7/24/24 – Comments
Grid Modernization
Docket QO21010085

Thank you for the opportunity to provide comments on Grid Modernization (email from BPU 6/4/24 referencing amendments, and scope, as an example, specifically as extracted[1] from a proposed document at the BPU docket). The background for these comments are in an endnote[2].

DG & EV Maps[3] available for several NJ electric utilities including JCP&L, PSEG, and AEC were examined via the following link:
https://www.energy.gov/eere/us-atlas-electric-distribution-system-hosting-capacity-maps

A simple, homegrown, non-expert model of local electrical distribution line capacity to support Building Electrification was developed based on several variables and applied to two example local distribution lines in the Red Bank, NJ area[4]. While subject to limitations and assumptions that may in turn be subject to change or correction, the model tends to demonstrate that existing example local distribution line capacity can exhaust when subject to Building Electrification growth, expected over the coming years.

With this context, here are comments on Grid Modernization.

1. **The BPU should require public Building Electrification capacity maps for all local distribution lines from all NJ electric utilities no later than 2025.**

   Building Electrification is going to be a substantial driver of NJ electricity consumption in the coming years for essentially every local distribution line. There are many electric growth drivers expected soon; these include Electric Vehicles, electric heat pumps for space heating and water heating, electric ranges, electric dryers, and other electric replacements such as for pool heaters and fireplaces (e.g. replacing gas logs). Just the growth in EVs alone will drive substantial increased capacity; many are in-use already. The NJ Governor has called for substantial building, transportation and clean electrification in Executive Orders. The PJM has published charts from multiple utilities demonstrating rapid electric growth over the coming years.

   The Building Electrification map should list, for each local distribution line down to each local transformer, the current capacity available, expected growth rates and demand by year, and how the local utility will meet this demand by year, e.g. grid upgrades where needed. Solar growth, normal electric growth and electric conservation should also be accounted for, among other factors.

2. **The BPU should require that the public BE capacity maps above drill down to every local distribution line and transformer[5].**

The DR & EV maps at the referenced utility websites do not indicate what the BE capacity is. In the public maps, the BPU should require utilities to make clear how much of the remaining capacity is devoted to BE vs fast EV chargers, vs solar capacity.

3. **The BE maps should factor in all aspects of the forthcoming Smart Grid[6]. Smart Grid technologies and concepts most likely are needed to reduce overall winter peak hour electric demand[7].**

   Examples of items that need to be covered in the public BE maps and associated utility and BPU documentation include Grid-interactive Efficient Buildings (GEB)[8], Vehicle Grid Integration[9], electricity storage, smart control over appliances, smart meters, smart panels, automated panel control to limit appliance output and enable appliance switching, time of day charging, transformer upgrade paths, etc.

   The BPU website[10] gives an idea of the smart grid, but no detail of what is actually happening or needs to happen statewide or by utility. There are no links to each utilities plans, actions, schedules, nor utility budgets by year shown. Little to nothing was found for select utilities, e.g. other than smart meters[11]; a large utility capital program did not obviously list any of the above.[12]

4. **The BE maps should also model weatherization initiatives, including projected impact by local distribution line. Likewise, the conversion of resistance electric heating to "cold climate" heat pumps should be covered.**

   To control overall winter peak electric demand, NJ most likely needs to make a large investment in weatherization and resistance heating conversion to "cold climate" heat pumps. Assistance is especially necessary in LMI communities in order to assist these communities to make the BE transition.

Robert Erickson
(affiliated with several NJ GHG reduction teams)

---

1 EXTRACT from BPU docket document: "N.J.A.C. 14:8-5.11 The Board is proposing new N.J.A.C. 14:8-5.11 to ensure consistent calculation methodologies and presentation of available hosting capacity across all EDCs. The proposed rule sets forth required EDC tariff filings, the information an EDC must make available on its website, and how often the EDC must update information posted to its website. Providing more consistent and timely hosting capacity information, in addition to, systematic tracking and analysis of process management data, should facilitate higher DER adoption rates and inform more proactive and focused system upgrade investments."

2 As the BPU, these electric utilities, the NJ state government and even the fossil fuel industry and utilities well know, Building Electrification and Transportation Electrification is an essential imperative to eliminate fossil fuel usage in residential, commercial, and transportation sectors. With the forthcoming use of 100% renewable electric, New Jersey

would be taking this necessary step towards ameliorating the worst effects of global warming due to fossil fuel production and burning, which results in carbon dioxide and monoxide build-up in the atmosphere, and where 200+ years of damage from American and world wide industrialization, transportation, and fossil fuel consumption needs to be quickly reversed.

3 https://www.energy.gov/eere/us-atlas-electric-distribution-system-hosting-capacity-maps

4 The simple homegrown model makes of JCP&L EV and Solar capacity maps, and treated two specific local distribution networks in the Red Bank, NJ area. It uses two source paradigms for Building Electrification. One paradigm included aggregation of specific electrified appliances including use of specific "cold climate" heat pumps, electric range, electric dryer, and Electric Vehicles, relying on specific examples. Representative hours, use duration, and consumption were assumed for each appliance. Another paradigm converted all natural gas usage spanning several thousand representative gas residences (as provided by a gas utility to their customers) to electric consumption using a specific conversion based on data for a "cold climate" electric heat pump. In both cases, an "average" residence was assumed. Both paradigms came within 5% of each other, but this could also be partial coincidence. Then, a peak electric demand winter "coldest" hour at 19F was computed (the reason for the 19F was available real 2024 winter data for an actual "cold climate" residential heat pump). The difference between the peak winter hour and an estimated recent existing summer peak electricity hour (hottest) obtained on recent July 2024, days exceeding 90F was obtained to represent the peak increase due to Building Electrification. This increase was substantial, i.e. the projected winter peak electric hour use (even with cold climate heat pump) is far greater than the peak summer AC use. Its also assumed that the utility must account for extreme weather events in its generation and grid engineering, and that therefore the utility modeling, budgeting, plans and build out must account for extreme days below 19F and above 95F; these extreme days were NOT accounted for in this modeling (note that the coldest days/hours are no longer nearly as cold as they were in the 1980's). Wind chill was also not accounted for (nor its companion, the extent of weatherization which itself is dependent on the demographics of the age and characteristics of the subject buildings, which for these example distribution lines, basically mostly ranges from the fifites to the eighties so would not represent today's best insulation standards). It follows that peak winter electric demand for full Building Electrification will be even greater than what the author found at 19F, making the Building Electrification maps by local distribution line and transformer even more important. The modeling was not helped by the apparent lack of public grid information; a comment above. The model had to rely on either the EV or the DR maps, which may not represent the actual capacity available for BE, nor represent the interplay of the factors of EV fast chargers, solar, and BE, nor, general electric growth aside from BE nor energy conservation. The models excluded consideration of growth in solar panels, weatherization, energy conservation, changed consumption patterns, partial Building Electrification, electric HVAC strips, spot electric heaters, commercial buildings, schools, and churches (the example electric networks actually did not have any churches), and street/traffic lights. Known all electric residences, which may mainly use inefficient resistance heating, were also excluded. These may even represent substantial electric savings if converted from resistance heating to "cold climate" heat pump heating, which some residents may already have done. All of these factors need to be accounted for in actual refined models produced by electric utilities.

5 The "dots" shown on the DR & EV capacity maps do not make it clear these are electric transformers or their locations. Rather, the author imputes that this is the case based on their locations on the maps and the way the capacity information is presented. The utilities need to make clear what these dots are, and ideally, fix and identify the specific locations, ideally indicate subtending structures, and include location transformer identifiers, including the model, age, and rated capacity along with current actual peak summer and winter hour use of each transformer. Where missing, the utilities need to include the actual distribution line ID number. One utility seemed to provide the distribution line identifier, while two other utilities apparently did not, but two utilities seemed to have more detail than the other. In short, the existing maps, and the popups, need improvement in the author's view.

6 https://www.smartgrid.gov/the_smart_grid/#smart_grid

7 That is, for the coldest hour, which the homegrown model implies generates a substantial electric peak demand if there are no focused technologies to control it.

8 https://www.energy.gov/eere/buildings/grid-interactive-efficient-buildings

9 https://www.energy.gov/sites/default/files/2024-07/future-of-vehicle-grid-integration.pdf

10 https://www.nj.gov/bpu/about/divisions/opp/smartgrid.html

11 https://www.firstenergycorp.com/help/smart-meters/nj-smartmeter.html

12 https://www.firstenergycorp.com/newsroom/news_articles/jcp-l-unveils-largest-ever-infrastructure-upgrade-investment-pla.html