Company /Contract	Project	Project Type	NYSERDA($)	Total Cost($)
Premium Power 11008	Zn-Br Flow Battery Demonstration	Demonstration	231,688	463,376
NYPA 8718	Na-S Stationary Battery Demonstration	Demonstration	1,000,000	4,700,000
NY Presbyterian Hospital 10466	Ground Fault Protector Demonstration	Demonstration	110,000	220,000
EPRI 10470	Real-Time Applications of Phasor Measurement Units	Demonstration	744,120	1,495,302
EPRI 10471	Fast Fault Screening Tool for Real-Time Transient Stability Assessment	Demonstration	250,000	500,000
Orange & Rockland 10474	Smart Grid Pilot Project	Demonstration	1,000,000	4,422,000
Consolidated Edison 10674	Super Conductor Demonstration	Demonstration	1,000,000	37,500,000
Innoventive Power 10676	Use of Demand Response to Support NYS Transmission and Distribution Circuits	Demonstration	999,665	2,451,934
NYSEG 10467	Compressed Air Energy Storage Study	Engineering Study	200,000	373,923
Alcoa 10468	NYISO Demand Response Capability Assessment	Engineering Study	165,000	215,000
Clarkson University 10677	Design Methodology for Electric Power Distribution Systems	Engineering Study	190,079	258,209
General Electric 10465	Analysis of the Impact of Proposed Greenhouse Gas Policies on the NY Power Grid	Research Study	200,000	350,250
Pace University 10472	Identification and Development of More Effective Approaches for Engaging Distribution Utilities in the Deployment of DG as T&D Resources	Research Study	148,650	203,003
NETSS 10476	Voltage Dispatch and Pricing Support of Efficient Real Power Dispatch	Research Study	150,000	150,000
JWD Consulting 10477	Installing Flexible Alternating Current Transmission System Devices on the Electric Transmission System Grid	Research Study	182,500	351,000
Columbia University 10675	Micro-grids: Benefits of Small Scale Electricity Networks in NYS	Research Study	134,958	179,944
Beacon Power 11007	Interconnection of a 20 MW Flywheel Regulation Plant to a High Voltage Grid	Demonstration	500,000	72,000,000
NYSEG 11052	Compressed Air Energy Storage Demonstration	Demonstration	1,000,000	125,000,000
Brookfield Power 11054	Dispatchable Green Energy Integration with Intermittent Wind Resources	Demonstration	1,000,000	2,975,725
Central Hudson Gas & Electric 11058	Utilization of Micro-grids for Reliability Improvement and System Reinforcement	Demonstration	371,000	800,000
Clarkson University 11053	Surface-Textured High Voltage Insulators with Super Hydrophobicity	Product Development	200,000	400,401
EPRI 11051	Conceptual Design and Assessment for a Green Urban Network	Engineering Study	194,280	259,280
6-Nines Power 11057	Public Ownership of Energy Storage Systems in NYS	Research Study	76,500	149,365
Power Factor Correction 11059	Local Distribution System Power Factor Correction	Demonstration	200,000	240,950
SMRT Line 11060	Commercial and Regulatory Models for Non-Utility Transmission Infrastructure	Research Study	200,000	430,000
NYISO 15467	New York State Phasor Measurement Network	Demonstration	400,000	800,000
V&R Energy Systems 15468	Prevention of Occurrence of Major Catastrophic Events: Demonstration for Electrical System	Demonstration	300,000	1,250,000

EPRI 15466	Transmission Grid Operation Risk Assessment using Advanced Sensor Technologies	Engineering Study	199,400	349,400
EPRI 15464	Energy Assessment of T&D Losses	Engineering Study	187,500	250,062
NYPA 21083	Increased Reliability and Efficiency Using Combined Phasor Measurement Units (PMU), Dynamic Line Rating and Optimized Equipment Management Technologies	Demonstration	1,683,494	3,366,988
National Grid 21086	Assessment of Microgrid Powered by Renewables	Engineering Study	106,624	195,468
National Grid 21085	Advanced Distribution Protection, Automation, and Control for the Smart Grid	Engineering Study	246,045	416,432
Energy Storage and Power 21087	Small Compressed Air Energy Storage	Engineering Study	250,000	393,234
Central Hudson Gas & Electric 21082	Distribution Smart Grid	Demonstration	1,599,450	4,849,450
Consert Inc 21084	Central Hudson Virtual Peak Plant	Demonstration	114,955	282,360
Delaware County Electric Co-op 21081	Smart Grid Demonstration Project	Demonstration	869,633	1,739,266
KEMA 28813	Markets & System Dynamics * buildings program budget	Research Study	96,070	127,903
Stony Brook University 28814	Enhanced Power System and Control Through High Performance Computing	Engineering Study	250,000	359,928
RPI 28815	State Estimation and Situational Awareness	Engineering Study	212,429	283,381
Ceralink Inc 28816	Elimination of Transmission & Distribution Line Losses through use of Line Arrestors	Engineering Study	249,988	365,802
EPRI 28817	Determine Effectiveness of Smart Grid Inverters to Support PV in NY Electric Distribution System	Engineering Study	250,000	350,000
Utility Systems Technologies 28819	Optimizing Supply Voltage Support to Minimize Energy Consumption	Product Development	250,000	381,000
Triple Point Energy 28820	Thermal Power Plant Energy Storage System	Engineering Study	146,962	197,801
V&R Energy Systems 28821	Advanced State Estimation to Improve Reliability of Con Edison's Network	Demonstration	500,000	1,000,000
NYPA 28822	Above Ground Compressed Air Energy Storage Plant	Engineering Study	250,000	500,000
Orange & Rockland 28823	Advanced Smart Grid System Applications	Demonstration	2,000,000	7,316,188
Central Hudson Gas & Electric 28824	Advanced Distribution Smart Grid – Phase II	Demonstration	967,800	2,066,100
Electrovaya 28825	Utility Scale Transportable Energy Storage System	Demonstration	1,324,210	2,975,996
Urban Electric Power 30366	Grid Scale Energy Storage Ni Zn Flow Battery	Product Development	1,000,000	2,000,000
Applied Materials 30730	Superconducting Fault Current Limiter	Demonstration	1,221,574	2,443,148
Binghamton University 30733	Electric Grid Reliability Improvements Utilizing Security Profile and Control Effectiveness Analysis	Research Study	100,000	133,580
RIT 30732	Improving Operator Situational Awareness Wide Area Geographic View of Electric Grid	Research Study	75,000	100,000
Pareto Energy 30731	Micro Grid Power Electronics	Engineering Study	150,000	275,000

Enernex 36651	Major Disturbance Mitigation	Research Study	210,000	285,000
RPI 36653	State Estimation using PMU's	Research Study	150,048	199,960
Georgia Tech 36654	Dynamic Resilience Measurements of Electric Service Under Severe Weather Conditions	Research Study	90,000	120,000
EPRI 36655	Application of Super Hydrophobicity and Icephobicity	Research Study	700,000	1,100,000
Con Ed 36656	Integration of Microgrids and Distributed Energy Resources	Engineering Study	663,094	884,125
Bigwood Systems 36657	Continuous Distribution Power Flow	Engineering Study	90,634	120,846
NYPA 36658	Improved Performance of NYS Power Grid	Engineering Study	250,000	668,468
Brookhaven National Lab 36659	Impacts of Utility Scale Solar Photovoltaic	Engineering Study	280,000	350,000
EPRI 36660	Assessment of Urban Microgrid	Engineering Study	334,990	734,990
Georgia Tech 36661	Setting-less Protection System	Product Development	897,994	1,838,235
NYPA 36663	Demonstration of Energy Storage System at SUNY Canton	Demonstration	424,998	969,976
American Vanadium 36664	Vanadium Redox Flow Battery Demonstration * buildings program budget	Demonstration	500,000	2,091,830
Clear Grid Innovations 41307	Using Computer Vision to Analyze Pictures of Electric Distribution Problems	Research Study	100,000	150,000
RIT 41308	Micro-Grid Cooperation for Improving Economic and Environmental Cost and Grid Resilience	Research Study	78,466	108,466
Clarkson 41309	Design of a Resilient Underground Microgrid in Potsdam, NY	Engineering Study	381,042	1,090,301
Brookhaven National Lab 41310	Using Radar in Real Time Response for Restoration of Electric Utility Systems	Engineering Study	249,996	333,396
Cornell University 41311	Advanced Building-to-Smart Grid Integration and Energy Distribution Controls	Engineering Study	227,321	356,331
Lockheed Martin 41312	Integrated Aerial Weather Damage Assessment System	Product Development	300,000	600,000
Pareto Energy 41313	A Non-Synchronous Microgrid Demonstration	Demonstration	2,000,000	5,595,000

Complete/Closed Projects Highlighted in Yellow

Available projects final reports can be found at: http://www.nyserda.ny.gov/Publications/Research-and-Development-Technical-Reports/Electric-Power-Delivery-Reports.aspx

Research Project Summary

EPTD Smart Grid Program: Demonstrating A Non-Synchronous Microgrid Power Electronic Solution (41313)

Pareto Energy LTD

Contractor

Pareto Energy LTD

2101 L St NW
Washington, DC 20037

Principal Investigator

Shalom Flank

CTO

Technologies

Project Type:

Product Demonstration

NYSERDA Contact Information

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Program

R&D - Energy Mkts & Pwr Del

Contract Details

Start Date

Project Status

Active

Contract Number

41313

Last Updated

07/08/2014

Background

Pareto Energy's objective is to demonstrate the GridLink technology that was reviewed by Consolidated Edison. Pareto worked with the utility's Distribution Engineering department to review the preliminary engineering design work for a 5 MW microgrid at NYU-Polytechnic in Brooklyn that utilized GridLink as a means of safely comingling utility service and power from proposed CHP. As a result of this process, Con Edison gave a preliminary approval in which the Company recognized that Pareto Energy's patented GridLink non-synchronous microgrid technology eliminates fault current contributions and voltage instabilities by not synchronizing distributed generation to the grid. Importantly, this approval included an agreement to program the inverters such that they could not backfeed Con Edison's system. Moreover, it also included a provision for the use of radial feeds to serve the site instead of standard second contingency networked feeds. This landmark work with Con Edison resulted in an expressed desire by the utility to further demonstrate the pioneering application of GridLink in their New York service territory, especially where existing DG/CHP could offer benefits with an immediate retrofit.

Project Description

Pareto Energy, in coordination with Con Edison and General Electric, seeks to use its GridLink technology in order to connect the Kings Plaza Shopping Mall to Con Edison's feeders for the expressed purpose of selling excess power into the distribution grid and providing a variety of support services, including but not limited to voltage support, frequency support and ancillary services. Additionally, this project will demonstrate an important new capability by using GridLink to safely import and export power. The exportation of power could allow for its use during grid outage situations to electrify users situated around the mall on two Con Edison feeders. In conjunction with local, state and federal policy makers, Pareto and Macerich hope to use this final capability to create a safe haven and place of refuge for the staging of medical services, creation of a warming/cooling center and support for basic community services such as gas stations, supermarkets, hotels, etc. Moreover, the ability to safely export power along Con Edison's existing feeders could lead to the deferment of potentially expensive substation upgrades in that part of the grid.

Benefits

For Consolidated Edison, the project will demonstrate a new way to simply and safely integrate large DG into its existing grid without expensive, complex infrastructure improvements. Additionally, it will allow the utility to bolster reliability within constrained portions of its network. Finally, successful demonstration will allow the Company to add GridLink to its portfolio of approaches during future infrastructure and reliability improvement projects.

For Pareto Energy, the project will successfully demonstrate the capabilities of its GridLink technology. Doing so will enhance Pareto's valuation and greatly increase its ability to attract investors for future development. Moreover, a successful demonstration will allow Pareto to pivot and attract similar projects in Brooklyn to fold in behind Kings Plaza and retrofit their existing CHP systems. As a result, there could be as much as 100 MW of additional CHP in Brooklyn alone that will be coordinated to provide the services described above to its nearby feeders.

For New York City, the project will serve as a platform for the development of future, similar projects. Moreover it will support the De Blasio administration's stated goals of redeveloping the innovation and industrial capabilities of Brooklyn and attracting jobs, both of which will require highly reliable power. Finally, it will offer the City and Consolidated Edison the ability to better serve New York City's most vulnerable residents.

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Funding

Funding	Total Anticipated
NYSERDA Unsigned Total	$2,000,000.00
Pareto Energy	$3,595,000.00
Total:	$5,595,000.00

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Research Project Summary

Lockheed Martin (LM) will develop and demonstrate an integrated aerial weather damage assessment system for electrical transmission and distribution infrastructure. (41312)

Lockheed Martin NE & SS

Background

Recent significant weather events including Hurricane Irene, Tropical Storm Lee and Superstorm Sandy have led the utility industry to recognize a need for improved storm response operations. The State of New York Public Service Commission recently published CASE 13-E-0140 approving a scorecard to assess utility response to significant outages. Over 20% of the scoring criteria are tied directly to a utility's ability to perform damage assessment and communicate Estimated Time of Restoration information within 24 hours. However, after significant weather events, damage assessment can require several days using current methods due to widespread impassable roadways and inefficient methods of aggregating information.

Project Description

Lockheed Martin (LM) Systems Solutions in Owego, New York, partnering with Iberdrola USA (IUSA) will perform product development activities to develop and demonstrate an integrated aerial weather damage assessment system for electrical transmission and distribution infrastructure. After significant weather events, damage assessment can require several days using current methods due to widespread impassable roadways and inefficient methods of aggregating information. LM will develop a solution to allow utilities to quickly and accurately determine the damage to electrical power assets caused by a weather event or other natural disaster. Geo-referenced video imagery collected by a piloted helicopter will be analyzed by an automated analytics system and organized into a decision support tool so that the utility can quickly and accurately assess damage, distribute appropriate resources to the right places, and resume normal operations as rapidly and efficiently as possible.

Specifically, this project is the first phase of the overall vision, and will focus on developing algorithms for assessing the condition of power poles from aerial imagery.

Benefits

This project aims to develop a tool that will dramatically improve the speed and accuracy of the damage assessment and response determination portion of the overall recovery from an extreme weather event. With this tool, video data collection via helicopter equipped with advanced sensor technologies, video analytics and Geographic Information System (GIS) mapping will allow for fast and accurate post event assessments. The aspect of this system that is most innovative is that the analytics enable detailed damage assessment to be completed using a helicopter. Eliminating dependencies on passable roads and daylight greatly improve the speed that the assessment can be completed. By expediting the assessment process, this solution will aid in meeting emerging regulatory requirements, improve response times, and allow for the right materials and resources to be acquired and utilized efficiently.

LM will develop algorithms that assess the condition of power poles from video imagery and geo-locate the power pole images to their real world locations. Subsequently, LM would look to expand these algorithms to a prototype system that could be used within the power utility industry for disaster assessment as a Phase 2 project. LM plans to commercialize this system solution for sale world-wide, starting in New York State, creating an additional market offering for LM's Owego, NY based team. It would also provide a foothold for expanding the solution for other applications in the utility industry.

Contractor

Lockheed Martin NE & SS

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Owego, NY 13827

Principal Investigator

Rick Evans

Program Manager

Technologies

Project Type:

Product Development

NYSERDA Contact Information

John Love
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Program

R&D - Energy Mkts & Pwr Del

Contract Details

Start Date

Project Status

Active

Contract Number

41312

Last Updated

06/12/2014

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Funding

Funding	Total Anticipated
Lockheed Martin	$300,000.00
NYSERDA Unsigned Total	$300,000.00
Total:	$600,000.00

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Research Project Summary

EPTD Smart Grid Program (41311)

Cornell University

Contractor

Cornell University

341 Pine Tree Rd
Ithaca, NY 14850 2820

Principal Investigator

Brian Wanck

Electrical System Manager

Universities Involved

Cornell University

Technologies

Project Type:

Research Study

Project Focus:

Site-specific Feasibility

NYSERDA Contact Information

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Program

R&D - Buildings Research

Contract Details

Start Date

Project Status

Active

Contract Number

41311

Background

Cornell's Ithaca campus includes nearly 14 million square feet, and Campus facilities are dominated by high technology research and teaching complexes, requiring complex mechanical and electrical systems to support their missions. The Campus utility distribution system, is served by a Central Energy Plant (CEP) responsible for Steam, Chilled Water, and Electricity. This plant is a Combined Heat and Power facility serving approximately 200 buildings. This facility manages a nominal peak load of 400klbs/hour steam in winter, 35MW Electricity in summer, and 20,000 tons of cooling capacity via the Lake Source Cooling plant. Portions of the CEP are vintage 1920's era construction while the newest addition was commissioned in fall of 2009. While many leading edge technologies and modern equipment have been installed on the campus, an overall systems approach has been difficult to execute. As more technologies and newer equipment is installed, the ability to integrate these into a manageable energy system has become challenging.

Project Description

Cornell will undertake an engineering study of the various Supervisory Control and Data Acquisition (SCADA) and physical plant systems presently in place at their Ithaca, NY campus to determine what would be required to integrate them into a smart grid. The results of this study will inform the design of a "Building to Grid" demonstration project integrating a portion of the campus district energy system with a smart micro grid to improve visibility, reliability, and efficiency of operation. Cornell will team with ANTARES who specializes in energy systems planning and Electrical Distribution Design (EDD), developers of dynamic grid modeling and optimization tools to perform the study.

The project objectives are segmented into three key components:
1) an evaluation and characterization of the existing infrastructure;
2) development of a dynamic proof of concept three phase unbalanced time-series electrical system model of the 13.2 kV distribution system of sufficient detail for use in efficiency and PV adoption analysis; and
3) development of a Basis of Design (BOD) for a demonstration project.

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10/06/2014

Benefits

The modeling of the Cornell Microgrid to improve efficiency and reliability can provide a model for institutions and communities across New York State.

Just as Cornell seeks to improve its energy distribution and respond rapidly to loss-of-service issues across its internal electrical network, so do utilities and communities seek to pinpoint service losses and opportunities for efficiency gains across their own networks.

The modeling exercise will be used to optimize energy storage, renewable energy integration, and reliability improvements for Cornell, but the approach is applicable to any electrical network. By using the Cornell campus, it will be shown how the benefits can be implemented within a typical Microgrid.

Project success will directly improve the performance of the Cornell system, which is tied in directly to the NY State system. Improved reliability will also help Cornell sustain their research base.

Broad communication of these systems will demonstrate that increased reliability, network efficiency, and integration of renewables is possible state-wide. The combination of improved reliability and enhanced system integration could provide substantial economic, social, and environmental benefits.

Funding

Funding	Total Anticipated
Cornell University	$46,800.00
Cornell University	$82,210.00
NYSERDA Unsigned Total	$227,321.00
Total:	$356,331.00

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Research Project Summary

Engineering Study to demonstrate that radar storm data related to a geospatially-referenced model can be used in analysis to greatly enhance storm model predictions and real-time storm response. (41310)

Brookhaven National Lab

Contractor

Brookhaven National Lab

32 Lewis Road
Upton, NY 11973

Principal Investigator

Stephanie Hamilton

Smart Grid R&D Manager

Technologies

Project Type:

Research Study

Project Focus:

Site-specific Feasibility

NYSERDA Contact Information

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Program

R&D - Energy Mkts & Pwr Del

Contract Details

Start Date

Project Status

Active

Contract Number

41310

Last Updated

08/06/2014

Background

Orange and Rockland Utility (ORU) currently is building and installing a storm prediction and management system, although it currently does not include using radar storm data. ORU has been working on its system for over six years. It includes storm detection, prediction of outages, and estimation of time of restoration. The current capability is driven by weather measurements that are geographically very coarse-grained as compared to the high resolution, fine-grained measurements available from radar.

Project Description

Brookhaven National Laboratory (BNL), Electrical Distribution Design (EDD), and its utility partners, Orange and Rockland Utility (ORU) and Central Hudson Gas & Electric (CHGE), propose to demonstrate that radar storm data related to a geospatially-referenced model can be used in analysis to greatly enhance storm model predictions and real-time storm response. In the work proposed here radar storm data will be related to equipment and customers modeled in a geospatially-referenced model so that weather conditions at each piece of equipment and each customer are known. The objective is an engineering study to demonstrate the large number of benefits to ORU's storm response capability that derive from making use of both historical and real-time radar storm measurements. The work proposed here will build on the existing ORU storm outage prediction and management system.

Benefits

Storm damage estimates on a localized basis will become possible. With high resolution radar measurements, ORU will better understand regional storm peculiarities over their geographical terrain. This will allow for targeting specific geographical areas for storm hardening and can assist in determining the storm hardening methods that should be applied. Furthermore, the increased understanding can be used in system expansion decisions, placing new equipment along corridors that historically are less affected by severe weather.

Major economic benefits include: More rapid restoration of power, thus lowering the economic losses of downtime; reduction of storm restoration time, which can save ORU $100,000 per hour of storm reduction and across the state can save utilities many millions of dollars per hour of storm reduction. Technical benefits include: Improved storm outage prediction models will be created by using historical, geographically dense radar storm measurements and the additional variables that they provide; outage based storm detection will be replaced by a more accurate and more rapid storm detection; detection and analysis of intense, localized storm activity; accurate, real-time estimates of the extent of storm activity; better models and the high-resolution, real-time weather radar measurements, storm response will be enhanced, with repairs being performed more rapidly at less cost.

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Funding

Funding	Total Anticipated
NYSERDA Unsigned Total	$249,996.00
Orange and Rockland Utilites	$83,400.00
Total:	$333,396.00

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Research Project Summary

EPTD Smart Grid Program Design of an Underground Microgrid System in Potsdam, NY. (41309)

Clarkson University

Contractor

Clarkson University

Attn: Comptroller's Office
Potsdam, NY 13699
5546

Principal Investigator

Gregory Slack

Universities Involved

Clarkson University

Technologies

Project Type:

Research Study

Project Focus:

Site-specific Feasibility

NYSERDA Contact Information

Michael Razanousky
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Program

R&D - Energy Mkts & Pwr Del

Contract Details

Start Date

Project Status

Active

Contract Number

41309

Background

The North Country of upstate New York has seen its share of devastating weather events. Due to its latitude and proximity to the Great Lakes, and Lake Ontario in particular, ice storms and major snow events occur with greater regularity than in other parts of National Grid's service territory. Although the worst events are winter-based, other occurrences including micro-bursts and excessive rain with associated widespread flooding have been experienced as well. The Village of Potsdam is the home of Clarkson University, SUNY Potsdam, Canton-Potsdam Hospital, and National Grid's Potsdam Service Center. All of these entities have proven critical to the restoration of services after emergency events in the North Country. Clarkson President Tony Collins serves as a member of the Moreland Commission on Utility Storm Preparation and Response, and has been directly involved in defining the need for improving the disaster response capability throughout the state. This proposed design for a resilient microgrid in Potsdam will address a critical aspect of this need.

Project Description

The goal of the proposed project is to plan and design a resilient underground microgrid to maintain services in Potsdam, NY during emergencies. The proposed project will consist of three phases. The first is the initial planning phase to define normal/emergency loads, identify generation/storage and demand response needs. The second phase will be the microgrid design. This will include the generation/storage size, quantity, and location, identification of electrical configuration, performance of steady state and transient voltage studies, renewable generation impact, system protection strategy, failure mode analysis, optimization analyses and specification of microgrid controls. The last phase will be the specification and cost design. This will include the preparation of cost estimates and system drawings and specifications for generation, distribution, load management and microgrid controller components.

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07/07/2014

Benefits

• Development of a methodology for the future planning and design of complex microgrids with multiple consumers and multiple generation owners. The planning and design of this type of system is novel.
• Discovery of potential regulatory issues based on equipment ownership scenarios, and expected microgrid operation
• Since most emergency events damage overhead assets, a microgrid based on a dedicated underground system provides true resiliency. This emerging area of study, planning, design, control, and operating practices requires novel consideration. The planning and design methods developed in this project will be available to developers in New York and elsewhere, and will lead to improved and more timely designs for more resilient microgrids across the state.
• An understanding of how the addition of the microgrid infrastructure can provide efficiencies and benefits during non-microgrid operation. Considering that the system will be operating in a grid-connected mode for the vast majority of time, it is important to quantify the advantages attained from the addition of advanced equipment and controls. Improved efficiencies and benefits may appreciably add to the value and return on investment. Such value during non-microgrid operation may provide important input into the selection of equipment.
• A well-conceived, vetted design to move ahead toward a demonstration program to verify efficiencies during grid-connected operation and resiliency during emergency operation.

Funding

Funding	Total Anticipated
Clarkson University	$58,659.00
General Electric	$147,600.00
National Grid	$500,000.00
Nova Energy	$3,000.00
NYSERDA Unsigned Total	$381,042.00
Total:	$1,090,301.00

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Research Project Summary

EPTD Smart Grid Program: Microgrids for Improving Economics, Environmental Costs and Grid Resiliency (41308)

Rochester Institute of Technology

Contractor

Rochester Institute of Technology

114 Lomb Memorial Dr
Rochester, NY 14623

Principal Investigator

Nenad Nenadic

Professor

Universities Involved

Rochester Institute of Technology

Technologies

Project Type:

Research Study

Project Focus:

Technology Feasibility/Assessment

NYSERDA Contact Information

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Program

R&D - Energy Mkts & Pwr Del

Contract Details

Start Date

Project Status

Active

Background

Microgrids are an emerging technology that is not yet widely deployed. Businesses are increasingly interested in deploying Microgrids to reduce their carbon footprint, reduce the cost of operation, improve power reliability, and achieve a higher level of autonomy. While there are a number of microgrid implementations, some with load-leveling/peak shaving characteristics, at this time there is still a need for guidance on how to operate a microgrid in a way that optimizes an objective function (e.g. economic/environmental cost, durability, etc.). Further, a large number of proposed protocols and standards provide little assistance for a microgrid operator for optimal utilization of the resources.

The grid also benefits from the distributed power generation enabled by microgrids via improved reliability and resilience, cleaner energy mix, and supply expansion. However, the deployment of purely independently-run microgrids over a small physical area can be troublesome for the utility. National Renewable Energy Laboratory, Pepco (the utility for Washington, D.C.) and the state of California, have reported that if the penetration of local energy exceeds 15%, the power supply may become unstable. Microgrid-grid cooperation aims to increase allowable "microgrid density", beyond 15%.

To improve the extendibility, flexibility, and resilience of the energy systems, researchers have identified Multi-Agent Systems (MAS) as an alternative control system architecture for power systems.

Project Description

RIT proposes to investigate the benefits of using MAS in the practical implementation of microgrids that enables cooperation between microgrids and the utility, RIT will build the framework and agents for the main microgrid actors: DGs, DS and DLs, as well as the microgrid itself. The agents will encapsulate the low-level controls of the system, improve its extendibility, flexibility, and resilience, and will also keep track of their energy, economic and environmental costs. The modeling will be assisted by using real, high-resolution data from the GIS microgrid. In training the agents, special attention will be given to reinforcement learning, which has nice theoretical properties and was demonstrated to work well in practical control problems where the process is subjected to unknown disturbances. While the outcome of this phase is simulation, the agents will be built to function in the real-world environment. If the results of the simulation indicate viable opportunity for improved energy efficiency, MAS may be implemented in the microgrid in stages in a follow-on empirical study. Approaches based on centralized control will be also considered.

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Contract Number

41308

Last Updated

07/07/2014

Benefits

Microgrids present some challenges to grid managers, especially as they grow in numbers; however, microgrids also offer an opportunity to improve overall grid resilience and also to increase the fraction of the renewable in the grid energy mix. This project will analyze the model of non-utility owned microgrids and will analyze a framework that promotes microgrid-grid collaboration and thereby provides the potential for both microgrid owners and utility companies to benefit from the increased microgrid penetration. The microgrid characterization will enable the utility to understand the state of microgrids within the network in order to better manage grid resources, possibly by providing appropriate incentives to microgrid owner/operators. The microgrid control design will allow microgrid owner/operators to balance grid needs against their own short and long term business objectives. Ultimately, the cooperative interactions will result in improved economics for microgrid operation and provide additional incentive and improved payback for microgrid implementation and will consequently result in a lower-carbon grid, with improved resilience.

Funding

Funding	Total Anticipated
NYSERDA Unsigned Total	$78,466.00
Rochester Gas & Electric	$30,000.00
Total:	$108,466.00

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Research Project Summary

Clear Grid Innovations will develop "computer vision" algorithms to recognize problems on the New York State electric distribution system to improve utility response. (41307)

ClearGrid Innovations, Inc.

Contractor

ClearGrid Innovations, Inc.

21 West St., Ste 3A
New York, NY 10006

Principal Investigator

Michael Wyman

President & CEO

Technologies

Project Type:

Research Study

Project Focus:

Monitoring/Repair/Inspection

NYSERDA Contact Information

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Program

R&D - Energy Mkts & Pwr Del

Contract Details

Start Date

Project Status

Active

Contract Number

41307

Last Updated

06/12/2014

Background

New York utilities are increasingly considering using photographs from customers, municipal personnel, and their own vehicles for damage assessment and/or vegetation management. ClearGrid believes photos could offer a variety of advantages. Photos submitted by customers and municipal personnel, or utility equipment could be used to determine whether the real problem is a tree fallen on an electric line – or a telephone line. And whether there is a problem with a wire to the customer's house from the pole – or with a primary or secondary wire on a distribution pole. Each of those events necessitates a different solution, with very different implications for the type of crews and resources required (or in some cases whether an on-site investigation is required at all).

Project Description

Clear Grid Innovations will team with Consolidated Edison Company of New York, Inc. (Con Edison) to develop "computer vision" algorithms to recognize important problems on the New York State electric distribution system to improve utility response. Clear Grid will collect "baseline" 3-D imagery of a portion of Con Edison's overhead electric distribution system that reflects the distribution system in its "healthy" state. The 3-D imagery will be used to develop computer vision algorithms to automatically recognize problems due to vegetation (i.e., trees, bark, or branches on or near lines, service drops, and secondary) and damage to distribution infrastructure (i.e., broken cross-arms and poles). The 3-D imagery can be combined with standard 2-D color images (e.g., pictures from a customer's smart-phone after a storm) of potential problem situations, uploaded with a geo-tag of the approximate location of where that photo was taken, aiding utility planners on the type of crews and resources required for efficient resolution.

Benefits

The key benefits to utilities and their customers resulting from the Project are expected to be:
(1) a more resilient and reliable system - with better ability to prevent weather-related distribution outages and quicker response when they occur;
(2) cost benefits - responding to vegetation-related power outages in a more cost-effective fashion; and
(3) better responsiveness to customers - leveraging customers' willingness to contribute information about the causes of power outages through imagery.

Funding

Funding	Total Anticipated
Consolidated Edison Company of NY, Inc.	$50,000.00
NYSERDA Unsigned Total	$100,000.00
Total:	$150,000.00

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Research Project Summary

Demonstration of vanadium flow battery in a NYC commercial building (36664)

American Vanadium US Inc.

Contractor

American Vanadium US Inc.

800 West Pender Street
Vancouver, BC V6C 2V6

Principal Investigator

Adam Stephenson

Manager, Engineering and Renew

Technologies

Project Type:

Product Demonstration

NYSERDA Contact Information

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Program

R&D - Buildings Research

Contract Details

Start Date

Project Status

Active

Contract Number

36664

Last Updated

03/10/2014

Background

The ability to automatically manage a building's electrical load on a daily and hourly basis is valuable and controlled batteries may be a pragmatic manner to do so in certain situations or building types. Smart-building control of the battery could be an effective way of reducing peak load, responding to dynamic energy prices and providing demand response. Battery technology has evolved, performance has improved and costs are falling. The barrier building integrated battery storage systems in NY may be the knowledge of where batteries are most appropriately and safely applied. . It is currently very difficult to site advanced energy storage inside of buildings in NYC due to concerns over safety and flammability in dense urban areas coupled with little to no operating experience. Bulky lead acid batteries have been the only commercially available systems deemed safe enough for use in NYC buildings. Another challenge is that NYC building load profiles peak are typically defined by air conditioning usage over a substantial portion of a 24 hour day requiring multi-hour discharge and therefore megawatt scale capacity in large buildings.

Project Description

The purpose of this project is to evaluate a commercially available Gildemeister vanadium flow battery system in a building application at 2 Broadway in NYC and will be the first such installation in North America. This project will provide operational experience as to the viability of distributed energy storage. The demonstration system consists of three (3) 30kW-130kWh CellCube™ energy storage systems, for a total of 90kW maximum power and 390kWh of energy with up to 80% efficiency. The demonstration site is a very large high-rise commercial office building with about 5000 occupants and peak load of about 6 MW. The building has been aggressive with energy efficiency, demand response participation, load profile management, building system automation and load submetering. As such the building load profile is fairly smooth throughout its day-time peak period and the impact of the demonstration battery on its load profile will be modest.

Benefits

The project will demonstrate how batteries can provide valuable services for the building, including peak load reduction, demand response, and price response. The project will demo how batteries could be integrated into the building's control to automatically reduce a building's peak, flatten its load profile, save money from demand-delivery charges or special tariffs for kW peak reduction or respond to hourly energy prices. The project will work closely with the code authorities including New York City Department of Buildings and the New York Fire Department to ensure the installation meets or exceeds all applicable codes, standards and required protocols.

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Funding

Funding	Total Anticipated
American Vanadium	$112,247.00
American Vanadium	$662,694.00
NYSERDA Unsigned Total	$1,045,918.00
Total:	$1,820,859.00

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Research Project Summary

Electric Power Transmission & Distribution Smart Grid Program Demonstration for Setting-less Protection System (36661)

Georgia Tech Research Corporation

Contractor

Georgia Tech Research Corporation

505 Tenth Street NW
Atlanta, GA 30318

Principal Investigator

Sakis Meliopoulos

Professor

Technologies

Project Type:

Product Development

NYSERDA Contact Information

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Program

R&D - Energy Mkts & Pwr Del

Contract Details

Start Date

Project Status

Active

Contract Number

36661

Last Updated

03/03/2014

Background

In the past few years, Georgia Tech and EPRI have been developing the setting-less protection technology. This technology has been demonstrated in the laboratory. The next step is to demonstrate the technology in the field. This proposal is to install, test, validate, monitor and assess the performance of the setting-less protection technology at two protection zones of the NYPA system.
The setting-less protection technology reduces the complexity of present day protection schemes and eliminates the need to coordinate a large number of protection functions. The research demonstrated that the state estimation based approach provides a secure and dependable protection scheme and it does not require coordination with other devices or protection schemes and thus it is setting-less. The state estimation based approach requires complex analytics to be performed on the data acquired with the data acquisition system of the relay. The complexity of the analytics is transparent to the user. A prototype setting-less protective relay was developed and tested in the laboratory to determine whether the analytics can be performed in real time. The experiments have demonstrated that the analytics can be performed in real time with only partial utilization of the computational power of modern day processors.

Project Description

The proposed project aims to demonstrate an innovative technology that can drastically change the way power system protection is implemented. A prototype setting-less protective relay has been developed and tested at the Georgia Tech laboratory. The technology is transferrable to any system. It requires the model of the protection zone (under protection) and the number and type of measurements available. We propose to implement and field evaluate the setting-less protective relay on two protection zones of the NYPA system. Most likely the protection zones will be: (a) the 765kV/345kV Autobank at Marcy substations and (b) the 765 kV transmission line between Marcy and Massena substations.

Benefits

The proposed project will demonstrate a new approach for power system protection with the following characteristics: (a) it does not require coordination with other protection schemes in the system and therefore removes the complexities of present day protection schemes and (b) increases protection security and reliability. The ultimate benefit to the electric power system will be increased overall reliability and security of the system. The technology has the potential to drastically reduce the cost of protection.

Funding

Funding	Total Anticipated
EPRI	$300,000.00
General Electric	$48,855.00
Georgia Tech	$199,139.00
NYPA	$392,195.00
NYSERDA Unsigned Total	$897,994.00
Total:	$1,838,183.00

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Research Project Summary

Electric Power Transmission & Distribution Smart Grid Assessment of an Urban Microgrid (36660)

Electric Power Research Institute

Contractor

Electric Power Research Institute

13014 Collections Center Drive
Chicago, IL 60693

Principal Investigator

Mark Stephens

Technologies

Project Type:

Research Study

Project Focus:

Technology Feasibility/Assessment

NYSERDA Contact Information

Michael Razanousky
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Program

R&D - Energy Mkts & Pwr Del

Contract Details

Start Date

Project Status

Active

Contract Number

36660

Last Updated

01/28/2014

Background

Urban areas offer a mix of customers and loads—industrial, institutional, medical, educational,
commercial, and residential—each with its own characteristics and effects on the power system and each with its own tariff and metering. To improve their systems and better support their customers, local utilities must have data on system performance and its effects on those customers. Monitoring and analysis can be an essential tool to effectively identify both normal and abnormal conditions as well as areas for improvement. Areas for improvement for both utility and customer may involve grid reliability, power quality, and energy efficiency. A key goal of the study is to identify realistic solutions for these areas regarding this local power system. Prior work by EPRI and our partners have looked in some detail at; power quality and end-use compatibility studies, mitigation equipment, integration of variable renewable, grid resiliency and reliability measures, value of the grid and of distributed resources, smart grid and smart inverter opportunities. This study will bring together many of these concepts and will leverage the past experience of team to provide an assessment of powering options at the BNMC.

Project Description

This engineering study proposes a cooperative effort between National Grid, EPRI, the University ofBuffalo, the BNMC, and key local stakeholders in the surrounding communities to develop a grid modernization plan for implementing realistic improvements in all aspects of the power system performance. The specific area of interest includes the BNMC as well as the surrounding areas of Allentown and Fruitbelt. Specifically, the goals of the project are to: Monitor the power system characteristics for various voltage levels and benchmark the existing power quality and reliability environment; Identify power quality and energy efficiency optimization possibilities throughout the local power grid and within BNMC customer facilities; Analyze results in the context of improving electric power for end users by combining attributes of both the grid and distributed energy resources; Determine the benefit of innovative systems such as micro-grids and renewable energy sources to improve the reliability, sustainability, and quality of the power system; and Determine feasibility of implementing a self-sustainable energy hub for the BNMC campus and surrounding areas

Benefits

This project will provide a systematic approach to: evaluating a local urban electrical system regarding effective monitoring, monitor selection and placement; gathering and analysis of data collected for such a system regarding reliability, power quality and energy efficiency; identification of realistic improvements to the system as indicated by the data and economic analysis; optimum location, sizing, rating, and control configuration of emerging advanced power system elements and solutions

For the state of New York, this study will provide a model for other municipalities in the state and local
areas within those municipalities to create similar energy hubs. The emerging advanced power system
elements photovoltaic arrays, wind generation, energy storage, etc., could also serve in themselves to boost local economic development.

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Funding

Funding	Total Anticipated
Buffalo Niagara Medical Center	$50,000.00
EPRI	$150,000.00
National Grid	$200,000.00
NYSERDA Unsigned Total	$334,990.00
Total:	$734,990.00

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Research Project Summary

Engineering Study to Model and Analyze the Impact of Utility-Scale Solar PV Plants on Distribution, Sub-transmission and Transmission Systems (36659)

Brookhaven National Lab

Contractor

Brookhaven National Lab

32 Lewis Road
Upton, NY 11973

Principal Investigator

Robert Lofaro

Group Leader

Technologies

Project Type:

Research Study

Project Focus:

Technology Feasibility/Assessment

NYSERDA Contact Information

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Program

R&D - Energy Mkts & Pwr Del

Contract Details

Start Date

Project Status

Active

Contract Number

36659

Last Updated

12/13/2013

Background

To reach its goal to provide 30% of electricity generation from renewable energy resources, New York State is interested in deploying increasing amounts of solar energy generation throughout the state. Integration of these solar generating plants with the existing electricity grid could be problematic since the variable nature of this resource can present problems with grid stability and control, particularly when the penetration level on specific circuits is high. Many residential and industrial solar plants are connected at the distribution level and studies have been performed to examine the impacts of high penetration solar on distribution circuits. However, utility-scale solar plants are more commonly connected at the sub-transmission or transmission level and the impacts of these plants on the grid, particularly when neighboring distribution circuits have large amounts of solar generation, have not been studied and are not well understood.

Project Description

In this Engineering Study, Distribution, sub-transmission and transmission circuits will be modeled and simulations will be performed based on actual circuits in the field with a 32MW utility-scale solar PV plant connected at the sub -transmission level and a 1MW solar PV array connected to a neighboring distribution circuit. The simulations will characterize the combined grid impacts of high-penetration solar PV on these circuits. Higher penetration levels will also be evaluated by adding "virtual" solar plants to these and other nearby circuits to determine the level at which grid operation becomes problematic. The study will provide guidance on determining acceptable solar PV penetration levels based on existing circuit loading and grid configurations. Methods to mitigate these impacts and allow high penetration levels, including the use of advanced inverter functionality to provide adaptive Volt/VAR support capability, will also be studied.

Benefits

This study will help New York State utility companies deploy increased amounts of solar generation by understanding and being able to mitigate the grid impacts of sub-transmission and transmission connected solar PV plants when neighboring distribution circuits also have PV systems installed. Specifically, the following benefits will be obtained:

- Provide a methodology for evaluating locations for utility-scale solar PV plants and supporting the approval of interconnect requests
- Enable an increase in the penetration level of solar PV plants by providing utilities with an understanding of the grid impacts and how they can be mitigated
- Prepare grid operators to adopt the integration of solar PV generating plants that employ inverters with advanced grid functionality

The adoption of increased amounts of solar generation will reduce the state's dependence on traditional fossil fuel-based generation, thus reducing the level of greenhouse gases produced, which will provide broad public benefit.

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Funding

Funding	Total Anticipated
Brookhaven National Laboratory	$49,000.00
EPRI	$25,000.00
LIPA	$20,000.00
NYSERDA Unsigned Total	$280,000.00
Total:	$374,000.00

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Research Project Summary

Electric Power Transmission & Distribution Smart Grid Program Improve Performance of New York State Power Grid (36658)

New York Power Authority,

Contractor

New York Power Authority,

Principal Investigator

George Stefopolous

Technologies

Project Type:

Research Study

Project Focus:

Technology Feasibility/Assessment

NYSERDA Contact Information

Michael Razanousky
MPR@nyserda.ny.gov

Program

R&D - Energy Mkts & Pwr Del

Contract Details

Start Date

Project Status

Active

Contract Number

36658

Last Updated

03/05/2014

Background

Smart grid applications at the bulk power system level essentially comprise a combination of fast and accurate monitoring systems based on high-speed communications, advanced computational capabilities (in terms of both hardware and algorithms) and fast control actuators, which allow real- time control of the power grid. Phasor measurement units are currently the primary driving force of such smart grid applications. Synchrophasor-related projects, however, have been still focusing on online control-room monitoring applications or offline disturbance analysis. Little has been done so far in the area of actual real-time system control, especially past the conceptual phase. The proposed project targets exactly this more ambitious goal of feedback control of the grid to improve its dynamic performance with respect of three tangible and quantifiable metrics: voltage stability limits, primary frequency response, and oscillatory stability limits. This study is the first step for moving existing synchrophasor research to secure, reliable, production-grade feedback control systems that will enable a better use of existing transmission and generation assets. The main enabling technology for the proposed wide-area control scheme is a new generation of multifunctional, multi-band power system stabilizers (MF-MBPSS). The technology has been piloted at in the Hydro-Québec network mainly for primary frequency control, which has proved very beneficial in cases of high-wind penetration.

Project Description

The objective of the project is to perform an engineering study to demonstrate the applicability and potential benefits of using advanced closed-loop controls based on the MF-MBPSS technology for wide area voltage and primary frequency control of the New York State electric power grid. The proposed methodology involves integrating synchrophasor measurements, wide-area power system stabilizers (PSS), and fast communications to enable supplementary modulation or set-point switching control of static and dynamic shunt compensators as well as generator voltage regulators to improve the overall performance and reliability of the New York State power grid. The primary goals of this work is to investigate the extent to which the benefits observed in the Hydro-Québec system can also be observed in the New York State grid and to perform a detailed engineering study that will ultimately lead to a pilot project to demonstrate this technology in the New York grid.

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Benefits

The project aims at investigating and eventually demonstrating a very innovative technology that will improve the reliability and dynamic performance of the New York State power grid. The key concept is to utilize existing control assets in a more effective, coordinated, and automated way to improve the power system primary frequency response, the voltage stability limits, and the oscillatory stability limits. Although the voltage-related control of the system is more pertinent to the New York State grid, the aspects of frequency response and oscillatory behavior may become more and more important in the near future, especially with the continuous integration of inertial power resources and with the deployment of new control equipment. The automatic, feedback-based, real-time control systems is the optimal way to drastically improve the power grid dynamic performance and the reliability of the transmission grid, to make a better use of existing assets, and to deferred costly investments in new infrastructure. This will guide the effort to implement a better, more flexible, and more resilient power grid that will be able to deliver power to the customers in a reliable way and in addition will be able to operate at the same level of reliability and resiliency even when pushed close to its limits. Such a system will also be able to safely accommodate integration of large amounts of renewable resources as well as various distributed resources and other innovative smart grid items.

Funding

Funding	Total Anticipated
NYPA	$168,469.00
NYPA	$250,000.00
NYSERDA Unsigned Total	$500,000.00
Total:	$918,469.00

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Research Project Summary

Electric Power Trans & Dist Smart Grid (36657)

Bigwood Systems

Contractor

Bigwood Systems

35 Thornwood Drive
Suite 400
Ithaca, NY 14850

Principal Investigator

Jeremy Keen

Technologies

Project Type:

Research Study

Project Focus:

Technology Feasibility/Assessment

NYSERDA Contact Information

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Program

R&D - Energy Mkts & Pwr Del

Contract Details

Start Date

Project Status

Active

Contract Number

36657

Last Updated

01/07/2014

Background

New York has an aggressive Renewable Portfolio Standard (RPS). By many metrics, the RPS has been successful, but the improvement of renewable interconnections on the electric grid has been identified as an area needing improvement. Voltage Security Assessment & Enhancement (VSA&E™) is a tool used by major US utilities including: CAISO (California Independent System Operator), and TVA (Tennessee Valley Authority). It provides system planners and operators with the available transfer capability (ATC) through transmission system interfaces under base case and contingency scenarios. Bigwood Systems Inc (BSI) ability to perform its VSA&E during online conditions and to provide mitigating control actions gives it a unique advantage in the assessment of ATC with renewable energy sources. Currently, BSI is modifying VSA&E to help operators at CAISO manage renewable energy. BSI hopes to draw on its experience at CAISO to develop a Continuation Distribution Powerflow (CDFLOW) package with analogous capabilities at the distribution level. For example, low cost control actions used by CAISO to increase ATC, such as tap changes and shunt capacitor switching, can also be used on distribution system to study and increase renewable interconnection capacity.

Project Description

The proposed project is to develop Continuation Distribution Software, as part of a NYSERDA Engineering Study that can be used to perform interconnection studies. The goals of the proposal are:

- BSI collaboration with NYSEG to identify, test and evaluate pending interconnection studies.
- CDFLOW will be used to produce metrics for performing the interconnection studies including: Available Delivery Capability (ADC, the margin of loading and renewable energy injection before an electrical limit is reached), the weakest bus (displaying the greatest voltage drop), and sensitivity information (describing buses where mitigation actions have the greatest impact).
- CDFLOW will provide recommended mitigation actions for increasing ADC. ADC, the weakest bus, and sensitivity information will be used to rank and suggest mitigation actions such as: tap changes, shunt capacitor switching or additions, network reconfiguration, or load shedding.

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Benefits

New York is generating high levels of renewable energy at the distribution level, but many of New York's distribution companies are poorly equipped to perform comprehensive interconnection studies. CDFLOW acts as a valuable "stress test" for these interconnection studies. The system wide impact of one or many renewable energy sources can be studied with a single CDFLOW simulation. IEEE 1547 and utility standard compliance with regard to the system's steady state behavior can be determined quickly, with confidence and without excessive labor. Overall, the benefits of CDFLOW are:

- An increase in renewable penetration levels in New York. Distribution planners will be able to perform studies more quickly and take mitigating action to increase renewable energy injection margins.
- Greater confidence among utility planning interconnections studies because CDFLOW provides the exact margin before electrical limits are reached, and CDFLOW's computational speed allows multiple contingency scenarios to be tested.

Funding

Funding	Total Anticipated
Bigwood Systems Inc.	$30,211.00
NYSERDA Unsigned Total	$90,635.00
Total:	$120,846.00

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Research Project Summary

Consolidated Edison Company of New York, Inc. will perform an Engineering Study to explore the challenges and opportunities involved in defining and implementing Microgrids and advanced control of Distributed Energy Resources (DER). (36656)

Contractor

Consolidated Edison Company

4 Irving Place
New York, NY 10003

Principal Investigator

Anthony Barna

R&D Engineer

Universities Involved

Polytechnic University, New York University

Technologies

Project Type:

Research Study

Project Focus:

Site-specific Feasibility

NYSERDA Contact Information

John Love
JFL@nyserda.ny.gov

Program

R&D - Energy Mkts & Pwr Del

Contract Details

Start Date

Project Status

Active

Contract Number

36656

Background

There are regulatory, political and consumer drivers for the increased connection of DER in New York City and New York State. In addition, super storm Sandy brought increased focus on the resiliency and flexibility of the distribution grid. The result is further discussion about the evolution of Smart Grid technologies to allow distributed resources to be integrated with the existing grid. This integration can be for customer-sited and local distribution-grid connected resources that can provide direct and indirect blue-sky benefits to customers, and also provide increased resiliency during a variety of potential contingencies and emergencies. The overall concept is described as the use of Microgrids. In this project, a range of new technologies connecting to the distribution grid, including various forms of distributed generation, Microgrids, various demand response technologies, and energy storage technologies will be assessed. Each technology could impact the capability of the existing distribution grid. As proliferation of these technologies increases, the effects will present a range of planning and operational challenges and opportunities.

Project Description

Consolidated Edison Company of New York, Inc. (Con Edison), Smarter Grid Solutions, Inc., NYU-Poly and NYU-CUSP have teamed to identify and explore the application of a range of techniques and technologies to develop Microgrid applications that can operate in parallel with the utility grid or isolated from it. The goals of the project are the identification and cost-benefit analysis of a range of technologies that could provide the basis for facilitating Microgrids and DER deployments in the near-term and in policy and design consideration going forward. This technology would be leveraged to optimize grid operations during normal system conditions and extreme weather events. The application of solution concepts (groupings of mature or available technologies in unique and creative configurations previously not combined or deployed together in New York State) will be considered for application to case studies on Con Edison's distribution grid. Recommendations will be made for further demonstration activity regarding the proposed solutions. The project will identify technical and commercial barriers that exist and provide an implementation guide for enabling Microgrids and DER that will be generically applicable in New York State.

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Last Updated

02/11/2014

Benefits

Anticipated benefits associated with the solutions to be assessed in the project include (but are not limit to):

- Identification of near-term technology options to facilitate increased penetration of DER;
- Identification of near-term technology options for integrating and enabling Microgrids;
- Identification and specification of new grid management techniques to enhance operation during normal operation;
- Identification and specification of new grid management techniques to deliver mission critical control of critical infrastructure during extreme weather events;
- Cost-Benefit Analysis of the above options to determine the most cost-effective means of achieving the objectives in the near-term;
- Identification of funding opportunities, both public and private;
- Identification of technology solutions that should proceed to a demonstration project;
- An implementation strategy for Microgrids and DER that recognises issues associated with integration with existing infrastructure and makes use of open standards; Clarity on how to assess and implement new technology options in the Microgrid, DER and smart grid space;and
- Identification of technology solutions to delay smaller infrastructure upgrades where uncertainty exists, providing an opportunity to coordinate a range of infrastructure development options to find the best economic solution.

Funding

Funding	Total Anticipated
Consolidated Edison Co of NY, Inc.	$162,244.00
NYSERDA Unsigned Total	$663,094.00
Smarter Grid Solutions	$58,788.00
Total:	$884,126.00

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Research Project Summary

Dynamic Resilience of Electricity Service under Severe Weather. Application of advanced system modeling to measure performance of utility restoration in severe weather events. (36654)

Georgia Tech Research Corporation

Contractor

Georgia Tech Research Corporation

505 Tenth Street NW
Atlanta, GA 30318

Principal Investigator

Chuanyi Ji

Associate Professor

Technologies

Project Type:

Research Study

Project Focus:

Other Technical Services

NYSERDA Contact Information

John Love
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Program

R&D - Energy Mkts & Pwr Del

Contract Details

Start Date

Project Status

Active

Contract Number

36654

Last Updated

02/28/2014

Background

Severe weather events have been occurring frequently in the northeastern US in recent years, resulting in wide-spread power outages in New York State. Resilience metrics are much needed for measuring the performance of utility restoration and the power grid in response to severe weather events. Such resilience metrics, however, are unavailable. Traditional metrics for day-to-day operation have been used inappropriately for measuring utility restoration performance on weather-induced large-scale power outages. Developing novel resilience metrics is highly needed for policy makers, utilities, and customers.

Project Description

The objective of this proposed research is to develop novel resilience metrics for measuring electricity service under severe weather. Resilience measures system-wide performance from two aspects. One is for a power grid to withstand external disruptions as much as possible. The other is for utilities to rapidly restore electricity service to customers from failures. The second aspect is particularly relevant to measuring the performance of utility restoration in severe weather.
The research provides a mathematical formulism ("system-model") that characterizes how failures and recoveries evolve along with severe weather. Resilience metrics are derived based on the model, showing dynamic evolution of an entire life cycle of failure and recovery. Such resilience metrics can thus differentiate fast from slow restoration. Large-scale data from the grid and severe weather will be used to estimate model parameters, and to evaluate/validate resilience metrics. To ensure the objectivity of the metrics to be developed, the proposed research will be conducted in a collaborative setting, involving both policy makers and utilities for feedback and suggestions. This will ensure the development of community-based resilience metrics.

Benefits

The proposed research is highly relevant to New York State, where severe weather has disrupted electricity services at a large-scale. Hurricane Sandy impacted service areas of all seven NY State utilities. Resilience study is highly recommended by Governor Cuomo "to improve the strength and resilience of the Empire State's infrastructure", and by Mayor Bloomberg for "a stronger and more resilient New York". The project will benefit NY State directly; the Department of Public Service expects to use the software developed for measuring utility restoration performance in future severe-weather events. The collaborative setting for developing resilience metrics hopes to enhance community-building among policy makers, utilities and researchers.

Funding

Funding	Total Anticipated
Georgia Institute of Technology	$30,000.00
NYSERDA Unsigned Total	$90,000.00
Total:	$120,000.00

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Research Project Summary

Electric Power Transmission & Distribution Smart Grid (36653)

Rensselaer Polytechnic Institute

Contractor
Rensselaer Polytechnic Institute

Principal Investigator
Meng Wang

Universities Involved
Rensselaer Polytechnic Institute

Technologies
Project Type:

Research Study

Project Focus:

Technology Feasibility/Assessment

NYSERDA Contact Information
Michael Razanousky
MPR@nyserda.ny.gov

Program
R&D - Energy Mkts & Pwr Del

Contract Details
Start Date

Project Status

Active

Contract Number

36653

Background
The recent deployment of Phasor Measurement Units (PMU) in the power grid allows synchronized real-time phasor measurements of remote points in the power system with a much faster sampling rate than in the traditional Supervisory Control and Data Acquisition (SCADA) system. Some utilities such as New York Power Authority (NYPA) are incorporating PMU data into SCADA system, while the benefits of utilizing PMUs in power system monitoring have not been fully explored.

With the increasing deployment of PMUs in New York Power System (about 50-60 PMUs by the completion of the Department of Energy Smart Grid Investment Grant), the development of a PMU-based monitoring system will improve the power system reliability significantly. This proposal addresses the challenges in implementing a novel state estimator based on PMU measurements. This two-year project is a joint effort between Rensselaer Polytechnic Institute and New York Power Authority. We will develop both analytical results and algorithmic tools for state estimation using synchronized phasor measurements.

Project Description
We propose to explore the temporal and spatial correlations in PMU measurements to estimate the missing data. Leveraging the new advances in signal processing techniques, especially the novel compressed sensing method, we plan to develop computationally efficient algorithms to estimate the missing measurements without complicated modeling of system dynamics . The new methods will enhance the state estimation performance when measurements are partially missing.
Integrating modern information technology into power system monitoring brings many benefits, but it also increases the possibility of cyber data attacks from malicious intruders. With the network configuration information, intruders may inject data attacks to multiple PMU measurements simultaneously so that these attacks cannot be detected by traditional bad data detection methods. These attacks may result in significant errors in the output of state estimator, which in turn will mislead the network operator and possibly result in catastrophic consequences.

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01/22/2014

Benefits

This project is centered on developing PMU-based methods for reliable power network monitoring.
Theoretical results and algorithmic tools developed in the course of this project will contribute the
efficient control and monitoring of power systems. The benefit to New York State include the
following aspects:

• The new state estimation algorithms will enable the network operator to monitor the network dynamics in a cost-efficient way.
• Accurate real-time estimates of operation states help system operators make correct and timely decisions about power dispatch, which in turn reduces the possibility of cascading failures and large-scale blackouts due to system mis-operations.
• The new methods to identify cyber data attacks will protect the power system from malicious intruders and enhance its reliability and security of the power system.

Funding

Funding	Total Anticipated
NYSERDA Unsigned Total	$150,048.00
RPI	$49,912.00
Total:	$199,960.00

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Research Project Summary

Electric Power Transmission & Distribution Smart Grid (36651)

EnerNex LLC

Contractor

EnerNex LLC

620 Mabry Hood Road
Suite 300
Knoxvill, TN 37932

Principal Investigator

Jiaxin Ning

Technologies

Project Type:

Research Study

Project Focus:

Technology Feasibility/Assessment

NYSERDA Contact Information

Michael Razanousky
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Program

R&D - Energy Mkts & Pwr Del

Contract Details

Start Date

Project Status

Active

Contract Number

36651

Last Updated

01/07/2014

Background

The New York State Reliability Council (NYSRC) and New York Independent System Operator (NYISO) together with the Northeast Power Coordinating Council (NPCC) have been dedicated for years to enhancing the reliability and stability of the NY power system and mitigating any adverse impacts of "beyond criteria" events. The recent efforts include deploying Phasor Measurement Units (PMUs)-based SynchroPhasor Wide-area Monitoring System (WAMS) on the NY system and conducting a confidential Feasibility Study on the Controlled System Separation Scheme (CSSS) with the assistance of EnerNex. The study concluded that the CSSS would need to be triggered before the initiation of unintentional separation which occurs very fast, and therefore precise event-based indicators need to be considered. Additionally, the study recommended further investigation of specific generator tripping schemes, critical voltage and reactive power issues, and out-of-step tripping. While preliminary results in the NYISO's CSSS study have been achieved to date, the results obtained are generally not sufficient to demonstrate feasibility of the concepts and control measures developed. Therefore, further studies are needed to leverage the CSSS and further develop concepts that use control measures in addition to separation actions.

Project Description

The overall objective of the project is to study the online and real-time instability detection and mitigation measures for enhancing the reliability and stability of the New York system when subject to major disturbances.

The scope of Phase I work is described herein and corresponds to Phase I:
1. Developing dynamic simulation cases with a wide range of disturbance scenarios for case study,
2. Developing algorithms for instability detection based on PMU and other measurements,
3. Developing mitigation measures for major disturbances, and
4. Verifying the effectiveness of candidate detection algorithms and mitigation measures in dynamic simulation.

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Benefits

Energy benefits - The 2003 blackout resulted in a totally de-energized electrical system over NY's major metropolitan areas. It took the various entities operating the system some 30 hours to completely restore power resulting in a major interruption of energy delivery. On the order of 300,000 MWh of energy were not delivered during this period. Implementation of concepts resulting from MDMS may prevent this level of energy interruption in the future

Economic benefits - Anderson Economic Group estimated economic losses of nearly $2 billion in New York from the 2003 blackout1. The MDMS study has the potential of saving NY's consumers billions of dollars over the next decades; and the MDMS study, dedicated to a more reliable and stable NY system, will result in a more profitable and prosperous power market for generation owners, transmission stakeholders, and customers on the NY system and neighboring systems.

Benefits for other industries and utilities - A more reliable power system under blackout-like events will better support the stability of other infrastructures and industries, such as manufacturing, transportation, water supply, commerce, food supply, education, entertainment, etc. These benefits are difficult to quantify but for example, a major disturbance can cause loss of large batches of semiconductor product, interrupt transportation and delivery of goods to metropolitan areas, compromise public safety and security.

Funding

Funding	Total Anticipated
NYISO	$50,000.00
NYSERDA Unsigned Total	$210,000.00
NYSRC	$25,000.00
Total:	$285,000.00

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Research Project Summary

NYS Microgrid Study (34365)

Electric Power Research Institute

Contractor

Electric Power Research Institute

3420 Hillview Drive
Palo Alto, CA 94304

Principal Investigator

Tom Short

Technologies

Project Type:

Research Study

Project Focus:

Technology Feasibility/Assessment

NYSERDA Contact Information

Michael Razanousky
MPR@nyserda.ny.gov

Program

R&D - Energy Mkts & Pwr Del

Contract Details

Start Date

10/09/2013

Project Status

Active

Contract Number

34365

Last Updated

08/12/2013

Background

The New York State Energy Research and Development Authority (NYSERDA), Department of Public Service (DPS), and Division of Homeland Security and Emergency Services (DHSES) have been tasked legislatively to assess how microgrids can be used in New York State to support mission critical operations during severe weather events. Critical loads are deemed essential services that are required for public safety and health. The term microgrid shall mean a group of interconnected loads and distributed energy resources that form a single controllable entity capable of operating continuously in both grid-connected and islanded mode to support mission critical loads for periods exceeding one week in duration.

Project Description

In this analysis, the Contractor shall develop conceptual radial, loop and network distribution system designs for microgrids in New York State. The analysis shall include, but not be limited to, how the operation of these microgrids would conform with the current utility requirement; the type of microgids that may be interconnected to the power grid; and the proper protections required to ensure safe operations in the event of an emergency situation.

Benefits

Maintaining power supply to such organizations and their command and control headquarters is essential because these nonprofits serve as key players in assisting governmental organizations in disaster relief, recovery and rescue. It is critically important that such organizations like the Red Cross and United Way and others are included in the review required by Chapter 58 of the laws of 2013.

Had New York State constructed microgrids to protect hospitals, first responder headquarters such as police and fire stations, emergency shelters, schools, water filtration plants, sewage treatment plants and other infrastructure, the extent of the damage caused by Super
Storm Sandy would have been tremendously mitigated.
The extent of severe damage caused by recent storms demonstrates the tremendous benefits of having microgrids in place to protect critical public health and safety infrastructure.

It is very clear that microgrids are needed in order to fully protect the expensive and extensive public safety and health infrastructure New York has in developed. In addition, microgrid technology can serve to save lives by not only protecting the communication systems of first responders but also by protecting the electrical needs of
hospitals and nursing homes where patients are connected to life-saving electrical equipment.

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Funding

Funding	Total Anticipated
NYSERDA	$48,000.00
Total:	$48,000.00

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Research Project Summary

Electric Grid Reliability Improvements Utilizing Security Profile and Control Effectiveness Analysis (30733)

The Research Foundation of SUNY at Bing

Background

In this research study, SUNY Binghamton along with its partner New York State Electric & Gas (NYSEG) plan to study new applications for selected NYSEG electrical networks. This study will analyze the security profile, which is the application of control actions and timing to electrical disturbances, and the control effectiveness, which is the application of determining the number and location of monitoring and control devices, for the electrical systems. The project will also analyze a range of different configurations for the new control and sensing devices in the electrical system. The electrical system's reliability benefits and costs will also be evaluated. The evaluation will be used for developing innovative operations planning criterion for mitigation of outages and as new device placement criterion for reliability based control.

Project Description

The objectives of this research study are to improve system reliability and operation planning tools aimed at mitigating electrical outages and improving operational efficiencies in the NYSEG service area. Security profile based operations planning will be used to establish the most resilient procedures for the dynamic management of equipment for functional redundancy. Control effectiveness will be used to place new monitoring and control devices that are expected to lead to increasingly robust architecture for supporting the electrical systems. For the selected NYSEG electrical systems for this study, security profile and control effectiveness will be analyzed with the occurrence of a set of electrical faults to develop a range of new electrical configurations. System reliability indices, benefits and costs will be compared, with the number, location, and type of new devices installed. Security profile will be used as a criterion for operations planning for outage mitigation, and control effectiveness will be used as a criterion for placement of new devices that enhances resiliency and efficiency of the existing electrical systems.

Benefits

The concepts proposed and the solutions sought in this research study are applicable to device placement and security profiling in the North American, or any transmission networks, and can be extended to include distribution systems, provided that models of such systems are available. These models can be aggregated and contain uncertain parameters, as security profile and control effectiveness evaluations allow formal incorporation of model uncertainties. It is also highly desirable to investigate how to
optimize control effectiveness and security profile to expedite restoration processes following blackouts, and to address the efficiency issue of the grid operation when they are applied to decongest a transmission system. Both can help reduce the cost of electricity to customers.

Contractor

The Research Foundation of SUNY at Bing
P.O. Box 9
Albany, NY 12201 0009

Principle Investigator

Eva Wu

Technologies

Project Type:

Research Study

Project Focus:

Technology Feasibility/Assessment

Technology Types:

Electric Power Delivery Distribution

NYSERDA Contact Information

Michael Razanousky
MPR@nyserda.org

Program

R&D - Energy Mkts & Pwr Del

Contract Details

Start Date:

Project Status
Active

Contract Number:

30733

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Research Project Summary

Electric Grid Reliability Improvements Utilizing Security Profile and Control Effectiveness Analysis (30733)

The Research Foundation of SUNY at Bing

Funding

Funding	Total Anticipated
SUNY Binghamton:	$33,580.00
NYSERDA:	$0.00
Total:	$33,580.00

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Research Project Summary

Wide Area Graphin Displays of Electric Power Grid (30732)

Rochester Institute of Technology

Contractor
Rochester Institute of Technology
120 Lomb Memorial Dr
Rochester, NY 14623 5608

Principle Investigator
Esa Rantanen

Technologies

Project Type:

Research Study

Project Focus:

Technology Feasibility/Assessment

Technology Types:

Electric Power Delivery
Transmission

NYSERDA Contact Information

Michael Razanousky
MPR@nyserda.org

Program

R&D - Energy Mkts & Pwr Del

Contract Details

Start Date:

Project Status
Active

Contract Number:

30732

Background

Operators in electric power system control centers serve a critical role in ensuring the integrity of the nation's electric grid and to prevent disruptions to the supply of electric power at any time, for any reason. Until only some 10 years ago, the operational quantities relevant to operators in power system control centers, such as power flows and voltages, were represented either as analog fields on substation one-line displays or as numeric fields on tabular displays. System-level overview information was typically displayed on static map boards with the only dynamic data shown using different colored lights. Recent advances in display technology have made display of truly dynamic system data both possible and affordable. The rationale behind wide-area displays is to allow operators earlier warnings of possibly cascading events that may originate outside their area of responsibility but disrupt the grid over large geographical areas.

These system visualizations are known as geographic data views (GDVs). With the GDV approach, power system visualizations can be dynamically created using power system information along with geographic information embedded in the system model. A key advantage of GDVs is that they can be used to visualize a wide variety of different power system field values with the ability to use different display attributes to simultaneously show different fields.

Project Description

The objectives of this research study has three distinct phases, in Phase 1 the Contractor will develop de-cluttering algorithms using different techniques to optimize the layout of the visual elements on displays. In Phase 2 the Contractor will develop several experimental displays based on real graphic display views in use at the NYISO control center. In Phase 3 the Contractor will empirically validate the display designs. The hierarchy of the constraints and the particular technique used to optimize the layout will result in different display layouts. A sample number of the resulting layouts representing distinct optimization criteria will be selected for empirical evaluation. The proposed solutions by the participants will also be evaluated and ranked, providing an accuracy measurement. The Contractor will conduct the experiment at Rochester Institute of Technology. In addition the Contractor will consult with the NYISO staff to review methodologies and results.

Benefits

Solving the decluttering problem mathematically will result in an optimal compromise between decluttering the display while maintaining reasonably accurate representation of geographic relations of the display elements. Validation of the visualization solutions empirically allow for estimation of effect sizes, which help predict human performance and human response times to contingency events. Within the collaborative structure of the proposed research, the immediate end user and beneficiary of the results would be Local Control Center operators, such as New York's transmission and distribution system operators, or a Regional or Statewide Control Center operator such as the NYISO. The new control center at NYISO will have a new power system visualization solution developed over next year, concurrently with the proposed project. It is possible that the results from the proposed project (e.g., the decluttering algorithm) may inform future developments in the new system.

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Research Project Summary

Wide Area Graphin Displays of Electric Power Grid (30732)

Rochester Institute of Technology

Funding

Funding	Total Anticipated
RIT:	$15,000.00
Northwestern U:	$10,000.00
NYSERDA:	$0.00
Total:	$25,000.00

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Research Project Summary

New Power Electronic Interconnection Technology (30731)

Pareto Energy LTD

Background

The Contractor will analyze ways to achieve Consolidated Edison's approval for a new distributed energy resource interconnection technology. The Contractor proposes utilizing a new power electronics technology that eliminates fault current contributions and voltage instabilities by not directly connecting or synchronizing distributed generation to the electrical grid. Power from the electrical grid and from the distributed generators are both connected to an AC to DC rectifier and then converted back to AC with an inverter. With these back-to-back power converters, the voltage, frequency and phase angle of the electrical grid and distributed generation are completely isolated from one other, creating a micro-grid. All interconnection and protection problems associated with synchronous interconnection can be eliminated, resulting in a micro-grid design simplification. The Contractor will work with engineers from Consolidated Edison's to familiarize them with this new technology. They will follow the application process to gain approval for the use of this new technology on the New York University (NYU) Polytechnic campus. The Contractor will prepare the detailed engineering drawings needed to obtain the interconnection agreement approval.

Project Description

The goal of this engineering study is to analyze the NYU Polytechnic micro-grid that will create a campus-wide thermal and electric energy system that utilizes distributed generation and a non-synchronous interconnection to the utility grid. This interconnection design will be of a new power electronics technology and will be analyzed in this project. Two main objectives to be completed for this project are a site analysis and a new utility interconnection design.

Benefits

The NYU-Poly project would result in savings of 10 to 15 percent below comparable costs for grid power with diesel backup systems. The project would open the way to implement more MWs of DG which implies infrastructural project financing of $3 to $4 billion and the associated job creation and tax revenues. Some third-party studies estimate a technical potential in New York City of more than 4,000 Megawatts of development, implying up to $20 billion of investment.

New York State environmental benefits could eventually total 25 million MMBTU in savings each year, based on PlanNYC's current goal for 800MW of DG. Separately, the 74 existing district energy systems (55 of them upstate) could be converted to combined heat and power far more easily once this type of technology is proved out, enabling thousands of MWs of distributed energy projects throughout the state to get off the drawing board. Other ratepayers will benefit as well where the cost of bringing in new high voltage transmission lines to the substation, or of building a new substation with a new feed, can be deferred. Short-term economic gains may be on the order of a 1000 jobs, but clearing away the barriers for micro-grids to encourage less expensive, cleaner and more reliable energy to cities will have a far greater impact on long-term economic development.

Contractor

Pareto Energy LTD
2300 M Street NW Suite 831
Washington, DC 20037

Principle Investigator

Shalom Flank

Technologies

Project Type:

Research Study

Project Focus:

Technology Feasibility/Assessment

Technology Types:

Electric Power Delivery Distribution

NYSERDA Contact Information

Michael Razanousky
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Program

R&D - Energy Mkts & Pwr Del

Contract Details

Start Date:

Project Status
Active

Contract Number:

30731

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Energy Innovation Solutions

Research Project Summary

New Power Electronic Interconnection Technology (30731)

Pareto Energy LTD

Funding

Funding	Total Anticipated
Pareto Energy:	$125,000.00
NYSERDA:	$0.00
Total:	$125,000.00

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Research Project Summary

Superconducting Fault Current Limiter (SCFCL) demonstration at the Central Hudson Gas & Electric Knapps Corner substation (30730)

Applied Materials Inc.

Background

Applied Materials Inc. acting through its Varian Power Systems Group ("Varian"), in partnership with Central Hudson Gas & Electric and SuperPower, will demonstrate the incorporation into the Grid of a new technology, a superconducting fault current limiter ("SCFCL"). This device allows for the rapid insertion of an impedance into the grid when a fault is detected, limiting the overall energy of the fault. This "smart" system is specifically designed to reduce the first peak of the fault current and thus limit the most destructive forces seen by the substation that is affected by the fault.

Project Description

The project objective is to successfully perform an in-grid single phase Superconducting Fault Current Limiter demonstration at Central Hudson's Knapps Corner substation located in Poughkeepsie, NY. The system will be designed to limit the system fault levels by 50% of today's fault current levels. During the demonstration, system characterization data will be gathered and quantified including fault limitation capabilities, electrical consumption rates, liquid nitrogen boil-off, preventative maintenance measures, etc. In addition to technical performance data the Contractor also expects to leverage the end-user (i.e. utility) value of having a system in the grid. This will be done through development of project outcome and performance documentation.

Benefits

Fault currents cause significant destruction and aging of the grid as the large current experienced during a fault cause excessive forces on grid components and joints. These forces wear on grid components, ageing them and causing premature failure and the need for expensive capital replacements. As power density increases in a substation, by the addition of transformers, the fault levels increase. In response to increased power demands utilities will have to split the bus, upgrade the switchgear, add impedances to the power flow or build new substations. These actions can reduce the reliability of the grid as well as incur large capital costs and have severe operational constraints. The addition of fault current limiters will lower overall fault currents, allowing for the extended use of substation components at higher power and the ability to increase overall power in the substation. For new substation designs the inclusion of fault current limiters will allow the utility to use lower rated fault current gear, saving significant cost. Fault current limiters remove from normal operation the impedances needed to keep fault currents under control. This reduction of impedance makes the grid stiffer, giving increased stability to the grid. Power quality and voltage stability are enhanced, making the NY state grid stronger and smarter.

Contractor

Applied Materials Inc.
3050 Bowers Avenue
Santa Clara, CA 95054

Principle Investigator

Scott Nickerson

Technologies

Project Type:

Product Demonstration

Technology Types:

Electric Power Delivery
Distribution

NYSERDA Contact Information

John Love
JFL@nyserda.org

Program

R&D - Energy Mkts & Pwr Del

Contract Details

Start Date:

Project Status
Active

Contract Number:

30730

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Research Project Summary

Superconducting Fault Current Limiter (SCFCL) demonstration at the Central Hudson Gas & Electric Knapps Corner substation (30730)

Applied Materials Inc.

Funding

Funding	Total Anticipated
Applied Materials Inc:	$1,221,574.00
NYSERDA:	$0.00
Total:	$1,221,574.00

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Research Project Summary

Development and Demonstration of a 1MWh System for Peak-Shaving and Demand Charge Reduction Based on UEP Flow-Assisted Zn-Anode Batteries (30366)

Urban Electric Power Inc.

Contractor

Urban Electric Power Inc.
177 E77th Street Suite 3E
New York, NY 10075

Principle Investigator

Alex Couzis

Universities Involved

City College of New York

Technologies

Project Type:

Product Development

Technology Types:

Energy Storage
Batteries

NYSERDA Contact Information

Jennifer Harvey
JLH@nyserda.org

Program

R&D -Transport & Power Systems

Contract Details

Start Date:

Project Status
Active

Contract Number:

30366

Background

The CUNY Energy Institute, with supporting funds from NYSERDA, developed flow-assisted rechargeable Zn-anode batteries with the proven capability of over 3,000 deep cycles at rapid charge-discharge times (under 1 hour) without loss of capacity.

Individual battery modules of 1kWh capacity each were assembled into two strings in 2012: one with a 30 kWh (580Ah) capacity that is presently undergoing cycling studies, and a second that is connected to the City College engineering building grid to demonstrate a peak-shaving application. A third string of 200 kWh will be built by March of 2013 and will be connected to the electric grid in CCNY using a 100 kW Princeton System Inverter. This string will also be also used for the development of the battery management system being developed under contract 28461 to optimally control the battery modules and the AC-DC inverter.

Urban Electric Power Inc (UEP), which was founded in 2011, has obtained the licensing rights to produce and commercialize the Zn-Anode flow-assisted energy storage technology developed at the CUNY Energy Institute.

Project Description

This project will productize the battery based energy storage system at the 1 MWh scale and test the system in a facility where it will be used to reduce building demand charges. The project builds directly on the work at CUNY and includes two, 18 month long phases. In Phase 1 UEP will design and build battery modules for 400kWh of capacity and connect them to the electric system of the selected facility. In Phase 2 UEP will build battery modules for an additional 600 kWh and install them to complement the initial 400 kWh in order to bring the installation to 1 MWh, which is large enough to demonstrate feasibility to utilities and other power system customers. In Phase 2 UEP will also approach manufacturing and assembling partners in NY State to prepare for scale up of production and obtain all the relevant certification. The system will be the first ruggedized system composed by modules with a bill of material cost < $500/kWh.

Benefits

Downstate New York has high peak electrical power demand, which stress the existing distribution system and requires extensive distribution upgrades. UEP's battery system has the potential to shave peak demand in distributed applications, not only saving demand charges paid by large customers, but also reducing the need for electrical substation upgrades. Increased energy storage on the electrical grid will reduce transmission congestion and electricity costs for ratepayers. UEP intends to establish their headquarters and a production line in New York City and will create a significant number of manufacturing full-time and part-time jobs.

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Energy Innovation Solutions

Research Project Summary

Development and Demonstration of a 1MWh System for Peak-Shaving and Demand Charge Reduction Based on UEP Flow-Assisted Zn-Anode Batteries (30366)

Urban Electric Power Inc.

Funding

Funding	Total Anticipated
Urban Electric Power:	$1,000,000.00
NYSERDA:	$0.00
Total:	$1,000,000.00

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Research Project Summary

Demonstration of a Utility-Scale Transportable Energy Storage System (TESS) in the Con Edison Electric Distribution System. (28825)

Electrovaya Company

Background

Cost effective energy storage is the most important element in the advancement of electric grid technology. Without energy storage, the grid must produce and consume the same amount of energy at any given time, therefore significantly lowering its overall flexibility. Ultimately this has led to the requirement for greater generation capacity, infrastructure requirements and leads to difficulty in incorporating intermittent generating sources like wind and solar. Consolidated Edison Co. of NY (Con Edison) has identified two specific issues that a mobile energy storage device would help mitigate for their purposes. This includes avoiding significant infrastructure upgrades for small increases in local demand by incorporating an energy storage device as a peak shaving tool, and potentially replacing a portion of its fossil fuelled mobile diesel generators with zero emissions and low noise mobile energy storage devices.

Project Description

Electrovaya and Con Ed will demonstrate the first Transportable Energy Storage System (TESS) for use in Con Ed's New York service territory. The TESS is a self contained energy storage device composed of multiple Li-ion batteries, a power conversion system (PCS) unit including transformers and manual disconnects, and an integrated thermal management system. The system is packaged on a mobile trailer approximately 40 ft long, 8 ft wide, and 12.5 ft tall. The unit will provide dual voltage output at customer voltage levels of 120V or 480V. The proposed utility energy storage device will be utilized by Con Edison to defer the installation of aditional expensive and disruptive transformer infrastructure and provide both peak shaving capability and improved power quality on the Con Edison grid. The TESS device will be designed specifically for the high energy and small footprint requirements of the Con Edison application. The TESS is sized for .8 MWh of energy storage and is designed around modular 95 kWh battery cabinet systems, which are constructed using Electrovaya's large format SuperPolymer cells. The utility scale products will be capable of both excellent energy storage capabilities for multi-hour storage in addition to the capability for high power ancillary and regulation services.

Benefits

The TESS can provide significant benefits to Con Ed and its customers through general technology development and offering greater flexibility in providing reliable and low cost service to the grid. Electrovaya will benefit through technology development and by gaining valuable experience. Moreover, the specific manufacturing, job creation, and environmental/operational benefits will be made at the Malta, NY manufacturing site. Con Edison and its customers benefit as a number of operational benefits have been identified concerning infrastructure upgrade deferments, reduction in reliance of diesel generators, experience with lithium ion battery technology and benefits in regards to smart grid operation/implementation. The system will be built at Electrovaya's Malta, NY facility. The company's NY personnel will gain significant insight into design and manufacturing aspects of large scale energy storage systems thereby creating a strong NY base for the production of future systems. The demonstration will have environmental benefits specifically for the highest population density area in the country.

By avoiding expensive infrastructure upgrades and improving power quality and the provision of emergency service, cost effective mobile storage will support the mission of all utilities in the state: safe and reliable service at just and reasonable rates. The TESS demonstration will be useful to other

Contractor
Electrovaya Company
107 Hermes Rd
Malta, NY 12020

Principle Investigator
Krista Goossens

Technologies
Project Type:

Product Demonstration

Technology Types:

Energy Storage
Batteries

NYSERDA Contact Information

John Love
JFL@nyserda.org

Program
R&D - Energy Mkts & Pwr Del

Contract Details
Start Date:

Project Status
Active

Contract Number:

28825

Research Project Summary

Demonstration of a Utility-Scale Transportable Energy Storage System (TESS) in the Con Edison Electric Distribution System. (28825)

Electrovaya Company

Funding

Funding	Total Anticipated
Consolidated Edison Co. of NY:	$620,000.00
Consolidated Edison Co. of NY:	$381,108.00
Electrovaya Co.:	$340,706.00
Electrovaya Co.:	$309,972.00
NYSERDA:	$0.00
Total:	$1,651,786.00

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Research Project Summary

Central Hudson Distribution Smart Grid Phase II (28824)

Central Hudson Gas and Electric Corporat

Background

Central Hudson envisions the smart grid as an electrical system that incorporates real time system information into an integrated system model capable of solving a system of both varying load and generation at near real time. Currently, Central Hudson operates automated devices autonomously with no integrated command and control. By driving their control logic autonomously the company does not realize or capitalize on other potential benefits that can be extracted from existing and future intelligent field devices. Having an integrated system model capable of performing state estimation based on near real time field measurements system wide will allow for unlimited opportunities to plan and design the grid in a much more efficient and effective manner. Utilizing intelligence based on the integrated system model will assist the utility to improve efficiency, reliability and the potential to defer capital while allowing for a tool to assist in the analysis of the impacts that renewable generation has on the electric system. Through an ongoing NYSERDA funded project, Central Hudson, in partnership with Electrical Distribution Design (EDD), is developing a model of the distribution system and will ultimately integrate real time information from field devices to support the model.

Project Description

Expand CHG&E's Phase 1 project to implement an integrated transmission system model alongside the distribution system model currently being developed in order to realize a complete system model capable of analyzing any possible contingency on both the transmission and distribution system. A comprehensive model-based transmission level management and distribution automation system that is built around the use of EDD's Distributed Engineering Workstation (DEW) Integrated System Model (ISM) software will be demonstrated. In using an ISM, transmission issues could be addressed by examining the distribution level to determine its potential impacts on the transmission system. Specifically, the transmission system serving the town of Woodstock, NY will be modeled. Reliability and lengthy restoration issues on the transmission line from the Woodstock substation require a solution. This project provides a distribution solution as an alternative to the very expensive construction of a second transmission line to serve the area.

Benefits

The Smart Grid Phase II project is anticipated to:

1. Develop a more reliable, efficient and better utilized T&D system through an integrated system model capable of processing field data with the potential to assist an engineer and an operator in operating the T&D system with enhanced decision making tools based on near real time field information and historical analytics (load research);
2. Demonstrate a smart grid solution to automate circuit ties between CHG&E's radially fed Woodstock Substation and its neighboring circuitry in order to defer the projected capital costs of building a second transmission feed to Woodstock through the Catskill Park estimated in excess of $15 million. The distribution solution is estimated to cost $900,000 and provide the same level of reliability to the Woodstock area; and
3. Demonstrate and validate a cost benefit analysis tool that would allow for a more efficient progression in the modernization of the electrical system.

Contractor

Central Hudson Gas and Electric Corporat
284 South Ave
Poughkeepsie, NY 12601 4838

Principle Investigator

Pete Harpolis

Technologies

Project Type:

Product Demonstration

Technology Types:

Electric Power Delivery
Transmission

NYSERDA Contact Information

John Love
JFL@nyserda.org

Program

R&D - Energy Mkts & Pwr Del

Contract Details

Start Date:

Project Status
Active

Contract Number:

28824

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Research Project Summary

Central Hudson Distribution Smart Grid Phase II (28824)

Central Hudson Gas and Electric Corporat

Funding

Funding	Total Anticipated
Central Hudson Gas & Electric:	$900,000.00
Electrical Distribution Design:	$198,300.00
NYSERDA:	$0.00
Total:	$1,098,300.00

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Research Project Summary

Demonstration of model-based real-time distribution automation control system. This agreement is an expansion of scope originated in Agreement #10474. (28823)

Orange and Rockland Utilities, Inc.

Contractor

Orange and Rockland Utilities, Inc.
390 Route 59
Spring Valley, NY 10977 5225

Principle Investigator

Charlie Scirbona

Technologies

Project Type:

Research Study

Project Focus:

Technology Feasibility/Assessment

Technology Types:

Electric Power Delivery Distribution

NYSERDA Contact Information

Anthony Abate
AWA@nyserda.org

Program

R&D - Buildings Research

Contract Details

Start Date:

Project Status
Active

Contract Number:

28823

Background

Moving New York State toward a smarter electric grid that improves both reliability and energy efficiency requires increasing the intelligence of utility transmission and distribution ("T&D") systems through creative and cost effective means. These 'Smart Grid' measures will require increased amounts of real-time operating system data coupled with processing and decision making capability and allow for better management, operation and control of the electric delivery system. When properly integrated into utility operations, this can result in cost savings, improved efficiency, environmental benefits, improved reliability and flexibility for New York State's energy delivery systems.

The most prevalent type of distribution automation currently in service relies on equipment that uses simple voltage and / or current inputs to field controls. When specific electrical parameters stray out of a specified range, the equipment reacts to it automatically. This automation approach is unaware of what is taking place on the rest of the system and cannot react to optimize system conditions. At the other extreme an approach to distribution automation might be to 'centrally monitor and control all things'. Orange and Rockland Utilities Inc. (ORU) is investigating an approach to 'smart' distribution automation what is between these other two approaches.

Project Description

This project is piloting a manner of 'smart' distribution automation including 'smart' field equipment coupled to a distribution Supervisory Control and Data Acquisition (SCADA) system. This system is then interfaced to a model-based real-time command and control system that is platform for system control and decision making. ORU is demonstrating this automation (NYSERDA agreement #10470) in a proof-of-concept project on two (2) circuits. In this project ORU will outfit 14 circuits with SCADA operable equipment to allow model-based control for fault isolation and restoration and for coordinated Volt / VAR control.

ORU has developed an integrated system model (ISM) of their entire territory using software called DEW. This ISM and a method for fast processing of real-time data are the analytical backbone used for both standard engineering analysis and advanced distribution system command and control automation. The selected circuits will also be re-designed to create auto-loop circuit pairs with fault clearing reclosers, SCADA operable sectionalizing switches, and SCADA operable switched capacitor banks. Each device mentioned will be SCADA enabled through the cyber secure, proven wireless communications and hardware. Finally the system will be commissioned for automatic model-based real-time control. Performance will be monitored and analyzed and used to validate a cost benefit

Benefits

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Research Project Summary

Demonstration of model-based real-time distribution automation control system. This agreement is an expansion of scope originated in Agreement #10474. (28823)

Orange and Rockland Utilities, Inc.

Compared to the proof-of-concept demonstration, this pilot scale demonstration is more representative of a full scale "smart' distribution automation deployment. The objective of this project is to increase the scale ORU's 'smart' distribution automation control system over a larger geographical area of fourteen (14) additional individual circuits, demonstrate ease of incremental expansion and verify the benefits projected from the smaller proof-of-concept pilot. ORU benefits anticipated from this 'smart' distribution automation demonstration include:

1. Provide a higher level of 'blue sky day' reliability and power quality.
2. Improve operational awareness of circuit status to speed response to equipment failures and storms, automate restoration and minimize the extent of outages.
3. Improved operational and maintenance efficiency of transmission and distribution circuits.
4. Minimize real time losses and maximize system performance from integrated volt/VAR control (IVVC) .
5. Improved circuit energy efficiency with phase balancing and optimization and rephrasing of distribution transformers and laterals.
6. Improve real-time transmission line utilization.

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Research Project Summary

Demonstration of model-based real-time distribution automation control system. This agreement is an expansion of scope originated in Agreement #10474. (28823)

Orange and Rockland Utilities, Inc.

Funding

Funding	Total Anticipated
Orange and Rockland Utilities, Inc.:	$5,250,791.00
Brookhaven National Laboratory:	$29,065.00
Electrical Distribution Design (EDD):	$36,332.00
NYSERDA:	$0.00
Total:	$5,316,188.00

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Research Project Summary

Above Ground Compressed Air Energy Storage System - Phase One Economic Analysis (28822)

New York Power Authority,

Contractor

New York Power Authority,
888 7th Ave
New York, NY 10106 1898

Principle Investigator

Kou Li

Technologies

Project Type:

Product Demonstration

Technology Types:

Energy Storage
Compressed air

NYSERDA Contact Information

Michael Razanousky
MPR@nyserda.org

Program

R&D - Energy Mkts & Pwr Del

Contract Details

Start Date:

Project Status
Active

Contract Number:

28822

Background

New York State is uniquely positioned to host demonstrations of energy storage technologies, which are important enablers of renewable energy and smart grid capabilities. New York State has been a leader in renewable and low greenhouse gas-emitting energy resources for many years. The State continues to lead with an aggressive Renewable Portfolio Standard (RPS), with the current RPS goal set at 30% renewables by 2015. The New York Independent System Operator (NYISO) has already experienced grid operational issues associated with wind and solar plants due to their rapid power fluctuations and unacceptably high ramp-up and ramp down characteristics. One of the key methods to reduce these issues is to smooth out the power fluctuations by using energy storage plants.

Project Description

This project is a phase one economic analysis of NYPA's proposed 9 MW–4.5 hour advanced CAES plant. This project's ultimate goalis to build and validate the operational performance of the first commercial-scale Compressed Air Energy Storage (CAES) plant in the world that utilizes an aboveground air storage system. This project, when completed, is a pioneering application of new and innovative technology and will support transmission operations in New York State. This project is a unique demonstration to address New York State's grid challenges in the wake of smart grid initiatives, a proliferation of increased amounts of intermittent renewable resources, increasing peak load demand, and rising grid infrastructure costs. The project is differentiated by its innovative use of an aboveground air storage system integrated into a new, second-generation CAES plant that makes this technology much easier to site since it is independent of siting and geological issues that have been associated with past CAES plants that use underground, geologically-based air storage systems.

Benefits

The project should produce a positive benefit-to-cost ratio. The project can enable intermittent renewables and potentially reduce congestion. This project will focus on phase 1 cost-benefit analysis.

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Research Project Summary

Above Ground Compressed Air Energy Storage System - Phase One Economic Analysis (28822)

New York Power Authority,

Funding

Funding	Total Anticipated
NYPA:	$300,000.00
NYSERDA:	$0.00
Total:	$300,000.00

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Research Project Summary

Advanced State Estimation to Improve The Reliability of Con Edison's Network (28821)

V&R Energy Systems Research, Inc.

Background

There is a growing need for effective solutions for increasing penetration of renewable sources of energy, reduced carbon production from the electric power sector in order to support reliable operation of the electric grid, prevent major blackouts and facilitate long-distance power transfers. The proposed project will be one of the first steps towards building and achieving a self-healing grid at Con Edison, which is one of the major characteristics of a Smart Grid such that:

- Increased levels of distribution automation are supported,
- Voltage profiles and protection mechanisms are improved,
- Losses in transmission and distribution systems are reduced;
- Major outages, cascading events or blackouts are mitigated or prevented.

Incorporation of these capabilities will improve reliability and stability of the distribution and transmission systems and facilitate creation of the Smart Grid in the New York State (NYS).

Project Description

The main objective of this project is to accomplish substantial increased use of distributed and renewable resources for supplying power during peak load periods and other functions and services in maintaining reliability of electric distribution systems. The objectives of the project are:

- Demonstrate the effectiveness of using a model of transmission and distribution grid as one integrated power delivery system, since historically transmission and distribution system networks have been analyzed separately. This will enable direct observation of network-wide improvements from changes in the distribution and transmission systems and the impacts of advanced voltage regulation and protection system on both the transmission and distribution grids.
- Comply with the existing ANSI limits for voltage and frequency regulation and NERC TPL standards. Voltage regulation is a critical factor contributing to the reliable and stable operation of the distribution and transmission grids under high levels of distributed and renewable generation.
- Demonstrate the effectiveness of an approach for voltage regulation and reactive power management such that it combines the use of Con Edison's voltage regulation control schemes with real and reactive power adjustments performed by the distribution-connected generation.
- Utilize real-time data obtained through synchronized phasor measurement units (PMUs) for arming

Benefits

Benefits of the proposed technology include:

- Ensuring reliable operation of integrated distribution and transmission system under normal and disturbance conditions under high penetration of distributed energy resources.
- Reduction in greenhouse emissions.
- Increase in the operating margin (margin to steady-state and transient limits in the integrated distribution and transmission system).
- Improved voltage profile.
- Reducing real and reactive losses in distribution and transmission systems.
- Improvement in power quality.
- Reduction in reactive power consumption.
- Increase in the load-serving capability of the network under normal and contingency conditions.
- Intentional islanding after a major disturbance to provide continuous power supply to critical loads.

Contractor

V&R Energy Systems Research, Inc.
11824 Darlington Avenue, Suite 101
Los Angeles, CA 90049

Principle Investigator

Marianna Vaiman

Technologies

Project Type:

Product Demonstration

Technology Types:

Electric Power Delivery
Distribution

NYSERDA Contact Information

Michael Razanousky
MPR@nyserda.org

Program

R&D - Energy Mkts & Pwr Del

Contract Details

Start Date:

Project Status
Active

Contract Number:

28821

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Energy Innovation Solutions

Research Project Summary

Advanced State Estimation to Improve The Reliability of Con Edison's Network (28821)

V&R Energy Systems Research, Inc.

Funding

Funding	Total Anticipated
V&R Energy:	$300,000.00
Con Edison:	$200,000.00
NYSERDA:	$0.00
Total:	$500,000.00

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Research Project Summary

Engineering study to assess the feasibility of implementing Triple-Point Energy's thermal energy storage system at Wheelabrator's 60MW plant in Peekskill, NY (28820)

Triple Point Energy

Background

Triple-Point Energy was founded to address a pressing need for load-shifting energy storage on the electrical grid. At present, seasonal and daily variations in demand must be met almost entirely with instantaneous changes in generation. As a result, the grid requires capacity far in excess of average load, and intermittent renewable sources are difficult to integrate.

Triple-Point Energy's unique thermal solution brings low-cost, high capacity storage to the grid by leveraging existing infrastructure. The technology stores energy thermally in a cold phase-change material, using it to then lower the temperature of a power plant's cooling water on discharge. In a typical plant this increases power output by approximately 2% to upwards of 10% for 3 to 8 hours, until the cold storage medium reaches equilibrium with the plant's cooling water.

Project Description

Triple Point Energy will perform this engineering study to assess the feasibility of implementing Triple-Point's system at the Wheelabrator's 60MW plant in Peekskill, NY.

The project scope of work has been carefully designed by Triple-Point Energy and B&V to deliver a robust, objective assessment of the solution's potential at Wheelabrator Westchester. Historical plant data will be used to build a steady state heat balance model of the plant with Triple-Point's energy storage system. The model will be able to accurately predict input and output characteristics and important performance metrics such as minimum and maximum power from discharge, effects on net thermal discharge, idling losses, parasitic load, round trip efficiency, and total energy storage capacity. The outputs from this model will drive an economic model that will use historical pricing and weather data to demonstrate hypothetical financial performance. The project will also include a detailed cost estimation that will combine with the economic analysis to determine system return on investment (ROI), payback, and net present value. Sensitivity analyses will show how the system would respond to changes in prices, weather, and host plant performance.

Benefits

The large-scale adoption that could follow would improve New York's energy infrastructure by:

- Helping the grid to efficiently match energy supply to energy demand while maintaining its reserve requirements and meeting environmental standards.
- Enabling generation owners to get more out of their existing facilities, while reducing the need for environmentally damaging and economically draining new power plant construction projects.
- Helping utilities, energy services companies, and ratepayers by lowering exposure to price spikes.

New York State has roughly 33,000MW of nameplate capacity from thermal power plants. Installing Triple-Point Energy's solution at 25% of these would result in an addition 400MW of peaking capacity on the grid – with additional benefits from cooling water management at once-through plants. Storage will also reduce peak energy prices and market volatility in NYISO.

Contractor

Triple Point Energy
26 Mianus Drive
Bedford, NY 10506

Principle Investigator

Matthew Rosenfeld

Technologies

Project Type:

Research Study

Project Focus:

Site-specific Feasibility

Technology Types:

Energy Storage
Other

NYSERDA Contact Information

John Love
JFL@nyserda.org

Program

R&D - Energy Mkts & Pwr Del

Contract Details

Start Date:

Project Status
Active

Contract Number:

28820

Research Project Summary

Engineering study to assess the feasibility of implementing Triple-Point Energy's thermal energy storage system at Wheelabrator's 60MW plant in Peekskill, NY (28820)

Triple Point Energy

Funding

Funding	Total Anticipated
Triple Point Energy:	$3,800.00
Triple Point energy:	$30,789.00
Black & Veatch:	$14,750.00
Wheelabrator:	$1,500.00
NYSERDA:	$0.00
Total:	$50,839.00

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Research Project Summary

Optimizing supply voltage to minimize energy consumption (28819)

Utility Systems Tech., Inc.

Background

The electric power consumed by different load types vary as a function of the magnitude and balance of the voltage supplied to that load. Ideally, the voltage delivered to a consumer by a utility would be balanced and at a magnitude allowing optimum performance of that specific consumer's load. Presently, this is not possible since the magnitude of voltage delivered by utilities to consumers is a function of the voltage established at the area substation, the configuration of the transmission system for that substation, and all the loads being served at that instant. The utility cannot deliver an optimum voltage to each customer because of the way in which the power is generated and delivered. The utility typically delivers power at a voltage deemed "acceptable" if it is between -10% and +10% of nominal. The utility does not have the means to assess the effect of voltage level or phase balance on energy consumption incurred by a specific customer.

Utilities presently regulate the delivered voltage with a combination of mechanical on-load tap changers and switched capacitors which are slow and inflexible. This method forces all consumers supplied by a substation to be supplied at essentially one voltage level. The utilities operating strategy provides the best power to the average consumer within a substations delivery area, it does not deliver the power at a voltage that will supply the load at the lowest energy consumption for a specific consumer.

Project Description

UST will assess the feasibility of the project by conducting a literature study determining system voltages variation and impact on efficiency, establishing motor sensitivity to voltage level and unbalance, and measure the voltage level and unbalance at a field location (Albany county sewer site). Based on the resultant data UST will design the systems control, the optimization algorithm, and the complete optimization device.

UST will then assess the economic effectiveness of the new technology. To accomplish this UST will build the control and verify its capability by bench test. UST will then construct the entire system and verify it's performance by testing in the UST laboratory. The completed unit will then be installed at the Albany County Sewer District north station and instrumented to measure it's performance.

Benefits

This project will demonstrate it is possible to use a transformer equipped with an electronic on-load tap changer and control to select the optimum output voltage from the transformer so that the energy consumption of a specific load will be minimized. Using this optimization capability will allow energy consumed by a residential, commercial, and industrial load to be reduced between 3 to 8%. When manufactured in reasonable quantities this product will be able to save enough energy to achieve an ROI of two years or less.

Contractor

Utility Systems Tech., Inc.
2315 Cayuga Road
Niskayuna, NY 12309

Principle Investigator

Robert Degeneff

Universities Involved

Rensselaer Polytechnic Institute

Technologies

Project Type:

Research Study

Project Focus:

Technology Feasibility/Assessment

Technology Types:

Electric Power Delivery Distribution

NYSERDA Contact Information

John Love
JFL@nyserda.org

Program

R&D - Energy Mkts & Pwr Del

Contract Details

Start Date:

Project Status
Active

Contract Number:

28819

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Energy Innovation Solutions

Research Project Summary

Optimizing supply voltage to minimize energy consumption (28819)

Utility Systems Tech., Inc.

Funding

Funding	Total Anticipated
Utility Systems Technologies, Inc:	$131,000.00
NYSERDA:	$0.00
Total:	$131,000.00

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Research Project Summary

EPTD Smart Grid Program (28817)

Electric Power Research Institute

Contractor

Electric Power Research Institute
3420 Hillview Drive
Palo Alto, CA 94304

Principle Investigator

Tom Short

Technologies

Project Type:

Research Study

Project Focus:

Technology Feasibility/Assessment

Technology Types:

Electric Power Delivery
Distribution

NYSERDA Contact Information

Michael Razanousky
MPR@nyserda.org

Program

R&D - Energy Mkts & Pwr Del

Contract Details

Start Date:

Project Status
Active

Contract Number:

28817

Background

Deployment of distributed PV power relies on existing electric distribution to take, and to deliver, energy while maintaining quality and reliability for all electricity consumers. Given that distribution was not designed for significant levels of distributed generation and output variability expected from renewables – a partly cloudy day for solar – can be a challenge. Utility concerns include DG interactions with feeder voltage controls, conflicts in grounding philosophies and coordination with fault recovery practices.

Prior work by EPRI has shown that application of a smarter inverter in the PV power conversion – providing active collaborative support of the grid – has potential to practically double the safe hosting levels of existing electric distribution system. Customer-side inverters with advanced functions can interact to positively support the grid and utility-side investments in automation, control and communication can make use of the added functionality.

Project Description

This study will determine potential advantages for using smart-grid ready PV inverters in specific areas of NY electric distribution where PV deployment is growing. It will also recommend the most effective paths for preparing the utility-side of the meter to effectively employ distributed PV inverters with grid support functions. Working with the NY Power Authority and NY Distribution Utilities, EPRI will provide monitoring equipment to measure PV variability combined with other available data describing PV variability. Time series PV output data along with, time series load data will be used in detailed feeder models to analyze a large number of future scenarios for areas where feeder penetration levels are a concern. Based on existing and expected future PV deployments the project team will identify how future distribution operating systems (EMS and DMS) can benefit from the application of inverters with grid support functions.

Benefits

Determines hosting capacity of existing NY distribution infrastructure for specific sites with high potential for PV deployment.

Fosters better use of electrical distribution assets.

Prepares NY distribution utilities to take advantage of controllable distributed resources.

Identifies potential value of inverter-based grid support for specific cases of PV deployment in NY State.

Provides results that can lead to improved DG screening methods and faster processing of interconnect requests.

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Research Project Summary

EPTD Smart Grid Program (28817)

Electric Power Research Institute

Funding

Funding	Total Anticipated
EPRI:	$100,000.00
NYSERDA:	$0.00
Total:	$100,000.00

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Research Project Summary

EPTD Smart Grid Program (28816)

Ceralink, Inc.

Background

There are over 12,000 miles of transmission lines in New York State. Most transmission lines are designed, built and maintained with a shield wire or set of shield wires situated at the top of the towers to reduce the effect of lightning strikes to the system. This type of lightning protection has been in place for over a hundred years. One of the significant drawbacks of these shield wires are losses associated with their use. During steady state operation of a transmission line with shield wires, the AC voltage induces currents in the shield wires that are conducted directly to earth. This current to earth is 100% losses. The losses on shield wires are between 1-4% of the total line losses, which can amount to billions of dollars over the life of the lines.

Surge arresters are the standard products used to protect power systems from the adverse effects of lightning, with protection of distribution and transmission lines being the second most common application. The non-gapped Metal Oxide Varistor (MOV) based surge arrester is the predominant form on the market today, and the only type used for line protection in the U.S. In other parts of the world however, a new type of MOV based arrester with significant advantages, is gaining popularity. This new device is referred to as the externally gapped line arrester (EGLA).

Project Description

The purpose of this engineering study is to support project development activities such as conducting EGLA benefits assessments, reliability testing procedures, economic analysis for implementation, and preparing technical publications/presentations. This study is expected to ultimately lead to a demonstration project involving utilities and line designers that improves the electric power delivery system. Specific goals of this engineering study are to show: 1) the economic benefits of a shield less transmission line using arresters, 2) the technical benefits of EGLA application on shield less lines, 3) how to select the proper EGLA, 4) the transmission line designers how it can be done, and 5) utility management the benefits of shield less lines.

Benefits

The projected benefits of replacing overhead transmission shield lines with externally gapped line arresters are 1) elimination of shield line losses (saving 1-4% of transmitted electricity), 2) national economic savings of $6 billion dollars over the lifetime of the line, 3) improved reliability and quality of the electric power delivery system, and 4) reduced tower infrastructure and maintenance. It is also theorized that this approach would realize an equivalent or even greater savings through reduction of power outages.

Contractor

Ceralink, Inc.
105 Jordan Rd
Troy, NY 12180 8376

Principle Investigator

Shawn Allan

Technologies

Project Type:

Research Study

Project Focus:

Technology Feasibility/Assessment

Technology Types:

Electric Power Delivery Distribution

NYSERDA Contact Information

Michael Razanousky
MPR@nyserda.org

Program

R&D - Energy Mkts & Pwr Del

Contract Details

Start Date:

Project Status
Active

Contract Number:

28816

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Energy Innovation Solutions

Research Project Summary

EPTD Smart Grid Program (28816)

Ceralink, Inc.

Funding

Funding	Total Anticipated
NYSERDA:	$0.00
Total:	$0.00

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Research Project Summary

EPTD Smart Grid Program (28815)

Rensselaer Polytechnic Institute-LRC

Contractor

Rensselaer Polytechnic Institute-LRC
110 8th St., CP&FD Service Bldg.
TROY, NY 12180

Principle Investigator

Joe Chow

Technologies

Project Type:

Research Study

Project Focus:

Technology Feasibility/Assessment

Technology Types:

Electric Power Delivery
Transmission

NYSERDA Contact Information

Michael Razanousky
MPR@nyserda.org

Program

R&D - Energy Mkts & Pwr Del

Contract Details

Start Date:

Project Status
Active

Contract Number:

28815

Background

At the completion of the Department of Energy Smart Grid Investment Grant (SGIG), New York will have 50-60 multi-channel PMUs gathering high sampling-rate synchronized phasor measurements across the state. The availability of such synchrophasors has the ability to vastly improve the reliability of the New York power system. This proposal addresses the development of tools to harness the potentials of phasor data. This two-year project is a joint effort between Rensselaer Polytechnic Institute and New York Power Authority. This engineering study is motivated by the results of a prior NYSERDA sponsored project in which we developed an efficient set of code to perform direct state calculation and a flexible integrated phasor system (FIPS). They are both used in this new proposal.

Project Description

The goal of this proposal is to develop new applications of synchrophasor data to enhance the reliability and efficiency of a large power grid such as the New York power system. These new applications will be provided to New York Power Authority, to be implemented on a phasor system platform installed at NYPA from a prior NYSERDA Project entitled "New York State Phasor Measurement Network." We will involve New York Independent System Operator to seek their comments and feedback.

Benefits

There are two main benefits to New York State from this project. First, the improved system visibility would allow real-time power dispatch to be more accurate, thus resulting in a lower cost solution. Second, the results of this project may lead to reduce the probability of large-scale blackout and the resulting economic losses in big cities such as New York City. The results of the project will provide general concepts and tools to benefit power companies utilizing synchrophasor data.

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Research Project Summary

EPTD Smart Grid Program (28815)

Rensselaer Polytechnic Institute-LRC

Funding

Funding	Total Anticipated
NYSERDA:	$0.00
Total:	$0.00

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Research Project Summary

EPTD Smart Grid Program (28814)

SUNY, Stony Brook

Contractor

SUNY, Stony Brook
SUNY, Stony Brook
Stony Brook, NY 11794 0002

Principle Investigator

Eugene Feinberg

Technologies

Project Type:

Research Study

Project Focus:

Technology Feasibility/Assessment

Technology Types:

Electric Power Delivery
Transmission

NYSERDA Contact Information

Michael Razanousky
MPR@nyserda.org

Program

R&D - Energy Mkts & Pwr Del

Contract Details

Start Date:

Project Status
Active

Contract Number:

28814

Background

The rapid evolution of electric power systems in the recent years has created new significant challenges in the areas of power system operation and control. Such challenges stem from new problems that need to be efficiently addressed, like the penetration and optimal utilization of intermittent generation, such as renewable resources, as well as new capabilities, in the form of new actuators or advanced control systems, which need to be optimally coordinated and exploited to provide a much more efficient and reliable operation of the power grid. Such important challenges will require faster and more robust control of the power grid to ensure maximum utilization of available resources along with system stability and reliability. Emerging smart grid technologies, including, for example, the deployment of telecommunication networks and new generation of sensors, such as phasor measurement units (PMUs), will provide additional large amounts of data to the system engineers and operators. Fast processing of such operational data will generate useful information that can increase situational awareness, assist decision making, and, eventually, allow the transmission system operators and engineers to implement manual or automatic real-time controls in a much more efficient and accurate way compared to today's practices, thus increasing the reliability and potentially the transmission capability of the power grid.

Project Description

The main goal of this project is to perform an engineering study on the utilization of advanced numerical algorithms and high performance computing for solving power-flow, state-estimation, and system-stability type of control problems for the New York State transmission grid. The main objective is to investigate how these problems can be solved 10 to 100 times faster compared to the solution times achieved in current control system implementations. This will provide system operators the capability to implement advanced, real-time control algorithms for the transmission system. Such algorithms could also incorporate additional data from smart grid sensors (like, for example, PMUs or dynamic line rating monitors) and their future implementation could lead to the reduction of safety margins in the transmission grid operation, increase of transmission capacity, and more importantly more secure and reliable operation of the power system. If the desired outcomes in terms of algorithm execution speed and system benefits are achievable and the implementation of such algorithms is practical, this study could lead to the subsequent demonstration project at the New York Power Authority and further future implementations.

Benefits

The study investigates more efficient techniques for monitoring and operation of the electric power transmission grid, focusing on the application of faster solution algorithms for obtaining the state of the grid based on large amounts of measurements. The project will look into the applicability of such advanced numerical algorithms in power system problems and the potential benefits in terms of faster execution speeds and robustness of the solution algorithms. Such benefits could have a significant impact on the way the transmission grid is controlled, resulting in more reliable and secure operation of the power grid primarily during abnormal or emergency conditions, where decisions need to be made in very short time frames. This study will also be the first step towards a more automatic, computer-based approach in power systems wide-area control. Potential benefits of this study could be readily applicable to the NYS grid. After the phase of engineering studies, it is expected that the tested solution methods and tools will be used for a demonstration project involving implementation at the NYPA system.

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Research Project Summary

EPTD Smart Grid Program (28814)

SUNY, Stony Brook

Funding

Funding	Total Anticipated
NYSERDA:	$0.00
Total:	$0.00

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Research Project Summary

Modeling of how large NYS commercial buildings and campuses may optimize energy use with advanced technologies and Smart Grid interactions. (28813)

KEMA Incorporated f/k/a XENERGY, Incorpo

Background

Today, electricity customers in New York State are presented with price signals, retail supply products and demand response program offerings. More customers are inquiring about innovations like on-site generation, combined heat-and-power, photovoltaic, islanding and microgrid, battery and thermal storage. Sever climatic events have increased awareness regarding the resiliency of facility operations and the value of distributed generation. It is expected that as technologies to manage consumption evolve and improve in performance and cost, New York State commercial and industrial electric customers, in particular, might undertake actions to self optimize (or even co-optimize with others customers) their energy use to minimize their costs and carbon foot prints or increase the resilience of their operations. Many self-optimizing behaviors aimed at lowering demand / delivery and capacity costs and at providing demand response have been observed in New York. It is feasible that additional self-optimizing behaviors could likely develop including automated curtailment and load shaping, response to day-head hourly prices, participation in "dispatchable" demand response and on-site energy production and storage.

Project Description

This research seeks to provide a better understanding of how large NYS commercial buildings and campuses may self-optimize their energy use in ways that modify their electricity load profiles. The objective is to better understand the value and costs of select self-optimizing behaviors, explore the capabilities and limitations of enabling technologies (on-site generation, storage, demand response automation, PV, etc.) and examine the likelihood of adoption. The objective is to model and analyze likely behavior of self-optimizing customers enabled by various technologies recognizing the economics of NYS ratepayers and describe potential load profiles changes.

Benefits

This study will provide a more holistic understanding of likely scenarios of how commercial customers in NYS interpret the myriad of retail and wholesale prices and programs and use new technologies to self-optimize their electricity consumption. It will provide an evaluation of the value propositions facing customers, potential load profile impacts and likelihood of adoption. There is some concern that rapid adoption of technology and self-optimizing behavior, particularly demand response participation in real time energy, may change the predictable nature of load behaviors resulting in additional cost or instability to the grid. By shedding light on the capabilities and challenges of self-optimizing behaviors and some enabling technologies, this study will benefit ratepayers who are interested in exploring such options and the NYISO who could engage such customers as demand-side resources.

Contractor

KEMA Incorporated f/k/a XENERGY, Incorpo
67 South Bedford St., Ste 201 E
Burlington, MA 01803 5108

Principle Investigator

Ralph Masiello

Technologies

Project Type:

Research Study

Project Focus:

Technology Feasibility/Assessment

Technology Types:

Building Systems
Controls/Sensors

NYSERDA Contact Information

Anthony Abate
AWA@nyserda.org

Program

R&D - Buildings Research

Contract Details

Start Date:

Project Status
Active

Contract Number:

28813

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Research Project Summary

Modeling of how large NYS commercial buildings and campuses may optimize energy use with advanced technologies and Smart Grid interactions. (28813)

KEMA Incorporated f/k/a XENERGY, Incorpo

Funding

Funding	Total Anticipated
DNV Kema:	$35,219.00
NYSERDA:	$0.00
Total:	$35,219.00

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Research Project Update

EPTD Smart Grid Program Small Compressed Air Energy Storage Design and Feasibility Study (21087)

Energy Storage and Power LLC

Contractor
Energy Storage and Power LLC

520 Route 22 East, Suite 205
Bridgewater, NJ 08807

Principle Investigator
Patrick Conroy

Universities Involved

Technologies

Project Type:

Research Study

Project Focus:

Site-specific Feasibility

Technology Types:

Keywords

Smart Grid

Background

New York State is a leader in the deployment of renewable energy resources and consequently has a significant need for new enabling technologies to both technically and economically enhance intermittent renewable integration. This needs to be compatible with New York's longstanding commitment to both energy efficiency and economic growth. The State also has unique geographic challenges in meeting its goal in these areas having large load centers that are significantly constrained during peak system load periods in delivering energy produced elsewhere in New York. Energy storage is recognized as having significant potential to mitigate these issues and meet the challenges.

Energy Storage and Power (ES&P) has been on the forefront of compressed air energy storage (CAES) system technology since its first application in the United States over twenty years ago. ES& P has invented significant improvements to the CAES technology and these advancements form the basis for this study.

Project Description

In this proposed engineering study, ES&P along with its team members New York Power Authority (NYPA) and the Electric Power Research Institute (EPRI) plan to analyze and evaluate technological alternatives using CAES on a scale significantly smaller that elsewhere. The work of the proposed study will be to examine the potential to economically apply an advanced CAES technology in situations where the size of the plant does not support the use of an underground air storage system. By freeing CAES from geological constraints, small and medium sized systems can be optimally sited near load centers to increase peak shaving capabilities and reduce transmission congestion and losses.

The three main deliverables from the study are:

- Identifying several sites and their unit sizes which will be used to determine preferred New York State plant locations.
- Develop the preferred thermodynamic cycle designs that best suit each site and the expected plants operational cost metric.
- Results of the cycle design alternatives identified, analyzed and evaluated, along with a public benefit

Benefits

Cost and public benefit of small and medium size CAES systems, this will include:

- Shifting off-peak energy, particularly renewable energy from wind, solar and hydro power to peak periods when it is more valuable.
- Providing superior load following and regulation ancillary services as compared to typical gas turbines.
- Reduce transmission capacity requirements by storing power near load centers and discharging power during peak time periods.
- Reducing emissions of greenhouse gases and other pollutants by increasing capacity factors of renewable generation resources and allowing base generators to run to their most efficient load design points.
- Firming renewable generation resources capacity for better system operations.

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Research Project Update

EPTD Smart Grid Program Small Compressed Air Energy Storage Design and Feasibility Study (21087)

Energy Storage and Power LLC

NYSERDA Contact Information

Program

R&D Transmission & Delivery

Contract Details

Start Date:

Project Status
158

Contract Number:

21087

Project Results

Funding

Funding	Total Anticipated
NYSERDA:	$250,000.00
Total:	$250,000.00

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Research Project Summary

Assessment of Microgrid Powered by Renewables (21086)

National Grid Companies

Background

Some communities in rural portions of New York State have been experiencing lengthy power outages several times per year. This engineering study focuses on the Wethersfield-Orangeville area (National Grid service territory) which has experienced power outages lasting as long as thirteen hours per event, at least three times per year. The Customer Average Interruption Duration Index (CAIDI), which is the average duration of each power outage experienced by retail electricity customers in New York State, is less than two hours. While the study focuses on Wethersfield-Orangeville communities, which include about 1000 electricity consumers, the problem is shared by numerous rural communities in New York State.

These power outages are due, in part, to the lack of a backup power source that can serve the electric power needs of the community when the primary source of power is disrupted. Many remote communities are situated in locations without a backup transmission or sub-transmission connection to the bulk power system and where construction costs of such a connection are prohibitive due to the distance or a physical barrier, such as a mountain range or river. The Wethersfield-Orangeville community is served by a single 34.5 kilovolt power line (Line 209). Another reason for lengthy outages is the time it takes for field crews to travel to this remote location and patrol the entire length (24

Project Description

An engineering study by National Grid and EPRI to mitigate the problem by operating the Wethersfield-Orangeville area as a micro-grid following loss of supply to the area. The micro-grid will utilize existing customer-owned renewable generation (wind-powered generation and biomass-powered generation) and new energy storage facilities and associated controls to supply power to as many customers as possible in the Wethersfield-Orangeville area following the loss of the National Grid supply line or other key element of the power delivery system for this area.

Benefits

During abnormal conditions (e.g., loss of the 34.5kV supply line to this area), National Grid will study operation of the area as a micro-grid, with distributed energy resources serving as many customers as possible as an independent electrical island from the bulk power system. This will reduce the customer outage duration from up to 13 hours per event down to a matter of minutes.

The engineering study shall also investigate deployment of new facilities that will assist field crews in locating faults on the 24 mile supply line. These new fault location facilities are expected to reduce total fault investigation time by 50% or more.

Contractor

National Grid Companies
Attn: Tami Evans
Syracuse, NY 13202

Principle Investigator

Michael Cooper

Technologies

Project Type:

Research Study

Project Focus:

Site-specific Feasibility

Technology Types:

Electric Power Delivery
Distribution

NYSERDA Contact Information

John Love
JFL@nyserda.org

Program

R&D - Energy Mkts & Pwr Del

Contract Details

Start Date:

Project Status
Active

Contract Number:

21086

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Research Project Summary

Assessment of Microgrid Powered by Renewables (21086)

National Grid Companies

Funding

Funding	Total Anticipated
National Grid:	$43,844.00
EPRI:	$45,000.00
NYSERDA:	$0.00
Total:	$88,844.00

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RPU – (21085 – Advanced Distribution, Protection Automation and Control)

BACKGROUND:

Contractor believes that a comprehensive, cost effective, and sustainable upgrade program for its aging distribution protection and control schemes is critical to maintain high levels of reliability and performance for customers. In particular, intelligent communicating protection and control systems are required for safe and reliable operation of the power distribution network with high penetration of renewable distributed energy resources (DER) and/or with micro-grid distribution systems. Existing National Grid substation protection and control infrastructure is mostly electromechanical and is not compatible with Smart Grid initiatives in National Grid or New York State programs.

DESCRIPTION:

The project will define a unified utility-wide standard architecture, design, and specification for advanced distribution protective relaying, automation, and control (PAC) functions based on IEC 61850 interoperable communications operating over optical Ethernet station bus and process bus networks. The work includes development of a long range roadmap where architecture and design specifications will align.

The work includes review of existing distribution protection and automation design methodologies to incorporate elements of existing practices, organizations, and prior operating experience as appropriate in specifying the new design. This project will gather design and specification elements from parallel National Grid and industry transmission PAC projects appropriate for use in distribution substations. The PAC design will be embodied in an efficiently-deployed format for economical and sustainable replacement, including factory assembled drop-in control buildings where feasible. Interactions with equipment vendors through a formal Request for Information (RFI) process, evaluation of results, and development of the business case will create the foundation for a demonstration project in late 2011.

BENEFITS:

- The new Protection Automation Control (PAC) design is a fundamental component in any plan to deploy distributed renewable or other energy generation resources at any penetration level above a few percent of system or feeder load.
- Design focuses on safe protection and control in the face of energy storage components such as battery systems on distribution feeders or in distribution substations.
- Design will provide for safe substation system behavior in the face of operating islands and microgrids.
- Design supports the deployment of renewable energy resources on distribution systems at high levels of penetration that are not feasible with most of today's installations.
- As utilities implement distribution equipment capacity reductions in consideration of local generation, the condition monitoring and adaptive protection capabilities of the new PAC system will reduce potential operating problems and equipment failures.
- A successful study and deployment, well publicized by the project investigators through technical papers and industry forums, will provide design equity for other utilities in New York and the region, as well as attracting constructive industry attention and project visits.

Research Project Summary

Aggregated residential demand respsonse using smart meters (21084)

Consert Inc.

Contractor

Consert Inc.
4700 Falls of Neuse Road
Raleigh, NC 27609

Principle Investigator

Charlie Mathys

Technologies

Project Type:

Product Demonstration

Technology Types:

Electric Power Delivery
Distribution

NYSERDA Contact Information

Anthony Abate
AWA@nyserda.org

Program

R&D - T & D (no longer in use)

Contract Details

Start Date:

Project Status
Active

Contract Number:

21084

Background

The ability to curtail large groups (aka aggregations) of residential customer loads (i.e. air conditioning and electric hot water heaters) can be useful to NYS utilities to relieve strain and maintain reliability of the distribution system during a small number of hours a year that might otherwise require expensive infrastructure upgrades. Similarly, aggregated residential load control can provide wholesale demand response to better balance supply and demand on the grid. Smart electricity meters on homes may be used to enable the utility to directly control large residential loads in the homes of customers who are willing to have these occasionally curtailed.

Project Description

Consert Inc., in conjunction with Central Hudson Gas and Electric Corporation (CHGE), will conduct a demonstration project involving 200 residences equipped with Consert's Virtual Peak Plant system, including smart meters and smart home equipment, to show how residential central AC and electric water heating load can be controlled for demand response. CHGE believes it may be able to delay or avoid capital investments to increase capacity of circuits that have experienced growth in peak loads through real-time load management and curtailment enabled by smart meters. Consert will investigate if and how this demand response may additionally be offer to the NYSIO demand response programs.

Consert's residential system includes a Zigbee home area network (HAN) and direct load control (DLC) devices for major energy consuming devices like water heaters and pumps, programmable communicating thermostats and a user web-portal with load automation functions and whole-home consumption feedback. Consert's DLC devices include a measurement chip for measurement and verification of energy being used and curtailed by the equipment it is attached to. Consert's portal allows residents to create dynamic profiles that automatically control thermostat and DLC device usage according to their preferences.

Benefits

The benefits of this demonstration project include characterization and quantification of the amount for load curtailment that can be achieved with direct utility control of programmable communicating thermostats and residential AC in NYS. Similarly, data will be gathered on the curtailment potential from electric hot water heaters. The utility will have a resource that will enable them to avoid or postpone expensive infrastructure expenses. Finally residential customers will have smart home equipment that will enable visibility to energy use via a web portal and automation of set points and schedules of HVAC and water heating via the portal. This project will also quantify any energy savings residents realize using this smart home equipment.

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Research Project Summary

Aggregated residential demand respsonse using smart meters (21084)

Consert Inc.

Funding

Funding	Total Anticipated
Consert:	$167,405.00
NYSERDA:	$0.00
Total:	$167,405.00

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Research Project Summary

EPTD Smart Grid Program: A Demonstration Project for Increased Reliability and Efficiency in NYS Using Combined Phasor Measurement Units (PMU), Dynamic Line Rating and Optimized Equipment Management Technologies (21083)

New York Power Authority

Background

The electric power system in the State of New York has for quite some time been exposed to delivery patterns for which the T&D was not designed. This is basically a result of adding many non-utility owned generators and consequent needs for economic transfers across wide areas instead of only wide area reliability transfers for which the T&D was designed. In addition, firm point-to-point bilateral energy contracts superimposed on top of coordinated least-cost generation dispatch by the system operators has created hard-to-track parallel flows within and between once loosely coupled control areas. Most recently, the trend to deploying unconventional intermittent resources and connecting them to the electric power grid is likely to even further change the T&D power flow patterns once well understood by the system operators. The overall complexity is likely to increase to the point of being hard to manage using today's industry practices. The complexity is further increased by much faster and larger fluctuations of power injections from their forecasted schedules than with conventional generation resulting in hard-to-predict variations in system operating conditions, as these new resources create qualitatively different transmission interface (flowgate) and line flow patterns. Furthermore, the system complexity is increased by the installation and utilization of modern generation and T&D control devices, which aim in substantially improving the power system performance, however,

Project Description

This project is a demonstration of a systematic framework for utilizing some of the most recent advances in sensing, communications, and computing for better utilization of the existing and future electric energy assets in the State of New York. In particular, this project builds on the already on-going integration of PMUs and today's SCADA, and the overall effort toward better Wide Area Situational Awareness (WASA). It will deploy Dynamic Line Rating (DLR) units for estimating actual thermal limits of key transmission lines. The PMU, DLR and SCADA data will be integrated into an Enhanced State Estimator (ESE) that forms the basis of WASA. The output of WASA will be used by an Adaptation Module for computing the optimal adjustments of settings on controllable T&D equipment, power plants and responsive demand. Off-line simulations and analysis will be carried out to show potential benefits from having better data, as well as from using the data to optimize system-wide control settings as conditions vary. Particular emphasis will be on optimal voltage dispatch and the state estimator for providing accurate data for such dispatch.

Contractor

New York Power Authority
1 Barney Road
Clifton Park, NY 12065 5839

Principle Investigator

Bruce Fardenash

Technologies

Project Type:

Product Demonstration

NYSERDA Contact Information

Michael Razanousky
MPR@nyserda.org

Program

R&D Transmission & Delivery

Contract Details

Start Date:

Project Status
Active

Contract Number:

21083

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Research Project Summary

EPTD Smart Grid Program: A Demonstration Project for Increased Reliability and Efficiency in NYS Using Combined Phasor Measurement Units (PMU), Dynamic Line Rating and Optimized Equipment Management Technologies (21083)

New York Power Authority

Benefits

Benefits from optimizing system-wide resources

- loss reduction by more than 50%, through O&M cost reduction during normal operation by 2-5%, and,
- potential for cost savings due to reliability reserve reduction by 10-20% resulting from optimizing the (N-1-1) reliability requirements. This translates in $500 million/year savings during normal operation, and
- estimated savings from 10-20% efficiency for managing reliability of $5 billion/year.

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Research Project Summary

Distribution Smart Grid (21082)

Central Hudson Gas and Electric Corporat

Background

The majority of supervisory control and data acquisition(SCADA), outage management, billing systems and engineering models in use today were developed independently. Like the different departments that use them, these systems were designed with their own specific purpose in mind, often with little regard for interoperability. This results in fragmented data that is often underutilized, rarely validated and difficult to integrate and maintain. The same is true for the engineering models that different departments build using this data. Past efforts to integrate these types of systems together to improve information use across different departments and engineering functions typically ended up costing more than expected, and while improving performance in some areas often generated new problems and work requirements in others. It is reasonable to assume that using this type of integration for smart grid analysis and information management will produce similar results.

Electric Distribution Design (EDD), a US based software company, has been working with US utilities, academic institutions and government labs for over 20 years to develop model-based solutions to complex integrated analysis, information management and control problems. EDD has recently begun combining its distributed engineering workstation (DEW) model-based analysis applications into a comprehensive set of analysis, information management and control solutions that are integrated

Project Description

Central Hudson proposes to leverage EDD's research to demonstrate the use of this comprehensive model-based distribution management and automation system. This software can be used to build models that contain millions of components that perform analysis at very high speeds to support real-time controls and operations. The proposed work will combine recent utility, Department of Energy (DOE) and Department of Defense (DOD) sponsored research to standardize, evaluate and implement a model-based distribution management and automation systems that can aid Central Hudson and other New York utilities.

Benefits

Benefits will include:

- Improvements in distribution system reliability, efficiency, capacity and security as the smart grid is implemented over time.
- Provide an open architecture that can adapt to technological and priority changes.
- Perform integrated system analysis for planning, design, operations management and controls
- Reduce the number and complexity of distributed control and monitoring devices needed to implement smart grid.
- Improve smart grid device selection, placement and capital investment planning.
- Simplified control of voltage regulators, capacitors and distributed resources.
- Automated fault location, isolation and restoration.
- Facilitate increased use of distributed energy resources.
- Improvements in system wide monitoring, analysis and visualization.

Contractor

Central Hudson Gas and Electric Corporat
284 South Ave
Poughkeepsie, NY 12601 4838

Principle Investigator

Pete Harpolis

Technologies

Project Type:

Product Demonstration

Technology Types:

Electric Power Delivery
Distribution

NYSERDA Contact Information

John Love
JFL@nyserda.org

Program

R&D - T & D (no longer in use)

Contract Details

Start Date:

Project Status
Active

Contract Number:

21082

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Research Project Summary

Distribution Smart Grid (21082)

Central Hudson Gas and Electric Corporat

Project Results

Project in Contracting Phase.

Funding

Funding	Total Anticipated
CHG&E:	$3,037,200.00
NYSERDA:	$0.00
Total:	$3,037,200.00

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Research Project Summary

IN NEGOTIATION - Residential Demand-side Smart Grid Research; hot water heater demand response aggregation, heat pump hot water heaters and energy feedback (21081)

Delaware County Electric Cooperative, In

Background

Electric utilities are considering a variety of Smart Grid measures including advanced metering, distribution automation, demand response and smart homes and appliances for cost effectiveness and their ability to maintain reliable and satisfactory service to customers. Though advanced metering is not currently being pursued by NYS's investor owned utilities there are lessons to be learned from both deployment of smart metering and smart grid demand-side measures that do not require AMI.

The Delaware County Electric Cooperative (DCEC) is a retail non-profit distribution and generation electric utility serving 5,200 member-owners throughout Delaware, Schoharie, Otsego and Chenango Counties. The cooperative has been progressive in its use of technology having implemented advanced meter reading, SCADA, integrated outage management software and direct load control (DLC) of electric hot water heaters.

DCEC is a participant in a National Rural Electric Cooperative Association (NRECA) Smart Grid Demonstration Project funded in part by a DOE smart grid investment grant. As part of that work, DCEC will install an advanced metering infrastructure (AMI) system. Installation of this metering system in NYS presents a unique opportunity to gather interval data needed to research several demand-side techniques that are of interest to NYS, as well as provide analysis of an AIM installation in NYS including cost/benefit, customer acceptance, and cyber security.

Project Description

This project will support DCEC to:

1) Install and demonstrate a hot water heater direct load control system in 800 homes and its integration and use for system load management and wholesale demand response.
2) Conduct a pilot study of heat pump electric hot water heaters in 40 homes to test their efficiency, performance and impact on peak load in comparison to the conventional water heaters in DCEC's direct load control system and traditional uncontrolled electric water heaters.
3) Conduct a full pilot study of the effectiveness of in-home energy displays, expanding the sample size from 50 to approximately 250 and adding a treatment of indirect mailed home energy report for comparison to a similarly sized sample.
4) Plan, implement and analyze smart grid measure as they relate to providing integration of interval metering and data management, interoperability, cyber security and metrics and benefits reporting.

Benefits

- DOE ARRA funding for a NYS cooperative utility smart grid investments supervised and studied by the NRECA as the principle investigator. Access to lessons learned from the larger national smart grid project.
- Demonstration of a verifiable residential aggregation of hot water heaters for utility load relief and wholesale demand response. Detailed baseline profile data of electric water heater use in single family homes.
- Demonstration of the effectiveness, energy efficiency and load impacts from heat pump hot water heaters in typical NYS single family residence applications.
- Demonstration of the relative effectiveness in encouraging conservation of in-home energy displays compared to a mailed home energy report and a control group.
- NYS specific reports on smart grid measure cost effectiveness, planning framework for smart grid cyber security and interoperability.

Contractor

Delaware County Electric Cooperative, In
39 Elm St # 471
Delhi, NY 13753 1273

Principle Investigator

Greg Starheim

Technologies

Project Type:

Product Demonstration

Technology Types:

Electric Power Delivery
Distribution

NYSERDA Contact Information

Anthony Abate
AWA@nyserda.org

Program

R&D - Buildings Research

Contract Details

Start Date:

Project Status
Active

Contract Number:

21081

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Research Project Summary

IN NEGOTIATION - Residential Demand-side Smart Grid Research; hot water heater demand response aggregation, heat pump hot water heaters and energy feedback (21081)

Delaware County Electric Cooperative, In

Funding

Funding	Total Anticipated
DCEC:	$869,633.00
NYSERDA:	$0.00
Total:	$869,633.00

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NYSERDA New York State Energy Research and Development Authority

Project Title: Prevention of Occurrence of Major Catastrophic Events: Demonstration for Con Edison System

Contractor:	V&R Energy Systems Research, Inc. (V&R)
NYSERDA Agreement #:	15468
Project Manager:	Michael Raznousky (518-862-1090 ext: 3245; mpr@nyserda.org)
Funding Solicitation:	PON 1208 (Electric Power Transmission and Distribution Program)
Funding Category:	Engineering Study
NYSERDA Funding:	$300,000
External Cost Share:	$950,000
Total Project Cost:	$1,250,000
Project Award Date:	4/7/09

Project Summary: NERC Disturbance Reports indicate that about 70% of major disturbances involve protective relays or special protection schemes. In the event of a major system blackout or cascading outage, protection systems and control actions should prevent its spread, effective islanding should minimize its impacts, and effective black start functionality should enable system restoration. ConEd and V&R are currently involved in two projects involving the assessment of cascading outages. Building on these, this project will incorporate analyses of cascading outages due to transient stability issues, allow the analysis of cascading outages in real time and in on-line environments. The objective is to provide ConEd operators with a comprehensive software solution that improves their situational awareness of cascading outages, minimizes their impacts, and prevents major catastrophic events. The project will be implemented within ConEd's advances visualization system, and will help visualize initiating events, their spread and severity, control preventative actions, and increase preparedness to address the next contingency.

Project Benefits:

- First time this technology will be evaluated in NYS.
- Improves reliability of ConEd grid.
- Increases the situational awareness of ConEd operators, allows them to quickly assess cascading outages and their impact, and identify the control actions necessary to prevent/reduce the impacts.
- Improves ConEd's visualization system and incorporates the results of cascading outages analyses.
- Addresses NERC planning standards by assessing potential cascading outages and having the capability to mitigate them.
- Addresses cascading outages causing transient instability, a major limit in the NYS System.
- Reduces enormous costs associated with blackouts.

Contractor: V&R Energy Systems Research, Inc.
11824 Darlington Avenue, Suite 101
Los Angeles, CA 90049
Phone: (310) 979-5966
Contact: Marianne Vaiman, Executive Vice President
marvaiman@VREnergy.com

Contract Status: Contract under negotiation

Relevant Links:
Current NYSERDA Solicitation: http://www.nyserda.org/Funding/1208summary.pdf

NYSERDA New York State Energy Research and Development Authority

Project Title: New York State Phasor Measurement Network

Contractor:	New York Power Authority (NYPA)
NYSERDA Agreement #:	15467
Project Manager:	Michael Raznousky (518-862-1090 ext: 3245; mpr@nyserda.org)
Funding Solicitation:	PON 1208 (Electric Power Transmission and Distribution Program)
Funding Category:	Demonstration Project
NYSERDA Funding:	$400,000
External Cost Share:	$400,000
Total Project Cost:	$800,000
Project Award Date:	4/7/09

Project Summary: The New York Power Authority, through its own initiative, had nine phasor measurement units (PMUs) installed on its 345 and 765 kV transmission system. Data from these was critical in partially reconstructing the events leading to and during the Northeast Power System Blackout on August 14, 2003. Considering their merits, the Department of Energy (DOE) and North America Reliability Council (NERC) have started the Eastern Interconnection Phasor Project (EIPP; recently re-named the North American Synchro Phasor Initiative (NASPI)). The intent of NASPI is to establish a phasor data network to allow transmission owners to upload their PMU data into Phasor Data Concentrators (PDCs), which can then broadcast a collection of such data in real time to power grid operators. The ultimate goal is to use the phasor data in real time to enhance the reliability of the power grid. To date, close to 100 PMUs have been installed in the US Eastern Interconnection (EI). To accomplish the goals of NASPI, the EI needs 'at least 400 to 500 PMUs spread throughout its region. Originally contract through the New York State Independent System Operator (NYISO), the New York Power Authority (NYPA) has since taken the project lead.

The objectives of this demonstration are to: 1. install five PMUs, purchased from NYS manufactures, at critical locations in the NY power system where power flow and exchange on key transmission lines can be monitored; 2. develop the 'New York Phasor Network', which will be set up so that new PMUs can be readily accommodated (like plug-and-play) under this framework; 3. using the phasor data, develop application software to enhance the reliability of the NY power system operation. Software will address three tasks: phasor state estimator and data communication development; real-time PMU data operating software and data archival; and application development on the real-time operating software.

Project Benefits:

- Reduces the probability of large-scale black-out such as the Northeast Blackout on August 14, 2003, increasing security and avoiding disaster costs.
- Allows real-time power dispatch to be more accurate, thus resulting in a lower cost solution.
- Provides monitoring of transmission systems.
- Provides training opportunities for the younger workforce.
- Transfers new communication network technology to NYISO, NYPA, and other transmission owners involved in this work, which is useful in applications such as system protection and control.
- Supports smart grid.
- Builds infrastructure for additional PMU's installations.

Contractor: New York Power Authority (NYPA)
123 Main St.
Mail Stop 10 – H
White Plains, NY 10601-3170
Bruce Fardanesh
Phone: (914) 681-6200

Contract Status: Contract under negotiation**Relevant Links:**
Current NYSERDA Solicitation: http://www.nyserda.org/Funding/1208summary.pdf

NYSERDA New York State Energy Research and Development Authority

Project Title: Transmission Grid Operation Risk Assessment using Advanced Sensor Technologies

Contractor:	Electric Power Research Institute (EPRI)
NYSERDA Agreement #:	15466
Project Manager:	Gregory A. Pedrick (518-862-1090 ext: 3378; gap@nyserda.org)
Funding Solicitation:	PON 1208 (Electric Power Transmission and Distribution Program)
Funding Category:	Engineering Study
NYSERDA Funding:	$199,400
External Cost Share:	$150,000
Total Project Cost:	$349,400
Project Award Date:	4/7/09

Project Summary: The health of electric system components impacts the overall reliability of the power delivery system. Currently, system operators perform online contingency analysis to examine whether the system will experience thermal or voltage violations if one component fails. However, the contingency analysis function does not account for the failure probability of each component. EPRI has developed the Probability Risk Assessment (PRA) method which links the probability of an undesirable event with the impact that the event would have into a single attribute for each contingency- the probabilistic risk index. EPRI has conducted a risk-based reliability assessment for the entire NYS electric power system with collaboration among Consolidated Edison, (ConEd), Long Island Power Authority (LIPA), and New York Power Authority (NYPA). The objective of that project was to build consensus of the reliability level of the NY region in order to better understand the reliability interactions among NY utilities, and promote regional co-operation. ConEd, LIPA and NYPA have now agreed with the usefulness and validity of the PRA methodology.

The accuracy of PRA depends on accurate outage probability information. The technical challenges are how to predict component failure rate and, then, how to integrate the predicted component failure rate information into system-wide reliability assessment. Data obtained from advanced sensors may be applied to estimate the component failure probability. EPRI has collaborated with numerous NY regulated utilities or power authorities to develop and demonstrate sensor technologies. The objective of this engineering study is to develop and demonstrate a concept that uses real-time sensing data and history to predict probability factors that consistently recognize the relative importance of potential outages. Based on a measured data stream from advanced sensors, and combined with EPRI's PRA, a new application will be developed. Concept development will be followed by a demonstration using simulation data.

Project Benefits:

- Improvement of the reliability of the electric power grid in NY
- Reduce costs of outages for customer and NYS. The most recent NYISO data for 2006 identifies a total annual cost attributed to congestion of approximately $120 Million. A 10% positive contribution from this Project to the congestion relief in NY would result in $12 million savings each year.

Contractor: Electric Power Research Institute (EPRI)
3420 Hillview Avenue
Palo Alto, CA 94304
Phone: (650) 855-2244
Contact: Pei Zhang, Program Manager
peizhang@EPRI.com

Contract Status: Contract under negotiation

Relevant Links:
Current NYSERDA Solicitation: http://www.nyserda.org/Funding/1208summary.pdf

NYSERDA New York State Energy Research and Development Authority

Project Title: Engineering Assessment of T&D Losses

Contractor:	Electric Power Research Institute (EPRI)
NYSERDA Agreement #:	15464
Project Manager:	Michael Raznousky (518-862-1090 ext: 3245; mpr@nyserda.org)
Funding Solicitation:	PON 1208 (Electric Power Transmission and Distribution Program)
Funding Category:	Engineering Study
NYSERDA Funding:	$187,500
External Cost Share:	$62,562
Total Project Cost:	$250,062
Project Award Date:	4/7/09

Project Summary:. The New York State Public Service Commission (NYPSC) has identified within the energy efficiency portfolios standard a potential source of savings from the reduction of losses in the transmission and distribution system. As such, it has ordered that 1. the utilities identify and propose measures to reduce electric system losses, 2. the Commission work with NYISO and transmission owners regarding loss reduction potential associated with optimizing power flows, and 3. the utilities evaluate and submit recommendations for changing or creating reactive power rates. The objective of this engineering study is to work with utilities to develop a consistent process for evaluating how the utilities calculate electric system losses using applicable industry standards such as ANSI, IEEE, and EPRI. In addition, the effect of reactive power tariffs on voltage and electric losses will be studied.

Project Benefits;

- Develops consistent ways for utilities to calculate losses and implement loss reduction techniques; standardizes loss evaluation throughout NY State.
- Develops a "Best Practices" framework for NY utilities T&D loss evaluation.
- Coordinates results with the PSC loss analysis, and reduces the effort required by the PSC for review.
- Provides a platform that can be used throughout the industry to plan, design, and operate transmission and distribution systems in a more efficient and cost effective manner.
- Helps establish bench-marking, and measurement and verification protocols of existing and future electric system losses so loss reductions can be properly documented and accounted for.
- Reduces impacts of future energy and peak demand requirements, thereby postponing and possibly eliminating capital projects.
- Contributes to a long-range transmission plan that can result in lower overall losses by reducing thru-flow and circular flows on lower voltage transmission lines caused by limitations on the bulk power transmission system.

Contractor: Electric Power Research Institute (EPRI)
801 Saratoga Rd.
Burnt Hills, NY 12027
Phone: (518) 374-4699 x14
Contact: Tom Short, Senior Project Manager
tshort@EPRI.com

Project Status: Active. Project kick-off meeting held on 3/20/2008.

Relevant Links:
Current NYSERDA Solicitation: http://www.nyserda.org/Funding/1208summary.pdf
DOE Energy Storage: http://www.eere.energy.gov/de/cs_energy_storage.html

NYSERDA New York State Energy Research and Development Authority

Project Title: Commercial and Regulatory Models for Non-Utility Transmission Infrastructure

Contractor:	SMRT Line, LLC
NYSERDA Agreement #:	11060
Project Manager:	John F. Love (518-862-1090 ext: 3317; mpr@nyserda.org)
Funding Solicitation:	PON 1208 (Electric Power Transmission and Distribution Program)
Funding Category:	Research Study
NYSERDA Funding:	$200,000
External Cost Share:	$230,000
Total Project Cost:	$430,000
Project Award Date:	11/7/08

Project Summary: Downstate New York is in need of new sources of power due to steady load growth, regional transmission constraints, and few options for new generation. A detailed mapping of the wind resources for NYS clearly shows significant offshore potential. Interconnecting offshore wind resources to the constrained distribution network in the NYC metropolitan region represents a substantive challenge. SMRT Line, LLC is evaluating the opportunity to develop, build and operate a privately-financed, non-utility transmission and wind-farm collector system which will not only alleviate constraints within the national transmission corridor, but also facilitate the delivery of utility-scale quantities of offshore wind into the states of New Jersey and New York. In order to move this project forward in the manner which respects each jurisdiction, cooperates with each administration, and yields the lowest cost to the ratepayers of each state, SMRT Line is preparing to begin a comprehensive study of the commercial and regulatory models for non-utility transmission line development. First, they will study commercial factors impacting the development of nonutility transmission assets, particularly with respect to Downstate New York. Second, they will study the regulatory constraints facing the development of new non-utility transmission assets in Downstate New York. Finally, based on findings from the first two studies, SMRT Line will develop a framework of considerations and set of recommendations for developing new non-utility transmission infrastructure in Downstate New York. This project will evaluate the potential for interconnecting offshore wind resource to both the NYISO and PJM regional markets.

Project Benefits:

- Study will provide tangible recommendations and create a practical framework for investment in new infrastructure, which will effectively upgrade the electric power delivery system to meet growing demand and promote open access to new generation sources, such as offshore wind.
- Overall project is consistent with the objectives of the Renewable Portfolio Standard
- Close coordination with FERC is proposed to address national transmission congestion issues.
- Novel approach to siting offshore wind into far deeper waters near the end of the continental shelf. This location reduces the view shed impacts.

Contractor: SMRT Line, LLC
36-42 Newark Street, Suite 402
Hoboken, NJ 07030
Phone: (201) 850-1715
Contact: Clint Plummer, Vice President
cplummer@dwwind.com

Contract Status: Contract negotiations underway.

Relevant Links:
Current NYSERDA Solicitation: http://www.nyserda.org/Funding/1208summary.pdf

Project Title: Local Distribution Power Factor Correction

Contractor:	Power Factor Correction, LLC
NYSERDA Agreement #:	11059
Project Manager:	Michael Raznousky (518-862-1090 ext: 3245; mpr@nyserda.org)
Funding Solicitation:	PON 1208 (Electric Power Transmission and Distribution Program)
Funding Category:	Research Study
NYSERDA Funding:	$200,000
External Cost Share:	$40,950
Total Project Cost:	$240,950
Project Award Date:	11/7/08

Project Summary: As distributed generation (DG) technologies proliferate and deliver a higher percentage of the network's power, there are potential problems on the horizon for the network. With the inevitable arrival of widespread net metering in New York State, alternative energy solutions, many of which are inverter based, will become more cost effective. While there is a net positive effect from these systems because of their high overall energy efficiency, there is concern that a large number of DG units installed under the current installation criteria will eventually affect network stability. This issue must be addressed for installation locations as well as for the utility grid in its entirety.
The first-of-a-kind in NYS, this project fully evaluates the impacts of end-use technologies on the power quality of the distribution network. The objectives of the project include:

- Improve the power factor in the neighborhood served by a failed transformer and 4 commercial facilities;
- Determine the degree to which power factor correction can reduce utility load in a residential area and commercial buildings;
- Learn the logistics necessary to implement widespread power factor correction;
- Determine the manpower and monetary costs involved in implementing widespread power factor correction;
- Build the foundation necessary to implement widespread power factor correction; and
- Collect and store before and after waveforms from all of the corrected addresses for analysis to determine the nature of power quality problems.

Project Benefits:

- Power factor correction can improve the efficiency of the entire utility transmission network and reduce the need for additional large scale generating plants.
- Reduced power losses on the utility transmission network and within customer premises
- Reduced wear and tear on transmission system and customer premise equipment.
- Improved service through fewer system failures (i.e. failed transformers and cables).
- Reduced losses on the transmission network will result in a greater capacity for real power
- (KW) distribution, allowing the delivery of more power with the existing network without adding additional transmission capacity.
- Reduce greenhouse gas emissions of the New York City and Westchester area through lower power consumption.
- Results of this study will be useful as a supplement to the ongoing PSC Order requiring the utilities to quantify T&D losses.
- Correcting power factor at the local level will likely yield significant energy savings.
- Many commercial technologies are available to improve local power factor and reduce system harmonics.

NYSERDA New York State Energy Research and Development Authority

Contractor: Power Factor Correction, LLC
PO Box 548
64 Drake Avenue
New Rochelle, NY 10805
Phone: (914) 235-1585
Contact: Richard Ellenbogen, President
richard@garb-o-liner.com

Contract Status: Active

Relevant Links:
Current NYSERDA Solicitation: http://www.nyserda.org/Funding/1208summary.pdf

NYSERDA New York State Energy Research and Development Authority

Project Title: Utilization of Microgrids for Reliability Improvement and System Reinforcement

11058

Contractor: Central Hudson Gas & Electric

Project Manager: Michael Raznousky (518-862-1090 ext: 3245; mpr@nyserda.org)
Funding Solicitation: PON 1208 (Electric Power Transmission and Distribution Program)
Funding Category: Demonstration Project

Project Award Date: 11/7/08

Project Summary: Properly planned and operated Distributed Generation/Microgrids can yield a wide variety of benefits. CHG&E has experienced difficulty in maintaining high year round reliability in a remote distribution circuit supplying electric energy to the Town of Denning. Weather related outages and rough terrain contribute to difficult overall system performance. This project will create a distribution microgrid in the Town of Denning, NY utilizing a diesel engine powered generator as an alternate energy supply. The microgrid will take the form of a distribution load center along with a parelleling generator source. The load center will be automatically isolate from the grid during a distribution curcuit disturbance and operate independently of the remainder of Central Hudson's electrical system. The real-time control of the microgrid will be preprogrammed into generator control systems so that the output of the generator will automatically adjust to match that of the load, and perform its own voltage and frequency regulation.

Project Benefits:

- Improved customer reliability in a seasonally constrained distribution circuit.
- Significant economic savings from deferred transmission and distribution improvement costs to service the area.
- Will provide useful information for the NYSDPS as it considers a re-issuance of the DG pilot program. This pilot program, which was initiated back in 1993, required all of the regulated utilities to solicit bids for alternatives to traditional "wires and poles" upgrades.
- Improved local power reliability may facilitate economic development.
- Local utility is sponsoring the project and fully committed to improving system reliability in a predominately rural area.
- Program may establish a precedent relating to utility ownership of distributed generation resources.

Contractor: Central Hudson Gas & Electric
284 South Avenue
Poughkeepsie, NY 12601
Phone: (845) 486-5542
Contact: Steven Vincent, Engineer
svincent@cenhud.com

Contract Status: Active

Relevant Links:
Current NYSERDA Solicitation: http://www.nyserda.org/Funding/1208summary.pdf

Research Project Summary

The Public Ownership of Energy Storage Systems in New York State (STD-11057)

6-Nines Power LLC

Background

Private investors cannot capture the full complement of benefits associated with energy storage technologies including, improved grid reliability, end user benefits, and facilitation of renewable energy resources. Therefore, another investment strategy must be developed. 6-Nines proposes that public ownership of energy storage may be essential to the wide-scale adoption of energy storage.

Project Description

The objective of this project is to establish the merits of energy storage as a publicly owned asset. The arbitrage value resulting from daily on-peak and off-peak energy commodity pricing disparities is insufficient to warrant private investment. A detailed financing methodology will be established that quantifies the non-captured benefits and identifies a strategy for issuing municipal bonds.

Benefits

The issue concerning utility ownership of energy storage assets has yet to be fully resolved with the regulators. This project provides an alternative approach - public ownership - that may provide the most practical financing option.

- This study will quantify the public benefits associated with energy storage and results will be shared with all key NYS stakeholders.

Contractor

6-Nines Power LLC
344 Whitney Street
Northboro, MA 01532

Principle Investigator

Larry Kruger

Technologies

Project Type:

Research Study

Project Focus:

Technology Feasibility/Assessment

Technology Types:

Energy Storage
Other

NYSERDA Contact Information

Michael Razanousky
MPR@nyserda.org

Program

R&D - Energy Mkts & Pwr Del

Contract Details

Start Date:
06/12/2009

Project Status
Active

Contract Number:

STD-11057

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Research Project Summary

The Public Ownership of Energy Storage Systems in New York State (STD-11057)

6-Nines Power LLC

Project Results

Three findings resulted from the reference cases and are the basis for the policy recommendations included in the gap analysis. The first finding resulted from the upstate reference case which uncovered the opportunity to integrate renewable energy generation into the upstate New York transmission grid by utilizing the municipal energy storage system (ESS). The second finding resulted from the downstate reference case for the use of the ESS resource by Con Edison as a distribution grid resource. Finally, the third finding is the need for an innovative hybrid energy storage/cogeneration system to level the load profile of a commercial site in Manhattan. This type of hybrid energy storage system may provide the solution for energy storage projects in New York City, in the near term similar to the hybrid automobile, as ESS technology advances.

The purpose of the gap analysis is to test the software analysis tool in correlating the impact of policy changes to the economic returns of energy storage projects in New York State. The results of the gap analysis, along with the policy recommendations and two proposed follow-on energy storage projects are included in the technology transfer plan to encourage action from these findings by engaging the various stakeholders.

Funding

Funding	Total Anticipated
NYSERDA:	$76,500.00
Total:	$76,500.00

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NYSERDA New York State Energy Research and Development Authority

Project Title: Engineering Study for the Feasibility of a NYPA Compressed Air Energy Storage (CAES) Plant

Contractor:	6-Nines Power LLC
NYSERDA Agreement #:	11056
Project Manager:	Michael Raznousky (518-862-1090 ext: 3245; mpr@nyserda.org)
Funding Solicitation:	PON 1208 (Electric Power Transmission and Distribution Program)
Funding Category:	Engineering Study
NYSERDA Funding:	$94,500
External Cost Share:	$90,900
Total Project Cost:	$185,400
Project Award Date:	11/7/08

Project Summary: Large scale energy storage has provided the promise of significant advancement in the delivery of more cost effective, cleaner and reliable electric power. Compressed Air Energy Storage (CAES) is one of a few technologies that have been practically deployed in large scale. As additional wind resources are added to the transmission system in NYS, the need for large scale storage throughout the entire grid becomes more pronounced. The objective of this engineering study is to develop a cost estimate and preliminary design of a CAES system with a nominal power output of 20 MW. The Contractor will coordinate with NYPA to evaluate installation/integration of an above ground CAES system at the Poletti Power Plant (owned by NYPA) in Astoria. Compressed air would be stored in above ground tubes during off-peak periods, and subsequently discharged during on-peak periods to produce electric energy. The CAES facility will benefit by utilizing existing infrastructure at the power plant. The Contractor will utilize a design tool developed by EPRI to assist in the design of the facility.

Project Benefits:

- Distributed energy storage can provide load leveling benefits throughout the entire electric T&D system.
- Peak shaving technologies installed in congested areas of the distribution system may significantly lower LBMP for customers.
- Cost reduction/revenue increase.
- This project builds upon a completed NYSERDA CAES study and provides an updated assessment of overall installation costs.

Contractor: 6-Nines Power LLC
344 Whitney St.
Northborough, MA 01532
Phone: (508) 393-9003
Contact: Larry Kruger, Partner
larry@6ninespower.com

Contract Status: Active

Relevant Links:
Current NYSERDA Solicitation: http://www.nyserda.org/Funding/1208summary.pdf

APA #11055
RPU

BACKGROUND

The Adirondack Park within New York State represents a unique opportunity to provide for and implement reliable power supplies to the occupants, while accounting for sensitivity to impacts on the visual quality and generation resource limitations within the park. The park has vast State land tracts, interspersed with relatively small population centers that require reliable and high quality electrical service. Providing the electrical service to these regions cannot be done in the more conventional way of building and constructing high voltage lines with multiple distribution centers. Case studies depicting what is possible to improve electrical reliability and resources for providing energy load without building generation, is required as an educational tool.

DESCRIPTION

The Contractor and associated sub-contractors will engage in an engineering study that will determine opportunities within the Adirondack Park to utilize energy efficiency, load reduction and possible micro generation measures which would lead to improvements in the reliability of the electrical grid within the Park. The study will also develop a matrix which depicts the necessary inter-agency State approvals required to perform maintenance and construction on utility lines within the Park.

OBJECTIVE

This project proposes to develop case studies reflecting energy saving solutions and improving electrical grid opportunities for communities within the Adirondack Park. The engineering study will develop a comprehensive strategy for meeting electric load growth demand in the park, while exploring all applicable measures that would help satisfy reliability. The study will also assess the impact of deploying self-sufficient microgrids within certain towns/villages that are currently difficult to serve by the local utility. A matrix for achieving the necessary state agency approvals to construct and maintain electrical utility lines will also be developed.

BENEFITS

1. The Adirondack Park is an intrinsically valuable NYS resource and the project genuinely reflects a true public benefit objective.
2. Development of a mutually agreeable guide for transmission and distribution line siting/installation/maintenance will avoid subsequent disputes among key stakeholders and expedite future project implementation.
3. Utilization of microgrids within the Park may improve overall system reliability and reduce costs for consumers.

SCHEDULE

Pending complete contract execution by December 2009, project expected to complete by March 2011.

NYSERDA New York State Energy Research and Development Authority

Project Title: Dispatchable Green Energy Integration with Intermittent Wind Resources

Contractor:	Carr Street Station LP (owned/operated by Brookfield Renewable Power)
NYSERDA Agreement #:	11054
Project Manager:	John F. Love (518-862-1090 ext: 3317; mpr@nyserda.org)
Funding Solicitation:	PON 1208 (Electric Power Transmission and Distribution Program)
Funding Category:	Demonstration Project
NYSERDA Funding:	$1,000,000
External Cost Share:	$1,975,725
Total Project Cost:	$2,975,725
Project Award Date:	11/7/08

Project Summary: Brookfield Renewable Power Inc. will demonstrate the conversion of an existing, conventional, electrical generation facility, the Carr Street Station, which uses natural gas (the primary fuel source) and No. 2 fuel oil, into a "Dispatchable Green Energy" facility which uses B100 biodiesel. Carr Street Station currently employs 12 full-time personnel, and is located in East Syracuse, New York. The facility commenced operation as a natural gas fueled combined cycle power plant in 1993 and includes 2 GE LM6000 combustion turbines integrated with a single Mitsubishi steam turbine. The power plant is outfitted with dual fuel capability and includes a 375,000 gallon on-site storage tank for distillate oil # 2. The facility produced a total of 20,617 MWh of electric energy in 2006, representing a capacity factor of 2.2%. This capacity factor is low and translates into 8 days of total operation for the entire year.

B100 will be the primary fuel source when there is low generation from New York State's other renewable resources, natural gas curtailments or disruptions, and/or poor air quality. The facility will serve to mitigate the fluctuations of other renewable technologies such as commercial wind resources. It will provide additional market opportunities for widespread use of biodiesel and encourage the necessary agricultural infrastructure to meet demand for renewable fuels. It will demonstrate that biodiesel can be used as an alternative to petroleum based fuel oil for peaking power plants throughout New York State. Preliminary testing at the facility on biodiesel demonstrated good results. Brookfield is currently investigating the possibility of utilizing pennycress, a "weed" commonly found in Canada with a short, winter growing season as a the biodiesel fuel source.

Project Benefits:

- The power plant will be operated to mitigate the fluctuations of commercial wind resources.
- Power plant applications provide additional market opportunity for widespread use of biodiesel.
- Demonstrate that biodiesel can be used as an alternative to petroleum based fuel oil for peaking power plants throughout NYS.
- This would be the first demonstration in NYS of a fully dispatchable renewable resource.
- The successful use of pennycress as the crop source has broad economic potential for NYS.

Contractor: Carr Street Station LP, owned and operated by Brookfield Renewable Power Inc.
64 Carr Street, East Syracuse, NY 13057
Phone: (315) 432-4443
Contact: Antonio Zarrella, General Manager
Antonio.zarrella@BrookfieldPower.com

Contract Status: Contract negotiations underway.

Relevant Links:
Current NYSERDA Solicitation: http://www.nyserda.org/Funding/1208summary.pdf

NYSERDA New York State Energy Research and Development Authority

Project Title: Surface-Textured High Voltage Insulators with Superhydrophobicity

Contractor:	Clarkson University
NYSERDA Agreement #:	11053
Project Manager:	Greg Pedrick (518-862-1090 ext: 3378; xxx@nyserda.org)
Funding Solicitation:	PON 1208 (Electric Power Transmission and Distribution Program)
Funding Category:	Product Development
NYSERDA Funding:	$200,000
External Cost Share:	$200,401
Total Project Cost:	$400,401
Project Award Date:	11/7/08

Project Summary: The high-voltage insulator is one of the fundamental components of the electric power delivery system. These insulators are typically designed with a self-cleaning hydrophobic surface where dirt and debris are removed by rolling water droplets. Under harsh conditions, such as repeated exposure to salt fog and particulate contamination, the hydrophobicity of these insulators diminish over time. As this occurs, the insulators gradually develop a conductive film which causes an increase in current leakage and arcing. The insulator surface degrades via pyrolysis and the formation of irreversible conductive paths lead to final component breakdown. The objective of this proposal is to develop superhydrophobic high voltage insulators that will considerably suppress leakage current, increase service life and reduce maintenance costs. These innovative insulators will enhance the performance and reliability of both transmission and distribution (T & D) networks.

Project Benefits:

- The reduction in leakage current reduces power loss over the T&D network.
- Reductions in leakage current can increase the service life of insulators, improve system reliability and reduce maintenance costs.
- Polymer insulators with the hydrophobic surface treatment are substantially more efficient than conventional porcelain alternatives.
- Clarkson is developing the product with a strong focus on commercialization.
- Clarkson is partnering with a leading insulator manufacturing company (Lapp Insulators, Inc.) located in NYS.

Contractor: Clarkson University
P.O. Box 5630
Potsdam, NY 13699-5630
Phone: (315) 268-6475
Contact: Dr. Gregory C. Slack, Director of Research and Technology Transfer
gslack@clarkson.edu

Project Status: Contract negotiations underway.

Relevant Links:
Current NYSERDA Solicitation: http://www.nyserda.org/Funding/1208summary.pdf

NYSERDA New York State Energy Research and Development Authority

Project Title: Compressed Air Energy Storage (CAES) Demonstration Project

Contractor:	New York State Electric & Gas Corporation (NYSEG)
NYSERDA Agreement #:	11052
Project Manager:	Greg Pedrick (518-862-1090 ext: 3378; gap@nyserda.org)
Funding Solicitation:	PON 1208 (Electric Power Transmission and Distribution Program)
Funding Category:	Demonstration Project
NYSERDA Funding:	$1,000,000
External Cost Share:	$58,998,400
Total Project Cost:	$59,998,400
Project Award Date:	11/7/08

Project Summary: NY electrical utilities are required under the Renewable Portfolio Standard (RPS) Program to obtain a minimum of 25% of their electrical power supply from renewable resources by the year 2013. These resources can be intermittent and therefore challenging in terms of reliability and stability. Another issue is the presence of transmission congestion in the electric grid, which significantly impacts the cost of electricity for all electric grid users. Balancing the loads and generation resources on the grid will be significantly assisted by implementing compressed air energy storage (CAES) systems. This project will build upon NYSEG's current NYSERDA-funded engineering study by constructing a CAES facility in western New York. The plant will be designed to provide a nominal power output of 100MW with a maximum discharge time interval of about 10 hours. Solution-mined salt caverns will be used to store compressed air underground. The plant will be operated to mitigate the intermittent characteristics of local wind resources and reduce peak daily demand.

Project Benefits:

- Large-scale energy storage systems can be effectively operated in conjunction with intermittent wind and solar resources to levelize power output.
- CAES plants have the potential to provide significant voltage and frequency support within the NYISO ancillary services markets.
- Energy storage technologies can reduce congestion on the electric power delivery system and thereby reduce locational-based marginal prices.
- Sufficient underground volume exists in local salt mines which can be utilized to produce significant energy (1,000 MWh) and electric power (100 MW).
- Local salt companies benefit by leasing the rights to an otherwise unused asset.
- CAES is considered one of the lower cost energy storage options.
- First demonstration of CAES technology in NYS.

Contractor: New York State Electric & Gas Corporation (NYSEG)
18 Link Drive
Binghamton, NY 13904
Phone: (607) 762-4201
Contact: Bruce Roloson, Manager of Projects
bdroloson@NYSERDA.com

Project Status: Contract negotiations underway.

Relevant Links:
Current NYSERDA Solicitation: http://www.nyserda.org/Funding/1208summary.pdf
EPRI Website: http://my.epri.com/portal/server.pt?

NYSERDA New York State Energy Research and Development Authority

Project Title: Conceptual Design and Assessment for a Green Urban Network

Contractor:	Electric Power Research Institute Inc.
NYSERDA Agreement #:	11051
Project Manager:	Michael Razanousky (518-862-1090 ext: 3245; mpr@nyserda.org)
Funding Solicitation:	PON 1208 (Electric Power Transmission and Distribution Program)
Funding Category:	Engineering Study
NYSERDA Funding:	$194,280
External Cost Share:	$65,000
Total Project Cost:	$259,280
Project Award Date:	11/7/08

Project Summary: The current grid system was built on the assumption that all electricity would be generated at very large central plants. This system is inefficient because it is difficult to adjust to changing demand patterns. Ideally, an intelligent grid provides integrated benefits for both the utility and the end-use consumer. Seamlessly integrating an array of locally installed power sources alongside traditional central-station power generation, it gives the system greater resilience, enhance security, and improve reliability. This study is in-depth evaluation of secondary network losses and methods for loss reduction. The first of its kind, it will render advancements to analytical tools that could be applied throughout New York to reduce distribution losses, both through better planning and through real time simulations. As part of smart grid progress, simulation and modeling tools must be updated to incorporate its concepts. This project considers the feasibility of using the simulation tool for application on the most complex distribution configuration in the country- Con Edison urban networks. If the tools can be shown to be effective for a complex urban network, the application for radial distribution systems is a logical next step.

Project Benefits:

- Significant energy savings are possible by reducing losses on the distribution system. The development of an accurate simulation tool will help identify areas on the grid with the highest losses.
- Reduced system losses directly translate to GHG emission savings.

Contractor: Electric Power Research Institute Inc.
801 Saratoga Rd
Burnt Hills, NY 12027
Phone: (518) 374-4699
Contact: Tom Short, Senior Project Manager
tshort@EPRI.com

Contract Status: Contract negotiations underway.

Relevant Links:
Current NYSERDA Solicitation: http://www.nyserda.org/Funding/1208summary.pdf

NYSERDA New York State Energy Research and Development Authority

Project Title: Interconnection of a 20 MW Flywheel Regulation Plant to a High Voltage Grid

Contractor:	Beacon Power Corporation
NYSERDA Agreement #:	11007
Project Manager:	John F. Love (518-862-1090 ext: 3317; JFL@nyserda.org)
Funding Solicitation:	PON 1208 (Electric Power Transmission and Distribution Program)
Funding Category:	Demonstration Project
NYSERDA Funding:	$2,000,000
External Cost Share:	$50,000,000
Total Project Cost:	$52,000,000
Project Award Date:	11/7/08

Project Summary: The electric power delivery system must maintain a frequency of 60 Hz to ensure a high level of reliability. Grid operators accomplish this by requiring generators to increase or decrease power output in response to frequency deviations on the grid. Not all generators can reliably operate in such a variable way, and generators that do so suffer a loss in efficiency and incur higher operating costs due to added fuel consumption and increased maintenance. Beacon Power Corporation (Beacon) has developed an energy storage flywheel-based technology to perform fast response frequency regulation. This technology has highly attractive performance attributes and low operating costs. The flywheel, comprised of carbon fiber composite material and installed in underground concrete vaults to mitigate noise and safety risk, can raise or lower frequency as needed in real-time. This project will demonstrate flywheel technology and validate overall system performance. A 20 MW system will be deployed in Stephentown, New York to provide ancillary services in the NYISO market. This venture represents the consolidation of two projects under two PON's (1208 and 1200), coordinated between two program groups (Power Transmission and Distribution Research and Power Systems Product Development). NYSERDA's total contribution is $2,000,000 towards an estimated $52,000,000 initiative involving a $43,000,000 grant/loan from the DOE. $500,000 of NYSERDA's funding is in connection with the T&D PON 1208.

Project Benefits:

- The flywheel is fast acting and provides rapid frequency control. Its speed allows grid frequency to be maintained closer to ideal frequency limits established by NERC. This makes NYS grid more resistant to blackouts caused by frequency instability. It also provides extremely fast response for Disturbance Control Standard, which helps restore grid frequency upon the loss of a large generator.
- Flywheels do not consume fossil fuel. They have zero direct emissions of CO2, SO2, NOX and mercury. This technology is projected to decrease CO2 and other air emissions by up to 85 percent compared to fossil units.
- Flywheel systems place the regulation service closer to the loads being regulated. Transmission and transformation losses associated with injecting regulating power on the transmission system would therefore be reduced. This would free up transmission line capacity, resulting in reduced or avoided congestion.

- Flywheel systems can be installed in a distributed fashion throughout the grid. Flywheel-based regulation plants embedded in the distribution system can reduce grid losses compared to more centrally located resources requiring greater allocation of transmission capacity.
- The technology has the potential to mitigate the fluctuations of wind resources and therefore promote additional renewable energy options.

Contractor: Beacon Power Corporation
65 Middlesex Rd.
Tyngsboro, MA 01878
Phone: (978) 661-2832
Contact: Matt Lazarewicz, VP & CTO
Lazarewicz@beaconpower.com

Project Status: Contract signed, plant construction underway. This project is part of a larger initiative with the Department of Energy (DOE).

Relevant Links:
Current NYSERDA Solicitation: http://www.nyserda.org/Funding/1208summary.pdf

Research Project Summary

Energy Storage System Demonstration at Niagara Falls State Park (STD11008)

Premium Power Corporation

Contractor

Premium Power Corporation

87 Concord Street
North Reading, MA
01864

Principal Investigator

Bill O'Donnell

Director of Programs and Produ

Technologies

Project Type:

Product Demonstration

NYSERDA Contact Information

Michael Razanousky
MPR@nyserda.ny.gov

Program

R&D - Energy Mkts & Pwr Del

Contract Details

Start Date

05/15/2009

Project Status

Active

Contract Number

STD11008

Last Updated

02/07/2011

Background

Energy storage systems can provide many benefits including renewable time shifting of energy, grid constraint relief and reduced T&D upgrades, emergency backup and uninterruptible power, reduced emissions and noise, ancillary services for grid regulation and stability, improved power quality and reliability. Battery-based energy storage systems are entering the commercial markets for some of these applications. The zinc-bromide battery chemistry has lower capital and operating costs, is environmentally friendly, is mobile, has cycling capability, and has a longer life than other available batteries.

Project Description

Project objective is to install and demonstrate the performance of two 100 kW/150 kWhr Zinc-Flow energy storage systems, one at the New York State Department of Parks Niagara Falls State Park Maintenance Facility The project includes an interconnection with a 30 kW PV system and would demonstrate time shifting of solar energy in addition to demand reduction, peak shaving, load shifting, and backup power.

Benefits

Time shift solar power,demand reduction, peak shaving, and backup power service. Reduce grid congestion, defer distribution upgrades and reduce emissions.

Funding

Funding	Total Anticipated
NYSERDA	$230,388.00
Premium Power Corporation	$362,274.00
Total:	$592,662.00

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NYSERDA New York State Energy Research and Development Authority

Project Title: Development of a Practical Reliability Based Design Methodology for Electric Power Distribution Systems

Contractor:	Clarkson University
NYSERDA Agreement #:	10677
Project Manager:	Greg Pedrick (518-862-1090 ext: 3378; gap@nyserda.org)
Funding Solicitation:	PON 1102 (Electric Power Transmission and Distribution Program)
Funding Category:	Engineering Study
NYSERDA Funding:	$190,079
External Cost Share:	$68,130
Total Project Cost:	$258,209
Project Award Date:	1/16/08

Project Summary: The electric power distribution system is facing multiple changes - new reliability requirements and incentives, more stringent customer needs that require a higher level of power quality, and advanced technologies that capitalize on new design options. All of these changes mean that the distribution system designer is facing a much wider range of considerations when approaching upgrades to the grid. The project involves the development of a software tool that assesses the impact of a variety of system design options on the reliability and power quality of radial distribution circuits. The primary focus of the project will be to establish uniform design techniques that reduce the frequency of power outages - with a particular emphasis on momentary outages.

Project Benefits:

- Significant improvement of system performance would result from the development of a design tool kit to reduce momentary outages (less than 5 minutes in duration) would significantly improve system performance.
- Provides improved reliability performance for the same levels of capital investment and O&M costs.

Contractor: Clarkson University
8 Clarkson Avenue
Potsdam, New York, 13699
Phone: (315) 268-4035
Contact: Dr. Thomas Ortmeyer
ortmeyer@clarkson.edu

Project Status: Active

Relevant Links:
Current NYSERDA Solicitation: http://www.nyserda.org/Funding/1208summary.pdf

NYSERDA New York State Energy Research and Development Authority

Project Title: Use of Demand Response to Support NYS Transmission and Distribution Circuits

Contractor:	Innoventive Power LLC
NYSERDA Agreement #:	10676
Project Manager:	Michael Razanousky (518-862-1090 ext: 3245; mpr@nyserda.org)
Funding Solicitation:	PON 1102 (Electric Power Transmission and Distribution Program)
Funding Category:	Demonstration Project
NYSERDA Funding:	$999,665
External Cost Share:	$1,452,269
Total Project Cost:	$2,451,934
Project Award Date:	1/16/08

Project Summary: Innoventive Power is partnering with the Consolidated Edison Company (Con Ed) and Verizon to develop and demonstrate methods to improve the ability of customer demand response (DR) resources to enhance the reliability of local electric distribution networks. This project will focus on the aggregation of DR resources by a demand response service provider (Innoventive Power) to participate in the special case resource (SCR) and ancillary service (AS) markets administered by the NYISO. The goal of this project is to develop enhanced interoperability techniques, including the development of protocols and software to improve the performance and effectiveness of coordinating numerous DR resources to reduce peak demand by approximately 20 MW in Con Ed service territory. Sixteen field sites will be coordinated as part of this project. Verizon has committed to install a selective catalytic reduction (SCR) system on three of their diesel generators to determine the reliability impacts associated with Nitrogen Oxide after-treatment equipment. ConEd's office building (4 Irving Place, NY, NY) will be actively controlled to shed load during peak demand periods.

Project Benefits:

- GE has extensive experience in modeling the NYS transmission system, and has completed an engineering study of the impact of intermittent wind energy resources on the grid.
- The study will assess the performance impacts throughout the entire Eastern Interconnection. This broad focus is critical since NY typically imports a substantial portion of its energy from outside the NYISO.
- Aggressive schedule (6 months) and clearly defined statement of work.
- The results from this project may be used to influence federal mandates and regulations specifically relating to a national CO2 cap and trade program and FERC jurisdiction over National Transmission Corridors.
- Development of clear coordination protocols, which will enable the participants to provide expanded services and demonstrate an effective, relatively low-cost method of enhancing the reliability of high-load-density distribution networks, while also producing the following benefits to the transmission and distribution systems, in which the DR resources are embedded:
  - Improve load control;
  - Increase the efficiency of the electricity delivery system;
  - Increase the reliability of the electricity delivery system;
  - Increase capacity and better integrate renewable resources, utilizing energy storage and other techniques; and
  - Lower the carbon footprint, and other pollutants that would otherwise be emitted, of the Con Edison delivery system, by better integrating dispersed backup generators and renewable energy facilities.

NYSERDA New York State Energy Research and Development Authority

Contractor: Innoventive Power LLC
5610 Wisconsin Ave.
Chevy Chase, MD 20815
Phone: (301) 718-2400
Contact: Dr. Howard Feibus
hfeibus@innoventivepower.com

Contract Status: Contract negotiations underway. This project is part of a larger initiative with the Department of Energy (DOE).

Relevant Links:
Current NYSERDA Solicitation: http://www.nyserda.org/Funding/1208summary.pdf
Innoventive Website: http://www.innoventivepower.com/index.cfm
DOE Announcement: http://www.oe.energy.gov/news_room_and_events/1120.htm

NYSERDA New York State Energy Research and Development Authority

Project Title: Microgrids: Benefits of Small Scale Electricity Networks in NYS

Contractor:	Columbia University in the City of New York
NYSERDA Agreement #:	10675
Project Manager:	Mark Torpey (518-862-1090 ext: 3316; mrt@nyserda.org)
Funding Solicitation:	PON 1102 (Electric Power Transmission and Distribution Program)
Funding Category:	Research Study
NYSERDA Funding:	$134,958
External Cost Share:	$44,986
Total Project Cost:	$179,944
Project Award Date:	1/16/08

Project Summary: Microgrids link distributed power generation systems into a network serving the energy needs of customers located in close proximity. Depending on the level of energy production and the load profile of the individual customers (commercial, residential), microgrids can operate independently of the local utility-managed power grid. Several cities around the world currently deploy microgrids and have demonstrated benefits in terms of reduced energy costs, increased energy efficiency, improved environmental performance, and enhanced energy security. In the United States, there is considerable interest in microgrid development - however - there is minimal practical experience to inform national/state policy makers on how best to proceed. Although the theoretical advantages of microgrids are well understood, additional work must be completed to quantify the benefits and identify tangible technology applications.

The project will be executed in three phases. Phase 1 will document the different types of microgrids that have been deployed around the world. The second phase of the project will analyze different ownership structures for advanced microgrids, including the "private wires" model employed in England and the potential for utility ownership/partnership. In Phase 3, a comprehensive roadmap will be created to guide policy makers and regulators in how best to promote microgrid implementation.

Public Benefits:

- The results from this project will support NYISO operations and reliability planning activities.
- The broad focus of this study, which will assess the performance impacts throughout the entire Eastern Interconnection, is critical since NY typically imports a substantial portion of its energy from outside the NYISO.
- The results from this project may be influential on federal mandates and regulations specifically relating to a national CO2 cap and trade program and FERC jurisdiction over National Transmission Corridors.

Contractor: Columbia University in the City of New York
351 Engineering Terrace
1210 Amsterdam Ave. MC2205
New York, New York, 10027
Phone: (xxx) xxx-xxxx
Contact: Dr. Steve Hammer
sh2185@columbia.edu

Project Status: Active

Relevant Links:
Current NYSERDA Solicitation: http://www.nyserda.org/Funding/1208summary.pdf

Research Project Summary

Project Hydra Demonstration (ST10674)

Consolidated Edison Company

Background

Con Edison maintains a distribution system to provide electric energy within its service territory. The majority of its distribution system is comprised of network architecture and is designed such that individual load islands of 100 to 300 MW are served from an area substation at voltages of 13 kV, 27kV, and 33kV. One of the challenges associated with this segregated distribution network concept is that there are no electrical connections between the isolated customer networks. Consequently, during an emergency where much of—or the entirety of—an area substation may be out of service, the affected distribution network supplied by that station has no means of using available excess load serving capacity from adjacent area substations.

Project Description

Con Ed proposes to demonstrate a superconducting cable system that has the technical capability for installation as a substation-to-substation tie within severely congested distribution networks. However, since the insertion of a superconductor cable in a power network has the potential to substantially increase the 13 kV fault current beyond the interrupting capability of existing substation equipment, Con Ed proposes to design/test/demonstrate an innovative high temperature superconducting (HTS) technology that cost effectively incorporates the required fault current limiting attributes within the cable itself. Con Ed is partnering with the Department of Homeland Security (DHS) and American Superconductor (AMSC) to develop an integrated fault current limiting cable technology. The innovative technology will combine the functionality of a superconducting cable and a fault current limiter into a single, fully-integrated product.

Benefits

- First of its kind technology demonstration.
- The technology could be applied at other locations in the State (Albany, Buffalo).
- Facilitate greater market penetration of synchronous DG resources.
- Quantitative benefits - reductions in ongoing costs for both transmission and distribution circuit breaker uprate programs and facilitation of asset utilization improvements and reduced equipment and real estate needs for new substations and future substation life extension/replacements.
- Qualitative benefits - accommodation of load growth and associated capacity increases, education of "through fault" stresses on all power system equipment and potentially resulting reductions in costs associated with equipment failures that could result from these stresses.
- Con Ed considers itself in an excellent position to advance this project, where its efforts in ongoing fault current limiter development efforts are highly leveraged through proactive engagement, cooperation and co-funding with many utility industry, superconductivity community and government stakeholders

Contractor

Consolidated Edison Company
4 Irving Place
New York, NY 10003

Principle Investigator

Zachary Wolff

Technologies

Project Type:

Product Demonstration

Technology Types:

Electric Power Delivery
Distribution

NYSERDA Contact Information

John Love
JFL@nyserda.org

Program

R&D Transmission & Delivery

Contract Details

Start Date:

Project Status
Active

Contract Number:

ST10674

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Research Project Summary

Project Hydra Demonstration (ST10674)

Consolidated Edison Company

Funding

Funding	Total Anticipated
Consolidated Edison Company of NY, Inc.:	$7,400,000.00
American Superconductor:	$27,700,000.00
U.S. Department of Homeland Security:	$24,900,000.00
NYSERDA:	$0.00
Total:	$60,000,000.00

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NYSERDA New York State Energy Research and Development Authority

Project Title: Installing Flexible Alternating Current Transmission System (FACTS) Devices on the Electric Transmission Grid

Contractor:	JWD Consulting, Inc.
NYSERDA Agreement #:	10477
Project Manager:	Mark Torpey (518-862-1090 ext: 3316; mrt@nyserda.org)
Funding Solicitation:	PON 1102 (Electric Power Transmission and Distribution Program)
Funding Category:	Research Study
NYSERDA Funding:	$182,500
External Cost Share:	$168,500
Total Project Cost:	$351,000
Project Award Date:	9/7/07

Project Summary: Transmission investment in New York is far below historical expenditures. Existing market-based revenue sources available to merchant transmission developers have not attracted new capital investment. Opposition on environmental and aesthetic grounds has hindered the construction of new overhead transmission lines. This project explores ways to maximally utilize existing transmission network capacity and rights-of-way. It includes three principal components:

1) Complete a screening study of the New York bulk power system to identify applications of FACTS devices that can resolve known system problems hindering the efficient use of the electric power system. Candidate substations will be identified where FACTS devices might be effectively installed.

2) Assess the current regulatory framework applicable to the installation of FACTS devices, and determine how these devices can be optimized in New York's deregulated electric market.

3) Identify the sources of capital required to invest in the installation of FACTS devices on the New York bulk power system.

Project Benefits:

- Increased private investment to improve transmission system performance.
- FACTS devices provide reactive power without impacting the environment as compared with large power plants that currently support 99% of the state's needs.
- Improved reliability and power quality by strategically locating distributed FACTS devices throughout the network.

Contractor: JWD Consulting, Inc.
200 East 94th Street
New York, New York 10128
Phone: (917) 282-0658
Contact: John Dizard - Principal
dizard@gmail.com

Project Status: Active.

Relevant Links:
Current NYSERDA Solicitation: http://www.nyserda.org/Funding/1208summary.pdf

NYSERDA New York State Energy Research and Development Authority

Project Title: Voltage Dispatch and Pricing in Support of Efficient Real Power Dispatch

Contractor:	New Electricity Transmission Software Solutions (NETSS) Inc.
NYSERDA Agreement #:	10476
Project Manager:	Mike Razanousky (518-862-1090 ext: 3245; mpr@nyserda.org)
Funding Solicitation:	PON 1102 (Electric Power Transmission and Distribution Program)
Funding Category:	Research Study
NYSERDA Funding:	$150,000
External Cost Share:	$0
Total Project Cost:	$150,000
Project Award Date:	9/7/07

Project Summary: Significant real-power dispatch inefficiencies result from overly conservative grid operation that does not consider concurrent on-line voltage/reactive power dispatch. Reactive power needs to be supplied at different locations on the grid to ensure that voltage levels remain within certain limits. A combination of generators, capacitors, and Flexible Alternating-Current Transmission (FACTS) devices currently provide voltage regulation services as dispatched by the NYISO. This Research Study will develop the requirements of a software tool that the NYISO will incorporate into its energy management control center to optimize coordinated real and reactive power dispatch.

Project Benefits:

- Provide grid operators with a simple graphical representation of control options.
- Improved stability assessment of the NYS electric power delivery system.□
- Improving system efficiency and reliability.
- Utilize existing network of PMU's to improve regional awareness of grid operations.
- Operate overall system more economically by increasing inter-regional transmission capacity while adhering to requisite safety margins.
- Provide planning studies, including loadability studies for buses and zones, determination of maximum power transfers, identification of weaknesses and location of new equipment using Lagrange multipliers, and evaluation of the effectiveness of new equipment.

Contractor: New Electricity Transmission Software Solutions (NETSS) Inc.
22 Weir Rd
Sudbury, Ma, 01776
Phone: (978) 443-8973
Contact: Dr. Marija Ilic
milic@netssinc.com

Project Status: Active.

Relevant Links:
Current NYSERDA Solicitation: http://www.nyserda.org/Funding/1208summary.pdf

NYSERDA New York State Energy Research and Development Authority

Project Title: Smart Grid Pilot Project

Contractor:	Orange and Rockland Utilities, Inc. (O&R)
NYSERDA Agreement #:	10474
Project Manager:	Anthony Abate (518-862-1090 ext: 3522; awa@nyserda.org)
Funding Solicitation:	PON 1102 (Electric Power Transmission and Distribution Program)
Funding Category:	Demonstration Project
NYSERDA Funding:	$1,000,000
External Cost Share:	$3,422,000
Total Project Cost:	$4,422,000
Project Award Date:	9/7/07

Project Summary: O&R will execute a "smart grid" pilot project in the southeastern portion of the company's New York service territory in Rockland County. The project will be implemented in the vicinity of its existing West Nyack Substation and its planned Snake Hill Road Substation- both located in West Nyack, New York. The project will improve the performance of two 13.2 kV electric circuits (one from each substation) that will be upgraded to an "intelligent" distribution system through the use of advanced sensors, field devices, on-line decision making software, and improved communications. Discussions are underway with O&R to incorporate advanced meters as part of the "smart grid" pilot demonstration. Approximately 3,000 customers (both commercial and residential) are served by the distribution network.

Project Benefits:

- Improve distribution infrastructure to accommodate greater market penetration of DG/CHP.
- Substantially improve SAIFI, CAIDI, and SAIDI performance metrics.
- Improved customer outage detection.
- "Real world" demonstration of advanced systems.
- Improved system reliability, planning, monitoring, energy information collection.
- Improved employee safety.

Contractor: Orange and Rockland Utilities, Inc.
390 West Route 50
Spring Valley, New York, 10977
Phone: (xxx) xxx-xxxx
Contact: Angelo Regan
regana@oru.com

Project Status: Contract negotiations underway.

Relevant Links:
Current NYSERDA Solicitation: http://www.nyserda.org/Funding/1208summary.pdf

NYSERDA New York State Energy Research and Development Authority

Project Title: Identification and Development of More Effective Approaches for Engaging Distribution Utilities in the Deployment of DG as T&D Resources

Contractor:	Pace Law School Energy Project
NYSERDA Agreement #:	10472
Project Manager:	Mark Torpey (518-862-1090 ext: 3316; mrt@nyserda.org)
Funding Solicitation:	PON 1102 (Electric Power Transmission and Distribution Program)
Funding Category:	Research Study
NYSERDA Funding:	$148,650
External Cost Share:	$54,353
Total Project Cost:	$202,993
Project Award Date:	9/7/07

Project Summary: The Pace Law School Energy Project will evaluate alternative approaches to the deployment of distributed generation (DG) as a means of providing transmission and distribution system support. The study builds upon the recently completed report entitled "Comprehensive Evaluation of the New York DG Pilot Program" (NYSERDA Agreement # 8589). The New York DG Pilot Program (NYSDPS Case #: 00-E-0005) was designed to test whether privately developed DG projects, as elicited through utility-run competitive solicitations, could serve as least cost solutions to identified distribution system needs. A total of twenty-two solicitations/RFPs were issued. No DG projects were selected for funding. The original study completed by Pace recommended that "the NYSPSC and other stakeholders... consider other approaches to eliciting DG proposals that minimize the high transaction costs and perception of bias that hindered the DG Pilot program".

This current study will examine three alternative strategies for incorporating DG as grid support: 1) selectively removing the regulatory restrictions on utility ownership of DG assets; 2) establishing geographically targeted "DG Development Zones"; and 3) administering a modified solicitation that reduces DG development risks.

Project Benefits:

- Expand market penetration of DG resources in NYS, with all the accompanying DG benefits.
- Provide pertinent information for the NYSPSC (Case 03-E-0640) to better evaluate the electric rate disincentives negatively impacting distributed generation.
- The results of the project will identify locations on the grid where DG resources would improve grid performance and reliability.

Contractor: Pace Law School Energy Project
78 North Broadway
White Plains, New York, 10603
Phone: (914) 422-4082
Contact: Christopher Young
cyoung@law.pace.edu

Project Status: Active

Relevant Links:
Current NYSERDA Solicitation: http://www.nyserda.org/Funding/1208summary.pdf
NYSDPS: Opinion No. 01-5; Case 00-E-0005 ("DG Pilot Program")
Pace Law School Energy Project: http://www.paceenergyproject.us/

NYSERDA New York State Energy Research and Development Authority

Project Title: Fast Fault Screening Tool for Real-Time Transient Stability Assessment

Contractor:	Electric Power Research Institute (EPRI)
NYSERDA Agreement #:	10471
Project Manager:	Mark Torpey (518-862-1090 ext: 3316; mrt@nyserda.org)
Funding Solicitation:	PON 1102 (Electric Power Transmission and Distribution Program)
Funding Category:	Technology Demonstration
NYSERDA Funding:	$250,000
External Cost Share:	$250,000
Total Project Cost:	$500,000
Project Award Date:	9/7/07

Project Summary: The project will demonstrate an innovative Fast Fault Screening software application that will quickly and accurately identify and rank the most severe three-phase fault locations on the transmission system. Faults leading to voltage instability and loss of generation will be prioritized according to their respective critical clearing times. The shorter the fault critical clearing time, the higher the priority. EPRI will coordinate with all of the New York State utilities and the NYISO to incorporate the software tool as an integral part of system operations.

Project Benefits:

- Rapid identification of fault locations will enhance system security.
- Accurate fault information will allow utilities to pinpoint failure location and minimize the number of customers w/o service while making the necessary repairs.
- Improve the utilities ability to identify which customers are w/o service
- Multiple electric utilities in support of this project.
- Software is easily integrated with existing utility energy management software.

Contractor: Electric Power Research Institute (EPRI)
3420 Hillview Avenue
Palo Alto, California, 94304
Phone: (650) 855-2486
Contact: Dr. Stephen Lee, Principal Investigator
slee@epri.com

Project Status: Active. Project kick-off meeting held on 5/12/08. Utility host demonstration site(s) has yet to be determined.

Relevant Links:
Current NYSERDA Solicitation: http://www.nyserda.org/Funding/1208summary.pdf
EPRI Website: http://my.epri.com/portal/server.pt?

NYSERDA New York State Energy Research and Development Authority

Project Title: Real-Time Applications of Phasor Measurement Units (PMU) for Visualization, Reactive Power Monitoring and Voltage Stability Protection.

Contractor:	Electric Power Research Institute (EPRI)
NYSERDA Agreement #:	10470
Project Manager:	Mark Torpey (518-862-1090 ext: 3316; mrt@nyserda.org)
Funding Solicitation:	PON 1102 (Electric Power Transmission and Distribution Program)
Funding Category:	Technology Demonstration
NYSERDA Funding:	$744,120
External Cost Share:	$751,182
Total Project Cost:	$1,495,302
Project Award Date:	9/7/07

Project Summary: EPRI will develop and demonstrate a software tool that improves the reliability of the electric power delivery system in NYS. The software application will be deployed at an electric utility host site to 1) improve the ability of network operators to accurately view the status of the grid from a regional perspective; 2) identify critical voltage areas and real-time reactive power requirements; and 3) automate system load shedding to preserve voltage stability and prevent blackouts. A project advisory board comprised of key New York stakeholders will provide technical and policy guidance.

Project Benefits:

- Improved stability assessment of the NYS electric power delivery system.□
- Utilize existing network of PMU's to improve regional awareness of grid operations.
- Determine the optimal location for additional PMU's to improve stability assessment tool.
- Operate overall system more economically by increasing inter-regional transmission capacity while adhering to requisite safety margins.
- EPRI has assembled a strong technical and management team; good collaboration.
- Provide NYS utilities with access to Eastern Interconnection PMU data.

Contractor: Electric Power Research Institute (EPRI)
3420 Hillview Avenue
Palo Alto, California, 94304
Phone: (650) 855-2486
Contact: Dr. Stephen Lee, Principal Investigator
slee@epri.com

Project Status: Active. Project kick-off meeting held on 5/12/08. Utility host demonstration site(s) has yet to be determined.

Relevant Links:
Current NYSERDA Solicitation: http://www.nyserda.org/Funding/1208summary.pdf
EPRI Website: http://my.epri.com/portal/server.pt?
North American SynchroPhasor Initiative: http://www.naspi.org/

NYSERDA New York State Energy Research and Development Authority

Project Title: Transmission Level High Temperature Superconductor Fault Current Limiting Prototypes

Contractor:	SuperPower Inc.
NYSERDA Agreement #:	10469
Project Manager:	Greg Pedrick (518-862-1090 ext: 3378; gap@nyserda.org)
Funding Solicitation:	PON 1102 (Electric Power Transmission and Distribution Program)
Funding Category:	Product Development
NYSERDA Funding:	$500,000
External Cost Share:	$11,035,732
Total Project Cost:	$11,535,732
Project Award Date:	9/7/07

Project Summary: SuperPower will design, build, test, and evaluate a pre-commercial prototype of a superconducting fault current limiter (SCFL) using second generation (2G) high temperature ceramic materials. The SCFL will be tested at a utility substation and operate at a transmission level voltage of 138 kV. The device will be subjected to short circuit conditions in order to confirm its ability to mitigate fault currents within 1 cycle. The SCFL will be designed to protect utility substation equipment from fault currents generated at large-scale power plants.

Project Benefits:

- Substantial market potential for a competitively priced product.
- The SCFL device can significantly improve overall reliability of the grid.
- Technology adoption provides significant reliability benefits for NYS utilities.
- Significant technology transfer opportunity for NYS utilities.
- NYSERDA funds will promote technology transfer and require that NYS utilities participate in the development of a comprehensive test plan.
- Broadens SuperPower's portfolio of product offerings and further complements NYSERDA's ongoing work to develop high temperature superconducting technologies. The project will assist a NYS manufacturer in bringing a new technology early to market.

Contractor: SuperPower Inc.
450 Duane Avenue
Schenectady, New York
Phone: (518) 346-1414
Contact: Chuck Weber, Program Manager
cweber@superpower-inc.com

Project Status: Withdrawn at this time.

Relevant Links:
Current NYSERDA Solicitation: http://www.nyserda.org/Funding/1208summary.pdf
DOE Superconductivity: http://www.oe.energy.gov/hts.htm
Albany Project: http://www.oe.energy.gov/DocumentsandMedia/albany_cable_09_18_07.pdf
SuperPower Website: http://www.superpower-inc.com/

NYSERDA New York State Energy Research and Development Authority

Project Title: NYISO Demand Response Capability Assessment - Alcoa Massena Operations

Contractor:	Alcoa Inc.
NYSERDA Agreement #:	10468
Project Manager:	Mark Torpey (518-862-1090 ext:3316; mrt@nyserda.org)
Funding Solicitation:	PON 1102 (Electric Power Transmission and Distribution Program)
Funding Category:	Engineering Study
NYSERDA Funding:	$165,000
External Cost Share:	$50,000
Total Project Cost:	$215,000
Project Award Date:	9/7/07

Project Summary: Alcoa will investigate the benefits of participating in the NYISO's ancillary services markets to provide for both regulation and spinning reserve. Alcoa operates an aluminum smelting facility that employs electric resistance heaters to control the thermal energy input to the process. An engineering study will evaluate whether these heaters can be effectively controlled - both increasing and decreasing electric energy usage in response to near real-time dispatch signals from the NYISO. On an annual basis, the NYISO purchases approximately 200 MW and 600 MW of regulation and 10-minute spinning reserve services, respectively. The engineering study will determine the costs, payback, and technical risks associated with participating in the NYISO's wholesale market.

Project Benefits:

- Provide additional revenue to offset increasing energy costs.
- Encourage industrial sector participation in the NYISO wholesale markets.
- Industrial load can respond more rapidly than conventional generation in order to improve overall system reliability.
- Increased reliability (the faster and more accurate response of controllable load will improve system reliability performance).
- Reduced costs (the marginal cost for load to provide regulation or spinning reserve is lower than the cost of supplying these services from generation).
- Reduced need for additional generation (supplying regulation and spinning reserve from loads frees up an equal amount of generation to supply energy and meet peak demand).

Contractor: Alcoa Inc.
Park Avenue East
Massena, New York, 13662
Phone: (315) 764-4272
Contact: Michael Caufield, Energy Regulatory Specialist
michael.caufield@alcoa.com

Project Status: Contract negotiations underway.

Relevant Links:
Current NYSERDA Solicitation: http://www.nyserda.org/Funding/1208summary.pdf
NYISO: http://www.nyiso.com/public/products/ancillary_services/regulation_service.jsp

NYSERDA New York State Energy Research and Development Authority

Project Title: Compressed Air Energy Storage (CAES) Engineering Study

Contractor:	New York State Electric and Gas Company (NYSEG)
NYSERDA Agreement #:	10467
Project Manager:	Greg Pedrick (518-862-1090 ext: 3378; gap@nyserda.org)
Funding Solicitation:	PON 1102 (Electric Power Transmission and Distribution Program)
Funding Category:	Engineering Study
NYSERDA Funding:	$200,000
External Cost Share:	$173,923
Total Project Cost:	$373,923
Project Award Date:	9/7/07

Project Summary: The CAES technology allows off-peak electricity to be effectively stored so that it can offset on-peak energy demand. Two existing facilities are in commercial operation today:

1) 290 MW; 4-hour discharge; Huntdorf, Germany. Commissioned - 1978
2) 110 MW; 26-hour discharge; McIntosh, Alabama. Commissioned - 1991

The engineering study will evaluate the use of underground salt caverns to store high pressure air at approximately 1,000 psi. During on-peak periods the compressed air would be discharged, heated and subsequently expanded through a turbo-expander to create electricity. The study will evaluate the CAES technology as a means to mitigate the intermittent characteristics of wind energy and provide regulation services for the NYISO.

Project Benefits;

- Delivery of low cost power during peak periods.
- CAES system can be operated to offset intermittent characteristics of wind energy.
- Significant reduction in peak load, pollution, and congestion
- Preliminary economics are strong, where NYSEG has already acquired cavern rights.
- Inventory of potential NYS geologic site assets, including recent cost and operational recommendations for developers of future CAES plants.
- May facilitate the future demonstration of a multi-million dollar CAES plant in an "optimal" location in New York.

Contractor: New York State Electric and Gas Company (NYSEG)
18 Link Drive, Kirkwood Industrial Park
Binghamton, New York, 13904
Phone: (607) 762-4201
Contact: Bruce Roloson
bdroloson@NYSEG.com

Project Status: Active. Project kick-off meeting held on 3/20/2008.

Relevant Links:
Current NYSERDA Solicitation: http://www.nyserda.org/Funding/1208summary.pdf
DOE Energy Storage: http://www.eere.energy.gov/de/cs_energy_storage.html

NYSERDA New York State Energy Research and Development Authority

Project Title: New York Presbyterian Hospital (NYPH) Ground Fault Protector (CliP) Demonstration

Contractor:	New York Presbyterian Hospital (NYPH)
NYSERDA Agreement #:	10466
Project Manager:	Greg Pedrick (518-862-1090 ext: 3378; gap@nyserda.org)
Funding Solicitation:	PON 1102 (Electric Power Transmission and Distribution Program)
Funding Category:	Technology Demonstration
NYSERDA Funding:	$110,000
External Cost Share:	$110,000
Total Project Cost:	$220,000
Project Award Date:	9/7/07

Project Summary: The NYPH is currently installing a 7.5 MW natural gas-fired combustion turbine partially funded by NYSERDA's distributed generation (DG) and combined heat and power (CHP) program. The Solar turbine will produce both electricity (synchronous parallel configuration) and steam for on-site use. In order to avoid substation equipment damage from potential turbine generator fault currents, Consolidated Edison Company (Con Ed) requires that the DG system be capable of disconnecting from the grid within a 1/4 cycle. A commutating current limiter manufactured by G&W Electric Company will be installed on the customer side of the utility meter to prevent reverse current flow in compliance with utility requirements. A series of field test will be conducted to verify that the ground fault protector satisfies ConEd's specifications.

Project Benefits:

- Significant opportunity for technology replication throughout NYS.
- Work closely with Con Ed to develop a comprehensive experimental test plan.
- Con Ed is eager to evaluate the operational performance of this device.
- This will be the first demonstration of this technology in NYS.
- The technology represents a significant cost reduction compared with substation upgrades and/or inverters for large rotating prime movers (gas turbines, reciprocating engines).
- CCL devices provide rapid response and may eliminate high fault currents within a 1/4 cycle @ 60 Hz.

Contractor: New York Presbyterian Hospital (NYPH)
523 East 70th Street
New York, New York, 10021
Project information is available via the NYPH's external consultant:
Jennifer Kearney, Managing Partner - Energy 360 LLC
Phone: (646) 306-4755
jkearney@energy-360.com

Project Status: Active

Relevant Links:
Current NYSERDA Solicitation: http://www.nyserda.org/Funding/1208summary.pdf
NYSERDA DG/CHP Program: http://www.nyserda.org/Programs/dgchp.asp
G&W Electric Company: http://www.gwelec.com/product_current/clip.cfm

NYSERDA New York State Energy Research and Development Authority

Project Title: Analysis of the Near-Term Impact of Proposed Greenhouse Gas Policies on the NYS Power System

Contractor:	General Electric (GE)
NYSERDA Agreement #:	10465
Project Manager:	Mark Torpey (518-862-1090 ext:3316; mrt@nyserda.org)
Funding Solicitation:	PON 1102 (Electric Power Transmission and Distribution Program)
Funding Category:	Research Study
NYSERDA Funding:	$198,750
External Cost Share:	$67,750
Total Project Cost:	$265,000
Project Award Date:	9/7/07

Project Summary: The electric utility sector in New York produces 25% of the state's greenhouse gas emissions. A number of studies have been completed to assess the impact of state and national carbon cap and trade programs on wholesale electric prices. However, additional analysis is warranted to evaluate the long-term impact of greenhouse gas regulations on the reliability and performance of the electric power delivery system. In a carbon constrained market, highly emitting power plants may need to reduce their capacity factor in response to higher operating costs. The research study will identify a number of scenarios - to be collectively determined by a program advisory board comprised of key NYS stakeholders - that have the potential to impact New York's generation dispatch, transmission congestion, and import power requirements.

Project Benefits:

- Provide the necessary quantification of the impact of proposed policies on transmission congestion in New York, wholesale electricity prices, generation changes both type and operation, emissions changes, changes in power imports/exports into/from New York, generation and transmission adequacy.
- Provide guidance to NYSERDA in understanding the impact of GHG policies on NY state power system, determining relative merits of various GHG policies, outlining cost-effective measures for maintaining generation and transmission reliability in New York State before a GHG policy takes effect.
    - Help New York lead the way in GHG policy implementation
    - Create public awareness on the impact of GHG policies
    - Provide guidance to Federal and state governments on impacts of GHG policies
    - Provide direction to stakeholders in New York on impacts of GHG policies
    - Ensure reliability and access to power is not compromised.
    - Determine locations where new generation/transmission may be needed.
    - Consider the impact of GHG policies on neighboring regions.

Contractor: General Electric
One River Road
Building 2-659
Schenectady, New York,
Phone: (518) 385.2522
Contact: Dr. Sundar Venkataraman
sundar.venkataraman@ge.com

Project Status: Active

Relevant Links:
Current NYSERDA Solicitation: http://www.nyserda.org/Funding/1208summary.pdf
Regional Greenhouse Gas Initiative: http://www.rggi.org/
Warner/Lieberman Climate Bill: http://thomas.loc.gov/cgi-bin/query/z?c110:s2191: