State Of New York Department of Public Service Case 19-G-0678
Proceeding on Motion of the Commission to Investigate Denials of Service Requests by National Grid USA, The Brooklyn Union Gas Company d/b/a National Grid NY and KeySpan Gas East Corporation d/b/a National Grid.

Personal Comments on Synapse Report

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April 17, 2020

Introduction

I previously submitted comments on the project alternatives presented by National Grid and the energy efficiency assumptions used by National Grid. Subsequently the Eastern Environmental Law Center submitted a report by Synapse Energy Economics that they sponsored entitled "Assessment of National Grid's Long-Term Capacity Report: Natural gas capacity needs and alternatives" (Hereinafter the "Synapse Report"). These comments address the analyses and conclusions of that report.

I am a retired utility meteorologist with nearly 40 years experience analyzing the effects of meteorology on electric and gas operations. The opinions expressed in this post do not reflect the position of any of my previous employers or any other company I have been associated with, these comments are mine alone. I am commenting because I worry that depending on demand side solutions will end badly.

Background

"It is hard to imagine a more stupid or more dangerous way of making decisions than by putting those decisions in the hands of people who pay no price for being wrong", Thomas Sowell.

The Synapse Report was prepared for the Eastern Environmental Law Center, a 501(c)(3) non-profit public interest environmental law firm located in Newark, DE that works on "on behalf of environmental and conservation organizations to protect communities, open space, wildlife, and the natural heritage and public health of the eastern United States for generations to come". Synapse Energy Economics located in Cambridge, MA has a staff of 30+ that "includes experts in energy and environmental economics, resource planning, electricity dispatch and economic modeling, all-sector emissions modeling, energy efficiency, renewable energy, transmission and distribution, rate design and cost allocation, risk management, cost-benefit analysis, environmental compliance, and both regulated and competitive electricity and natural gas markets". I believe that Mr. Sowell's quote is applicable because there are significant risks if the State and National Grid get natural gas supply wrong on the days when people must have heat. Neither organization will have any culpability if their belief that "it would be arbitrary, capricious and against the public interest to select NESE as a solution for meeting long-term demand" ends up leading to a natural gas shortage that affects heating.

The Synapse report concludes the following:

- The supply gap most likely does not exist
- National Grid has multiple cost-effective demand-side options to meet any foreseeable need
- National Grid's analysis of long-term capacity options is not compatible with New York's climate change policies

I address each conclusion below.

Supply Gap

The section entitled Description of National Grid's Baseline Demand Forecast In the Synapse Report discusses historical design day demand referencing "Natural Gas Long-Term Capacity Report Technical Appendix to the Capacity Report issued on April 1,2020". However, the Technical Appendix Revised 04/01/20 available at the National Grid long term solution website does not include any historical data.

Consequently, I was not able to compare Synapse historical demand day growth rates (page 6) with work that I did in my energy efficiency comments submitted on April 15, 2020. Synapse report Table 2 purports to show "historical" data but because of year to year variability in load due to weather using a year to year comparison can be mis-leading.

Sowell's quote that than by putting decisions in the hands of people who pay no price for being wrong can be extended to not regarding commentary from people and organizations who pay no price for being wrong. On page 10 there is a comment that illustrates that point: "While a moratorium may not be appropriate or feasible, slowing customer growth, especially for firm heating service, could have substantial capacity benefits." Given the history of this proceeding the reference to the moratorium in that statement is wholly inappropriate.

On Page 10 the text states

> "Table 4 above highlights another notable point: a 13.1 percent decrease per year in the temperature-controlled customers. This means that this cohort of customers are essentially gone by 2035. If National Grid wishes to control design day loads, then it should retain these customers and even expand the number of such customers. By assuming in the Baseline that these customers essentially all convert to full gas service, National Grid sets up a case where demand-side adjustments are required to compensate. Temperature-controlled customers are demand response customers that are required to switch from gas to an alternate fuel when the temperature drops below a pre-set level (e.g., 16 Degrees Fahrenheit). This customer group consists of multi-family (85%) and commercial (15%) customers per the footnote to Table 4 of the Capacity Report."

I believe that this comment can be disregarded. National Grid cannot retain these customers because the alternate fuel option is oil which if not phased out due to New York City regulations will likely be phased out for the CLCPA.

On Page 14 a section entitled Design Day calculation issues starts. The analysis is useful inasmuch as it calculates that "a design day temperature of 3 degrees, for example, would reduce the design load by about 107 MDth/day for the 2019/20 season. This represents 3.8 percent of that load." In my amended comments submitted on March 27, 2020, I stated that:

> I am a meteorologist so I checked the representativeness of the 0° Fahrenheit in Central Park criterion. I used the Northeast Regional Climate Center CLIMOD 2 data portal to download Central Park daily minimum, maximum and average temperature data from 1869 to the present. Over that period the lowest daily average temperature was -5.5° Fahrenheit and there were six other days with daily average temperatures less than or equal to the 0° Fahrenheit design day criteria. Note also that on December 30 and 31, 1917 there were two days with average temperatures below 0° Fahrenheit in the midst of a seven-day period with daily average temperatures less than 10° Fahrenheit. I also evaluated hourly meteorological data for two NYS Mesonet stations (Rush and York sites from December 29, 2017 to January 8, 2018. In that period the temperature did not get above freezing and on January 6, 2018 the average temperature was 0.8° Fahrenheit. Based on my meteorology background and despite the fact that the most recent date with an average zero degree design day temperature in Central Park was 15 February 1943, I believe the weather conditions that caused a 0.8° Fahrenheit average

day near Rochester in 2018 support the continued use of the 0° Fahrenheit in Central Park criterion. Because 85% of the Design Day capacity is used for heating this design day criterion may not be stringent enough and certainly should not be adjusted upwards.

Given the small change in design day affect I see no reason to modify the design day criteria.

In addition, Footnote 21 on page 15 of that section states:

> "We obtained historical daily high and low temperature data from the National Oceanic and Atmospheric Administration (NOAA) from 1920 to the present (National Climate Data Center, https://www.ncdc.noaa.gov/cdo-web/search; Central Park weather station). We took the simple average of the high and low to calculate the approximate HDD requirement based on 65 degrees. We then extracted the highest HDD value for each year, corresponding to the coldest average day. One thing of note is that our calculated average temperature for 1934 is lower than the daily average used for the design day calculations. We believe this is because our simple average of high and low temperatures does not correctly capture the hourly averages (hourly temperatures for the full historical period are not available)."

For the record, in 1934 the Central Part temperature readings were once-daily readings of a maximum-minimum thermometer. They did not take hourly observations so their explanation is incorrect. I used the Northeast Regional Climate Center CLIMOD 2 data portal because it includes Central Park daily minimum, maximum and average temperature data from 1869 to the present. The average temperature listed is the average of the minimum and the maximum in this data set. Finally, note that on February 15, 1943 the data I used list the maximum temperature as 8° F and the minimum temperature as -8° F so the average was 0° F which makes that the most recent date that the design day criterion was met not February 9, 1934 as listed in the Synapse report.

On Page 16 there is a discussion of natural Gas design hour issues:

> "National Grid indicates that one reason for using a stricter design day weather standard is to account for hourly variability in gas use. Inflating the design day demand forecast causes National Grid to hold more gas delivery capacity, and it provides a buffer in the event that pipeline operators put restrictions on hourly gas deliveries. However, this is a very imprecise approach to the problem and creates the risk that National Grid will contract for more gas supply capacity than it actually needs. It would be better for National Grid to quantify its Design Hour requirement and compare this to the hourly flexibility that will be available from all upstream and on-system gas supply resources."

My first impression is that these arguments likely should not apply for the worst case. In that instance I prefer a conservative approach. Given that National Grid has a responsibility to provide natural gas when it is needed most and Synapse was paid to find faults without any regard to responsibility, I believe that this argument is weak.

Demand-Side Resources

The Synapse report claims that National Grid has multiple cost-effective demand-side options to meet any foreseeable need. They base that on their expectations for energy efficiency, demand response, and alternative energy systems such as heat pumps.

Energy Efficiency

My amended comments submitted on March 27, 2020 noted that New York had extensive energy efficiency efforts in place during the time that demand growth increased 2.4%. As a result, the easiest and most effective, aka low hanging fruit, energy efficiency projects have already been implemented. Any future reductions will not be as cheap or effective.

I submitted comments on the energy efficiency sections in the National Grid report on April 15, 2020. I concluded that I the best statistic to evaluate recent energy efficiency performance is gas use per customer measured as the change over the last five years relative to the five previous years. Using data from NYSERDA Patterns and Trends - New York State Energy Profiles: 2002-2016 I showed that the residential and commercial sectors gas use per customer went up despite on-going energy efficiency efforts during that period. Based on that analysis I think that National Grid's high-demand (80% of future efficiency targets) and low-demand scenario (100% of future efficiency targets) bounds to their analysis and the feasibility of the no-infrastructure project option for incremental energy efficiency over-estimate the amount of energy efficiency reductions to be expected.

To date energy efficiency effects have been tested against arbitrary goals. Make no mistake trying to evaluate the effectiveness of energy efficiency is difficult because the effects of weather, number of customers and the economy are likely as large as the effects of energy efficiency programs. My review of energy efficiency effectiveness reveals a mixed bag of results. My point is that in this instance Synapse claims that energy efficiency programs will lower demand enough to replace alternatives that we know will work with a margin of safety. Given that adequate heating is literally a matter of life and death I think the Public Service Commission mandate to ensure access to safe, reliable utility service means that reliance on energy efficiency is inappropriate.

Customer demand response

The ability of demand response to shave peak summer electric demand is a cherished belief of "smart" grid advocates like Synapse Energy. In theory it sounds great but in practice we do not know if the public will willingly forgo comfort and choice to markedly reduce the summer peak to the point where peaking resources are much less critical to reliability. The Synapse report accepts the National Grid analysis of demand response peak impacts but I do not. There are significant differences between the winter peak and the summer peak. In the summer the diurnal temperature cycle means that shifting between uses (A/C is not as large a component of total load) and times (when the sun is down cooling load needs drop significantly) suggests that peaks can be reduced. However, when 85% of your load is heating and the diurnal heating load cycle does not vary as much as the summer cooling cycle, how can you shift the load? Therefore, I do not believe that any of the demand response load expected reductions should be considered viable alternatives to a proven technology.

Electrification

The Synapse report claims that National Grid's electrification estimates are overly conservative and that more reductions in natural gas use should be expected. I think that National Grid's heating electrification estimates are too high because the preferred retrofit alternative is air source heat pumps.

I believe that there are significant problems with plans for widespread air source heat pump implementation. In my 9/16/2019 filed comments on Resource Adequacy Matters, Case 19-E-0530, I included an analysis in an appendix entitled Air Source Heat Pumps that demonstrated the fundamental flaw with this technology. In short, when the temperature drops below 20° Fahrenheit there simply is not enough energy to be transferred and converted to heat for the technology to work. In the event of a seven-day cold snap like the one that occurred around New Year's Day 1918 or the more recent period around New Year's Day 2018, anyone without a supplemental heating technology would not be able to get sufficient heat their living space. The most likely supplement heating source available to respond is electric resistance heaters. However, even if the heaters were available, the increased electrical load needed to provide sufficient heat could lead to unprecedented peak loads which could, in turn, lead to even more problems. Claims that improved air source heat pumps will solve this problem are unwarranted absent repealing the laws of physics

In the final analysis, the problem is that natural gas works well for heating and cooking, it is cheaper, more resilient (if the power goes out customers can still get heat), and it does not require a backup heating system so it is the preferred alternative. The presumption made by Synapse that electric heat would be preferred to natural gas assumes that the public will willingly choose a more expensive and less effective energy solution.

New York Climate Change Policy

The Synapse report concludes that National Grid's analysis of long-term capacity options is not compatible with New York's climate change policies. Ideally the National Grid long-term capacity options could be evaluated relative to New York's plan to implement the Climate Leadership and Community Protection Act (CLCPA). However, there is no CLCPA plan now and one will not be available for several years. The presumption is that the CLCPA targets can be met but that is not assured until a plan is prepared. Moreover, there is a timing issue inasmuch as the natural gas supply constraints in 2034/2035 and the CLCPA target for GHG emission reductions is 2050. Finally, the focus of the Synapse report is exclusively on natural gas. It is generally acknowledged that the CLCPA targets will shift the electric system peak from the summer to winter. I believe that it is likely that electrification of heating with air source heat pumps will create a peak upon the expected peak because of the inefficiency of that technology when temperatures go below 10^0 F. Furthermore, the State has yet to show that an electric system that relies only on non-fossil fueled sources can meet that peak load condition. Accordingly, National Grid cannot afford to wait to integrate their plan with the CLCPA plan.

Conclusion

Based on my review of technology and data I reject the Synapse report claim that National Grid has multiple cost-effective demand-side options to meet any foreseeable need. Like the rest of National Grid's natural gas customers, I rely on them to provide safe and adequate supply so that my home is warm and I can cook. I urge the Public Service Commission to choose the Northeast Supply Enhancement pipeline and the other pipeline distribute infrastructure projects based on my evaluation of the alternatives. Synapse's solutions are based on theory and not proven results. I believe it is in the best interests of New York to implement a proven technology solution for current and future heating requirements as soon as possible.