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## **Revised Statement**

# **Establishing Nuclear Diversity Certificate Program**

**Bill No. S-877**

## **Before the New Jersey Senate Environment and Energy Committee**

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The Independent Market Monitor for PJM

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## Revisions to Statement of January 25, 2018

This Revised Statement includes two corrections to my Statement to the Committee of January 25, 2018. This Revised Statement includes corrected 2017 revenues and corrected 2018 revenues for the first 17 days of January. The corrections do not significantly change the results and do not change the conclusions of my Statement of January 25, 2018.

### Introduction

I am the Independent Market Monitor for the PJM wholesale power markets. I do not speak for PJM. The role of the independent market monitor (IMM), as defined by FERC and included in the PJM tariff, is to help ensure that the PJM markets are competitive by proposing market rules that incent competition, by monitoring for the exercise of market power and by reporting on the markets to regulators and market participants. I support efficient, competitive wholesale power markets which bring clear benefits to customers as well as to suppliers of power.

The PJM Interconnection, L.L.C. (PJM) operates a centrally dispatched, competitive wholesale electric power market that, as of June 30, 2017, had installed generating capacity of 183,089 megawatts (MW) and 1,007 members including market buyers, sellers and traders of electricity in a region including more than 65 million people 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.

New Jersey and PSEG chose competition and markets over cost of service regulation in 1996 and 1997 as the new PJM markets were established and filed with the Federal Energy Regulatory Commission (FERC). New Jersey and PSEG chose competition and markets in order to reduce costs for New Jersey customers because competition would be more effective than regulation in ensuring efficient outcomes and providing incentives for innovation. In markets, investors take the risks associated with investing in and operating generating plants and investors receive the profits associated with investing in and operating generating plants. In markets, investors make the decisions about which generating plants to build and which generating plants to retire, based on market incentives.

The goal of competition in the wholesale power markets is to provide customers wholesale power at the lowest possible price, but no lower. The PJM markets work. The PJM markets bring customers the benefits of competition. The PJM markets have worked for New Jersey customers and generation owners. But the PJM markets face new challenges that threaten the viability of competitive markets, including the threat of subsidies to existing units. The proposed bill would create such a subsidy.

A benefit of competitive power markets is that they are dynamic, flexible and resilient. The PJM market has resulted in a reliable system despite significant changes in

underlying market forces. Technical innovation and significantly lower gas costs have been key market forces. In PJM, there have been substantial unit retirements and there has been substantial new market entry as a result of market forces. In New Jersey, there have been both unit retirements and new market entry based on market signals. The PJM market design has worked flexibly to address both market exit and entry without preferences for any technologies. The result of new entry has been lower costs and increased reliability.

Particularly in times of stress on markets and on some generating technologies, nonmarket solutions may appear attractive. Top down, integrated resource planning approaches are tempting because it is easy to think that experts know exactly the right mix and location of generation resources and the appropriate definition of resource diversity and the appropriate definition of reliability and therefore which technologies should be favored through exceptions to market rules. Subsidies are tempting because they maintain existing resources and provide increased revenues to asset owners in uncertain markets. Cost of service regulation is tempting because guaranteed rates of return and fixed prices may look attractive to asset owners in uncertain markets.

But once the decision is made that market outcomes must be fundamentally modified, it will be virtually impossible to return to markets. The subsidy model is inconsistent with the PJM market design and constitutes a significant threat to PJM markets.

The issue of external subsidies continued to evolve in 2017. The Ohio subsidy proceedings and the Illinois ZEC subsidy proceeding originated from the fact that competitive markets result in the exit of uneconomic and uncompetitive generating units. The Illinois ZEC subsidy remains subject to legal challenge. The proposed subsidies in the proposed New Jersey legislation for specific PSEG nuclear plants are the latest proposed intervention in the PJM markets. Regardless of the specific rationales offered by unit owners, the proposed solution for all such generating units has been to provide out of market subsidies in order to retain such units. These subsidies were not requested to accomplish broader social goals. Broader social goals can all be met with market-based mechanisms available to all market participants on a competitive basis and without discrimination.

The proposed legislation in New Jersey to subsidize specific nuclear power plants would result in a market intervention that would have a negative impact on PJM's competitive wholesale power markets and would provide subsidies to units that are demonstrably financially viable.

Nuclear and coal plants face strong competitive pressures in the PJM markets as a result of low gas prices and efficient combined cycle units, including new combined cycle units in New Jersey. But there is no evidence that PSEG's nuclear plants are uneconomic and facing a retirement signal from the PJM markets. A plant is economic if it covers the annual expenditures required to operate the unit because it is more profitable to continue to operate the plant than to shut it down.

The proposed subsidies are a response to the success of the competitive PJM markets. Competition has resulted in low prices in PJM. Prices are not too low in PJM. There is no market design problem that requires subsidies.

In a market, investment and retirement decisions are made solely by private investors. PSEG has indicated that management may decide to shut down Hope Creek or Salem or both plants because management, on behalf of shareholders, does not believe that the units are economic and will not be economic in the future. PSEG has indicated that they would like New Jersey customers to subsidize these plants by paying approximately \$300 million per year to PSEG and its shareholders. PSEG has not explained why it is in customers' interest to subsidize uneconomic plants when it is not in its shareholders' interests to do so.

Standard economics indicates that units receive a retirement signal from the market when revenues are not high enough to cover annual avoidable costs, also called operating costs or going forward costs. There is no evidence that the PSEG plants face a retirement signal from the PJM markets.

## Historical Performance

The results for nuclear plants are very sensitive to small changes in PJM prices. In 2016, PJM prices were at the lowest level since the introduction of competitive markets on April 1, 1999. As a result, in 2016, PSEG's nuclear plants fell short of covering annual avoidable costs, based on IMM analysis that relies entirely on public data for transparency.<sup>1</sup> The analysis includes a conservatively high estimate of annual avoidable costs from the Nuclear Energy Institute (NEI) based on NEI's calculations for a sample of nuclear plants.<sup>2</sup> The annual costs are for 2016 and include 100 percent of NEI's annual capital expenditures, which likely exceeds actual expenditures at Hope Creek and Salem. For example, NEI's capital expenditures include historical expenditures to meet regulatory requirements that resulted from reviews based on the accident at the Fukushima nuclear plant in Japan.

This analysis includes updates to the results I reported in my December 20, 2017, Statement Before the New Jersey Senate Environment and Energy Committee and the Assembly Telecommunications and Utilities Committee on the Nuclear Diversity

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<sup>1</sup> Actual operating costs and capital expenditures for Hope Creek and Salem are confidential.

<sup>2</sup> Operating costs from: Nuclear Energy Institute (August, 2017) "Nuclear Costs in Context," <<https://www.nei.org/CorporateSite/media/filefolder/Policy/Papers/Nuclear-Costs-in-Context.pdf?ext=.pdf>>

Certificate Program Bill No. 5330.<sup>3</sup> The updates reflect revenues and costs for the full month of December 2017 and the first 17 days of 2018. This Revised Statement includes corrected 2017 revenues and corrected 2018 revenues for the first 17 days of January.

PSEG's nuclear plants covered their annual avoidable costs on average over the last five full years (2013 through 2017) by an excess of \$1.4 billion even when 100 percent of NEI's capital expenditures are included (Table 3), and by an excess of \$1.6 billion when the first 17 days of 2018 are included (Table 3).<sup>4</sup> In 2016, PSEG had a shortfall of \$81 million, or 5.7 percent of the \$1.4 billion excess. In 2017, PSEG covered their annual avoidable costs by an excess of \$3.7 million.<sup>5</sup> In 2018, PSEG covered their avoidable costs for the first 17 days by an excess of \$131.7 million.<sup>6,7</sup>

Table 1 shows PJM energy prices (LMP), capacity prices (BRA), and annual operating and capital costs over this period. The 2018 results use LMPs for the relevant plant locations for January 1, 2018, through January 17, 2018.

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<sup>3</sup> IMM Statement re: Establishing Nuclear Diversity Certificate Program Bill No. 5330 <[http://www.monitoringanalytics.com/reports/Reports/2017/IMM\\_Statement\\_NJ\\_Bill\\_No\\_5330\\_20171220.pdf](http://www.monitoringanalytics.com/reports/Reports/2017/IMM_Statement_NJ_Bill_No_5330_20171220.pdf)> (December 20, 2017).

<sup>4</sup> The NEI costs for Hope Creek and Salem were both treated as those associated with a two unit configuration because all three units are located in the same area. The reported results are based on public data including LMP, capacity market prices and cost data from the Nuclear Energy Institute (NEI).

<sup>5</sup> Net revenues presented in my Statement of January 25 for the year 2017 were based on an LMP of \$29 per MWh rather than the correct value of \$27 per MWh. The result of correcting the LMP value was to reduce the excess revenue in 2017 from \$68.5 million to \$3.7 million. The result was also to reduce the total surplus for the 2013 through 2017 period from \$1.5 billion to \$1.4 billion.

<sup>6</sup> Net revenues presented in my Statement of January 25 for the first 17 days of 2018 were based on the LMP for the first 11 days of 2017, \$141 per MWh, rather than the correct value of \$119 per MWh for the first 17 days of 2018. The result of correcting the LMP value was to reduce the excess revenue in the first 17 days 2018 from \$163.4 million to \$131.7 million. The result was also to reduce the total surplus through January 17, 2018, from \$1.7 billion to \$1.6 billion.

<sup>7</sup> All calculations are based on publicly available data. Energy and capacity prices are current market prices. PSEG's results could vary depending on whether PSEG's costs are less than the benchmark NEI data and whether PSEG's revenues are greater than market prices, for example as a result of forward energy sales. The results of the analysis are not based on actual, confidential PSEG data in order to ensure that the results can be provided without confidentiality concerns.

**Table 1 Prices in PJM energy and capacity markets and annual costs**

	ICAP	Average DA LMP (\$/MWh)						BRA Capacity Price (\$/MWh)					2016 NEI Costs (\$/MWh)		
		2013	2014	2015	2016	2017	2018	2013	2014	2015	2016	2017	Fuel	Operating	Capital
Salem	2,332	\$37	\$52	\$32	\$23	\$27	\$119	\$8	\$8	\$6	\$6	\$5	\$7	\$19	\$6
Hope Creek	1,161	\$37	\$52	\$32	\$23	\$27	\$119	\$8	\$8	\$6	\$6	\$5	\$7	\$19	\$6

Table 2 and Table 3 show the revenue received by PSEG for Salem and Hope Creek net of operating and capital costs by year since January 1, 2013, through January 17, 2018. Table 2 shows the results on a dollar per MWh basis and Table 3 shows the results on a total dollar basis. The results for 2018 reflect revenues and costs on a per MWh basis through January 17.

**Table 2 Annual surplus (shortfall) in \$/MWh**

	Surplus (Shortfall) (\$/MWh)					
	2013	2014	2015	2016	2017	2018
Salem	\$14	\$28	\$7	(\$3)	\$0	\$92
Hope Creek	\$14	\$28	\$7	(\$3)	\$0	\$92

**Table 3 Total surplus (shortfall) in \$M**

	Surplus (Shortfall) (\$ in millions)						Total
	2013	2014	2015	2016	2017	2018	
Salem	\$289.0	\$569.9	\$146.6	(\$54.1)	\$2.3	\$87.9	\$1,041.7
Hope Creek	\$144.2	\$284.1	\$73.4	(\$26.7)	\$1.4	\$43.8	\$520.2
Total	\$433.3	\$854.0	\$220.0	(\$80.8)	\$3.7	\$131.7	\$1,561.9

The results for Hope Creek and Salem demonstrate that net revenues are sensitive to LMP, to capacity market prices and to the factors that affect energy and capacity prices. For example, 2018 capacity market prices are higher than 2017 capacity market prices by \$2.58 per MWh. This known increase in revenues will be received by Hope Creek and Salem and will contribute to covering annual costs. Gas prices are volatile and have a direct impact on PJM energy market prices. High gas prices and correspondingly high energy prices in PJM in late 2017 and early 2018 resulted in significant increases in net revenues for Hope Creek and Salem and in a surplus over costs. In 2014, higher gas prices in the winter for a relatively short period resulted in a significant increase in net revenues and in a surplus over annual costs for Hope Creek and Salem. Even in 2016, prices were just \$2.65 per MWh short of covering annual costs.

## Forward Looking Performance

This additional analysis includes a forward analysis based on forward energy market prices for 2018, 2019 and 2020 and known capacity market prices for 2018, 2019 and 2020. This analysis does not include the actual results for the first 17 days of 2018. The purpose of the forward analysis is to evaluate whether current forward prices are consistent with PSEG's nuclear plants covering their annual avoidable costs over the next three years. While the forward capacity market prices are known, actual energy prices will vary from current forward values.

Based on forward prices for energy and the known forward prices for capacity, PSEG’s nuclear plants would cover their annual avoidable costs on average over the next three years (2018 through 2020) by an excess of \$320 million even when 100 percent of NEI’s incremental capital expenditures are included. Table 6 shows the revenue that would be received by PSEG for Salem and Hope Creek net of operating and incremental capital costs by year, based on forward prices, for the 2018 through 2020 period, on a total dollar basis.

Table 4 shows PJM energy prices (LMP), capacity prices (BRA), and annual operating and capital costs for the 2018 through 2020 period. The LMPs are based on forward prices with a basis adjustment for the specific plant locations.<sup>8</sup> The capacity prices are known based on PJM capacity auction results.

**Table 4 Forward prices in PJM energy and capacity markets and annual costs**

	ICAP	Average Forward LMP (\$/MWh)			BRA Capacity Price (\$/MWh)			2016 NEI Costs (\$/MWh)		
		2018	2019	2020	2018	2019	2020	Fuel	Operating	Capital
Salem	2,332	\$29	\$28	\$27	\$8	\$7	\$7	\$7	\$19	\$6
Hope Creek	1,161	\$29	\$28	\$27	\$8	\$7	\$7	\$7	\$19	\$6

Table 5 shows the revenue that would be received by PSEG for Salem and Hope Creek net of operating and capital costs by year, based on forward prices, for the 2018 through 2020 period, on a dollar per MWh basis.

**Table 5 Forward annual surplus (shortfall) in \$/MWh**

	Surplus (Shortfall) (\$/MWh)		
	2018	2019	2020
Salem	\$5	\$3	\$2
Hope Creek	\$5	\$3	\$2

Table 6 shows the revenue that would be received by PSEG for Salem and Hope Creek net of operating and capital costs by year, based on forward prices, for the 2018 through 2020 period, on a total dollar basis.

**Table 6 Forward total surplus (shortfall) in \$M**

	Surplus (Shortfall) (\$ in millions)			
	2018	2019	2020	Total
Salem	\$105.9	\$58.5	\$48.9	\$213.3
Hope Creek	\$52.9	\$29.3	\$24.6	\$106.8
Total	\$158.8	\$87.9	\$73.5	\$320.1

<sup>8</sup> Forward prices are reported for PJM trading hubs which must be adjusted to reflect the historical differences between prices at the trading hub and prices at the relevant plant locations. The basis adjustment is based on 2017 data.



## Conclusion

Even if New Jersey wants to subsidize these nuclear plants in order to guarantee that the plants cover their avoidable costs including incremental capital expenditures, the proposed bill is not an effective way to accomplish that objective. The proposed subsidy is \$10.00 per MWh which is well in excess of the single year shortfall in 2016 (almost four times higher than the \$2.65 per MWh shortfall). The bill does not include a clear definition of the need for a subsidy. The bill states that the need for a subsidy is based on: “the nuclear power plant is cash negative on an annual basis, or alternatively is not covering its costs including its cost of capital on an annual basis...” (Section 3.e (4)). “Cash negative” can be interpreted as not covering annual going forward costs but should state that explicitly. Not covering its cost of capital is a significantly different standard, is vague as written, and would result in a significantly higher defined need for a subsidy, although PSEG has not calculated the subsidy that would be required under this standard. Not covering its cost of capital is equivalent to reintroducing cost of service regulation under which customers guaranteed investors full recovery of costs including returns. Not covering its cost of capital is not the test for whether a unit is at risk for retirement.

The bill does not provide for reductions in the subsidy amounts if PJM market prices increase. As a result, there is the opportunity for PSEG to receive windfall profits from the subsidy when PJM market prices increase, as would occur during cold weather as a result of higher gas costs and correspondingly higher energy prices. The first 17 days of 2018 are a good example of these market dynamics.

The bill does not provide that PSEG would pay back to customers the subsidy payments that resulted in recovery in excess of costs. The subsidy is not symmetric. Customers would pay PSEG when PSEG is not making enough, but PSEG would keep 100 percent when PSEG is making more than its annual avoidable costs. As a result of the lack of clear definitions and lack of symmetry, the bill is likely to result in significant overpayments to PSEG and payments in excess of the level needed to reverse any short run retirement signal received from the market.

If New Jersey wants to ensure that Hope Creek and Salem do not receive a retirement signal, the level of subsidy should be defined to equal the difference between all market revenues and annual avoidable costs including incremental capital expenditures on an annual basis and the subsidy should be subject to a rolling after the fact true up based on verified actual costs that calculates any net defined subsidy over the entire period from its implementation.

The same conclusions about subsidies apply whether the New Jersey plants are economic or uneconomic. The proposed subsidy solutions ignore the opportunity cost of subsidizing uneconomic units. Such subsidies suppress energy and capacity market prices and therefore suppress incentives for investments in new, higher efficiency thermal plants, but also suppress investment incentives for innovation in the next

generation of energy supply technologies and energy efficiency technologies. These impacts are large and long lasting.

Subsidies are contagious, as this legislation illustrates. If subsidies are provided to one generating plant, this will suppress prices for all generating plants and create a need for additional subsidies for the remaining units. Competition in the markets will be replaced by competition to receive subsidies. Subsidies to economic units are simply a way to increase prices to individual plants at the expense of customers, with no impact on the operational status of the units.

There is no reason to intervene in the markets in order to provide reliability and resilience. If PJM or FERC or the U.S. DOE identify a need for greater reliability, it can be addressed using market mechanisms.

Competitive markets were introduced as an alternative form of regulation to ensure that wholesale power is provided to customers at the lowest possible price. The PJM markets are working. The PJM markets provide competitive, reliable and resilient outcomes. The PJM markets should be permitted to continue to work in New Jersey and across the entire PJM market. Subsidies will not result in the lowest prices for customers in New Jersey. Competition has resulted in the lowest possible prices for customers in New Jersey and will continue to result in the lowest possible prices for customers in New Jersey unless the growing trend of providing subsidies is permitted to undermine competition.

Subsidies are inconsistent with markets. But if New Jersey decides to proceed with a subsidy for PSEG's nuclear power plants, the results show that such an approach should clearly define the need for a subsidy based on avoidable costs, and should include a true up to ensure that customers do not pay a subsidy when it is not needed. Paying a guaranteed, fixed subsidy amount based on estimates of future market outcomes without a true up mechanism is very likely to produce an incorrect result. Market outcomes vary as a function of the cost of fuel inputs, for example, and it is not possible to accurately predict market outcomes.

Paying a subsidy in order to ensure a target rate of return for PSEG is inconsistent with the functioning of a competitive wholesale power market. Target rates of return are a feature of cost of service ratemaking and not markets.

The results of this analysis are consistent with the conclusion that PSEG does not need a subsidy for its nuclear units based on historical data and based on current forward prices for energy and capacity in the PJM markets.