Q. Please state your name.

A. Arthur Kressner.

Q. Mr. Kressner, have you previously testified in this proceeding?

A. Yes, I have.

Q. What is the purpose of your rebuttal testimony?

A. My testimony responds to: (1) Staff witness John Quackenbush's recommendation to reduce the Company's Research & Development ("R&D") program by $3,090,000; (2) the Staff Accounting Panel's ("SAP") recommendation to decrease R&D funding by $280,000 by rejecting a normalization made by the Company in deriving its expense-to-capitalization ratio adjustment; (3) the NYPA Panel's recommendation that NYPA not be allocated certain R&D costs; (4) NYC witness Arnett's general criticism of the Company's proposed R&D funding; and (5) Staff witness Quackenbush's recommendation that R&D expenditures associated with energy efficiency projects be considered in the EEPS case.

PROPOSED REDUCTIONS OF R&D EXPENDITURES

Q. Please describe Staff witness Quackenbush's proposed adjustments.

A. Mr. Quackenbush's three proposed adjustments to the R&D program are:

1) Reducing the funding of the Company's internal distribution program budget by a total of $1,300,000;

2) Continuing two austerity measures identified by the Company, totaling $990,000; and

3) Reducing the funding to zero for three of EPRI's base programs, resulting in a revenue requirement reduction of a total of $800,000.

Q. Do you agree with the Staff witness Quackenbush's adjustments totaling $3.09 million to R&D expenditures?

A. No. As I explain, Staff's adjustment unreasonably reduces proposed R&D funding necessary for the Company to continue modernization, reinforcement and expansion at the transmission, substation and distribution levels.

Internal Distribution Program Adjustments

Q. What reasons did Mr. Quackenbush provide for his recommendation to reduce funding of the Company's internal distribution program budget?

A. Mr. Quackenbush claims that the Company has not formally approved the cited programs nor has there been any cost-benefit analyses supporting the programs.

Q. Do you agree with this adjustment?

A. No. I explained in my initial testimony and responses to interrogatories tendered by Mr. Quackenbush the process employed by the Company in developing its R&D program. In contrast, Mr. Quackenbush provides no basis for the Commission to find this process, or the forecast of expenses for the Rate Year resulting from this process, is unreasonable.

Q. Please describe the process you employed to developing your Rate Year forecast.

A. The program plan presented in a rate filing reflects a combination of specific projects and targeted programs. Some of the projects are ongoing, others newly identified. The programs are more conceptual in nature than projects. Programs encompass areas of critical importance to the Company, in which the Company has determined that R&D should be focused, but for which the Company has not yet identified specific projects in which to invest. During the period leading up to the Rate Year, the Company endeavors to match the current needs of Company operations with opportunities for solutions. In all cases, an analysis of candidate projects is made, with potential advantages reviewed against financial resources required for successful development. A cost/benefit analysis is performed for

all projects over $150,000. Emphasis is placed on projects with the possibility of near- and mid-term benefits, but we are also mindful of long-term programmatic issues that need to be addressed. This general approach facilitates a comparison of various candidate technologies and aids in project selection and prioritization.

Q. Please continue.

A. R&D also regularly evaluates its portfolio to apply lessons learned and assess risks to the Company that may have solutions in R&D and reprioritizes projects to better match Company needs to R&D opportunities. Our research program is focused on obtaining the greatest results over various product delivery times. Our portfolio seeks to balance both the short- and long-term, and small and large, projects. Our internal program primarily focuses on problems unique to the characteristics of our urban territory, such as very high densities of energy consumption and/or underground transmission and distribution systems.

Q. Has the Company used this approach in formulating its R&D forecast in previous Con Edison electric rate filings?

A. Yes, including the prior two rate cases (Case 07-E-0523 and 08-E-0539). I note that Staff has generally found our proposals, based on this approach, to be justified. For example, Staff witness Nicola Jones on page 3 of her testimony in Case 08-E-0539 stated: "I have concluded that each of the base programs are warranted and justified…". Similarly, in Case 07-E-0523, Staff witness Jason Pause stated, "I have concluded that each of the base programs are warranted and justified."

Q. Since preparing your direct testimony, has the Company established specific projects for the six program areas that Mr. Quackenbush has recommended be disallowed?

A. Yes, we have identified, and provided explanations for, 11 new projects, totaling $1,270,000, for the six program areas in Exhibit__ (AK-3). As we approach the beginning of the rate year, we expect that additional projects, making up the entirety of each program, will also be identified.

Q. Please explain Exhibit __ (AK-3).

A. Exhibit __ (AK-3) provides explanations for 11 projects under the six program areas. This exhibit was prepared under my supervision and direction.

MARK FOR IDENTIFICATION AS EXHIBIT __ (AK-3)

Q. Please explain Mr. Quackenbush's recommendation to continue two austerity measures that were part of the austerity plan submitted by the Company in response to the order in the last rate case.

A. The Company, as required by the Commission Order in Case 08-E-0539, submitted an austerity filing that included $3.2 million in reductions in the Company's 2009 R&D program. Mr. Quackenbush recommends that the Company continue reduced spending for two of those activities into the Rate Year.

Q. What are these two adjustments?

A. The first adjustment reduces the rate request by $240,000 for salaries associated with three positions in the R&D department.

Q. What is the basis of Mr. Quackenbush's recommendation?

A. Mr. Quackenbush contends that the Company has not established a hiring date nor identified a clear need for these positions.

Q. Do you agree with Mr. Quackenbush's contentions?

A. No. With respect to his claim that the Company has not established a hiring date for these individuals, there was no need to establish specific hiring dates. As Mr. Quackenbush recognizes, the Company deferred hiring these positions for the period ending July 1, 2010, as

part of the austerity plan, and plans to take the appropriate steps to fill these positions on or before the expiration of the austerity period.

Q. As to Mr. Quackenbush's claim that the Company has not identified a clear need for these positions, please explain the basis for your disagreement.

A. Mr. Quackenbush ignores the Commission's approval of these positions as part of the revenue requirement adopted in the last rate case, which was based upon the level of project work in the Company's approved R&D plan and the need to support that work with appropriate staff.

Q. Mr. Quackenbush's second adjustment (pp. 12-14) reduces the revenue requirement by $750,000 associated with the Company's proposed Network Reliability and Monitoring Program because he contends that the Company has not established a start date for the Network Reliability and Monitoring Program. Do you have a comment?

A. While Mr. Quackenbush is technically correct that my testimony did not contain a start date, as with the open positions above, there was no reason to include one. This project was part of the R&D program approved by the Commission's order in Case No. 08-E-0539. This program was deferred as part of the Company's austerity

plan and, like the filling of the open positions, it will be undertaken upon expiration of the austerity period.

EPRI Base Program Adjustment

Q. Please explain Mr. Quackenbush's adjustment to the EPRI Base Program.

A. Mr. Quackenbush adjusts the R&D request to remove three programs totaling $800,000. These three programs are Integration of Distributed Renewables Program ($175,000), the Energy Storage Program ($150,000) and the Energy Utilization Program ($475,000). I will discuss the EPRI Energy Utilization Program later in my testimony, starting on page 22.

Q. What is the basis for Mr. Quackenbush's recommendation to remove the first two programs?

A. He alleges (pp. 6-7) that these two programs are duplicative of two programs the Company has identified in its internal research portfolio.

Q. Do you agree?

A. No, I do not. The Company funds EPRI's base program research to support and complement our internal program. EPRI has been conducting research for distributed renewables and energy storage for several years and has a significant body of information, data

and analyses available that can be used in developing a long range plan for these technologies. This body of information is not available to the Company without its participation by funding the cited EPRI Programs. Since energy storage systems for bulk power storage, distributed renewable energy sources and grid support are actively under Company development in many configurations, we need to have the best available information about cost and performance and best practices of the available options as well as how to reliably integrate them into our system. The Company uses information from these EPRI programs to support and complement, not duplicate, the Company's internal research programs in these areas.

Q. Please explain why the efforts are not duplicative.

A. Our internal programs will be directed at building upon what we learn from EPRI and developing systems that can be installed in New York City. As I explained in my initial testimony, EPRI is not working on products and systems specific to New York City, which presents issues not encountered in other geographic areas. For example, we cannot immediately adopt energy storage technologies being developed and tested like sodium-sulfur batteries because of restrictions imposed by New

York City fire and building codes. It is my understanding that no other utility in the country has similar restrictions. The Company is therefore working to develop a different storage technology and requires the base data developed by EPRI in this area. Similarly, lithium-ion batteries and compressed air energy storage ("CAES") systems require too much space to be practical in most of our service territory. Nonetheless, the EPRI information will serve as the base for our research regarding CAES systems that would be viable in our service territory.

Q. What is the basis for Mr. Quackenbush's recommendation to remove the EPRI energy efficiency utilization program?

A. He alleges (p. 6) that funding of this program depends on the outcome of the Company's request for this funding in the Energy Efficiency Portfolio Standard (EEPS) Proceeding in accordance with the Commission Order in Case 08-E-0539. We explain our position on the EEPS proceeding later in the testimony.

Q. Have the funding requirements for EPRI's base energy efficiency program changed from the $475,000 stated by Mr. Quackenbush?

A. Yes. Mr. Quackenbush relied upon the Company's response to Staff's Interrogatory DPS-63 to determine the $475,000 estimate. However, when the response to DPS-63 was prepared, the Company used EPRI's 2009 program portfolio and funding requirements, the information then available. Since that time the Company has received and is reviewing EPRI's 2010 program portfolio and funding requirements. For 2010, EPRI has restructured its program related to energy efficiency, dropped some items that did not obtain enough funding in 2009, and is allowing the Company to be more selective in what we can fund. Based upon the 2010 portfolio, the Company now estimates this funding to be $275,000.

Q. Does the Company have a process for determining which EPRI base programs should be funded annually?

A. Yes. The Company has a robust review process of our annual EPRI program selection process.

Q. Please describe this process.

A. When EPRI's annual funding solicitation is received, it is distributed to all the Company's and Orange and Rockland Utilities, Inc. staff who serve as EPRI advisors as well as interested technical staff (approximately 50 people) for review with an eye toward

securing the highest value at the lowest cost. Those responsible for selecting programs/project sets are required to provide R&D with cost justification and analytical support for each program/project set recommended for funding. After their input is received, a funding straw proposal and recommendation is assembled, which is sent out to a second review team for their input. That team consists of approximately 24 Chief Engineers, Directors and Vice Presidents. They prepare a second straw proposal and recommendation based upon the input received and sent for review to a third review team, consisting of approximately 12 Vice Presidents and Senior Vice Presidents. Thereafter, a final recommendation, along with all the necessary forms, is prepared and sent for review and approval to the Senior Vice President of Enterprise Shared Services, then the President and finally, to the Chairman. This entire review process takes approximately five months and is normally completed by the middle of December.

Q. What does this process accomplish?

A. By using this robust process, we are able to compare the EPRI program to our internal program portfolio to determine where our funding should be directed to

provide us with a balanced portfolio that provides the best value to our customers. Thus, Mr. Quackenbush's adjustment should be rejected.

STAFF ACCOUNTING PANEL

Q. Please describe the Staff Accounting Panel's recommendation to which you object.

A. The Staff Accounting Panel recommends decreasing R&D funding by $280,000, by rejecting the Company's normalization of costs related to the Sarnoff stray voltage vehicles in developing its capitalization rate.

Q. What reason does the Staff Accounting Panel give for rejecting this normalization?

A. Staff says that the purpose of using a five-year average is to smooth out anomalies in any given year.

Q. Do you agree with Staff's rationale?

A. I agree that the use of a five-year average is intended to smooth out year-to-year variations and can constitute a reasonable approach when it is not practical to forecast an expense level for a future period; variations from year to year during the historic period are within a reasonable range; and there is no reason to believe that the future period will be materially different. However, there are situations, like this one, where the failure to

normalize a particular occurrence will result in an average expense level that is not representative of average annual circumstances and will result in a materially overstated forecast.

Q. Please explain why.

A. As stated in my initial testimony, the Sarnoff stray voltage vehicles were the result of an R&D project in response to the death of a pedestrian resulting from stray voltage. This project and deployment of its products were given the Company's highest priority for development and implementation. Several prototype vehicles were built to test and demonstrate the technology. Once the technology was shown to be successful, the Company purchased several additional vehicles through the R&D organization to expedite delivery of these vehicles in an effort to rapidly expand the Company's stray voltage testing program to enhance public safety. Absent these particular circumstances, more typically, a single prototype would have been put into commercial, productive use and thereby capitalized for R&D purposes.

Q. Is the Company proposing to eliminate this project altogether?

A. No. Our proposal is to include the cost of one of these vehicles in the capitalization adjustment consistent with normal practice.

Q. Has Staff, including the Staff Accounting Panel, proposed rate adjustments based upon the average for an historic period for which they have proposed normalization?

A. Yes they have. For example, the Staff Accounting Panel recommends (and recommended in Case 08-E-0539) that costs for litigation involving spent nuclear fuel be excluded from the five year average for regulatory commission expense on the grounds that the spent nuclear fuel litigation is a large expense and may not be recurring (the Company's Accounting Panel addressed this recommendation in their rebuttal testimony). In Case 08-E-0539, the Staff Accounting Panel also proposed to remove the costs of the Vantage audit from regulatory commission expenses, again claiming it would not occur in the rate year. Although the Commission correctly rejected these proposed adjustments by Staff, their actions demonstrate that normalizations should be considered by the Commission. Since under normal circumstances the Company would have only purchased one Sarnoff device, not five, the cost of one vehicle

should be included in the average for capitalization purposes and the cost of the remaining four vehicles removed through a normalization adjustment.

NYPA PANEL

Q. Please explain the NYPA Panel's recommendation that NYPA not be allocated R&D costs.

A. NYPA believes that because it pays dues to many of the same research organizations as Con Edison, including EPRI and NYSERDA, allocating a $1.5 million share of Con Edison's R&D costs to NYPA constitutes "double charging." (p. 25)

Q. Do you agree?

A. No. First, all of Con Edison's customers including NYPA generally benefit from the research activities of these organizations. Even assuming for purposes of argument that there is an overlap because both Con Edison and NYPA fund these two organizations, NYPA provides no basis whatsoever for eliminating the total amount of R&D costs allocated to NYPA ($1.5 million), where approximately 80% of the R&D department's budget is for its internal program. Next, the mere fact that NYPA pays dues to these organizations does not reduce Con Edison's commitment to these organizations. As I had explained earlier in this testimony, in order to

have access to EPRI's research results, a utility must fund the specific base program where the result has been derived. Neither Con Edison nor NYPA could share in EPRI information if only one of the entities was to pay EPRI for a category of research information. In any event, the Company's EPRI funding is primarily focused on underground transmission and distribution programs and not generation. We believe that any overlap with a project NYPA would fund would be minimal, if at all, since NYPA's interest would be focused on transmission and/or generation. In other words, NYPA benefits from our participation in the EPRI information and data just like any other customer. Presumably NYPA itself participates in EPRI projects because of particular benefits to its customers.

Q. Do you have a comment regarding NYPA's concern with double charging of the NYSERDA funding?

A. The Company's funding of NYSERDA's R&D program is mandated by New York State Legislation. The Company has no input as to how NYSERDA manages this program or the funds it draws from the Company. I would note that NYSERDA's R&D program is in addition to the other programs NYSERDA is managing on behalf of the State, including EEPS, RPS, and SBC. I also understand that

NYPA is not mandated to fund NYSERDA but does so voluntarily.

Q. Do the Company and NYPA collaborate in funding other research activities?

A. Yes. In the past both entities have collaborated and funded joint R&D projects, the most recent being the NAS battery demonstration taking place on Long Island.

Q. Is the Company receptive to having discussions with NYPA to review R&D portfolios to see if there are any other areas where research programs can be made more cost-effective via collaboration?

A. Yes. We welcome the opportunity to meet with NYPA to review each of our R&D portfolios to identify areas of overlap as well as identifying areas where we could collaborate together, potentially reducing the costs to our customers.

NYC WITNESS ARNETT

Q. NYC witness Arnett asserts that the Company demonstrates poor judgment in seeking an increase in R&D funding at this time. Do you agree with this assertion?

A. No. In fact, the Company is not asking for an increase in the R&D base program beyond what was approved in the last two rate cases, before application of the

capitalization adjustment (Rate Order, Case 08-E-0539, p. 94 and Case 07-E-0523, p. 59). As detailed earlier in this testimony, the Company has added two new programs areas in energy storage and distributed renewables but these programs do not increase the requests above the level requested in the last case. Significant research and development of associated devices and systems is required to adequately assess energy storage, its impact on the electric system, it ability to integrate wind and solar power, and customer impacts and acceptance. We need to research the availability, limitations, and deployment-readiness of technologies, information about cost and performance, best practices among the available options, and reliable integration into our system.

Q. What is the basis for Mr. Arnett's assertion?

A. Mr. Arnett's assertion appears to be based upon a response to an interrogatory question that I prepared which he may have misunderstood.

Q. Please explain.

A. Interrogatory NYC 144, asked the following: "Please provide a list of all projects expected to be completed and enter commercial use in rate year, and for each such project provide the amount spent on the project,

the potential savings or other benefits resulting from the project, and the estimated proceeds or profits to be realized from the commercialization of the project." In preparing the response to this interrogatory, as well the responses to City questions 123, 138, 142 and 143, I assumed the question to be specific to R&D products that were going to be commercialized, outside of Company operations, with an expectation that the Company would realize profits from such commercialization. My response was intended to mean that, because of the nature of R&D, we do not know if a vendor is going to commercialize a product after developing it for the Company or if the Company would receive any royalties or other compensation as a result. Our R&D program is not conducted in order to generate profits from the sale of products. As explained earlier and in my initial testimony, rather our R&D is directed at garnering benefits to the Company and its customers by matching the needs of Company operations to opportunities for solutions using advanced technology. The benefits are realized by then following through on that match-up to develop and demonstrate these beneficial technological solutions in company operations.

Q. Can you identify any products of R&D that may be in use by the Company in the rate year?

A. Yes. The following eight products might result be introduced into operations, as prototypes, during the rate year:

1) Mobile/ transportable video systems for security applications
2) New SF6 Leak Camera
3) Directional hand-held stray voltage detector
4) Submersible fast switch
5) Applied Mesh Secondary Monitoring and High Tension Monitoring wireless data gateways,
6) Consequential learning simulator
7) Hybrid composite manhole cover; and
8) PHEV Infrastructure (Metering and Charging) Stations.

Q. Will these eight products be capitalized?

A. No. As explained in my initial testimony, many of the results of R&D projects are prototypes that do not go into commercial, productive use. Instead the prototypes become the model underlying specifications and purchase orders for new equipment by various Company operating departments from third party manufacturers. While these prototypes are an important

part of the R&D process, they are not constructed in a way that is durable enough to place them into commercial operation. Therefore, the associated costs of development and earlier prototype units remain as operating expenses within the R&D department.

Q. Will any of these eight projects be put into commercial use?

A. As I stated in my discovery response, I do not know.

DEFERMENT OF EXPENDITURES ASSOCIATED WITH ENERGY EFFICIENCY PROJECTS TO THE EEPS CASE

Q. Staff witness Quackenbush proposes that the R&D expenditures related to the EPRI Energy Utilization programs be considered in the EEPS case, in accordance with the Commission Order in Case 08-E-0539. Do you agree?

A. The Commission determined in Case 08-E-0539 that funds for energy efficiency-related R&D be pursued in the EEPS case. Pursuant to the Order (pp. 99-101), the Company will be filing a petition in the EEPS proceeding ("Petition") seeking to recover energy-efficiency-related R&D expenses for the current rate year and for the rate year in this proceeding. The Petition will seek recovery of these costs through the Monthly Adjustment Clause or through base rates. In addition, the Company has expressed its disagreement

with the Commission's decision to have these costs considered in the EEPS case as part of its May 26, 2009 request for rehearing of the 2009 Rate Order. If the Commission grants the Petition or the rehearing and agrees that these costs be recovered in base rates, then the Company requests that the rates established in this proceeding be updated to reflect the expenses for these programs.

Q. For purposes of clarification, please identify the energy efficiency-related projects for which you are seeking rate relief.

A. The five energy efficient related projects, which we have identified for the rate year, and which total $640,000 in projected expenditures, are as follows:

1) EPRI's base program concerning End Use Energy Efficiency and Demand Response Technologies, which provides research in efficient energy utilization through the assessment, testing, and field demonstrations of advanced energy-efficient technologies and integrated demand response systems. The program also includes the development of robust analytical frameworks to appropriately value the economic, environmental, and societal impact of

energy efficiency technologies. The projected annual cost of these base programs is $275,000.

2) The Lighting Research Center (LRC) to allow Company personnel to obtain information and analysis related to state-of-the-art and emerging lighting technologies. The projected cost is $70,000.

3) An LED streetlight demonstration in Westchester County. The projected cost of this demonstration is $45,000.

4) An expanded demonstration of home automation network (HANs) devices from various vendors that allows customers to monitor and control their energy usage, reduce their electricity consumption and save money. The project cost of this expanded demonstration is $100,000.

5) A Data Center Energy Efficiency program that expands desktop computer power supply efficiency standards to large scale computer power systems operated in data centers. The estimated cost of this demonstration is $150,000.

Q. Are there any additional items that you wish to address?

A. Yes. On page 16 of his testimony, Mr. Quackenbush recommended that any rate funding, initially allocated

to the R&D budget, that the American Recovery and Reinvestment Act stimulus package covers, be deferred.

Q. Are their any overlaps between the Company's stimulus filings and the Company's budget?

A. No, to the best of my knowledge, there are no overlaps between our filings and the R&D budget.

Q. Does that conclude your rebuttal testimony?

A. Yes.

Projects Identified by Specific Placeholder Program Areas identified by Staff Witness Quackenbush

	Presented in Rate Case	Projects identified
NETWORK RELIABILITY AND MONITORING PROGRAM	$ 750	
RMSX - ADVANCED PRIMARY AND SECONDARY SCADA		$ 735
Program Subtotal		$ 735
ADVANCED SPLICES AND JOINTS PROGRAM	$ 250	
ADVANCED DISTRIBUTION AUTOMATION TECH PROGRAM	$ 500	
FEEDER TEST SET INDICATION OF CONDITION FOLLOW-ON		$ 35
POWER FACTOR CORRECTION DEVELOPMENT FOR UNDERGROUND NETWORKS		$ 50
ADVANCED NETWORK PROTECTOR		$ 100
VIRTUAL NETWORK PROTECTOR TEST BOX		$ 50
SUBSTATION ALIVE-ON-BACKFEED RMS DEVICE		$ 50
DISTRIBUTED INTELLIGENCE FOR ADAPTIVE NETWORK OPERATION		$ 50
ON-LINE NETWORK FEEDER DIAGNOSTIC		$ 50
DATAPASS ACCESS CONTROL SYSTEM		$ 50
Program Subtotal		$ 435
ADVANCED DISTRIBUTION CABLES PROGRAM	$ 250	
ADVANCED-CURVE CABLE LIMITER		$ 50
BLOWN CABLE LIMITER ANNUNCIATOR		$ 50
Program Subtotal		$ 100
ADVANCED NETWORK SWITCHES PROGRAM	$ 300	
Total Funding	$ 2,050	$ 1,270

Descriptions of Projects identified as specific placeholder program areas

Network Reliability and Monitoring Program

RMSX- Advanced Primary and Secondary SCADA

This R&D initiative will develop and demonstrate an advanced primary and secondary SCADA whereby a new two-way network remote monitoring system – RMSX (Remote Monitoring System Expansion) will be developed and demonstrated. The new two-way network remote monitoring system will have the capability to monitor (open/close position) and control (open/make automatic) the existing network protector located at the sub surface network transformer vault. The system will allow control center personnel to identify sources of alive-on-backfeed (ABFs). The use of the an RMSx system will substantially reduce the time to clear the ABFs, since determining the status of the protector and blocking open the protector, if necessary, can all be done without vault entry. RMSx will provide for additional monitoring inputs to allow improved sensing of the conditions of the sub surface network transformer vaults.

Advanced Distribution Automation Tech Program

Feeder Test Set Indication of Condition

The objective is to develop portable test set to sense when the condition of the feeder is disrupted. This test set will replace existing equipment which does not currently have the capability to collect and record test data. Existing test sets are obsolete and the manufacturer is no longer in business. New devices need to be more accurate with the ability to electronically collect the test data and in addition gain more flexibility with test parameters.

Power Factor Correction Development for Underground Networks

This project is to look at underground conductor losses, which are typically on the order of 2% if the cables are operated near their ampacity rating (lower if the cables are larger than needed for the load). The reduction in losses that can be achieved with power factor correction depends on where it is applied. If it is applied as close to the loads as possible, conductor losses may be reduced from 2% to maybe as low as 1%. Also you always have to consider effects on harmonic levels and switching transients when applying capacitors. You can apply power

factor correction safely by making the capacitors tuned banks to avoid creating resonance problems or magnifying capacitor-switching transients. Power factor correction also may free up transformer capacity.

Advanced Network Protectors

Con Edison uses a mix of Eaton and Richards network protectors. At 120/208, Con Edison mounts the network protector directly on the transformer secondary. At 265/460, Con Edison's design standard calls for the protectors to be mounted separately from the transformer, normally in a separate vault enclosure. Con Edison has divided its territory into hurricane flood zones, and needs to develop submersible network protectors that are compact in size to fit within existing vaults located within these zones.

Virtual Network Protector Test Box

Grid networks present greater problems. They, by design, serve many more customers. Therefore, any integration of DER could negatively impact many, often high profile, customers located on grid networks. Little detailed work has been done in the area of modeling the impacts of DER to grid networks. This puts engineers at a disadvantage when attempting to set rules for the integration of DER. It has become increasingly apparent to DER developers and Con Edison that the issues, challenges, and best practices for interconnecting DER into network needs to have a full grid modeling tool developed that might show where and how generators might be applied on a grid network. The modeling might also determine the practical limits of DER saturation. This project is to develop a prototype modeling tool.

Substation alive-on-backfeed (ABF) RMS device

This project is to develop a prototype of a new substation RMS device to be used in ABF conditions at 13kV and 27kV area substations. The new RMS auxiliary device will consist of two pads. The device is intended to allow PLC current to flow in the absence of a closed circuit breaker and thus to permit receipt of PLC information. The first pad of the device will be an RMS Test Unit that is similar to a Ground and Test device but has no grounding capability. The device will rack into the breaker position as in normal operation. The second pad of the device will consist of a sealed enclosure on a mobile cad and will attach to the RMS Test Unit via test probe pods on the station side of the

interrupters rather than on the feeder side as in the normal GBT device. This enclosure will contain all components of a circuit that connects the feeder phases (three-phase delta, three-phase ungrounded wye, or only two phases tied together phase-to-phase) via hi-pass filters designed to allow only 45.45, 50, 55.55, or 62.5 kHz RMS signals through. This completes the PLC circuit and allows the RMS signal to be detected by the magnetic coupling coil. The hi-pass filters will not allow the 60 Hz feeder current and associated harmonics to pass through the device. Each substation has its own unique Ground and Test unit, which is dependent on the model of breakers used. One Ground and Test model commonly used in the Con Edison system will be modified for the prototype. Testing (laboratory and field) and demonstration of the prototype will be included in this project. In the future, each substation will require one alive-on-backfeed RMS device, modeled after the appropriate Ground and Test unit. While the modified Ground and Test part of the device will need to be substation specific, the mobile enclosure containing the RMS signal filters can be of a standard design.

Distributed Intelligence for Adaptive Network Operation

Utility engineers must use diagnostic test results to make decisions on the appropriate time for replacement of cables and accessories such as joints. To date, little information has been available on the relationship between the results of diagnostic measurement and the actual remaining life of those accessories. The aim of this project is to develop advanced monitoring and diagnostic sensors and systems are needed to provide reliable and accurate information for determining the condition of the network.

On-Line Network Feeder Diagnostic

This project is to develop on-line techniques and systems to detect changes in the properties of the network as precursors to failure.

Datapass Access Control System

Access to secure equipment and cabinets require conventional keys for opening mechanical door locks and padlocks. When immediate or unscheduled access is required the keys may not be available and access is impeded. Datapass access control systems will eliminate this problem. Datapass is an innovative lock system that converts existing mechanical locks into an electronic access control system. With Datapass electronic lock

cylinders, programmable keys and software we can create a system to track and control access to most locks in our system without the use of mechanical keys and locks.

Advanced Distribution Cables Program

Advanced-curve cable limiter

This project is to develop an advanced cable limiters that is primarily intended to isolate faults in multiple-cables-per-phase installations. This prevents total power outages until maintenance of faulted cable(s) can be scheduled. During the process of opening under fault conditions to isolate faulted cable(s), limiters current limiting action reduces potential for excess heat damage to un-faulted cables.

Blown Cable Limiter Annunciator

This project is intended to develop a sensor and system that will monitor cable limiter and communicate with the control room when a limiter has blown so that maintenance personnel can be dispatch to determine the cause of the failure and make necessary repairs to the system.