New Jersey Resources

November 15, 2019

Via Electronic Submittal: emp.comments@bpu.nj.gov

Charles Teplin
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RE: IEP feedback

Dear Mr. Teplin:

Thank you for giving New Jersey Resources (NJR) the opportunity to comment on the Rocky Mountain Institute's (RMI) draft Integrated Energy Plan (IEP) that was released for comment on November 1, 2019.

NJR also appreciated the opportunity to participate in RMI's stakeholder meetings held in June 2019 and October 2019.

The RMI modeling released to the public does not provide sufficient information to fully understand either the methodology or the full results of the study. In order to provide a detailed assessment of the results, RMI would need to provide additional data on the assumptions and inputs used in the modeling.

NJR believes that in addition to sharing the data that informed these modeling results, a full ratepayer impact study is needed and should be made available to the public before any potential pathway is defined as the "Least Cost" case. Additional questions and concerns regarding the cost calculations are provided below.

NJR strongly recommends that to best serve ratepayers during the clean energy transition to 2050, New Jersey should avoid locking into one decarbonization pathway solely focused on electrification strategies. Instead, a strategy offering multiple solutions should be developed to prove a more cost-effective, long-term approach as technologies emerge and advance.

For example, given the opportunities to utilize biofuels in the existing natural gas infrastructure, which is acknowledged in the IEP as an alternative to support clean power generation, we strongly recommend that RMI broaden the clean energy solutions it has modeled for the building sector beyond just electrification.

The State's success in achieving the ambitious clean energy goals for New Jersey as outlined in the draft Energy Master Plan (EMP) and in the IEP, will lie in the acknowledgement that we will need a variety of solutions in all market sectors to reduce emissions and fully achieve an affordable, reliable transition to a low-carbon future by 2050.

Building Decarbonization

The starting assumption by the RMI pathway analysis is that building retrofits lead to 90 percent electrification of residential and commercial buildings by 2050 with a rapid transition to electric beginning in 2030.

Among RMI's reported findings is that retaining gas use in buildings produces no major changes in the estimated total costs compared with the "least cost" scenario until 2040, at which point "retaining gas use" is *a lower-cost option*. Only after 2047 does the "retaining gas in buildings" scenario exceed the "least cost" scenario after costs rise very quickly. The reason for the abrupt cost increase in the final years is unclear.

To engage in a substantive way on the important issues guiding the pathway to New Jersey's 2050 goals, NJR partnered with ICF in 2018 to conduct an extensive, year-and-a-half long study on different strategies to align with and meet New Jersey's clean energy goals.

ICF provided data that shows New Jersey can achieve an 80 percent reduction in emissions from 2006 levels by 2050 focusing on GHG emissions reductions rather than fuel choice. By sequencing GHG reduction policies, this approach would minimize cost impacts to consumers while taking advantage of expected improvements in technologies.

Natural gas customers in the ICF scenarios are converted to a *mix* of high-efficient heating technologies, including hybrid electric heat pump-natural gas furnace systems and targeted building electrification, using natural gas to reliably meet heating needs on the coldest days.

In addition, further emissions savings are achieved in the building sector by reducing the carbon intensity of natural gas through renewable natural gas (RNG) and the development of other new technologies, including carbon capture and Power-to-Gas, to produce green carbon.

The RMI analysis does not evaluate the technical merits or cost-effectiveness of these other solutions to reduce emissions from buildings.

The RMI "Retain Fuel Use in Buildings" scenario does not include building retrofits to electricity or include any electrification target. According to the RMI analysis, the "Retain Fuel Use in Buildings" variation reaches the emissions goals at roughly the same cost as the "Least Cost" scenario. Building sector emissions are higher, and are offset by additional biofuel use in the transportation sector. RMI rejects this case based on: "Not pursuing building electrification avoids some electric T&D incremental costs but relies on higher consumption of expensive biofuels. Poor foundation for carbon reductions beyond 80x50." (Slide 45).

The RMI Variation #3 "Retain Fuel Use in Buildings" does not appear to be an energy efficient scenario. Even though the assumptions for this variation (Slide 14, line E4) suggest that the most efficient electricity technology is included in the case, Variation #3 does not appear to take advantage of improvements in natural gas energy efficiency, or incorporate higher efficiency technologies such as gas heat pumps and hybrid gas/electric heating systems. Based on the chart on page 39, natural gas demand in this variation declines by a minimal amount (about 10 percent) between 2020 and 2050, well below even a nominal level of incremental efficiency improvements.

The failure to consider higher efficiency natural gas use leads to increased emissions and higher costs from the building sector. It also requires additional expensive emissions reduction efforts in the transportation sector to meet the emissions reduction target.

And, despite the fact that the "Retain Fuel Use in Buildings" scenario does not appear to be a reasonable representation of a "Retain Fuel Use in Buildings" scenario, it still appears to be roughly the same or lower cost than the "Least Cost" scenario over the 2020-2045 time period. (see chart 44). While the costs are moderately higher than the "Least Cost" scenario in 2050 due to the rapid increase in biofuel use for transportation at the end of the analysis, a reasonable level of energy efficiency would likely offset these cost increases.

The comparable results of the RMI "Retain Gas in Buildings" scenario to their "Least Cost" scenario creates a strong argument for delaying any decision to promote electrification of New Jersey's building stock. Even in the RMI case, any benefits from building electrification will not be seen until after 2045. However, moving away from using gas in buildings requires a fundamental restructuring of the energy system in the state with increased costs and uncertain environmental and reliability benefits.

If by 2035 or 2040, it appears that 1) Building electrification is necessary; and, 2) The electric grid can handle the increased winter load, then it may become appropriate to start promoting building electrification.

Reliability Risks

At the same time, NJR believes that the building electrification policy promoted as the "Least Cost" approach to mitigate climate change by the RMI study would lead to significant potential risks to New Jersey consumers.

Rapid increased building electrification would turn New Jersey's power system into a winter peaking system that would rely heavily on renewable power. The ability of a renewable power grid to meet these kinds of winter load is still unproven, especially with the proposed level of renewable energy that would be part of the energy mix.

In addition, reducing reliance on natural gas to generate electricity will significantly decrease the resiliency of the New Jersey energy system, which could have significant financial and human costs associated with the energy system failing during a peak winter event.

The RMI "Least Cost" scenario requires the size of the electric grid to more than double. Monthly peak demand increases from about 14GW in 2020 to about 32GW in 2050. (Slide 28). The costs provided by the study seem extremely low to support this type of electric grid expansion. Additional information about the cost assumptions and input into their modeling should be provided to the public by RMI.

The RMI "Least Cost" scenario increases the amount of power generation capacity in the State by 350 percent, from about 19 GW to about 74 GW. And, natural gas generating capacity in the State increases from about 16 GW to about 21 GW.

The RMI "Least Cost" scenario changes the nature of the electric grid from summer peaking to winter peaking, which will change the issues and costs associated with system reliability in the future. Specifically, under the RMI "Least Cost" scenario, the electricity peak demand in the winter goes from approximately 20 percent below summer peak to 33 percent higher than summer peak.[1]

In 2050, solar, offshore wind and battery storage account for 66 percent of total in-state generation capacity. Solar alone is 43 percent of total capacity. In a recent cold snap in New England, over a single day, snow cover and clouds fully eliminated solar power plant output. On that same day, wind output was also very low and only generated about 10 percent of what their wind turbines could have produced (see Figures). If electric batteries were exhausted, and if this occurs in New Jersey, the State would lose nearly 66 percent of its capacity, and would need to conduct rolling black-outs, or incur more costs than shown here.[2]

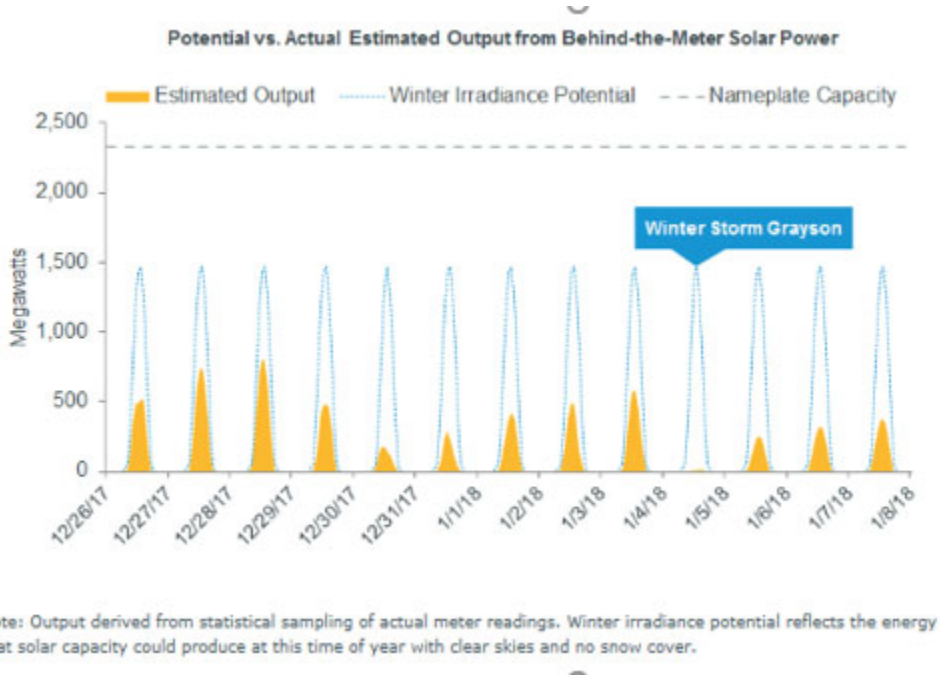
RMI should demonstrate how New Jersey will meet peak electricity demand and maintain critical heating loads during cold days. RMI also does not address how the "least cost" scenario compensates for the lower resiliency by going from two main energy delivery systems for meeting winter energy peak to one system.[3] This diversification cannot be obtained via electrical supply alone. RMI also does not address the greater costs to customers of winter outages compared to summer outages which would likely increase reserve requirements.

[1] In 2020, the expected summer peak is approximately 14 GW versus winter electricity demand peak of 11 GW. In 2020, the summer peak is 24 GW versus the winter demand peak of 32 GW.

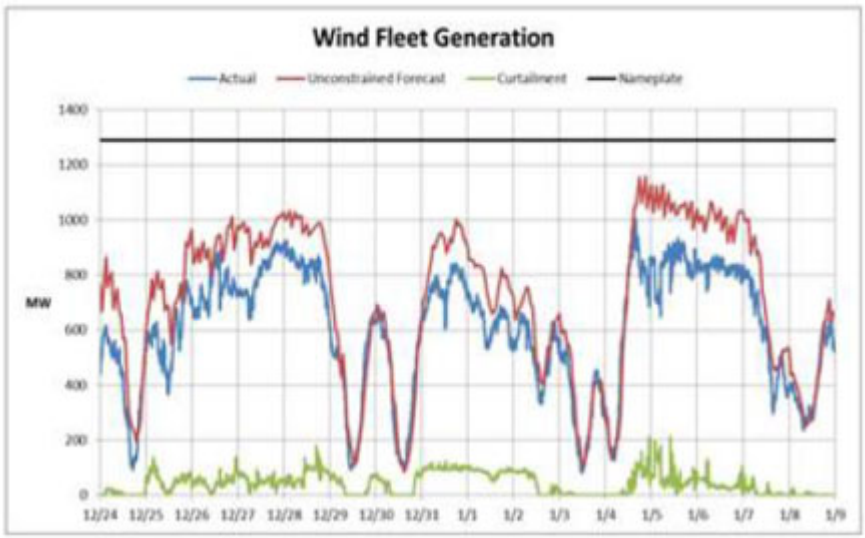
[2] Expected (i.e. the 50:50 case) peak would exceed capacity by approximately one third (shortfall equals 32-24 or 8 GW and the thermal generation is 24 GW). The shortages could be much higher. This is because during the cold snap, electricity demand might be significantly greater than the expected level and might be closer to 90:10 demand levels. Also, outages can also occur at thermal plants e.g. 8% decreases supply by 2 GW. New Jersey might be able to rely on imports, but if other states pursue similar policies, and/or similar events are occurring elsewhere on the grid, New Jersey would not be able to import and or have so little thermal capacity.

[3] Resiliency refers to the ability to withstand unlikely natural or man- made events that damage infrastructure.

ISO NE Solar Output During Two-Week Cold Snap[4]



Note: Output derived from statistical sampling of actual meter readings. Winter irradiance potential reflects the energy that solar capacity could produce at this time of year with clear skies and no snow cover.



Costs

Characterizing the costs of the energy transition in New Jersey between now and 2050 as "small" as compared to the State's total annual energy system costs is misleading, particularly for ratepayers. The incremental energy system costs to meet the emission targets are

[4] http://isonewswire.com/updates/2018/4/25/winter-20172018-recap-historic-cold-snap-reinforces-findings.html

significant, amounting to about $16 billion in 2050. Avoided costs are primarily due to reductions in petroleum use; only a small share is attributable to natural gas.

As noted above, a ratepayer impact analysis must by conducted before characterizing the cost or affordability of the modeling results.

Electrification of natural gas in residential and commercial buildings would also result in a significant decrease in the number of customers connected to the natural gas distribution system, and a significant decline in natural gas throughput on the system. These changes would result in a material shift in natural gas distribution system costs to the remaining gas utility consumers, which would include the remaining residential, commercial, and industrial sector customers. The RMI analysis does not appear to account for these costs, which could be significant to those customers.

NJR is concerned that the "Retain Gas in Buildings" scenario implemented by RMI does not consider alternative cost-efficient approaches to reducing GHG emissions in the building sector, without forcing natural gas customers to electrify. As a result, the RMI "Least Cost Approach" seems likely to be more expensive and less effective than policy approaches based on improving efficiency of natural gas use in buildings rather than forced full electrification of buildings.

Conclusion

NJR supports a multi-solution strategy to achieve emissions reduction goals outlined in the draft EMP. We believe this approach is the most effective and affordable path for all sectors of the economy that must lower emissions – including the building sector.

Currently, in the draft EMP and the IEP, there is a single solution for the building sector – aggressive electrification.

However, the decarbonization solutions for the building sector that are rapidly evolving are so much broader than just electrification.

NJR would like the opportunity to work with New Jersey Board of Public Utilities and RMI to develop the most affordable and resilient path forward to achieve critical emissions reductions for the building sector.

There is untapped opportunity to leverage renewable natural gas from waste streams to reduce and reuse harmful methane emissions. Based on an independent study commissioned with ICF, Renewable Natural Gas has the potential to account for 20 percent of total residential and commercial gas distribution system volumes in New Jersey; and would move through an existing pipeline network already paid for by New Jersey consumers.

A new study presented by SoCalGas in California shows that replacing less than 20 percent of the traditional gas supply with Renewable Natural Gas, captured from sources like wastewater

treatment plants and landfills, can achieve emissions reductions equivalent to converting 100 percent of buildings to electric-only by 2030. Using a mix of in-state and out-of-state Renewable Natural Gas is 3 times more cost-effective in reducing emissions than an electrification pathway.

The development of Power-to-Gas technology to create green hydrogen also has great potential. It is gaining momentum like solar did a decade ago. As the amount of electricity generated each year by wind and solar increases, intermittency of these sources will pose major seasonal imbalances between load and generation and Power-to-Gas technologies can play a part to improve efficiencies.

Power-to-Gas can leverage any overproduction of electricity to separate hydrogen from water in a process called electrolysis. Hydrogen can be used directly in cars and buildings, blended in the natural gas distribution system to reduce the carbon content of natural gas, or be mixed with carbon dioxide to create carbon-neutral synthetic fuels.

RMI has made the following observations: “Hydrogen is the new kid on the block of low-carbon alternatives, with applications in mobility, industrial processing, and heavy transport. It can also be used to provide electricity and heat, and can be blended with natural gas to help decarbonize existing natural gas grids.” RMI went on to state: “This is not winner-take-all. The energy transition will be a blend of alternative fuels and electrification.” NJR agrees with RMI on these points.

In Bloomberg’s 2019 Study “Hydrogen: The Economics of Production from Renewables; Costs to Plummet,” the following statement is made: “If the world is serious about decarbonization, it will need hydrogen. Electricity provided just 19 percent of final energy demand in 2017, and although this could increase... in a deeply decarbonizing world, there are many sectors of the economy that electrons cannot serve. Hydrogen offers a solution to lower emissions in hard-to-decarbonize sectors [industry, heavy transportation, buildings] at moderate additional costs.”

Depending on the approach taken with New Jersey climate change policy, existing natural gas infrastructure can play an important role to increase resiliency, significantly lower costs and facilitate the use of new renewable technologies to aid the State in reaching its clean energy goals.

Maintaining the long-term value of the natural gas assets, which the state’s residents and businesses have already invested billions of dollars in, will ultimately help drive down clean energy costs borne by our energy customers.

Sincerely,

DocuSigned by:

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Amy Cradic
Vice President, Government Affairs & Policy