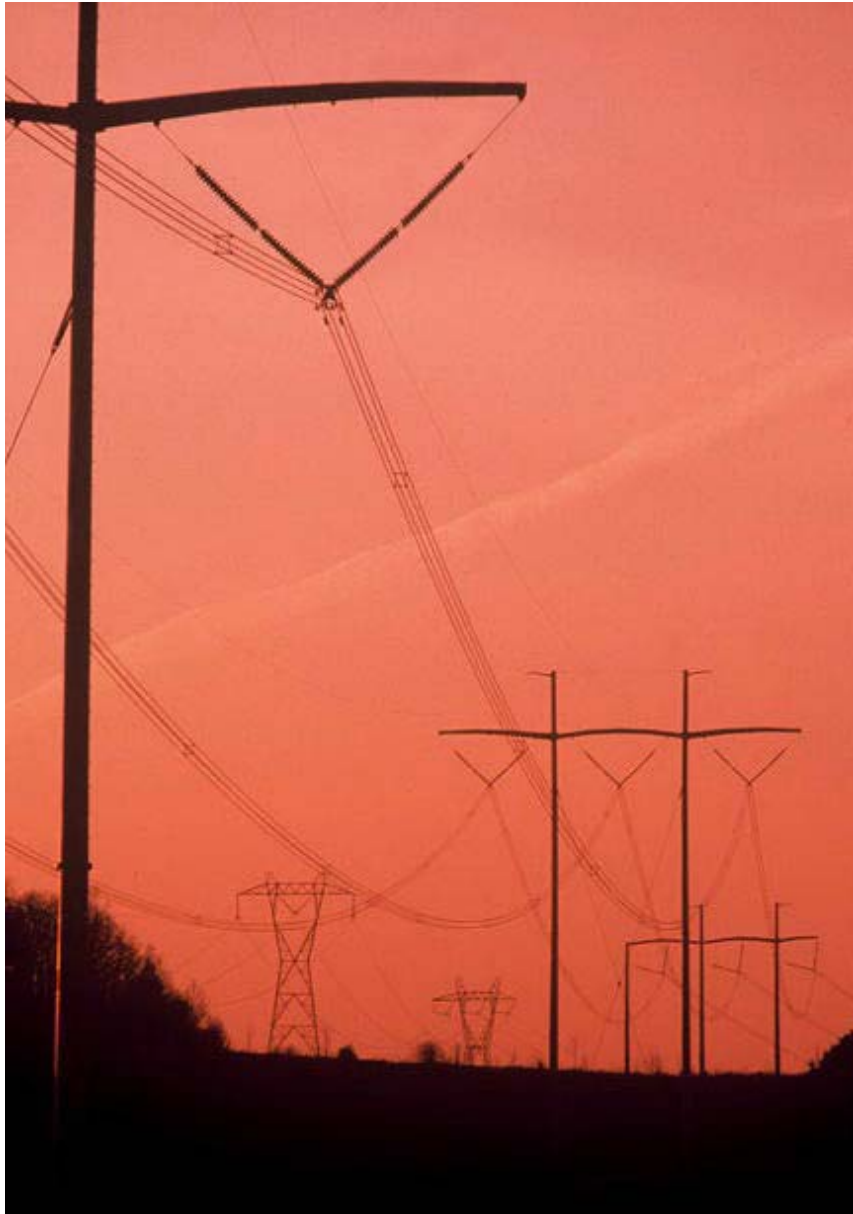


# **New York State Reliability Council**

## **2009-2010 Biennial Report**

**Committed to Promoting and Preserving  
the Reliability of the  
New York State Electric Power System**



**Edic-New Scotland 345 kV Transmission Line**  
(Courtesy George C. Loehr)



# About the Reliability Council

Since 1999, the New York State Reliability Council (NYSRC) has been committed to promoting and preserving the reliability of the New York State electric power system. NYSRC carries out this mission through the development of Reliability Rules and monitoring compliance with these Reliability Rules.

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## Letter from the Chairman

As the New York State Reliability Council (NYSRC) begins its second decade, I would like to examine briefly the mission and background of our work, and show how that history inevitably influences our present and our future.



Our mission is to promote and preserve the reliability of electric service in New York State. To that end, we develop and maintain a comprehensive set of Reliability Rules with which the New York Independent System Operator (NYISO) and all market participants must comply. In parallel, we monitor conformance with these rules. Since our mission is closely associated with, and greatly influences, the operation of the New York Control Area, we work in close conjunction with the NYISO.

Since the NYSRC's formation, one of its primary obligations has been to publish annually an Installed Reserve Margin (IRM) requirement, to be implemented by the NYISO in the operation of New York's capacity market. The IRM value is determined through a series of complex, probabilistic "Loss of Load Expectation" (LOLE) calculations. New York has long been a leader in the development and application of such probabilistic techniques. They have been used to determine the adequacy and reliability of generating and other resources in New York since the 1950s – originally through the informal cooperation of the state's major utilities, then under the auspices of the New York Power Pool, and now through the NYSRC and NYISO. Today's studies are far more complex and sophisticated than those done 50 years ago, but the basic mathematical principles and protocols remain the same. The Laws of Physics have not changed!

As I mentioned earlier, the NYSRC develops and maintains Reliability Rules which are mandatory for all entities doing business in New York State. New York has been in the forefront of the formulation of reliability rules or "criteria" since the 1965 Northeast Blackout. The first comprehensive, all-inclusive rules for a regional reliability council were developed as part of the 1965 Blackout follow-up activities by the "Federal Power Commission System Studies Group, Interconnected System," which included representatives from industry (including New York), government and academia. The resultant document became the model for the detailed planning and operating criteria approved by the Northeast Power Coordinating Council (NPCC) in September 1967. These still exist as NPCC's "Regional Reliability Reference Directory #1:

Design and Operation of the Bulk Power System.” Further, the protocols used in monitoring conformance by both the NYSRC and NYISO are modeled on the procedures developed by NPCC in the 1970s. NYSRC personnel continue to assist in the ongoing maintenance of the NPCC Criteria and North American Electric Reliability Corporation (NERC) Standards, as well as our own Reliability Rules.

The 1965 Northeast Blackout originated outside New York. So did the August 14, 2003 Midwest/Middle Atlantic Blackout. A Working Group of the NYSRC has been cooperating with NYISO and NPCC groups to find ways to protect the New York system from disturbances which begin outside New York. The most recent of these is the NYISO’s Controlled Separation Feasibility Study. NYSRC representatives worked closely with NYISO engineers in defining the requirements of the study, and evaluating vendor proposals. Similarly, NYSRC has provided support for such interregional efforts as the Eastern Interconnection Planning Collaborative (EIPC), and the Inter-area Planning Stakeholder Advisory Committee (IPSAC). Once again, these undertakings are the logical extension of efforts that trace their way back half-a-century. New York was co-participant in a variety of New York-PJM studies going back to the early 1960s. Similar efforts were undertaken in conjunction with New England and Canadian systems. Likewise, New York systems were at the heart of the MAAC-ECAR-NPCC planning and operating studies of the 1970s and ’80s, and special efforts like the post-oil-embargo NERC Transregional Transfer Study of the latter ’70s. Once again, neither the Laws of Physics nor New York’s commitment to state-of-the-art methods and procedures have changed over the past 50 years. Nor are they likely to change during the next 50 years.

Finally, I would like to express my personal thanks to the members of the Executive Committee, subcommittees and task forces, and the various market participants they represent. I also want to express the NYSRC’s appreciation to our consultants and counsel, to the management and staff of the NYISO, and the many other organizations with whom we have worked – in particular, the New York State Department of Public Service, the New York State Energy Research and Development Authority, the New York State Department of Environmental Conservation, and the Northeast Power Coordinating Council.

*George C. Loehr*  
*Chairman, New York State Reliability Council*  
*May 2011*

# New York State Reliability Council's Mission to Promote Electric Power System Reliability

A reliable and dependable supply of electricity is essential to the quality of life of New York State's 19.4 million residents. It is essential to the state's economy. Without it, businesses would not operate productively, hospitals and schools would not be able to provide essential services effectively, and residents would not be able to depend on the amenities of daily life they have come to expect.

The New York State Reliability Council (NYSRC) is dedicated to promoting and enhancing the reliable and efficient operation of the New York bulk electricity system – a system consisting of hundreds of generating units and thousands of miles of high-voltage transmission lines. Development of a reliable supply of electricity that meets New York's growing needs is a foundation of the quality of life and vital for our economy.

Formation of the NYSRC was approved by the Federal Energy Regulatory Commission as part of the

comprehensive restructuring of the competitive wholesale electricity market in New York State. Under the restructuring, the New York Power Pool was replaced by the New York Independent System Operator (NYISO) as the entity with the primary responsibility for the operations of the state's bulk power generation and transmission system. The NYISO also assumed responsibility for administration of the newly established competitive wholesale electricity markets. The NYISO abides by the NYSRC Reliability Rules, as well as reliability standards and criteria established by the North American Electric Reliability Corporation (NERC) and the Northeast Power Coordinating Council (NPCC).

The NYSRC has served as a source of information for state policymakers with respect to the potential impact of state policy on system reliability, and has consistently urged policy makers to carefully balance the strong public interest in a reliable electricity system with other policy objectives.

## **Our Mission**

To facilitate the maintenance and enhancement of the reliability of New York State's electric power system.

## **Our Vision**

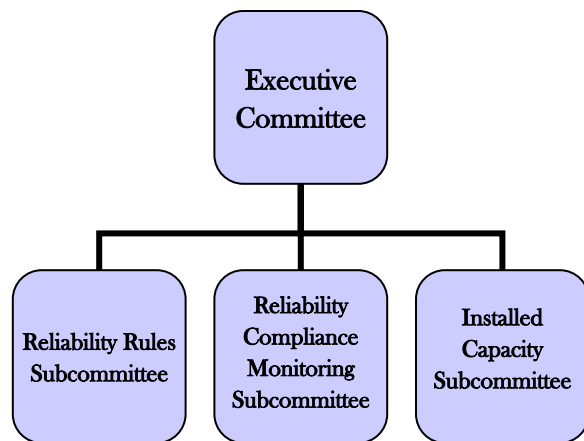
A professional organization managed by a team of experts who are dedicated to achieving excellence in the promoting and preserving of reliable electricity service for the businesses and residents of New York State.

## NYSRC Governance and Primary Roles

The NYSRC is an independent not-for-profit organization governed by a 13-member Executive Committee. Nine members come from key sectors of New York's electric industry: transmission owners (six members), wholesale sellers (one member), industrial and large commercial consumers (one member), and municipal electric systems and cooperatives (one member). The remaining four NYSRC members are independent members with no affiliation with any sector of New York's electric industry. Each member of the NYSRC Executive Committee is required to have substantial knowledge and/or expertise in the reliable operation of bulk power electric systems. The Executive Committee sets high standards for the organization's subcommittees and working groups.

The NYSRC focuses on three primary roles in achieving its mission. First, the NYSRC develops reliability rules that are more stringent or specific than NPCC and NERC standards and criteria. These additional rules are necessary to meet the special requirements of New York's electric power system. Secondly, the NYSRC assesses NYISO and New York market participant compliance with these reliability rules. Finally, the NYSRC is responsible for adopting statewide installed capacity requirements. There

are three subcommittees reporting directly to the NYSRC Executive Committee that support all facets of these roles.



1. The **Reliability Rules Subcommittee** manages the review, development, and modification of NYSRC Reliability Rules to maintain or enhance the reliability of the New York State electric power system.
2. The **Reliability Compliance Monitoring Subcommittee** manages the NYSRC compliance monitoring process, develops procedures for measuring and documenting compliance, and assesses compliance with the NYSRC Reliability Rules.

3. The ***Installed Capacity***

***Subcommittee*** is responsible for the development and analysis of studies related to the NYSRC's adoption of annual statewide installed capacity requirements for the New York State electric power system.

The industry sectors and independent members represented on the NYSRC Executive Committee are also represented on these subcommittees, as are representatives of the NYISO and New York State Department of Public Service (NYSDPS) staffs, and NYSRC consultants. Collectively, subcommittee members provide expertise in the planning and operating aspects of the reliable operation of the New York bulk electricity system.

We encourage you to visit our web site, [www.nysrc.org](http://www.nysrc.org). It includes proposed NYSRC Reliability Rules for which comments are requested, meeting schedules and meeting materials, and other useful information.



## Today's Challenges of Ensuring Safe and Reliable Electricity

A New York State Energy Plan was adopted in late 2009. The Plan establishes a framework of policy objectives and strategic recommendations to be implemented over a long term period within which the state will reliably meet its future energy needs in a cost-effective manner. The NYSRC served as a source of information for development of the Plan. The recommendations in the New York State Energy Plan are being implemented by a series of actions. Those actions that would affect the state's bulk electricity system have been identified and are being monitored by the NYSRC.



**Solar Photovoltaic Installation on Roosevelt Island, New York City**  
*(Courtesy, New York State Energy Research & Development Authority)*

In responding to the State Energy Plan and the incentives provided by New York State to promote renewable energy development, many investors are choosing to build wind generation. With zero emissions and no fuel costs, the addition of significant amounts of wind energy will help achieve environmental goals and help lessen New York State's reliance on fossil fuels to produce electricity. In 2008 there was almost

400 MW of wind-powered generation in New York. It is currently projected that by the end of the 2011, there will be over 1,300 MW of wind generation, with a total of 16 wind-powered generation sites in upstate New York. Wind developers are

currently proposing to install an additional 5,500 MW of wind capacity after 2011.

Because of the intermittent nature of wind, the current projected availability of wind power during the summer peak period (capacity factor) is, on average, 11%. As a direct result of this relatively low capacity factor, the NYSRC projects increases in the statewide installed margin reserve (IRM) requirements to maintain the same level of reliability as

more wind projects become operational.

In addition to wind-powered generation for providing clean renewable energy resources, there are proposals to install several solar projects throughout the state. A 32-megawatt solar power project, presently under construction on Long Island, is expected to be completed in 2011. The Long Island project will be

the first solar generation capacity modeled in NYSRC IRM studies. In August 2009, Governor Paterson issued an Executive Order that formally established a state goal reducing greenhouse gas emissions to 80% below 1990 levels by 2050. The governor established a Climate Action Council to develop a plan to achieve this goal. While the Climate Action Council's planning process is not complete and the specifics of many policy proposals are yet to be worked out, the initial analysis documented in the New York State Climate Action Plan interim report makes clear that achieving the 2050 greenhouse gas reduction goal will require dramatic change and transform the way we make and use energy. The NYSRC has worked with the Climate Action Council in identifying the reliability challenges posed by the Climate Action Plan. The NYSRC and NYISO will continue to monitor the impacts of emerging policies to support the Climate Action Plan and make recommendations for modification of such policies and programs if it is determined to be necessary to protect electric power system reliability.

The NYSRC has been engaged in a dialogue with several state agencies to help define the relationship between environmental policies and electric power system reliability. As a part of this effort, the NYSRC initiated a collaborative process to exchange information on pending regulations. Accordingly, we formed an ad hoc working group – composed of representatives from the New York

State Department of Environmental Conservation, the New York State Energy Research Development Authority, the NYSDPS, the NYISO, the market participants, and the NYSRC. This collaborative effort, the Joint NYSRC/DEC Working Group, provides a forum to receive detailed updates concerning emerging regulations and to communicate potential reliability impacts to state policymakers. Potential regulations that have raised particular concern by their potential adverse impact on power system reliability include:

- New York State's *NOx Reasonably Available Control Technology* (NOx RACT) regulations are due to be in force by July 2014. Some generator owners will need to retrofit emissions control technologies in order to comply with the new regulation, while maintaining electric system reliability.
- New York State's draft *Best Technology Available* (BTA) for cooling water regulations were released in 2010. Implementation of BTA may require significant investment by existing generators. Some of the affected generator owners may choose to limit operation or shut down nuclear units and older fossil fueled units, rather than make large reinvestments to retrofit cooling towers.

The Joint NYSRC/DEC Working Group is monitoring these and other state and federal environmental initiatives to determine their potential impact on power system reliability.

## Our Role to Develop Reliability Rules

One of NYSRC's primary roles is to establish reliability standards (Reliability Rules) necessary to maintain the reliability of the New York electric power system. These Reliability Rules define the reliability requirements for planning and operating this system. NYSRC Reliability Rules are developed using a process that is open to all entities which are directly and materially affected by the reliability of the New York power system. The rulemaking process is transparent to the public and provides for reasonable notice and opportunity for comment.

The NYSRC's Reliability Rules Subcommittee (RRS) directs and oversees Reliability Rule development. The NYSRC rule development process, which is defined in the NYSRC's Policy 1, provides for the development, approval, and revision of the rules.

Over the years, the NYSRC has developed Reliability Rules for meeting local and statewide requirements that are more stringent or more specific than NERC and NPCC standards and criteria for maintaining electric system power system reliability. NYSRC Reliability Rules are necessary to satisfy the special reliability needs of New York's electric power system.

The NYSRC is also an active participant in the development of NERC and NPCC standards and criteria. An important part of our participation is to ensure that NYSRC Reliability Rules are consistent with any new NERC and NPCC standards and criteria, and to make any necessary modifications to the Reliability Rules. During 2009 and 2010 we continued to review NERC standards under development and prepare comments and, as a member of the NERC Registered Ballot Body, voted on a number of proposed standards. An important NYSRC focus is to ensure that changes in NERC reliability standards will not weaken the level of electric system reliability in New York.

In 2010, the Federal Energy Regulatory Commission (FERC) issued an order related to revision to the definition of the facilities that are to be considered part of Bulk Electric System (BES). This order urges NERC, which has been designated by FERC as the nation's Electric Reliability Organization (ERO), to include all power system elements at 100 kV and above within the definition of the BES and thereby be subject to all NERC reliability standards. Implementation of this order will substantially increase the number of power system elements subject to NERC standards.

The FERC order provides that NERC will develop a proposed BES definition that encompasses all facilities necessary for the reliable operation and planning of the interconnected power system. The FERC order further requires that the revised definition describe what constitutes BES and non-BES elements, and that NERC establish an exemption process that would permit the exclusion of facilities at 100 kV and above that are not necessary for operating the interconnected transmission network. In 2011, RRS will provide input and comments to NERC as it develops a proposed BES definition. RRS will also examine the impact of a new BES definition on the NYSRC Reliability Rules. In 2009 and 2010, NYSRC continued to ensure that NYSRC Reliability Rules are consistent with changes to NERC and NPCC standards and criteria.

During 2009 and 2010 the NYSRC adopted modifications to four Reliability Rules and 15 measurements. Measurements identify the specific NYISO and market participant actions necessary for compliance with the related Reliability Rule. These modifications included new requirements for improving the accuracy of generating unit outage data and equipment data (load flow, short circuit and stability) reported to the NYISO, and for reviewing the data after it has been received by the NYISO. We have already seen improvement in the quality of data available for reliability studies as a result of implementing these changes.

Other Reliability Rules were adopted for improving the process of requesting exceptions to the Rules, improving the NYISO emergency restoration program requirements, and improving the collection of data for providing more accurate modeling of reactive power capabilities.

By the end of 2010, there were a total of 52 NYSRC Reliability Rules and 58 measurements. The NYSRC Reliability Rules and measurements can be found on the NYSRC web site at <http://nysrc.org/NYSRCReliabilityRulesComplianceMonitoring.asp>.

## Our Role to Monitor Compliance with the NYSRC Reliability Rules

Compliance monitoring is the process used to assess, investigate, evaluate, and measure compliance with the NYSRC Reliability Rules. This process is implemented primarily through an annual NYSRC Reliability Compliance Program developed and administered by the Reliability Compliance Monitoring Subcommittee (RCMS). In addition to this program, from time to time the NYSRC initiates special compliance reviews.

RCMS directly monitors NYISO compliance with those Reliability Rules for which the NYISO is directly responsible. The NYSRC relies on the NYISO to monitor compliance with the rules for which market participants have compliance responsibility. RCMS provides oversight with respect to these NYISO reviews.

If non-compliance by the NYISO is identified by the NYSRC, mitigation plans and corrective actions are developed to achieve compliance. In

addition, when a non-compliance finding is made, a letter reporting non-compliance is sent to the NYISO and to other appropriate entities. The NYSRC also provides oversight review of NYISO compliance with NERC and NPCC standards, which are separately monitored and assessed by NPCC. Through the entire process NYSRC and the NYISO work closely with each

other to review and monitor plans to mitigate and resolve any reliability issues as quickly as possible. A very important result of the compliance monitoring process is that reliability is likely to be improved as a result of NYSRC and NYISO efforts to prevent system violations.

In 2009 RCMS actively monitored NYISO and market participant

compliance with 32 measurements included in the NYSRC Reliability Compliance Program; in 2010, compliance with 41 measurements was monitored. NYISO and market participant were found in full compliance with all but one of these measurements during this period, which was the result of the failure of



a market participant to perform a blackstart test. The NYISO is taking steps to address this issue. In November 2008, RCMS prepared a report to the Executive Committee, *Reliability Compliance Review of 2004 NERC-GADS Outage Data Misreporting Event*. (This report can be found at <http://www.nysrc.org/reports3.asp>) The report provided RCMS findings and recommendations relative to its review of a 2004 outage data reporting NYSRC rule violation and related compliance concerns that were raised. The report further presented a series of seven recommendations for implementation by the NYISO and NYSRC, targeted at improving the quality of GADS data used for IRM and other NYSRC and NYISO studies. By the end of 2009, six of these recommendations were fully implemented. NYISO work to implement the seventh and remaining recommendation was successfully completed and implemented in early 2010 to develop software for a new NYISO generating unit GADS outage data screening process. During 2010 the NYISO provided to RCMS results from the initial implementation of its new outage data screening process as part of the NYSRC Compliance Program documentation requirements. The new NYISO screening process resulted in identifying one generating unit with suspect outage data that was later replaced with proxy data by the Installed Capacity Subcommittee for the 2011 IRM Study.

The NYSRC Reliability Rules require that the NYISO conduct annual long term resource and transmission reliability assessments of the New York power system. The NYSRC concluded that, based on the 2009 and 2010 assessments, the New York power system, as currently planned, is in conformance with all NYSRC Reliability Rules.

## Our Role to Establish NYCA Installed Capacity Requirements

Another important NYSRC role is the establishment of an annual statewide installed capacity requirement (IRM) for the New York power system. The IRM represents the amount of generating capacity that must be in place in order to ensure an acceptable level of reliability. The Installed Capacity Subcommittee (ICS) conducts reliability studies for determining and setting statewide installed capacity requirements. These studies utilize state-of-the-art probabilistic computer modeling techniques to calculate the probability of losing electric load in the event of insufficient capacity. The statewide installed capacity requirement is administered by the NYISO. Consistent with NYSRC reliability requirements, the NYISO also establishes the amount of installed capacity New York load serving entities must purchase, as well as locational capacity requirements for New York City and Long Island.

For many years, the New York power industry has pioneered the application of probability methods for capacity planning, including the development of computer models, reliability evaluation techniques and methods, and resource adequacy criteria. Studies for establishing statewide capacity requirements using probabilistic techniques were

implemented during the late 1960s by the New York Power Pool. During 2007 and 2008, we continued to make significant progress at improving capacity and load modeling representations. This included the consideration of two emerging energy issues that have the potential to impact IRM requirements: the growing wind generation capacity and environmental initiatives.

In 2009, an installed reserve margin (IRM) requirement of 18.0% was established for the 2010-2011 Capability Year. This represented an IRM increase over the previous Capability Year, caused principally by implementation of a new special case resource model that better represented likely load reduction during peak periods, and a trend of increasing generating unit forced outage rates. Although there had been an improvement in the availability of the New York electric system's fleet of power plants during the early and mid-2000s, generating unit forced outage rates, on average, increased starting in 2007.

In 2010, our study determined an IRM reduction for the 2011-2012 Capability Year, from 18.0% to 15.5%. The principle drivers for this change were an updated model for New York's interconnected control areas, and an updated load forecast. The

outside control area model update consisted of increasing the number of zones represented in New England and Ontario to thirteen and three, respectively. This improved New England and Ontario representation increased emergency assistance benefits to New York, thereby permitting an IRM decrease. It should be recognized that variations of required IRM levels from year to year such as these do not increase or decrease New York electric system reliability; the amount of IRM required for a given year is designed to meet a fixed level of reliability that is mandated by the Reliability Rules.

The 2009 IRM Study also examined environmental regulations presently being developed by environmental regulators in New York and other states. When implemented, these may impact IRM requirements. NYISO analyses on the implementation of these regulations have concluded that environmental initiatives will not impact IRM requirements through the 2011 Capability Year, although our studies have shown that they have the potential to result in the retirement of a significant amount of generating capacity and cause substantial increases in statewide IRMs in later years.

The NYSRC IRM study process focuses on methods to improve the quality of study data assumptions. We will continue data quality assurance efforts in 2011.



## Protecting the New York State Power System

A NYSRC initiative to explore the feasibility of implementing defensive strategies commenced immediately following the August 2003 Blackout. This effort was implemented through the formation of the NYSRC Defensive Strategies Working Group (DSWG) with a charge to explore the mitigation of major system disturbances impacting New York. The working group is comprised of representatives of the NYCA transmission owners, NYISO, PSC Staff, NPCC, and members of the NYSRC Executive Committee. NPCC's representation included a member of an NPCC ad hoc working group that is charged with conducting dynamic studies related to the 2003 Blackout.

### **Accomplishments during 2009 and 2010**

1. During the past two years, the DSWG closely monitored the NPCC Under Frequency Load Shedding (UFLS) studies as the program forms the base upon which additional defensive strategies can be built. As part of this work, the Defensive Strategies Working Group gained awareness of "coherent generation groups" which is a driver in how electrical islands are likely to be formed as a result of a major disturbance.
2. The DSWG continued its review of the blackout related studies through continued participation of the NPCC dynamics working group. The DSWG planned and hosted several technology presentations by equipment vendors to gain insight into applications of system protection devices and phasor measurement units with an eye toward use of these technologies for mitigation of the impact of major disturbances on the New York electric power system.
3. The DSWG invited input from systems analysis experts (including Brookhaven National Laboratories, Pacific Northwest National Laboratories and Electric Power Research Institute) on developing concepts of controlling the separation of the power system that might occur during major disturbances. Application of phasor measurement technology permits direct monitoring of the behavior of coherent generation groups and offers the promise of early detection of emerging instabilities. As a result of the technology presentations and input from various experts, it became apparent that the application of phasor measurement technology has the potential for simplifying the implementation of the controlled separation concept.

4. In the spring of 2009, the NYISO began exploring the possibility of obtaining U.S. Department of Energy Smart Grid funding to enhance the reliability of the New York electric power system. A number of project initiatives evolved. The DSWG worked with the NYISO in developing a feasibility study for the application of phasor measurement technology to control any unavoidable separation that could result from major disturbances. This feasibility study is just one component of the NYISO initiatives.

### **The Challenges Ahead**

The objective of the controlled separation study is to develop and assess feasibility of a protection system for New York which will address where, how and when to separate the system when separation becomes inevitable.

The study will commence during the first quarter of 2011, and continue into the 2012 timeframe. As with any protection system that has the potential for wide area impact, security (ability to avoid unintended operation) is of paramount importance. Therefore, the demonstration of feasibility will include careful simulation of a variety of system events, originating both outside and internal to New York to demonstrate security as well as dependability. The New York study will be closely coordinated with a related NPCC study, referred to as Task 5 of the blackout study. While

the New York study is focused on the interests of New York and probes the security issue in detail, the NPCC Task 5 study is more focused on initial feasibility findings related to the entire NPCC region. Should feasibility be demonstrated, the DSWG will work with the NYISO in the pursuit of detailed design and implementation studies. These will include the areas related to communications infrastructure, hardware/firmware/software deployment and interfaces with the NYISO control center and cyber security issues.

Through its Defensive Strategies Working Group, the NYSRC remains dedicated to the identification of strategies that would reduce the likelihood and mitigate the impact of an event such as the August 14, 2003 blackout.

## New York State Reliability Council Executive Committee Members



### **Executive Committee (left to right)**

Michael N. Forte, Consolidated Edison Company of NY, Alternate Member  
Arnold J. Schuff, New York Power Authority  
George E. Smith, Unaffiliated Member  
Thomas C. Duffy, Central Hudson Gas & Electric Corporation  
Raymond P. Kinney, New York State Electric & Gas Corporation  
George C. Loehr, NYSRC Chairman, Unaffiliated Member  
Mayer Sasson, Consolidated Edison Company of NY  
Bruce B. Ellsworth, Unaffiliated Member  
Michael B. Mager, NYSRC Vice Chairman, Industrial and Large Commercial Consumers Sector  
Richard J. Bolbrock, Municipals & Electric Co-Op  
William H. Clagett, Unaffiliated Member  
Joseph J. Hipius, National Grid, USA

### **(not shown)**

Paul A. DeCotis, Long Island Power Authority  
Chris J. LaRoe, Wholesale Sellers Sector



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