

STATE OF NEW YORK
PUBLIC SERVICE COMMISSION

Proceeding on Motion of the Commission as to the
Rates, Charges, Rules and Regulations of
Consolidated Edison Company of New York, Inc.
for Electric Service

PSC Case No. 13-E-0030

Proceeding on Motion of the Commission as to the
Rates, Charges, Rules and Regulations of
Consolidated Edison Company of New York, Inc.
for Gas Service

PSC Case No. 13-G-0031

Proceeding on Motion of the Commission as to the
Rates, Charges, Rules and Regulations of
Consolidated Edison Company of New York, Inc.
for Steam Service

PSC Case No. 13-S-0032

**POST-HEARING BRIEF OF THE
COLUMBIA CENTER FOR CLIMATE CHANGE LAW**

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Public Service Commission should require Con Edison to conduct a vulnerability assessment, analyze alternatives, and create a long-term adaptation plan with respect to climate change in order to ensure long-term cost-effective reliable service. These would inform future investment decisions and ensure that dollars are spent in a prudent manner.

INTRODUCTION

The Center for Climate Change Law at Columbia Law School (“CCCL”) respectfully submits this post-hearing brief in response to the testimony, pleadings, and evidence provided in the hearing conducted in these proceedings from July 22 to August 2, 2013, regarding the proposal of Consolidated Edison Company of New York (“Con Edison” or the “Company”) for an increase in its electric, gas, and steam service rates.

Given the importance of reliable provision of service and given that climate change will alter the environmental conditions in which Con Edison’s system will need to operate, the Public Service Commission (PSC) should require Con Edison to (1) perform a short- and long-term vulnerability assessment with respect to climate change, (2) conduct an analysis of alternatives to improve resiliency, (3) prepare a long-term climate change adaptation plan, and (4) update that plan on a frequent basis to reflect new scientific data and projections. The long-term plan should extend at least as long as the useful life of infrastructure currently being installed. These planning efforts should consider not only the flooding and coastal storm hazards exposed by the October 2012 storm called “Superstorm Sandy” but also the climate hazards posed by rising sea level, increasing temperatures and more severe heat waves.¹ Climate change also stands to alter energy demand patterns and increase the benefit of integrating Distributed Generation and CHP systems. A vulnerability analysis should assist Con Edison in altering its long-term planning processes to reflect the fact that weather is no longer a stable constant, one which can be expected to behave according to historic patterns, but rather is a changing and variable threat. Advance planning will be necessary to ensure prudent expenditure of funds and long-term provision of reliable service.

¹ Exhibit 223 (RH-2), New York City Panel on Climate Change (2010) Report, at 126 (“NPCC 2010”).

I. A CLIMATE CHANGE VULNERABILITY STUDY IS NECESSARY TO ENSURE PRUDENT INVESTMENT OF STORM HARDENING FUNDS AND FUTURE RELIABILITY OF SERVICE

In its initial filing, the Company provided preliminary plans to invest \$716 million in new electric system storm hardening initiatives during the period 2013-2016.² This represents a substantial financial investment in improving the resiliency of the system. In order to ensure that further investments in storm hardening are prudent, Con Edison should be required to conduct a vulnerability assessment, perform an analysis of alternatives, and develop a long-term adaptation plan in order to ensure that the investments are adequately addressing and preparing for the threats posed by climate change.

A. Climate change will alter the threats posed to Con Edison's infrastructure.

The most recent information describing the nature and extent of the effects of climate change on New York City can be found in interim FEMA Advisory Base Flood Elevation Maps, the New York Panel on Climate Change's report on the effects of climate change on New York, and the New York State Clim AID report on adaptation.³ These sources are aligned in concluding that it is very likely that climate change will lead to rising sea levels, higher average and extreme temperatures, more extreme precipitation events, and more extensive coastal flooding during extreme weather events.⁴ Climate change expert Radley Horton summarized the expected impacts of climate change on Con Edison's infrastructure as follows:

As the 21st century progresses, extreme heat events are projected to become more frequent and intense, and sea level rise is projected to lead to

² Direct Testimony of Con Edison Infrastructure and Operations Panel at 22: 5-8 ("IIP Direct").

³ See Exhibit (RH-2) 223 (NPCC 2010 Report); see also Exhibit (RH-3) 220 ("Clim AID Report").

⁴ Direct Testimony Radley Horton on behalf of Center for Climate Change Law, dated May 31, 2013 at 10-11 ("Direct Testimony Radley Horton").

increased coastal flooding. It is also likely that intense precipitation events will become more frequent. In light of these projected changes, infrastructure is likely to be faced with a different range of environmental conditions than it has experienced in the past, and risk management efforts should be revised to account and prepare for altered conditions.⁵

These effects pose a major threat to the reliability of Con Edison's system.

Variability caused by climate change means that some years will be similar to weather patterns previously documented while others will produce unprecedented temperatures and extreme weather events.⁶ As Con Edison's recent Annual Form 10-K Financial Reports to the Securities and Exchange Commission stated, "emissions of greenhouse gases, including carbon dioxide, are very likely changing the world's climate," and "[t]he effects of climate change might also include physical damage to the Companies' facilities and disruption of their operations due to the impact of more frequent and more extreme weather-related events."⁷

- i. Flooding threat to infrastructure at low elevations will increase due to sea level rise, more intense coastal storms, and raised groundwater table

Climate change is causing sea levels to rise and is likely to increase the severity of storms, a combination that will result in an increased flooding threat to Con Edison's infrastructure and equipment.⁸ Rising sea levels will result in both more frequent and more severe floods. A sea level rise of just 5 inches at the Battery in New York City,

⁵ Direct Testimony Radley Horton at 4-5.

⁶ Id. at 16.

⁷ Exhibit 127 (KHJ-4) at 27 (New York Office of the Attorney General quoting Con Edison 2010 Form 10-K at 28, 2011 Form 10-K at 29, and 2012 Form 10-K at 27).

⁸ See Exhibit 219 (RH-4), National Climate Assessment 2009 Northeast Regional Assessment, at 9 (stating, "Rising sea level is projected to increase the frequency and severity of damaging storm surges and flooding."); Direct Testimony of Radley Horton at 3:62-66; Exhibit 214 (KHJ-1), Direct Testimony of Klaus Jacob on behalf of New York State Office of the Attorney General, dated May 31, 2013, at 3 ("Direct Testimony of Klaus Jacob"); Exhibit 221 at 12-13 (Clim Aid Report); Exhibit 223 at 6 (NPCC Report 2010).

expected by the 2020s, would result in 4 moderate flood events each year, with water levels 1 to 3 feet higher than in the past.⁹ What is considered to be a 100-year flood in New York City today is projected to occur at least twice as often by 2050¹⁰ and four times as often by 2100.¹¹ Climate change also has the potential to increase the severity of coastal storms. According to the New York State Clim AID Report, “Warming ocean waters raise sea levels through thermal expansion and have the potential to strengthen the most powerful storms.”¹² Stronger, more intense storms hitting New York City, combined with an elevated sea level, pose a significant threat to Con Edison’s infrastructure and services, as demonstrated by the extensive and prolonged service disruptions faced by one third of Con Edison’s 3.3 million New York and Westchester County customers in the wake of Sandy.¹³ Con Edison’s Infrastructure and Operations Panel noted that “recent weather events that have severely impacted the Company’s infrastructure, including two hurricanes – Sandy and Irene – in as many years, more frequent nor’easters, tornados and heat waves, present a trend that requires the Company to prepare for the likelihood of increasingly violent and destructive storms.”¹⁴ Climate change is likely to increase the frequency and severity of flooding events that threaten Con Edison’s system.

⁹ Exhibit 222 at 16 (Clim Aid Report stating “Sea level rise projections for the coast and tidal Hudson River based on GCM methods are 1-5 inches by the 2020s, 5-12 inches by the 2050s, and 8-23 inches by the 2080s.”).

¹⁰ Exhibit 219 (RH-4) at 9-10 (National Climate Assessment 2009 Northeast Regional Assessment); Direct Testimony of Radley Horton at 11:188-12:195.

¹¹ Exhibit 222 (RH-3) at 16.

¹² Direct Testimony of Radley Horton at 11:186-188 (quoting Clim Aid Report).

¹³ See IIP Direct at 15: 6-9 (“Approximately 8.5 million customers along the eastern U.S. lost power during Sandy. The storm resulted in approximately 1,115,000 customer outages in Con Edison’s electric system.”); see also Direct Testimony of Klaus Jacob at 14.

¹⁴ Exhibit 127 (KHJ-4), Supplemental Testimony of Klaus Jacobs presented by New York Office of the Attorney General, at 3 (“Supplemental Testimony of Klaus Jacobs”). Quoting Con Edison Electric Infrastructure and Operations response to New York Attorney General Interrogatories Information Request 025.

- ii. Increased temperatures and heat waves that are more intense and of longer duration will change the demand profile and rating of Con Edison's equipment

Global warming associated with climate change will not only increase average ambient temperatures but will also cause longer, more extreme, and frequent heat waves.¹⁵ New York City has historically experienced two heat waves per year on average, but this is projected to increase to 4 to 9 heat waves by the 2080s. The number of days over 90°F is projected to double from 14 a year, currently, to 23-29 per year by the 2020s, less than a decade into the future.¹⁶ High temperatures will also begin earlier in the year and extend later into the fall.¹⁷

When the ambient temperature is higher, equipment has a decreased ability to dissipate heat,¹⁸ and this, in turn, decreases the capability of equipment to carry power, which affects the load capacity of the system.¹⁹ Flood walls and other storm hardening measures taken to mitigate water intrusion may also reduce the ability of equipment to dissipate heat, necessitating the installation and use of forced cooling measures.²⁰

Ambient temperature also affects the peak load calculations. Con Edison uses a Temperature Variable (TV) as the “primary order-of-magnitude peak load benchmark”²¹

¹⁵ Defined as three consecutive days over 90°F. *See* Direct Testimony of Radley Horton at 7:106-107.

¹⁶ Exhibit 223 at 43-44 (NPCC Report 2010); Direct Testimony of Radley Horton at 7:105-112.

¹⁷ *See* Exhibit 219 (National Climate Assessment 2009 Northeast Regional Assessment), *quoted in* Direct Testimony of Radley Horton, at 7:118-8:127 (“hot summer conditions would arrive three weeks earlier and last three weeks longer into the fall.”).

¹⁸ Tr. at 1357:22-1358:23 (Cross Examination of Consolidated Edison Infrastructure and Operations Panel, July 29, 2013).

¹⁹ Id. at 1357: 6-1368:23.

²⁰ Id. at 1372:12-16 .

²¹ Exhibit 877 at 1 (Con Edison Response to CCCL-1).

to calculate and forecast future system loads.²² The TV is calculated using a weighted average of the highest consecutive three hour temperature and humidity readings each day for three days.²³ This method is supposed to yield a TV that is met or exceeded once every three years.²⁴ Currently, the TV is set at 86°F,²⁵ where it has remained unaltered since it was first established in the 1960s.²⁶ If the TV were increased, due to higher ambient temperatures and more frequent, hotter heat waves, then the forecasted load would also be higher, and Con Edison would require more capacity.²⁷

In 2007, DPS Staff recommended that Con Edison re-evaluate the feasibility, cost, and benefits of adjusting the TV.²⁸ In its responding study, Con Edison stated that adjusting the TV just one half of a degree from 86.0°F to 86.5°F would increase the peak load forecast by 75MW, which would require the procurement of an additional 87MW of generation capacity from the NYISO at an estimated cost of \$21 million.²⁹ It would also “require that many major area substation, transmission, and distribution projects be advanced by one year”³⁰ and require the advancing of area substation load relief projects at a cost of \$311 million.³¹

Given that the New York Panel on Climate Change (NPCC) is projecting that the number of days in New York over 90°F will double in the next 10 years, it is likely that

²² Exhibit 878, Con Edison 2007 Study “Re-Evaluation of Temperature Variable Design to Meet One in Three Years Criteria”, at 4 (“Con Ed 2007 TV Study”); *see also* Tr. at 1365-1367 (Cross Examination of Con Edison Infrastructure and Operations Panel, July 29, 2013).

²³ Exhibit 877 at 1 (Con Edison Response to CCCL-1).

²⁴ Exhibit 877 at 2 (Con Edison Response to CCCL-1); Exhibit 878 at 4 (Con Ed 2007 TV Study).

²⁵ Tr. at 1357:2-5 (Cross Examination of Consolidated Edison Infrastructure and Operations Panel, July 29, 2013).

²⁶ Exhibit 877 at 2 (Con Edison Response to CCCL-1).

²⁷ Tr. at 1357: 6-1368:23 (Cross Examination of Consolidated Edison Infrastructure and Operations Panel, July 29, 2013); *see also* Exhibit 878 at 9 (Con Ed 2007 TV Study).

²⁸ *See* Exhibit 878 at 3 (Con Ed 2007 TV Study).

²⁹ Exhibit 878 at 10 (Con Ed 2007 TV Study).

³⁰ *Id.* at 10.

³¹ *Id.* at 11.

the TV will need to be increased by several degrees at substantial cost. Increasing temperatures would also increase demand from consumers, and there is the potential, as Klaus Jacob, Ph.D. and one of the co-authors of the NPCC report, notes, that “This increase in temperatures may over-burden Con Edison system components and power grid, particularly as demand for power increases during heat waves.”³²

It should be noted that while storm events impair Con Edison’s system, they also tend to decrease load, because many businesses close; but extreme events impair Con Edison’s system and increase load by escalating the use of air conditioning.

B. Con Edison’s current planning procedures do not adequately address future conditions

Addressing climate change will require a fundamental shift in the way planning procedures incorporate weather. Temperatures and sea levels will not simply rise to a new normal and then stabilize. Climate will no longer be a static condition and it will no longer be possible to expect future conditions to reflect historic trends. Rather, climate change requires planning processes to address climate as a changing variable and to use future projections.³³

- i. Con Edison’s planning processes focus on storm hardening but do not necessarily address climate change

³² Direct Testimony of Klaus Jacob at 14.

³³ Direct Testimony of Radley Horton at 15 (“As greenhouse gas concentrations continue to rise, the climate of New York State and New York City is projected to change as well. By the 2020s, we would expect the climate of New York State and New York City to be statistically different from the climate we have experienced over the past 30 years. This difference will only increase as we move further into the 2050s, 2080s, and to 2100. Using the past 30 year average of weather as a benchmark for risk management would be unwise and contrary to our current scientific understanding.”).

As a result of Sandy, Con Edison has been undertaking significant storm-hardening efforts.³⁴ However, the projects identified by Con Edison and the planning procedures discussed all focus specifically on storm hardening in order to address the weaknesses exposed by Sandy. As part of the Company's participation in the New York City Climate Change Adaptation Task Force Energy Working Group, the Company did prepare a risk assessment for major electric/gas/steam infrastructure.³⁵ In response to concerns by several parties that Con Edison was not considering sea level rise, the Company agreed to a stipulation that commits it to plan all storm-hardening efforts based on the new 2013 FEMA Preliminary Maps plus three feet to account for sea level rise.³⁶

And yet, according to the Company:

During the historic year ended June 30, 2012, the Company engaged in a variety of initiatives that hardened the Company's electric system against the impacts of severe weather. **These initiatives were not generally implemented to specifically address evolving hazards related to climate change** but instead were intended to improve electric system performance to mitigate the impacts of **experienced** weather-related events.³⁷ (Emphasis added)

Con Edison's current planning procedures are focused on storm mitigation based on historic, experienced, events rather than projected future events.

- ii. Con Edison's planning processes uses historic data rather than future projections

³⁴ See, e.g., IIP Direct Testimony at 57, stating that "Prior to Hurricane Sandy, our projection for the 18 period of 2013 through 2017 held our projected capital 19 spending virtually flat."

³⁵ Exhibit 127 (KHJ-4) at 4 (Con Edison response to New York Attorney General Information Request 010).

³⁶ Exhibit 846, Climate Change Stipulation, dated July 19, 2013 at 2 ("Climate Change Stipulation").

³⁷ Exhibit 127 (KHJ-4) at 3 (Con Edison response to New York Attorney General Information Request 010).

Con Edison bases its projects, system designs, and planning on historic climate data rather than future projections. Planning experts representing the New York City Mayor’s Office of Long Term Planning and Sustainability, and climate change scientists who are members of the New York City Panel on Climate Change, have testified that Con Edison currently relies on outdated data in crafting responses to climate change threats.³⁸ One example is the TV. As mentioned above, Con Edison has used a TV of 86°F since the 1960s.³⁹ In 2006, Con Edison conducted a validation analysis for the TV “based on analysis of historical Central Park weather going back to the 1950’s.”⁴⁰ Con Edison considered exposure based on 51-year, 45-year, 36-year, 30-year, 21-year, and 12-year weather cycles through 2006, and all cycles other than the 51 year cycle yielded a TV slightly higher than 86°F (86.1°F, 86.4°F, 86.6°F, 86.3°F, and 86.3°F).⁴¹ Con Edison noted that “there may be evidence of a TV ‘bracket-creep’” but decided the trend was not marked enough to warrant a change.⁴² Moreover, despite noting this potential “bracket-creep,” the Company has not conducted a validation study since and has not set a timeframe for doing one in the future.⁴³

A second example is Con Edison’s treatment of recent flood map data. Although Con Edison has agreed in a stipulation to use the 2013 FEMA maps plus three feet, the data that Con Edison was using in its preparation of its filing is indicative of the Company’s reliance on historic data. The FEMA Flood Insurance Rate (FIRM) Maps for New York City that were used by Con Edison in its filing preparation were developed in

³⁸ Direct Testimony of the New York City Climate Risk Panel at 2:16-21.

³⁹ Exhibit 877 at 2 (Con Edison Response to CCCL-1); see also Tr. at 1323:18-21 (Cross of Con Ed Infrastructure and Operations Panel, July 29th).

⁴⁰ Exhibit 878 at 7 (Con Ed 2007 TV Study).

⁴¹ Id.

⁴² Exhibit 878 at 8 (Con Ed 2007 TV Study).

⁴³ Tr. at 1333-34, line 21-5 (Cross examination of Con Ed Infrastructure and Operations Panel, July 29th).

1983. During Hurricane Sandy the total land area flooded exceeded the FIRM predictions by 53 percent.⁴⁴ Even the updated FIRMs by FEMA use only historic data and do not account for sea level rise, unlike the maps used by New York City in its recent vulnerability assessment of city infrastructure.⁴⁵

Using historic data, especially over long periods of time, flattens any recent trends in increasing temperature and biases the results towards past conditions that may not adequately reflect future conditions. This is particularly problematic when design reviews and validations are conducted on an ad hoc basis rather than as part of a routine evaluation conducted at regular intervals.

- iii. Con Edison's planning procedures do not extend far enough into the future to cover the useful life of new infrastructure

A Liberty Management Audit of Con Edison “underscored...the need to more explicitly link infrastructure investments to long term planning and to performance, risk and customer bill impacts.”⁴⁶ In response to this recommendation, “Con Edison has developed an Electric Long Range Plan.”⁴⁷ However, the Long Range Plan extends only 20 years into the future.⁴⁸ This may seem like ample future planning. However, the average lifespan of much of the major transmission infrastructure and technology used by Con Edison is 40 plus years.⁴⁹ Con Edison's planning range therefore does not even account for conditions that will be experienced within the lifetime of its equipment. A

⁴⁴ Direct Testimony of the New York City Climate Risk Panel at 4:14-16.

⁴⁵ See Direct Testimony Klaus Jacob.

⁴⁶ IIP Direct at 46: 3-7.

⁴⁷ Id. at 46, line 7-11.

⁴⁸ Id. at 4, line 17-19.

⁴⁹ Exhibit 186 (EIP-2) Direct Testimony of New York City Electric Infrastructure Panel on behalf of The City of New York, dated May 2013, at 9-13 (“New York Electric Infrastructure Panel”).

transformer purchased in 2014 could still be operating well into the 2060s,⁵⁰ and transmission cable installed in 2014 could be in operation in the 2070s.⁵¹ A long-range vulnerability assessment should therefore cover at least this time frame to consider the conditions that this equipment will experience in its service life.

- iv. Con Edison does not consider what the climate conditions are that its infrastructure will have to operate in throughout the useful life of the equipment

Discussing changes in the 2050s and 2080s sounds far off, but, as just shown, equipment purchased in 2014 could still be in operation in those decades. Therefore, when purchasing and installing equipment today, it is appropriate to consider not only the current environment but also what future threats the equipment will have to face.

However, when asked if the company considers the conditions that equipment will have to cope with throughout the useful life span, the reply was “Up to today, the answer to that question is no. The answer going forward is, I think, yes.”⁵² This consideration “going forward”, should be guided by long-term studies conducted by the Company to assess its vulnerability, analyze options, and prepare a long-term plan.

- C. Absent a vulnerability assessment, Con Edison’s capital expenditures may be inefficient or insufficient, which could require additional rate increases in subsequent years to address un-identified vulnerabilities

Unless Con Edison conducts a vulnerability assessment of its infrastructure with respect to climate change and the long-term threats posed by rising sea levels and temperatures, the Company will not know what storm-hardening and resiliency measures

⁵⁰ Tr. at 1327:14-15 (Cross of Con Ed Infrastructure and Operations Panel, July 29th).

⁵¹ Id. at 1333: 20-24.

⁵² Id. at 1332:21- 1333:3.

are appropriate. For example, in the flooding context, infrastructure that is located in an area outside of the current 100-Year Flood zone may in the future be at risk of flooding due to the landward expansion of the 100-Year Flood zone resulting from rising sea levels.⁵³ The 2013 FEMA maps plus three feet may account for sea level rise in some areas, but in others it is possible that even that addition will not be sufficient to address future sea levels and that additional funding will be required in the future to extend those walls. As recommended by Klaus Jacob, “To ensure continued cost-effective system reliability in the face of increasing climate-risks, I urge the PSC to direct Con Edison to reevaluate its proposals using a comprehensive risk management approach. This approach should identify the full range of climate-related risks based on the best available science and evaluates the cost and feasibility of a range of mitigation and adaptation options.”⁵⁴

II. AN ANALYSIS OF ALTERNATIVES IS NECESSARY TO ENSURE PRUDENT CAPITAL EXPENDITURE AND LONG-TERM RESILIENCE

Climate change threats can be addressed by a number of alternative solutions. Specifically, it can be addressed through changes to operations, organization, equipment, personnel, training, and facilities or, most likely, through a combination of the above. In order to determine which approaches are the most effective and cost-effective, it is necessary for Con Edison to conduct a thorough analysis of alternatives. The System Design Task Force, established after Superstorm Sandy, is tasked with developing “a prioritized listing of potential design changes, operational strategies, procedural

⁵³ Supplemental Testimony of Klaus Jacobs at 8:4-9:14 (“Similarly, Con Edison may find that assets located in the 500-year flood zone today will, in 40 years, be located instead within a 100-Year Flood zone.”).

⁵⁴ Supplemental Testimony of Klaus Jacobs at 8:4-9:14.

modifications, and hardening initiatives to mitigate the impact of severe weather.”⁵⁵ The prioritized listing should also include also include further non-structural alternatives to address long-term climate change challenges.

- a. Con Edison’s storm hardening initiatives are mainly technological and focused on raising flood walls and elevation to prevent floods

Con Edison’s storm hardening initiatives in response to Sandy are technological in nature. The Company emphasizes building flood walls, elevating equipment, installing submersible equipment, and isolating equipment to prevent water intrusion.⁵⁶ This includes efforts to “make equipment more robust to withstand the effects of wind and water intrusion during storms,”⁵⁷ such as replacing copper wire with fiber,⁵⁸ reinforcing towers to withstand higher winds,⁵⁹ installing back up pumps,⁶⁰ and sealing equipment to decrease water intrusion.⁶¹

Con Edison is proposing some solutions to alter its operations, such as installing circuit switchers to isolate faults⁶² and remote-controlled switchers to enable faster recovery,⁶³ but these responses are still primarily equipment in nature. Moreover, these responses may be effective for acute storm events but will not address the longer-term challenges posed by climate change.

- b. Raising elevation and flood walls may be insufficient or more expensive than non-structural responses

⁵⁵ IIP Direct at 21:15-18.

⁵⁶ Id. at 14:20, 22-23.

⁵⁷ Id. at 16:1-2.

⁵⁸ Id. at 17: 3-7.

⁵⁹ Id. at 16: 22-23.

⁶⁰ Id. at 17:13-16.

⁶¹ Id. at 17: 17-19.

⁶² Id. at 17:20- 18:5.

⁶³ Id. at 17:18-19:20.

As Con Edison's Infrastructure and Operations Panel acknowledges, storm hardening projects are expensive and some can be mitigated through the use of "demand management initiatives," "modification of programs and projects," and "asset management initiatives, including Smart Grid."⁶⁴ Con Edison should conduct further assessment of the feasibility of pursuing alternative long-term solutions. This assessment should consider equipment and non-equipment solutions and should conduct a cost-benefit assessment over a long period of time.

- i. Demand side reductions and distributed generation will be important parts of the response to increased demand from increased heat

Con Edison's storm hardening initiatives could result in increased costs to ratepayers not only in the form of this immediate rate increase but also potentially through the form of a surcharge for additional future storm hardening projects.⁶⁵ The approval of a surcharge mechanism means that the cost of additional storm hardening measures resulting from a failure to implement appropriate long-term planning measures may be tacked onto customer costs in the form of ad hoc surcharges. This concern is echoed by the New York State 2100 Commission Report which highlights the importance of long-term resilience planning in protecting customers against unnecessary future overhaul costs and reducing the burden on the ratepayer.

Climate change is expected to place both acute and chronic strain on Con Edison's system, which demand side reduction efforts and distributed generation could aid. The New York State Commission's 2100 report includes an electricity sector

⁶⁴ IIP Direct at 58: 3-12.

⁶⁵ IIP Direct at 42:9-15 (explaining the Company's proposed surcharge mechanism to recoup the costs of programs that were not included for consideration in the ongoing rate increase hearings).

specific recommendation to design a rate structure and other incentives which will encourage distributed energy and smart grid investments and also to reduce demand for energy.⁶⁶ Experts testifying on behalf of Pace Energy and Climate Center discuss the importance of CHP and Distributed Generation backups at sites that were able to provide energy during the storm.⁶⁷ Although Con Edison states it is considering distributed generation, combined heat and power (CHP) systems, and off-grid renewable supply programs to mitigate possible effects of service disruption meaningful steps towards these programs have yet to be initiated.⁶⁸

- ii. Changes in siting and equipment replacement requirements might be necessary for long-term adaptation to changing flood levels

Rather than investing in extending the life of substations in vulnerable floodplains and investing further funds in defending those stations against flooding, it may be more cost-effective to relocate certain stations to new location at a higher elevation. This cost-assessment cannot be adequately performed without considering the cumulative costs of investing in new equipment and storm hardening measures and response efforts over the course of the expected service life of the station. This is just one example of the type of equipment replacement and siting changes that should be considered as alternative adaptation strategies for climate change. As Con Edison considers updating or

⁶⁶ Direct Testimony of Jackson Morris to Pace Energy and Climate Center, dated May 31, 2013, at 7:157-163 (Direct Testimony of Jackson Morris).

⁶⁷ Exhibit 205 (A), Direct Testimony of Thomas R. Bourgeoise for Pace Energy and Climate Center, dated May 31, 2013, at 5:79 -85.

⁶⁸ Exhibit 186 (EIP-2) at 37:18-38:2 (New York Electric Infrastructure Panel) stating “During blue sky outages and small storms, Con Edison’s automated systems will be able to recognize an outage and utilize sectionalizers and reclosers to isolate the outages and reroute the flow of electricity, thereby reducing the number of customers affected by an interruption in service. This development, while important, will not have as large of an impact in a significant storm as there may not be sufficient lines operable to reroute the flow of electricity.”

refurbishing existing cables, substations, transformers and other equipment, it should consider the long-term viability of the current locations.

- iii. Changes in personnel levels might be necessary for recovery and response initiatives

Personnel levels and operating measures also have a role in storm hardening and climate change adaptation and should be considered as part of a long-term adaptation plan and analysis of alternatives. The New York State Commission's report includes an electricity sector specific recommendation to develop long-term career training and a skilled energy workforce.⁶⁹

- c. A long-term risk-cost-benefit analysis and comparison of alternatives is necessary to ensure proper allocation of ratepayer dollars

Con Edison currently uses cost-benefit analyses to determine the appropriate allocation of funds,⁷⁰ but this cost-benefit analysis needs to be extended over a longer term. Specifically, it needs to address the full life expectancy of the equipment (or the system of which the equipment is a part) in order to determine the efficiency of the solution.

III. A MANDATORY LONG-TERM CLIMATE CHANGE ADAPTATION PLAN WOULD ENSURE SOUND INVESTMENT

While the need for immediate storm hardening measures proposed by Con Edison is apparent, it would be prudent and most cost-effective for Con Edison to carry out a study regarding vulnerability resulting from climate change that is integrated with its mid- and long-term planning processes. A long-range adaptation plan would use the information in the vulnerability assessment and analysis of alternatives and would

⁶⁹ Direct Testimony of Jackson Morris at 7: 157-163.

⁷⁰ IIP Direct at 63.

identify a long-term strategy for Con Edison investment to ensure that the company is anticipating and responding to the increasing threats of climate change. The plan would identify long-term expenditure plans and allow the Commission to evaluate future revenue requirements according to the Company's vulnerability and analysis of alternatives. This would minimize redundant requests for storm hardening funds.

A. This process should be initiated in 2014 and cover the useful life of infrastructure in order to maximize benefits to ratepayers

Prolonging the planning process will increase uncertainty and may result in redundant or unnecessary expenditures or in costly last-minute solutions. A process begun in 2014 would be able to inform expenditures in the 2015 rate year and well beyond.

A risk assessment and adaptation plan for climate change needs to consider how the changing climate will affect infrastructure throughout the useful life of the equipment or system. This long-term assessment therefore needs to extend out at least as long as the useful life of new infrastructure to be installed in 2014. This means the plan should extend at least into the 2070s.

i. Decisions made today affect the future reliability of the system

Discussing changes in the 2050s and 2070s sounds far off, but, as stated above, equipment purchased in 2014 could still be in operation in those decades. Each year that Con Edison fails to conduct a climate change vulnerability assessment, analysis of alternatives, and adaptation plan is another year that equipment is being purchased and installed and investment decisions are being made without an understanding of whether the equipment will be able to function throughout its planned anticipated useful life.

The need to undertake this climate adaptation study is accentuated by the fact that Con Edison makes many of its purchasing decisions several years in advance.

ii. Details of proposed 2014 study

PSC should require Consolidated Edison to undertake a study beginning in 2014 including a long-term risk assessment for a range of climate hazards and a cost-benefit analysis of alternative responses to identified risks. This study should be used to develop Consolidated Edison's long-term climate change adaptation plan.

Risk assessment should address the following hazards:

- Flooding
 - Coastal storms (sea level rise, storm surge, high winds, flooding).
 - Extreme precipitation events (and associated flooding).
 - River flooding.
 - Increases in groundwater elevation.
- Heat
 - Increased average temperatures.
 - Extreme heat events (intensity, duration, and associated probabilities).
 - Demand profile changes as a result of climate change.
- High Winds

Identify and evaluate the costs and benefits of alternative responses to address identified risks. These alternatives should not be limited to equipment solutions but also:

- Include possible relocation of facilities or equipment out of flood-prone areas to higher elevations and a real estate acquisition strategy to meet those demands;
- Address changes in demand and load forecasts due to increased heat and possible demand side alternatives to addressing this change (such as DG and CHP);
- Identify decision-making, planning, and acquisition procedures into which climate change considerations could be integrated to ensure that infrastructure and real property investment decisions and personnel decisions account for future climate conditions;
- Design variables that might be affected by changing climate conditions should be identified and thresholds for changing those variables also identified (e.g. Temperature Variable)
- A risk-cost-benefit analysis that should compare both the cost of action versus inaction and the cost of action now versus action at a later date;
- Demand side alternatives to reduce demand peaks caused by extreme heat.

CONCLUSION

Con Edison is requesting significant funds to spend on storm hardening and resiliency measures. In light of the importance of reliable provision of service and the changing climate in which Con Edison's system will need to operate, the Commission should require Con Edison to (1) perform a short- and long-term vulnerability assessment with respect to climate change, (2) conduct an analysis of alternatives to improve

resiliency, (3) prepare a long-term climate change adaptation plan, and (4) update that plan on a frequent basis to reflect new scientific data and projections. In order to adequately inform investment decisions, the analysis of alternatives should consider equipment and non-equipment strategies, and the long-term plan should extend at least as long as the useful life of infrastructure currently being installed.

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