STATE OF NEW YORK

BEFORE THE PUBLIC SERVICE COMMISSION

Consolidated Edison Company	**)**	
of New York Inc.	**)**	**Case No. 08-E-0539**
Electric Rate Proceedings	**)**	

DIRECT TESTIMONY OF

PAUL CHERNICK

ON BEHALF OF

THE CITY OF NEW YORK

Resource Insight, Inc.

SEPTEMBER 8, 2008

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I. Identification and Qualifications

Q. Please state your name, occupation and business address.

A. I am Paul L. Chernick, President of Resource Insight, Inc., located at Five Water Street, Arlington, Massachusetts.

Q. Summarize your professional education and experience?

A. I received an SB degree from the Massachusetts Institute of Technology in June, 1974 from the Civil Engineering Department, and an SM degree from the Massachusetts Institute of Technology in February, 1978. I have been elected to membership in the civil engineering honorary society Chi Epsilon, and the engineering honor society Tau Beta Pi, and to associate membership in the research honorary society Sigma Xi. I was a utility analyst for the Massachusetts Attorney General for more than three years, and was involved in numerous aspects of utility rate design, costing, load forecasting, and the evaluation of power supply options. Since 1981, I have been a consultant in utility regulation and planning, first as a research associate at Analysis and Inference, after 1986 as president of PLC, Inc., and in my current position at Resource Insight. In these capacities, I have advised a variety of clients on utility matters. My work has considered, among other things, the cost-effectiveness of prospective new generation plants and transmission lines, retrospective review of generation-planning decisions, ratemaking for plant under construction, ratemaking for excess and/or uneconomical plant entering service, conservation-program design, cost recovery for utility efficiency programs, the valuation of environmental externalities from energy production and use, allocation of costs of service between rate classes and jurisdictions, design of retail and wholesale rates, and performance-based ratemaking and cost recovery in restructured gas

and electric industries. My professional qualifications are further summarized in Exhibit PLC-1.

Q. Have you testified previously in utility proceedings?

A. Yes. I have testified more than two hundred times on utility issues before various regulatory, legislative, and judicial bodies, including utility regulators in thirty states and three Canadian provinces, and before two Federal agencies.

Q: Have you previously testified before the New York State Public Service Commission?

A: Yes. I have testified in the following cases:

- Case No. 96-E-0897, on the electric restructuring plan of the Consolidated Edison Company of New York;
- Case No. 99-W-0658, on the planning and rates of United Water New Rochelle;
- Case No. 99-S-1621, on Con Edison's steam rates;
- Case No. 00-E-1208, on the allocation of generation costs between New York City and Westchester County;
- Cases No. 03-G-1671 on Con Edison's gas rates and No. 03-S-1672 on Con Edison's steam rates;
- Case No. 04-W-1221, on the planning and rates of United Water New Rochelle;
- Case No. 04-E-0572 on Con Edison's electric planning and ratemaking;
- Case No. 06-M-1017 on electric power procurement;
- Case No. 06-G-1332 on Con Edison gas DSM programs.
- Case No. 07-E-0523 on Con Edison electric DSM programs and related issues.

Q: Have you been involved in other activities in New York relevant to Con Edison and energy conservation?

A: Yes. I have acted in the following capacities in the following matters, all on behalf of the City of New York:

- lead author of a 2003 City-wide electric-energy plan and supporting developer of the Electricity Resource Roadmap;[1]
- co-author of comments in Case No. 05-M-0090 on the system-benefits charge;
- participant in the collaboratives on the Con Edison–targeted electric-DSM program and the NYSERDA system-wide program for the Con Edison territory;
- co-author of comments and meeting participant in Case No. 07-M-0548 on energy-efficiency program standards.

In addition, I am the author of the sections on avoided costs and lost revenues for NYSERDA's study of natural-gas energy-efficiency-program potential in Con Edison's service territory and avoided costs for NYSERDA's study of natural-gas program potential.[2] I also developed electric avoided costs for National Grid's Niagara Mohawk service territory in early 2008.

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[1]"New York City Energy Policy: An Electricity Resource Roadmap," prepared by the New York City Energy Policy Task Force. 2004. New York: New York City Economic Development Corporation.

[2]"Natural Gas Efficiency Resource Development Potential in Con Edison Service Territory" (with Phillip Mosenthal, Jonathan Kleinman, R. Neal Elliott, Dan York, Chris Neme, and Kevin Petak. 2006. Albany, N.Y.; NYSERDA. "Natural Gas Efficiency Resource Development Potential in New York" (with Phillip Mosenthal, R. Neal Elliott, Dan York, Chris Neme, and Kevin Petak). 2006. Albany, N.Y.; NYSERDA.

II. Introduction

Q. On whose behalf are you testifying?

A. I am testifying on behalf of the City of New York.

Q: What is the subject matter of your testimony?

A: My testimony covers the following topics:

- The importance of regular reading of meters and the potential for Con Edison to deploy advanced metering technology to allow regular readings of meters at City-owned facilities that the Company has not read consistently in the past.
- Con Edison's role in aggregating billing data from the customer level to the building level for large buildings, to support benchmarking and the energy-efficiency goals of the City.
- Demand-side-management-program philosophy, especially the targeted program.
- The role of distributed generation in T&D load relief and reduction of Zone J loads and market prices.

Q: Please summarize your conclusions and recommendations.

A: My major conclusions and recommendations are as follows:

- The Company should use automated meter reading and advanced metering to eliminate estimated meter readings for major customers and to provide better information to all customers.
- The Commission should direct Con Edison to work with the City, National Grid, and representatives of building owners to develop a streamlined process for uploading aggregate building data to the EPA's Portfolio Manager. The Commission should direct those parties to convene a working group addressing improved access to load and usage data. within

30 days of the final order in this proceeding, and report to the Commission every six months.

- Con Edison should change the targeted load-relief program to integrate it with system-wide and state-wide programs, eliminate the perverse incentives for contractors under the program, and minimize lost opportunities by replacing bidding per kilowatt of load reduction with focusing and targeting of comprehensive treatment of buildings, including new construction.
- The Commission should require Con Edison to include targeted incentives for clean distributed generation, especially photovoltaics, that can contribute to deferring major T&D investments.
- The Commission should require Con Edison to study the value of photovoltaic solar and clean-distributed-generation load reductions in day-peaking networks.

III. Meter Reading and Advanced Metering

Q: What is the City's position regarding advanced metering?

A: As reflected in PlaNYC, New York City's long-term sustainability program issued in 2007, the City supports implementation of advanced metering, as expeditiously as feasible, wherever the benefits exceed the costs.

Q: What are the benefits of advanced metering?

A: Advanced metering has a number of benefits, including interval and real-time metering for billing, providing real-time consumption data to customers (improving the effectiveness of real-time pricing and energy-efficiency programs), allowing remote detection of outages, and allowing remote meter reading. As Con Edison explains (Customer Operations Panel, pp. 15–16),

automated meter reading (AMR), a less-ambitious version of advanced metering, provides the following benefits:

- reducing the labor required to read meters, "one of the most labor-intensive tasks at Con Edison,"
- reducing meter-reader injuries,
- overcoming problems of restricted access,
- increasing customer convenience,
- reducing estimated readings.

Q: Is there any particular reason for Con Edison and the Commission to be concerned with the last item in that list, estimated meter reading?

A: Yes. A large percentage of NYPA's bills to the City are based on estimated usage rather than actual Con Edison meter readings.

Q: How serious is this problem?

A: As shown in Exhibit PLC-2, over the 36 months from July 2004 through June 2007, 28% to 37% of City's bills from NYPA were estimated. Con Edison is responsible for reading those meters; the readings are used to determine Con Edison's charges to NYPA and NYPA's charges to the City.

While estimated bills are unavoidable when meters cannot be read, they are inferior to actual bills in several respects. First, when rates are changing on a monthly basis, estimated bills can be inequitable, since a customer may be billed in one month for usage that actually occurred in other months. Second, demand meters do not indicate whether the maximum demand level was met in just one month of a multi-month bill, or in every month. Hence, even if rates do not change, missing a demand reading can result in serious over- or under-charging the customer. Third, customers have difficulty budgeting when their bills do not reflect the amounts they will be eventually be charged for service. Fourth,

tracking energy usage and the effects of efficiency initiatives is much less accurate when bills are incorrect, interfering with feedback on the effectiveness of behavior and investments.

Q: Are these primarily small accounts?

A: No. For 2006–2008, the City's records of its own accounts with estimated bills include more than 2,000 accounts with maximum demands greater than 100 kW and 127 with maximum demand in excess of 1,000 kW. While some of these were single incidents of estimated bills, 446 of the more-than-100-kW accounts and 25 of those greater than 1,000 kW had ten or more estimated bills in those 36 months.

Q: Are the high levels of estimated bills experienced by the City typical for Con Edison?

A: Apparently not. In response to IR NYC 4-44, Con Edison provided the percent of meters "read on cycle" for each month from January 2005 to December 2007. This measure varies from 86% to 89%, and should be close to the share of bills based on actual meter readings.[3] Hence, about 12% of Con Edison's bills are based on estimates, which is roughly a third of the estimated-billing rate for the City's accounts.

Q: What is Con Edison's proposal regarding implementation of advanced metering?

A: Con Edison has several initiatives regarding advanced metering. Specifically, Con Edison is installing interval metering equipment and communications infrastructure for the roughly 1,360 customers with maximum demand between

[3]Con Edison notes that "in a small number of cases, we actually read the meter but do not bill to the reading for various reasons, e.g. reading falls outside of expected reading range and we estimate the bill" (IR NYC 4-44).

500 kW and 1,500 kW that are currently without such metering, so that they can be placed on mandatory hourly pricing (Customer Operations Panel, pp. 8–9). The Company plans to have those meters in place by March 2010 (Customer Operations Panel, p. 11).

In addition, the Company is planning on completing the installation of AMR on all customers in Westchester County, installing AMR strategically for hard-to-read meters, and including AMR modules in meters to be installed in selected projects (Customer Operations Panel, p. 14).

Q: Why does Con Edison say it is concentrating its AMR efforts in Westchester?

A: The Company asserts that the cost of meter reading is greater in Westchester due to the lower density of homes. (Customer Operations Panel, p. 17). Con Edison does not explain why this argument applies to denser commercial areas in Westchester, compared to residential areas in Staten Island, for example. According to census data, a quarter of Westchester households are in municipalities (mostly Yonkers and Mt. Vernon) with household density greater than the average in Staten Island. Further disaggregation of the boroughs (such as by census tract) would undoubtedly show areas in which household density is lower than in the denser parts of Westchester.

Q: Is the Company consistent in concentrating AMR in low-density areas?

A: No. In addition to the decision to prioritize high-density areas of Westchester before low-density areas of New York City, the Company's "special projects" turn out to be selected high-density locations, such as "a new building requiring large numbers of electric meters" (Customer Operations Panel, p. 19). These locations should have very low meter-reading costs, suggesting that they are

among the last places Con Edison should be installing AMR, if the objective is to reduce labor costs and injuries.

Q: Is the Company's proposal to install AMR for hard-to-read meters appropriate?

A: The concept is certainly valid. The Company proposes to deploy AMR

> where it is expensive, dangerous or otherwise inefficient to read meters in a conventional manner. These meters are regularly inaccessible on the meter reading day and generally require that a meter reader expend more than the average time to obtain readings, and the overall rate of meter readings is low. The installation of AMR equipment for these meters or routes will increase meter reading efficiency and provide an actual reading for the customer. (Customer Operations Panel, p. 19)

Accurate and timely meter reading is important for customer budgeting and monitoring of energy usage, and may support participation in and motivation to for energy-efficiency programs. Unfortunately, in discovery Con Edison indicated that "[t]his program involves installation of automated meter reading on a *limited* basis at locations and meter reading routes where it is expensive, dangerous or otherwise inefficient to read meters in a conventional manner" (IR NYPA 5-90, emphasis added).

Q: Does the Company have a process for identifying customers for which it has been issuing estimated bills?

A: Apparently not. According to Con Edison's discovery responses, "The Company does not maintain…information" on "the individual customers for whom estimated meter reads were used" (IR NYPA 8-131). Nor could Con Edison identify "individual customers for whom 3 or more estimated meter reads were used within any calendar year between 2003 and 2007" (IR NYPA 5-87).

Q: How do Con Edison's criteria apply to the large number of estimated bills for NYPA accounts?

A: I assume that the Company is not intentionally ignoring meter readings for City accounts. Yet scores of meters for City accounts are not read, month after month. If the meters in question are "expensive, dangerous or otherwise inefficient to read and regularly inaccessible," Con Edison should install AMR expeditiously so that the Company, and its customers, have the benefit of regular, actual meter reads.

Q: What is your recommendation?

A: The Commission should require Con Edison to install AMR for any account with more than three estimated bills over a three-year period; for the largest accounts, even a single estimated bill should trigger installation of AMR. As the Customer Operations Panel witnesses testify (p. 19), "the installation of AMR equipment for these meters will increase meter-reading efficiency and provide actual readings for customers."

IV. Aggregating Billing Data to the Building Level

Q: Please explain the City's interest in benchmarking and gaining access to energy consumption data.

A: Reducing energy consumption and greenhouse gas emissions is a policy priority for New York City. Specifically, PlaNYC 2030, the City's comprehensive sustainability plan, emphasizes the need for increased energy efficiency. It is estimated that by 2030, at least 85% of energy usage and carbon emissions will come from New York City's existing buildings. To that end, the City Council is considering legislation that would require the owner of private-sector buildings of more than 50,000 sq. ft. and public buildings of more than 10,000 square feet located within the City to report annually on the building's energy and water usage. The data would be up-loaded to EPA's web-based Portfolio Manager program.

Q: How would those ratings be useful?

A: The City is committed to raising the public's awareness of the value of energy efficiency. On the one hand, energy performance ratings are a way to inform building owners and property managers that their buildings are inefficient and that energy-savings opportunities exist through participation in programs made available by Con Edison, National Grid–Keyspan, NYSERDA, NYPA, and other parties. Furthermore, the City believes that potential renters and owners are willing to pay a premium for energy efficient properties, which is why such data should be made available at the time of lease or sale.

Q: What is Con Edison's potential role in benchmarking?

A: Con Edison has an obligation to read almost every electric meter in New York City, as well as a large fraction of the gas meters in the buildings that are covered by this City-wide initiative. While it would be technically feasible for every gas and electric customer in a large building to collect its annual electric bills and forward the usage data to the building owner, the logistics would be much simpler if Con Edison could upload the data directly to Portfolio Manager. The data would likely be assembled more quickly and more accurately than if every large-building tenant were required to provide the data, and each owner were required to enter it into the database.

Q: Would this process violate the confidentiality of customer information?

A: No. The aggregation of data in multi-tenant buildings mitigates the customer-confidentiality concern. It should be relatively simple to restrict data access to the aggregate building information, and to the building owner or any other party authorized by law to view the data.

Q: Would you expect that Con Edison would be able to provide aggregate building data immediately?

A: That is possible, but not likely. Con Edison's billing software may not include a field for each account identifying the building in a unique manner. The billing address for an account may be different from the meter location, and even if the meter location is identified by address, a single large building may have several addresses. Populating the billing database with unique building identifiers may require some time and effort.

Q: How do you recommend the Commission proceed on this issue?

A: The Commission should direct Con Edison to assess the capability of its billing system and work with the City, National Grid, and representatives of building owners to develop a process for sharing aggregate building energy data. The working group should convene within 30 days of the final order in this proceeding and report to the Commission every six months. As the party requesting this process, the City is willing to chair the working group but would not object to Con Edison chairing the group.

V. Energy-Efficiency Issues

Q: What comments do you have on Con Edison's energy-efficiency programs?

A: My comments will be limited to Con Edison's targeted program, which procures peak-load reductions from ESCos based on the prices per kilowatt bid in response to a series of RFPs. This is essentially an auction based on dollar-per-kilowatt bid prices, for proposals that meet non-price standards. Con Edison selects the location and timing of the contract load reductions to defer addition of transmission and distribution equipment.

Q: Why are your comments limited to this program?

A: Most of the energy-efficiency programs to be implemented in Con Edison's service territory—by Con Edison, NYSERDA and National Grid—are currently under review in Case No. 07-M-0548, on energy-efficiency portfolio standards. I do not believe that the targeted program—which appears to be unique in New York and perhaps in the world—has been discussed in any detail in that proceeding. Since no other utility appears to be following Con Edison's example, the program is likely to receive little attention in the current statewide review.

Unlike other energy-efficiency programs, which are intended to reduce total costs of providing energy services, the targeted program focuses on reducing Con Edison's investment in major transmission-and-distribution facilities. Since the costs of future T&D additions are reflected in the revenue requirements in this proceeding, the adequacy of the program to reduce those costs is particularly relevant in this case.

Q: Have you previously testified on Con Edison's targeted program?

A: Yes. In my prefiled direct testimony in Case 07-E-0523 (p. 11), I said that the program

> relies on non-comprehensive, balkanized programs implemented by contractors that are paid only for peak load reductions. The current practice creates complicated and inefficient incentives for contractors, while encouraging cream-skimming and the creation of lost opportunities.

Q: Are you aware of any actions Con Edison has taken to correct these problems?

A: No.

Q: Please explain why the program is "balkanized."

A: The programs are not coordinated between targeted areas, or between NYSERDA programs and the targeted programs. Indeed, the bidders are generally prohibited from using NYSERDA funding. There is no comprehensive planning for the

targeted areas; each bidder offers the measures it chooses to offer, and Con Edison selects the winners based on "favorable pricing and Con Edison's assessment of the likelihood of successful performance based on the Respondent's experience, expertise and proposed implementation program" (Demand Side Management RFP dated December 20, 2006, §VII, p. 7).

Q: Please explain how contractors are "paid only for peak reductions"

A: .The Demand Side Management Agreement dated December 20, 2006, §9 "Price"(p. 14) reads as follows:

> Con Edison shall pay Contractor (i) the applicable price per KW of load reduction set forth in Exhibit C hereto for each KW of load reduction, up to the applicable Contract Load Reduction Guaranty, achieved by the Contract DSM Measures with respect to such Electric Network Period (such price per KW being referred to herein as the "Price") and (ii) for each KW of load reduction in excess of the applicable Contract Load Reduction Guaranty, up to a quantity equal to ten percent (10%) of the applicable Contract Load Reduction Guaranty, achieved by the Contract DSM Measures with respect to such Electric Network Period (the "Excess Load Reduction"), the applicable price per KW of load reduction set forth in Exhibit C hereto (such price per KW being referred to herein as the "Additional Price").

There does not seem to be any payment for energy.

Q: Please explain how the incentives are "complicated and inefficient"

A: The contractors have no incentives to minimize total resource costs. Instead, they are paid for reaching their contractual peak-reduction targets with measures whose savings they can demonstrate to Con Edison's satisfaction. The contractors' incentives vary from the interests of energy consumers in the following ways:

- Contractor and customer interests are diametrically opposed in terms of the portion of measure costs paid by the customer. The more the participant pays, the higher the contractor profit. Rather than pursuing the measure

with the highest net benefit, the contractor's incentive is to pursue the measure for which the customer will pay the most.

- Customers generally bear the costs of equipment maintenance (such as replacing lamps), while contractors care only about their investment and demonstrating savings to Con Edison.
- Contractors must periodically verify the existence of the energy-efficiency equipment, and are likely to focus on measures that are easy to verify, even if those are not the most beneficial for customers.
- Contractors are paid per kilowatt of installed nameplate load reduced, rather than the actual load reductions at peak times. This convention eliminates contractor incentives to install measures that do on reduce installed load—such as switches, daylight sensing, and occupancy sensors —while overpaying for reduction in nameplate ratings for equipment that generally operate at much lower levels, drawing the nameplate current only during startup or other unusual conditions. Customers benefit from actual load reductions.
- Contractors are paid only for peak-load reductions over a fixed contract term, while customers benefit from energy savings over the measure life.

Consequently, the best installation from the contractor's perspective may be very different than the best installation from the perspective of the participant or customers as a whole.

Q: Please describe "cream skimming"

A: "Cream skimming" in the DSM context includes any action that captures some low-cost savings while leaving behind cost-effective opportunities that cost more or are more-difficult to achieve or verify. Cream skimming can consist of ignoring opportunities during the process or site visit that can be captured later

but only at higher cost (e.g., visiting a home to install lighting without wrapping the water heater) or installing equipment that is less efficient than economically optimal (e.g., a SEER 12 unit where SEER 14 has lower total cost, or T-8 lamps without dimming where T-5 lamps with dimming would be cost-effective).

Q: Please describe how the program creates "lost opportunities."

A: A lost opportunity occurs whenever an opportunity for cost-effective energy savings passes and is not captured. That opportunity can be market-driven (an air conditioner wears out, a restaurant is remodeled) or driven by an energy-efficiency program as follows. Suppose a program encourages the customer to replace its aging chiller, but fails to reduce lighting load and downsize the chiller. The contractors in the targeted program are not paid for the costs of more-comprehensive treatments and have no obligation to install them. Rather, they are paid only for meeting the load reductions in their contracts.

Any load reduction outside the period of the local distribution peak has no value to the contractor, including reductions in energy load and (for evening-peaking areas) reductions in the daytime peaks that determine generation-capacity requirements and capacity prices.

Q: Is all energy-efficiency eligible for the targeted program?

A: No. Con Edison does not permit new loads to participate in the program, even though fast-growing networks are likely to include some new construction. As I understand Con Edison's reasoning, the decision to make the targeted program dependent on contractor bids for kilowatts of load reduction led Con Edison to decide that it could only include projects in which energy use could be measured before and after the installation of high-efficiency equipment. This precludes new construction, major renovations, and other loads without measurable baselines.

Q: Does Con Edison rely on the Commission-approved total resource cost test in designing or implementing the targeted program?

A: No. Con Edison ignores the implementation costs borne by the customers recruited by the contractors, as well as the energy and generation-capacity benefits of various measures.

Q: What is the significance of Con Edison's omission of non-T&D costs and benefits from the cost-effectiveness determinations of targeted efficiency investment?

A: Exhibit PLC-3 disaggregates targeted electric efficiency investment benefits and costs of into their component parts with reference to each of three cost-effectiveness tests recognized by the Commission. At the center of benefits is the T&D capacity value of reduced peak load in the targeted areas. Total electric benefits also include electric generating capacity and energy, and in many cases non-electric resources including natural gas and water savings as well. These non-T&D benefits can easily and often outweigh the costs of the efficiency investment, even when participants' share of total costs is counted.

Q: You have observed that the targeted program ignores significant costs and benefits, and that the contractors are paid only for reductions in peak load. Would correcting those two problems fix the targeted program?

A: No. Any program that purchases load reductions based on unit price bids (e.g., dollars per kW or per MWh) is inherently inefficient. The problems with that approach are discussed in Exhibit PLC-4, a paper I coauthored.[4]

[4]Published as "Demand-Side Bidding: A Viable Least-Cost Resource Strategy" (with John Plunkett and Jonathan Wallach), *Proceedings from the NARUC Biennial Regulatory Information Conference*, September 1990.

Q: What is the core problem with acquiring energy efficiency through an auction based on unit prices?

A: Unit-price auctions have two fundamental flaws. The first is that they lead to a suboptimal allocation of resources by systematically under-investing in cost-effective efficiency investments. This is because the suppliers have no incentive to spend more than the unit price they contract for with Con Edison and no incentive to procure savings for which they are not paid, including energy savings, O&M benefits for the participating customers, and in some networks, generation capacity. They leave electricity savings and benefits on the table; achieving those savings and benefits later may be much more expensive, and may even require tearing out the sub-optimal equipment the contractor installed.

The second is that unit-price auctions for efficiency resources redistribute net economic benefits from Con Edison's customers to suppliers of fixed-price peak demand savings. The approach unnecessarily overpays contractors for the smaller amount of low-cost savings delivered.[5]

Q: Can you illustrate these flaws in unit-price auctions for efficiency?

A: Yes. These problems are illustrated in Exhibit PLC-5, Exhibit PLC-6, and Exhibit PLC-7.

In these exhibits, I have expressed the multiple costs and benefits of energy-efficiency (T&D capacity, generation capacity, on- and off-peak energy summer and winter) as a single net cost per peak kW saved. Often, this net cost of peak demand savings becomes negative once the investment is credited with

[5]Depending on the contractor's marketing strategy, participants may also be paid more than their costs.

its electric energy value (standard practice when assessing the cost per kW of non-transmission alternatives).[6]

Q: What do the supply curves in these exhibits represent?

A: Each of the three exhibits presents hypothetical supply curves for peak kW savings achievable from energy efficiency across all customers in the targeted area. I assume best practices in energy-efficiency-program design and implementation. Added horizontally in order of increasing net cost per kW, each exhibit presents two hypothetical supply curves for peak demand savings achievable in a targeted area. While stylized, the upward sloping supply curves reflect the realities of diminishing marginal returns from deeper efficiency investment in individual customer facilities and harder-to-reach customers. The next kilowatt of savings eventually costs more in total resources (including program costs) than the last, at an ever increasing rate.

In addition to the total-resource cost supply curve, each exhibit also portrays the expenditures Con Edison would make if it followed best program design and implementation practices to invest directly in targeted efficiency peak savings. This utility-cost supply curve ignores participant contributions. Sometimes programs need to spend more than the net resource cost of low-cost peak demand savings (just providing information about them costs money). For more expensive efficiency investments, programs designed and implemented under best practices are capable of securing significant participant contributions. Farther up the efficiency supply curve, best practices have shown that programs

[6]Generation alternatives to T&D investment are routinely credited for the market value of the energy generation and capacity sold. See John Plunkett, "Charting New Frontiers with Vermont's Deployment of Demand-Side Transmission and Distribution Resources," ACEEE National Conference on Energy Efficiency as a Resource, Berkeley, Cal., September 27, 2005.

need to cover all the incremental costs of the highest-efficiency measures. Accordingly, the utility-cost supply curve starts out above the TRC supply curve, then crosses it as the curve as participants contribute partially to efficiency measure resource costs, and then finally joins it to reflect the need for programs to cover the full incremental costs of the highest efficiency measures approaching at the far right.

Q: What are the best practices in direct efficiency investment you refer to?

A: Best practices in program design and implementation incorporate the lessons learned from efficiency programs deployed throughout North America over the past two or more decades. They include aggressive financial, technical, marketing, and delivery services proven to maximize per-participant comprehensiveness and accelerate market penetration over less direct approaches. Such practices are reflected in the "fast-track" program designs that the Commission recently ordered for Con Edison and other regulated utilities in the EPS proceeding.

Q: What is the purpose of Exhibit PLC-5?

A: This exhibit illustrates the outcomes under direct investment using best practices. The xxred line is the total-resource-cost supply curve. It indicates the economically optimal level of efficiency investment at 60 MW. The area under the curve represents the total costs of acquiring any quantity of peak savings. The area under the avoided-cost line at the economically optimal quantity of efficiency investment represents the total benefits of that amount of efficiency investment. The net benefits of the economically optimal efficiency investment are the difference between these two areas–that is, the triangular area under the avoided cost line and above the supply curve. The xxgreen line is the utility-cost supply curve based on direct investment using best practices.

Q: What is the purpose of Exhibit PLC-6?

A: Exhibit PLC-6 portrays what happens given the same supply curves under a unit-price auction seeking 50 MW in a targeted area. In this case, the supplier of peak demand savings follows the xxgreen utility-cost supply curve (assuming it follows best practices). As I explain above, in this case the supplier stops investing in savings costing more than the unit-bid price of $250/kW-yr, leaving behind another 10 MW of savings that are available for less than the net avoided cost of additional peak demand savings.

This exhibit also shows the distributional outcome of the unit-price auction. Total payments to the contractor are represented as the rectangular area from the origin under the unit price line to the 50 MW quantity on the horizontal axis. The area under the unit-bid-price line and above the utility-cost supply curve represents the amount of consumer surplus transferred to the savings supplier.

Q: What is the loss in net resource benefits and the transfer of consumer surplus to contractors?

A: This is shown in Exhibit PLC-7. The triangular area in the upper-right corner represents the loss in economic welfare in the Con Edison service area and the State from the unit-price auction compared to direct investment. The area above the utility-cost supply curve and beneath the unit-bid price represents the economic benefits consumers forfeit to successful bidders supplying the smaller amount of savings.

Q: Why do you conclude that these flaws are fatal to the unit-price auction for targeted efficiency resources?

A: Because the problem gets worse the more "successful" the utility becomes in lowering the bid price for supplying the targeted amount of peak savings.

Lowering the winning bid price merely pushes the supplier further left and down on the supply curve. Raising the unit price alleviates the misallocation, but worsens the distributional outcome. Raising the unit price all the way to full avoided costs would transfer all benefits to the contractors.

Q: Do the problems illustrated in Exhibits PLC-Error! Reference source not found. **through -**Error! Reference source not found. **only affect how far up the aggregate supply curve the contractors in the targeted program will invest?**

A: No. The opportunities at each customer's premises will include a mix of low-cost and high-cost measures, measures with low benefits per kilowatt of peak reduction and measures with high benefits, measures for which the customer will pay a lot and those for which the customer will pay only a small part of the cost. These problems arise for each customer installation, and are compounded by the variability in the technical, financial, and institutional situation faced by each customer. Since the contractor is paid the same for every kilowatt of load reduction, the contractor will prefer

- a measure costing $400/kW-yr for which the customer will pay $300/kW-yr to a $250/kW-yr measure for which the customer will only pay $100/kW-yr (since the contractor cares only about its net cost).
- a measure with $400/kW-yr of benefits costing $100/kW-yr to one with $600/kW-yr of benefits that costs $150/kW-yr (since the contract cares only about its costs and the contract price per kW-yr, not about benefits to customers).

Finally, as I noted above, the contractor's incentive is simply to maximize its profit, even if that creates lost opportunities.

Q: Have other utilities followed the direct-investment approach in pursuit of targeted peak demand savings?

A. Yes. Efficiency Vermont, the statewide energy-efficiency utility in Vermont, has been actively engaged in this approach in two geographically targeted areas of the state with the express purpose of reducing peak demand with aggressive program strategies to reduce peak demand growth and thus postpone T&D investment that would otherwise be scheduled in those areas by the local utilities. Program strategies include comprehensive, free direct installation of all cost-effective efficiency measures. The Public Service Board recently ordered the Efficiency Vermont to continue and broaden its "geotargeting" investments in these areas for the next three years.

Q: How should Con Edison improve the targeted program?

A: In concert with the new role that Con Edison will assume pursuant to Commission directives in the EPS proceeding, the Company should discontinue its current approach to acquiring targeted efficiency. Instead, Con Edison should refocus the targeted program to concentrate and intensify the Company's new programs (starting with the expedited residential HVAC and small C&I programs) and NYSERDA's statewide and system-wide programs and Con Edison's new programs (starting with the expedited residential HVAC and small C&I programs), to deliver comprehensive and cost-efficient savings in the targeted areas. In targeted areas, Con Edison should enhancing the generally available programs with increased funding; higher rebates; additional marketing, training or technical assistance; more generous financing; and/or improved incentives to trade allies.

In general, NYSERDA reports show the existing statewide and system-wide programs to be highly cost-effective. Increasing the funding of the programs should reduce unit costs, higher rebates do not affect cost-effectiveness, and the

other improvements should be undertaken only to the extent that they are cost-effective, including both the generic and targeted benefits.

VI. Distributed Generation

Q: Does Con Edison provide incentives to distributed generation that can contribute to deferring major T&D investments?

A: Con Edison allows distributed generation to participate in its RFP process, but only with serious restrictions. Either customer load must be isolated from the Con Edison system and served only by the distributed generation, or the customer must be willing to shed load if the generator is out of service.

> [Distributed-generation] installations may be operated in parallel with the Company's system or in isolation from the Company's system by means of a transfer switch (break-before-make) to reduce load during peak periods of a selected load area. However, proposals for DG installations operating in parallel with the Company's system will have to demonstrate that such DG installations have alternative physical means to effectuate the demand reductions offered when the DG is not operating (physical assurance), for example, the installation of customer-owned equipment or system, approved by Con Edison, that would to be used to reduce the customer's load whenever the DG is not operating. (Request for Proposals to Provide Demand Side Management to Provide Transmission and Distribution System Load Relief and to Reduce Generation Capacity Requirements, Con Edison, August 28, 2007, pp. 2–3)

Q: Is this treatment of distributed generation consistent with Con Edison's treatment of its own small generators in T&D planning?

A: No. In its T&D plan, Con Edison credits the W. 59th St gas turbine—which is listed in the 2008 Gold book as having a summer capacity of just 12.4 MW—with contributing 14.6 MW of load relief to the W. 65th St. area substation No. 2, the 138-kV subtransmission feeders to the W. 65th St. and Astor substations, and

the W. 49 St. substation. [7] Without the W. 59th St generator, Con Edison would have found the W. 65th St. substation No. 2 to be capability-deficient through 2013. Similarly, Con Edison credits the East 74th St. gas turbines 1 and 2 (listed in the Gold Book at 19 and 19.5 MW respectively) as providing 18 and 20 MW of load relief respectively to the East 75th St. area substation and the 138-kV feeders. Without these generators, Con Edison would have determined the East 75th St. substation to be deficient through 2010.

Although Con Edison counts on the capacity from these three generators, not one would meet Con Edison's strict requirements for distributed generation in the targeted program. This double standard is particularly pronounced when one considers that Con Edison's three 1960s-vintage generators are likely to have forced-outage rates and failure-to-start rates that are much higher than those of more-modern distributed generators: reciprocating engines, micro-turbines, combustion gas turbines, and especially fuel cells. In addition, these Con Edison generators are fairly large by distributed-generation standards, and impose much more serious outage risks than smaller, more diverse units. For example, if the W. 59th St generator fails to start, the substations and feeders dependent on it lose 14.6 MW of relief. The same capacity in large microturbines (500 kW) would require 29 units, only a few of which are likely to fail at any particular time. Yet Con Edison counts those three old combustion turbines as providing adequate assurance of load relief, even though it denies similar credit to other, more-reliable generation sources.

Q: What can Con Edison do to facilitate the use of distributed generation to relieve T&D constraints and reduce congestion into Zone J?

[7] Area Substation and Subtransmission Feeder Ten-Year Load Relief Program, 2008–2017, Con Edison Distribution Engineering Department, May 28, 2008.

A: There are at least five things that Con Edison can do along these lines. First, the Company should establish more appropriate rules for inclusion of clean distributed generation in the load-relief process, perhaps as part of a revised targeted program. For example, the rules might determine the load-relief credit for generation (whether owned by Con Edison or others) as a function of unit size (with smaller units given greater credit), number of units on the network, and reliability (forced outage rate and failure-to-start rate).

Second, Con Edison should prioritize resolution of the fault-current constraints on the development of clean distributed generation in the areas requiring load relief. Of the networks targeted in the 2007 RFP, Con Edison does not expect that the Chelsea, Cooper, Beekman, and Grand Central networks will be able to accommodate additional synchronous generation until sometime after 2014, even though load relief is required by 2012.

From the Load Relief Program document, it appears that load relief from distributed generation in the Hunter, Sutton, and Lennox Hill networks, and probably the Turtle Bay and Roosevelt networks, would allow for the deferral of the new York area substation in 2011. However, Con Edison's June 2008 map of synchronous generation placement availability indicates that these networks would not be able to accommodate more synchronous generation until 2011 (Turtle Bay and Roosevelt), after 2012 (Lennox Hill), or 2014 (Hunter and Sutton). Similarly, load relief on the Herald Square, Columbus, Rockefeller Center, Lincoln Square, and Pennsylvania networks would appear to be able to contribute to delaying the need for the fifth transformer at Astor in 2013. Although Con Edison lists most of these networks as being able to accommodate additional synchronous generation, the Pennsylvania network is shown as not being able to accept synchronous generation until 2012. In short,

fault-current constraints are hampering the development of clean distributed generation and thus should be resolved as soon as possible.

Third, Con Edison should develop processes and guidelines to facilitate development and interconnection of solar generation with net metering. Senate Bill 7171B, signed August 5, 2008 (long after Con Edison filed this proceeding), allows net metering for up to 2 MW of solar generation for non-residential customers.[8] Net metering requires that Con Edison accept some flow of power back onto its system, which in turn may require modification of protection schemes. The net-metering law is intended to—and should—boost the development of solar and wind distributed generation. To facilitate that growth, the Company should modify its protection schemes and determine how the distributed generation will communicate with the network, so that dispatchable distributed generation can be on line when needed, generation can be separated from the network during network outages, and the Company can monitor generation levels in real time. The Company should be developing these procedures now, rather than risking delay of future solar and wind developments in the City.

S. 7171B also requires that, by early November 2008, Con Edison must file a model contract and rate schedule to implement net-energy metering. Those filings should be as specific as possible, leaving little or nothing to be negotiated on an individual project basis. The standard connection procedures for preparing the network to accept the net-metered power should be filed and reviewed at the same time. To ensure speedy development of these procedures, the PSC should require that Con Edison report semi-annually on its implementation of the net-metering laws, including the number of inquiries and applications, the status of

[8]Senate Bill 8481 does the same for wind generation.

each application, and the time required to process and accomplish each interconnection.

Fourth, Con Edison should work with the New York City Economic Development Corporation and other agencies to resolve the process by which district-energy schemes—cogeneration plants providing heating and cooling services for multiple buildings, as well as electricity—can be developed in conjunction with such large-scale redevelopment projects as Hunts Point, Willets Point, and the Hudson Yards. While the development of the cogeneration and the district heating and cooling loops would be the responsibility of other parties, it is important that Con Edison's build-out of electric distribution (and in some cases, gas distribution) be coordinated with the development of the district-energy system. Specifically, Con Edison should be required to file annual reports on this district-energy process.

Fifth, to encourage and facilitate the completion of proposed distributed-generation developments, Con Edison should implement an on-line interconnection system to track pending applications. The system should follow the status of each application, including the application's location in any analysis or review queue; the dates of receipt, start of review, approval and completion of Con Edison's portion of the work; and the identification of any missing information delaying completion. The date tracking should include forecasts of Con Edison's engineering and administrative milestones, so that project owners can plan their part of the work. The data on project status should be available on-line, with full detail available to project owners and more aggregate data regarding type of technology, size, status, and network available to the public.

Q: Doesn't the Company already provide public information on the status of distributed generation projects?

A: The Company has sent to some parties documents entitled "Semi-Annual Status Report on Customer-Owned Distributed Generation," with some information on distributed-generation interconnection status for individual projects. However, those reports are apparently not always timely.[9] They are also incomplete and inconsistent in the following ways.

- The reports frequently show only the date of Con Edison's most-recent comments or action. In order to allow customers to track their progress compared to other projects, and to allow public-interest parties to track Con Edison's overall progress, it would be useful to have the dates of each customer submittal, each Con Edison response, resolution of design issues, preoperational testing, inspections, and other milestones. [10]
- The reports also have long gaps in information, such as the report dated September 4 2007 listing for a completed project, in which the only schedule information is "Issued comments on May 19, 2003 and awaiting response from Customer." If no important milestone has been passed in the subsequent four years, the report should probably treat the project as inactive.
- An active project is listed in the September 4 2007 report as "Three generators (out of six to be installed) successfully completed pre-operational testing in July, 2006," raising questions about the fate of those generators in the subsequent year.

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[9] The most recent "semi-annual" report I have located is dated September 4 2007 and states that it contains data through June 30 2007 (although it actually references at least some activity in August of 2007), covering distributed generation projects in progress as of December 31 2006.

[10] The reports mention "comments," "design review comments," preliminary design review comments," "preliminary comments," and "comments on second submittal" (not all of which are necessarily distinct), but generally provide the date of at most one set of comments.

- Other milestones—"Customer agrees to feasibility study to be performed by Company," "Customer responded to comments," "Con Ed awaiting inspection and pre-operational test," "Customer submittal is being reviewed"—are not dated, so the reader has no idea whether Con Edison has been studying feasibility, considering customer responses, or awaiting inspection for a few days or a few years.
- The reports also include references to the issuance of cost estimates for projects, but do not provide the estimates in the modification cost column, which is supposed to contain "order of magnitude estimates...when available."

Q: How would Con Edison's standards for distributed generation affect the use of solar photovoltaic generation to defer T&D investments?

A: Con Edison's standards would essentially preclude the use of photovoltaics in the targeted program. Few customers are likely to be willing to shed load every time a cloud reduces the output of their solar arrays.

Q: Would photovoltaics contribute to relieving T&D overloads?

A: Yes. Most high-load days will be very sunny days. This is especially true for the parts of New York City, such as Midtown Manhattan, that are dominated by tall buildings with high solar heat gain. In addition to reducing load at the peak hour, solar generation will reduce load in hours (and even days) leading to the peak, reducing the heat buildup in transformers and lines. That heat buildup is the major load-related factor leading to failure of T&D equipment.

Q: How should Con Edison be encouraging solar generation in networks in need of load relief?

A: Con Edison should offer incentives for photovoltaics in day-peaking targeted areas, commensurate with the T&D benefits. If Con Edison believes that a

kilowatt of solar photovoltaics contributes less to the deferral of T&D capacity than a kilowatt of peak load reduction through energy efficiency, the Company should determine the relative value and submit its analysis for review by the Commission.

Q: Does this complete your testimony?

A: Yes.