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VIA ELECTRONIC MAIL

Ms. Aida Camacho-Welch
Secretary of the Board
New Jersey Board of Public Utilities
44 South Clinton Avenue
Trenton, NJ 08625
EMP.comments@bpu.nj.gov

Re: Energy Master Plan for 2019

Dear Secretary Camacho-Welch:

Public Service Enterprise Group, Inc. ("PSEG" or the "Company"), on behalf of affiliates Public Service Electric and Gas Company ("PSE&G") and PSEG Power LLC ("PSEG Power"), appreciates the opportunity to provide comments in response to the Energy Master Plan Committee's request for stakeholder input in support of New Jersey's Energy Master Plan for 2019 ("2019 EMP").

On May 28, 2018, Governor Murphy signed Executive Order No. 28, ("EO28") which directed the New Jersey Board of Public Utilities ("BPU" or "Board") to develop the 2019 EMP. Seven stakeholder meetings were held in September and October to garner input from the public. PSEG's comments below will be responsive to the five work group topics discussed at those stakeholder meetings.

PSEG has a long history of partnering with the state and aligning its interests with those of New Jersey. This partnership has been critical to New Jersey's pursuit of several energy efficiency initiatives and the development of clean and renewable power in the state, making New Jersey one of the recognized leaders in the installation and operation of clean, carbon-free energy technologies. Building on this legacy, PSE&G recently submitted to the BPU its Clean Energy Future ("CEF") filings, designed to address many of the goals set forth in EO28. The CEF investments, which will be discussed in much greater detail below, would significantly expand opportunities for customers to reduce their energy use and save money, reduce greenhouse gas emissions from the transportation sector through accelerating the development of the electric vehicle industry, enable the integration of additional renewable energy though the deployment of energy storage technology in the state, and provide customers with the benefits of advanced metering infrastructure ("AMI") throughout PSE&G's electric service territory.

Clean and Renewable Power

Climate change is undeniably the single most significant environmental threat to the planet. The State of New Jersey and Governor Murphy have made reducing greenhouse gas emissions a top priority, exemplified most recently by the Governor's action to rejoin the Regional Greenhouse Gas Initiative ("RGGI") and the enactment of the Clean Energy Act of 2018, P.L.2018, Ch. 17 ("Clean Energy Act").

To support these efforts, clean energy should be defined as "any energy source that emits zero greenhouse gas or other air emissions" and would necessarily include renewable energy sources like solar, offshore wind, energy storage (so long as the energy stored is derived from clean energy sources), and nuclear power, which is the number one clean energy resource in the state. The inclusion of existing clean central station nuclear power generation will be essential if New Jersey is to realize the 100% clean energy goal set by Governor Murphy in EO28 while maintaining a safe and reliable electric grid.

Reaching the Governor's goal will not be easy as there are many obstacles to overcome. The 100% clean energy goal will likely have customer rate implications that cannot be ignored. Consistent with the Governor's goals, every effort should be made to minimize those rate impacts. In addition, managing the intermittent and seasonal nature of renewable energy sources, particularly offshore wind and solar, will require both the continued reliance on clean baseload nuclear units and flexible generation resources (like efficient natural gas power plants – for at least a transitional period), as well as significant investments in transmission and distribution assets and new technologies designed to integrate the variable output of wind and solar. Governor Murphy's goal of achieving 2,000 MWs of energy storage by 2030 will certainly be a step in the right direction towards further integrating renewable energy sources into the daily mix of energy consumed in the state.

Consistent with the Clean Energy Act, the state should adopt policies that encourage competitive markets, with the goal of encouraging and ensuring the emergence of new entrants that can foster innovations and price competition in the clean energy sector. However, given the magnitude of the challenge of global climate change, and the State's bold response to transform its energy mix and infrastructure, it cannot be denied that utilities are a key partner to help deliver on these solutions. As such, where market participants are disinclined to invest in certain aspects of the clean energy sector, or where the utilities' central role and connection to customers would enable universally-accessible solutions or drive greater results faster, the state should continue to originate and expand policies and programs in partnership with its utilities. This would include, among others:

- Continuing to develop renewable energy on underutilized and underdeveloped sites, like landfills and brownfields, in economically disadvantaged communities that would benefit from the investment, or in partnership with customers that support our communities, like non-profits and public institutions;
- Bringing solar benefits to all customers, including low-to-moderate income customers, by helping to drive down costs, offering universally-accessible behind-the-meter solar, or enabling access through community solar;

- Encouraging workforce development needs associated with a new energy economy;
- Supporting initiatives to drive down the soft costs of solar, e.g., standardizing permitting and continuing to facilitate interconnections;
- Determining rate structures, enabled by advanced metering, that encourage more deployment and cost-efficient use of distributed solar and energy storage;
- Helping to transition to more cost-effective incentive structures, like a successor to the existing SREC program; and
- Piloting and deploying new technologies (like storage) or grid management practices that will enable higher penetrations of distributed energy resources.

The state might also encourage innovative clean technologies by establishing a New Jersey "research and development" group or incubator with the utilities and other market participants, in partnership with established and start-up companies, to promptly test new technologies, approaches to financing, or means to reduce costs of deployment, and establish "best practices" based on successful programs in other states and countries.

The state has become a clean energy leader in many respects: New Jersey now has one of the more robust Renewable Portfolio Standards in the nation, it has opened up the solar market with the Community Solar program authorized under the Clean Energy Act, and it has established aggressive targets for energy efficiency. To achieve its long term 100% clean energy goal, the state should look to utility partnership policies adopted by other states with similar long term goals. In many instances, states have adopted policies that align utility incentives and business models with clean energy goals. For example, to achieve carbon emission reductions from the transportation sector, California recently adopted policies that will reward its electric utilities for accelerating the build out of the electric charging infrastructure. States with aggressive energy efficiency and renewable energy targets such as Massachusetts, New York, and California have adopted revenue decoupling mechanisms for their gas and electric utilities, so utilities can pursue energy efficiency goals on a larger scale without directly harming their bottom line. PSEG believes that electric and gas utilities are essential partners in the pursuit of this goal. We welcome this partnership in transitioning the utility business model to one in which business success is fully aligned with all of the state's clean energy goals.

Investments in clean and renewable energy yield good, high paying jobs. PSEG is committed to working with the BPU and the NJ Department of Labor and Workforce Development to ensure that workforce development is an integral part of its clean energy efforts. Establishing New Jersey as a national leader in clean energy through the Governor's commitments to energy efficiency, electric vehicles, and offshore wind provide a significant opportunity to reduce greenhouse gas emissions while also creating jobs and benefiting customers.

The state has already begun to focus policies and programs that encourage clean energy investments in overburdened communities, such as the new Community Solar program. PSE&G's CEF filings specifically focus on these overburdened communities to ensure that they

have access to energy efficiency programs, LED streetlights, energy storage and the benefits of vehicle electrification. PSE&G welcomes the opportunity to partner with the state to bring other clean energy solutions, including solar energy technologies, to these underserved markets. PSE&G is a key partner that can help ensure universal access to clean energy advancements.

Reducing Energy Consumption

PSEG applauds Governor Murphy's bold commitment to reducing energy consumption and investing in Energy Efficiency. Indeed, we believe one of the most important missions for utilities is to help their customers use less energy. To achieve that mission, however, utilities will have to reset their core business model – shifting from the 20th-century model in which utilities sought to sell as much electricity and natural gas as possible, to a new model that helps customers use less energy and thus save money on their monthly bills, while benefitting the environment and supporting the state's broader energy goals.

A key to the success of the new model will be to develop a rate structure that encourages utilities to help customers use less energy while still allowing utilities to collect the revenue needed to provide safe and reliable service. The current business model creates a disincentive to promote energy conservation and efficiency. This disincentive must be eliminated if the energy reduction targets of 2% for electricity and 0.75% for gas set forth in the Clean Energy Act are to be achieved.

In its recent Clean Energy Future Energy Efficiency ("CEF-EE") filing PSE&G proposed a decoupling mechanism or another mechanism for recovering lost revenues. New Jersey policy has repeatedly supported the recovery of lost revenues caused by energy efficiency programs. Specifically, the RGGI Law states: "[I]nvestment in energy efficiency and conservation programs or Class I renewable energy resources may be eligible for rate treatment approved by the [BPU], including a return on equity, or other incentives or rate mechanisms that decouple utility revenue from sales of electricity and gas."[1] The Clean Energy Act also recognizes that a utility must include as part of its annual cost recovery filing "the revenue impact of sales losses resulting from implementation of energy efficiency [programs]."[2] The Board has previously approved decoupling mechanisms for two New Jersey gas utilities. Approval of a decoupling or other lost revenue recovery mechanism for PSE&G would be entirely consistent with state policy and practice and is a prerequisite to the achievement of the deep energy savings called for in the Clean Energy Act.

"Energy Efficiency" is comprised of many components including encouraging customers to upgrade to appliances and equipment that use less power while providing the same

[1] P.L. 2007, c. 340, codified at N.J.S.A. 26:2C-45 to 26:2C-57 and N.J.S.A. 48:3-98.1

[2] "Each electric public utility and gas public utility shall file annually with the board a petition to recover on a full and current basis through a surcharge all reasonable and prudent costs incurred as a result of energy efficiency programs and peak demand reduction programs required pursuant to this section, including but not limited to recovery of and on capital investment, and the revenue impact of sales losses resulting from implementation of the energy efficiency and peak demand reduction schedules, which shall be determined by the board pursuant to section 13 of P.L.2007, c.340 (C.48:3-98.1)."

or greater level of service, comfort and convenience; using more power at times when demand is low; installing equipment to allow motors to run at lower speeds when full power is not needed; and installing more efficient LED lights or exhaust fans to avoid using air conditioning.

Energy Efficiency delivers clean energy benefits similar to solar or wind, but at a fraction of the cost to consumers. Energy Efficiency costs less than any source of electricity – whether fossil fuels or renewables. A published paper by the America Council for and Energy-Efficient Economy (ACEEE) shows that Energy Efficiency costs between two and five cents per kilowatt-hour, the lowest of any source of electricity.[3] Additionally, Energy Efficiency saves U.S. consumers approximately $90 billion per year according to the ACEEE, which translates into household savings of $460 a year.

There are broader benefits for the environment and public health as well. Energy Efficiency already helps reduce carbon emissions by nearly half a billion tons per year. Reducing electricity use by 15 percent could prevent 30,000 asthma attacks and save Americans as much as $20 billion in avoided healthcare costs.

Across the nation, the states with the most successful Energy Efficiency portfolios are those with programs operated by the utilities, with state regulators providing strategic leadership and oversight. Utilities must also take a leadership role to ensure we achieve the aggressive energy conservation goals established in the Clean Energy Act, and that Energy Efficiency's benefits are available to all customers, regardless of income. Given the mandatory energy reduction targets in the new Clean Energy Act, Energy Efficiency program implementation should be streamlined and operated at the utility level to ensure that the state meets these targets. When done correctly, Energy Efficiency can produce a big win for customers and the environment. PSE&G is well situated to implement Energy Efficiency programs given its preexisting customer relationships, experience in implementing award-winning Energy Efficiency programs, ability to provide on-bill repayment options, and access to customer usage data.

To support these worthy goals, PSE&G's CEF-EE filing contains a strong energy efficiency component, which represents a significant expansion of PSE&G's energy efficiency efforts. It consists of 22 subprograms -- seven targeted towards residential customers; seven targeted towards commercial and industrial customers; and eight pilot programs designed to support future energy efficiency programs. Through the CEF-EE Program, PSE&G proposes to commit up to $2.8 billion in investment and expenses over the six-year term of the program. The plan has a special emphasis on hard-to-reach customers, such as low-income, multi-family, small business and local governments.

The Company's CEF initiative also contains and Energy Cloud ("CEF-EC") filing, the cornerstone of which is the deployment of advanced metering infrastructure ("AMI") throughout PSE&G's electric service territory. The CEF-EC Program will install 2.2 million "smart" meters to all PSE&G electric customers, beginning in 2019 and culminating in 2024. The Energy Cloud will also pave the way for additional technological advances and new products and services that

[3] American Council for an Energy-Efficient Economy, https://aceee.org/how-much-does-energy-efficiency-cost

will improve the PSE&G customer experience. PSE&G proposes to spend approximately $800 million in the Energy Cloud/AMI.

PSE&G's CEF-EC Program will provide many benefits to customers including: expanded control, increased flexibility, and additional choices in how customers can manage their energy use; expanded ability to leverage more detailed energy use to tailor and expand Energy Efficiency and Demand Response products and services to customers; more accurate visibility on Power Quality metrics to all customers, resulting in a reduction in voltage spikes, shortages and other short term variations; and improved information on outage detection and restoration, resulting in improved restoration times and better outage communication to customers.

PSE&G looks forward to working the state to transform the energy sector and its relationship with customers, while providing the reductions in energy usage that are needed to meet our climate and ozone challenges.

Clean and Reliable Transportation

PSE&G applauds Governor Murphy's bold commitment to promote Clean and Reliable Transportation. "Greening" the transportation sector is essential if we are to meet the requirements of NJ's Global Warming Response Act ("GWRA"), which mandates a reduction -- by 2020 -- in greenhouse gas emissions ("GHG") to the 1990 level of GHGs emissions, and a further reduction to 80 percent below 2006 levels by 2050.

Recent legislative and executive action in New Jersey has demonstrated a strong state policy in support of clean energy, electric vehicles ("EVs"), and energy storage projects. The state recently codified many of its energy goals in the Clean Energy Act, including an objective of achieving 600 MW of energy storage by 2021 and 2,000 MW by 2030. The Clean Energy Act further directs that the Board conduct an analysis that considers "whether implementation of renewable electric energy storage systems would promote the use of electric vehicles in the State…." In addition, EO28 calls for the conversion of New Jersey's energy production profile to 100% clean energy sources by January 1, 2050. The state must also explore methods "to incentivize the use of clean, efficient energy and electric technology alternatives in New Jersey's transportation sector and at New Jersey's ports."

New Jersey is also a partner in California's zero-emission vehicle program ("ZEV Program"), which stipulates that large volume automobile manufacturers achieve a certain percentage of new vehicle sales from zero emission vehicles. As a result, New Jersey consumers will be offered an ever greater selection of electric vehicles in the years ahead; we must do all we can do to remove barriers – both real and perceived – that prevent or discourage NJ residents from purchasing EVs.

PSE&G is determined to do all that it can to help the state meet these ambitious goals. To that end, PSE&G's Clean Energy Future initiative contains an Electric Vehicle and Energy Storage component ("CEF-EVES"). The CEF-EVES Program is designed to rapidly accelerate the electric vehicle industry and energy storage technology in the state. The electric vehicle

component of this program includes four subprograms that combined will install approximately 40,000 electric vehicle chargers throughout the state, including at residences and on public corridors. PSE&G also seeks to provide grants for school districts to purchase electric school buses. PSE&G proposes to spend $364 million towards electric vehicles over the course of six years.

PSE&G's proposed CEF-EVES Program will effectively "jump start" the electric vehicle market in the Garden State. Not only will this program provide considerable benefits to EV owners, but all PSE&G customers, local communities, those traveling through the state, and especially those residing in neighborhoods most impacted by air pollutants and greenhouse gas emissions will see the following improvements:

- **Environmental benefits** – EVs offer tremendous promise to help improve the environment by reducing greenhouse gas emissions and other air pollutants. ChargEVC, a not-for-profit trade and research organization, recently estimated that every electrically fueled mile driven in New Jersey is at least 70% cleaner than an average mile that is fueled by gasoline. The increased EV adoption resulting from PSE&G's CEF-EVES Program would remove approximately 16 million net tons of CO_2 emissions through 2035. In addition, this increased EV adoption will lower overall NOx emissions that contribute to ozone formation;

- **Advancement of New Jersey clean energy goals –** The CEF-EVES Program will facilitate achievement of state goals set forth in the Global Warming Response Act, the Energy Master Plan, the Clean Energy Act, the 2015 Ozone National Ambient Air Quality Standard (NAAQS), and California's ZEV Program, in which New Jersey participates;

- **Job creation** - The CEF-EVES Program will support the clean energy economy and create approximately 3,900 direct, indirect, and induced job-years;

- **Mitigation of EV market barriers** – The CEF-EVES Program will address critical barriers in the EV market such as lack of consumer awareness, higher upfront cost of EVs (including charging equipment), gaps in public charging coverage, and range anxiety (fear of running out of charge);

- **Increased knowledge** – Collectively, the CEF-EVES Program will facilitate the implementation of approximately 40,000 "smart chargers" with two-way communication, which will transmit data to a platform that is accessible to PSE&G. This technology will provide data to help optimize electric distribution system planning and operation, and support improvements to rate design to better align rates with cost causation.

Simply put, the proposed CEF-EVES Program will help to position New Jersey as a national leader in vehicle electrification. The CEF-EVES Program is comprised of the following components:

- **Residential Smart Charging** – PSE&G will provide rebates for networked EV chargers at residences in the PSE&G territory and provide customer incentives to encourage charging during off-peak periods.

- **Level 2 Mixed-Use Charging** - PSE&G will deploy electrical infrastructure and provide rebates, tiered by customer type, towards the upfront cost of Level 2 charging equipment and installation. The Level 2 Mixed-Use Charging subprogram is designed to target a diverse set of customers (e.g., multifamily residences, workplaces, fleets, municipalities, overnight lodging) and serve a variety of end-use EV charging needs.

- **Public DC Fast Charging** – Recognizing the significance of range anxiety and the need for public charging at public corridor and community locations, PSE&G will deploy electrical infrastructure and either own or provide financial incentives towards the upfront cost of direct current ("DC") Fast Charging equipment and installation. PSE&G will also provide financial incentives to offset electricity costs.

- **Vehicle Innovation** – PSE&G will provide incentives towards electric school buses and EV charging infrastructure that will service school districts in the PSE&G territory, as well as hold an open bidding process to fund high-impact, customized electrification projects for customers with non-standard medium and heavy-duty vehicle electrification needs.

- **Support for schools, including in low income areas** – by providing grants to public school districts to cover the cost of purchasing electric school buses, thereby reducing exposure to diesel emissions and freeing up resources that can be devoted to educating students.

The CEF-EVES Program will have wide-reaching customer and societal benefits, while launching New Jersey on a track to become a frontrunner in transportation electrification. These benefits include environmental improvement, job creation, mitigation of EV market barriers, increased knowledge of the electric distribution system and energy usage patterns, and advancement of state energy and environmental goals.

With respect to the environmental benefits, electrifying the transportation sector offers the single most significant opportunity in New Jersey to improve air quality, since 52% of the state's greenhouse gas emissions and 71% of the state's NOx emissions come from the transportation segment. Additionally, compared to other states, New Jersey ranks sixteenth for total carbon dioxide emissions, but it is the eighth largest polluting state in terms of carbon dioxide emissions from transportation. The CEF-EVES Program will help facilitate a meaningful reduction in carbon emissions and NOx emissions.

There are many factors that make PSE&G uniquely positioned to effectively implement the proposed CEF-EVES Program including:

- **Established Customer Relationship**: As the state's largest electric and gas delivery company, PSE&G is in a position to encourage program participation because it has

access to many potential Program participants through its monthly billing process, social media platforms, internet site, e-mail distribution lists, customer call centers, walk-in customer service centers across its service territory (located in urban environments, including the state's largest cities), and field activities.

- **Experience:** PSE&G has deep experience and a successful track record with building electrical infrastructure and operating the distribution system, which can be extended to the EV subprograms. PSE&G also has experience with EVs through its:
    - EV employee incentive program, which is the largest in the state and features over 45 chargers at Company locations;
    - Pilot program that provided 135 chargers to 23 New Jersey hospitals, colleges and businesses;
    - Effort to deploy DC Fast Charging stations along corridor locations in New Jersey; and
    - Partnerships with automobile manufacturers to provide PSE&G customers and employees with rebates on EVs.

- **On-bill Repayments:** The Company can provide customers with on-bill repayments over an extended period of time at zero percent rates in a way that is accessible and easy for all customers, which will reduce the up-front cost burden of EV charging equipment installations.

- **Usage Data:** PSE&G can use EV charging data to increase knowledge to improve grid planning and operations and develop effective rate designs.

Building a Modern Grid

PSE&G owns and operates 1,700 circuit miles of electric transmission and 22,000 circuit miles of electric distribution in service of 2.2 million customers here in New Jersey. In addition, PSE&G owns and operates 58 miles of gas transmission and 17,800 miles of gas distribution mains to service 1.8 million customers in New Jersey. Like our country's interstate highway system, electric and gas transmission and distribution infrastructure is essential to New Jersey's economic well-being and quality of life. It has helped power the industrial northeast for more than a century. Unfortunately, a significant portion of New Jersey's transmission and distribution system dates back to the early 1900's and needs to be replaced and upgraded to handle the increasing demand for clean and reliable power. In recent years PSE&G has worked to replace, upgrade, modernize and sometimes move parts of the grid to ensure our system can withstand extreme weather and other threats. For even as our customers are using less gas and electricity, their reliance on clean and reliable energy has never been greater.

Our investments must be targeted and prudent. We must push back against the myth that investments in a modern electric grid are not needed in periods when the demand for power is flat. Recent events in North and South Carolina are all-too-painful reminders of Superstorm Sandy, which devastated our region and cost customers 775 million hours of lost electricity. Since Superstorm Sandy, PSE&G has made significant infrastructure improvements that have reduced unplanned outages by over 60 percent. Watching our fellow citizens struggle with the

effects of Hurricane Florence has yielded an appreciation for NJ's robust grid and the need to continuously strengthen and modernize it. The high-voltage grid must also be storm-hardened and modernized for an environment that can be hostile to our electrified society. The customer benefits are clear and unassailable.

As we move further into the 21st Century, the electric grid must be upgraded to adapt to more distributed generation and energy storage, a shift in the electric generation mix, a move away from central generation, and a world that places a high premium on system resilience. Edge-of-grid technologies like energy storage and electric vehicle infrastructure are important complementary pieces to that investment. The need for continued strong investment in building a modern grid requires an investment in grid facilities as a first option (rather than a last resort) when it comes to meeting local and regional reliability needs. In virtually all instances, a robust modern grid will retain its importance and vitality as a complement to, and facilitator of, technology and markets.

With that said, it must also be recognized that some areas in southern and central NJ have experienced tremendous growth in the adoption of renewable energy, particularly solar, that has tested the limits on individual electric circuits. It is undeniable that part of building a modern grid will be planning for and developing new tools to equip the grid to accommodate large amount of renewables.

PSE&G's recent Energy Strong II filing represents the next step in PSE&G's efforts to further strengthen the utility's gas and electric systems to withstand storms, improve reliability, significantly enhance resiliency and meet the Governor's goal of 50% renewable energy by 2030. Through hardening stations and circuits and increasing system automation, the Energy Strong II program will improve reliability and enhance resiliency. In addition, by building a secure distributed communication network and new operational tools PSE&G is working to modernize the system to not only increase resiliency but also implementing the foundational tools to safely and reliably integrate new, clean and renewable generation sources.

Building a modern grid gives us the optionality to adapt to whatever the future holds, and a modern and resilient transmission and distribution system will be among the most valuable energy assets we have. Distributed generation resources, energy storage, and other new technologies will not supplant the need for a modernized electric grid. Rather, these resources and technologies will depend more than ever on the grid for their economic justification and deployment. Growing demand for electric vehicles, the declining cost of renewable generation, the imperative to reduce carbon emissions, improvements in battery technology, and other developments coupled with the requirements of intermittent distributed generation resources near load centers make a modernized electric grid an invaluable, essential asset for an energy-dependent society.

A modern grid will depend on continued investment both in distribution assets and the transmission highway that moves generation to distribution lines. A core element of the next generation grid is therefore a reliable and resilient transmission network. Transmission is and will continue to be the backbone of our electric system, and the ability of the modern grid to

respond to the dynamic needs of the customer is predicated on the efficient and reliable flow of power through the high voltage network.

PSE&G has been actively involved in upgrading and reinforcing its transmission system over the last several years. We have made, and continue to make, investments that maintain reliability, make our system more resilient to protect against extreme weather and man-made threats, replace aging infrastructure, and modernize our facilities to make them smarter and more adaptable for the new technologies our customers are seeking.

Our investments have also included large and challenging Extra High Voltage (EHV) transmission projects covering hundreds of miles in some of the most densely populated areas in the nation. Collectively, these projects have achieved multiple objectives – not only replacing aging infrastructure, but also addressing reliability concerns, improving resiliency, reducing congestion and increasing access to lower cost generation resources.

On the natural gas side, our Gas System Modernization Program (GSMP) improvements are reducing methane emissions caused by leaks in older infrastructure, installing additional safety devices like excess flow valves, and supporting increased use of natural gas for traditional applications, as well as emerging technologies such as residential fuel cells, combined heat and power equipment, and compressed natural gas vehicles. Cast iron and unprotected steel gas pipes represent less than 25 percent of PSE&G's infrastructure, but they account for more than 65 percent of distribution system's methane gas leaks each year. Our objectives remain to provide our customers and the communities we serve with the safe and reliable gas for their present and future needs while reducing greenhouse gas emissions, and providing a positive impact on employment and the New Jersey economy. The leak reduction, enhanced safety, and system upgrades begin pursued under GSMP are a fundamental aspect of New Jersey's energy future.

Energy storage also offers some extremely promising benefits for modernizing the electric grid: energy storage enables higher levels and better integration of renewable energy onto the electric grid, provides resiliency for critical infrastructure, and enables electric lines to handle greater capacity during times of peak electric use. As mentioned earlier, the Clean Energy Act has set a target of 600 MW of energy storage in the state by 2021, and 2,000 megawatts of energy storage by 2030. PSE&G has already taken up the Governor's challenge: As mentioned earlier, PSE&G's recently filed Clean Energy Future initiative contains an Electric Vehicle and Energy Storage component ("CEF-EVES") consisting of the following five sub-programs, which collectively will install 35 megawatts of battery storage across PSE&G's service territory. This new storage capacity is targeted at the following applications: solar smoothing, which makes the grid more reliable and mitigates voltage fluctuations on the grid produced primarily by changes in cloud cover; distribution deferral, which boosts capacity on select electric lines and defers the need for distribution system upgrades, saving millions of dollars; mobile storage for outage management, which leverages storage to reduce peak demands at substations that are under construction, resulting in more efficient construction projects; microgrids for critical facilities, which enables critical facilities to maintain a reliable supply of electricity during an unplanned outage; and peak reduction for public sector facilities, which will

locate energy storage systems at public sector facilities that will, in turn, help these customers manage costs by reducing electric use at peak times.

These subprograms are designed to incorporate utility-scale energy storage into PSE&G's distribution system to optimize electricity costs for PSE&G's customers, support grid operations (and micro-grids), and facilitate the integration of renewables on the PSE&G grid. PSE&G proposes to commit up to $109 million of investment towards energy storage over a period of approximately six years.

In addition, PSE&G has and is continuing to investigate ways to more effectively integrate energy storage into its infrastructure to provide resiliency and maintain reliability as the amount of grid connected solar increases. PSE&G's Solar 4 All® program currently has a 3 megawatt (dc) pilot program that integrates solar with other battery technologies to provide grid reliability and resiliency for critical facilities during prolonged power outages. PSE&G has four solar storage projects in operation at the following facilities in our service territory as part of this pilot program: Hopewell Valley Central High School, Cooper University Hospital in Camden, the Caldwell wastewater treatment plant, and the Pennington Department of Public Works building.

It's clear that customers are using energy differently today than in previous generations. Predictable usage curves that decades ago determined the optimal lay-out for the grid are currently being reimagined to account for on-site generation, electric vehicle charging, and the need for consumers to be "plugged in" at all times. Continued investment is not optional if we are to meet challenges of an electrifying economy, installing modern digital technologies, deploying and serving more distributed resources, enhancing regional and interregional energy markets, lowering electricity prices for consumers, and strengthening the grid against physical, cyber, and natural disruptions.

Sustainable and Resilient Infrastructure

As mentioned earlier, PSEG has a long history of partnership with the state, aligning its interests with those of New Jersey. Significantly, and with respect to sustainable and resilient infrastructure, this partnership has been critical. The generation and delivery of reliable and safe energy is a key element of a healthy economy. When the utility industry's substantial financial contributions to the state's economy are coupled with the companies' critical mission of managing and maintaining utility infrastructure, it becomes readily apparent why stable and viable utility companies are critical for the existence of all businesses and residents in New Jersey.

PSEG looks forward to continuing and building upon the prior collaboration that has ensured that New Jersey remains properly focused on infrastructure investment to ensure energy resiliency, emergency preparedness, and response both today and tomorrow. Infrastructure investments that enhance the reliability and resiliency of the electric and gas systems have benefitted all customers and create jobs. In our service territory alone, we are seeing evidence of the value and importance of infrastructure resiliency in promoting tremendous urban renewal and development from Camden to Newark to Jersey City just to name a few.

PSEG supports the state's goals of making energy accessible, reliable, and affordable; maintaining a balanced portfolio of clean generation resources, delivering the economic and environmental benefits of energy efficiency; and supporting new energy technologies and renewable energy investments. The backbone to all of those goals and objectives is a sustainable and resilient infrastructure. PSE&G is already immersed in the task of addressing the need for a more resilient electric and gas network through its Energy Strong and Gas System Modernization Programs as well as its transmission replacement program. In many areas of our service territory, our assets have successfully withstood the test of time and lasted nearly a century.

However, resiliency has become a more significant issue over time. We now must navigate dramatic weather shifts from temperatures of 50/60 degrees to near-zero in less than a day, bomb cyclones, ice storms, heightened national security concerns, and a greater customer appreciation and desire for enabling and relying upon renewable energy. All of these imperatives require that resiliency of utility systems is a top priority when crafting long-range planning as envisioned in EO28.

According to the U.S. Department of Energy, between 2003 and 2012, weather events caused nearly 680 power outages that affected at least 50,000 customers.[4] With more than one hundred and fifty-four million electric utility customers in the United States, severe weather events are a concern for every utility company that services them. To illustrate the scope of the problem on the ground here in New Jersey, Superstorm Sandy downed 9,441 utility poles, left more than 100 transmission lines out of service, and damaged or flooded more than 4,000 transformers statewide, leaving 2.8 million electric customers without power after the peak of the storm.

The lessons learned include that in today's digital age, customers require and demand reliable power. Ultimately, our goal has to be ensuring the lights work, and that there is heat in the winter, air conditioning in the summer, and the proper flow of water and sewer systems. Meeting this goal not only benefits all of the citizens of New Jersey, but it has provided thousands of jobs to bolster the state's economy.

On the natural gas side, the first phase of PSE&G's Energy Strong program hardened five Metering and Regulating stations and two peak shaving plants against storm surge and flooding and 240 miles of gas mains and over 21,000 services against water infiltration. The second phase of Energy Strong, in addition to continuing to harden our metering and regulation stations, proposes projects that will improve the resiliency of the gas distribution system against supply curtailments by the interstate pipelines. These resiliency improvements are designed to reduce the potential interruption of service to PSE&G's firm customers particularly in the winter heating season when a loss of gas supply would be most detrimental.

PSE&G is also pursuing efforts to proactively modernize its gas systems to promote a safe, clean and reliable natural gas system well into the future. Cast iron and unprotected steel gas pipes represent less than 25 percent of PSE&G's infrastructure, but they account for more

[4] https://www.energy.gov/sites/prod/files/2013/08/f2/Grid%20Resiliency%20Report_FINAL.pdf

than 65 percent of distribution system's methane gas leaks each year. The Company's Gas System Modernization Program (GSMP) addresses this issue head on. During the course of the first phase of GSMP, the Company is making improvements to older infrastructure that serve to reduce greenhouse gas emissions by an equivalent of 23,500 tons of CO2 a year. As PSE&G moves into the second phase of this program, our objective remains to provide our customers and the communities we serve with the continuing environmental benefits—to the magnitude of a 31,000 ton per year reduction in greenhouse gas emissions.

On the electric side, when the first phase of PSE&G's Energy Strong program is completed later this year, 490,000 of PSE&G's 2 million customers who lost power during Superstorm Sandy won't lose power again due to flooding. By way of example, the program built a new, elevated station that did not flood during severe rains on May 27, 2018, while the old neighboring station flooded at its lower elevation. In addition to continuing its efforts to raise critical electric equipment in flood prone areas, by phase two of the Energy Strong program, the Company proposes to modernize aging electric stations, install stronger poles and wires to reduce wind and tree damage, install circuit reclosers and redundancies, and deploy advanced technology to quicken restoration.

Our experience demonstrates that it is possible to power the economy, provide good jobs for people, deliver reliable and resilient energy, and protect the environment at the same time. Yet we recognize there is much more to do. Our customers depend on our energy more than ever at a time of unprecedented and intensifying changes in technology and the climate, and we understand and appreciate that the status quo is not an option.

We also understand that while we continue to work toward improving and modernizing our delivery system, we must also be mindful of the need to improve and harden the transmission system. In fact, just last month the U.S. Energy Department's National Renewable Energy Laboratory (NREL) presented a new seam study finding considerable economic and engineering value in fortifying these connections to better distribute power resources around the country. The study highlighted the relationship between transmission resiliency and meeting renewable energy goals. PSEG looks forward to continuing to discuss these issues as the electric transmission and distribution systems become more critical to enabling New Jersey's renewable goals to be met.

Somewhat related, we understand that microgrid investments and energy storage, in certain applications, may play a complimentary role to protect certain critical facilities. That said, investments that make our existing electric and gas transmission and distribution systems more resilient have and should remain the priority, as they benefit the greatest number of residents in the most cost-effective manner.

Conclusion

PSEG appreciates the opportunity to provide these comments, and looks forward to a continuing dialogue with all stakeholders consistent with the policy goals set forth in EO28 and the Clean Energy Act, toward the development of a robust Energy Master Plan for 2019 and beyond.

Very truly yours,

Joseph F. Accardo Jr., Esq.