Public Appeals Analysis

Process for determination of system demand reduction in NYISO Zone K via public appeals

PSEG Long Island

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Summary

As part of the NYISO Emergency Operating Procedures, PSEGLI analysis showed that load in excess of 80 MW can be shed in a public appeal event. This paper identifies the customer segments that will be called upon and estimates the amount of achievable load curtailment. The supporting analysis adopts a conservative approach by targeting the segments that would be most responsive to a public appeal. These segments include federal, state, and local government facilities, libraries, and schools and universities. While it is likely that other segments of the commercial sector would also curtail load during a public appeal, the analysis focuses on the government entities as the primary source of curtailable load as these facilities can be readily directed by state and local government officials to reduce non-essential load. In addition, very conservative reductions were assumed in the residential sector.

Analysis Methodology & Results

Commercial Sector

Historically, the government sector has been a reliable group of customers that have responded to state and local official's directives to reduce load during a critical event. Additionally, a lot of their energy consumption is associated with lighting, air conditioning, and business equipment that can be turned off or greatly reduced. These actions have been observed during previous public appeal events such as the August 2001 heat wave. As mentioned in Newsday on 8/10/2001, *"Fearing a major power crash, officials with the Long Island Power Authority pleaded with residents to limit electricity use to what was absolutely essential." "Government employees considered "non-essential" in town, state and federal agencies were almost all dismissed at 2 or 3 p.m. Only a few offices kept people on to do work without lights or air conditioning in the afternoon"*[1]

[1] Givens, A (2001, August 10) "Too Hot To Handle". Newsday, pp. A7, A48

In addition, with the exception of libraries, the accounts that make up the aforementioned commercial segments are part of the PSEGLI Large Customer Support portfolio. These customers are assigned a Major Account Consultant that manages and is intimately familiar with the accounts. In a public appeal event, these consultants will reinforce the message to reduce load and are available to guide the customer on actions to take to conserve energy.

To quantify the amount of expected demand reduction in the commercial sector for a public appeal event, PSEGLI used a bottom up analysis at the customer account level.

First, a list of customer accounts for each commercial segment along with their 2018 NYCA coincident peak demand was compiled. The 2018 NYCA peak occurred at 8/29/2018 HE 5PM. The coincident peak demand per account was measured at the meter and then grossed up to the system requirements level by applying line loss factors based on the account voltage delivery level[2]

Next, each market segment was reviewed with our major account consultants and assigned a reduction factor based on their likelihood and ability to reduce load. Last, the expected demand reduction by segment was calculated by multiplying the coincident peak demand by the reduction factor. The demand reduction estimates by market segment are summarized in Table 1 below.

For example, this analysis shows that the Federal/State government segment can be expected to reduce load by 9.01 MW. The Federal/State government segment contains 261 accounts with a total coincident peak demand of 15.01 MW. Utilizing a 60% reduction factor for this segment yields an expected load shed of 9.01 MW.

An explanation of the reduction factors can be found in the next section (Development of the Commercial Reduction Factors).

Table-1 Expected Demand Reduction from Public Appeals by Market Segment

Market Segment	Number of Accounts	Reduction Factor	2018 NYCA CP Demand (MW)	Expected Demand Reduction (MW)
Federal/State Govt	261	60%	15.01	9.01
Libraries	92	60%	7.96	4.78
Nassau/Suffolk County Govt Twnsps	2280	60%	66.93	40.16
Nassau K-12 Schools	494	25%	37.24	9.31
Nassau Universities	84	25%	25.15	6.29
NYC Agencies	69	60%	5.31	3.18
Suffolk K-12 Schools	627	25%	43.00	10.75
Suffolk Universities	90	25%	14.09	3.52
Villages	791	60%	10.85	6.51
Total Commercial			226	**93.5**

[2] Line loss factors for each voltage delivery level are specified in the LIPA statement of energy and peak demand losses. https://www.lipower.org/wp-content/uploads/2016/09/Stat_EDL.pdf

The following facilities were excluded from the commercial segments since they are either essential/critical services or already participating in a demand response program.

- Traffic Signals
- LIRR/NYC Transit
- Police/Fire Departments
- Water Districts
- NYISO SCR EDRP Participants
- PSEGLI CSRP DLRP Participants
- Housing Authorities
- Federal Aviation Administration

In summary, the commercial sector is expected to yield 93.5 MW of demand reduction during a public appeal event.

Development of the Commercial Reduction Factors

In developing the commercial reduction factors for each sector, two main factors were considered:

- The types of end use loads for the sector (air conditioning, lighting, office equipment)
- The expected responsiveness of the sector

The composition of the peak load for each sector is quantified in table-2 below[3].

Table-2 Percentage of Sector Coincident Peak Load by End Use

End Use	Gov't	Schools	Universities
Air Conditioning	42.68%	0.00 %	61.90%
Lighting	43.90%	89.72%	26.98%
Office Equipment	7.32%	0.93%	1.59%
Other	6.10%	9.35%	9.52%

The expected responsiveness of each sector is based on insight from Major Account Consultants as well as historical evidence of the sector's willingness to respond to public appeals.

For the government sector, 93% of the peak load is associated with air conditioning, lighting, and office equipment. During a public appeal event, these end use loads can be readily shed. A high response rate is expected from the government sector since these institutions are civic-minded and can be directed by state and local officials to respond during an event. As noted above, historically, government organizations have sent employees home and turned off air conditioning, lighting, and office equipment in response to public appeals. Therefore, a 60% reduction factor was adopted for this sector.

[3] Applied Energy Group, "PSEG Long Island Energy Efficiency Potential Study", (June 2016)

For the Schools and Universities 90% of the load is associated with air conditioning, lighting, and office equipment. However, a more conservative reduction factor of 25% was adopted for this sector as schools may be less flexible than government buildings in changing their operating schedules without advanced notice.

Residential Sector

During past public appeal events, internal surveys of LIPA customers have found that residential customers were aware of the public appeals and willing to reduce their electric usage. In 2002, our survey's found that over 70% of customers were aware of the public appeal and many responded that they took some action to cut back their consumption, including raising their thermostat and shutting off lights.

Previous energy efficiency potential studies have estimated the residential lighting load to be approximately 185 MW or 6% of the residential peak load[4]. An assumption that 5% of residential customers will reduce their interior lighting by one third yields an expected peak load reduction of 3 MW.

Additionally, residential air conditioning accounts for approximately 2100 MW or 70% of the residential peak demand. A conservative estimate of a .5% reduction rate on the residential air conditioning load yields an expected demand reduction of 10.5 MW.

In total this analysis yields a conservative estimate of 13.5 MW's of expected residential demand reduction during a public appeal event.

Conclusion

The analysis outlined in this paper is a realistic and conservative approach to quantifying the available load that can be curtailed via public appeals. While it showed that 107 MW's of reduction can be achieved via public appeals in the targeted market segments, an even more conservative approach would be to maintain the current 80MW reduction attributed to public appeals for the 2020/2021 capability period.

Table-3 Summary of Demand Reduction by Market Segment

Market Segment	Expected Demand Reduction (MW)
Commercial	93.5
Residential	13.5
Total	107
Total for 2020/2021 IRM/LCR Calculation	**80**

[4] Applied Energy Group, "PSEG Long Island Energy Efficiency Potential Study", (June 2016)