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SUBJECT: Docket QO21010085-IN THE MATTER OF MODERNIZING NEW JERSEY'S INTERCONNECTION RULES, PROCESSES, AND METRICS

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Schneider Electric North America (SE) is pleased to present the following memo that outlines how to futureproof New Jersey energy and infrastructure investments. This is particularly salient in our world of increasing customer or prosumer investment in technologies that support customer interconnections with distribution utilities.

While the New Jersey Board of Public Utilities (NJBPU) has focused mostly on transmission and interconnection policy issues in this grid modernization stakeholder proceeding, we would like to shine a light on microgrid and distributed energy resource (DER) deployment in the BPU's comprehensive investigation into modernizing the current grid and looking towards the grid of the future. Deployment of Microgrids and DER will reduce the duration of power outages, as outlined in New Jersey A1784, and it is crucial that the BPU align work on new technologies with the recent passage of Infrastructure Investment and Jobs act of 2021 which calls greater attention towards modernizing critical infrastructure.

This moment is once-in-a-generation opportunity to spend funding dollars wisely on digitized infrastructure. However, **deploying digital will require critical policy changes** to fully realize the vision of a modern digital economy with high penetration Distributed Energy Resources (DERs). These are essential components for achieving the goal of 100% clean energy by 2050 per New Jersey's Energy Master Plan.

Current State of New Jersey's Electric Distribution System for Distributed Energy Resources (DERs):

1) The first step in transforming grid modernization will be to update government procurement practices which currently hinder grid modernization by reinforcing the entrenched analog build-out of the past. Existing procurement practices are short sighted and favor the cheapest initial cost for capital expenditures (CAPEX). The focus on the immediate needs of today, at the lowest price, preclude the resilient and sustainable improvements to meet the challenges of tomorrow.

   Consumers, government entities, and businesses will benefit immediately, and over the long term, if procurement decisions provide a level playing field which considers the long term benefits which come from a higher initial investment in in digitizing against the lower initial cost of the procuring the analog systems of the past.

   These dueling outcomes can be seen in housing policy where lower initial CAPEX to build a house with outdated windows, HVAC, and appliances will result in a lower initial purchase price for that house, but over the long term, an energy efficient house with modern energy saving technology will cost more up front but the long term savings will make the modern house more affordable and resilient over the long term.

   Further, digital improvements encompass many life cycle improvements. For example, installing sensors and communication networks allows for the collection of real time data to feed software with machine-based learning—resulting in operational efficiencies and cost-savings. The higher upfront capital investment not only provides superior technology and energy efficiency, but also saves operating costs over the lifetime of the infrastructure.

   Conversely, analog systems are severely limited. A simple example of the difference between an analog and digital system is looking at how water leaks are monitored and fixed. In an analog system, you might become aware of a slow leak between two points only after you see water where it shouldn't be. This may lead you to investigate further using old, inaccurate tools and technologies such as sound waves to track down the location of the leak, or worse still, you may have a large break that causes an emergency reaction to fix but relying on analog technologies will lose precious time. A digital water system will immediately recognize the smallest drop in pressure, pinpoint the exact leak location, and will allow for **planned, predictive, and preventive decisions** about the water distribution system. Digital systems are not only energy and cost efficient, but they also provide operating savings by preventing and diagnosing potential failures rather than being forced to react to exigent situations that create damage unexpectedly and cost much more time and money to repair

Three Recommended Rule Proposals that would Unleash Digital Solutions in Planning and Procurement of Resources to Modernize the Grid:

1) **Propose a rule that requires all new grid modernization for distribution utilities infrastructure to be digitized or digitally transformed.** Here are two alternative definitions worth considering:

   a. *"Digital infrastructure" means joint fiber-optic and wireless-based advanced information and communication technology platforms with embedded multi-functional application services that facilitate 24/7 online real-time connectivity between nodes in the operational network to allow remote management of assets.*
   b. *"Digital transformation" is a continuous process of multi-model adoption of digital technologies to fundamentally change the way government infrastructure or services are ideated, planned, designed, deployed, and operated such that they are operationally optimized for efficiency.*

2) **Propose a rule that requires all infrastructure to be digital infrastructure in capital budget investments using the above definitions for a return on investment.**

3) **Update the procurement process in New Jersey on calls for power or resources by distribution utilities from "lowest cost" to "lowest lifecycle cost."** This considers cradle to grave costs that include the operating expense (removing analog bias) over the lifetime of that infrastructure as well as decommissioning.

2) The second step in modernizing the grid in New Jersey is to amend existing legislation and regulations to allow for the deployment and development of Microgrids.

New Jersey has invested a considerable amount of funds to assess the resiliency and the role that microgrids could serve to improve resiliency. This look towards microgrids came in the aftermath of Superstorm Sandy which left 3 million people without power for extended periods of time. Yet, few of the "town square" microgrid hardening projects funded by the state have moved forward and none of these projects have been built to the point of operation. One reason for this delay is that the current statutes and rules in New Jersey do not allow low voltage DC electric lines to cross more than one right of way. See N.J.S.A. 48:3-77.1 et seq. and N.J.S.A. 48:3-51. These laws, which were originally enacted long ago, were intended to prevent independent electric generators from being built and operated inside Utility Franchises but these laws did not anticipate smart, nimble, and safe microgrids that can enhance and become a benefit to the grid in many ways. The current law and code in New Jersey remains one of the largest barriers to the deployment of Microgrids (MG), Building Energy Management Systems (BEMS), Grid Interactive Buildings (GeIbs), or EV fleet charging that runs through a BEMS or an MG. For all the "town square hardening" activities after Superstorm Sandy, microgrid deployment will remain at a standstill until the law and code are amended and modernized.

SE recommends the NJBPU adopt a rule that any DC line connected to a microgrid* 1000 VDC and below that follows the Article 490 of the NEC (2020) be allowed to cross multiple public rights of way.

When SE deploys or interconnects a fully digitized microgrid—be it at a facility, a grid interactive building, or as part of resilient fleet charging like the Brookville, Maryland 44 EV bus depot in a EaaS deployment (attached)—it is the most modern, safe, and resilient part of the entire electric grid from the retail customer up to wholesale generators.

With a few exceptions, we are connecting to an analog circuit below a substation that has no situational awareness or visibility into its customers in real-time or near real-time need, as well as no way to communicate with our digitized machine learning platform, Ecostruxure. Thus, modern microgrid safety features are a foundational component when intercoupled to most distribution utilities' analog systems.

A modern digitized microgrid system is built on the following six principals of safety by design:

1. Sensitivity—to identify any abnormal condition and immediately isolate from the main grid.
2. Fault detection—if a fault is detected in a system based on voltage, the direction of the fault zone is determined and the microgrid system disconnects.
3. Speed—in order to avoid damage to equipment and maintain stability, advanced protective relaying schemes are implemented to ensure safety is maintained quickly.
4. Cyber—security is built into the firmware to protect operational integrity
5. Redundancy—planned and referred to as backup protection which ensures a high-level of safety and operational time.
6. Reliability—by digitizing millisecond by millisecond decision and leveraging microprocessors at the device level, microgrids build a modern protection and control system reliability that supports a faster restoration of outage.

These building blocks of modern-day safety that microgrids bring to electric systems are not part of a social contract in rates on the distribution utility side of a microgrid intercoupling. Microgrids which organize unorganized distribution energy resources behind meter intercoupling are the safest part of the electrical system in any New Jersey neighborhood because of these six tenants of safety and current building electric and fire codes.

3) Direct regulation to develop technology-neutral retail rate signals based on outcomes to work with microgrids, BEMS, EV charging, and other customer-owned DERS initially in the top 200 annual hours (five days) of utilities needing capacity, offloading capacity, or ancillary services on distribution circuits.

Automated demand response is a critical component of a modern-day electric system that provides the flexibility needed to mitigate unplanned events which tax an electric distribution system.

The most efficient, economic, and resilient energy transaction is when supply and demand can meet at the closest point possible. Having a retail value for DERs in State Sovereignty to work with federally created wholesale markets represent a complete marketplace where just values can be found for ratepayers. Today's market represents only half a market signal, that being wholesale.

SE commends to you a 1/25/2022 study just released by Pacific Northwest Laboratory (PNNL) entitled *"How a Smart Electric Grid Will Power Our Future."* The report ran a simulation DERs in ERCOT. The simulation showed that if a transactive energy system were deployed on the Electric Reliability Council of Texas (ERCOT) grid, peak loads would be reduced by 9 to 15 percent. That savings could translate to economic benefits of up to $5 billion annually in Texas alone, or up to $50 billion annually if deployed across the entire continental United States. The savings would equal the annual output of 180 coal-fired power plants nationally. (released 1/25/22 link here https://www.pnnl.gov/newshttps://www.pnnl.gov/news-media/how-smart-electric-grid-will-power-our-futuremedia/how-smart-electric-grid-will-power-our-future)

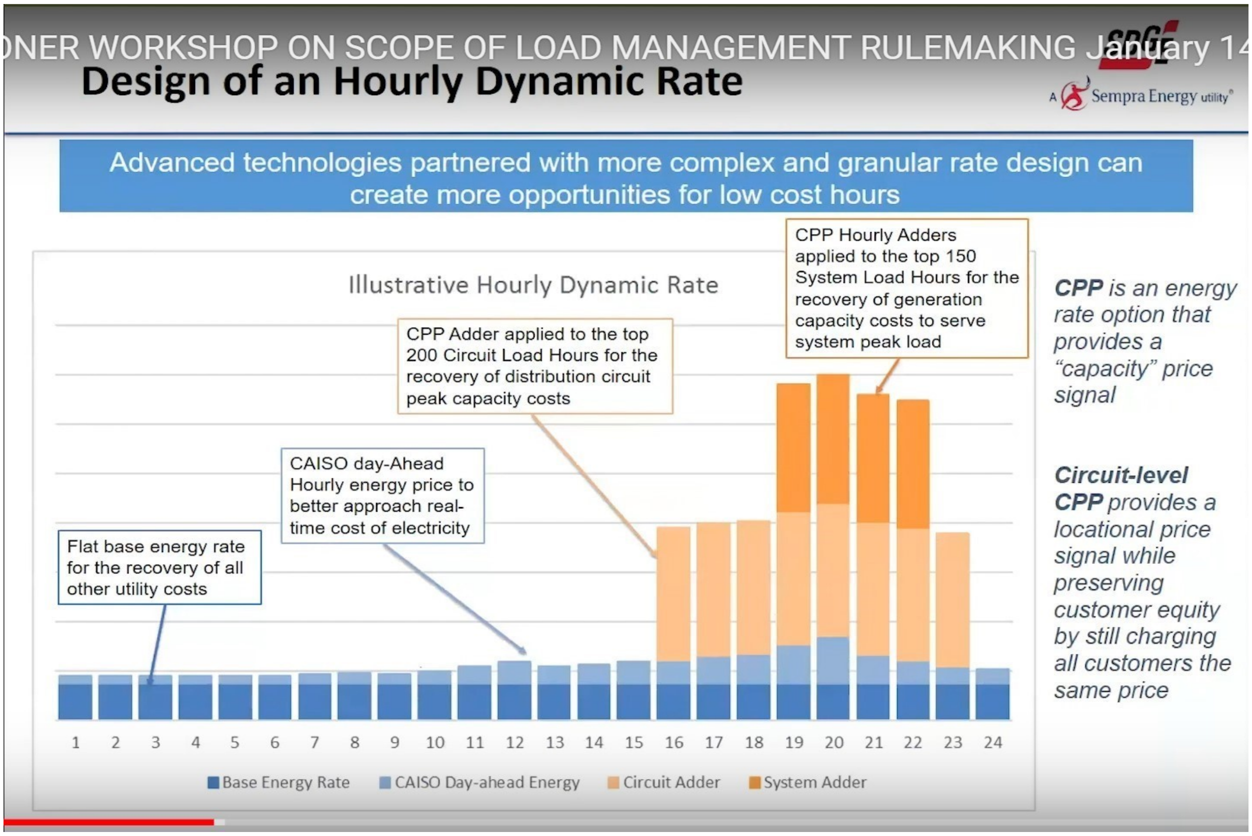
Having PNNL run a specific simulation for New Jersey would be rich with data for this proceeding as well as other ratemaking actives.

Three Policy Changes to Unleash a Resilient, Modernized Grid:

1) Any electric grid modernization funds allocated to be spent by regulatory bodies including the NJBPU should be focused on digitizing circuits between distribution substations and customers by distribution utilities.

When creating the optimal energy efficiency systems by deploying microgrids, installing building energy management systems (BEMS), or developing optimized fleet EV charging networks, these systems are fully digitized and safe electrical environments connecting to an analog distribution circuit on the other side of the meter intercoupling.

Because utilities are unable to "see" what is happening in real-time, they are unable to take advantage of the optimization that can be extended by customers to other ratepayers on that same utility distribution circuit. An initial step would be to target amalgamated distribution peaks in the first 200 hours of needing capacity, taking capacity, or ancillary services. However, the ultimate goal would be the first 200 hours of peak on each substation circuit feeder as this is where the highest locational value is for resiliency and economics. The feeder/circuits below a distribution substation only align about a third of the time with distribution peaks. We have included a slide from a San Diego Gas and Electric (SDG&E) presentation to the California Energy Commission as they have digitized their distribution system to see this real-time value.



2) Adopt performance-based regulations for distribution utilities to earn a return.

The 1800's rate of return or cost of service business monopoly regulatory model needs to be updated to this century's technology. As opposed to cost-of-service regulation, where utilities have an opportunity to earn a return on capital investments, performance-based regulation (PBR) allows utilities to earn a return based on their achievement of specific metrics.

PBR recognizes the efficiency that digital technology can deliver today. It also reflects what customers in a rate class want from their distribution utility—reliability, better customer service, lower rates, or many other values that they can articulate in outcomes measured by PBR.

Reference: Please see attached an overview of the Brookfield microgrid backed Energy as a Service deployment.