Making the Grid More Resilient within Reason

Case Study in Public Service Electric and Gas Energy Strong Petition

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ABSTRACT

Following the devastating impact from Superstorm Sandy, Public Service Electric and Gas Company ("PSEG" or "the Company") introduced a 10-year, $3.9 billion investment program for grid hardening and grid resiliency ($2.7 billion for electric investments and $1.2 billion for gas investments). The Company's petition sought $2.6 billion in rate recovery over five years ($1.7 billion for electric and $0.9 billion for gas). Almost 18 months after the initial petition, the Company reached a settlement with intervening parties for $1.2 billion over three years ($820 million for electric and $400 million for gas investments). From the electric component of this case, we identify themes and lessons for consumer advocates to ensure that utilities develop reasonable and prudent programs to plan for major outage events without the hype and fear. These themes include: understanding proper goals, understanding cost-effectiveness analysis, ensuring proper planning, and preventing gold-plating.

SUPERSTORMS AND GRID RESILIENCY

Major, damaging storms are not a new phenomenon, and utilities have had and continue to have an obligation to provide safe and reliable service during and in the wake of these storms. However, the frequency, intensity, and prominence of these events appear to be on the rise. In the last three years, the Eastern Seaboard has experienced well publicized events such as: Hurricane Irene (2011), the October Snowstorm (2011), the Derecho (2012), and Superstorm Sandy (2012). These events have resulted in storm response dockets including, but not limited to: Maryland Derecho Docket 9298, New Jersey Hurricane Irene Docket EO11090543, Connecticut Docket 11-09-09, and Massachusetts Docket 11-119. The White House estimates that the annual, inflation-adjusted cost of storm damage between 2003 and 2012 was $18 to $75 billion, depending on study and year.[1]

Much has already been written about the devastation caused by Superstorm Sandy along the Eastern Seaboard and especially in New Jersey and New York City. For PSEG, the storm and tidal surge flooded 21 substations, which then resulted in the shutdown of 88 substations. Combined with flooding and

[1] Executive Office of the President. *Economic Benefits of Increasing Electric Grid Resilience to Weather Outages.* August 2013. Available at http://energy.gov/sites/prod/files/2013/08/f2/Grid%20Resiliency%20Report_FINAL.pdf. Page 3.

downed trees, Superstorm Sandy caused the loss of power for 90 percent of its service territory. The Company reported that the storm resulted in 96 million outage duration hours. As a point of comparison, the Company's average outage duration for the last ten years excluding Superstorm Sandy has been 5.7 million hours.[2]

In the weeks following Superstorm Sandy, the Company focused on restoration efforts to the tune of $250 to $300 million, which is part of a separate storm recovery proceeding.[3] As the recovery phase progressed, it became clear that the Company would file a petition to plan for the "next" major event.

On February 21, 2013, the Company filed its petition to seek $2.6 billion ($1.7 electric and $0.9 billion for natural gas) for the first five years of a much larger $3.9 billion ($2.7 billion for electric, $1.2 billion for gas) ten-year program. The stated goal of the petition was to redesign and build elements of its electric and gas distribution system to prevent the damaging impacts of a Superstorm Sandy-like event in the future.[4] The Company describes its goal as "system hardening" in order to make its electric and gas infrastructure "less susceptible to storm damage" and "resiliency" to enhance its "ability to recover quickly" from such a storm event.[5]

Critically, consumer advocates should note that the proposed spending would be incremental to the Company's current distribution capital budgets and would allow the Company to include spending into distribution rates before projects were complete.[6] Throughout the proceeding, several issues arose that are applicable in other major capital investment programs designed to respond to major events. We highlight these issues below in the context of the PSEG case.

ISSUES FOR CONSUMER ADVOCATES

When evaluating the reasonableness and prudency of proposed grid resiliency projects, consumer advocates should examine the following topics.

Reliability goals

The Company touted that its program would reduce outage frequency and duration for customers in future events. However, the premise was based on a fully implemented program that would take ten

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[2] New Jersey Division of Rate Counsel. Initial Brief on Behalf of the New Jersey Division of Rate Counsel. In the Matter of the Board's Review of Petition of Public Service Electric and Gas Company for Approval of the Energy Strong Program. BPU Dockets EO13020155 and GO13020156. April 4, 2014. Page 24.

[3] http://www.pseg.com/info/media/newsreleases/2012/2012-12-04.jsp#.U33tyPldU_Y. Accessed May 22, 2014.

[4] PSE&G. Petition ("Petition"). Dated February 20, 2013. A copy of the petition is available at http://www.pseg.com/family/pseandg/tariffs/reg_filings/pdf/EnergyStrong.pdf. Accessed September 23, 2013.

[5] Petition. Paragraph 8, Page 3

[6] Rate Counsel (2014). Page 14.

years to complete. Even once fully implemented, the program still would not sufficiently alleviate reliability concerns. The results of the Company's calculations indicate that the Energy Strong program would reduce the number of customers who would suffer outages by 325,606.[7] In Superstorm Sandy, the number of customers affected as reported by the Company was 2,014,516.[8] Thus Energy Strong, if fully implemented, would still result in 1,688,910 customer outages for an event such as Superstorm Sandy. The Company also reports that Energy Strong would have the effect of reducing outage durations associated with a Superstorm Sandy-like event. The Company calculated that the fully implemented Energy Strong program would reduce customer outage durations by 62,714,213 hours, or 39 percent of customer outage hours.[9] This means that there would still be approximately 99,781,420 customer outage hours for a Superstorm Sandy-like type of event ten years from the start of the program.[10]

Cost effectiveness

We recommend that interveners seek engineering estimates, planning studies, and professional literature to document the efficacy of any grid investments. While relying on some professional judgment is understandable, unsupported professional judgment and experience should not be the sole basis of major capital investments. In the Energy Strong proceeding, the Company had not performed any calculations to determine the cost-effectiveness of the Energy Strong Program prior to a discovery request. Once prompted, the Company provided a cost-benefit analysis for individual elements of the Energy Strong program based on high-level estimates of avoided outages frequency and duration for major outage events.[11]

When we analyzed the Company's cost-benefit analysis, we realized that the total benefits attributed to the petition were very sensitive to assumptions associated with the benefit of the value of lost load (VOLL). VOLL in the context of the Energy Strong proceedings was a subjective value of service reliability. The Company relied upon VOLL estimates from a 2009 Lawrence Berkeley Nation Laboratory Study that itself was based on cost estimation or willingness to pay methods from 28 studies in 10 utilities from 1989-2005.[12] None of the studies were taken from the mid-Atlantic or Northeast region.[13] We compared the impacts of changing a single input value: the small C&I VOLL from the mean value of $314.6 per kWh used initially by the Company in its analysis and the median value of $49.17 per kWh used by the Brattle

[7] Rate Counsel (2014). Page 18.

[8] Rate Counsel (2014). Page 17.

[9] Rate Counsel (2014). Page 18.

[10] Rate Counsel (2014). Page 18.

[11] Rate Counsel (2014). Page 25.

[12] Sullivan, M., Mercurio, M., and Schellenberg, J. *Estimated Value of Service Reliability for Electric Utility Customers in the United States.* Ernest Orlando Lawrence Berkeley National Laboratory. LBNL-2132E. 2009.

[13] We acknowledge that VOLL estimates from mid-Atlantic or Northeast areas could be higher, but to our knowledge we have not seen an updated study of VOLL estimates specific to the mid-Atlantic or Northeast region.

Group in an analysis commissioned by the Company.[14] The change in this single input resulted in a difference of $20 billion, or 84 percent, in financial benefits attributable to the proposed program.[15]

Proper planning

Interveners should examine the planning process of utilities to ensure that the incentive to control costs associated with proposed capital expenditures is maintained. This requires understanding the steps of the utility planning process, contingencies, and the likelihood of major events.

During the proceeding, we learned that the Company developed the $3.9 billion, ten-year program over the course of a few weeks between January and February 2014.[16] We found it problematic that such a capital-intensive proposal evolved so quickly and outside of the Company's normal planning process.

The Company noted that it follows a standardized method of project identification, development, and execution. The Company divides the process into five phases: (1) Project Initiation, (2) Preliminary Engineering/Design, (3) Detail Engineering/Design, (4) Construction, and (5) Completion. For the $819 million ($1.7 billion total) substation component of the proposed program, the Company indicated that it was still at the Project Initiation stage at the time of the hearing.[17] Furthermore, the Company had not conducted detailed engineering studies across the programs. The Project Initiation designation means that the Company included a 50 percent cost adder to the petition. In other words, of the $819 million requested for the substation program, $204 million was a cost adder. We argued that as a result, the Company's cost estimates were not fully developed and that the Company was in fact asking ratepayers to bear the project risks based on the proposed rate treatment without any guarantees that any cost savings would be passed along to ratepayers. Therefore, the Company's only incentive to control associated project costs would be to meet the approved amount including the 50 percent contingencies. Very late in the proceeding, the Company disclosed that other components of the proposal contained contingencies that averaged 25 percent.[18]

During the proceedings, we critiqued the Company for developing the proposed program primarily to address catastrophic event such as Superstorm Sandy without including any consideration of the likelihood of this type of event in its assessment.[19] We argued that the Company failed to consider programs that would be less costly and address an objective of reducing customer outages for storm conditions. In addition, we argued that that it would have been more prudent for the Company to develop a program to address more likely storm events, and that such a program could be used as a

[14] Rate Counsel. (2014). Page 26.

[15] Rate Counsel. (2014). Page 26.

[16] Rate Counsel. (2014). Page 15.

[17] Rate Counsel. (2014) Page 55.

[18] Rate Counsel. (2014) Page 52.

[19] Rate Counsel. (2014). Page 20.

better gauge in determining the value of a Superstorm Sandy-based program. In essence, the Company should have developed a grid resiliency program under a phased approach to sequence work based on its short-, medium-, and long-term planning process. We recommend that projects should not be undertaken unless the Company's planning process determines that the investment is justified and the benefits of the project exceed costs.

In the settlement, the Company agreed to install an independent monitor who would report to the Board and intervening parties regarding the Company's planning and spending on the stipulated Energy Strong program.[20] We recommend installing such a monitor at the outset of a major capital program to ensure transparency and appropriate oversight. While the details of the independent monitor have not been finalized and are critical to the success of the monitor, we are hopeful that the monitor will help identify and prevent issues that would otherwise occur during a prudency review when it is after the fact.

Gold-plating

In its petition, the Company stated that they considered three equally effective alternatives when evaluating its substation program.[21] These three approaches were: (1) Flood Walls, (2) Raise and Replace, and (3) Relocation/Elimination.[22] The Company based its substation program on historical flooding and revised 100-year FEMA flood level maps.

We found the difference between the flood barrier solution and the other two alternatives to be considerable. Following Hurricane Irene (2011), the Company commissioned Black and Veatch to conduct a flood mitigation study for 12 flooded substations.[23] Black and Veatch determined the cost of installing flood walls across the 10 substations to be $10 million dollars in aggregate. By comparison, the Company's preferred solution for each of the same 10 substations resulted in an aggregate cost of $322 million, or 32 times higher than the earlier study.[24] When pressed, the Company only provided highly subjective justifications for the alternatives that it selected compared to the least-cost alternative.

[20] New Jersey Board of Public Utilities. In the Matter of the Board's Review of the Petition of Public Service Electric and Gas Company for Approval of the Energy Strong Program. Order 6-21-13-2G. Paragraph 36. Available at http://www.nj.gov/bpu/pdf/boardorders/2013/20130619/6-21-13-2G.pdf

[21] PSEG. (2013). Cardenas. Page 8. Line 172.

[22] PSEG. (2013). Cardenas. Page 8. Line 173.

[23] Rate Counsel. (2014). Page 54.

[24] Rate Counsel. (2014). Page 56.

CONCLUSION AND RECOMMENDATIONS

Major events that affect ratepayers have and will continue to occur, and consumer advocates have a very important role in proposed grid resiliency programs designed to respond to future events. In the context of the PSEG Energy Strong program, we find:

- Consumer advocates should ask questions to ensure that reliability goals of proposed programs are meaningful and realistic commensurate with proposed investments. The proposed Energy Strong program would have required ten years of investment and may only reduce 40 percent of outage durations based on internal estimates.
- Companies should provide cost-benefit analyses based on supportable input assumptions and identify drivers to such analyses.
- Companies should plan for grid resiliency programs in a manner that solves the objectives of the program at least cost for ratepayers.
- Ratepayers should not have to bear the risk of contingency estimates; otherwise, companies will have less incentive to manage costs.
- Major grid resiliency capital investment programs could benefit from the establishment of an independent monitor to oversee costs and planning of such programs during the development and implementation processes.
- Utilities should provide appropriate justification that the identified grid resiliency programs represent the least-cost solution to address the objective of the program. The programs should not be an opportunity to allow utilities to gold-plate its system.

Grid resiliency investments are and will be important. That said, utilities should not be able to stoke fears of power disruptions to justify capital project that could potentially be too expensive and may not improve outage disruptions. While utilities should plan and update their distribution systems in the wake of major events, consumer advocates should ask questions to ensure that such programs solve the stated objective in a reasonable manner.