New York State 2100 Commission Report: Energy
Improving Strength and Resilience

Phil Mihlmester
New York Bar Association
Columbia University Law School
New York, NY

May 14, 2014
Vulnerabilities in energy infrastructure were exposed following Hurricane Sandy in October 2012.

- Over 2.1 million lost power in New York State
- Long lag time (up to two weeks) for power to be restored in some areas
- Some permanent relocations of tenants out of Manhattan following the storm
- Gasoline rationing in New York City and Long Island for the first time since the 1970s
- Flooding of power plants, substations, and other electric system infrastructure
- Outages and damages to the steam distribution system

Massive infrastructure improvements are needed to make natural gas and fuel distribution systems resilient to natural disasters.

- Current energy workforce is ill equipped to deal with challenges of future extreme weather events
- Despite the perception that the natural gas system is more resilient, it is still vulnerable to underground damage from uprooted trees and flooding
- Breakdown in fuel distribution supply chain revealed need to build resilience
- Events like Hurricane Sandy will become more frequent in the future, making the idea of a “100-year storm” obsolete
- To achieve its goal of reducing GHG emissions to 80% below 1990 baseline by year 2050, New York State needs to simultaneously shift away from fossil fuel usage and improve reliability, availability, and resilience

Recommendation #1

Strengthen critical energy infrastructure.

• Require plans to strengthen critical infrastructure
• Protect underground equipment and substations
• Identify best underground locations for electrical transmission and distribution lines
• Protect transmission and distribution lines
• Reconfigure electric system for critical infrastructure customers
• Strengthen marine terminals and relocate key fuel-related infrastructure to higher elevations
• Reinforce natural gas distribution infrastructure
• Reinforce electrical supply to fuel infrastructure and pursue additional booster stations for the Buckeye pipeline
• Waterproof and improve pump-out ability of steam tunnels
• Create a long-term capital stock of critical equipment among utilities

Recommendation #2

Accelerate the modernization of the electrical system and improve flexibility.

- Design a more flexible electric grid to be dynamic and responsive during normal operations and emergencies
  - Distribution Management System (DMS)
  - Distribution Supervisory Control and Data Acquisition (D-SCADA)
  - Automated Metering Infrastructure (AMI) and Meter Data Management
  - Distributed Energy Resource Management (DERM)
- Increase the deployment of distributed generation and microgrids throughout New York
- Make the grid electric vehicle ready

Design rate structures and create incentives to encourage distributed generation and smart grid investments.

- Price energy markets to all customers in real time to maximize grid efficiency and enhance resilience
- Communicate real-time pricing and advanced metering to rate payers so they understand how these savings are generated

Recommendation #4

Diversify fuel supply, reduce demand for energy, and create redundancies.

- Facilitate greater investments in energy efficiency and renewable energy
- Diversify fuels in the transportation sector
- Support alternative fuels across all sectors
- Lower the greenhouse gas cap through the Regional Greenhouse Gas Initiative (RGGI)

Recommendation #5

Develop long-term career training and a skilled energy workforce.

- Create a workforce development center with utilities
- Expand energy career training and placement programs
- Promote awareness of the need for skilled energy workers
- Coordinate workforce development among all stakeholders within the energy sector

Status of Recommendations

- Fuel NY initiative to provide residents and first responders access to fuel during emergencies with up to $17M in federal Sandy relief funding to help retail gas stations improve back-up power capacity to stay open in storms.¹
- Governor Cuomo announced action through federal Community Reinvestment Act to spur over $3B of private investment to finance resilient infrastructure and other projects in storm-impacted communities.²
- Governor Cuomo launched New York Green Bank initiative to improve capitalization process for clean energy projects with $165M in initial funding.³
  - Later added $45M from RGGI.⁴

Governor Cuomo announced over 250 downstate gas stations installing back-up power capacity to prepare for future emergencies

Draft State Energy Plan released Jan. 7, 2014 with goals:

- Improving energy affordability
- Unleashing the power of private sector energy financing
- Providing a more resilient, flexible, and clean power grid
- Giving customers more control over their energy use
- Aligning energy innovation with market demand

$1.4 billion in FEMA federal recovery funds committed to strengthen Long Island’s power utility system

Status of Recommendations

• PSC is required to approve electric emergency response plans filed every December by electric corporations
  1
• Established a State Strategic Gasoline Reserve on Long Island with 3 million gallons of fuel for residents and first responders
  2
• NYPA released Strategic Plan, calling for infrastructure changes driven by:
  3
  • Development of new technologies like solar power, electric vehicles, and smart grid
  • Awareness of environmental issues
  • Changes in structure of energy markets, economic growth, and new demands for energy

ConEd Rate Cases: Filing Made Jan. 25, 2013

- Consolidated Edison’s electric, gas, and steam rate cases (13-E-0030, 13-G-0031, 13-S-0032) were filed with the PSC on January 25, 2013
- Include proposals for a $1B investment in new capital initiatives for 2013 – 2016 to mitigate impacts of extreme weather
- Goals:
  • to reduce time for service restorations to customers
  • to make delivery and generation structures and equipment more resistant to weather events
- ConEd requested rate changes for an additional $375 million in revenue: ¹
  • 3.3% increase for electric rates
  • 1.3% increase for gas rates
  • 10.1% decrease for steam rates
- ConEd also requested permission to return to the PSC for approval of further rate increases to be effective in January 2015 ²

## ConEd Planned Capital Expenditures for Storm Hardening

<table>
<thead>
<tr>
<th>($ Millions)</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric Substations</td>
<td>30.0</td>
<td>60.0</td>
<td>70.0</td>
<td>80.0</td>
<td>240.0</td>
</tr>
<tr>
<td>Electric Network Distribution</td>
<td>21.0</td>
<td>72.5</td>
<td>60.5</td>
<td>52.0</td>
<td>206.0</td>
</tr>
<tr>
<td>Electric Overhead Distribution</td>
<td>19.6</td>
<td>15.0</td>
<td>115.0</td>
<td>112.0</td>
<td>261.6</td>
</tr>
<tr>
<td>Transformers</td>
<td>10.0</td>
<td>12.5</td>
<td>11.3</td>
<td>11.4</td>
<td>45.2</td>
</tr>
<tr>
<td>Electric Transmission</td>
<td>3.9</td>
<td>4.9</td>
<td>2.0</td>
<td>2.0</td>
<td>12.8</td>
</tr>
<tr>
<td>Electric and Steam</td>
<td>18.4</td>
<td>42.8</td>
<td>51.5</td>
<td>52.3</td>
<td>165.0</td>
</tr>
<tr>
<td><strong>Generation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gas and Tunnels</td>
<td>2.1</td>
<td>6.8</td>
<td>41.6</td>
<td>51.7</td>
<td>102.2</td>
</tr>
<tr>
<td>Telecommunications</td>
<td>0.0</td>
<td>1.3</td>
<td>2.7</td>
<td>2.6</td>
<td>6.6</td>
</tr>
<tr>
<td>Facilities</td>
<td>0.0</td>
<td>0.0</td>
<td>5.0</td>
<td>5.0</td>
<td>10.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>105.0</td>
<td>215.8</td>
<td>359.6</td>
<td>369.0</td>
<td>1,049.4</td>
</tr>
</tbody>
</table>

Parties to the Storm Hardening and Resiliency Collaborative Report

• PSC staff
• ConEd
• New York State Office of the Attorney General
• New York Department of State Utility Intervention Unit
• New York Department of Environmental Conservation
• City of New York
• County of Westchester
• Environmental Defense Fund
• Pace Energy and Climate Center
• Columbia Center for Climate Change Law
• NYU School of Law
• New York Energy Consumers Council

Storm Hardening and Resiliency Collaborative Report

- ConEd and collaborative parties released the report Dec. 4, 2013
- Resulting feedback and insights from collaborative parties:
  - Design standard for protection and equipment and locations affected by flood
  - Modification of ConEd’s risk assessment model for storm hardening projects
  - Consideration of the impact of climate change on storm resiliency plans
  - Design resiliency into capital investments and operating practices
- Future agenda of the collaborative parties:
  - Conduct ConEd’s 2014 Climate Change Vulnerability Study
  - Examine ConEd’s storm hardening project plans under development for 2015
  - Consider potential alternative strategies to mitigate effects of extreme weather on ConEd customers
  - Quantify leakage rate of Type 3 natural gas leaks and reduce backlog of leaks
  - Develop a formal economic cost/value model that can be applied to storm hardening projects

Joint Agreement, Issued Dec. 31, 2013

- Joint agreement between PSC staff, ConEd, and other parties freezes electric rates for two years and gas and steam rates for three years
- Requires the same $1 billion investment in storm hardening and resiliency
- All customers will see a rate freeze, and most commercial and industrial customers will actually see a rate decrease

Parties to the Joint Agreement

- PSC staff
- ConEd
- City of New York
- New York Power Authority
- New York State Department of Consumer Protection Utility Intervention Unit
- Consumer Power Advocates
- New York Energy Consumers Council
- Environmental Defense Fund
- Columbia Center for Climate Change Law
- Pace Energy and Climate Center
- NRG Energy, Inc.
- US Power Generating Company

Freezes electric rates for two years and gas and steam for three years beginning Jan. 1, 2014 – same as Joint Agreement

Requirements for ConEd:
- Invest $1 billion in storm hardening and resiliency over the next four years
- Expand leak-prone pipe replacement program in flood zones
- Conduct study on methane leak reduction
- Conduct study on feasibility and cost-effectiveness of a microgrid system

Results in a $30.1 million credit to electric consumers available in Rate Year 3 (Jan. 1 – Dec. 31, 2016) to offset future rates
- ConEd can change electric rates for RY3
- But if ConEd chooses not to, PSC would apply the $30.1 million credit and rates would increase 0.15% automatically

bit.ly/1iFqyhJ.
Customer Restoration-90 (CR-90) Framework

- **CR90** - The definition is the number of hours it takes from the start of the outage event to restore power to 90 percent of the customers of a given utility.

- **CR95, CR85, CR80** etc. are also possible. Different customer classes (e.g., industrial, commercial and residential) or geographies would have different curves.

- The cost to reduce the CR-90 would comprise the amortized capital costs of certain “hardening” and related investments, as well as the “extra” O&M costs associated with extra tree trimming, more trucks, more crews, etc to maintain the given CR-90 level.

- The “extra” O&M is above and beyond the standard reliability expenses for these items that a utility incurs.
Mathematically Solving For “Optimal” Resiliency Investment Strategy

CR-90 (Customer Restoration, 90th percentile), is a measure of reliability. It refers to the time post impact that service is restored to 90% of customers.

- Each utility can determine its own CR-90 or other measure of reliability.
- Note: Cost estimates are for illustration only

Outage Cost likely not linear and will vary by customer class
Selected Bibliography

- *Critical Infrastructure Interdependency and Vulnerability Analysis*, ICF International, prepared for the NYS Division of Homeland Security and Emergency Services, August 2012
- *New York State Transportation Fuels Infrastructure Study*, ICF International, prepared for the New York State Energy Research and Development Authority, September 2012
Phil Mihlmester

Executive Vice President
Global Energy Sector Lead
ICF International

philip.mihlmester@icfi.com