

NYSRC

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New York State Reliability Council

**2011-2012 Biennial  
Report**

May 2013



Working to ensure the reliability of the  
New York State electric power system

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# The New York State Reliability Council at a Glance

**Mission:** To ensure the reliability of the New York State Power System

**Founded:** 1998

**Business:** 501(c)(3) not-for-profit organization

## **Members**

- Affiliated: 9
- Unaffiliated: 4

**2012 Budget:** \$763,000

## **Major Activities**

- Creates Reliability Rules
- Monitors compliance
- Establishes annual statewide Installed Capacity Requirements

**Web Site:** [www.nysrc.org](http://www.nysrc.org)

Photos on cover, top to bottom: 1) Solar Photovoltaic Installation on Roosevelt Island, New York City, courtesy, New York State Energy Research & Development Authority; 2) Transmission lines at sunset, photo by George Loehr; 3) Skyscrapers at dusk, photo by George Loehr.

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## MESSAGE from the CHAIRMAN



In 1998, the Federal Energy Regulatory Commission (“FERC”) approved the formation of the New York State Reliability Council (“NYSRC”). Since its formation, the NYSRC has strived to fulfill its singular mission – to facilitate the maintenance and the enhancement of the reliability of New York State’s bulk electric power system. Well into the second decade of its existence, the NYSRC remains steadfastly focused on that goal.

The NYSRC is governed by a 13-member Executive Committee comprised of representatives from the State’s transmission owners, wholesale sellers, industrial and large commercial consumers, municipal electric systems and cooperatives, as well as a number of unaffiliated members that have been chosen for their subject matter expertise. While the Executive Committee is charged with carrying out the mission of the NYSRC, it delegates important work to, and relies extensively upon, its Defensive Strategies Working Group, Installed Capacity Subcommittee, Reliability Compliance Monitoring Subcommittee, and Reliability Rules Subcommittee. The activities and the accomplishments of the Executive Committee, its subcommittees and working group during 2011-2012 are detailed throughout this biennial report. Readers are encouraged to review this report for a comprehensive overview of the NYSRC and its work during the last two years.

Electricity is a rare commodity in that it is absolutely essential for daily life in the 21<sup>st</sup> century, yet its seemingly-unlimited availability – at the “flick of a switch” – is taken for granted by most people and businesses. Importantly, however, the electric grid must be coordinated and balanced on a constant basis. In addition, various contingencies must be planned for so that the grid can continue to operate reliably, even when unexpected events occur. The NYSRC establishes Reliability Rules for the operation of the electricity grid in New York State that take into consideration the special characteristics and requirements of the New York bulk power system, including the severe consequences of major power disruptions. While the electric grid in New York cannot be totally shielded from potential problems, most notably those that arise from regions outside the State to which we are electrically interconnected, New York’s record for electric reliability is exemplary. Every now and then, typically when electricity service is interrupted on a large scale

– such as the widespread outages caused recently by Hurricane Sandy and its aftermath – electric reliability is accorded renewed public attention. That attention is welcomed because there always is more that can be done to protect and ensure reliable electric service. Rest assured, however, that when the spotlight fades, and public attention is diverted elsewhere, the NYSRC will remain focused on playing its role in helping to ensure that the lights always go on, and stay on.

As the conclusion of my term as Chairman draws near, many thanks are in order. First, I would like to thank my colleagues on the Executive Committee, whose dedication, expertise and collegiality ensure that the important work of the NYSRC is accomplished in a responsible, yet enjoyable, manner. Second, many thanks are due to the NYSRC’s technical, legal and administrative consultants and contractors, who are highly-skilled and without whom much of the organization’s work probably never would get done or be performed so competently. Third, I would like to thank the chairs and the members of the NYSRC’s three subcommittees and working group for the technical expertise that they provide. Much of the “nitty-gritty” work of the NYSRC is undertaken by these professionals, and they facilitate the work of the Executive Committee to a tremendous degree. Fourth, the NYSRC owes a large debt of gratitude to the New York Independent System Operator (“NYISO”) and, in particular, the many NYISO representatives that participate actively in NYSRC matters. The NYISO provides invaluable technical assistance to the NYSRC, and the two organizations share an excellent working relationship that I trust will continue well into the future. Finally, I would like to thank the representatives of the New York State Department of Public Service, the New York State Energy Research and Development Authority, and the Northeast Power Coordinating Council that routinely attend, and contribute meaningfully to, NYSRC meetings.

As you read this report, I invite you to note the progress that the NYSRC is making towards ensuring the reliability of New York State’s bulk electric power system.

*Michael B. Mager*  
*Chairman, New York State Reliability Council*

# NYSRC OVERVIEW

One word echoes throughout every aspect of the work of the New York Reliability Council (NYSRC). That word is **reliability**. We achieve **reliability** through our Reliability Rules and through our compliance assessments. To fulfill our mission of preserving the reliability of the New York State electric power system, the NYSRC develops and monitors compliance of Reliability Rules, assesses reliability through the preparation of long-term generation and transmission reviews, and develops statewide installed reserve margin (IRM) requirements.

The NYSRC was approved by the Federal Energy Regulatory Commission (FERC) in 1998 as part of the restructuring of the 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. FERC also approved a NYSRC Agreement which established the NYSRC and described its responsibilities, and an Agreement between the NYISO and the NYSRC, which established the relationship between the NYISO and the NYSRC and their respective responsibilities. Under these Agreements, the NYISO is required to abide 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 oversees reliability for a bulk electric power system that:

- Provides electricity to 19.4 million people in the Empire State.
- Forecasts a 2013 electricity demand of 33,278 Megawatts.
- Has 37,920 Megawatts of generation.
- Has 11,000 miles of high-voltage transmission lines.

## **NYSRC Governance and Structure**

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.

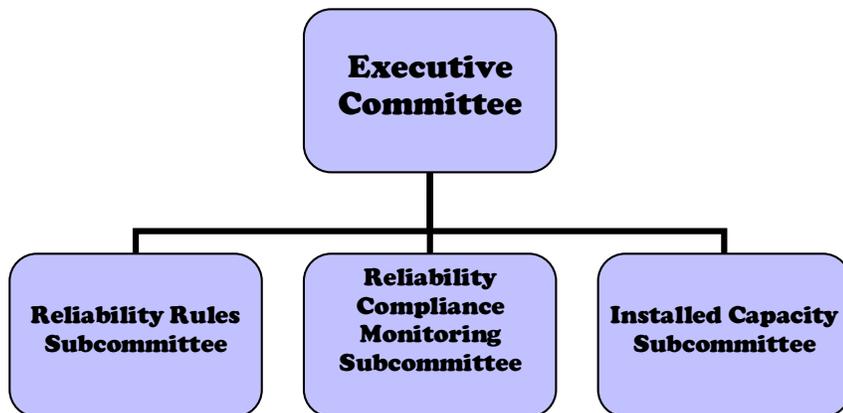
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*The Executive Committee sets high standards for the organization’s subcommittees and working groups.*

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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.

## **NYSRC Accomplishments during 2011 and 2012**

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*The NYSRC initiated a series of initiatives in 2012 which led to enhanced reliability rules and consultation with the NYISO and a black start provider aimed at ensuring future reliability.*

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During 2011 and 2012, the NYSRC continued to fulfill its mission of promoting and preserving reliable service for New York State's electric customers through several important initiatives. Some of these accomplishments are reported in more detail later in this report.

### **System Restoration**

The restoration plan for the New York Control Area (NYCA) includes procedures to ensure the adequacy of system restoration following a major or total blackout. A critical component of the NYCA restoration plan is a NYSRC Reliability Rule requirement that generating units designated for providing black start service are available to restore the system in a safe, orderly, and prompt manner. During 2011, concerns were raised about black start testing violations and the possible unavailability of black start facilities necessary for prompt restoration during a blackout event. As a result, the NYSRC initiated a series of initiatives in 2012 which led to enhanced reliability rules and consultation with the NYISO and a black start provider

aimed at ensuring future reliability. These initiatives are further discussed later in this report.

### **Rules Enhancement Plan**

In late 2012, the Executive Committee approved initiation of the NYSRC Rules Enhancement Plan (REP). This project has two objectives: (1) to reorganize the NYSRC Reliability Rule elements so as to be consistent with the structure of the NERC Reliability Standards, and (2) to modify the NYSRC rules to assure consistency with NERC and NPCC standards and criteria, while retaining the more stringent and specific NYSRC requirements. The REP is scheduled to be completed in early 2014.

### **Modeling Enhancement for Installed Reserve Margin Studies**

An improved model for representing Demand Equivalent Forced Outage Rate (EFORd) in IRM studies was completed in 2012 after three years of effort by ICS and the NYISO. The new model provides a more accurate measure of generator performance.

### **Protecting New York from Major Disturbances**

An NYSRC initiative to explore the feasibility of implementing defensive strategies commenced immediately following the August 14, 2003 Blackout. The primary objective of this effort is to develop and assess feasibility of a protection system for New York which will address where, how and when to perform automatic control measures to protect New York against major disturbances originating both within and outside of the New York Control Area. In 2011 and 2012 progress was made towards meeting this objective – as fully discussed later in this report.

## **Challenges of Maintaining a Safe and Reliable Electric Power System**

During 2011 and 2012 the NYSRC examined a series of challenges that were faced and will continue to be faced in the future by the New York power grid.

## **Sustaining Reliability Despite Dramatic Weather Events**

The performance of the New York State electric power system met the challenges of extreme heat in 2011 and Hurricanes Irene and Sandy in 2011 and 2012, respectively. Prior to and during these events, the NYISO maintained a reliable power system that was in full compliance with NYSRC Reliability Rules.

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*The performance of the New York State electric power system met the challenges of extreme heat in 2011 and Hurricanes Irene and Sandy.*

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## **Gas Supply to New York's Generators**

The increased use of natural gas for gas-fired generation makes the reliability of the New York electric power system vulnerable to loss of major gas pipelines. NYSRC Reliability Rules require that the NYISO study the impact of gas supply disruptions and evaluate measures to mitigate these impacts. The NYISO has formed a working group to address this issue. The NYSRC will closely monitor the progress of this initiative during 2013.

## **Potential Impact of Emerging Environmental Regulations on Power System Reliability**

The NYSRC established an ad hoc working group with several State agencies, including the New York State Department of Environmental Conservation (DEC), to help define and promote understanding of the relationship between environmental policies and the reliability of the New York electric power system. The NYSRC/DEC Working Group has been meeting approximately every two months since March 2010 and comprises representatives from the DEC, the New York State Energy Research Development Authority, the New York State Department of Public Service, the NYISO, Market Participants, and the NYSRC.

This collaborative effort provides a forum to discuss emerging State and federal regulations and to communicate potential reliability concerns. Potential impacts from several new State and federal regulations have been identified, including:

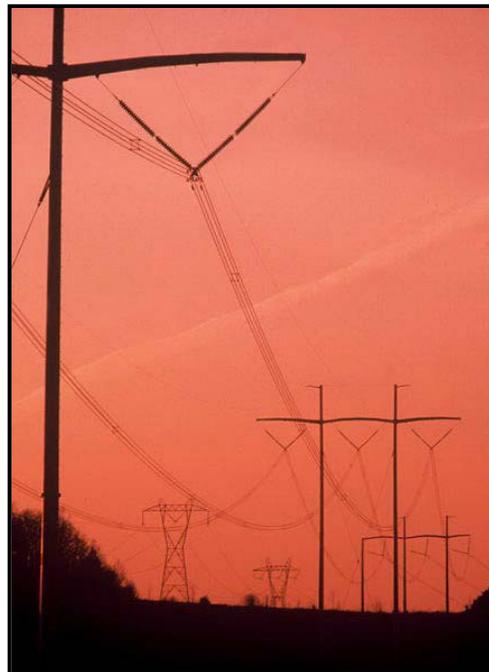
- NOx RACT (Reasonably Available Control Technology for Oxides of Nitrogen)
- BART (Best Available Retrofit Technology)
- MATS (Mercury and Air Toxics Standard)
- BTA (Best Available Technology for Cooling Water Intake Structures)
- CSAPR (Cross State Air Pollution Rule)

The NYSRC/DEC Working Group is monitoring these and other environmental initiatives to determine their potential impact on the reliability of New York State's electric power system.

### **New York State Transmission and Distribution System Reliability Study**

The State Energy Planning Board undertook a study of the overall reliability of the State's electric transmission and distribution systems. The NYSRC provided significant support and insight throughout the study, particularly with respect to the history of reliability standards and the evolution of regulatory processes.

Work on the study report was completed in 2012. In addition to meeting specific statutory requirements, the study was intended to serve as a resource document to inform the legislature and public on how reliability is measured, who has regulatory oversight, how and what planning studies evaluate reliability, and how reliability is maintained in system operations. The report recognized that New York State has several opportunities to support increased system reliability.



**765/345kV Marcy-New Scotland transmission line,  
west of Schenectady, N.Y.  
Photo by George Loehr.**

# DEVELOPMENT of RELIABILITY RULES

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***The (NYSRC) rulemaking process is transparent to the public and provides for reasonable notice and opportunity for comment.***

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One of the NYSRC responsibilities is to ensure the reliability of the New York Bulk Power System by developing Reliability Rules that are clear, consistent and technically sound. The NYISO and all of New York's market participants – in accordance with the NYSRC/NYISO Agreement – must comply with these Rules. These Rules define the requirements for planning and operating the New York State electrical grid, so that widespread cascading outages and blackouts do not occur. 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.

NYSRC rule development activities are primarily guided by NYSRC Policy 1, Procedure for Developing, Modifying, and Disseminating NYSRC Reliability Rules, which provides for the development, approval, and revision of the Rules. The Reliability Rules Subcommittee (RRS) directs and oversees the Reliability Rule development process. The Reliability Rule development process was further enhanced with the recent preparation of a new version of Policy 1, which added descriptions of processes for developing rule interpretations and glossary terms.

The NYSRC is always working to improve its Reliability Rule development process and the soundness of the rules it produces. To that end, in late 2012, RRS initiated the Rules Enhancement Plan (REP). The scope of the REP is two-fold: (1) to reorganize the components of NYSRC Reliability Rules so as to be consistent with the NERC Standards, including specifying requirements for complying with the related Reliability Rule and those elements necessary to demonstrate and monitor compliance with the Rule's Requirements; and (2) where necessary, to modify the Reliability Rules to assure consistency with NERC and NPCC standards and criteria, while retaining the more stringent and specific requirements in the present Reliability Rules. One issue that will be considered in this project is whether to include in the REP only elements in the revised Rules that are more stringent and more specific than NERC and NPCC requirements, or make the Rules more complete by also including certain existing NYSRC requirements

that are common to both NERC and NPCC requirements. The REP is scheduled to be completed in early 2014.

During 2011 and 2012, the NYSRC adopted two new measurements. In addition, two existing Reliability Rules and two existing measurements were modified. Also, two measurements were modified on an expedited basis. Measurements identify the specific NYISO and market participant actions necessary for compliance with the related Reliability Rule. The above modifications included new requirements for the submission of Special Case Resource (SCR) performance data required for ICS studies for calculating the IRM, black start testing requirement modifications, and modifications of required NYISO actions in the event of transmission thermal overloads. By the end of 2012, there were a total of 51 NYSRC Reliability Rules and 60 measurements. The NYSRC Reliability Rules and measurements can be found on the NYSRC web site at <http://www.nysrc.org/documents.asp>.

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 2011 and 2012, 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, FERC ordered NERC to develop a proposed Bulk Electric System (BES) definition to encompass all facilities necessary for the reliable operation and planning of the interconnected power system. The FERC order further required 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 and 2012, the NYSRC provided comments to NERC as it developed its proposed BES definition. In 2012, FERC issued a final rule establishing the BES definition based on a definition proposed by NERC. Key revisions to the definition removed previous language that allowed for broad discretion by the NERC regions, and established a "bright line" threshold that includes all facilities operated at or above 100 kV. In 2013, RRS will examine the impact of the new BES definition on NYSRC Reliability Rules.

# COMPLIANCE MONITORING

Compliance monitoring is the process used to assess, investigate, evaluate, and measure compliance with the NYSRC Reliability Rules. The NYSRC conducts its compliance monitoring activities via a number of methods, including 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 compliance audits, assesses NYISO self-reports of rule violations, and performs compliance spot checks as needed. These processes are described in NYSRC Policy 4, Procedure for Monitoring Compliance with the NYSRC Reliability Rules. This policy describes compliance monitoring procedures and responsibilities of the NYSRC and NYISO for implementing these procedures. Policy 4 was revised in 2011.

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***A very important objective of the compliance monitoring process is that reliability will be improved as a result of NYSRC and NYISO efforts to prevent compliance violations.***

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

In 2011 and 2012, RCMS monitored NYISO and market participant compliance in accordance with the NYSRC Reliability Compliance Program. During this period, the NYISO and the market participants were found in full compliance with all but two of these measurements. Both non-compliance findings were the result of the failure of the same market participant to

successfully perform black start tests. The NYISO took steps to address these non-compliance events.

### **NYSRC Reliability Compliance Program**

#### **By the numbers in 2011 and 2012:**

- 43 NYISO compliance reviews performed
- 24 market participant compliance reviews performed
- 0 compliance violations by the NYISO
- 2 compliance violations by one market participant

It is the NYSRC's responsibility to assess the future transmission and generation adequacy of the New York power system. Accordingly, the NYSRC Reliability Rules require that the NYISO conduct annual transmission and generation reliability assessments. A study conducted by the NYISO in 2012 concluded that the State's bulk power transmission system, as planned through the year 2017, is compliant with NYSRC Reliability Rules, NPCC Criteria, and NERC Standards, with the exception of thermal criteria violations of NYSRC rules that were identified in four areas on the system. It was determined that certain facilities in these areas would be overloaded following the loss of multiple resources. A transmission review will be conducted by the NYISO in 2013, which will include an evaluation of the areas of the system impacted by these violations and identify upgrades that are necessary to meet Reliability Rule performance requirements. The NYSRC will closely monitor this NYISO analysis.

A NYISO study that evaluated the adequacy of resources through 2014 concluded that NYCA will have sufficient existing and planned resource capacity to meet NYSRC resource adequacy criteria through this period.

During late 2011, a black start provider in the service territory of Consolidated Edison Company of New York, Inc. (Con Edison) informed the NYISO that it wished to cease providing black start service for some of its units. As a result, RCMS raised concerns as to what the reliability impacts would be if these units were unavailable to provide black start service, i.e., what would be the effect on the ability of the NYISO and Con Edison to restore the NYCA system following a black out event in a safe, orderly, and prompt manner in accordance with NYSRC Reliability Rules. To respond to this concern,

RCMS conducted an evaluation to: (1) determine how the withdrawal of existing black start units would affect the NYCA System Restoration Plan (SRP), and (2) provide the NYSRC Executive Committee with recommendations for maintaining system reliability. The first phase of the RCMS black start evaluation was a forum in January 2012 in which the NYISO and Con Edison participated and responded to a series of questions from the RCMS on the NYCA Black Start Program.

A major finding of the RCMS evaluation was that if the units in question were to no longer participate in the NYISO Black Start Program – following a blackout – restoration time to a significant portion of load in New York City could increase by up to five hours. RCMS concluded this outcome to have a serious adverse impact on the NYCA SRP and would violate NYSRC Rules, which conclusion subsequently was adopted by the Executive Committee. The 2012 RCMS report, Evaluation of the NYCA Black Start Program (see [www.nysrc.org/reports](http://www.nysrc.org/reports)), contains several recommendations that were implemented by the Executive Committee, including a filing to FERC providing NYSRC's concern about the reliability impact of withdrawal of the black start facility from the Black Start Program, and the consideration of rules for providing a more effective SRP. The RCMS report was included in the FERC filing.



**The economic vitality of cities depends on a reliable supply of power.  
Photo by George Loehr.**

# NYCA INSTALLED CAPACITY REQUIREMENTS

Another important NYSRC role is the establishment of an annual statewide installed capacity requirement (ICR) for the New York power system. The ICR 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. Implementation of the statewide ICR 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. The process of determining the statewide ICR is through calculation of an Installed Reserve Margin (IRM) requirement. Procedures for calculating the IRM are described in NYSRC Policy 5, Procedure for Establishing NYCA Installed Capacity Requirements. Policy 5 was revised during 2011-12.

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*.... we continued to make significant progress at improving capacity and load modeling representations for use in our reliability studies.*

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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 ICRs using probabilistic techniques were initially implemented during the late 1960's by the New York Power Pool.

During 2011 and 2012, we continued to make significant progress at improving capacity and load modeling representations for use in our reliability studies. ICS determined that development of an improved EFORd model would provide a more accurate measure of generator performance, as well as provide a metric that was aligned with what is used in the capacity markets. An independent consulting firm was retained by the NYISO in 2011 to assist in developing this method. Based on analyzes conducted by the consultant, ICS developed and successfully validated the new EFORd model following extensive testing. The methodology was initially used in 2012 for the 2013-14 Capability Year IRM study. The effect of replacing the previous model

with the improved model was to lower IRM requirements. At the end of 2012 efforts began for the development of a new model for representing the statewide load shape. After testing, this model is expected to be implemented in time for application in the 2014-15 IRM Study.

In 2011 and 2012, the NYSRC continued to focus on assuring the quality of data used for IRM studies. Independent data quality review efforts were conducted by the NYISO, transmission owners, and the General Electric Company.

Loss of Load Probability studies were conducted in 2011 and 2012 to establish NYCA IRM requirements for the 2012-13 and 2013-14 Capability Years, respectively. The results of these studies showed a trend of increasing IRM requirements. This trend was caused principally by higher generating unit forced outage rates, reduced assistance from interconnected control areas, and an increase in forced outage rates for the transmission cable system in Southeast New York. 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.

<b>NYCA Installed Reserve Margin (IRM) Requirements</b>		
<b>Year of IRM Study</b>	<b>Capability Year</b>	<b>IRM</b>
2010	2011-12	15.5%
2011	2012-13	16.0%
2012	2013-14	17.0%

IRM studies include a detailed representation of load, generation, and transmission for eleven NYCA zones, including two locational capacity zones. ICS has plans to develop and implement a methodology for establishing a third locational capacity zone in 2013. This initiative is necessitated by the NYISO market rules which provide that a new locational capacity zone is warranted if it is demonstrated that the deliverability of generation between zones is constrained by the transmission system.

# **PROTECTING the NEW YORK POWER SYSTEM from MAJOR DISTURBANCES**

A NYSRC initiative to explore the feasibility of implementing defensive strategies commenced immediately following the August 14, 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 a NPCC ad hoc working group that was charged with conducting dynamic studies related to the 2003 Blackout. These NPCC studies investigated the adequacy of the Under Frequency Load Shedding Program and progress was reviewed during DSWG meetings. Subsequently, the NPCC dynamics working group performed studies to investigate ways to mitigate the impact of major disturbances.

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 transmission separation that could result from major disturbances. This study is referred to as the NYISO Controlled System Separation Study (CSSS).

## **Accomplishments during 2011 and 2012**

The CSSS initiative led to the following DSWG accomplishments:

1. During 2011 and 2012, the DSWG closely monitored a NPCC study dedicated to exploring measures to mitigate the impact of major disturbances on the systems of the NPCC. The NPCC dynamic study yielded dynamic information valuable to the CSSS, which focused on the New York system.
2. A subgroup of DSWG members was formed to act as an advisory committee for the NYISO CSSS. Over the course of 2011 and 2012, this advisory committee participated in monthly CSSS progress meetings as well as three face-to-face workshops. Meetings of the DSWG were held periodically to review progress and solicit input.

3. Hundreds of extreme disturbances were analyzed over some seven different operating conditions. These included disturbances originating outside of the NYCA, as well as those originating within New York. Under some conditions, instability and uncontrolled separation within the New York system, resulting in widespread loss of load, was observed.
4. "Indicators" were developed using phase angle measurements, simulating those that would be derived from Phasor Measurement Units (PMUs). These indicators are capable of predicting imminent instability and subsequent uncontrolled separation of the New York system.
5. Control measures were developed and tested that, if applied in a timely manner, would prevent the instability and widespread loss of load for most of the extreme disturbances cited above.
6. From the above it is concluded that one automatic control scheme that performs a controlled separation at a strategic New York transmission interface is "conditionally" feasible. The term "conditional" reflects the fact that the timing to achieve a satisfactory result is very tight and that load shedding beyond that presently employed in the NPCC region would be required to maintain stability. An issue of paramount importance is that any automatic control action that involves load shedding must ultimately be secure and protected from miss-operation. Further study is required in this area.

### **The Challenges Ahead**

The primary objective of the DSWG is to develop and assess feasibility of a protection system for New York which will address where, how and when to perform automatic control measures to protect the State against major disturbances originating both within and outside of the NYCA. While the CSSS resulted in a conditionally feasible protection system concept using phase angle information obtainable from PMUs, a substantial amount of work remains, including the following tasks:

1. The CSSS revealed that the New York system is exposed to several extreme contingency situations that could result in uncontrolled system separation and major loss of load. Further studies are needed to assess exposure to broader, more comprehensive events that fall beyond the criteria normally used in design and operations.

2. The protection/control measures developed in CSSS need to be investigated further to determine if significant enhancements can be made to improve their operation, with a focus on maximizing security against any false operations.
3. Some significant improvements to the New York transmission system are currently planned within the next ten years. These transmission upgrades need to be evaluated to determine their potential impact on the stability of the New York system.
4. The exposure analysis described in Task 1 should be extended to include the impact of the improvements reported in Tasks 2 and 3.
5. Depending on the results of Task 4, any automatic protection and control system that is deemed beneficial should be implemented using actual PMU measurements and operated “open loop” (no actual control actions performed) over an extended time period to verify that its operation is both dependable and highly secure.
6. In the operations domain, operational awareness of evolving system conditions, related to major disturbances, continues to be of high importance. The DSWG will provide its support, with information gained from the analyses above, to initiatives of the NYISO in this area.

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***....the NYSRC remains dedicated to the identification of strategies that would reduce the likelihood and mitigate the impact of events similar to the 2003 Blackout.***

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Recognizing that the work and challenges outlined above requires resources well beyond those available directly to the NYSRC, the NYSRC will explore avenues with the NYISO, on a prioritized basis, to meet these challenges. Through its DSWG, the NYSRC remains dedicated to the identification of strategies that would reduce the likelihood and mitigate the impact of events similar to the 2003 Blackout.

# NYSRC EXECUTIVE COMMITTEE MEMBERS



Photo by George Loehr

**Seated Left to Right:**

Michael B. Mager, NYSRC Chairman, Large Customer Sector  
George E. Smith, Unaffiliated Member  
Christopher J. LaRoe, Wholesale Seller Sector  
William H. Clagett, Unaffiliated Member  
Dr. Mayer Sasson, NYSRC Vice Chairman, Consolidated Edison Co. of NY

**Standing Left to Right**

George C. Loehr, Unaffiliated Member  
Frank S. Pace, Central Hudson Gas & Electric, Alternate Member  
Bruce B. Ellsworth, Unaffiliated Member  
Paul A. DeCotis, Long Island Power Authority  
Arnold J. Schuff, New York Power Authority  
Richard J. Bolbrock, Municipal & Electric Cooperative  
Joseph J. Hipius, National Grid, USA

**Not Shown**

Thomas C. Duffy, Central Hudson Gas & Electric  
Raymond P. Kinney, New York State Electric & Gas/Rochester Gas & Electric

**NYSRC Support Team**

P. Donald Raymond, Executive Secretary  
Paul L. Gioia, Legal Counsel  
Roger Clayton, RRS/RCMS Chairman  
Alan Adamson, Consultant  
Frank Vitale, Consultant  
Carol Lynch, Administrative Assistant



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