



# The Commonwealth of Massachusetts

## DEPARTMENT OF PUBLIC UTILITIES

D.P.U. 16-104

December 29, 2016

Petition of Massachusetts Electric Company and Nantucket Electric Company, each d/b/a National Grid, for approval by the Department of Public Utilities, pursuant to G.L. c. 164, § 1A(f), to construct, own, and operate solar generation facilities.

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## I. INTRODUCTION

On June 30, 2016, Massachusetts Electric Company and Nantucket Electric Company, each d/b/a National Grid (“National Grid” or “Company”), filed with the Department of Public Utilities (“Department”) a proposal for the third phase of the Company’s solar program (“Solar Phase III”).<sup>1</sup> Under the Solar Phase III Program, National Grid proposes to construct, own, and operate up to 14 megawatts (“MWs”) of solar generation facilities. To implement its proposal, National Grid seeks Department: (1) pre-approval of a range of estimates of upfront capital costs and ongoing annual operation expenses; and (2) approval of revisions to its Solar Cost Adjustment Provision (“SCAP”) tariff to allow for the recovery of the proposed investments in its Solar Phase III Program, which will be made through the Solar Cost Adjustment Factors (“SCAFs”) as provided in the SCAP tariff. The Company filed its request pursuant to G.L. c. 164, § 1(A)(f), as amended by St. 2016, c. 75, §§ 1 and 2 (“Section 1A(f)"). The Department has docketed this matter as D.P.U. 16-104.

Pursuant to notice duly issued, the Department held a public hearing and procedural conference on August 15, 2016. The Attorney General of the Commonwealth of Massachusetts (“Attorney General”) filed a notice of intervention and notice of retention of experts and consultants to assist in her investigation of the Company’s filing, and has requested Department approval to spend up to \$150,000 in this regard, pursuant to G.L. c. 12,

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<sup>1</sup> The Department approved the Company’s five-MW Solar Phase I Program in Massachusetts Electric Company and Nantucket Electric Company, D.P.U. 09-38 (2009), and approved the Company’s proposal for up to 20 MWs in its Solar Phase II Program in Massachusetts Electric Company and Nantucket Electric Company, D.P.U. 14-01 (2014).

§§11E(a), 11E(b). On August 23, 2016, the Department approved the Attorney General's notice to retain an expert witness pursuant to G.L. c. 12, § 11E(b). Massachusetts Electric Company and Nantucket Electric Company, D.P.U. 16-104, Order on Notice of Attorney General to Retain Experts and Consultants (August 23, 2016). On August 15, 2016, the Department granted the petitions to intervene as full parties of the Massachusetts Department of Energy Resources ("DOER") and the Low-Income Weatherization and Fuel Assistance Program Network ("Network"), respectively.

The Department conducted an evidentiary hearing on November 8, 2016. The Company sponsored the direct testimony of: (1) Fouad E. Dagher, Director of Customer Solutions in the New Energy Solutions organization of National Grid USA; and (2) Timothy Roughan, Director of Energy and Environmental Policy for National Grid USA. On November 16, 2016, the Company filed an initial brief, the Attorney General filed a letter in lieu of a brief stating that she does not have any issues to address, and neither DOER nor the Network filed initial briefs. None of the parties filed reply briefs. The evidentiary record consists of the Company's pre-filed testimony and exhibits, 98 responses to information requests, and the responses to four record requests.

## II. COMPANY PROPOSAL

The Company's Solar Phase I Program was designed to produce electric power. D.P.U. 09-38, at 5. In addition to producing electric power, National Grid's Solar Phase II Program was designed to strategically deploy solar generation facilities with advanced

inverters<sup>2</sup> that were intended to provide technical solutions to decrease interconnection costs and provide load relief at selected locations on the Company's distribution system.

D.P.U. 14-01, at 14-15. With the Solar Phase III Program, National Grid proposes to construct additional solar generation facilities utilizing advanced inverters, with other enhancements, to continue the Company's testing and research goals started in the Solar Phase II Program (Exh. SPP-1, at 11).

In this proceeding, National Grid seeks Department pre-approval to procure, through a request for proposals ("RFP"), up to 14 MWs of "turn-key"<sup>3</sup> solar generation facilities to be owned and operated by the Company on either Company-owned or third-party-owned property (Exh. SPP-1, at 6-7, 18-19). National Grid estimates that the overall capital cost of its Solar Phase III Program will be \$69.32 million, plus a 15-percent variance, resulting in a cost cap of \$79.72 million for up to 14 MWs (Exh. SPP-1, at 25). The Company estimates that the annual operation and maintenance ("O&M") costs associated with its proposal are \$248,000

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<sup>2</sup> An inverter converts direct current power, which is produced by solar photovoltaic facilities, to alternating current power that can be used by customers. An advanced inverter has the ability to: (1) allow the solar facility to remain safely connected to the electric grid during system fluctuations; (2) provide voltage and reactive power that are necessary to maintain power quality; (3) gradually reconnect solar output after an interruption; and (4) adjust the output of the solar generation and avoid the need to install other costly devices that would otherwise be required. D.P.U. 14-01, at 14 n.15; National Renewable Energy Laboratories, Advanced Inverter Technology for High Levels of Photovoltaic Generation in Distribution Systems, at 2, 8 (March 2014). The Department approved National Grid's proposal to use and test advanced inverters in the Company's Solar Phase II proceeding, D.P.U. 14-01.

<sup>3</sup> Upon completion of the construction and installation work by the Company's hired solar developers, the solar generation facilities will be ready for use and operation by the Company.

(Exh. SPP-1, at 30). To meet the sunset provision in Section 1A(f), the solar generation facilities must be constructed before December 31, 2017 (Exh. SPP-1, at 6).

### III. STANDARD OF REVIEW

In conducting its review of a petition for pre-approval of the recovery of costs associated with the construction of solar generation facilities, the Department must determine whether the proposal is consistent with the Commonwealth's energy policy and could be used to satisfy, in part, the Renewable Portfolio Standard ("RPS") requirements contained in G.L. c. 25A, § 11F. Section 1A(f). In addition, the Department must determine whether the underlying solar program is in the public interest,<sup>4</sup> and whether the associated cost recovery method results in just and reasonable rates under G.L. c. 164, § 94.<sup>5</sup> D.P.U. 09-38, at 33;

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<sup>4</sup> The Supreme Judicial Court has recognized that the public interest standard controls the Department's exercise of its regulatory power. Attorney General v. Department of Telecommunications and Energy, 438 Mass. 256, at 268 (citations omitted) (2000); Zachs v. Department of Public Utilities, 406 Mass. 217, at 224 (1989). The Court has equated "public interest" with the phrase "public convenience and necessity," a term advocating a "public benefit, good, or interest." Zachs, 406 Mass. at 224. In determining whether a proposed rate conforms to this standard, the Department has wide discretion to undertake a broad and balanced consideration of a range of factors. Zachs, 406 Mass. at 223-24 (citations omitted).

<sup>5</sup> Setting rates that are just and reasonable under G.L. c. 164, § 94 requires the Department to evaluate the "propriety" of the proposed rates. G.L. c. 164, § 94; see, e.g., Boston Gas Company, D.T.E. 04-62, at 3 (2004); Incentive Regulation Investigation, D.P.U. 94-158, at 42 (1995). The Department has considerable discretion in assessing the propriety of proposed rates under G.L. c. 164, § 94. Boston Edison Company, Cambridge Electric Light Company, and Commonwealth Electric Company Rate Plan, D.T.E. 99-19, at 8 (1999), aff'd, Attorney General v. Department of Telecommunications and Energy, 438 Mass. 256, 269 (2002).

Western Massachusetts Electric Company, D.P.U. 09-05, at 18 (2009). Accordingly, we review the Company's Solar Phase III Program in terms of its attributes and costs.

#### IV. SOLAR PROGRAM ATTRIBUTES

##### A. Company Proposal

##### 1. Advanced Inverters, Enhancements, and Other Technology Pairings

The Company proposes to purchase, own, and operate up to 14 MWs of turn-key solar facilities (Exh. SPP-1, at 7). The proposed facilities would: (1) range in size from 60 kilowatts ("kW") to 5,000 kW; (2) be mounted on rooftops, on the ground, or on poles; (3) be located in pre-selected communities in the Company's service territory; (4) have advanced inverter functionality with additional enhancements (e.g., sun tracking systems, solar canopies, solar with energy storage, pole-top solar, etc.); and (5) be paired with other technologies (e.g., solar tracking system coupled with energy storage, solar canopies paired with electric vehicle charging, etc.) (Exhs. SPP-1, at 7, 9, 11; SPP-5; AG 3-1; AG 3-2).

National Grid will deploy its Solar Phase III Program facilities in targeted areas in its service territory (Exh. SPP-1, at 12). The Company expects that its Solar Phase III Program will complement the research objectives being conducted in its Solar Phase II Program. Specifically, the Company will examine whether its Solar Phase III proposal can: (1) enable an increased level of distributed generation in locations that already have distributed generation capacity; (2) show benefits from distributed generation and energy storage on electric demand reduction in targeted areas on the distribution system; (3) have value in integrating solar generation into the daily operation of the distribution system; (4) increase the resiliency of the

Company's distribution system; (5) alleviate load constraints on the Company's distribution system; and (6) have the potential to defer capital investments that would otherwise be needed to address these load constraints (Exh. SPP-1, at 12-13).

To further these objectives the Company plans to conduct additional testing and research to complement the testing that is ongoing in its Solar Phase II Program (Exhs. SPP-1, at 11; DPU 2-1).<sup>6</sup> National Grid plans to conduct tests that: (1) evaluate the performance of solar generation facilities paired with specific technologies; and (2) are site specific and will examine the effect on distribution system load (Exh. SPP-1, at 14). The Company will pursue the following research objectives to gather more data in determining whether advanced solar technology can: (1) enable an increased level of distributed generation in locations that already have distributed generation capacity; (2) show benefits from distributed generation and energy storage on electric demand reduction in certain targeted areas of the distribution system; and

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<sup>6</sup> For example, in the Solar Phase II Program, the Company is testing whether advanced inverters will improve the control output voltage of solar generation facilities by injecting or consuming reactive power (Exh. SPP-1, at 13 n.4). That is, if the voltage is higher than required, the inverter may consume reactive power, and if the voltage is lower than required, the inverter may inject reactive power on the circuit (Exh. SPP-1, at 13 n.4). Also, in the Solar Phase II Program, the Company is evaluating the "ride through" capability of solar generation facilities with advanced inverter functionality. Because of the increased volume of distributed generation on the distribution system, it is important to understand whether distributed generation can "ride through" and be relied upon to help stabilize the bulk power system (Exh. SPP-1, at 13 n.4). Including these voltage and reliability research objectives in the Company's Solar Phase III Program could yield more data and expand the Company's knowledge of both topics (Exh. SPP-1, at 13 n.4). Also, technology improvements continue to lower the cost of storage, and the strategic deployment of solar generation facilities with storage systems could optimize the use of solar generation facilities and provide additional services such as frequency regulation, output smoothing, and capacity relief (Exh. SPP-1, at 13-14 n.4).

(3) show the value of solar generation facilities, potentially with enhancements, on increasing distribution system resiliency (Exh SPP-1, at 13).

2. Energy, Capacity, and Environmental Attributes

The proposed solar generation facilities will produce energy, capacity, and environmental attributes (i.e., Solar Renewable Energy Certificates (“SRECs”)) (Exh. SPP-1, at 42). National Grid will register the solar generation facilities with the ISO New England Inc. (“ISO-NE”) and sell the energy output into ISO-NE’s energy markets (Exh. SPP-7).<sup>7</sup> As with the Solar Phase I and II Programs, the Company will credit customers with (1) net proceeds associated with energy sales to the ISO-NE; (2) either (a) net proceeds associated with sales of Renewable Energy Certificates (“RECs”) or (b) the market value of RECs that were used to comply with the RPS; and (3) net proceeds associated with bidding the capacity of the solar generation facilities into the ISO-NE Forward Capacity Market (Exh. SPP-7).

B. Position of the Company

1. Advanced Inverters, Enhancements, and Other Technology Pairings

The Company asserts that the implementation of its Solar Phase III Program will complement the research being conducted under the Solar Phase II Program and advance National Grid’s ability to operate a more optimized electric grid and integrate more solar distributed generation facilities (Company Brief at 8). To this end, National Grid expects to gather more data to determine whether advanced solar technology can: (1) accommodate

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<sup>7</sup> ISO-NE is the Regional Transmission Organization for New England responsible for operating and maintaining the New England region's bulk electric power system, developing and overseeing the wholesale electricity market, administering the region's Open Access Transmission Tariff, and coordinating transmission system planning.

increased distributed generation in locations that have distributed generation constraints; (2) demonstrate benefits from distributed generation and energy storage on electric demand reduction in targeted areas of the distribution system; (3) show the value of integrating solar generation facilities into the daily operations of the distribution system; and (4) show the value of integrating solar generation facilities on increasing distribution system resiliency (Company Brief at 8-9).

The Company asserts that this research will help the Company determine how to facilitate increased levels of solar distributed generation, using advanced technologies and enhancements, in locations presenting unique challenges or benefits to the distribution system (Company Brief at 9). Additionally, the Company asserts that researching the effects of solar distributed generation will allow the Company to better understand optimal interconnection strategies that, in turn, may reduce costs incurred by and maximize benefits to the Company's customers of additional investments in solar generation facilities (Company Brief at 9).

Finally, National Grid observes that its Solar Phase III Program is consistent with the Department's grid modernization objectives, which include integrating distributed resources (Company Brief at 9, citing Modernization of the Electric Grid, D.P.U. 12-76-A (2013)).

National Grid concludes that the benefits of its Solar Phase III Program will contribute to the Company's ability to develop and operate an electrical grid that can accommodate additional solar distributed generation facilities with advanced technology and enhancements (Company Brief at 10).

## 2. Energy, Capacity, and Environmental Attributes

The Company asserts that it intends to treat the output and products generated by the solar generation facilities within its Solar Phase III Program in the same or similar manner as it treats the output of the solar generation facilities from its Solar Phase I and Phase II Programs (Company Brief at 4). The Company intends to credit the value from the energy, capacity, and environmental attributes to National Grid customers through the SCAFs in the Company's solar reconciliation filings (Company Brief at 4).

### C. Analysis and Findings

As stated in Section III, above, the Department, in conducting its review of a petition for pre-approval of the recovery of costs associated with the construction of solar generation facilities, must determine whether the proposal: (1) is consistent with the Commonwealth's energy policy; (2) could be used to satisfy, in part, the RPS requirements contained in G.L. c. 25A, § 11F; and (3) is in the public interest.

The Green Communities Act<sup>8</sup> includes a broad range of provisions intended to enhance the development of renewable and alternative energy and to increase energy efficiency in the Commonwealth. See generally St. 2008, c. 169. The Green Communities Act sets the specific goal that the Commonwealth meet at least 20 percent of its electric load by the year 2020 through new renewable and alternative generation. St. 2008, c. 169, § 116(a)(2).

In addition to the goal contained in the Green Communities Act, there are several initiatives taking place at the state and regional levels that are aimed at reducing greenhouse

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<sup>8</sup> An Act Relative To Green Communities.

gas emissions, particularly carbon dioxide, from electric generation facilities. At the state level, the Massachusetts Global Warming Solutions Act requires the Commonwealth to reduce greenhouse gas emissions, relative to 1990 levels, by ten to 25 percent by 2020. G.L. c. 21N, §§ 3, 4. Pursuant to the Global Warming Solutions Act, the Secretary of Energy and Environmental Affairs established a limit on greenhouse gas emissions for the year 2020 at 25 percent below 1990 levels (Massachusetts Clean Energy and Climate Plan for 2020, at ES-7; Secretary of EEA Determination of Greenhouse Gas Emission Limit for 2020 (December 28, 2010)); Massachusetts Clean Energy and Climate Plan for 2020, Update at 68 (December 31, 2015). This requirement increases to 80 percent by 2050. G.L. c. 21N, §§ 3, 4. At the regional level, the Regional Greenhouse Gas Initiative<sup>9</sup> is a carbon cap and trade regime that establishes caps on carbon emissions from larger electric generation facilities in participating states. Further, on September 16, 2016, Governor Baker issued an Executive Order Establishing An Integrated Climate Change Strategy For The Commonwealth, which: (1) includes directives to establish a plan that includes policies and strategies for meeting the statewide emission limits, as well as safeguard residents, municipalities, and businesses from the impacts of climate change; and (2) directs the Massachusetts Department of Environmental Protection (“DEP”) to promulgate regulations to comply with G.L. c.21N, § 3(d) by August 11, 2017, with the objective that these regulations ensure that the Commonwealth meets the 2020 statewide emissions limits mandated by the Global Warming Solutions Act.

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<sup>9</sup> The Regional Greenhouse Gas Initiative (“RGGI”) is a mandatory cap and trade program for greenhouse gas emissions in which all six New England States, in addition to four other states, currently participate. G.L. 21A, § 22; see also RGGI history available at <http://www.c2es.org/us-states-regions/regional-climate-initiatives/rggi>.

Executive Order 569, § 3. On December 16, 2016, DEP presented its proposed regulations that establish a cap on the amount of greenhouse gas emissions that may be emitted from the largest electricity generating facilities in Massachusetts. 310 C.M.R. §§ 7.00, 69.00. These proposed regulations would cap the amount of carbon emissions allowable from large electric generating facilities and, accordingly, zero emission sources of electric generation will become an increasingly important contributor to the safe and reliable distribution system.

The Department recognizes that these initiatives and proposed regulations will increase costs associated with the internalization of reduced greenhouse gas emissions in electricity prices, resulting in increased costs to electric consumers over time. As such, it is appropriate for the Department to take into account the full range of benefits of the Company's Solar Phase III Proposal, which include: (1) producing electricity without emissions, thus avoiding future costs to electric consumers associated with the control of greenhouse gas emissions; (2) stimulating additional solar generation in the Commonwealth; (3) producing valuable information on the costs and benefits of installing solar generation facilities in Massachusetts; (4) enabling optimal integration of additional solar generation facilities in Massachusetts; and (5) crediting to customers the value associated with the energy, RECs, and capacity output of the solar generation facilities. Accordingly, the Department finds that the Company's proposal to develop up to 14 MWs of solar generation facilities, pursuant to Section 1(A)(f), is consistent with the Commonwealth's energy policy and is in the public interest.

The Commonwealth's RPS requires that all retail electric suppliers provide a minimum percentage of kilowatt-hour sales to end-use customers in the Commonwealth from new

renewable energy generating sources. G.L. c. 25A, § 11F(a). Solar photovoltaic is a renewable energy generating source. G.L. c. 25A, § 11F(b). These minimum percentage requirements, which increase annually, are defined as class I renewable energy generating source requirements. G.L. c. 25A, § 11F(a). Class I renewable energy generating sources include solar photovoltaic generation that began commercial operation after December 31, 1997. G.L. c. 25A, § 11F(c). Accordingly, the Department finds that the solar generation facilities proposed by National Grid in the Solar Phase III Program could be used to satisfy the RPS as they would qualify as class I renewable energy generating sources.

## V. SOLAR PROGRAM COSTS

### A. Company Proposal

#### 1. Capital Development Costs, Ownership Costs, and Annual Operation Expenses

National Grid estimates that its Solar Phase III Program will have a mid-point ownership cost of \$69.32 million (Exhs. SPP-1, at 25; SPP-2). The ownership costs include: (1) development capital costs for the solar facilities and enhancements (estimated at \$58.67 million); (2) project management costs (1.5 percent of development capital costs); (3) commissioning costs (1.25 percent of development capital costs); and (4) capital overhead allocations costs (15 percent of development capital costs) (Exhs. SPP-1, at 26-27; SPP-2). Consistent with its Solar Phase I and II Programs, the Company calculated a plus 15 percent variance on the estimated ownership costs, which would cap the Company's ownership costs at \$79.72 million (Exh. SPP-1, at 25).

The Company plans to procure its solar generation facilities through an RFP process (Exh. SPP-1, at 18). Through the RFP process, the Company would solicit bids from solar developers to develop the Solar Phase III generation facilities, which National Grid would then purchase (Exh. SPP-1, at 18-19). These developers would be responsible for designing, engineering, permitting, locating, leasing, procuring, installing, interconnecting, and commissioning the solar generation facilities in pre-selected targeted locations (Exh. SPP-1, at 18-19). According to the Company, the RFP will offer guidance on the types of acceptable bids but also will encourage developers to propose innovative approaches for the solar generation facility installations (Exh. SPP-1, at 18).

The Company expects to incur annual operation expenses to ensure that the Solar Phase III facilities operate safely, properly, and generate their maximum capacity over their projected design life (Exh. SPP-1, at 29). The Company estimates that the first year of annual operation expenses will be \$705,000, for: (1) O&M expense (\$248,000); (2) site maintenance expense (\$282,000); and (3) oversight, reporting, and analysis expenses (\$175,000) (Exh. SPP-3). The Company estimates that these costs likely will inflate at a rate of 2.5 percent per year for 20 years (Exh. SPP-1, at 32). National Grid additionally estimates that it will incur annual expenses for maintaining the system enhancements (e.g., canopies and tracking devices (\$70,000 per year), and energy storage facilities (\$147,000 per year) (Exhs. SPP-1, at 31; SPP-3)). In total, these expenses result in an annual operation expense for the Solar Phase III Program of \$922,000 (Exh. SPP-3).

The selected solar generation facility developers will be responsible for the solar generation facilities' site maintenance during the first five years of operation (Exh. SPP-1, at 29). For years six through 20, the Company will select one or more O&M service providers through a competitive solicitation (Exh. SPP-1, at 29). National Grid will require the developers to provide: (1) a 20-year warranty on the photovoltaic panels; and (2) a minimum ten-year warranty on the inverters, data acquisition systems, communication, and other associated equipment (Exh. SPP-1, at 32).

## 2. Lease Payments and Property Taxes

National Grid expects to enter long-term lease agreements (20 years) with third-party property owners to house its Solar Phase III generation facilities (Exh. SPP-1, at 32).<sup>10</sup> According to the Company, lease payments will vary based on the city or town, the geographical location, the size of the area leased, the project placement location, whether photovoltaic panels are roof-mounted or ground-mounted, and the ability of the property to be used for other purposes once the solar generation facility is in place (Exh. AG 1-49). Based on data from the Solar Phase II Program, the Company expects that lease payments will range from \$15,000 to \$50,000 per MW (Exh. AG 1-49). Because annual lease payments will be site specific, the Company has not included them in its estimate of expenses (Exh. SPP-1, at 33).

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<sup>10</sup> National Grid states that at the end of the lease term, the Company will enter into discussions with the solar generation facility's host to renew the lease, sell the solar generation facility to the host at fair market value, or remove the solar generation facility from the host property and relocate it (Exh. SPP-1, at 34).

The Company will pay property taxes to the municipalities where its Solar Phase III generation facilities are located (Exh. SPP-1, at 34). Because property tax payments will be site specific, the Company has not yet determined the annual property tax expense for its Solar Phase III Program (Exh. SPP-1, at 34). National Grid will calculate actual property taxes when the size and the location of each solar generation facility is determined (Exh. SPP-1, at 34).<sup>11</sup>

### 3. Cost Recovery and Tariff Revisions

The Company currently recovers the revenue requirement of its Solar Phase II Program through the SCAFs as provided in the SCAP tariff. National Grid proposes to expand the SCAFs to recover the revenue requirement for its Solar Phase III Program (Exhs. SPP-1, at 6; SPP-6; SPP-7). Accordingly, the SCAP tariff must be modified to reflect the incremental capacity proposed for the Solar Phase III Program (Exhs. SPP-6; SPP-7).

#### B. Position of the Company

##### 1. Capital Development Costs, Ownership Costs, and Annual Operation Expenses

National Grid states that, in advance of its competitive bidding process, it retained a consulting firm to help compile estimated costs to own and maintain up to 14 MWs of solar generating capacity using publicly available information (Company Brief at 11). The Company asserts that its estimated mid-point ownership costs would be \$69.32 million, with a cap of

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<sup>11</sup> As an illustration, however, the Company calculates that the property tax expense for a solar generation facility located in Weymouth, Massachusetts could be \$631,000 annually (Exh. SPP-4).

\$79.72 million (Company Brief at 12). National Grid argues that it has developed ownership cost estimates that are reasonable and, therefore, should be approved (Company Brief at 12).

The Company expects that its annual operation expenses will consist of: (1) annual system O&M, provided by a third party; (2) site maintenance, provided by a third party; and (3) National Grid oversight to manage property leases and to report and analyze solar generation facility performance (Company Brief at 13-14). National Grid states that the solar enhancement technologies paired with the solar generation facilities will require additional O&M expenses (Company Brief at 14). The Company estimates that these annual operation expenses will be \$922,000 (Exh. SPP-3).

National Grid states that it will require the selected developers to provide the first five years of O&M and site maintenance services (Company Brief at 15). After the first five years, the Company will select O&M service providers based on an RFP process (Company Brief at 15). The Company indicates that it also will require developers to provide a five-year workmanship guarantee on the entire solar generation facility, a twenty-year warranty of all photovoltaic panels, and a minimum ten-year warranty on the inverters, data acquisition systems, communication and other associated equipment (Company Brief at 15).

## 2. Lease Payments and Property Taxes

The Company seeks pre-approval of reasonable costs to lease property from third-parties to host its solar generation facilities (Company Brief at 12). The Company asserts that it will negotiate lease payments based on prevailing market conditions that reflect the intended use of the property and the lease term (Company Brief at 13). National Grid

represents that it will use data from its existing Solar Phase II generation facilities and may engage a broker to assist in evaluating proposed lease payments (Company Brief at 13).

Because lease payment expenses are not yet known, the Company did not include an estimate of lease payment expenses in its requested annual operating expenses (Company Brief at 13).

The Company did, however, provide a sample range of annual lease payment (Company Brief at 13).

The Company seeks pre-approval of the property tax expenses that it will incur associated with its Solar Phase III generation facilities (Company Brief at 12). National Grid states that property tax expenses will be determined by the municipalities hosting the solar generation facilities once the locations, sizes, and investment amounts are known (Company Brief at 13). Because actual property taxes are not yet known, the Company did not include an estimate of property taxes in its requested annual operation expenses (Company Brief at 13). The Company did provide a sample annual property tax expense to demonstrate how property taxes will be calculated (Company Brief at 13).

### 3. Cost Recovery and Tariff Revisions

National Grid states that it will treat the output and products generated by its Solar Phase III generation facilities just as it treats the output and products generated by its Solar Phase I and Phase II generation facilities (i.e., net proceeds will be passed on to the consumers through the SCAFs) (Company Brief at 16). The Company asserts that the only purpose of the proposed revision to the SCAP tariff is to allow the Company to recover its additional investment in the proposed Solar Phase III generation facilities, which are not contemplated in

the current SCAP tariff (Company Brief at 16). Thus, the Company argues that its proposed SCAP tariff is reasonable and should be approved (Company Brief at 16).

C. Analysis and Findings

1. Capital Development Costs, Ownership Costs, and Annual Operation Expenses

National Grid retained the services of Zapotec Energy Inc. (“Zapotec”) to assist the Company in compiling the capital development costs associated with developing the Solar Phase III Program (Exh. SPP-1, at 28). Zapotec conducted a market analysis of solar generation facilities and enhancements using cost data from multiple resources, which it tailored to National Grid’s Solar Phase III proposal (e.g., DOER SREC program and the National Renewable Energy Laboratory (“NREL”)) (Exhs. SPP-1, at 28; AG 1-43 (att.)). Using Zapotec’s analysis, along with National Grid’s experience implementing its Solar Phase I and II Programs, the Company was able to generate estimates of development costs by kW range and by cost per Watt (Exh. SPP-1, at 28).<sup>12</sup>

Based on the foregoing information, the Company estimated the development capital costs for the solar generation facilities would be approximately \$58.67 million (Exh. SPP-2). National Grid added the following to its estimated development capital cost: (1) \$880,020 in project management costs (1.5 percent of development capital costs); (2) \$733,350 in commissioning costs (1.25 percent of development capital costs); and (3) \$9.04 million in

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<sup>12</sup> National Grid increased certain of Zapotec’s estimates by ten percent to account for the increased costs associated with Company-specific requirements, which would not be included by a typical solar developer (e.g., a supervisory control and data acquisition system) (Exhs. AG 1-66; AG 1-43 (att.), at 8)).

overhead allocation costs (15 percent of development capital costs), for a total estimated ownership costs of \$69.32 million (Exh. SPP-2). Finally, National Grid calculated a plus 15 percent variance to produce an ownership cost capped at \$79.72 million for the proposed 14-MW Solar Phase III Program (Exh. SPP-1, at 25).

The Company estimates that it will incur \$922,000 in annual operation expenses for: (1) system maintenance (\$248,000); (2) site maintenance (\$282,000); (3) Company oversight and reporting (\$175,000); (4) system enhancement maintenance (\$70,000); and (5) energy storage maintenance (\$147,000) (Exh. SPP-3). In developing these estimates, National Grid relied on its experience with the Solar Phase I and Phase II generation facilities and information from a study conducted by NREL (Exhs. SPP-1, at 30; SPP-3). The Company expects that these operation expenses will increase at a rate of 2.5 percent per year for 20 years (Exh. SPP-1, at 32).

The Company has provided appropriate estimates of the mid-point ownership costs and of annual operation expenses that it projects to incur for the proposed Solar Phase III generation facilities. For the ownership costs, the Company relied on the market analyses of a solar engineering firms and publicly available data from DOER. Guided by these analyses, the Company will rely on an RFP process to select developers for its Solar Phase III generation facilities. We have found that properly conducted competitive bidding and evaluation processes provide essential, objective benchmarks for the reasonableness of the cost of the services sought. New England Gas Company, D.P.U. 10-114, at 221 (2011); Bay State Gas Company, D.P.U. 09-30, at 228-229 (2009); Fitchburg Gas and Electric Light Company,

D.P.U. 07-71, at 101 (2007); Boston Gas Company, D.T.E. 03-40, at 152 (2003). Also, we find that the use of a 15-percent variance to cap ownership costs is appropriate.<sup>13</sup>

For annual operation expenses, the Company relied on its experience with operating and maintaining the solar generation facilities constructed under its Solar Phase I and Phase II Programs and on information from NREL. Also, the Department finds it appropriate to recognize the effect of inflation on operation expenses. Therefore, in its cost recovery filings, National Grid may apply to its estimated annual operation expenses an inflation factor based on the gross domestic product price index, or other appropriate index.

The Department finds that National Grid provided sufficient information on the method used in developing the mid-point ownership cost and annual operation expense estimates, and based its estimates on reliable information. Also, the Department finds that application of contingency and escalation factors are appropriate. Accordingly, the Department finds that the Company's ownership costs capped at \$79.72 million, after contingency, and annual operation expenses of \$922,000, adjusted for inflation, are reasonable, and we pre-approve recovery of these costs and expenses.

## 2. Lease Payments and Property Taxes

National Grid has not provided a definitive estimate of lease expenses related to its Solar Phase III Program. In response to an information request, the Company indicated that it expects overall lease payments will range from \$15,000 per MW to \$50,000 per MW (Exh.

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<sup>13</sup> This type of contingency is intended to provide for unknown costs that are indicated as likely to incur by experience, but are not identifiable. This contingency is not intended to compensate for poor estimate quality.

AG 1-49). National Grid did not provide a definitive estimate of its expected property tax expenses. The Company did, however, provide an example of its average property tax expense (Exhs. SPP-1, at 34; SPP-4). Using the 2016 tax data for Weymouth, Massachusetts, the Company calculated its property tax expense related to the Solar Phase III Program to be \$631,376 per year for all of its solar generation facilities (Exhs. SPP-1, at 34; SPP-4). This figure assumes a 20-year depreciation rate on its solar generation facilities as well as an estimated annual tax rate increase of one percent (Exh. SPP-4).

The Department finds that lease expenses and property taxes related to National Grid's Solar Phase III Program are appropriate costs for recovery. Thus, the Department pre-approves and National Grid may include in its SCAFs the costs for reasonable lease payments. In filing for recovery of lease expenses, the Company must show its consideration of the rental market for the location of the solar generation facilities, including such factors as the city or town, the geographical area, the size of the area leased, the project placement location, whether the solar generation facilities are roof-mounted or ground-mounted systems, the lease term length, and the continued usability of the leased property. Also, the Department pre-approves and National Grid may include in its SCAFs the actual property taxes assessed by the local municipalities to National Grid for the solar generation facilities.

Based on our pre-approval of costs associated with these solar generation facilities, we will not, as part of our review of cost recovery filings, revisit whether the Company should have proceeded with these investments. The Department will, however, review the prudence of the Company's action in developing these facilities. National Grid estimated the capital

costs for its Solar Phase III generation facilities at approximately \$4.95 million per MW (\$69.32 million/14 MWs = \$4.95 million per MW) (Exh. SPP-2). If the actual costs exceed this amount, National Grid must demonstrate that the cost increases were outside of its control and are consistent with prevailing market conditions. Further, we expect the Company to apprise the Department before making commitments to proceed with a solar generation facility if the costs are likely to exceed this amount. See D.P.U. 09-38, at 24; D.P.U. 14-01, at 47-48.

### 3. Cost Recovery and Tariff Revisions

The Company has revised the SCAP tariff to include up to 35 MWs of solar generation facilities. The Department has reviewed this modification and finds this modification to be reasonable. The Department finds that the SCAP tariff, with the proposed modifications, continues to be an appropriate cost recovery mechanism. Accordingly, we approve the proposed modification to the SCAP tariff. The Department notes that the Company did not provide an updated tariff number for its proposed SCAP tariff. The Department directs the Company to make a compliance filing reflecting the updated tariff number for the SCAP tariff.

## VI. CONCLUSION

As discussed in Section IV, above, the Department finds that National Grid's Solar Phase III Program: (1) is consistent with the Commonwealth's energy policy; (2) could be used to satisfy, in part, the RPS requirements contained in G.L. c. 25A, § 11F; and (3) is in the public interest. As provided in Section V, above, we find that the Company's capital cost estimates and annual operation expense estimates are reasonable, and we pre-approve the

specified levels of capital costs and annual operating expenses, subject to contingency and escalation factors. Further, as provided in Section V, we pre-approve reasonable lease expenses and actual property tax expenses that will be incurred by National Grid for its Solar Phase III Program. Finally, as provided in Section V, above, we find that the Company's proposed modification to its SCAP tariff is reasonable. Based on the foregoing, the Department concludes that National Grid's Solar Phase III Program, as provided herein, will result in just and reasonable rates under G.L. c. 164, § 94.

VII. ORDER

Accordingly, after notice, hearing, and due consideration, it is

ORDERED: That the Petition of Massachusetts Electric Company and Nantucket Electric Company, each d/b/a National Grid, in connection with the third phase of its solar program is APPROVED subject to the conditions specified in this Order; and it is

FURTHER ORDERED: That the Department pre-approves the amount of \$79.72 million in ownership costs and the amount of \$922,000 in annual operation expenses, subject to adjustment for inflation, in connection with the third phase solar program of Massachusetts Electric Company and Nantucket Electric Company, each d/b/a National Grid; and it is

FURTHER ORDERED: That the Department pre-approves reasonable lease expenses and actual property tax expenses incurred in connection with the third phase solar program of Massachusetts Electric Company and Nantucket Electric Company, each d/b/a National Grid; and it is



Appeal as to matters of law from any final decision, order or ruling of the Commission may be taken to the Supreme Judicial Court by an aggrieved party in interest by the filing of a written petition praying that the Order of the Commission be modified or set aside in whole or in part. Such petition for appeal shall be filed with the Secretary of the Commission within 20 days after the date of service of the decision, order or ruling of the Commission, or within such further time as the Commission may allow upon request filed prior to the expiration of 20 days after the date of service of said decision, order or ruling. Within ten days after such petition has been filed, the appealing party shall enter the appeal in the Supreme Judicial Court sitting in Suffolk County by filing a copy thereof with the Clerk of said Court. Sec. 5, Chapter 25, G.L. Ter. Ed., as most recently amended by Chapter 485 of the Acts of 1971.