UNITED STATES OF AMERICA
BEFORE THE
DEPARTMENT OF ENERGY

Notice of Intent and Request for Information Regarding Establishment of a Civil Nuclear Credit Program	)	Docket No. DOE-HQ-2022-0006

RESPONSE TO REQUEST FOR INFORMATION OF THE INDEPENDENT MARKET MONITOR FOR PJM

Pursuant to the request for information issued in this docket ("RFI"),[1] Monitoring Analytics, LLC, acting in its capacity as the Independent Market Monitor ("Market Monitor") for PJM Interconnection, L.L.C. ("PJM"),[2] submits these comments. Pursuant to Section 40323 of The Infrastructure Investment and Jobs Act ("IIJA") enacted on November 15, 2021, the Department of Energy (DOE) is authorized to allocate funds through a credit allocation program to certified nuclear reactors.[3] The funds, known as Civil Nuclear Credits (CNC) are intended to prevent closure of nuclear generation due to economic factors.[4] The DOE indicates that it intends to execute the CNC program "in a manner that maximizes its

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1 *See Notice of Intent and Request for Information Regarding Establishment of a Civil Nuclear Credit Program*, 87 Fed. Reg. 8570 (February 15, 2022) ("RFI").

2 Capitalized terms used herein and not otherwise defined have the meaning used in the PJM Open Access Transmission Tariff ("OATT"), the PJM Operating Agreement ("OA") or the PJM Reliability Assurance Agreement ("RAA").

3 Public Law 117-58.

4 IIJA § 40323(b)(1).

contribution to the national objectives of clean energy generation, energy security and stability, and economic competitiveness."[5]

The IIJA directs the DOE to determine whether to certify operating nuclear reactors under the CNC program based on whether certain minimum requirements are met, including: (i) "the nuclear reactor is projected to cease operations due to economic factors," (ii) "pollutants would increase if the nuclear reactor were to cease operations," and "the Nuclear Regulatory Commission has reasonable assurance that the nuclear reactor— … will continue to be operated in accordance with the current licensing basis … and poses no significant safety hazards."[6] Six billion dollars have been appropriated to fund CNCs, and the DOE has authorization to obligate up to $1.2 billion in Fiscal Year 2022.[7]

The IIJA does not require the DOE to certify any nuclear reactor or allocate any CNCs.

The CNC program should be implemented in a manner that avoids wasteful expenditures of public funds or discriminatory preferences. The CNC program should avoid duplicating existing state subsidy programs such as the New Jersey Zero Emissions Credits ("ZECs") program and Illinois nuclear subsidies program under the Clean Energy Jobs Act ("CEJA").

The CNC program is a subsidy program that will unavoidably suppress wholesale power market prices below competitive levels, and will harm the regulation and operation of wholesale electricity markets, including making renewable resources less economic. Subsidies are contagious. Subsidies and the harm to competitive markets that results from subsidies should be minimized.

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5 87 Feg. Reg. 8570.

6 IIJA § 40323(c)(2)(A)(ii)(I–III).

7 87 Feg. Reg. 8570.

Regulation through competition is the approach relied on by the Federal Energy Regulatory Commission ("FERC") to ensure just and reasonable rates under the Federal Power Act ("FPA") in Regional Transmission Organizations ("RTOs") such as PJM Interconnection, L.L.C. ("PJM"). Regulation through competition serves the public interest because its goal is to ensure wholesale electric power prices at the lowest possible cost and to assign risks to generation owners who are best positioned to manage it. RTOs have demonstrated the ability to provide wholesale power at competitive prices and to accommodate the economic transition from coal to a mix of coal and gas and renewable resources. The CNC Program should avoid awarding subsidies except where there is an objectively demonstrated need for subsidies as defined in the IIJA.

I. COMMENTS

A. The Market Monitor Helps Ensure that PJM Markets Are Competitive.

The Market Monitor's interest in this proceeding is to help ensure that the PJM wholesale electric power markets are competitive. PJM operates a centrally dispatched, competitive wholesale electric power market in all or parts of Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia and the District of Columbia. PJM is regulated by the FERC under an approach that relies on regulation through competition to ensure the lowest possible electricity prices for consumers. In PJM, competition means that decisions about whether to enter the market, to exit the market and to remain in the market are made by suppliers based on their view of the market fundamentals. Potential and existing suppliers must believe that the market fundamentals will determine the success or failure of their investment or they will not invest, the market will not sustain adequate supply, and the federal regulatory approach will fail.

The Market Monitor and entities like it are established by the FERC to monitor each organized electric wholesale market and to help protect the public interest in regulation through competition.[8] The Market Monitor is responsible for independently and objectively monitoring "[a]ctual or potential design flaws in the PJM Market Rules;""[s]tructural problems in the PJM markets that may inhibit a robust and competitive market;" and "[t]he potential for a Market Participant to exercise market power or violate any of the PJM or FERC Market Rules."[9]

B. Responses to Specific Questions.

1. Do the proposed approach and considerations for certification of a qualified nuclear reactor, including key aspects of CNC Program implementation and other aspects and outcomes of the CNC Program, as described in Section III, support the intent of Congress to assist nuclear reactors at risk of early closure? Why or why not? If not, please suggest alternative approaches to be considered.

Awards of CNCs should be limited to reactors that prove that they "compete in competitive markets" and are "projected to cease operations due to economic factors." There are two distinct elements of the test. The owners of reactors must compete. This means that the owners do not receive subsidies. The owners of the reactors must compete in competitive markets. This means that the owners are not paid via rate base rate of return regulation or regulated contracts and depend on competitive markets for all revenues.

There are objective measures of need based on the definitions in the CNC Program. The metrics used to evaluate whether individual owners and reactors meet the need standard should be based on metrics that are verifiable and systematic and subject to review by relevant independent organizations.

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8 *See* 18 CFR § 35.28.

9 *See* PJM Open Access Transmission Tariff ("OATT") Attachment M § IV.B.2–4.

2. **Are the evaluation criteria being considered for certification as described in this RFI appropriate? If not, please suggest alternative criteria.**

The DOE intends to evaluate seven certification categories:

- Category 1—Competitive Electricity Market: The applicant must demonstrate that the nuclear reactor competes in a competitive electricity market.

- Category 2—Economic Factors: The applicant must demonstrate that the nuclear reactor is projected to cease operations due to economic factors. Applicants must include information on the operating costs necessary to make the certification determination, including, but not limited to, average annual operating loss per megawatt hour over the 4-year period for which credits would be allocated.

- Category 3—Emissions Impact: The applicant must estimate the potential incremental air pollutants that would result if the nuclear reactor were to cease operation. Applicants must demonstrate an increase in these emissions if operations of the nuclear reactor were to cease and the power generation were replaced with other types of generation.

- Category 4—Post-Support Operations Plan: The applicant must provide a plan to sustain operation of the reactor after the 4-year award period, either without future credits or with a reduced level of credits.

- Category 5—Uranium and Fuel Source: The applicant must identify, to the extent known, where fuel for the reactor will be sourced over the 4-year period for which credits may be allocated, including the uranium, conversion, enrichment, and fabrication source. In determining whether to certify a reactor, priority will be given to a nuclear reactor that uses, to the maximum extent available, uranium that is produced, converted, enriched, and fabricated into fuel assemblies in the United States.

- Category 6—NRC Assurance: The NRC has reasonable assurance the reactor will continue to be operated in accordance with the current licensing basis and poses no significant safety hazards.

- Category 7—Other Criteria: Other criteria that may be identified by the Secretary to be considered in certification. A general description of DOE's proposed evaluation consideration in each certification category is described below.

All of the proposed criteria are consistent with IIJA.

a. Category 1—Competitive Electricity Market:

Section 40323(a) of the Act requires that a nuclear reactor ''competes in a competitive electricity market" to be eligible for certification. There are two distinct elements of the test. The owners of reactors must compete. This means that the owners do not receive subsidies. The owners of the reactors must compete in competitive markets. This means that the owners are not paid via cost of service regulation or regulated contracts and depend on competitive markets for all revenues, and that entry and exit signals depend upon the pricing signals from markets. A reactor receiving subsidies under an existing state program, such as the New Jersey ZECs program and the Illinois CEJA program, is not competing in a competitive market and should not be eligible to participate in the CNC Program.

The RFI proposes (at 8572) "to interpret the Act as independent of reactor ownership." The Act should be not be interpreted independent of reactor ownership. The definition of competing depends on reactor ownership. A reactor owned by a utility subject to cost of service regulation appropriately depends on decisions by state regulatory agencies for revenues and economic viability. Such ownership means that the reactor does not compete in a competitive market.

The RFI solicits comment (at 8572) on "whether and under what circumstances the following commercial arrangements would qualify as competing in a competitive market:" (i) participation in market operated by an RTO/ISO, such as PJM; (ii) sales outside of RTOs/ISOs under market-based rates authorization; (iii) sales based on "merit order" within a vertically integrated utility; (iv) and sales in "an all-source competitive solicitation process administered by a State public utility commission."

The Market Monitor's view is that participating in the PJM markets generally means that the competitive markets part of the test is met because in PJM market participants generally rely solely on the market for revenues. In PJM, the markets are intended to be self sustaining and generation resources generally do not depend on outside nonmarket revenues. PJM has energy markets, ancillary services markets and capacity markets. But

even in PJM, some participants may opt out of the capacity market and instead rely on state regulated revenues under standard cost of service regulation. Such participants are not competing and do not require federal subsidies. In PJM, some market participants receive direct subsidies from individual states. Such participants are not competing and do not require federal subsidies. In other RTOs/ISOs market participants may rely on nonmarket revenues in place of a capacity Such market participants are not competing and do not require federal subsidies.

In order to satisfy this criterion, a reactor must demonstrate that it receives revenues solely and entirely from competitive markets which could include bilateral contracts and could include forward sales of energy and capacity.

The balance of the options do not constitute competing in a competitive market: (ii) sales outside of RTOs/ISOs under market-based rates authorization; (iii) sales based on "merit order" within a vertically integrated utility; (iv) and sales in "an all-source competitive solicitation process administered by a State public utility commission."

b. Category 2—Economic Factors

The RFI proposes (at 8572):

> The applicant must demonstrate that the nuclear reactor is projected to cease operations due to economic factors. Applicants must include information on the operating costs necessary to make the certification determination, including, but not limited to, average annual operating loss per megawatt hour over the 4-year period for which credits would be allocated.

The RFI explains (at 8573):

> Economic factors include, but are not limited to, the following: Anticipated cost of producing electricity; anticipated market pricing, including all out-of-market revenues; regulated revenues; monetization of risk using reasonable and appropriate methods for the specific market, which may include impacts of renewable and clean energy mandates, energy source and delivery mandates, and others; operations and maintenance costs; capital costs, including depreciation and amortization; administrative costs, including corporate and similar allocations; and accounting for the operational risk and market risks faced. The sum of these factors provides a projection of the average profit, or loss,

> associated with the ongoing operation of the reactor, for each year in the prospective 4-year award period. Information will be requested for each year of the 4-year period, showing anticipated yearly changes (e.g., outages, etc.). To be certified as eligible to submit a bid for credits, DOE proposes that the nuclear reactor must demonstrate that it projects an average annual operating loss over the 4-year period for which credits would be allocated.

The list of criteria includes all relevant criteria but does not define how actual results are measured or what the relevant metrics are for defining need. Using a four year forward period is reasonable. The list includes two types of criteria: expected net positive or negative net revenues compared to relevant costs; and the distribution of such revenues less costs, characterized as risk.

The Market Monitor routinely evaluates the economic viability of all nuclear reactors in the PJM markets that fully depend on the PJM markets for revenues.[10] The Market Monitor uses net avoidable costs as the relevant metric for evaluating whether reactors meet the need criteria. Net avoidable costs equal net market revenue (gross market revenue minus short run marginal costs) minus avoidable costs. If avoidable costs are covered, the unit is covering its annual going forward costs. The Market Monitor's analysis focuses on the standard economics definition of whether an asset is receiving a retirement signal from the market. Under that definition, an asset is receiving a retirement signal from the market if the asset is not covering and is not expected to cover its avoidable costs on an annual basis. Avoidable costs are the costs incurred each year to keep a unit running. Avoidable costs include, for example, operation and maintenance expense but do not include the return on and of capital and do not include allocated overhead costs. Net avoidable costs are the relevant metric for evaluating whether the a reactor may "cease operations due to economic factors."

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[10] See the *2021 State of the Market Report for PJM:* Volume 2, Section 7: Net Revenue (March 10, 2022).

i. Costs

Costs included in an economic analysis should be accurate and objective and consistent with reporting to public and nonpublic reviewers. The DOE suggested a useful provision requiring that an applicant "describe how the method of analyses of economic circumstance is consistent with that used in other decision making (e.g., rate cases, tax filings, insurance statements, filings with the Securities and Exchange Commission), or why there would be a difference in the method or outcome of analyses." Applicants should be required to provide all communications to the public and to investors and to industry groups concerning the economic viability of the reactors and the costs and revenues of the reactors, as well as complete internal studies.

A reliable source for reasonably unbiased, accurate and objective information on reactors' costs are the avoidable costs submitted by reactors to the Electric Utility Cost Group (EUCG), although the EUCG and the NEI have recently attempted to broaden their definition of the costs they account for beyond the appropriate definition of avoidable costs, particularly related to the inclusion of common and overhead costs.[11]

The Electric Utility Cost Group (EUCG) Nuclear Committee is a cooperating group of nuclear plant representatives. Their primary goal is to optimize costs and reliability performance of participating plants. To achieve these objectives, the Nuclear Committee maintains a database for comparing nuclear plant costs, staffing, and performance data. This database was originally developed in 1986 and EUCG states that it is the best, most comprehensive source of nuclear plant data. This database is updated annually and includes comprehensive nuclear performance and cost data, including operating costs, capital costs, and fuel costs.[12]

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[11] *See* Electric Utility Cost Group. Nuclear Committee. (Jan. 25, 2021) <https://www.eucg.org/committees/nuclear.cfm>.

[12] Electric Utility Cost Group. Nuclear Committee. (Jan. 25, 2021) <https://www.eucg.org/committees/nuclear.cfm>.

The Nuclear Energy Institute (NEI) is the Washington, D.C. based policy organization of the nuclear industry. NEI publishes a report annually on nuclear costs using data from EUCG. In November 2021, NEI published the latest version of a report, Nuclear Costs in Context, including average operating costs, capital expenditures, and fuel costs for the U.S. nuclear fleet for 2020.[13] The source for this data is the EUCG.

Reactors' nonavoidable overhead costs should be excluded from consideration. Nonavoidable overhead costs are associated with management and administrative services. Examples of these costs include expenses related to executive leadership, strategy, shareholders services department and the Corporate Secretary's office. Other examples include shared building space, training, supervisory expenses, and prorata expenses based on total labor hours assigned to all products/services. Since these costs would be incurred even if a reactor ceased operating, they are not relevant to the decision on whether to cease operating.

Spent fuel expenses should be excluded from consideration because they are not incurred. Such costs should be included if and when they are incurred. Reactors incurred a dollars/MWh charge for the cost of disposing of its spent nuclear fuel at the Yucca Mountain nuclear waste depository. In May 2014, development of the Yucca Mountain nuclear waste repository ceased. Since 2015, the spent fuel charge has been zero.

ii. Revenues

The RFI proposes (at 8573) to "consider all sources of revenue that a nuclear power owner or operator receives or expects to receive in the 4-year period during which credits would be allocated." DOE explains:

> [R]evenue may come from short-term power sales, power contracts, electricity and capacity markets, ZEC payments,

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[13] Nuclear Energy Institute, Nuclear Costs in Context (November 2021) <*https://www.nei.org/CorporateSite/media/filefolder/resources/reports-and-briefs/Nuclear-Costs-in-Context-2021.pdf*> .

> revenue from other energy services (i.e., ancillary services), revenue from other products (e.g., heat energy, desalinated water, and hydrogen), and other federal and state programs, including tax credits. With respect to a regulated or public power utility (e.g., with cost recovery in retail rates) revenue would also include amounts collected in rates relating to or arising from the nuclear reactor for which certification is sought.

The DOE is correct to recognize "ZEC payments" as revenues, but receipt of ZEC payments mean that a reactor does not meet the criteria under categories 1 and 2.

Projected energy market revenues are a function of projected unit MWh generation and projected energy prices. Projected generation and projected prices affect gross energy revenues, net revenues, net coverage of avoidable costs, and the final dollars per MWh subsidy request. Projected generation output is a function of the unit's size and the hours in which the unit operates, which are total hours in the year net of outage hours.

Reactors will take refueling outages during the four year period. The timing of the outages should reflect actual timing, typically scheduled during the shoulder months in the spring and fall when wholesale energy market prices tend to be lower. Projected energy market revenues are calculated as the projected unit MWh generation multiplied by the projected energy prices but should also include any bilateral contract revenue.

Expected energy prices are based on forward energy markets. Forward markets provide a market source of future prices based on the expectations of market participants buying and selling power. Liquid forward prices provide the best indication of expected prices because they incorporate the expectations of more market participants. The PJM West Hub is the most liquid forward market in PJM. The analysis of forward market prices in PJM and any nodal market should reflect the locational price differences (basis difference) between the bus price at the reactor location and the PJM West Hub price. Forward prices vary with the date on which the forward energy prices are observed and with the period used to calculate the basis adjustment.

Based on forward prices as of January 3, 2022, for energy, and known forward prices for capacity, all the nuclear plants in PJM are expected to cover their annual avoidable costs

in 2022, based on NEI average costs.[14] None of the currently subsidized nuclear plants in PJM need a subsidy for 2022 in order to cover their avoidable costs.

iii. Risk

The assessment of risk and the cost of mitigating risk should be carefully evaluated.

Risk may appropriately factor into an economic analysis, but assertions about the quantification of risk require careful review because there is significant potential for misunderstanding of risk to skew the analysis. An appropriate risk analysis accounts for the probabilities of costs being lower or higher than expected and revenues being higher or lower than expected. Uncertainty about unlikely and worst case scenarios does not drive rational decisions on market exit.

The risk faced by nuclear reactors is sometimes incorrectly defined, resulting in an asserted need for a subsidy that is higher than supported by actual costs and revenues and the distribution of net revenue. It is essential to account for the full distribution of possible outcomes rather than to guarantee a nonrefundable subsidy based solely on the worst possible outcome out of the full range of possible outcomes. Subsidies should not be guaranteed for four years regardless of changing market conditions and subsidies should not be nonrefundable.

Compensation for risk should not be interpreted as the provision of a guarantee rather than payment to mitigate risk. Risk describes the probability distribution of possible market results. There is a probability that revenues could be higher or lower. There is a probability that costs could be higher or lower.

In addition, sophisticated owners of nuclear reactors routinely manage risk, including the risk of energy market price fluctuations and the risk of cost fluctuations. It is reasonable to assign operational risk management for the nuclear units to owners rather

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[14] Monitoring Analytics, LLC, *2021 State of the Market Report for PJM*, Vol. 2 (March 10, 2022) at 2.

than to customers. That is how markets work. That is how a reasonable regulatory framework works.

Energy market prices will fluctuate and costs will fluctuate. These fluctuations define a distribution of possible outcomes. Compensation for risk should not be to require taxpayers to pay it as if only the worst possible outcomes in this distribution could occur. A reasonable risk adjustment could be zero or negative.

It is essential that risk adders not be a one way guarantee that nuclear reactor owners will be held harmless if the worst outcomes occur. The operational costs incurred by owners already include the costs of maintaining the safety of the unit and minimizing the risks of operating the units. These costs are included in the costs of the unit and are covered by revenues. Owners have the capability to manage the risks of price fluctuations and do manage that risk.

An appropriate analysis should not assume that the reactor competing in competitive markets must be held harmless from reductions in revenues and increases in costs. Risks are not correctly defined as guarantees.

No risk adjustment is appropriate to address risks that are within reactor owners' power to address. Reactors should not be held harmless against low probability events that are within their control. Owners of reactors are sophisticated companies that can be expected to routinely manage risk. The role of management in controlling costs should be recognized and incentives for management to continue to reduce costs should be preserved. Owners can and do manage the risk of energy market price fluctuations. It is reasonable to assign risk management to the owners rather than to customers. That is how markets work. That is how a reasonable regulatory framework based on competition works.

3. Is the information requested for the applications for certification appropriate and sufficient? Why or why not?

The Market Monitor recommends that each reactor owner be required to provide the same data that they provided to EUCG .

4. **Is the proposed CNC Program structure, including timing, process, and evaluation approach for certification, acceptance of bids, credit allocation, and periodic audits appropriate? If not, please suggest alternatives.**

5. **Please identify any regulatory or business barriers that might impede the implementation of the CNC Program. Please propose solutions to eliminate or mitigate any identified barriers.**

6. **Should DOE establish a standard format and methodology for each applicant to present economic data, projections, analysis, and other information in support of an application for certification? If so, please address the components that should be included as part of a standard format and methodology and what information should be required.**

7. **What information should be considered by the Secretary in assessments of the marginal impact of projected reactor closures on emission of air pollutants? Should a standard methodology be adopted to address estimation of incremental air pollutants? Why or why not? What methodologies could be considered?**

8. **How should the certification methodology prioritize reactors that utilize U.S.-produced fuel and fuel constituents? Are there additional criteria that should be prioritized, and if so, how?**

9. **Is the use of an indexing mechanism to re-set annually the value of credits allocated to a nuclear reactor as described herein appropriate? Please consider the advantages and disadvantages of such an approach and the basis for such an approach. Should the indexing mechanism be subject to a floor and/or cap? How would an indexing mechanism interact with the recapture provision discussed herein?**

If subsidies are to be provided, a strike price should be defined above which subsidies would be terminated. The strike price in PJM would be the equivalent revenue per MWh required to cover avoidable costs. A well designed strike price would reduce the

need for after the fact recapture provisions. The strike price should be based on forward curves for energy and known forward capacity market prices. The strike price should be defined annually for the following year and the need for the subsidy under the IIJA should be correspondingly defined for the next year.

Market conditions fluctuate significantly and the apparent need for subsidies can appear and disappear. PJM market conditions are a good example. In 2020, no PJM market-based nuclear plant covered its avoidable costs. Based on 2020 alone, it would have appeared that all nuclear plants required subsidies. But in 2021, the situation fully reversed. Looking forward, based on forward prices for energy and capacity in 2022, not a single PJM market-based nuclear reactor requires a subsidy. In fact, the subsides already provided in New Jersey and Illinois were not necessary and resulted in overpayment to the reactors.[15]

10. Using the bid requirements in the Act of price per megawatt-hour and megawatt-hour commitment for a 4-year period, should DOE award credits starting with the lowest price bid and continuing until available funds are exhausted? What policy considerations or parameters other than bid price would inform the determination of which bids would most cost-effectively achieve the objectives of the Act? Should DOE use any other methodology or criteria for awarding credits to bidders?

While use of a competitive process is appropriate, use of a bidding process as described could result in selection of those reactors least in need of a subsidy. Cost effectiveness could be defined in terms of minimizing the MW of nuclear production lost per dollar spent.

11. How should DOE incorporate evaluation of the impacts of the closure or continued operation of nuclear reactors on disadvantaged communities?

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[15] *See 2021 State of the Market Report for PJM*, Vol. 2 (March 10, 2021) at 384 - 390.

12. **Please provide any other input DOE should consider in the establishment and implementation of the CNC Program, including any other information and criteria that might be useful in DOE's approach for and implementation of both the certification process and the sealed-bid process for credits.**

II. CONCLUSION

The Market Monitor respectfully requests that the DOE afford due consideration to these comments as it resolves the issues raised in this proceeding.

Respectfully submitted,

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