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.	CASE 13-E-0030

DIRECT TESTIMONY
OF
PAUL CENTOLELLA
VICE PRESIDENT OF ANALYSIS GROUP
on behalf of
ENVIRONMENTAL DEFENSE FUND

Dated: May 31, 2013

New York, New York

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I. Introduction and Qualifications

Q. Please state your name and business address.

A. I am Paul Centolella and my business address is Analysis Group, 111 Huntington Avenue, Tenth Floor, Boston, MA 02199.

Q. Would you please summarize your professional experience?

A. I joined Analysis Group as a Vice President in the firm's energy practice in July 2012. My practice focuses on issues related to utility regulation, electricity markets, and technological innovation. Analysis Group is an economic, financial, and strategy consulting firm with approximately six-hundred employees and nine offices in the United States as well as offices in Montreal and Beijing. I previously served as a Commissioner on the Public Utilities Commission of Ohio from 2007 to 2012. As a Commissioner, I served as a member of the National Association of Regulatory Utility Commissioners (NARUC) Smart Grid Working Group; the NARUC Energy Resources and Environment Committee; the NARUC Climate Change Task Force; the NARUC – Federal Energy Regulatory Commission Smart Response, Smart Grid, and Demand Response Collaboratives; and the U.S. delegations to the 2009 and 2012 World Forums on Energy Regulation. Prior to being appointed to the Commission, I was a Senior Economist in the Energy Solutions Group of Science Applications International Corporation (SAIC), a Fortune 500 services and technology company. At SAIC from 1992 to 2007, I managed major projects related to analysis and design of energy and environmental markets, utility regulation, energy policy, management practices, and power system operations including grid modernization and deployment of real-time information systems. From 1982 to 1992, I was a Senior Utility

Attorney and the Senior Energy Policy Advisor in the Office of the Ohio Consumers' Counsel, the state's residential utility consumer advocate. I also have practiced law in California and Washington State.

I have served on a number of boards and advisory committees including: the Secretary of Energy's Electricity Advisory Committee, an Advisory Committee for the Bipartisan Policy Center's initiative on Cyber Security Governance in the Electric Sector, the Board of Directors and Governing Board for the Smart Grid Interoperability Panel, the Electric Power Research Institute Advisory Council, the Board of the Organization of PJM States, the U.S. Delegation to the 2011 Asia-Pacific Economic Cooperation Senior Officials Meeting, and the Technical Advisory Committee for the Ohio Coal Development Office.

II. Summary of Testimony

Q. What is the purpose of your testimony?

A. My testimony will address issues related to enhancing grid resilience including Consolidated Edison's (CECONY or the Company) planning for its transmission and distribution system; optimizing demand, including CECONY's proposal to extend Automated Meter Reading; and research, development, and demonstration spending including the Company's proposed cuts in smart grid related R&D.

Q. Can you please provide a brief summary of your testimony?

A. In portions of its system, the Company is taking positive steps to protect assets from the corrosive effects of saltwater and harden elements in the aftermath of Superstorm Sandy. Sandy interrupted electric service to approximately 1,150,000 Consolidated Edison customers. Moreover, Sandy, the October 2011 snowstorm, tropical storm

Irene in August 2011, and the March 2010 Nor'easter each interrupted power to more of the Company's customers than any prior storm. These events underscore the system's vulnerabilities and the importance of adapting to a future in which the City could experience more severe weather events. The Company needs a plan for adaptation to the potential impacts of climate change and to further enhance grid resilience including through the integration of distributed resources and advances in grid modernization.

The Company also faces the challenges associated with financing increased investment, improving its asset utilization, integrating distributed and variable renewable generation, and reducing greenhouse gas emissions. The Company needs a broad strategy for enabling price responsive demand to help meet these challenges. This demand response strategy offers compelling economic and customer benefits. It also can enhance system resilience and help offset cost increases associated with climate adaptation.

The Company operates a complex distribution network that will become increasingly dynamic with the growth of distributed generation and responsive demand. To remain effective as a system operator and take advantage of advances in technology, the Company should be pursuing an expanded research and development program. And, the Commission should adopt policies that support innovation.

CECONY is operating in an environment of rapidly changing technology, customer expectations, and regulatory requirements. The Company tells its own employees that the "business landscape is changing" and "business as usual is not a sustainable

business model for the future."[1] Yet in some areas, the Company is proposing incremental approaches or imposing financial constraints that are not aligned with longer term strategies and are likely to produce uneconomic results, by:

- Failing to identify approaches that might deliver greater value per dollar expended;
- Addressing issues in isolation, without considering the necessary components of a successful strategy; or
- Making investments that either will become obsolete or foreclose other options, without consideration of the real costs associated with giving up those options.

My testimony recommends changes in Company planning and rates to bring them into alignment with its strategic objectives of reliable service and efficient use.

Q. Would you please define what you mean by enhanced resilience?

A. A resilient system has the ability to rebound from disruptive events. A resilient electric grid would be designed to maintain service to critical and other highly valued uses of power and to enable rapid service restoration. While hardening is one way to improve resilience, sensors, controls, distributed resources, and microgrids also can create a more resilient power system.

Q. Would you please summarize your recommendations related to enhancing grid resilience?

[1] CECONY, Management Audit Panel Testimony at 20.

In the area of planning for grid resilience:

- The Commission should direct CECONY to develop and file a revised long-term plan that includes a strategy for enhanced grid resilience and adaptation to the potential impacts of climate change, including storm surge, sea level rise, more severe storms, and extreme heat.
- To help identify where customers today can and would support additional investments to enhance resilience, the Company should be directed to file with its revised long-term plan a study of the value of uninterrupted service to different segments of its customers. Consistent with the recommendation of the Liberty Consulting Group's management audit that CECONY analyze capital projects based on their economic value, the study's results may be utilized to help guide investments and, as appropriate, adjust future cost allocations and customer class definitions.
- To create a more resilient and efficient system, the Commission should give equitable consideration to the system benefits offered by distributed generation when setting standby tariffs.

Q. Would you please describe what you mean by price responsive demand?

A. The term price responsive demand refers to the electricity used by end use devices which either themselves, through an energy management system, or from a curtailment service provider can receive price or comparable control signals and respond to market and grid conditions. At a later point in my testimony, I will discuss how appropriate policies and emerging technology could rapidly accelerate the growth of price responsive demand outside of current demand response programs.

Q. Would you please summarize your recommendations related to price responsive demand?

A. With respect to price responsive demand:

- The Company should be directed to propose a plan to transition, within a defined time frame, to dynamic retail pricing that reflects the real time cost for the supply and delivery of power. The plan should lead to default pricing which, at least in part, reflects competitive wholesale energy prices and should remove barriers to competitive retail energy service companies marketing and implementing dynamic pricing plans. The plan should reflect a comprehensive strategy with initial steps focused on developing tools that will enable customers to efficiently respond to dynamic pricing and on the Company's metering, billing and other systems.
- Given the risk that the Company's planned AMR deployments may become obsolete or foreclose other options, the Commission should direct CECONY to suspend further AMR deployments pending a prompt Commission review of the Company's advanced metering plans.

Q. Would you please summarize your recommendations with respect to the Company's research and development program and related regulatory policies?

A. With respect to research, development, and demonstration programs:

- The Company has set financial constraints on its research and development program and is proposing sharp cuts in smart grid related research and development. This is inconsistent with the further development of the

utility's ability to act as an effective system operator for an increasingly dynamic distribution system. The Company should be directed to include in a revised long-term plan an expanded research, development, and demonstration program to support continued grid modernization and accelerate its ability to take advantage of emerging technology.

- To ensure that it is taking advantage of the best new ideas, the Company should consider, as part of an expanded grid resilience research, development, and demonstration program, a competitive solicitation enabling third parties to propose innovation partnership projects.
- The Commission should authorize separate accounting for and establish a tracker mechanism to fund incremental research, development, demonstration, and competitive innovation partnership programs.

Q. Are any other topics addressed in your testimony?

A. I briefly comment on the Company's proposal for settlement discussions on a multi-year rate plan. A properly structured multi-year agreement can more closely approximate the incentives for efficiency, investment, and innovation that would be found in a competitive market.

III. <u>Adaptation and Grid Modernization</u>

Q. Does public policy in New York recognize the risks created by climate change and the need for the Company to take measures to adapt to its potential impacts?

A. Yes, the 2010 report of the New York City Panel on Climate Change, a panel of experts convened by the Mayor, found that, "Temperature increases and sea level rise

are already occurring and, along with other climate changes, will continue to occur and accelerate in the future."[2] The panel further concluded that, "Investments are needed to begin the climate change adaptation process even in times of economic downturn. Both the public and private sectors should make investments today to minimize climate risks that they currently face and that are projected to grow in the future. Historical climate precedents are no longer valid for long-term environmental planning."[3]

In the aftermath of Superstorm Sandy, the Governor appointed a twenty-eight member commission representing a broad cross section of experts and representatives from business, government, labor, and environmental organizations to evaluate how to improve the strength and resilience of New York State's infrastructure.[4] The NYS2100 Commission concluded that:

> "After the damage inflicted by recent extreme storms, it is clear that New York State must prepare for a new normal. Planning for the future will never again mean the same thing. The recent storms are not anomalies. They represent further evidence in a developing pattern: an increased frequency and intensity of severe weather attributable to climate change."[5]

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[2] New York City Panel on Climate Change, "Executive Summary of Climate Change Adaptation in New York City: Building a Risk Management Response," *Ann. N.Y. Acad. Sci.* 1196 (2010) at 8.
[3] *Ibid.*
[4] Environmental Defense Fund President Fred Krupp was a member of the NYS2100 Commission.
[5] NYS 2100 Commission, *Recommendations to Improve the Strength and Resilience of the Empire State's Infrastructure* (2013) at 20.

The Commission's report goes on to document expert projections of sea level rise in New York City of as much as six feet under certain scenarios, increases in average temperature of four to ten degrees, and more frequent and intense severe weather events before the end of this century.[6]

Q. Does either the Company's filing in this case or its 2012 Integrated Long-Range Plan represent a reasonable plan for adapting to the potential impacts of climate change?

A. The hardening measures that the Company is undertaking represent a first step, but represent less than a comprehensive plan. While Company representatives have participated in statewide technical discussions on adaptation, the Company's April 2012 Integrated Long-Range Plan does not mention adaptation for the impacts of climate change. The Commission should direct the Company to file a revised plan addressing climate change adaptation.

Q. What should be considered in a plan for adapting to the risks presented by climate change?

A. The following are among the factors which should be considered:

- The Company should work with technical experts to track indicators of climate change related risks and both establish near term adaptation requirements and identify forward looking indicators of risk and the need for additional adaptation measures.

[6] *Ibid.* at 19.

- The Company should adopt an appropriate economic framework for evaluating investments that could mitigate the potential impacts of climate change and enhance grid resilience, including consideration of the value of uninterrupted service to customers. A study of the value of uninterrupted service to different segments of customers may well identify places where additional investments would be justified and could be supported in large part by the customers who would most directly benefit.
- To help create a more resilient system, the Company should continue to invest in grid modernization and develop its operational capabilities to efficiently operate a dynamic distribution network and integrate distributed resources and responsive demand into network operations. The plan should support an expanded research, development, and demonstration program on grid modernization and resilience.
- To ensure that it is taking advantage of the best new ideas, the Company should consider, as part of an expanded grid resilience research, development, and demonstration program, a competitive solicitation for innovation partnership projects.
- As described at a later point in my testimony, to reduce expenditure requirements and provide a beneficial response to disruptive events, the Company should pursue a broad strategy to optimize demand response.

Q. How can the Company improve its consideration of climate related risks?

A. The Company initiated its Enterprise Risk Management (ERM) program in 2005. However, a major theme of the 2009 Liberty Consulting Management Audit was the continuing need for CECONY to develop a capability to get out in front of external

risks and a strategic vision that would enable the Company to become less reactive. The Audit found that:

> "CECONY typically operates in a reactive mode. External events, particularly incidents and accidents, are the primary drivers of its activities. Within the operating organizations, there appears to be an awareness of the major risks facing them, but the Company is unwilling or unable to get out in front of them. An overarching conclusion of this audit was that CECONY needs to develop a long range vision for its electric business, in order to provide a basis for defining long-term network goals, and to identify major system needs and long-term programs required to meet the network goals."[7]

The Company's testimony indicates that, in response to the 2009 Management Audit, the Company expanded its ERM program by developing departmental level risk profiles and new guidance for risk indicators, and by integrating enterprise risks further into its planning and budget processes. However, there is no indication of a specific assessment of climate change related risks. The Company was not prepared to protect system assets from an event the size of Superstorm Sandy. A revised plan should include both an assessment of current risks and near term investment requirements for different likely climate change related impacts and a means to track and respond to forward looking indicators of climate related risks.

Q. How can CECONY improve the economic framework that it uses to evaluate transmission and distribution investments?

[7] Liberty Consulting Group, *Final Report Management Audit of Consolidated Edison Company of New York, Inc.* (June 16, 2009) at I-11.

A. All of the Company's customers are entitled to adequate and reliable service. And, current levels of reliability should be maintained. Additionally, considering the value of enhanced reliability to different segments of customers may help identify the places where additional investments in resilience and adaptation would be justified and could be supported largely by the customers who could most directly benefit. Consideration of the value of uninterrupted service is relevant in benefit cost analyses. Moreover, there can be important system and societal benefits to ensuring service continuity to high value loads.

The value of uninterrupted service can vary significantly both within and between customer classes. There also can be important differences by region, season, timing and duration of outages.[8] Understanding these differences can play an important role in determining whether investments would be cost effective and in setting investment priorities.

The range of differences in outage costs for different customers is illustrated in part by an often cited Department of Energy report.[9] Consolidating outage cost estimates from nine utilities, the study finds that the cost of an eight hour outage on a summer afternoon, in 2008 dollars, to be $10.70 for an average residential customer, $4,768 for an average small commercial and industrial customer, and $93,890 for an average large commercial and industrial customer. However, within the large

[8] Centolella, et al., *Estimates of the Value of Uninterrupted Service for the Midwest Independent System Operator,* Midwest Independent Transmission System Operator (April 2006).

[9] Sullivan *et. al*. "Estimated Value of Service reliability for Electric Utility Customers in the United States" Ernest Orlando Lawrence Berkeley National Laboratory, June 2009 at xxiv.

commercial and industrial class, the study finds that the cost of such an eight hour outage might range from $41,250 for an average agricultural customer, to $147,219 for average customers in finance, real estate and insurance, and up to $214,644 for an average customer in construction.[10] Individual customer impacts can be much higher. I am not suggesting that the estimates of outage costs from the Department of Energy study should be used in CECONY planning. Indeed, the results of Department of Energy study may be conservative in the context of New York City. However, they illustrate that different customers will be impacted differently when their service is interrupted.

I am not aware of a well-developed estimate of the costs to CECONY customers from the interruption of electric service associated with Superstorm Sandy. However, these costs were clearly substantial. Appropriate consideration of the value of uninterrupted service might change investment planning and support the development of microgrids or other investments in areas where reliability is particularly important to customers. The Company and regulators could gain valuable insights by applying contemporary market research and customer segmentation methodologies to better understand how different customers value uninterrupted service.

Q. Did you find any indication in the Company's testimony that it had used estimates of how customers value uninterrupted service in planning reliability enhancements?

[10] *Ibid.*at xxiii.

A. No, I did not. While it is not uncommon for utility planners to consider judgments regarding the criticality or importance of different loads or circuits, I did not find indications that the Company had estimated or considered the value of uninterrupted service in the systematic manner that would be appropriate given the level of investment required. The testimony of the Infrastructure Panel indicates that the management used a numerical ranking methodology, and it is possible that manager rankings might have incorporated informal judgments regarding value to customers. However, other portions of the Panel's testimony suggest that the Company's objective was to maintain existing levels of reliability at the lowest cost and not to pursue further enhancements that could deliver value to customers in excess of the dollars expended.

Q. Is consideration of the value of investments to customers consistent with the recommendations of the Liberty Consulting Group's management audit?

A. Yes, the management audit recommended that, "CECONY should analyze all of its capital expenditure projects and annual capital programs with long-term economic analysis that provides common value metrics. Such analysis and metrics demonstrate and compare the economic value of various projects or programs to the company and, in turn, its customers."[11]

Q. What action should the Commission take in this case with respect to ensuring the Company is in a position to consider the value to customers of its capital investment program?

[11] Liberty Consulting Group, *Final Report Management Audit of Consolidated Edison Company of New York, Inc.* (June 16, 2009) at XI-45.

A. The Commission should direct the Company to conduct a value of uninterrupted service study and report the results when it provides its revised Long-term Plan. In an environment where customer service expectations are changing and there is a need for increasing investment, it is not appropriate for the Company to consider only the least cost approach to deliver current levels of reliability. In the absence of data on customer value, the Company is not in a position to evaluate whether other approaches may be available that would provide customers greater value per dollar of expenditure.

Q. How should the utility balance investments that deliver value to customers with concerns about impacts on utility rates?

A. As a former regulator, I appreciate the Company's concern with rate impacts and reinforcement of a culture of cost consciousness. However, the appropriate test for making investments is not whether it represents the lowest cost means to deliver current levels of reliability or adequate service. Investments may be justified that deliver value to customers in excess of their costs. With a greater understanding of how customers value uninterrupted service, regulators will be in a better position to allocate the costs of such investments to those who will benefit and are able to pay for the achievement of those benefits.

Q. In what areas should the Company continue to invest in grid modernization and develop related operational capabilities?

A. Grid modernization, including the effective integration of sensor, communication, control, and information technologies, is a key approach for achieving enhanced reliability and resilience. The Company should be accelerating its pursuit of

comprehensive grid modernization. In addition to deployment of advanced distribution automation and other sensor, communication, and control systems, the Company's grid modernization program should include the integration of both distributed generation and price responsive demand into the planning for and operation of its transmission and distribution system. Additionally, the Company should be further developing its capability to function as an effective system operator for a networked distribution system with enhanced islanding capabilities, real-time pricing for distributed resources, and responsive demand.

The Company's investment plan includes some key elements of grid modernization. This is reflected, for example, in the Company's Third Generation System of the Future Initiative, its Asset Management and Smart Grid programs, and its Information Technology Capital Programs and Projects. However, other elements of grid modernization that would contribute to enhanced reliability and resilience, including the integration of distributed generation and price responsive demand, are not effectively advanced in the Company's proposals in this case.

Q. Will there be greater adoption of distributed and dispersed generation?

Distributed generation and dispersed back-up generators will become increasingly widespread. CECONY forecasts the addition of 75MW of distributed generation by 2017. This forecast could prove conservative. The rate of adoption of distributed generation could accelerate and a growing share of these resources could come from less polluting technologies. The cost of photovoltaic systems has fallen significantly and is expected to continue to decline over the remainder of the decade. The reduction in natural gas prices accompanying the development of shale gas reserves

and continuing improvements in technology have made combined heat and power (CHP) and small gas turbines increasingly attractive alternatives. Increasing customer attention on reliability and resilience also appears to be leading to greater adoption of dispersed and distributed generation.

Q. The Company's infrastructure panel's testimony indicates that, "… DG capacity does not provide a benefit at the distribution-system level as we must provide Standby power to the DG customer." Does this reflect a full integration of distributed generation into distribution planning?

A. While the panel's testimony goes on to address protocols which the Company would utilize in the event that a distributed generator was not in service on a summer peak day, this passage seems to reflect what the Company's witnesses have characterized as second generation design – that is, the development of multiple supply paths to serve load, but without participating in asset sharing approaches, enabled by enhanced monitoring and switching. Properly integrated into the operation of the distribution system, distributed generation can function as a substitute for distribution investments that otherwise would be required. The infrastructure panel later appears to acknowledge this opportunity indicating that, "adding [distributed generation] to the Company's many options for achieving load reductions will help us move towards a more probabilistic, multi-solution approach to capital planning and infrastructure avoidance."[12]

Q. Does distributed generation provide grid reliability and resilience benefits?

[12] CECONY, *Infrastructure Panel Testimony* at 366.

A. Yes. First, distributed generation can continue to serve critical or high value loads during a major disruptive event. It offers the direct benefit of maintaining service to such customers. And, in doing so, it provides important system and societal benefits. During a major event, utilities would normally give priority to restoring service to critical or some other high value loads. Depending on actual conditions, focusing on rapidly restoring service to these facilities may be inconsistent with minimizing service interruptions to the customer population as a whole. If critical and other high value loads continue to be served with distributed generation, the utility can redirect resources and reduce the service restoration time for other customers. Moreover, many critical and other high value loads provide services that are important to the public during a major outage or other disruptive event. Access to medical care, public safety services, telecommunications, food, water, fuel, transportation, and other essential services may be maintained where appropriately configured distributed generation is present to support these services during a major event impacting the city.

Second, in the networked distribution system, distributed generation can provide additional options for serving load when parts of the network reach capacity or service in portions of the system may be interrupted. Third, when fully integrated into an advanced distribution network, distributed generation can permit sections of the grid to be structured and function as microgrids that can remain operational when separated from the larger system.

Q. Given the system and societal benefits of distributed generation, is the Company's proposal to modify mandatory standby rates for distributed generation in this proceeding appropriate?

A. The Company is proposing to set the contract demand for mandatory standby service to customers with distributed generation so as to take into account the customer's maximum potential demand assuming that its distributed generators were not operating on a peak day. While I understand the Company's desire to avoid cross-subsidization, the treatment of standby rates for customers who do not qualify for net metering should take into consideration that distributed generation provides reliability benefits to the system which, in part, can benefit other customers. In a fully integrated distribution level market, the customer with distributed generation could benefit from congestion and scarcity pricing on the distribution system. However, in the absence of such a distribution level market, the Commission should give equitable consideration to the benefits that distributed generation provides to the system in setting standby rates.

Q. Does price responsive demand produce system reliability and resilience benefits?

A. Price responsive demand provides important efficiency and customer choice benefits that I address at a later point in my testimony. These efficiency and customer choice benefits provide a compelling basis for the Company to adopt a more comprehensive demand response strategy. Additionally, when the system is impacted by an event that disrupts planned or normal operations, responsive demand also can help maintain system reliability. To the extent that devices incorporate an automated response to

next interval or real-time price signals, responsive demand will introduce a beneficial feedback by reducing demand precisely when and where a reduction is needed to alleviate grid congestion or resource scarcity. When compared to conventional options, price responsive demand may respond more rapidly and provide a response closer to where it is needed to efficiently resolve a reliability issue.

Q. What have been CECONY's plans with respect to facilitating and integrating distributed generation and demand response?

A. In 2010, the Company conducted outreach sessions with residential and commercial customers and developed a strategy described in the Company's 2010 Integrated Long Range Plan (2010 ILRP). This plan was the first to integrate transmission and distribution planning and incorporate demand-side solutions and renewable resources. The plan included a "full portfolio of programs to actively manage customer demand, diversify supply sources, and improve [the Company's] environmental profile" and major electric system initiatives for the Company to:

- "Expand [the Company's] role as an energy advisor to customers to aid them in managing their energy expenditures through energy efficiency demand response programs.
- Facilitate and integrate distributed generation to provide choices for customers and increase the penetration of clean distributed generation, including renewables such as rooftop photovoltaics, through customer and utility owned applications with benefits for the electric system.
- Support new infrastructure to facilitate plug-in electric vehicle deployment (and other emerging end-use applications) and potential storage and vehicle-

to-grid applications through a series of pilots, working with industry associations, manufacturers and customers. …

- Invest in the cost-effective deployment of an advanced metering infrastructure (AMI) for the implementation, measurement, and dispatch of the aforementioned demand- and supply-side resources.
- Seek to incorporate renewable supply sources into the grid, including developing partnerships to investigate new technologies and building new transmission lines where necessary for reliability or which are the most cost-effective solutions (compared to generation or demand side management)."[13]

The Company also planned to "empower customers with information and tools to manage their energy bills by expanding time-based pricing and offering more diverse energy efficiency programs."[14]

Q. How are these initiatives reflected in the Company's more recent plans?

A. The Company's April 2012 Integrated Long Range Plan (2012 ILRP), as a subset of one of five strategic priorities, indicates that "energy-efficiency, demand-side management, distributed generation, combined heat and power, and renewable generation" are among the customer-sited solutions already identified as central to the Company's plans. However, there are new elements in the 2012 ILRP that could limit the development and integration of distributed generation and demand response.

- The 2012 plan introduces a discussion of the standby charges which the Company has proposed in this proceeding.

[13] conEdison, *Electric System Long Range Plan 2010-2030* (December 2010) at 12.
[14] *Ibid.* at 21.

- While the 2012 plan mentions the use of different methods (e.g. bill inserts, Interactive Voice Response messaging, the website, etc.) to "increase customers' awareness of Energy Savings Tips, Time Based Pricing, and Energy Efficiency Programs," it does not propose any expansion of time-based pricing or associated tools to empower customers to take advantage of differences in the cost to provide power at different times.
- The plan appears to back away from the commitment to invest in cost-effective advanced metering infrastructure or AMI.

AMI can provide two-way communication capabilities to support the integration and track the operation of distributed generation. AMI can provide detailed information on customer load patterns, enabling customers with price responsive demand to directly benefit from time-differentiated or dynamic pricing. AMI also enables customers to obtain more detailed and timely feedback regarding how their actions and use of intelligent technology may be improving their load patterns and helping them control their costs. These capabilities typically are not available with Advanced Meter Reading or AMR technologies. Most AMR meters record energy usage between readings without gathering interval usage or other detailed data and are read through a short distance transmission when the utility's meter reading vehicle periodically drives through the neighborhood and pings the meter to transmit data.

The 2012 ILRP does not include plans to conduct cost – benefit analyses of AMI or expand saturated deployments of AMI, and instead states that:

> "Automated meter reading and smart metering technologies offer an array of benefits including opportunities for energy conservation and

cost savings. While we will employ a cost benefit model to identify areas where automated meter reading will save meter reading costs, we will also explore the interest of individual customers in investing in metering equipment and services that will provide them with opportunities to better manage their energy costs. As necessary we will work with regulators to implement rates and programs that utilize advanced metering technologies."[15]

Q. Are the changes that you have observed between the 2010 and 2012 ILRPs reflected in the Company's filing in this case?

A. Yes. The Company is proposing changes to distributed generation standby charges that were foreshadowed in its 2012 ILRP. It has proposed changes to its Voluntary Time of Use (VTOU) rate which could narrow the application of that tariff and make it less attractive to some customers. It is proposing not to expand Mandatory Hourly Pricing (MHP). And, it has not proposed a broader strategy for moving toward time-varying or dynamic pricing. Finally, the Company is proposing to expand the deployment of AMR and does not include any benefit-cost evaluation for further deployments of AMI.

Q. Are these changes consistent with the recommendations of Governor Cuomo's NYS2100 Commission?

A. The Company's 2012 ILRP and its proposal in this case do not appear to be directionally consistent with the recommendations of the NYS2100 Commission.

[15] Consolidated Edison Company of New York, *Integrated Long-Range Plan* (April 2012) at 133.

The Commission had five top level recommendations to improve the resilience of the energy system:

1. Strengthen critical energy infrastructure;
2. Accelerate the modernization of the electrical system and improve flexibility;
3. Design rate structures and create incentives to encourage distributed generation and smart grid investments;
4. Diversify fuel supply, reduce demand for energy, and create redundancies; and
5. Develop long-term career training and a skilled energy workforce.[16]

In recommending that utilities accelerate the modernization of the electrical system, the NYS2100 Commission calls for a reevaluation of the Public Service Commission's "relatively conservative approach" to deploying smart grid technology.[17]

The NYS2100 Commission found that utilizing distributed generation resources can improve reliability for customers as it "reduces dependence on the electric distribution system that is susceptible to damage during a natural disaster," and that for critical customers microgrids are the "natural evolution of distributed resources"[18] and "provide resilience through redundancy in the power supply system."[19]

[16] NYS 2100 Commission, *Recommendations to Improve the Strength and Resilience of the Empire State's Infrastructure* (2013) at 80.
[17] *Ibid. at 95.*
[18] *Ibid.*
[19] *Ibid*. at 97.

The NYS2100 Commission found with respect to time-differentiated or dynamic pricing and advanced metering that:

> "Employing a utility rate plan based on prices that vary by time-of-use, and reflects the actual cost of energy in near real-time, coupled with advanced metering could improve electric system efficiency by reducing peak demand. Under this rate design, consumers can shift loads to periods of low demand and pay a lower price for electricity — this could provide system-wide leveling of demand and reduce the need for additional infrastructure to meet what would otherwise be higher peak demand."[20]

It recommended that, "[t]he PSC should work with utilities to develop these market mechanisms," and "the State should consider requiring electricity to be priced to reflect the real-time cost."[21] It further recognized the need for customer education; encouraged due consideration of impacts on elderly, disabled, and low income customers; and noted certain statutory limitations. It stated that "to encourage greater deployment" of AMI and other smart grid technologies "the PSC should factor in resiliency benefits in cost justifications."[22]

IV. Price Responsive Demand

Q. Have you reached any conclusions regarding the Company's positions on variable pricing and meter deployments?

[20] *Ibid.* at 104.
[21] *Ibid.*
[22] *Ibid*. at 97.

A. Yes. I find that the Company needs to begin implementing a strategy that will facilitate a transition to dynamic retail pricing reflecting the real-time costs of power supply and delivery. This strategy should begin with the development and deployment of tools that will enable automated responses by electricity using devices in homes and businesses and create an efficient architecture of meaningful choices for customers. This strategy should both lead to default pricing that, at least in part, reflects the real-time cost of electric usage and facilitates efficient dynamic pricing offers by competitive energy service providers.

Additionally, I find that the Company's failure to address the benefits and costs of AMI and its decision to proceed with deployments of AMR without an explanation as to how its AMR technology could support distributed generation and demand response are unreasonable. By continuing to deploy AMR without a well-defined path for achieving benefits associated with distributed generation and demand response, the Company risks making its current AMR investments rapidly obsolete. Moreover, by investing in AMR today it is giving up the option to move from standard meters to AMI in the future. Surrendering this option has real and potentially very significant costs which do not appear to have been factored into the Company's analysis.

Q. Why is it important to pursue a transition to dynamic retail pricing that reflects the real-time cost of power supply and delivery?

A. Dynamic pricing that reflects real-time changes in the cost of electricity will encourage efficient use, improve utility asset utilization, flatten loads reducing investment requirements and total customer costs, enhance system reliability and grid

resilience, facilitate the integration of variable renewable resources, provide appropriate pricing for charging electric vehicles, incent cost-effective innovation including energy storage, and help mitigate market power. Moreover, unlike conventional demand response programs, dynamic pricing can create an efficient response to changing prices and grid conditions in all hours throughout the year.

There is a more fundamental reason for regulators to support this transition. The basis for utility regulation is that the utility is a monopoly and customers must be protected from a monopoly's incentives to increase prices and reduce service. However, if generation services are provided in an efficient competitive market, there is no on-going reason for regulators to interpose a different set of rates between the consumer and competitive market prices. To the extent practicable, customers should have a right to know and to be able to see and respond to prices that reflect the actual cost of providing electricity when and where they are using power.

Q. Has the Public Service Commission previously recognized that giving consumers the opportunity and tools that could enable them to respond to changing prices is in itself valuable?

A. Yes, in its 2006 Order Relating to Gas and Electric Metering Services, the Commission said, "Although we cannot predict the response of customers to advanced metering information, it is incumbent upon us to provide opportunities for all customers, to the extent feasible and cost effective, to have access to the

technological tools necessary to understand the relationship between price and demand."[23]

Q. How should the Commission implement this change from historical pricing?

A. I recognize that this is a significant change from historical practices. For that reason, I support a transition that ensures customers will have the tools and information that they need to respond to dynamic pricing and that customer issues of particular concern, such as impacts on low income, elderly or disabled customers, can be adequately studied and addressed. Customers will need to have information and the opportunity to learn how they can take advantage of new tools and pricing options. And, the Company will need to have appropriate metering, billing, and other systems in place. Therefore the Commission should direct the Company to develop a plan for making the transition to dynamic retail pricing. The plan, at a minimum, should provide for competitive wholesale energy market prices to be simultaneously reflected in default retail energy prices for consumers who have not chosen an alternate supplier and for implementation of the utility systems necessary to support the use of dynamic retail pricing by competitive retail energy service companies. And, the plan should provide for the transition to be completed within a defined time frame.

Q. What steps should the Company take during an initial phase to facilitate a transition to dynamic retail pricing?

[23] New York Public Service Commission, *Order Relating to Gas and Electric Metering Services,* Cases 94-E-0952, 00-E-0165, and 02-M-0514 (June 20, 2006).

A. In the near term, the Company should focus on the development of tools that will enable customers to respond effectively; upgrade utility systems including metering and billing systems, as needed, to be able to support dynamic pricing; and conduct market research to better understand of the motivations, issues, and concerns of different segments of customers that may affect the introduction of tools to enable automated responses and the design of dynamic pricing plans.

Q. What customer tools should be developed?

A. First, the Company should seek to enable automated responses by making price signals readily available and transparent to electricity using devices. Most devices that use electricity either have thermal inertia (e.g. heating, cooling, water heating, and refrigeration) or flexibility in when they take power from the grid (e.g. industrial pumping loads and batch processes, pool pumps, dishwashers, clothes dryers, and charging of electric vehicles and battery powered devices). While many of these end use devices have built-in intelligent controls, they lack information on when it would be most economical to use power from the grid. An inexpensive, standards-based approach for communicating current and indicative near-term forecasts of energy prices could enable such devices to automatically and continuously adjust the timing of their electricity use in response to grid conditions without materially impacting the consumer's experience. For example, a building HVAC system could decide whether it would be more economical to use power now or thirty minutes from now. In the aggregate, such devices could provide a large flexible resource.

Many of the components needed to provide price transparency to devices exist. The New York ISO posts day-ahead, real-time and look-ahead prices. There is a standard

data model, developed by the Organization for the Advancement of Structured Information Standards, for communicating electricity price information. And, there are low cost technologies that could enable such information to be broadcast, received, authenticated, and for each appliance or other device to automatically identify the price information that is for that device's location on the grid.

With price transparency, customers would be able to take advantage of the flexibility inherent in their heating, cooling, refrigeration, process loads, and certain appliances to use power when it is most economical to do so consistent with operational constraints of the particular application and their own preferences. Just as consumers have come to rely on automated choice engines such as KAYAK to find cheap air fares or Pandora to match their musical preferences, automated responses within electricity consuming devices would find lower cost power consistent with matching customer preferences for heating, cooling, and other services.

Second, the Company should support and seek to expand the On Bill Recovery (OBR) Loan Program and/or develop similar programs that leverage the OBR concept to achieve greater energy savings. The OBR approach enables consumers to finance permanent energy improvements and permits financing charges to run with the premises. The OBR concept is significant because it has the potential to overcome barriers to investment and activate a broad base of service providers. The Company should seek opportunities to open OBR programs up to more customers and more financial institutions to perform far more energy improvements (including additional classes of improvements, such as permanent technologies that respond to price signals and facilitate automated demand response).

Third, the Company has proposed an online time of use calculator to assist customers in evaluating changes in its voluntary TOU rate. The Company should build upon this initiative to develop an online bill comparison tool. Today, competing options often are presented in terms of rate comparisons. Enabling customers to understand the benefits of a dynamic price will require showing them the bills they are likely to receive under different pricing alternatives, given past or anticipated load patterns. Ideally, such a bill comparison also would estimate the savings to be gained by replacing conventional equipment with communicating thermostats and other smart devices and by introducing storage technologies.

Finally, consistent with its prior commitment, the Company should implement Green Button, a standards based tool that enables customers to download and visualize their own energy usage information.

Q. What else should be addressed in the Company's plan for this transition?

A. An intermediate step might include demonstrations involving different customer segments that combine tools that enable customers to respond with different dynamic pricing options. In addition to the simple flow through of wholesale energy prices, other options might include a dynamic price coupled with budget billing, or two-part pricing that combines the real-time price with pre-paid bill insurance. The insurance could be in the form of a right to a specified quantity at a specified price if market prices exceed that price level.

Q. How can consumers be assured that there will be timely progress in advancing the objective of enabling efficient use of power?

The plan should have a well-defined schedule of milestones and a date by which the transition to dynamic default energy pricing and enabling dynamic offers by competitive retail energy service companies will be completed. While I anticipate that the plan will be reviewed by the Commission in a separate proceeding, it would not be unreasonable for the Commission and consumers to expect CECONY to complete the transition before the end of the decade.

Q. Why should the Company develop tools that will enable automated responses to changing prices?

A. Much larger responses can be achieved when the response is automated such that each customer does not have to personally track changing prices. An automated response that is built into, for example, a building HVAC system or that can be set once and then not require further consumer intervention is likely to be easier to achieve and sustain.

Q. The Company has indicated that its existing Mandatory Hourly Pricing program has not led to significant changes in demand. Does this imply that CECONY should not pursue dynamic pricing?

A. No, there are many examples of time-differentiated and dynamic pricing that have produced significant reductions in peak demand. Results for the Mandatory Hourly Pricing program reflect the structure of the program and are not particularly surprising. First, the pricing differentials were not large. Second, the program's structure assumed that responses would be created by changes in customer behavior. This is evident in the assumption that load reductions would be triggered by prices exceeding a customer set threshold. Customers typically focus on completing certain

jobs, rather than directly on their use of electricity. While the electricity consuming devices used to perform those jobs will have flexibility, customers are much less likely to change behavior and stop trying to complete jobs that are important to them given only the information that electricity prices have exceeded a particular threshold. Third, the program was focused on the Company's largest customers. Many large commercial and industrial customers place a high value on uninterrupted service. Other large customers may operate or be located in multitenant buildings with a limited ability or incentive to respond. Finally, customers that selected a competitive energy service company may well be participating in New York ISO demand response programs that may offer larger savings.

Q. What are the Company's plans with respect to AMR deployment?

A. As indicated in the testimony of the Customer Operations Panel, the company completed deployment of AMR throughout Westchester County, a portion of the territory served by a radial distribution system, in 2010. In 2011, it began saturated deployment of AMR in Bronx East with the objective to install 275,000 AMR meters. It plans to install the remaining meters needed to complete the Bronx East deployment in 2013 at a cost of approximately $6 million. It also plans to install an additional 450,000 AMR meters in Bronx West, starting in 2013 and concluding in 2017 at a cost in excess of $70 million. In the Bronx, the Company operates a network distribution system. And, the Company also plans to spend an additional $11.4 million in 2017 to begin saturated deployments of AMR in areas outside the Bronx. In total, the Company plans to spend more than $87 million on saturated AMR deployments during the period 2013 through 2017.

The Company also intends to make additional AMR deployments to replace hard to read meters and meters which have failed.

Q. Why should the Company not simply continue to deploy AMR if it produces savings relative to current standard meters and manual meter reading practices?

A. It is unreasonable because the Company has not demonstrated that AMR deployments can adequately support key strategic objectives and achieve equivalent net benefits when compared to an AMI system. The Company's deployment of AMR may well be like buying a bicycle because it could enable you to get from point A to point B faster than you could by walking. However, with no disrespect for the benefits walking or cycling, if you need a car or some other faster means of transportation to get to point B in a timely manner, it would make no sense to purchase a bicycle for the trip.

The proposed AMR deployments may prevent participating customers from realizing the benefits of responding to real-time price signals. They may lack the ability to record, store, or transmit usage data on an interval basis and support to dynamic pricing. Timely access to granular usage data will be needed for participating customers to fully realize the benefits of a transition from simple TOU pricing or utility controlled demand response to a system in which intelligent electricity using devices continuously respond to dynamic prices.

An AMR system may not support the integration of distributed generation. AMR would not provide the means for system operators to determine in real-time whether a

generator is operating and feeding power into the grid or to communicate with that distributed resource.

Unlike AMI meters that can notify the utility of a customer outage and allow the utility to remotely determine when power has been restored following an outage, an AMR system may not provide comparable support for enhanced grid reliability.

And, there are other benefits which would be available from the deployment of AMI, that are not available in an AMR system.

The Company's March 2007 Plan for the Development and Deployment of Advanced Electric and Gas Metering Infrastructure found that deployment of AMI could produce significant net benefits and includes a Technology Assessment that compares the functionality available from the Mobile AMR – which the Company has been deploying, Fixed Network AMR, and AMI based on either RF Point to Point or RF Mesh radio networks.[24]

[24] Consolidated Edison Company of New York, Inc. and Orange and Rockland Utilities, Inc., *Plan for Development and Deployment of Advanced Electric and Gas Metering Infrastructure* (March 28, 2007).

Functionality Available	System Architecture			
	Mobile AMR	Fixed Network	RF Point to Point	RF Mesh
Integrated remote service reconnect			✓	✓
Advanced (time-based) rates		✓*	✓	✓
Distributed Generation detection and control			✓	✓
Remote meter programming			✓	✓
Power Quality monitoring/reporting			✓	✓
Home area network interface			✓	✓
Enhanced security compliance			✓	✓
Daily or on-demand reads		✓	✓	✓
Interval data		✓	✓	✓
Outage notification		✓	✓	✓
Load profiling		✓	✓	✓
Automated monthly reads	✓	✓	✓	✓
Tamper reporting	✓	✓	✓	✓
Improved meter read accuracy	✓	✓	✓	✓

* To be validated in pre-deployment demonstration projects.

Although the Company's 2007 plan indicates that Fixed Network AMR might be able to support certain advanced (time-based) rates, it also indicates that this potential capability would need to be validated in pre-deployment demonstration projects. The Fixed Network AMR system is presented in the 2007 plan as a means to upgrade the functionality of the AMR meters already installed in Westchester County, "if an AMI system were to be implemented elsewhere in the Companies' service territories."[25] The Company's 2007 plan suggests that Fixed Network AMR could offer some of the functionality of an AMI system without the flexibility and increased functionality offered by bi-directional communications link to each AMI meter.

The mobile AMR which the Company has deployed will not support distributed generation, real-time price responsive demand, and other advanced metering

[25] *Ibid.* at 8.

functions. And, the Company has not documented costs of upgrading its Mobile AMR deployments to a Fixed Network AMR system, demonstrated its ability to support distributed generation and real-time demand response in a Fixed Network AMR upgrade, or shown that net benefits of its plans exceed those of an AMI deployment.

Q. Do you have a recommendation regarding how the Public Service Commission should address the Company's proposed AMR deployments?

A. The selection of a metering technology has strategic importance for grid reliability and resilience and for future costs and investment requirements. With respect to further AMR deployments, my recommendation is that the Public Service Commission should direct CECONY to suspend AMR deployments pending a prompt review by the Commission of the Company's advanced metering plans.

V. Supporting Innovation: Research, Development and Demonstration Programs

Q. Would you describe your concerns with the Company's overall research and development program plan?

A. Company witness Devries testified that, "R&D's mission is to be an agent of change that drives timely innovation of technological solutions addressing strategic and operational needs."[26] This is certainly a time when innovation is needed. And, it is a time when emerging technologies provide opportunities to deliver greater value to the Company's customers.

[26] Troy Devries Testimony at 3.

The Company's overall electric research and development budget is $10.54 million or approximately one-tenth of one percent of the Company's electric revenues. This is the same amount which the Company spent in the historical twelve months ending in June 2012. And, the Company proposes no increases in electric research and development spending through calendar year 2016. The Company plans to fund electric research and development activities at a rate, as a percentage of revenues, that is far below that seen in many other industries. This may be understandable given the current regulatory model, but is inconsistent with the challenges and complex operational issues facing CECONY and the power industry generally.

Q. Is the Company taking appropriate steps in its research and development program to advance its capability to function as an effective system operator in a changing environment?

A. The Company operates complex distribution networks and is introducing new sensors and controls. However, with more distributed and dispersed generation and demand response, the system is becoming increasingly dynamic. The models, integrated real-time systems, and control architectures needed to operate in such a dynamic environment will challenge even the most advanced utilities. However, the Company's plans (Exhibit_TD-1) call for a more than an 85 percent reduction in smart grid research and development funding from 2012 to 2016.

The Company will face critical challenges in the development of integrated transmission and distribution system models, integrated real time operational systems, and a control architecture that can effectively integrate distributed resources and responsive demand at scale, consistent with maintaining power quality and the

reliable operation of a dynamic networked distribution grid with greater capabilities for islanding sections of the network to enhance resilience. While statewide initiatives such as the planned Advanced Energy Management System Control R&D Center may help the Company address this issue, there are likely to be issues unique to CECONY's distribution architecture. Given this context, the proposed reduction in smart grid related research and development funding appears to be inconsistent with the strategic objectives of enhanced resilience and efficient use.

Q. How does the Company set its research and development budget?

A. Mr. Devries testified that the process of selecting research and development projects includes a benefit-cost analysis of each project and the development of a prioritized list. However, he states that then, "This list is then reviewed with senior management against available financial resources."[27] This statement, together with the Company's plan that the budget for electric research and development for the years 2014, 2015, and 2016 not change and remain identical to electric research and development spending in the historical twelve months ending in June 2012, indicates that electric research and development spending is being financial constrained by the Company rather than based on a comparison of project costs to expected benefits.

Q. How should the Public Service Commission address these limitations?

A. The Commission should direct CECONY to file an updated research, development, and demonstration plan as part of a revised Long-Term Plan. The Commission also should direct the Company to develop a competitive innovation partnership program

[27] *Ibid.* at 8.

in which third parties can propose innovative projects, which would be implemented in partnership with the utility, to demonstrate new approaches that enhance the strategic objectives of reliability and efficient use. Submissions to the innovation project program should be evaluated based on both their expected net value to customers and their potential to advance the development of cost effective approaches to meeting these strategic objectives. Specific consideration may be given to projects aimed at reducing the costs of climate adaptation and enhancing grid resilience.

Q. You indicated that the Company's limited research and development spending may be understandable given the current regulatory model. Could you please elaborate?

A. In conventional cost of service ratemaking, utilities that come in for frequent rate cases have limited opportunities to benefit from innovations that prove to be successful in reducing costs or providing greater value to customers. And, in some cases, they might even face a risk that costs will be disallowed if the anticipated benefits of a project fail to materialize. It is inevitable in research and development that not all projects will produce the anticipated benefits. However, that does not mean that the project was not valuable to undertake or should be denied cost recovery.

Additionally, unlike firms in competitive industries, which can rapidly innovate, learn, and, if necessary, redirect their efforts, a utility may need to cycle through a lengthy regulatory review process to justify changing past practices. This further impedes the process of innovation.

Q. Can the current regulatory model be modified to encourage innovation?

A. Yes, in the context of an appropriate multi-year revenue plan with output and efficiency incentives, a utility can capture a greater share of the benefits of innovation thereby providing an appropriate incentive. The New York Energy Highway Task Force[28] recognized this opportunity when it cited the example of the eight year, performance based regulatory framework for network companies in the United Kingdom, RIIO or "Revenue set to deliver strong Incentives, Innovation and Outputs." The Task Force stated that, "The RIIO regulatory framework recognizes the need to have a longer term planning horizon to encourage research and development investments in the utility sector," and recommended that the Department of Public Service and NYSERDA continue to evaluate RIIO and other mechanisms to most effectively encourage innovation in New York's electricity sector.[29]

Q. How can the Commission provide an appropriate incentive for the Company to pursue needed research and development activities in the context of this proceeding?

A. In this case, the Public Service Commission should approve separate accounting for and authorize a tracker mechanism to accelerate recovery of incremental research, development, demonstration, and innovation partnership programs. This would

[28] The task force was comprised of the chief officers of the New York Power Authority, the New York Department of Environmental Conservation, Empire State Development, the New York Public Service Commission, and New York State Energy Research and Development Authority (NYSERDA).

[29] New York Energy Highway Task Force, *New York Energy Highway Blueprint* (2012) at 89.

enable the Commission to review and approve incremental costs to be recovered through the tracker when it reviews a revised research, development, and demonstration program and proposed innovation partnership projects.

VI. Multi-Year Rate Plans

Q. Company witnesses have indicated that CECONY is open to settlement discussions focusing on a multi-year rate plan. Can you comment?

A. It can be difficult for rate regulation to provide incentives for needed investment, efficiency, and innovation when a utility is coming before its regulatory agency in annual rate cases. A properly structured multi-year agreement can more closely approximate the incentives that would be found in a competitive market. A well designed multi-year agreement should include an efficiency incentive and a means by which a portion of cost savings can be shared with customers, strong and bi-directional incentives for delivering service reliability and other outputs based on the value that those outputs provide to customers, and funding for innovation projects with the ability of third party partners to compete for innovation funding.

Q. Does this conclude your testimony?

A. Yes.