuclear plants a fundamental guiding principle.**

Regardless of which discrete solutions emerge from the technical conference, the Commission should seek to ensure that wholesale power rates are sufficient to retain the continued operation of merchant nuclear plants. As noted above, once these units retire, they are gone.⁷ Huge swaths of zero-emissions baseload generation will be lost. While wholesale markets are not designed to favor any particular fuel source, nor should properly-designed wholesale markets fail to recognize desirable and necessary attributes of reliable, secure sources of generation or result in irreversible damage to our nation's energy diversity. FERC-jurisdictional competitive wholesale markets provide shorter-term economic incentives that, if not corrected in design, can have long-term adverse generational impacts on our energy future. Whatever solutions the Commission implements, retaining nuclear generation as part of a diverse energy portfolio should be a critical objective.

B. **The Commission should not preempt or interfere with legitimate state public policy goals such as encouraging clean energy and maintaining fuel diversity.**

The Commission should ensure that approved wholesale power pricing in ISO/RTO markets does not interfere with legitimate state efforts to separately value public policy attributes that are not currently valued in wholesale markets. For this reason, the Commission at the very least should ensure that the application of the minimum offer price rule is limited (*i.e.*, select Path 1 and reject Path 5). While it may be acceptable to achieve state goals through wholesale markets, the Commission should not impose a minimum offer price rule on existing nuclear programs providing additional revenues compensating legitimate attributes via power purchase

⁷ Coal and gas units can be mothballed and repowered. For legal and technical reasons, nuclear units don't have these options. *See, e.g.*, 10 C.F.R. § 50.82(a)(2) ("Upon docketing of the certifications for permanent cessation of operations and permanent removal of fuel from the reactor vessel . . . the 10 CFR part 50 license no longer authorizes operation of the reactor or emplacement or retention of fuel into the reactor vessel.").

agreements or zero-emission credit programs. By establishing these types of legitimate programs, states are paying for benefits, such as environmental attributes, that are not tied to wholesale energy or capacity sales.

States maintain responsibility to set environmental policy and assure supply adequacy, reliable local service, and reasonable retail rates. The Federal Power Act expressly leaves to states decisions about generation, including the mix of resources.⁸ FERC-regulated wholesale markets have a long history of accommodating state policy goals such as renewable energy credit programs, renewable portfolio standards, and the Regional Greenhouse Gas Initiative. State support for nuclear generation should be treated no differently, especially when it comes to the environmental attributes of nuclear resources, which align closely with the other clean resources that rely on renewable energy credit programs, renewable portfolio standards, and the Regional Greenhouse Gas Initiative. NEI urges the Commission not to inhibit states from exercising their legitimate authority to value and pay nuclear plants for their contributions to state environmental, fuel and technology diversity, system resiliency, and long-term rate stability goals.

The inability to recover revenues for nuclear's special attributes is particularly problematic within the competitive wholesale power markets where such nuclear units rely primarily on market clearing prices to cover their capital investment, operating, and maintenance costs. Revenues from energy and capacity alone have been insufficient to support continued operation of some merchant nuclear facilities. Wholesale power rates that allow merchant nuclear facilities in these circumstances to prematurely and permanently shut down are not just and reasonable, and are contrary to the public interest.

⁸ *See, e.g.*, 16 U.S.C. § 824(b)(1) (establishing that the Commission does not have jurisdiction, except as specifically provided in the Federal Power Act, “over facilities used for the generation of electric energy or over facilities used in local distribution or only for the transmission of electric energy in intrastate commerce, or over facilities for the transmission of electric energy consumed wholly by the transmitter”).

In short, states have legitimately recognized that the premature closing of productive nuclear facilities compromises environmental goals as well as fuel and technology diversity. That resulting reduction in diverse, carbon-free around-the-clock production increases the risk of non-compliance with state environmental goals, vulnerability of the electric grid to reliability risks, and price volatility experienced by consumers. By fully compensating nuclear plants for the value they provide, state programs preserve the benefits that are not recognized in the wholesale markets, but are counted on to accomplish state objectives.

NEI opposes any action that would not permit merchant nuclear plants to receive for their energy and capacity the full clearing prices that all other resources receive in the wholesale market where nuclear plants are being paid separately for other attributes not recognized in the wholesale power markets.⁹ In such circumstances, those nuclear generators are not receiving duplicative payments at both the state and federal levels. Additional revenue streams established by state programs are for separate attributes of nuclear power that are not recognized in the wholesale power market, are valuable to states, and for which states have determined their consumers should pay for. NEI therefore urges the Commission to reject proposals that would “mitigate” these state-based programs, effectively forcing customers to overpay for capacity.

C. The Commission should encourage ISOs/RTOs to develop market design structures to achieve state public policy goals.

Not only should the Commission not take action to preempt or mitigate actions by states pursuing valid and worthy policy goals, but the Commission also should direct the ISOs/RTOs to establish market structures to help achieve state public policy goals. Pricing state goals encouraging clean energy, supporting grid resiliency, and maintaining fuel diversity in the

⁹ A recently issued white paper suggests that PJM might consider separate state payments to recover for undervalued attributes of nuclear power to be “actionable” subsidies requiring mitigation. PJM Interconnection, Capacity Market Repricing Proposal (June 12, 2017), *available at* <http://pjm.com/%7E/media/library/reports-notice/special-reports/20170502-capacity-market-repricing-proposal.ashx>. NEI would not support such an outcome.

market would encourage competition and efficiency. Market-based solutions may present optimal ways to achieve these state public policy goals through Path 4 (Pricing State Policy Choices). As discussed at the technical conference, efforts are already underway to consider these types of solutions, including PJM's efforts to advance zero-emission objectives through the wholesale energy markets,¹⁰ ISO New England's stakeholder Integrating Markets and Public Policy (IMAPP) initiative to identify an acceptable long-term solution to achieve state goals,¹¹ and New York Independent System Operator's efforts to integrate the value of carbon into the wholesale energy price-setting process.¹² The Commission should remain involved as these market rules develop and provide guidance as appropriate to ensure progress is made.

D. To ensure just and reasonable rates, the Commission should direct ISOs/RTOs to develop mechanisms that provide additional revenues to recognize attributes such as fuel security, fuel and technology diversity, long-term rate stability, and system resiliency.

There is an urgent need for a solution to undervalued attributes of merchant nuclear power. A resilient and diverse portfolio of fuels and technologies—nuclear, coal, natural gas, hydro, non-hydro renewables, efficiency—is the core strength of the U.S. electric power supply system. With each merchant nuclear facility that shuts down, the nation irrevocably loses a reliable source of baseload generation that helps provide long-term rate stability, system resiliency, fuel and technology diversity, and energy security. The organized markets, however, inherited these benefits based on fuel and technology decisions made decades ago, and fail now to support these attributes. The current design of the Commission-approved wholesale power markets does not value attributes that are important to national energy security.

¹⁰ PJM Interconnection, Advancing Zero Emissions Objectives through PJM's Energy Markets (May 2, 2017), available at <http://pjm.com/%7E/media/library/reports-notice/special-reports/20170502-advancing-zero-emission-objectives-through-pjms-energy-markets.ashx>.

¹¹ Pre-technical Conference Statement of Thomas W. Kaslow, Chairman of the New England Power Pool in FERC Docket AD17-11-000, at 3-5 (Apr. 24, 2017).

¹² Comments of Bradley C. Jones, President and Chief Executive Officer New York Independent System Operator, Inc. in FERC Docket AD17-11-000, at 4-5 (May 3, 2017).

While a current resilient and diverse portfolio serves as a hedge against price volatility and supply disruptions in any part of the portfolio, these tremendous benefits are taken for granted and, as a result, undervalued. This is illustrated in PJM’s recent “Evolving Resource Mix and System Reliability” report. While that report found that the system could run with large quantities of natural gas-fired generation while maintaining operational reliability, it highlighted significant concerns if resource diversity is lost.¹³ PJM acknowledges it “does not analyze market or economic impacts of fuel diversity” and does not fully capture “additional risks, such as gas deliverability during polar vortex-type conditions and uncertainties associated with economics and public policy.”¹⁴ PJM also confirms that “‘heavy’ reliance on one resource type *raises questions about electric system resilience*, which are beyond questions about already-accepted measures of reliability attributes.”¹⁵ This demonstrates that the traditional view of reliability, essentially a quantified loss-of-load expectation calculation, does not capture important attributes provided by the current diverse portfolio of which nuclear makes a substantial component.

Nuclear generation provides significant—yet undervalued—contributions to system resiliency, allowing the energy system to endure disturbances while continuing to deliver energy services to consumers without price volatility. A 2014 analysis by IHS Energy demonstrated the value of fuel and technology diversity, finding that the current diversified portfolio of U.S. power supply “*halves* the potential variability [in] monthly power bills compared to a less diverse supply.”¹⁶ IHS Energy further found that moving to a less diverse supply (*i.e.*, one

¹³ PJM Interconnection, PJM’s Evolving Resource Mix and System Reliability at 5 (Mar. 30, 2017), *available at* <http://www.pjm.com/~media/library/reports-notice/special-reports/20170330-pjms-evolving-resource-mix-and-system-reliability.ashx>.

¹⁴ *Id.* at 3-5.

¹⁵ *Id.* at 33 (emphasis added).

¹⁶ IHS Energy, The Value of US Power Supply Diversity at 5 (July 2014) (emphasis added), *available at* <http://www.energyxxi.org/sites/default/files/USPowerSupplyDiversityStudy.pdf>.

without significant nuclear generation contributions) would increase average wholesale power prices by about 75 percent and retail power prices by about 25 percent, price impacts that would reduce U.S. GDP by nearly \$200 billion and lead to about one million fewer jobs.¹⁷

As the electric grid becomes increasingly reliant on natural gas, the reliability and fuel diversity offered by nuclear power becomes even more important. With each premature closure of a nuclear plant, the bulk power system becomes even more reliant on natural gas-fired generation to provide baseload supply and to backstop intermittent renewable resources. Any market that relies too heavily on any one fuel source is threatened by extreme price volatility and price spikes, as well as energy shortages associated with interruptions in that primary fuel.

The prospect of losing the attributes supplied by nuclear generators justify, if not compel, the need for Commission policy changes that allow for greater recognition of the energy security value that nuclear units offer. In short, the rules that currently govern the nation's wholesale electric markets are unjust and unreasonable if they fail to provide sufficient revenues to retain these important attributes provided by nuclear generators. In these circumstances, the Commission can and should take action to direct the ISOs/RTOs to develop policies that safeguard the continued viability of baseload nuclear generation.

There are many approaches the Commission and the ISOs/RTOs can take to monetize the fuel and technology diversity, long-term rate stability, and system resiliency provided by nuclear generation. Proposals have been presented as part of New England's IMAPP initiative and are being pursued in New York that might successfully accomplish, or at least advance, state environmental goals through wholesale market mechanisms. While NEI and its members are encouraged by these efforts, they may fall short of the reforms that are needed if they ultimately do not also reflect the value of system resiliency and long-term price stability. The Commission

¹⁷ *Id.* at 5-6.

should therefore direct the ISOs/RTOs to ensure their market prices reflect currently undervalued attributes of baseload generation, including onsite fuel security, long-term rate stability, system resiliency, and fuel and technology diversity.¹⁸

Many of the options discussed at the technical conference may take years to fully implement. In the case of capacity markets, any reforms may not be realized in market prices for years to come. In the meantime, nuclear generation continues to face real economic threats. Considering the irreversible nature of nuclear retirements, the Commission should not mitigate state programs aimed at preserving the environmental value of these resources, as discussed above. In addition, the Commission should order the ISOs/RTOs to implement stopgap measures to ensure that short-term market conditions do not result in more retirements before long-term solutions are implemented. Specifically, to avoid losing these undervalued attributes provided by nuclear generators while the ISOs/RTOs develop comprehensive price reform efforts, the Commission should direct the ISOs/RTOs to submit a transitional mechanism that provides additional revenues for undervalued attributes. One such transitional mechanism could be to recognize these merchant nuclear plants as “national strategic energy security resources” and to require the creation of a FERC-regulated mechanism for tracking and paying for wholesale power attributes that the Commission determines are not adequately valued.¹⁹ In essence, the Commission would be preserving the diversity of our nation’s electric generation mix by establishing separate revenue streams for key baseload merchant resources that contribute

¹⁸ The Commission may also consider directing the ISOs/RTOs to appropriately value environmental attributes.

¹⁹ NERC has voiced its concerns with the ever-increasing risks associated with single fuel dependency, particularly during extreme weather conditions. *See* 2016 Long-Term Reliability Assessment at vii-viii (Dec. 2016), *available at* <http://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/2016%20Long-Term%20Reliability%20Assessment.pdf>. Although the ISOs/RTOs are in the best position to address these concerns by designing appropriate interim mechanisms, in concept this could be a market for existing generating resources with the capability and fuel onsite to produce energy during all hours of a day.

critically to a stable, reliable, and resilient grid until the ISOs/RTOs complete comprehensive price reform efforts.

In summary, NEI urges the Commission to push the ISOs/RTOs to develop market structures to value the traditionally overlooked yet much needed attributes of onsite fuel security, fuel and technology diversity, long-term rate stability, and system resiliency. While comprehensive, enduring reforms are being developed, the Commission should ensure that interim measures are in place to prevent further loss of secure and resilient nuclear generation.

E. The Commission should move with greater urgency to complete energy market price formation reforms.

As nuclear plant owners assess the long-term prospects of these resources, distorted or suppressed energy price signals make these evaluations more difficult and artificially reduce the value these assets provide. Reforms to improve energy price formation, however, could allow the market to better reflect the true marginal cost of serving load. PJM for example is considering very promising price reform efforts to recognize the contributions of both baseload and flexible resources.²⁰

In addition to these types of more comprehensive price reform efforts, the Commission should continue to press forward on its ongoing and planned rulemakings to improve price formation in the wholesale markets. While not a complete solution for the challenges facing nuclear generators, accurate price signals are necessary to create efficient short-run resource allocation decisions and to provide a basis for long-term investment decisions. The Commission should pursue further rulemakings to ensure all operating costs are reflected in clearing prices,

²⁰ PJM Interconnection, Energy Price Formation and Valuing Flexibility at 1-4 (June 15, 2017), *available at* <http://www.pjm.com/%7E/media/library/reports-notice/special-reports/20170615-energy-market-price-formation.ashx>.

including start-up and no-load costs.²¹ Accordingly, NEI encourages the Commission to continue and expand these efforts to improve price formation as expeditiously as possible.

III. CONCLUSION

Consistent with potential Path 4 identified by the Commission in its notice in this proceeding, the Commission should act quickly to prevent more premature nuclear closures by encouraging ISOs/RTOs to develop market mechanisms to achieve legitimate state public policy goals. At the very least, the Commission should limit any mitigation associated with such state policy initiatives, as suggested by potential Paths 1 and 2. Beyond the paths outlined in the Commission's notice, there is an urgent need for the Commission to direct the ISOs/RTOs to undertake more comprehensive price reform efforts to ensure additional revenues for baseload generating resources now providing undervalued benefits such as long-term rate stability, system resiliency, and fuel diversity. The Commission also should promptly expand and complete energy market price formation efforts now currently underway. As these efforts move forward, the Commission should ensure that interim measures are in place to prevent further loss of secure and resilient nuclear generation.

²¹ See Joint Comments of Edison Electric Institute, Electric Power Supply Association, Natural Gas Supply Association, Nuclear Energy Institute, and America's Natural Gas Alliance, Principles for Energy Market Price Formation Reforms, Docket No. AD14-14-000 (Mar. 6, 2015).

Respectfully submitted,

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