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This document of written comments is being formally submitted by e-mail in response to the Notice on Energy Master Plan Stakeholder Meetings to be conducted via public hearings to gather key information

- Event: New Jersey Energy Master Plan Stakeholder Meetings
- Work Group: **Sustainable and Resilient Infrastructure**
- Date: September 28, 2019

Based on the Executive Order No. 28 dated May 23, 2018, the State of New Jersey is preparing the 2019 Energy Master Plan (EMP). New Jersey has already set ambitious goals for making its energy infrastructure more sustainable and resilient during normal, abnormal, upset and emergency conditions (i.e., superstorms such as Hurricane Sandy and other disasters, both natural and man-made). New Jersey aims to develop additional concrete energy sustainable resilient infrastructure policies for the tangible benefit of various stakeholders. Accordingly, a sustainable and resilient energy infrastructure, including the electric power grid, the natural gas supply and distribution system, and the logistics of liquid fuels and feedstocks, is closely related to the other four key area work groups of the EMP initiative, particularly "Building a Modern Grid" and "Clean and Renewable Power". In addition, electric vehicles (EVs) and their integration into the grid can help enhance demand side management (DSM), distributed energy resources (DER), demand response (DR), and energy storage, and other important elements of a resilient grid. Both sustainability and resilient infrastructure must be jointly pursued with the aim of reducing GHG emissions and overall carbon footprint in the long-term. Thus, it paramount to pursue techno-economically viable solutions and business case(s) which target zero or low carbon pathways utilizing methane and hydrogen relatively soon. Nexant suggests and recommends that the following key issues and market drivers be addressed in the scope and contents of the 2019 EMP:

Key Issues and Market Drivers along with Key Recommendations

- **Distributed generation** - Distributed generation and energy storage is the key feature of a grid that is modern and resilient. Distributed systems are also more secure against sabotage and natural disasters. Redundancy is technically and economically easier to achieve with smaller, modular, and standardized systems as contrasted with mega-generation, transmission, and distribution. Microgrids can be made to continuously operate schools, municipal buildings, fire stations, gas stations, police stations, hospitals, pumping stations, supermarkets, and mission-critical systems such as cell towers.
- **Complement electric grid and gas distribution systems** - It is important to utilize both electric grid and gas distribution together to achieve greater resiliency. A tool for distributed integration of these systems is small-scale LNG production, storage, and utilization. Few are aware of the commercialized energy conservation strategy using technology available from the US DOE national labs. This exploits the pressure in the natural gas transmission pipeline, typically at 200 - 1500 psi, let down at a "city gate" to typically 125 psi. Rather than having this potential energy wasted across a pressure reducing valve, the pressure is reduced through a turbo expander system, which can produce about 20 percent LNG. The liquid can be stored for power generation during emergencies, or during peak demand curtailments. This measure can reduce investment in gas supply infrastructure and/or increase revenue, and LNG can also be supplied to transportation and commercial users. Eventually, renewable synthetic natural gas (RSNG) via gasification or anaerobic digestion (AD) of waste biomass and by cleaning landfill gas (LFG) can be supplied to the natural gas pipeline network. LFG can also provide renewable compressed natural gas (CNG), as it has to garbage truck fleets throughout the US. AD is highly commercialized for CHP, pipeline gas, and CNG in Europe, Scandinavia, Asia, and elsewhere.
- **Fuel cells** - An important option for modular and distributed combined heat and power (CHP) generation is fuel cell technology. Fuel cells "burn" fuels across membranes to produce electricity and byproduct heat without combustion in flames. The emphasis in R&D has been on polymer membrane fuel cells (PEMFCs), which are appropriate for cars, but need high-spec hydrogen as fuel; however, other types, such as solid oxide and molten carbonate fuel cells (SOFC and MCFC, respectively) can utilize liquid and gaseous hydrocarbon fuels and alcohols (including renewable ones) that are far easier to supply and handle than hydrogen. Several vendors have been successful in commercializing SOFCs

and MCFCs for stationary applications as well as for auxiliary power units (APUs) in transportation and other mobile applications.

- **Hardening** – Energy infrastructure hardening, critically needed for resiliency, can have several aspects, primarily cybersecurity and against physical threats. Cybersecurity requires working with federal authorities, international agencies, private industry, and other states. Hardening is mainly a set of technical measures, such as raising the platforms supporting equipment like transformers and switchgear above any potential flood level, and providing dikes and/or flood walls.

Nexant recommends that the EMP address the following specific elements:

- Guidelines and directives that advocate for and enable enactment of an overarching regulatory framework and legislative policy covering fiscal, financial, and tax incentives, carbon pricing mechanisms, potential market structures for infrastructure (e.g., private-public partnerships, tolling etc.) and related policy initiatives that will advance proactive capital investment, projects, jobs creation, and environmental justice in energy system sustainability and resiliency
- Provide data on the historical (past five years) and forecast (up to 2030) for New Jersey energy market elements (supply, demand, and pricing for electricity, natural gas, and liquid fuels) to enable various stakeholders to get a better understanding of the potential markets and project opportunities
- Provide guidelines for various types of studies, assessments and evaluations that must be conducted, including detailed market forecasts and outlooks, types of commercially mature technologies and their applications that are viable for deployment, directives on types of projects that need to be developed and financed, and related areas