

SUPREME COURT OF THE STATE OF NEW YORK  
COUNTY OF ALBANY

In the Matter of

HUDSON RIVER SLOOP CLEARWATER, INC., GOSHEN  
GREEN FARMS, LLC, NUCLEAR INFORMATION AND  
RESOURCE SERVICE, INDIAN POINT SAFE ENERGY  
COALITION, and PROMOTING HEALTH AND  
SUSTAINABLE ENERGY, INC.,

Petitioners-Plaintiffs,

For a Judgment pursuant to Article 78 of the CPLR,

-against-

NEW YORK STATE PUBLIC SERVICE COMMISSION, along  
with KATHLEEN BURGESS in her official capacity as Secretary,  
AUDREY ZIBLEMAN in her official capacity as Chair,  
PATRICIA L. ACAMPORA, GREGG C. SAYRE, and DIANE X.  
BURMAN, in their official capacities as Commissioners,

Respondents-Defendants,

-and-

CONSTELLATION ENERGY NUCLEAR GROUP, LLC, With  
Subsidiaries and affiliates EXELON GENERATION COMPANY,  
LLC, RE. GINNA NUCLEAR POWER PLANT, LLC, NINE  
MILE POINT NUCLEAR STATION, LLC, ENTERGY  
NUCLEAR FITZPATRICK, LLC, ENTERGY NUCLEAR  
INDIAN POINT 2, LLC, and ENTERGY NUCLEAR INDIAN  
POINT 3, LLC,

Nominal Respondents-Defendants.

Index No. 07242-16

**AFFIDAVIT OF COLLIN CAIN, M.SC.**

**ON BEHALF OF PETITIONERS-PLAINTIFFS**

**DECEMBER 12, 2018**

**PUBLIC - REDACTED**

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## I. SUMMARY AND CONCLUSIONS

- (1) My name is Collin Cain. I am a Principal with the economics and litigation consulting firm Bates White, LLC (“Bates White”). My business address is 2001 K Street, NW, North building, Suite 500, Washington, DC 20006. I am submitting this affidavit on behalf of the Petitioners-Plaintiffs in the captioned proceedings.
- (2) I am a member of Bates White’s Energy Practice. I have more than 20 years’ experience in the energy industry, providing expert testimony, advisory, and analytical services to clients including electric utilities, regulatory agencies, and other business entities involved in the power sector. In various assignments, I have evaluated elements of wholesale power market design, including the interrelationship of wholesale market pricing and generation supply, impacts of market rule changes, and methods for allocating costs among market participants. I have previously provided expert testimony in proceedings before the Federal Energy Regulatory Commission (FERC) in state and federal courts, before state regulatory commissions, and in arbitration proceedings. I hold a Master of Science in Economics from the London School of Economics.
- (3) In a variety of recent assignments, I have evaluated the effects of state and federal policies on wholesale electricity markets. I have previously evaluated the New York Zero Emission Credit (ZEC) program on behalf of market participants, and have provided economic analysis of the similar Illinois ZEC program in support of testimony in a complaint before the US District Court for the Northern District of Illinois.<sup>1, 2</sup> I have provided testimony in FERC’s *Grid Reliability and Resiliency Pricing* docket regarding the effects of proposed federal policy to provide out-of-market subsidies to uneconomic nuclear and coal units operating in the organized wholesale markets.<sup>3</sup> I have also provided testimony evaluating electricity market design proposals related to accommodating subsidized generation in centralized market clearing processes.<sup>4</sup>

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<sup>1</sup> Supporting the Declaration of David W. DeRamus in *EPSA et al. v. Anthony M. Star et al.* (U.S. District Court for the Northern District of Illinois, Eastern Division, Case No. 17-cv-01164)

<sup>2</sup> A key distinguishing feature of the Illinois ZEC program, compared to the NY ZEC program, is that it was established through legislation passed by the Illinois General Assembly. The New York ZEC program, in contrast, was created by order of the NYPSC, without directing legislation.

<sup>3</sup> Joint Affidavit of David W. DeRamus and Collin Cain, FERC Docket No. RM18-1-000, October 23, 2017.

<sup>4</sup> Joint Affidavit of David W. DeRamus and Collin Cain, FERC Docket No. ER18-1314-000, May 7, 2018; Joint Affidavit of David W. DeRamus and Collin Cain, FERC Docket No. EL16-49-000, November 6, 2018.

- (4) My *curriculum vitae* is attached as Exhibit Cain-1.
- (5) I have been asked by Petitioners-Plaintiffs to provide an assessment of the New York ZEC mechanism for subsidizing upstate nuclear plants, the ZEC payment rate methodology, its justification, and cost-effectiveness.
- (6) My conclusions are as follows:
  - (7) The ZEC mechanism is an arbitrary subsidy to specific uneconomic businesses – specifically, nuclear power plants located in upstate New York – all fully- or majority-owned by a single company: Exelon Corporation. Imposing the costs of this arbitrary subsidy on ratepayers is unjust and unreasonable.
  - (8) The ZEC payments do not provide “appropriate and fair” compensation for zero-emission generation, and are not “independent of the actual wholesale prices for energy and capacity,” as claimed.
  - (9) The ZEC payments constitute an enormous subsidy, totaling approximately \$965 million over the first two years of the ZEC program, and \$7.6 billion through 2029, amounts that are far greater than is justified either by the claimed intent of supporting the CES goals or by the true costs of the nuclear plants.
  - (10) Even when sufficient renewable generation has been added in New York to fully replace the upstate nuclear plants, the ZEC program will still require New York ratepayers to subsidize the nuclear plants at ever-growing payment rates.
  - (11) The ZEC methodology produces arbitrary payment rates that do not correspond, either initially or over time, to the quantity or value of emissions reductions associated with keeping the upstate nuclear units in operation.
  - (12) The ZEC program commitment to subsidize all the upstate nuclear plants for a full twelve years is likely to have a counter-productive effect on achieving the CES goals for the development of in-state renewables, because it will artificially maintain excess supply conditions that suppress market-clearing prices for capacity and energy.

- (13) The ZEC program fails as a least-cost regulatory approach because it provides excessive revenue to the upstate nuclear plants. Cost data demonstrate that Nine Mile Point needs no subsidy to remain economic; the ZEC payments will also provide revenue in excess of the combined costs of Nine Mile Point and Ginna, and likely also in excess of combined costs including Fitzpatrick.
- (14) The ZEC program fails to provide appropriate safeguards to minimize cost, such as periodic evaluations of whether the program is still needed, whether it is providing value commensurate with cost, and whether there are inadvertent effects of the program.

**II. THE NEW YORK ZEC PROGRAM IS NOT A CORRECTION OF A MARKET DEFECT, BUT IS AN ARBITRARY SUBSIDY TO SPECIFIC NON-ECONOMIC BUSINESS**

- (15) I describe the specifics of the New York ZEC payment mechanism below. As a threshold matter, it is important to emphasize that, while the ZEC is characterized as providing “fair value” for the zero emission attributes of the upstate nuclear plants,<sup>5</sup> this is flatly contradicted by the way the program is implemented. In reality, the ZEC program is an arbitrary subsidy to specific uneconomic businesses, all fully- or majority-owned by a single company, Exelon Corporation (“Exelon”).
- (16) If the ZEC program were actually intended to pay a fair value for the attribute of providing zero-emission electric generation, as claimed, it would be available to any resource capable of doing so, but it is not. ZEC payments are provided only to existing *nuclear* plants in New York State that would not be economically viable in the absence of out-of-market financial support.<sup>6</sup> Indeed, as I discuss further in Section III of my affidavit, the ZEC program does not serve to advance New York’s emissions reduction goals in a least-cost manner.
- (17) As further evidence that the ZEC program is not, in fact, intended to provide “appropriate and fair” compensation for zero-emission generation, the ZEC payment would be reduced or eliminated if market electricity prices rise above a benchmark level. This categorically

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<sup>5</sup> Clean Energy Standard Order, NYPS&C Case 15-E-0302 and Case 16-E-0270, August 1, 2016 (“CES Order”), page 119.

<sup>6</sup> While the CES Order does not explicitly require that an eligible nuclear plant be located in New York State, the criterion that an eligible facility have made a “verifiable historic contribution” of energy “consumed by retail customers in New York State” (CES Order, page 124) is a *de facto* requirement that eligible nuclear plants be in-state.

refutes the assertion that the ZEC payment is “independent of the actual wholesale prices for energy and capacity....”<sup>7</sup> If the zero emission attribute of generation from upstate nuclear plants actually had a value peculiar to these facilities, it would be appropriate to compensate them for that attribute regardless of payment the market provides for other attributes – i.e., electric energy and capacity. As an economic principle, it is appropriate to compensate each attribute or product commensurate with the value it provides. In contrast, the ZEC program aims to keep uneconomic businesses in operation, not to provide “fair” compensation.

- (18) The ZEC program subsidizes a narrowly defined group of uneconomic businesses, fully- or majority-owned by a single company, and applies an arbitrary mechanism to establish subsidy rates that do not properly correspond either to the value of the zero emission attribute produced by the nuclear plants, or to the actual cost of plant operation. As a consequence, imposing the large costs of the ZEC subsidy on ratepayers is unjust and unreasonable.

#### **A. The ZEC Mechanism**

- (19) ZECs provide payments to uneconomic nuclear plants at a specified rate per unit of electric energy produced, in dollars per megawatt-hour (\$/MWh). The program establishes a twelve-year subsidy period consisting of six two-year “tranches”, with the ZEC payment rate determined for each tranche using the same general methodology. For the first two-year tranche, applicable to the period April 2017 through March 2019, the ZEC payment rate is set at \$17.48/MWh. This is ostensibly based on a value of avoiding carbon dioxide (“CO2”) emissions, but as a general matter also depends on market prices for electric energy and capacity.<sup>8</sup>
- (20) In general, the ZEC payment rate is determined by the simple formula illustrated in Figure 1, where the first box is the putative value of avoided CO2 emissions, or cost of carbon (which will change for future periods), and the second box can be thought of as “excess” market revenue that the nuclear plants are expected to benefit from. The initial cost of carbon is reduced by the excess market revenue to give the ZEC payment rate. For the

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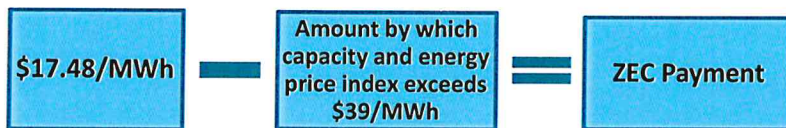
<sup>7</sup> CES Order, page 119.

<sup>8</sup> Electric generators produce energy (which is consumed by end users), and also are compensated based on their “capacity” or potential to produce energy when needed.



first two-year period, the implicit market revenue rate is the same \$39/MWh as the benchmark level. Hence, the excess market revenue is zero, and the ZEC payment rate is simply the (net) cost of carbon: \$17.48/MWh, which is guaranteed for the first two-year tranche.

**Figure 1: ZEC Payment Rate for Tranche 1**



- (21) The result of the ZEC payment mechanism is that the upstate nuclear plants are effectively assured of revenue of more than \$56/MWh in the first two years of the program (\$39/MWh in estimated market revenue plus \$17.48/MWh in ZEC subsidy revenue), and likely more in future years. While it is possible that the revenue for the nuclear plants could fall below \$56/MWh, if actual market prices average below \$39/MWh during the first two-year period, it is also possible that the total revenue rate will be greater, since the \$17.48/MWh ZEC payment rate is guaranteed for the period, even if market prices were to exceed \$39/MWh.
- (22) The ZEC payment is an enormous subsidy, totaling approximately \$965 million over the first two years of the ZEC program, and \$7.6 billion through 2029.<sup>9</sup> The ZEC provides approximately 45% of bonus revenue ( $\$17.48/\$39.00 = 45\%$ ) on top of expected market revenues for the nuclear plants and possibly a substantially larger amount in subsequent years. As I discuss in Section III, below, the ZEC subsidy is far greater than is justified either by the claimed intent of supporting the CES goals or by the true costs of the nuclear plants.

### **B. Arbitrary Determination of the Cost of Carbon**

- (23) The \$17.48/MWh net cost of carbon in the ZEC formula is determined by a method I describe below. It is important to emphasize at the outset that the methodology is ultimately arbitrary. As noted above, the ZEC does not in fact compensate a general zero-

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<sup>9</sup> Calculations based on annual MWh cap on generation that can receive ZEC payments, assuming no modification to the 0.53846 tons/MWh emissions factor, and market prices not projected to exceed the applicable market baseline.

emission generation attribute, because it is only available to in-state uneconomic nuclear plants, and because the ZEC payment rate can change, depending on market prices of energy and capacity. These simple facts demonstrate that the ZEC payment rate is arbitrary. Its intent is solely to induce Exelon to keep upstate nuclear plants in operation. The fact that the ZEC payment rate can change independently from the putative value of the zero emission attribute shows that the formal methodology establishing the value of the ZEC is deceptive. The ZEC payment rate corresponds neither to the value of the attribute it supposedly compensates nor to the cost of continued operation of the upstate nuclear units. Indeed, the ZEC payment rate is far higher than necessary to keep Exelon financially whole, which I address in Section III.

- (24) For the first 2-year tranche, the ZEC payment rate is determined based on a Social Cost of Carbon (“SCC”) of \$42.87 per short ton of CO<sub>2</sub>.<sup>10, 11</sup> This gross SCC value is reduced by \$10.41/ton to reflect the fact that New York participates in the Regional Greenhouse Gas Initiative (“RGGI”), and market clearing prices for energy consequently reflect RGGI CO<sub>2</sub> allowance costs of fossil-fuel generators. The resulting (net) cost of carbon for ZEC purposes is \$32.47 per ton of CO<sub>2</sub> ( $\$42.87/\text{ton} - \$10.42/\text{ton} = \$32.47/\text{ton}$ , with rounding).
- (25) The net cost of carbon is then translated into \$/MWh terms through the use of an average emission rate that is assumed for existing generation resources that would replace energy from the nuclear plants if they were to retire. The assumed emission rate of 0.53846 tons/MWh is multiplied by the net cost of carbon of \$32.47/ton to give \$17.48/MWh. As described above, this is equal to the ZEC payment rate for the first tranche, implicitly reflecting market energy and capacity revenue of \$39/MWh.
- (26) This methodology has the semblance of being grounded empirically, but it is suspect for several reasons. First, the assumed emission rate for resources that would replace output from the nuclear units is drawn from a study that has nothing to do with the potential retirement of the upstate nuclear units. The emission rate is taken from a December 2015

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<sup>10</sup> The values for the SCC used in determining the ZEC payment rate are based on a schedule from the federal government technical document: US Interagency Working Group on Social Cost of Carbon, Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866, (US Interagency Working Group on Social Cost of Carbon, 2015), 17.

<sup>11</sup> The U.S. Environmental Protection Agency currently reports revised SCC estimates based on an alternative methodology that considers costs to the U.S. only, and uses higher discount rates, resulting in SCC values far lower than those used in the ZEC payment methodology.



report on the value of net energy metering in New York, and represents a marginal emission rate based on 2014 data.<sup>12</sup> For the quantity of nuclear generation at issue – approximately 3,400 MW of capacity, and roughly 27 million MWh of energy produced annually – the emissions associated with replacement generation would not be based on current marginal rates, but rather would reflect a dynamic adjustment process that would likely include accelerated additions of zero-emission renewable generation, as well as increased energy flows from other regions, including possible increased imports of zero emission hydroelectric energy from Quebec. The replacement emission rate in the ‘but for’ case of the retirement of the upstate nuclear plants would likely be substantially lower than past or current marginal emission rates. The use of current marginal emission rates in the determination of the net cost of carbon in \$/MWh likely results in substantially overstated ZEC payment rates.

- (27) The CES Order provides a mechanism to adjust the assumed emission rate in determining ZEC payment rates starting with Tranche 4 (2023-2025), but any adjustment will be minor, and will be based on predetermined values, *not* on an empirical assessment of any actual emissions reduction benefit of keeping the upstate nuclear plants in operation. Starting with Tranche 4, the assumed emissions rate of generation that would replace upstate nuclear output (0.53846 tons/MWh, fixed for the first 6 years) would be reduced by 0.00491 tons/MWh for every million MWh of renewable generation in New York in excess of 50 million MWh per year.<sup>13</sup> The maximum adjustment would be a reduction of the assumed emissions rate to 0.45008 tons/MWh, which would occur if 68 million MWh of annual renewable generation were achieved. That quantity of renewable output would represent an increase of 27 million MWh on the approximate 2014 baseline of 41 million MWh – i.e., incremental renewable generation equal to the combined output of the upstate nuclear plants. What this means is that even in a scenario in which there is sufficient renewable generation to *fully replace* the output of the upstate nuclear plants, the ZEC subsidy to the nuclear plants would continue for another six years – and at a base ZEC payment rate that would continue to grow. Because the SCC grows over time, and because the maximum adjustment to the assumed offset emissions rate is so modest, the minimum ZEC payment rate for Tranche 4 – even if new renewable generation were

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<sup>12</sup> Energy and Environmental Economics, *The Benefits and Costs of Net Energy Metering in New York*, (San Francisco: Energy and Environmental Economics, 2015.)

<sup>13</sup> CES Order, page 137.

sufficient to fully replace the nuclear output – would be \$19.92/MWh – a 14% increase over the ZEC payment rate for Tranche 1.<sup>14</sup> With so much renewable generation, plus retained nuclear output, there is, for practical purposes, zero chance that market energy and capacity prices would rise to cause a downward adjustment of the final ZEC payment rate. The unreasonable result is that even when sufficient renewable generation has been added to replace the upstate nuclear plants, New York ratepayers will be required to subsidize the plants at ever-growing rates.

- (28) The ZEC payment is not, in reality, anchored to the value of the zero emission attribute for which it supposedly provides compensation. If it were, the payment rate methodology would be based on an evaluation of dynamic, rather than marginal, effects of retiring the nuclear plants; it would provide for an assessment of *actual* changes in emissions rates over time; and it would also consider the economics of retiring one or more of the uneconomic units rather than retaining all of the nuclear capacity. I discuss further how the ZEC program fails as a least-cost regulatory approach in Section III.
- (29) The ZEC program commitment to subsidize all the upstate nuclear plants for a full twelve years is also likely to have a counter-productive effect on achieving the CES goals for the development of in-state renewables. Because of the operational characteristics of nuclear plants, they are most efficient, and least costly to operate, when they generate constantly at full output (except when taken out of service for refueling and maintenance). This has consequences for the rest of the generation system. In particular, when the demand for electricity is low, the nuclear plants will continue to operate even if other resources would be less costly to operate in a given hour. Essentially, it is too costly to shut down a nuclear unit and restart it later, or even to move the operating point down and up repeatedly, than to keep the facilities running at full output, even when market energy prices do not cover the cost of operation in some hours. With the ZEC subsidy, this effect is exacerbated. Even if NYISO energy prices are clearing at zero, the nuclear units can still earn \$17.50/MWh for every hour they operate.
- (30) Low demand hours typically occur when it is neither very hot (when air conditioning load is high) or very cold (when heating load is high) – e.g., in the spring and fall, particularly

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<sup>14</sup> The SCC for Tranche 4 is set at \$54.66/ton, and reduced by the \$10.41/ton RGGI adjustment, giving a net cost of carbon of \$44.25/ton. The maximum adjustment of the offset emissions rate to 0.45008 tons/MWh multiplied by \$44.25/ton gives a ZEC payment rate of \$19.92/MWh.

overnight. And these are the very times when wind generation tends to be highest. As more wind generation is added in coming years, there is an increasing likelihood that maintaining full output of the uneconomic nuclear plants will require that wind generation be reduced, or curtailed, in order to maintain system stability. For the electric system to operate safely, demand and supply have to be balanced precisely on a minute-by-minute basis. As a consequence, when demand is low and nuclear generation is unchanged, other resources must give way, including wind and solar if necessary. Any such displacement of renewable generation would correspond to a zero emission rate for 'replacement energy'. That is, keeping the nuclear plants in operation would be providing no zero emission benefit at all, but the plants would still be compensated richly. The ZEC payment methodology makes no reasonable accounting for such potential effects, and is consequently unreliable and likely substantially overstates the emissions benefit of keeping the nuclear plants in service.

- (31) The CES Order provides that the baseline market price level of \$39/MWh would be reviewed prior to the determination of ZEC payment rates for Tranche 4 (2023-2025). By keeping all the upstate nuclear plants in operation, despite excess supply conditions and regardless of the quantity of renewable generation added in coming years, the ZEC program effectively ensures that market prices for capacity and energy will remain depressed, and that there will consequently be no reduction in the ZEC payment rate.
- (32) Returning to the point I emphasized at the beginning of this section, the implementation of the ZEC program demonstrates that the ZEC payment rate is arbitrary. Fundamentally, the ZEC program would not exist except for the fact that (some of) the upstate nuclear plants are not economically viable. There is consequently no necessary payment basis that justifies the ZEC rate. That is, if all the upstate nuclear plants were economically viable, there would be no ZEC program, regardless of whether the plants were being compensated appropriately for their alleged CO2 emissions reduction attributes. The ZEC payment rate is arbitrary and, as I discuss below, vastly overcompensates Exelon relative to actual plant costs, resulting in windfall revenues.

### **III. THE NEW YORK ZEC PROGRAM IS NOT LEAST COST, AND PROVIDES WINDFALL REVENUES TO EXELON CORPORATION**

- (33) In this section I address multiple factors demonstrating that the ZEC program is not designed to be a least cost method to achieve New York's CES goals. I address the decisions and implicit assumptions that result in a program much more costly than necessary, and show that the program pays Exelon far more than the actual cost to keep the upstate nuclear plants operating.
- (34) As part of this analysis, I have examined cost data, provided under protective order in this proceeding, documenting plant costs for the R.E. Ginna Nuclear Power Plant ("Ginna"), and the Nine Mile Point Nuclear Station ("Nine Mile"), two of the three upstate nuclear plants that receive subsidy payments via the ZEC program. The third plant is the James A. FitzPatrick Nuclear Power Plant ("Fitzpatrick"). Information derived from documents provided under protective order are marked for redaction.
- (35) The nuclear plant cost data discussed below were provided by Constellation Energy Nuclear Group ("CENG") in 2016 to the NYPSC pursuant to CENG's petition to determine nuclear facility costs expected to be the basis for subsidies under the CES.<sup>15</sup> CENG and its nuclear generating assets, including Ginna and Nine Mile Point, were acquired by Exelon Corporation as part of the merger with Constellation Energy in 2012. As of April 1, 2014, Ginna, Nine Mile Point, and all of CENG's other nuclear assets, were integrated into Exelon's nuclear fleet, and the CENG corporate office was absorbed into Exelon's corporate infrastructure. Notwithstanding the corporate and functional integration in 2014, CENG continued to be the named entity addressing facility costs of Ginna and Nine Mile Point in the NYPSC proceedings.
- (36) As development of the CES implementation proceeded, the NYPSC moved away from a nuclear subsidy approach based directly on facility costs, and eventually established the ZEC program in its August 1, 2016 CES Order, with the ZEC payment methodology described above. Though the ZEC payment methodology is not linked directly to the nuclear facility costs, the cost data submitted by CENG are highly relevant, because they provide a measure of the magnitude of the 'problem' the ZEC program was crafted to

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<sup>15</sup> Plant cost data are from the Excel file: '2016 05 10\_CES confidential appendix (HBROC-2813305 v1).xlsx', submitted by CENG pursuant to the company's filing: Petition to Initiate a Proceeding to Establish the Facility Costs for the R.E. Ginna and Nine Mile Point Nuclear Power Plants, NYPSC Case 16-E-0270.

address: that the upstate nuclear plants were purported to be too costly for CENG/Exelon to continue operating them. As discussed below, the cost data demonstrate that the ZEC program pays Exelon far above the actual facility costs, providing the company with an inappropriate revenue windfall. As I have addressed in detail in II, there is no necessary level of the ZEC payment rate, and so no justification for giving Exelon an amount greater than the actual cost of continued operation of the nuclear plants. The NYPSC has created no mechanism to ensure that the ZEC payment rate is actually commensurate with the value of the zero emission attribute that is supposedly being compensated, and no mechanism to ensure that the program is least-cost.

**A. All-in power plant costs**

- (37) The ZEC formula described above will adjust the payment rate for Tranches 2 through 6 depending on whether market prices for energy and capacity are projected to exceed \$39/MWh. This captures the fact that the upstate nuclear plants, like other generators, earn revenue through the NYISO centralized markets for energy and capacity.<sup>16</sup> Energy (and related ‘ancillary services’) are priced on a \$/MWh basis, while capacity is transacted on a dollars per kilowatt month (\$/kW-mo) basis. The capacity price is paid on the maximum amount of output that a plant can reliably generate, whether or not the plant is actually called on to generate electricity by the system operator. Plants are paid for capacity because that is the product or attribute that is important for keeping the lights on over highly uncertain conditions. Changes in weather, planned or unexpected outages of generating plants, and the state of the transmission network are all factors that the system operator must anticipate, and which require generating capacity in excess of expected peak demand in order to operate a reliable system. Hence, wholesale electricity markets typically compensate generators for capacity and energy separately.
- (38) The \$39/MWh baseline market price level applied in the ZEC methodology is a combined number for energy and capacity. The estimated capacity price is translated from \$/kW-mo to \$/MWh terms by spreading the assumed capacity revenue over the applicable energy quantity. The resulting capacity value can then be added to the energy value to produce an ‘all-in’ price in \$/MWh.

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<sup>16</sup> Power plants may not sell all energy and capacity directly through the NYISO centralized markets, but will face pricing for other types of sales (i.e. bilateral transactions) closely tied to centralized market prices, which establish visible, liquid alternative prices for alternative transactions.



- (39) The same process can be applied with respect to plant costs. A power plant has variable operating costs based on the cost of fuel and the plant's efficiency in converting fuel to electric energy, plus a component of operations and maintenance ("O&M") cost associated with hourly operation (for wind and solar, the fuel cost is zero, but there is still a small O&M component). A power plant also has fixed costs that generally do not change with the level of output, such as salaries, capital investment and debt service costs. These fixed costs can be converted to a \$/MWh basis by dividing the dollars by the quantity of energy actually generated. This \$/MWh value can then be added to the variable operating cost to produce an all-in cost on a \$/MWh basis.

**B. Nine Mile Point does not need to be subsidized**

- (40) Nine Mile Point consists of two separate units: Nine Mile 1, with a capacity of approximately 625 MW, that went into service in 1969, and Nine Mile 2, with a capacity of approximately 1,300 MW, that went into service in 1987. This large nuclear facility generates approximately 16 million MWh of energy on average annually, corresponding to about 95% of its maximum theoretical output (i.e., if operated at maximum output every hour). Exelon provided data to the NYPSC showing projected all-in costs for both Nine Mile units for 2017-2020 of approximately [REDACTED]. This is well below the \$56/MWh implicit revenue rate, reflecting the \$17.48/MWh ZEC payment rate and the \$39/MWh projected market baseline. The cost data indicate that Nine Mile Point is economic without the ZEC subsidy, and that providing ZEC payments justified by the need to prevent the plant from retiring is, in fact, unwarranted.
- (41) The unnecessary subsidization of Nine Mile Point demonstrates that the ZEC program is not a least cost regulatory solution, even if the premises of the program were accepted uncritically. Nine Mile Point already receives more than adequate market compensation to keep it from retiring for economic reasons. It is consequently a windfall gift to Exelon to provide substantial subsidies through ZEC payments.
- (42) In its presentation of Nine Mile Point costs, CENG includes more than [REDACTED] of risk-related costs. These costs are appropriately excluded from a comparison of actual plant costs to the payment provided under the ZEC program, because: 1) the subsidy payments protect against market price risk, and 2) the ZEC payment should provide no compensation for operational risk, because it is supposedly paying for an attributed only produced through operation of the plant.

- (43) Even if the [REDACTED] of risk-related costs are included, they raise Nine Mile's costs to just [REDACTED], still well below the \$56/MWh that it is expected to receive via the market and the ZEC payment during the Tranche 1 period. Moreover, the ZEC payment will grow by more than 65% over the 12-year program, based on the schedule of increasing values for the social cost of carbon, providing growing windfall revenues over time.
- (44) Specific terms established by the CES with respect to the Nine Mile Point plant actually contradict the claimed ZEC program rationale. The CES Order states that the Nine Mile units qualify jointly as a single facility, and that "[if] either unit permanently ceases producing zero emissions credits it will be treated as if the entire qualified Nine Mile Point facility has permanently ceased producing zero-emissions credits."<sup>17</sup> This makes no sense as part of a policy supposedly aimed at retaining zero emission nuclear generation that would otherwise retire for economic reasons. Say one of the Nine Mile units fails and cannot be brought back into operation. It makes no sense to eliminate ZEC payments for output from the remaining unit if it is true that the plant needs subsidies to remain economically viable. This provision would effectively force the retirement of the remaining unit, flying in the face of the alleged rationale of the entire program.
- (45) But the 'poison pill' provision *would* make a sort of sense if it were understood that one of the Nine Mile Point units (presumably the larger, newer Unit 2) is in fact highly economic, and perhaps the other unit is marginally economic or uneconomic, even with ZEC payments. (The facility cost data submitted by CENG do not distinguish costs for the individual Nine Mile units.) Without the poison pill provision, Exelon might make more money by retiring the less-economic unit. I say that this makes a sort of sense, but it demonstrates that the ZEC program is not focused on ensuring the retention of zero emission generation; otherwise, it would not be crafted in a way that puts at risk the viability of the entire Nine Mile Point facility because of exigencies at one of the units. The poison pill provision is consistent with keeping all of Nine Mile Point in operation, but it is only understandable if part of the facility is highly economic and does not need subsidies to stay in operation, demonstrating that the ZEC program is not least-cost. A

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<sup>17</sup> CES Order, footnote 100.

least-cost program, assuming the validity of its goal, would subsidize only resources that are not otherwise economic.

**C. The ZEC payment rate does not consider true plant revenue**

- (46) The ZEC payment rate methodology described above takes an indirect route to determining the likely revenue Exelon can achieve from its upstate nuclear units. The method to determine the baseline market price of \$39/MWh, and to determine the projected market price that will be compared to the baseline, is linked to Zone A energy prices, despite the fact that the subject nuclear plants are located in Zone B (Ginna) and Zone C (Nine Mile and Fitzpatrick). This approach is justified because Zone A forward transactions are more liquid, and prices more reliable, than those for Zone B or C. This is reasonable, but distracts from a more fundamental issue, which is that the plants do not rely on spot market sales for revenue, but rather lock in prices through longer-term bilateral sales. The NYPSC has established a ZEC program justified by the claim that the upstate nuclear plants would otherwise be retired because they are not economically viable. Economic viability is a function of plant costs and market revenues, yet the ZEC payment methodology ignores what market revenues actually are. While there may be a rough correspondence over time between short-term market price levels and longer-term bilateral contract prices, in this case, the *actual* revenue of the nuclear plants is of fundamental concern in assessing whether subsidies are justified, and at what level, yet this basic fact is ignored in the ZEC process.

**D. The ZEC payment rate ignores Exelon's actual profit levels**

- (47) It is striking that there is no provision in the ZEC program to revisit plant costs over time, or to examine actual plant profit levels. The schedule of values for the social cost of carbon, which drives the ZEC payment rate, has increases from tranche to tranche averaging more than 10%. For Tranche 6, the payment rate would be more than \$29/MWh, all else equal. No basis is established for plant costs beyond the estimates provided for Ginna and Nine Mile for 2017-2020, and there is no reason to expect plant costs to grow at a rate comparable to that of the ZEC payment rate – more than 65% by the beginning of Tranche 6. Over the 12 years of the ZEC program, the Nine Mile facility would consequently be making ever-greater amounts of pure profit. There is no provision in the ZEC program to determine whether Exelon is making windfall profits over a period of more than a decade when much can change.

- (48) If the ZEC were a least-cost regulatory program, it would incorporate periodic evaluations of whether the program is still needed, whether it is providing value commensurate with cost, and whether there are inadvertent effects of the program that require it to be modified. The ZEC program provides no such safeguards. The ZEC program should provide no more subsidy than the minimum necessary to achieve the zero-emission goals of the CES, but the program makes no effort to ensure that costs are minimized.

**E. A least-cost program would not subsidize all upstate nuclear plants**

- (49) As demonstrated above, there is no reason to provide Nine Mile Point with subsidies. Even if one of the Nine Mile units is marginally economic or uneconomic, there is no reason to subsidize the entire facility the way the ZEC program does.
- (50) It would also be substantially less costly to New York ratepayers, and less disruptive to the wholesale electricity markets as a whole, if the least viable upstate nuclear unit – whether Ginna, Fitzpatrick, or Nine Mile 1 – were to retire. Say that Ginna is the least economically viable of the units. Removing it from the ZEC program would save roughly \$85 million a year in subsidy costs for the Tranche 1 period, and larger amounts for later tranches. Ginna represents less than 18% of combined generation from the upstate units, so the effect of its retirement on the stated intent of the CES would be modest. Retiring the plant would also reduce the subsidy level required for the remaining units, because it would cause wholesale energy and capacity prices to rise modestly by reducing the quantity of excess generation supply that currently suppresses energy and capacity prices in the upstate region. That excess supply is the real cause of the nuclear “problem”. Excess supply of generation relative to electricity demand depresses market-clearing prices, pushing more-costly generating units to retire as they become uneconomic. Such retirement is a feature of the market construct, not a flaw. Uneconomic resources retire, reducing excess supply and allowing clearing prices to rise again, which encourages development of new, more efficient resources, including renewables. The ZEC program cuts against this process, exacerbating the excess supply situation that caused the “problem” in the first place. A more sensible, and cost-effective, program would provide for the managed retirement of uneconomic resources rather than keep them all in operation for an extended period the way the ZEC program does.



**F. Even accounting for the higher costs of Ginna and Fitzpatrick, the ZEC program provides excessive subsidies**

- (51) As discussed above, there is no need to subsidize Nine Mile Point according to the cost information submitted by CENG. While a breakout of Nine Mile costs by unit was not provided, it is a reasonable inference that the larger, newer Nine Mile 2 will earn particularly large, and unwarranted, excess profits. Yet the ZEC program appears to provide excessive subsidies even when the higher costs of Ginna are accounted for. When Ginna and Nine Mile are considered together, the combined plant costs total [REDACTED] for 2017-2020 (excluding the inapplicable [REDACTED] risk adders for all units). This is still far below the \$56/MWh implicit revenue rate including the ZEC payment for Tranche 1. Even Ginna's costs considered alone, at [REDACTED] (excluding the risk adders), are comfortably below the implicit revenue rate with the ZEC payment, and the rapidly escalating ZEC payment rate would likely provide Ginna with substantial profits in later tranches.
- (52) Costs for Fitzpatrick were not included in the cost data provided under protective order.<sup>18</sup> As an indicative estimate of the costs of the entire portfolio of upstate nuclear plants, I have included costs for Fitzpatrick assuming they are proportional to those for Ginna – that is, approximately 50% greater, reflecting Fitzpatrick's larger unit size. This results in combined costs for all the upstate nuclear plants for 2017-2020 of [REDACTED], still significantly below the implicit revenue with the Tranche 1 ZEC payment rate.
- (53) A final observation regarding the plant costs submitted by CENG is that they were estimated prior to enactment of the Tax Cuts and Jobs Act of 2017. The estimates therefore reflect an assumed federal corporate income tax rate of 35%, rather than the 21% that is now law. The plant costs discussed above are consequently overstated, and the ZEC payments are even more generous than indicated above.

**G. NYISO's Independent Market Monitor showed that keeping smaller upstate nuclear units in operation is not a least cost solution to meeting CES goals**

- (54) In comments submitted in the NYPSC's proceeding on the Clean Energy Standard, the Independent Market Monitor ("IMM") for NYISO compared the costs of reducing carbon

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<sup>18</sup> The acquisition of Fitzpatrick by Exelon was not completed until March 2017.



emissions in New York by different means. The IMM estimated that building a new gas-fired combined cycle power plant on Long Island would reduce CO2 emissions (by displacing higher-emitting fossil-fueled generation) at a cost of \$20 per ton.<sup>19</sup> The IMM estimated the cost of reducing CO2 emissions through payments to upstate nuclear units (to induce them not to retire) at between \$20/ton and \$43/ton, based on an emission rate of 0.45 tons/MWh. Note that this assumed emission rate for generation that would replace retiring nuclear units is substantially lower than the 0.53846 tons/MWh applied in the actual ZEC payment rate. The actual cost of the ZEC program ranges from \$32/ton for Tranche 1 and \$54/ton for Tranche 6. The ZEC subsidies to upstate nuclear plants are demonstrably not a least-cost approach to reducing CO2 emissions. The IMM argues that technology-neutral, market-based mechanisms offer more cost-effective means to achieve New York's emissions goals, noting in particular that the RGGI cap-and-trade program, in which New York already participates, could be modified to reduce emissions at lower cost to consumers.<sup>20</sup>

(55) This concludes my affidavit.

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<sup>19</sup> Comments of Potomac Economics, Ltd., NYPSC Case 15-E-0302, page 5.

<sup>20</sup> *Id.*, page 5.

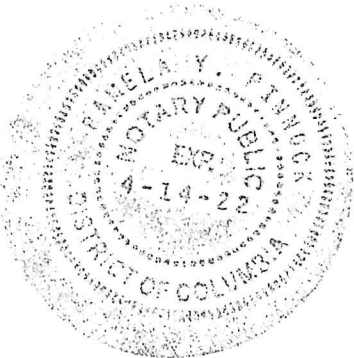
I declare under penalty of perjury under the laws of the United States that the foregoing facts are true and correct to the best of my knowledge.



Collin Cain

December 12, 2018

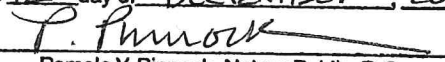
Date



**PAMELA Y. PINNOCK**  
**NOTARY PUBLIC DISTRICT OF COLUMBIA**  
My Commission Expires April 14, 2022

District of Columbia: SS

Subscribed and sworn to before me, in my presence,  
this 12 day of DECEMBER, 2018

  
Pamela Y. Pinnock, Notary Public, D.C.

My commission expires April 14, 2022.

