NEW YORK INDEPENDENT SYSTEM OPERATOR

MANUAL 24

Reliability Analysis Data Manual

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Revision History

Version	Date	Revisions
3.0	**11/22/2013**	**Section 2.3.1** ➢ Changed Directory#9 Section 5.4 reference to Directory#9 Section D.1.4 reference. **Section 2.3.1.1** ➢ Added an additional exemption criterion to be consistent with Directory#9 Section D.1.5. **Section 2.3.2.1** ➢ Added additional exemption criteria to be consistent with Directory#10 Section D.1.5.
2.0	**11/07/2011**	**Global** ➢ Changed the title of the manual from System Analysis Data Manual to Reliability Analysis Data Manual ➢ Reformatted per new template to standardize presentation. ➢ Implemented minor stylistic changes. ➢ Standardized labeling and numbering of graphical and tabular material. ➢ Implemented programmatic linking for internal cross-references to facilitate navigation within the document. ➢ Added external-document links that explicitly cite URLs from which documents may be accessed and that reflect changes in location secondary to NYISO Web site redesign. ➢ Performed a major rewrite and reorganization of content. ➢ Technical Bulletins merged: o 160, Market Participant Notification of NYISO Network Power System Model Updates (Created new Section 2.2) o 190, Reactive Power Testing for Non-VSS Generators (Created new Section 2.3.2) o 191, Non-ICAP NYCA Generators Must Report Capacity Data as Required by NPCC Directory #9 (Created new Section 2.3.1) **Front Matter** ➢ Reformatted Revision History as tabular material.
1.0	**09/24/1999**	**Initial Release** ➢ Changed all instances of *Transmission Provider*/*Provider's* to *Transmission Owners*.

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1. OVERVIEW

This section provides a general description of the purpose of this manual, the types of data used in NYISO planning and operations, and guidelines on safeguarding that critical energy infrastructure information and confidential data.

1.1 Purpose and Scope

This manual describes data required by the NYISO to carry out technical analysis to support its mission of preserving the reliability of the New York State Bulk Power System.

This manual identifies the data users and defines how data is to be submitted to the NYISO including schedules for data collection.

Three major groups use the data defined by this manual:

1) NYISO Staff
2) Suppliers of data, including:
   - Reliability Organizations:
     - North American Electric Reliability Corporation (NERC)
     - Northeast Power Coordination Council (NPCC)
     - New York State Reliability Council (NYSRC)
   - Reliability Coordinators
   - Planning Coordinators
   - Transmission Planners
   - Transmission Operators
   - Transmission Owners
   - Generation Owners
   - Load Serving Entities
   - Other NYISO Market Participants
3) Receivers of data:
   - Government Agencies:
     - New York Public Service Commission (PSC)
     - U.S. Department of Energy (DOE)
     - Federal Energy Regulatory Commission (FERC)
   - Reliability Organizations
     - NERC
     - NPCC
     - NYSRC
   - Reliability Coordinators
   - Planning Coordinators
   - Transmission Planners

  - Transmission Operators
  - Transmission Owners
  - Other NYISO Market Participants

This data is collected by the NYISO to comply with the following requirements, standards, criteria, rules, and procedures:

- Federal Power Act, Sections 213(b), 307(a) and 311
  - FERC Form No. 715: Annual Transmission Planning and Evaluation Report
- NERC MOD-010: Steady-State Data for Modeling and Simulation of the Interconnected Transmission System
- NERC MOD-012: Dynamics Data for Modeling and Simulation of the Interconnected Transmission System
- Eastern Interconnection Reliability Assessment Group (ERAG) Multiregional Modeling Working Group (MMWG) Procedural Manual
- NPCC Directory #1: Design and Operation of the Bulk Power System
- NPCC Document C-29: Procedures for System Modeling
- NYSRC Reliability Rules

Actual and forecast data of all the components including load are required to analyze, study, and plan the interconnected electric system. Detailed data of system components must be maintained and updated by the facility owners and load-serving entities and provided to the NYISO accurately and as needed for system analysis and distribution.

Complete, accurate, and timely data is needed by the NYISO to prepare system analyses to assess reliability of the New York State Bulk Power System.

System analyses include steady-state, transient, and dynamic simulations of the electrical networks. Data requirements for these system analyses include information on system components, system configuration, facility ratings, customer demands, and electric power transactions. This manual describes specific data supplied by the New York Control Area (NYCA) facility owners and collected by the NYISO for these purposes.

1.2 NYISO Data Classification

In order to perform reliability analysis, various databases are developed by NYISO for use in computer simulations. These computer simulations include power flow, stability, and fault current programs.

The NYISO reliability analysis data described in this manual is divided into:

- Data for reliability assessment:
  - Power Flow Data
  - Dynamics Data
  - Short Circuit Data
- Data for Real-time security monitoring:
  - Real-time System Representation Data

- Ratings of Facilities

1.3 Treatment of Data

This section summarizes guidelines for the treatment and disclosure of NYISO data classified as critical energy infrastructure information (CEII) or confidential and proprietary. Treatment of CEII and confidential data is governed by NYISO policies. Detailed rules and procedures concerning the confidentiality of data are covered in Attachment F to the *NYISO Open Access Transmission Tariff*[1] and Section 6.3 of the *NYISO Market Administration and Control Area Services Tariff*[2].

1.3.1 Critical Energy Infrastructure Information (CEII)

The CEII classification was created by FERC to assure that critical infrastructure information is protected in the event of Freedom of Information Act (FOIA) or other requests to the FERC for access. FERC Regulations (contained in 18 CFR§ 388.113(c)) identifies CEII information as "specific engineering, vulnerability, or detailed design information about proposed or existing critical infrastructure that: (1) relates details about the production, generation, transportation, transmission, or distribution of energy; (2) could be useful to a person in planning an attack on critical infrastructure; (3) is exempt from mandatory disclosure under the Freedom of Information Act, 5 U.S.C. 552 (2000); and (4) does not simply give the general location of the critical infrastructure."

NYISO reliability analysis databases containing electric system network data, including power flow, dynamics, and short circuit data, are classified as CEII. Interested parties with a legitimate need to access CEII may receive such CEII only if they request it in writing, as described in Section 1.3.3, specifying the information sought, the planning process to which the information relates, and demonstrating their need related to the specified planning process to have access to that information. The NYISO will review such requests and, if approved in the NYISO's sole discretion, the interested party may receive that CEII only after it signs an appropriate non-disclosure agreement prescribed by the NYISO.

1.3.2 Confidential Data

NYISO databases containing electric system network data may contain data considered confidential, such as market-related data.

Distribution or disclosure of confidential data to any other party by any means including verbal, graphic, and/or electronic is strictly prohibited without the prior approval of the Market Participant who owns the data.

1.3.3 Data Requests

Requests for FERC Form No. 715 – Part 2 databases, reliability analysis databases, or any other CEII should be submitted to NYISO using the CEII Request Form posted at:

[1] http://www.nyiso.com/public/markets_operations/documents/tariffs/index.jsp
[2] http://www.nyiso.com/public/markets_operations/documents/tariffs/index.jsp

http://www.nyiso.com/public/markets_operations/services/planning/planning_resources/index.jsp

Release of NYISO reliability analysis databases is managed through the NYISO ePlanning system. Access to ePlanning is granted on an as-needed basis.

1.4 Reliability Analysis Databases

This section describes the NYISO processes used to maintain the necessary network representation data to comply with FERC, NERC, NPCC, and NYSRC requirements.

1.4.1 NYISO Data Bank

The NYISO Data Bank serves as the NYISO main database of reliability analysis data required in order to simulate thermal, voltage, and dynamic responses to contingencies, and to determine interface transfer limits and fault current levels.

The NYISO Data Bank is the basis for power flow, dynamics, and short circuit cases as required for regularly scheduled studies, reviews, and reports including, but not limited to:

- FERC Form 715: Annual Transmission Planning and Evaluation Report
- ERAG MMWG Power Flow Base Case Development process
- NPCC SS-37 Modeling Working Group Base Case update
- NPCC & NYSRC Area Transmission Reviews
- NYISO Reliability Needs Assessments
- NYISO Transmission Expansion and Interconnection studies
- NYISO Seasonal Operating Studies

The following base cases and associated contingency definitions are maintained in the NYISO Data Bank:

- Power Flow
  1) As-found system Winter peak load
  2) As-found system Summer peak load
  3) 5th year off-peak (Spring) light load
  4) 5th year Summer peak load
  5) 5th year Summer peak load based on a 90/10 statewide forecast
  6) 5th year Winter peak load
  7) 10th year Summer peak load
  8) 10th year Summer peak load based on a 90/10 statewide forecast
- Dynamics
  1) As-found system Summer peak load
  2) 5th year off-peak light load
  3) 5th year Summer peak load
- Short Circuit

1) As-found system Summer peak load
2) 5th year Summer peak load

The "as-found system" cases represent the existing transmission system and system conditions as are expected to occur at the time of the respective seasonal peak load of the current year. In general, the NYCA representations in the future-year cases include only those future new or modified generation and transmission facilities that: (1) have met the qualifications to be included in a NYISO Interconnection Facilities Study (IFS); or (2) have been proposed by Transmission Owners, consistent with the *NYISO Load & Capacity Data* report[3]. Other proposed new or modified generation and transmission facilities that may be under study are not represented.

1.4.2 FERC Form 715: Annual Transmission Planning and Evaluation Report

The FERC Form 715, Annual Transmission Planning and Evaluation Report, is required pursuant to Sections 213(b), 307(a), and 311 of the Federal Power Act to provide information adequate to inform potential transmission customers, state regulatory authorities and the public of potential transmission capacity and known constraints, to support the FERC expanded responsibilities under 211, 212, and 213(a) of the Federal Power Act (as amended by the Energy Policy Act), and to assist in rate or other regulatory proceedings.

The NYISO, as designated agent of the Transmission Owners of New York State, is responsible for preparing the FERC Form 715 – Part 2 report every year, which includes the NYISO Data Bank power flow cases.

1.4.3 ERAG MMWG Power Flow Base Cases

The purpose of the Eastern Interconnection Reliability Assessment Group (ERAG) is to further augment the reliability of the bulk power system in the Eastern Interconnection through periodic studies of seasonal and longer-term forecasted transmission system conditions.

The Multiregional Modeling Working Group (MMWG) has responsibility for developing all Eastern Interconnection power flow and dynamic base case models, including seasonal updates to summer and winter power flow study cases.

1.4.4 NPCC Power Flow Base Cases

In addition to the NYISO Data Bank, the NYISO is also responsible as an Area Coordinator for compiling NYCA information to develop the NPCC SS-37 Working Group Base Cases. The data requirements are documented in *NPCC Document C-29: Procedure for System Modeling*. These NPCC power flow base cases are used by all NPCC members to perform transmission planning and operating studies, and are input to the ERAG MMWG base

[3] Planning Data and Reference folder at http://www.nyiso.com/public/markets_operations/services/planning/documents/index.jsp

cases. The NPCC SS-37 Working Group has representation from all interested parties including Transmission Owners.

2. NYISO DATA BANK UPDATE PROCEDURES

This section describes the NYISO processes for maintaining the necessary system representation data to comply with FERC, NERC, NPCC, and NYSRC requirements.

2.1 Annual Data Bank Update Process

The following procedure describes the annual process followed by the NYISO, Transmission Owners, and Generator Owners to collect the required power flow, dynamics, and short circuit base case data for the NYCA. Dates associated with each task are subject to change.

NYISO Actions

1) Review and incorporate all power flow, dynamics, and short circuit model updates and associated contingency definition updates received since the previous issuance of base cases by the end of December.
2) Prepare the Data Bank power flow cases for review, using the most recent available ERAG MMWG, NPCC, and NYISO power flow base cases, during the months of November and December.
3) Request power flow and dynamics updates from PJM by the 1st week of January.
4) Request short circuit data updates from neighboring systems by the 1st week of January.
5) Using the most recent data, prepare the Data Bank short circuit cases for review during the month of January.
6) Send power flow and short circuit cases and associated contingency definitions to the Transmission Owners' data contacts by the 3rd week of January.

Transmission Owners Action

7) Provide initial changes to the power flow and short circuit data and associated contingency definitions to the NYISO by the 2nd week of February.

NYISO Action

8) Update the Data Bank and send revised power flow and short circuit cases and associated contingency definitions to Transmission Owners' data contacts by the end of February.

Transmission Owners Action

9) Provide final updates and comments on the NYISO power flow and short circuit representations and associated contingency definitions to the NYISO by the 2nd week of March.

NYISO Actions

10) Receive short circuit updates from neighboring systems by 2nd week of March.

11) Update the Data Bank for consistency with the draft current year *NYISO Load & Capacity Data* report and issue final power flow and short circuit cases and associated contingency definitions to Transmission Owners by the last week of March.

Transmission Owners Action

12) Certify accuracy of power flow information and data provided to the NYISO for the FERC Form 715 Report by the last week of March.

NYISO Actions

13) File the the FERC Form 715 report, including the power flow cases, with FERC by March 31.

14) Prepare the Data Bank dynamics data for review, using the most recent available ERAG MMWG, NPCC, and NYISO databases, during the months of April and May.

15) Submit power flow cases to NPCC SS-37 by the 1st week of June.

16) Finalize dynamics cases and issue to NPCC and Transmission Owners by the end of June.

17) Collaborate with NPCC SS-37 to update and finalize the regional power flow cases for submittal by NPCC to ERAG MMWG by the end of July.

18) Prepare the as-found system short circuit case using the most recent available data, and provide the case to Transmission Owners for review during the first week of September.

19) Collaborate with NPCC SS-37 to review ERAG MMWG power flow cases by the end of September.

20) Collaborate with NPCC SS-37 to initialize and test the NPCC regional dynamics cases by the end of September.

21) Provide current generator data to Generator Owners by the end of September and request update and certification of generator data from Generator Owners.

Transmission Owners Actions

22) Provide initial changes to the as-found system short circuit case to the NYISO by the end of September.

23) Provide, if applicable, changes that are found during review of the Seasonal Operating Study power flow base case to the NYISO during the months of July through October.

NYISO Action

24) Update and send the as-found system short circuit case to Transmission Owners for review by mid-October.

Transmission Owners Action

25) Provide final changes to the as-found system short circuit case to the NYISO by the third week of October.

NYISO Action

26) Update and send the finalized as-found system short circuit case to Transmission Owners by the end of October.

Generator Owners Action

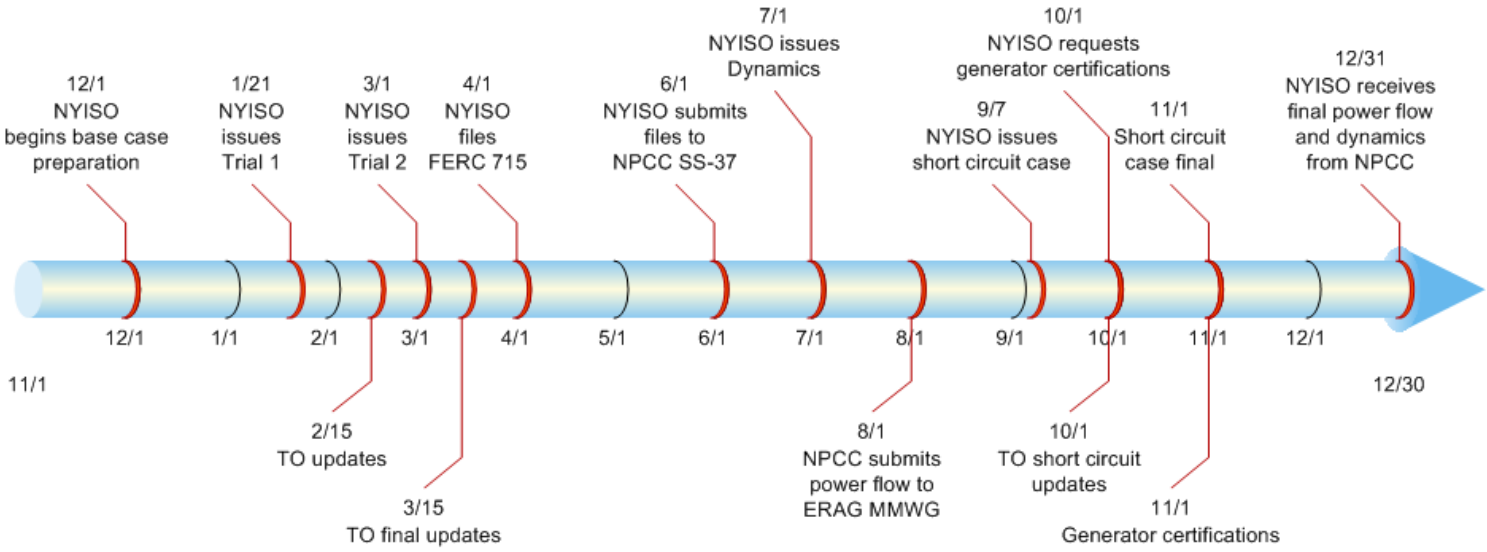
27) Provide requested generator data and certify the accuracy of that data to the NYISO by the requested deadline, typically the end of October.

NYISO Action

28) Receive from NPCC final ERAG MMWG and NPCC power flow and dynamics cases by the last week of December.

Figure 2-1 shows a time line for the NYISO Data Bank update process.

Figure 2-1: NYISO Data Bank Update Process Time Line



2.2 Facility Owner Updates

Each Market Participant that owns or operates facilities within or interconnected to the New York Control Area, including Transmission Owners and Generator Owners, shall inform the NYISO, and interconnecting New York Transmission Owner as necessary, of all planned power system equipment additions or modifications that may affect NYISO power system operational tools or planning models. Market Participants shall provide to the NYISO and the interconnecting Transmission Owner the required modeling data, (as described below), pursuant to the notification procedures provided in this manual.

1) Updates to Seasonal Ratings of Existing Equipment: At least seven (7) days ahead of the expected implementation date. These updates are limited to seasonal ratings of existing facilities that have already been included in the NYISO System Network Representation.
2) Updates to Metering Data for Existing Equipment: At least fourteen (14) days ahead of the expected implementation date. These updates are limited to the metering data transfer identifiers (Inter-control Center Communication Protocol Object Identifiers or ICCP OIDs) of existing facilities that have already been included in the NYISO System Network Representation.
3) All Other Equipment Additions or Modifications: At least sixty (60) days ahead of the expected implementation date. These additions or modifications comprise all data that is not covered under items 1 and 2, including as-built data for new generator and merchant transmission interconnections.

Additionally, each Market Participant that owns or operates facilities, including each New York Transmission Owner and Generator Owner, shall inform the NYISO and interconnecting New York Transmission Owner of all changes to parameters of existing modeled power system facilities or modeling discrepancies within five (5) business days after identifying the change or discrepancy.

2.2.1 Data Notification Requirements

The following information shall be provided for each power system modeling update:

Change Description: A short description of the power system modeling update.

Facility: The power system facility to be added/modified such as transmission line, transformer, shunt, series reactor, breaker, disconnect, generator, and any associated data identified in this manual.

Station One-Line Diagram: A switching one-line station diagram which indicates the updated facilities before and after the change.

Effective Date and Expected Duration: The expected date and duration of the change. Please note that the request for changes must be provided in writing to the NYISO as soon as possible and no later than sixty (60) days prior to the effective date of the change.

Cut-Over Requirement: If there is any temporary configuration change required for implementation of the new configuration, the NYISO needs to be informed of such temporary operating configuration changes.

2.2.2 New York Transmission Owner Data Coordinator Requirements

The NYISO Control Center Requirements Manual[4] establishes the requirements for Transmission Owner Data Coordinators to provide power system network modeling data and associated real-time measurement data to ensure the proper operation of the NYISO and Transmission Owner computer control energy management systems. These data requirements and the process for periodic updates are described in Section 3.4 of that manual.

In addition to these periodic reporting requirements, Transmission Owner Data Coordinators shall inform the NYISO within the applicable timeline specified above when New York Transmission Owners' real-time system representation data, as described in Section 4 of this manual, require ad-hoc updates.

Notification of changes to real-time system representation data as described in Section 4 should be sent via e-mail to the NYISO Data Coordinator Mailbox: Data_Coordinator@nyiso.com.

2.2.3 NYCA Facility Owner Requirements

In addition to the periodic reporting requirements described in Section 2.1, NYCA Facility Owners shall inform the NYISO and any affected New York Transmission Owners within the applicable timeline specified above of any changes to their facilities described in Section 3 that could affect NYISO operations and planning of the Bulk Power System or the affected Transmission Owners operations and planning of non-Bulk Power System facilities.

Notification of changes to system network representation data as described in Section 3 should be submitted via e-mail to the NYISO System Analysis Data mailbox: System_Analysis_Data@nyiso.com.

2.3 Generation Capability Reporting

NPCC Directory #9: Verification of Generator Gross and Net Real Power Capability and *NPCC Directory #10: Verification of Generator Gross and Net Reactive Power Capability* require the NYISO, as the Transmission Operator, and Generator Owners to comply with NPCC criteria to assure the accuracy of information used in the system network representation to assess the reliability of the NPCC Bulk Power System.

Generators actively participating in the Installed Capacity (ICAP) market are in compliance with Directory #9, in accordance with the NYISO ICAP Manual[5], Section 4.2. Some

[4] Operations folder at http://www.nyiso.com/public/markets_operations/documents/manuals_guides/index.jsp
[5] Operations folder at http://www.nyiso.com/public/markets_operations/documents/manuals_guides/index.jsp

generators in the system network representation are not participating in the ICAP market and must come into compliance with Directory #9 by reporting Real Power Capacity to the NYISO as described in Section 2.3.1 of this manual.

Generators that participate in the Voltage Support Service (VSS) program have no additional testing requirements beyond those required for participation in the VSS program in accordance with Section 3 of the NYISO Ancillary Services Manual[6]. Generators that do not participate in the VSS program must come into compliance with Directory #10 by reporting reactive power capabilities as described in Section 2.3.2 of this manual.

2.3.1 Real Power Capability

Generators operating in the NYCA that do not participate in the ICAP market must submit Dependable Maximum Net Capability (DMNC) data per the specifications in NPCC Directory #9 and in the NYISO ICAP Manual Section 4.2 in order to initially come into compliance. The interval for subsequent reporting of DMNC data for system network representation generators that do not participate in the ICAP market is three (3) years; for example: a DMNC report for Summer 2009 submitted by November 15, 2009 must be followed by a DMNC report for Summer 2012 submitted by November 15, 2012.

Generators in the system network representation will be notified when found non-compliant with Directory #9 requirements and shall report DMNC data as required. Verification criteria for the various generator types to report are detailed in Directory #9 Section D.1.4. The NYISO has determined per Directory #9 that verification will be required for only the Net Real Power Capability (i.e., DMNC).

DMNC data must be reported electronically to the NYISO on the Real Power Capability Reporting Form (Attachment B). The results must be submitted to the NYISO via email at icap_info@nyiso.com.

2.3.1.1 Real Power Capability Demonstration Exemptions

NPCC Directory #9 provides the following exemptions from its reporting requirements related to seasonal capability testing on a generator or generation facility:

1) Adverse impact on transmission system reliability
2) Potential damage to transmission system or generator equipment
3) Environment conditions
4) Governmental regulatory or operating license limitations
5) An extended outage to the generator or generation facility

Requests for exemption for the above listed reasons may be e-mailed to icap_info@nyiso.com. Within 30 days of receiving notification by a Generator Owner that it cannot perform verification testing for the required seasonal period, the NYISO will respond to the Generator Owner's request.

[6] Operations folder at http://www.nyiso.com/public/markets_operations/documents/manuals_guides/index.jsp

2.3.2 Reactive Power Capability

Generators are required to demonstrate their gross leading and lagging reactive power capabilities at least once every five years.[7] This demonstration can be in the form of a scheduled test or operational data. For new units, commissioning data can be used.

The following demonstration rules apply:

- Both leading and lagging reactive power capability must be demonstrated during the summer capability period (May 1 through October 31, inclusive).
- Leading reactive power must be demonstrated for a 15 consecutive minute period.
- Lagging reactive power must be demonstrated for a 60 consecutive minute period.
- Lagging and Leading tests must be performed at the real power levels described in Table 2-1.
- Small units at the same site may apply demonstration results from one unit to another unit at the same site. In order to qualify for this treatment, the units must be electrically identical and must be less than 60 MW nameplate capacity.
- Reactive power demonstration for multiple generator facilities when limited by common elements must be based on the reactive power capability of the facility and not the sum of the capabilities of the individual generators.

Table 2-1: Real Power Level Requirements for Reactive Power Capability Testing

	Intermittent and Limited Control Run-of-River Hydro Resources		**All Other Generators**	
	Lagging	Leading	Lagging	Leading
ICAP Suppliers[1] and Non-ICAP Suppliers with a Valid DMNC Test[2]	≥ 90% of UCAP[3]	≥ 10% of UCAP[3]	≥ 90% of DMNC[4]	≥ 10% of DMNC[4]
All Other Non-ICAP Suppliers	≥ 90% of Generator Nameplate MW	≥ 10% of Generator Nameplate MW	≥ 90% of Generator Nameplate MW	≥ 10% of Generator Nameplate MW

1 *ICAP Supplier* refers to resources qualified to supply UCAP as defined in the *NYISO Services Tariff*.

2 DMNC tests cannot be used for Intermittent or Limited Control Run-of-River Hydro Resources that are not ICAP Suppliers.

3 *Unforced Capacity* (*UCAP*) refers to the rating assigned to ICAP Suppliers as defined in the *NYISO Services Tariff*. The UCAP value that is tested to must correspond to the Available UCAP recorded in the NYISO ICAP Automated Market System.

4 *DMNC* refers to the Dependable Maximum Net that is in effect at the time of the test. The DMNC value that is tested to must correspond to the DMNC recorded in the NYISO ICAP Automated Market System.

[7] For the testing requirements applicable to Generators in the NYISO Voltage Support Service Program, please see the NYISO Ancillary Services Manual.

Demonstration results, including reactive power auxiliary loads, must be reported electronically to the NYISO on the form in Attachment C and should be reported within ten business days of the date of the demonstration. The results must be submitted to the NYISO at vss_test_results@nyiso.com.

If a generator is unable to achieve its reactive power capability for 30 days or more during a capability period, it must report that reduction to the NYISO at vss_test_results@nyiso.com within 30 days after the end of that capability period. The summer capability period is May 1 through October 31, and the winter capability period is November 1 through April 30.

If requested by the NYISO, generators must submit supporting documentation associated with reactive power demonstrations within 30 days of the request.

Demonstration results must be retained by the Generator Owner for the current and most recent prior verification period. Any supplemental engineering analysis to support data for the current and most recent prior verification period must be retained.

2.3.2.1 Reactive Power Capability Demonstration Exemptions

NPCC Directory #10 provides the following exemptions from its reporting requirements related to the requirement to demonstrate leading or lagging reactive power capability:

- Adverse impact on transmission system reliability
- Potential damage to transmission system or generator equipment
- Environmental conditions
- Governmental regulatory or operating license limitations
- An extended outage to the generator or generation facility

If an exemption is given, existing generators must submit certified generator operation records, manufacturer data, or performance tracking for the same previous seasonal verification period. For new generators only, commissioning data must be submitted.

2.4 NYISO Data Screening Procedure

In accordance with NYSRC Reliability Rule C-R4, upon receipt of system network representation model data from a facility owner or Developer, NYISO will screen the data to determine if it is reasonable, as outlined in Attachment D. If suspect data is identified, the results of that screen will be sent electronically to the data owner for their review. The data owner shall respond to the NYISO by the specified deadline and shall either confirm the data is accurate or provide modified data accordingly.

3. SYSTEM NETWORK REPRESENTATION

This section describes the data requirements for system studies. Data for conducting planning and operating studies includes the power flow and short circuit network representation and the necessary dynamic model data for performing stability analysis, as well as network configuration information necessary to define contingency events. The NYISO collects this data from all Transmission Owners and Generation Owners with facilities connected to the NYCA. Facility owners must develop and maintain data for their facilities suitable for modeling both steady-state (power flow and short circuit) and dynamic (stability) analysis. All facility owners must provide this data to the NYISO in accordance with these procedures. All system network representation data is subject to the NYISO Data Screening Procedure, as described in Section 2.4 and Attachment D.

3.1 Network Model Data

The NYISO requires all Transmission Owners, Generation Owners, and Load Serving Entities with facilities connected to the NYCA to provide the NYISO with the appropriate network modeling information. To maintain an accurate network model in accordance with NERC and NPCC requirements, the NYISO requires data for the following facilities, as described in Attachment A:

- AC transmission facilities
- HVDC transmission facilities
- Shunt devices
- Transformers
- Substation and switching station bus configurations
- Substation Loads
- Generating stations and units
- Static VAr compensators or synchronous condensers
- Flexible Alternating Current Transmission System (FACTS) devices
- Voltage Source Converter (VSC) devices

3.2 Facility Ratings

Electrical facilities used in the production, transmission, storage, and delivery of electricity shall be rated in compliance with *NYPP Tie-Line Ratings Report*[8]. These criteria apply to all ratings data required for network modeling and for real-time applications. The base facility rating criteria is described below:

- Facility owners shall document the methodology for determining facility ratings, including delineation and justification of assumptions, standards, and practices used in establishing the ratings. The documentation submitted to the NYISO must state

[8] Planning Data and Reference folder at http://www.nyiso.com/public/markets_operations/services/planning/documents/index.jsp

the ratings and their basis applicable to each of the base case models described Section 1.4.1 of this manual.

- Facility owners shall provide facility ratings (applicable normal, long-term emergency, and short-term emergency) for all facilities required for system modeling as defined in this manual.
- The rating of a system facility (e.g., transmission line, transformer, etc.) shall not exceed the rating of the most limiting series element in the circuit or path of the facility, including terminal connections and associated equipment.
- In cases where protection systems and control settings constitute a loading limit on a facility, this limit shall become the rating for that facility.
- Ratings of jointly owned facilities shall be coordinated and provided on a consistent basis. The ratings submitted shall be agreed to through the consensus of the facility owners.
- Facility ratings should be based on or adhere to applicable national electrical codes and electric industry rating practices consistent with good engineering practice.

3.3 Load Data

The NYISO requires that all Load Serving Entities and Transmission Owners provide actual and forecast demand data for their respective customers for steady state modeling at the bus load level (MW and MVAr), consistent with the *NYISO Load & Capacity Data* report[9].

The NYISO Data Bank bus load data provides for forecast loads for ten (10) years. Upon request and in accordance with Section 2.1, data representing the following loads shall be provided for each of the summer and winter capability periods:

- Coincident (NYISO) peak (MW and MVAr)
- Independent peak (MW and MVAr)
- Off-peak (light) load (MW and MVAr)
- Nominal peak (MW and MVAr)

The off-peak load is defined as the minimum load expected on the day of the system peak, and is generally 40–45% of the season peak. The nominal load is the typical load level expected during Spring or Fall, and is generally 70–75% of the season peak.

3.4 Dynamics Model Data

Many dynamics models are developed by the Institute of Electrical and Electronics Engineers (IEEE); however, many other models are not. The NYISO will provide data sheets for any standard dynamic model in NYISO dynamics software upon request. Submission of dynamics data in the form of raw data files for NYISO dynamics software is also accepted and encouraged. For a few specialized devices, a computer simulation

[9] Planning Data and Reference folder at http://www.nyiso.com/public/markets_operations/services/planning/documents/index.jsp

module for the implementation of the model may also be needed and shall be maintained and provided by the equipment owner to NYISO upon request. The NYISO uses the Siemens Power Technologies, Inc. (PTI) PSS/e power system analysis program. Models directly supported by the PSS/e program are described in the Siemens PTI *PSS/e Manual*.

The dynamics data required by the NYISO includes detailed equipment-specific data for:

- generators and power generating facilities,
- excitation systems and voltage regulators,
- turbine-governor systems,
- power system stabilizers,
- relays and protection equipment (out of step, over-speed, etc.), and
- other control equipment or dynamic devices.

Equipment-specific data includes complete and accurate models of controls suitable for integration with the analytical software. Unit-specific data shall be used for all generator units installed after 1990. Typical manufacturer's dynamics data, based on units of similar design and characteristics, may be used when unit-specific dynamics data cannot be obtained.

3.4.1 Generator Dynamics Data

The NYISO requires a dynamic model for each generator connected to the NYCA. The model for dynamic studies must be in a form usable by the dynamics software employed by the NYISO. For most generators, the following data items constitute a complete dynamic model:

- Rotor type (solid or salient pole)
- Unsaturated values of synchronous, transient, and subtransient reactances [X_{di}, X_{qi}, X_{di}', X_{qi}' (for solid rotors), X_{di}"] in per unit on machine base
- Unsaturated value of leakage reactance (X_{li}) in per unit on machine base
- Transient and subtransient time constants [T_{do}', T_{qo}' (for solid rotors), T_{do}", T_{qo}"] in seconds
- Combined turbine/generator/exciter inertia constant (H) in per unit on machine base
- Shape of saturation curve (quadratic or exponential)
- Saturation factors ($S_{1.0}$, $S_{1.2}$)

Some generators or power generating facilities may require a model which is not supported by an available model in the PSS/e model library. For such generators, the model must include all data and be in a form compatible with NYISO dynamics software.

3.4.2 Generator Controls Dynamics Data

Generators have many associated control systems, including excitation systems, voltage regulators, turbine-governors, and power system stabilizers. The number of different types

of models for each category of control system is large, and each model has different parameters associated with it. Generator Owners must supply all modeling data for each control system on the generator, and must also supply all network dynamics data (e.g., SVCs, synchronous condensers, and monitoring relays) associated with the generator or the generating plant, in a form compatible with NYISO dynamics software.

3.4.3 Network Dynamics Data

Transmission Owners must supply the NYISO with the models for dynamic devices on the transmission network. Examples of such devices include static VAr compensators (SVCs), synchronous condensers, FACTS controls, HVDC and VSC devices, and monitoring relays. For each such dynamic device, the Transmission Owner must supply the NYISO with a dynamic model and all associated data in a form compatible with NYISO dynamics software.

3.4.4 Load Dynamics Model Data

Some large loads include synchronous or induction motors or other equipment or characteristics that may have a significant impact on the dynamic response of the New York State Power System. For each such device on the system, the Load Serving Entity must provide the NYISO with a dynamics model and all associated data in a form usable by NYISO dynamics software. Load Serving Entities may consult their host Transmission Owner for guidance on which loads, if any, need to be included in NYISO dynamic studies.

3.5 Short Circuit Data

The NYISO shall maintain a uniform short circuit representation for fault analysis. The Transmission Owners shall periodically review and update their respective portions of the representation, in accordance with Section 2.

It is necessary for the NYISO to maintain a current short circuit representation to ensure availability of this data for any necessary analyses required in a system impact study in accordance with the *NYISO Transmission Expansion and Interconnection Manual*[10]. Voltage and dynamic stability studies for either system reliability or operating security also require accurate short circuit data.

Specific data necessary for fault current analysis includes:

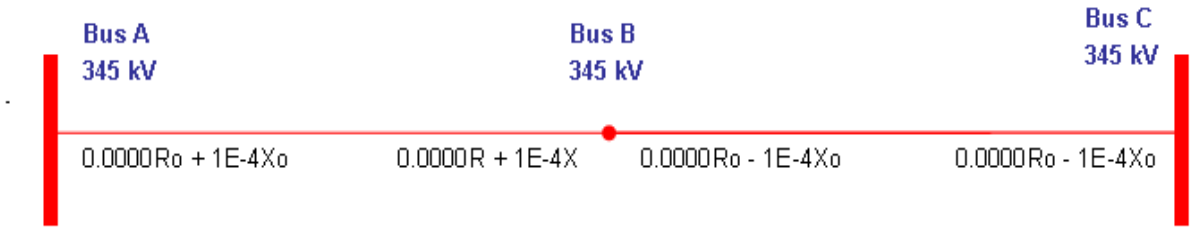
- transmission line and transformer positive, negative, and zero sequence impedances
- transmission line mutual impedances
- synchronous machine saturated values of synchronous, transient, and subtransient reactances [X_{dv}, X_{qv}, X_{dv}', X_{qv}' (for solid rotors), X_{dv}"] in per unit on machine base
- synchronous machine zero-sequence reactance X_{0v}

[10] Planning folder at http://www.nyiso.com/public/markets_operations/documents/manuals_guides/index.jsp

To the extent possible, bus names and numbers in the short circuit representation should be consistent with the power flow network model and line names should be consistent with the Facility Owner's line identification number.

Zero-impedance lines shall be represented in the short circuit representation as two line segments in series: one with an impedance of 0.0000+j0.0001 per-unit and the second with an impedance of 0.0000-j0.0001 per-unit, as shown in Figure 3-1.

Figure 3-1: Zero Impedance Line from Bus A to Bus C



The NYISO uses the ASPEN One-Liner program; however, new data or modifications to existing data may be submitted in any of the standard data formats used by the industry which are compatible with ASPEN.

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4. REAL-TIME SYSTEM REPRESENTATION

This section describes the data requirements, formats, and procedures used in modeling and maintaining the NYISO/NYCA system representation used for real-time analysis. The Energy Management System (EMS) model is also used in the day-ahead Security Constrained Unit Commitment (SCUC) and Real Time Commitment (RTC) and Real Time Dispatch (RTD) processes.

4.1 Real-Time System Representation Data

The NYISO EMS representation data includes the following data groups:

- Substation data
- Busbar data
- Synchronous Machine data
- Conductor data
- Transformer data
- Energy Consumer data (Load)
- Compensator data (Shunts)
- Switch data
- Static Var Compensator data
- Facility Rating data

Attachment F of this manual contains a sample of each of these data groups and the EMS Data Specifications.

4.1.1 System Network Representation Data

The representational data in each of the data groups cited in Section 4.1 must be provided to model the NYISO-secured facilities to ensure accurate modeling in real-time system operation. In addition, all applicable real-time metering for facilities must be provided to the NYISO (MW, MVar, Tap position, kV, breaker or switch status points, facility seasonal ratings and dynamic ratings). The exact location of metering should be indicated on the substation one line diagram where the corresponding instrument transformer(s) is located.

Whenever possible, the data exchange Inter-Control Center Communications Protocol (ICCP) should be pre-assigned by the Transmission Owner Data Coordinator so that the NYISO can implement metering database updates in advance of the actual metering becoming available.

4.1.2 Facilities Ratings Data

All facilities represented in the NYISO-secured system must be provided with thermal rating data in accordance with the *NYPP Tie-Line Ratings Report*[11]. Included in these ratings are the Normal, Long-Term Emergency, and Short-Term Emergency ratings for each of the summer and winter capability periods. It is the responsibility of the Facility Owner to provide timely updates of these facility ratings to NYISO staff in accordance with Section 2.2.

Where a facility involves multiple-party ownership, each owning party shall provide their respective ratings of their owned portion of the facility. NYISO staff shall coordinate the data to ensure that the proper ratings are used.

4.1.3 Dynamic Rating Updates

All transmission lines and power transformers included in the NYISO-secured facilities system representation and those that have real power (megawatt) telemetering transmitted to the NYISO Control Center are reviewed by the NYISO Data Coordinator to determine which facilities are critical to system security.

These facilities are included on the Dynamic Rating List as shown in Attachment E of this manual.

Dynamic ratings are normally updated by coded messages sent to the NYISO Control Center via computer to computer data links. (See the *NYISO Control Center Requirements Manual*[12])

Updated ratings entered in the NYISO Control Center computer are used immediately. The rating of a facility may be changed only by the Rating Authority (see Attachment E).

If computer facilities are not available, the NYISO Shift Supervisor may manually enter dynamic ratings into the NYISO Control Center computer upon receipt of verbal instruction from the Rating Authority only.

A message is returned to the rating authority, reporting the status of each update. For jointly owned facilities within the NYISO, all involved parties receive notice of all rating changes.

4.2 Operating System Representation

The NYCA operating system representation is used for short-term and mid-range system studies. These studies include the following:

- Operating Studies including:
  - interface thermal limit analysis,
  - system studies for voltage limits, and
  - system dynamic analysis

[11] Planning Data and Reference folder at http://www.nyiso.com/public/markets_operations/services/planning/documents/index.jsp
[12] Operations folder at http://www.nyiso.com/public/markets_operations/documents/manuals_guides/index.jsp

4.2.1 Operating System Representation Definitions

The following terms are used to describe different components of or references to the operating system representation:

- ***Detailed System Representation***: A power flow that contains the full extent of detail available from the NYISO Data Bank for the appropriate season (summer or winter) represented and is most suitable for Market Participant review.
- ***Reduced System Representation***: A power flow reduction of the Detailed System Representation which is employed for inter-regional analysis, such as the MMWG representations addressed in Section 1.4.3. The Reduced System Representation is approximately one half the size of the Detailed System Representation. The Reduced System Representation employs a network equivalent for the network below 100 kV.
- ***Seasonal Operating Studies Base Case***: The power flow base case used for establishing seasonal transfer limits, day-ahead analysis, and stability transfer and voltage limit development analysis.

4.2.2 System Representation Review Procedure

The following procedure describes the process followed to review and edit the NYISO Seasonal Operating Study Base case System Representation.

1) The NYISO Operating Studies Task Force (OSTF) shall review the Detailed System Representation power flow base case prior to the start of each Seasonal Operating Study.
2) If changes are applicable to the NYISO Data Bank base cases, members of the OSTF shall communicate these changes to the Transmission Owner Data Coordinators, and the Transmission Owner Data Coordinators shall submit these changes to the NYISO Data Coordinator.
3) The NYISO Operations Engineering staff shall review and update the Seasonal Operating Study Base case representation as necessary for changes corresponding to revisions to the EMS representation.

4.2.3 Review of Real-time Contingencies and Monitored Lines

Upon completion of the annual review, the following actions are required.

1) The NYISO sends a copy of the real-time contingencies and monitored lines to the OSTF for review. This includes the lists of multiple-circuit tower, bus-fault, and delayed clearing contingencies, thunderstorm watch multiple element contingencies, and any exceptions to the criteria.
2) OSTF approves the new list of real-time contingencies and monitored lines.
3) NYISO Operations Engineering staff modifies the contingency and monitored lines to reflect any corrections.

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Attachment A. NYISO Power Flow Data Bank Forms

The attached forms describe the network model data contained in the NYISO Power Flow Data Bank, as described in Section 3.1.

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Attachment B. Real Power Capability Reporting Form

In accordance with Section 2.3.1, DMNC data must be reported electronically to the NYISO on the Real Power Capability Reporting Form spreadsheet, posted with this manual. The results must be submitted to the NYISO via email at icap_info@nyiso.com.

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Attachment C. Reactive Power Capability Reporting Form

In accordance with Section 2.3.2, reactive power capability demonstration results, including reactive power auxiliary loads, must be reported electronically to the NYISO on the Reactive Power Capability Reporting Form spreadsheet, posted with this manual. The results must be submitted within ten business days of the date of the demonstration. The results must be submitted to the NYISO at vss_test_results@nyiso.com.

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Attachment D. NYISO Data Screening Procedure

In accordance with NYSRC Reliability Rule C-R4, upon receipt of system network representation model data from a facility owner or Developer, NYISO will screen the data to determine if it is reasonable. If suspect data is identified, the results of that screen will be sent electronically to the data owner for their review. The data owner shall respond to the NYISO by the specified deadline and shall either confirm the data is accurate or provide modified data accordingly.

If any model data meets the following conditions, that data will be identified as suspect data:

A. Power Flow

1. Generator data checks:
   - PGEN < PMIN
   - PGEN > PMAX
   - PGEN < 0
   - PMAX < PMIN
   - QMAX < QMIN
   - Machine with MBASE < PMAX
   - Machine with MBASE = 0
   - Small X"d impedance (less than 0.05 p.u. on machine MVA base)
   - Large X"d impedance (greater than 0.50 p.u. on machine MVA base)

2. Non-Transformer Branch data checks:
   - Small impedance (less than 0.0001 p.u. on 100 MVA base)
   - Large impedance (greater than 3.0 p.u. on 100 MVA base)
   - High R/X ratio (absolute value of R greater than absolute value of X)
   - High X/R ratio (X/R ratio greater than 12)
   - Low X/R ratio (X/R ratio less than 3)
   - High charging (greater than 5.0 or negative)
   - Branch long-term emergency ratings (RATE B) or short-term emergency ratings (RATE C) less than the normal ratings (RATE A)
   - Branch long-term emergency ratings (RATE B) greater than the short-term emergency ratings (RATE C)

3. Transformer data checks:
   - Small impedance (less than 0.01 p.u. on transformer base)
   - Large impedance (greater than 0.30 p.u. on transformer base)
   - High R/X ratio (absolute value of R greater than absolute value of X)
   - High X/R ratio (X/R ratio greater than 40)
   - Low X/R ratio (X/R ratio less than 10)
   - Tap step = 0.0

- Small tap steps (less than 0.00625)
- RMAX, RMIN, VMAX, or VMIN = 0.0
- High tap ratios (greater than 1.20)
- Low tap ratios (less than 0.90)

B. Dynamics

1. Generator data checks:

   - X”d > X’d
   - X’d > Xd
   - Xl > X”d
   - T’d0 < T”d0
   - Machine with MBASE < PMAX
   - Machine with MBASE = 0
   - Small X”d impedance (less than 0.05 p.u. on machine MVA base)
   - Large X”d impedance (greater than 0.50 p.u. on machine MVA base)
   - Does it have the exciter model?
   - Does it have the governor model?
   - Does it have the stabilizer model?

C. Short Circuit

1. Generator data checks:

   - X”d > X’d
   - X’d > Xd
   - Machine with MBASE < PMAX
   - Machine with MBASE = 0
   - Small X”d impedance (less than 0.05 p.u. on machine MVA base)
   - Large X”d impedance (greater than 0.50 p.u. on machine MVA base)

2. Non-Transformer Branch data checks:

   - Small impedance (less than 0.0001 p.u. on 100 MVA base)
   - Large impedance (greater than 3.0 p.u. on 100 MVA base)
   - High R/X ratio (absolute value of R greater than absolute value of X)
   - High X/R ratio (X/R ratio greater than 12)
   - Low X/R ratio (X/R ratio less than 3)

3. Transformer data checks:

   - Small impedance (less than 0.01 p.u. on transformer base)
   - Large impedance (greater than 0.30 p.u. on transformer base)
   - High R/X ratio (absolute value of R greater than absolute value of X)
   - High X/R ratio (X/R ratio greater than 40)
   - Low X/R ratio (X/R ratio less than 10)

Attachment E. NYISO Dynamic Rating Facilities

Table E-1 designates those facilities that can be updated and designates which Transmission Owner is the Rating Authority for each facility.

When a facility is to be updated, the Rating Authority must address the facility consistent with the form in which it is listed and shown in the operating system representation. If a facility is listed as a combination (those parallel facilities bussed at both ends and metered as a net), the combination rating must be updated; if the facility is listed individually, the individual facility must be updated.

Rating reductions caused by abnormal operating conditions, such as a breaker out of service in a breaker-and-a-half scheme, cooling reduced on a facility normally forced cooled, etc., must also be reflected in the updated rating.

Combinations

In the case of a combination, the updating should address the combination for the condition of all facilities in service. Programs at the NYISO modify that combination rating to reflect the current status of relevant facilities that are out of service.

Series Elements between the Two Terminals Listed

Ratings entered for a metered facility must reflect the most limiting element(s) in the series path between the two terminals listed.

Table E-1: Table of Facilities That Can Be Updated Dynamically (Listing by Rating Authority)

Transmission Owner	Circuit Name	PTID
CECONY	BRANCHBG-RAMAPO___500_5018	25019
CECONY	ASTANNEX-E13THSTA_345_Q35L	25134
CECONY	ASTANNEX-E13THSTA_345_Q35M	25142
CECONY	ASTENRG2-ASTANNEX_345_G13	325744
CECONY	ASTORIAE-CORONA___138_34181	25277
CECONY	ASTORIAE-CORONA___138_34182	25278
CECONY	ASTORIAE-CORONA___138_34183	25279
CECONY	ASTORIAE-CORONA___138_34184	25280
CECONY	ASTORIAE-CORONA___138_34185	25281
CECONY	ASTORIAE-CORONA___138_34186	25282
CECONY	ASTORIAW-QUENBRDG_138_28241	25315
CECONY	ASTORIAW-QUENBRDG_138_28242	25316
CECONY	ASTORIAW-QUENBRDG_138_28243	25317
CECONY	ASTORIAW-QUENBRDG_138_28244	25318
CECONY	BUCHAN_N-BUCHANAN_138_95891	25568

Transmission Owner	Circuit Name	PTID
CECONY	BUCHAN_N-EASTVIEW_345_W93	25133
CECONY	BUCHAN_S-MILLWOOD_345_W97	25146
CECONY	BUCHAN_S-MILLWOOD_345_W98	25247
CECONY	BUCHANAN-MILLWOOD_138_96951	25283
CECONY	BUCHANAN-MILLWOOD_138_96952	25284
CECONY	CORONA__-JAMAICA__138_18001	25285
CECONY	CORONA__-JAMAICA__138_18002	25286
CECONY	DUNWODIE_345_138_BK N1_W74	25209
CECONY	DUNWODIE_345_138_BK S1_W73	25208
CECONY	DUNWODIE-E179THST_138_99153	25287
CECONY	DUNWODIE-MOTTHAVN_345_71	25151
CECONY	DUNWODIE-MOTTHAVN_345_72	25191
CECONY	DUNWODIE-SHERMCRK_138_99031	25193
CECONY	DUNWODIE-SHERMCRK_138_99032	25239
CECONY	DUNWODIE-SHORE_RD_345_Y50	25091
CECONY	E13THSTA_345_138_BK 10	25467
CECONY	E13THSTA_345_138_BK 11	25468
CECONY	E13THSTA_345_138_BK 12	25463
CECONY	E13THSTA_345_138_BK 13	25464
CECONY	E13THSTA_345_138_BK 14	25465
CECONY	E13THSTA_345_138_BK 15	25466
CECONY	E13THSTA_345_138_BK 16	25469
CECONY	E13THSTA_345_69__BK 17	25459
CECONY	E13THSTA-FARRAGUT_345_45	25190
CECONY	E13THSTA-FARRAGUT_345_46	25251
CECONY	E13THSTA-FARRAGUT_345_47	25177
CECONY	E13THSTA-FARRAGUT_345_48	25252
CECONY	E179THST-HELLGT_E_138_15053	25289
CECONY	E179THST-HELLGT_E_138_15054	25290
CECONY	E179THST-HELLTP_W_138_15055	25288
CECONY	E179THST-PARKCHTR_138_38X01	25327
CECONY	E179THST-PARKCHTR_138_38X02	25328
CECONY	E179THST-PARKCHTR_138_38X03	25329
CECONY	E179THST-PARKCHTR_138_38X04	25330
CECONY	EASTVIEW_345_138_BK 1N	25472
CECONY	EASTVIEW_345_138_BK 1S	25373
CECONY	EASTVIEW_345_138_BK 2N	25471
CECONY	EASTVIEW_345_138_BK 2S	25470

Transmission Owner	Circuit Name	PTID
CECONY	EASTVIEW-SPRNBRK__345_W64	25143
CECONY	EASTVIEW-SPRNBRK__345_W65	25144
CECONY	EASTVIEW-SPRNBRK__345_W78	25346
CECONY	EASTVIEW-SPRNBRK__345_W79	25153
CECONY	EFISHKCH_345_115_BK 1	25724
CECONY	EFISHKIL-WOOD_ST__345_F38	25367
CECONY	EFISHKIL-WOOD_ST__345_F39	25368
CECONY	FARRAGUT-GOWANUS__345_41	25141
CECONY	FARRAGUT-GOWANUS__345_42	25140
CECONY	FARRAGUT-HUDS_AVE_138_32077	25291
CECONY	FARRAGUT-HUDS_AVE_138_32078	25292
CECONY	FARRAGUT-HUDS_AVE_138_32711	25293
CECONY	FOXHILLS-WILLWBRK_138_29211-1	25771
CECONY	FOXHILLS-WILLWBRK_138_29212-1	25772
CECONY	FRESHKLS_345_138_TA 1	25457
CECONY	FRESHKLS_345_138_TB 1	25458
CECONY	GOETHLSS-FRESHKLS_345_21	25138
CECONY	GOETHLSS-LINDN_CG_345_G23L	26000
CECONY	GOETHLSS-LINDN_CG_345_G23M	325203
CECONY	GOETHSLN-FRESHKLS_345_22	25137
CECONY	GOWANUS_-GOETHLSS_345_26	25571
CECONY	GOWANUS_-GOETHSLN_345_25	25139
CECONY	GOWANUS_-GREENWD__138_42231	25214
CECONY	GOWANUS_-GREENWD__138_42232	25215
CECONY	GREENWD_-FOXHILLS_138_29231	25321
CECONY	GREENWD_-FOXHILLS_138_29232	25322
CECONY	HELLGT_E-ASTORIAE_138_34051	25323
CECONY	HELLGT_E-ASTORIAE_138_34052	25324
CECONY	HELLGT_W-ASTORIAW_138_24051	25210
CECONY	HELLGT_W-ASTORIAW_138_24052	25211
CECONY	HELLGT_W-ASTORIAW_138_24053	25212
CECONY	HELLGT_W-ASTORIAW_138_24054	25213
CECONY	HUDS_AVE-JAMAICA__138_701	25294
CECONY	HUDS_AVE-JAMAICA__138_702	25295
CECONY	HUDSONP_-FARRAGUT_345_B3402	25020
CECONY	HUDSONP_-FARRAGUT_345_C3403	25038
CECONY	JAMAICA_-LAKSUCSS_138_903	25090
CECONY	JAMAICA_-VALLYSTR_138_901 L_M	25048

Transmission Owner	Circuit Name	PTID
CECONY	KENTAVE_-GREENWD__138_31232-2	25299
CECONY	LADENTWN-BOWLINE__345_68	25249
CECONY	LADENTWN-BUCHAN_S_345_Y88	25185
CECONY	LADENTWN-WHAVSTRW_345_67-2	25248
CECONY	LINDENP_-GOETHSLN_230_A2253	25017
CECONY	LONG_MTN-PLSNTVLY_345_398	25033
CECONY	MILLWOOD-EASTVIEW_345_W82	25147
CECONY	MILLWOOD-EASTVIEW_345_W85	25258
CECONY	MILLWOOD-EASTVIEW_345_W99	25255
CECONY	MOTTHAVN-RAINEY___345_Q11	325430
CECONY	MOTTHAVN-RAINEY___345_Q11	325430
CECONY	MOTTHAVN-RAINEY___345_Q12	325431
CECONY	MOTTHAVN-RAINEY___345_Q12	325431
CECONY	PLSNTVLE_345_13__BK 1	25477
CECONY	PLSNTVLE_345_13__BK 2	25478
CECONY	PLSNTVLY-EFISHKIL_345_F36	25256
CECONY	PLSNTVLY-EFISHKIL_345_F37	25257
CECONY	PLSNTVLY-WOOD_ST__345_F30	25237
CECONY	PLSNTVLY-WOOD_ST__345_F31	25238
CECONY	QUENBRDG-VERNON___138_31281	25159
CECONY	QUENBRDG-VERNON___138_31282	25160
CECONY	RAINEY__-FARRAGUT_345_61	25152
CECONY	RAINEY__-FARRAGUT_345_62	25253
CECONY	RAINEY__-FARRAGUT_345_63	25254
CECONY	RAINEY__-VERNON___138_36311	25296
CECONY	RAINEY__-VERNON___138_36312	25297
CECONY	RAMAPO___345_345_PAR3500	25370
CECONY	RAMAPO__-BUCHAN_N_345_Y94	25184
CECONY	RAMAPO__-LADENTWN_345_W72	25233
CECONY	ROCKTVRN-RAMAPO___345_77	25183
CECONY	SHERMCRK-ACADEMY__138_331	325755
CECONY	SHERMCRK-ACADEMY__138_332	325754
CECONY	SHERMCRK-E179THST_138_15031	25156
CECONY	SHERMCRK-E179THST_138_15032	25157
CECONY	SMAHWAH_-RAMAPO___345_69	25021
CECONY	SMAHWAH_-RAMAPO___345_70	25259
CECONY	SPRNBRK_-ACADEMY__345_M29	325756
CECONY	SPRNBRK_-DUNWODIE_138_99941	25245

Transmission Owner	Circuit Name	PTID
CECONY	SPRNBRK_-DUNWODIE_138_99942	25246
CECONY	SPRNBRK_-DUNWODIE_345_W75	25071
CECONY	SPRNBRK_-TREMONT__345_X28	25175
CECONY	SPRNBRK_-W49TH_ST_345_M51	25053
CECONY	SPRNBRK_-W49TH_ST_345_M52	25223
CECONY	TREMONT__138A_138B_BK 11	25649
CECONY	TREMONT__138C_138D_BK 12	25650
CECONY	VERNON__-GREENWD__138_31231	25337
CECONY	W49TH_ST-E13THSTA_345_M54	25228
CECONY	W49TH_ST-E13THSTA_345_M55	25222
CECONY	WALDWICK-SMAHWAH__345_J3410	25032
CECONY	WALDWICK-SMAHWAH__345_K3411	25039
CECONY	WILLWBRK-FRESHKLS_138_29211-2	25319
CECONY	WILLWBRK-FRESHKLS_138_29212-2	25320
CECONY	WOOD_ST_-MILLWOOD_345_W80	25148
CECONY	WOOD_ST_-PLSNTVLE_345_Y86	25358
CECONY	WOOD_ST_-PLSNTVLE_345_Y87	25132
CHGE	COOPERS_-MIDDLETP_345_CMT-34	25110
CHGE	COOPERS_-ROCKTVRN_345_CRT-42	25111
CHGE	FISHKPLN-SYLVANLK_115_FP	25066
CHGE	HURLYAVE_345_115_BK 1	25419
CHGE	HURLYAVE-ROSETON__345_303	25218
CHGE	LEEDS___-HURLYAVE_345_301	25055
CHGE	PLSTVYCH_345_115_BK S1	25382
CHGE	ROCKTVRN_345_115_BK TR1	25406
CHGE	ROSETON_-EFISHKIL_345_305	25108
CHGE	ROSETON_-ROCKTVRN_345_311	25069
LILCO	EGRDNCTY_345_138_BK 1	25551
LILCO	EGRDNCTY_345_138_BK 2	25552
LILCO	EGRDNCTY-NEWBRDGE_138_462	25303
LILCO	EGRDNCTY-NEWBRDGE_138_463	25304
LILCO	FREEPORT-NEWBRDGE_138_461	25155
LILCO	LOCUSTGR-NEWBRDGE_138_558	25158
LILCO	NEWBRDGE-RULAND___138_561	25305
LILCO	NEWBRDGE-RULAND___138_562	25306
LILCO	NRTH1385-NRTHPORT_138_1385	25035
LILCO	NRTHPORT-ELWOOD___138_678	25543
LILCO	NRTHPORT-ELWOOD___138_681	25544

Transmission Owner	Circuit Name	PTID
LILCO	NRTHPORT-PILGRIM__138_672	25307
LILCO	NRTHPORT-PILGRIM__138_677	25308
LILCO	NRTHPORT-PILGRIM__138_679	25309
LILCO	RULAND__-PILGRIM__138_661	25310
LILCO	RULAND__-PILGRIM__138_662	25311
LILCO	SHORE_RD_345_138_BK 1	25439
LILCO	SHORE_RD_345_138_BK 2	25440
LILCO	SHORE_RD-GLENWD___138_365	25205
LILCO	SHORE_RD-GLENWD___138_366	25154
LILCO	SHORE_RD-LAKSUCSS_138_367	25145
LILCO	SHORE_RD-LAKSUCSS_138_368	25150
LILCO	SPRNBRK_-EGRDNCTR_345_Y49	25105
LILCO	VALLYSTR-BARRETT__138_291	25312
LILCO	VALLYSTR-BARRETT__138_292	25313
LILCO	VALLYSTR-EGRDNCTY_138_262	25244
NG	ADIRNDCK-CHASLAKE_230_13	325233
NG	ADIRNDCK-EDIC_PTR_230_12-AP	25082
NG	ALCOA___-DENNISON_115_12-AD	25227
NG	ALCOA___-NOGDNBRG_115_13-ANO	25230
NG	ALCOA_N.-ALCOA____115_R8105	25202
NG	ATHENS__-PLSNTVLY_345_91	25054
NG	BEAR SWP-ROTTRDAM_230_E205W	25030
NG	BECK NM_-SWANROAD_115_104-1	25042
NG	BECK____-PACKARD__230_BP76	25024
NG	BERKSHIR-ALPS_____345_393	25034
NG	BLISSVIL-WHITEHAL_115_7	25028
NG	BNNINGTN-HOOSICK__115_K6	25029
NG	CHASLAKE-EDIC_PTR_230_11	25051
NG	CLAY_____345_115_BK 1	25387
NG	CLAY_____345_115_BK 2	25421
NG	CLAY____-DEWITT___345_13-CD	25168
NG	DENNISON-NORFOLK__115_4-DA	25225
NG	DENNISON-SANDSTON_115_5-DS	25226
NG	DEWITT___345_115_BK 1	325221
NG	DEWITT___345_115_BK 2	25418
NG	DUNKIRK__230_115_BK 31	25386
NG	DUNKIRK__230_115_BK 41	25430
NG	EDIC_PTR_230_115_BK 1P	25389

Transmission Owner	Circuit Name	PTID
NG	EDIC_PTR_230_115_BK 2P	25423
NG	EDIC_PTR_345_115_BK 3E	25424
NG	EDIC_PTR_345_115_BK 4E	25454
NG	EDIC_PTR_345_230_BK 2E	25422
NG	EDIC_PTR-FRASER___345_EF24-40	25112
NG	EDIC_PTR-N.SCTLND_345_14-EN	25170
NG	EDIC_PTR-ROTTRDAM_230_30-PR	25173
NG	EDIC_PTR-ROTTRDAM_230_31-PR	25194
NG	EDIC_PTR-VALLEY___115_4-PV	25231
NG	EDIC_PTR-WATKINRD_115_5-PW	25232
NG	ELBRIDGE_345_115_BK 1	25448
NG	ELBRIDGE-LAFAYTTE_345_17-LE	25149
NG	ERIEEAST-S.RIPLEY_230_69	25016
NG	FEURABSH-NCATSKLL_115_2-FN	25067
NG	GARDNVLB_230_115_BK 2	25385
NG	GARDNVLB_230_115_BK 3	25416
NG	GARDNVLB_230_115_BK 4	25417
NG	GARDNVLB-DUNKIRK__230_73	25166
NG	GARDNVLB-DUNKIRK__230_74	25197
NG	HUNTLEY_-SAWYER___230_79	25127
NG	HUNTLEY_-SAWYER___230_80	25128
NG	INGHAM_C_115_115_PAR 2	25242
NG	INGHAM_C-INGHAM_E_115_R81	25243
NG	INGHAM_E-ESPRGFLD_115_7	25061
NG	LAFAYTTE-CLRKSCRN_345_4-46	25049
NG	LAFAYTTE-DEWITT___345_22-DL	25174
NG	LEEDS___-ATHENS___345_95	25789
NG	LEEDS___-PLSNTVLY_345_92	25056
NG	LOCKPORT-HINMAN___115_100	25087
NG	LOCKPORT-N.AKRN_1_115_108-2	25266
NG	LOCKPORT-OAKFIELD_115_112-1	25300
NG	LOCKPORT-SWEDEN_A_115_111-1	25262
NG	LOCKPORT-SWEDEN_B_115_113-1	25263
NG	LOCKPORT-TELGRAPH_115_107-1	25265
NG	LOCKPORT-TELGRAPH_115_114-1	25264
NG	MARCY___-N.SCTLND_345_18	25276
NG	MORTIMER-FAIRPRTA_115_1-FM	25163
NG	MORTIMER-FAIRPRTB_115_2-FM	25240

Transmission Owner	Circuit Name	PTID
NG	MORTIMER-PITSFRDB_115_24-1	25096
NG	MORTIMER-PITSFRDC_115_25-1	25095
NG	N.AKRN_1-BATAVIA__115_107-3	25124
NG	N.AKRN_1-BATAVIA__115_108-1	25125
NG	N.SCTLND_345_115_BK 1	25445
NG	N.SCTLND_345_115_BK 2	25460
NG	N.SCTLND-ALPS_____345_2-AN	25217
NG	N.SCTLND-FEURABSH_115_3-NF	25495
NG	N.SCTLND-LEEDS____345_93-LN	25171
NG	N.SCTLND-LEEDS____345_94-LN	25203
NG	NIAGARA_-GARDNVLB_115_180	25104
NG	NIAGARA_-LOCKPORT_115_101	25267
NG	NIAGARA_-MOUNTAIN_115_120	25135
NG	NIAGARA_-PACKARD__115_191	25075
NG	NIAGARA_-PACKARD__115_192	25099
NG	NIAGARA_-PACKARD__115_193	25100
NG	NIAGARA_-PACKARD__115_194	25101
NG	NIAGARA_-PACKARD__115_195	25102
NG	NIAGARA_-PACKARD__230_61	25186
NG	NIAGARA_-PACKARD__230_62	25220
NG	NINEMILE-CLAY_____345_8-NC	25167
NG	NINEMILE-SCRIBA___345_9-NS	25359
NG	OAKFIELD-BATAVIA__115_112-2	25126
NG	OSWEGO__-ELBRIDGE_345_17-EO	25234
NG	OSWEGO__-VOLNEY___345_11-OV	25199
NG	OSWEGO__-VOLNEY___345_12-OV	25201
NG	PACKARD__230_115_BK 3	25414
NG	PACKARD__230_115_BK 4	25415
NG	PACKARD_-SAWYER___230_77	25164
NG	PACKARD_-SAWYER___230_78	25195
NG	PANNELRG-FARMGTN__115_4-FP	25080
NG	PARISHVL-COLTON___115_3-CP	25241
NG	REYNOLDS_345_115_BK 2	25403
NG	ROTTRDAM_230_115_BK 6	25407
NG	ROTTRDAM_230_115_BK 7	25392
NG	ROTTRDAM_230_115_BK 8	25413
NG	S.RIPLEY-DUNKIRK__230_68	25045
NG	SANDBORN-LOCKPORT_115_102-1	26052

Transmission Owner	Circuit Name	PTID
NG	SCRIBA__-FITZPTRK_345_FS-10	25076
NG	SCRIBA__-VOLNEY___345_20-SV	25204
NG	SCRIBA__-VOLNEY___345_21-SV	25314
NG	SUNY_77_-GARDNVLB_230_79-1	25165
NG	SUNY_78_-GARDNVLB_230_80-1	25196
NG	SWANROAD-LOCKPORT_115_103-1	26051
NG	SWEDEN_A-MORTIMER_115_111-2	25347
NG	SWEDEN_B-MORTIMER_115_113-2	25348
NG	TELGRAPH-MORTIMER_115_114-2	25349
NG	VOLNEY__-CLAY_____345_6-CV	25198
NG	VOLNEY__-MARCY____345_19	25345
NG	WARREN__-FALCONER_115_171	25015
NG	WATKINRD-INGHAM_C_115_2-WI	25805
NYPA	S HERO__-PLATSBRG_115_PV20	25027
NYPA	STLAWRNC-MOSES____230_L33P	25026
NYPA	STLAWRNC-MOSES____230_L34P	25037
NYSEG	*none*	
O&R	RAMAPO___345_138_BK 1300	25441
O&R	RAMAPO___345_138_BK 2300	25442
O&R	ROCKTVRN-SUGRLOAF_115_SL	25420
O&R	SMAHWAH__345_138_BK 258	25393
O&R	WHAVSTRW_345_138_BK 194	25447
RG&E	ROCHESTR_345_115_BK 3	25446
RG&E	CLYDE____115_34__TR1	25221
RG&E	GINNA___-PANNELRG_115_912	25260
RG&E	PANNELL__345_115_BK 1	25396
RG&E	PANNELL__345_115_BK 2	25431
RG&E	PANNELL__345_115_BK 3	25572
RG&E	QUAKERRD-PANNELRG_115_914	25261
RG&E	ROCHESTR_345_115_BK 1	25412
RG&E	ROCHESTR_345_115_BK 2	25432
RG&E	STA_162_-S.PERRY__115_906- 7X	25062
RG&E	STA_33__-MORTIMER_115_901-2	25097
RG&E	STA_82__-MORTIMER_115_7X8272	25098

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Attachment F. NYISO EMS Common Information Model Data Base

The following tables describe the NYISO EMS representation data groups, as described in Section 4.1.

Table F-1: Substation data

Substation Data

Attribute Name	Example
Busbar Name	ASTORIAE
Substation	Substation
FK_SubControlArea	CENY
FK_Company	C E
FK_LoadArea	N.Y.C.

Data Supplier Key:
TO/GO supplies
NYISO determines

Table F-2: Busbar data

BusBar Data

Attribute Name	Example
name	ASTORIAE_138____6_____ND
description	330021
SubtypeCode	Busbar Section
phases	ABC
D_ConnectivityNode_rdfID	ConnectivityNode-7451
FK_Substation	ASTORIAE
FK_VoltageLevel	138

Data Supplier Key:
TO/GO supplies
NYISO determines

Table F-3: Synchronous Machine data

Synchronous Machine Data

Attribute Name	Example
name	ARTHUR_KILL_2
description	23512
SubtypeCode	Generator
phases	ABC
FK_Substation	FRESHKLS
FK_VoltageLevel	20
FK_AggGeneratingUnit	
FK_GeneratingUnit	ARTHUR_KILL_2
FK_Measurement	Measurement-BB-KV4
maximumMVAR	312
minimumMVAR	-186
rDemandAccOutputLimitHigh	350
rDemandAccOutputLimitLow	0

Data Supplier Key:
TO/GO supplies
NYISO determines

Table F-4: Conductor data

Conductor Data

Attribute Name	Example
name	ASTORIAE-CORONA___138_34186
description	25282
SubtypeCode	AC Line Segment
phases	ABC
FK_Company_RatingsAuthority	C E
baseVoltage	138
bch	0.22
r	0.00159
x	0.00688
rDaysReqForNotification	2

Data Supplier Key:
TO/GO supplies
NYISO determines

Table F-5: Transformer data

Transformer Data

Attribute Name	Example
name	ASTORIA3_138_20__BK 3N
description	70124
SubtypeCode	Two Winding
phases	ABC
FK_Substation	ASTORIA3
transformer Type	Fix
rPhaseShiftController	No
rTapData	Yes
SubtypeCode	TransformerWinding
VoltagLevelHighSide	138
VoltagLevelLowSide	20
bch	0
r	0
x	0.0644
highStep	33
lowStep	1
neutralAngle	0
newtralKV	125.44
newtralStep	1
normalStep	17
stepPhaseShifterIncremental	0.775

Data Supplier Key:
TO/GO supplies
NYISO determines

Table F-6: Energy Consumer data

Energy Consumer Data (Load)

Attribute Name	Example
name	ASTORIAE_138KV_NQ_38Q11
description	335517
SubtypeCode	Equivalent Load
phases	ABC
FK_Substation	ASTORIAE
FK_VoltageLevel	138
conformingLoadFlag	Yes
pFixed	70.30000305
qFixed	18.5

Data Supplier Key:
TO/GO supplies
NYISO determines

Table F-7: Compensator data

Compensator Data (Shunts)

Attribute Name	Example
name	EFISHKIL_345KV_CAP_CAP _1
description	31334
SubtypeCode	Shunt Capacitor
phases	ABC
FK_Substation	EFISHKIL
FK_VoltageLevel	345
FK_Measurement	Measurement-BB-KV1016
Compensator Type	Shunt
nominalMVAR	135
mVARperSection	135
MaximumSections	1
nominalKV	345

Data Supplier Key:
TO/GO supplies
NYISO determines

Table F-8: Switch data

Switch Data

Attribute Name	Example
name	ASTORIAE_138KV_F6E
description	14755
SubtypeCode	Breaker
phases	ABC
FK_Substation	ASTORIAE
FK_VoltageLevel	138

Data Supplier Key:
TO/GO supplies
NYISO determines

Table F-9: Static Var Compensator data

Static Var Compensator Data

Attribute Name	Example
name	LEEDS____345_LEEDS SVC
description	31327
SubtypeCode	Static Var Compensator
phases	ABC
FK_Substation	LEEDS
FK_VoltageLevel	345
FK_Measurement	Measurement-BB-KV3528
capacitiveRating	270
inductiveRating	-300
rDaysReqForNotification	30

Data Supplier Key:
TO/GO supplies
NYISO determines

Table F-10: Facility Ratings Update data

Facility Rating Data

Attribute Name	Example
equipName	ROSETON_-EFISHKIL_345_305
description	25108
company	CH
equipType	LN
lineID	305
powerfactor	100
voltageLevel	345
summerNOR*	1936
summerNORCode	D - Disconnect
summerLTE*	2743
summerLTECode	D - Disconnect
summerSTE*	3407
summerSTECode	A - Conductor
winterNOR*	2528
winterNORCode	D - Disconnect
winterLTE*	3191
winterLTECode	D - Disconnect
winterSTE*	3585
winterSTECode	D - Disconnect

Data Supplier Key:
TO/GO supplies
NYISO determines

* Facility ratings are provided in megawatts.