

# *Load Forecasting Manual*

*April 2010*

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**Version:**

3.0

**Revision Date:**

08/10/2006[\_\_\_\_\_]

**Committee Acceptance:**

08/09/2006[\_\_\_\_\_]

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## Revision History

Version	Date	Revisions
		<p><b>Global</b></p> <ul style="list-style-type: none"> <li>➤ Reformatted per new template to standardize presentation</li> <li>➤ Implemented minor stylistic changes</li> </ul> <p><b>Revision History Table</b></p> <ul style="list-style-type: none"> <li>➤ Changed column headings as follows:                             <ul style="list-style-type: none"> <li>• “Revision” changed to “Version”</li> <li>• “Changes” changed to “Revisions”</li> </ul> </li> </ul>
<b>3.0</b>	<b>08/09/2006</b>	<b>Complete rewrite of manual</b>
<b>2.0</b>	<b>05/14/2001</b>	<b>Unavailable</b>
<b>1.0</b>	<b>09/23/1999</b>	<b>Initial Release</b>

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# 1. OVERVIEW

The ISO's Business Issues Committee (BIC) is responsible for the establishment of procedures related to the efficient and non-discriminatory operation of electricity markets centrally coordinated by the ISO, including procedures related to bidding, settlements, and the calculation of market prices. (BIC By-Laws, 9.01.1.)

The Load Forecasting Task Force (LFTF) has been designated by the Installed Capacity Working Group of the BIC to prepare and present load forecasts used in the Installed Capacity markets for the New York Control Area (NYCA) and for those Transmission Districts (TD) with a Locational Minimum Installed Capacity Requirement. The LFTF's methods and procedures for preparing load forecasts are described in this Load Forecasting Manual. The LFTF does not prepare the Installed Reserve Margin, the Equivalent Demand Forced Outage Rate, or the percentages of the Locational Minimum Installed Capacity Requirements.

## 1.1 Purpose and Scope

This manual has two main purposes.

The first purpose is to set forth the data reporting, weather-normalization methodology, and load forecasting methodology requirements that are prescribed in the ISO Services Tariff Sections 5.10 and 5.11 and used in the calculation of the NYCA Installed Capacity forecast (ICAP). The load forecasts used in the calculation of the ISO's Installed Capacity requirements will be referred to herein as ICAP Load Forecasts. The second is to set forth the data submissions required by the ISO to prepare the ICAP Load Forecasts and its filings to NPCC, NERC, FERC, and other reliability and regulatory bodies.

## 1.2 ICAP Forecast for the New York Control Area and ICAP Forecast for Localities

Prior to each Capability Year, the ISO determines the forecast peak load for the NYCA (as referred to in Tariff §§5.11.1, "NYCA peak Load") and for each Locality. The NYCA forecasted peak load for each Capability Year is based on the highest Adjusted Actual Load for the NYCA in the immediately preceding Capability Year. The NYCA Adjusted Actual Load is calculated by adjusting the coincident peak for the entire Control Area. The forecasted peak load for each Locality is based on the highest Adjusted Actual Load in each Locality, calculated using the Locality's noncoincident peak load. That is, each Locality's actual peak load may be noncoincident with the NYCA actual peak load.

Adjusted Actual Load is defined in Tariff §2.2a. That definition sets forth adjustments to Actual Load.

When computing the Adjusted Actual Load for the NYCA or a Locality, the load reductions resulting from dispatchable load management programs of Load Serving Entities (LSEs), Curtailment Service Providers (CSPs), or Responsible Interface Providers (RIPs) that are not otherwise accounted for by the Transmission Owners (TOs) and Municipal Electric Systems (also referred to in the Tariff as Municipal Electric Utilities; MES) through the components of their respective Adjusted Actual Load computations are also included.

The ICAP Load Forecast for the NYCA is computed as the product of (a) the Actual Adjusted Load of each Transmission District coincident with the NYCA peak and (b) the Regional Load Growth Factor (RLGF). The individual Transmission District peak forecasts are added to obtain the ICAP Load Forecast for the NYCA. The ICAP Load Forecast for each Locality is obtained by multiplying the noncoincident Actual Adjusted Load in the Locality by the RLGf specific to its Transmission District.



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## 2. DATA, WEATHER-NORMALIZATION, AND LOAD FORECASTING METHODOLOGY SUBMISSION REQUIREMENTS FOR THE NYCA ICAP LOAD FORECAST

This section describes:

1. Notification procedures to be followed by the ISO
2. Data submission requirements for TOs and MESs
3. The procedures the ISO follows for
  - Evaluating the TO and MES submitted actual and weather-normalized loads at the time of the NYCA peak hour (and Locality peaks)
  - Calculating NYCA Weather-Normalized Load + Losses (WNL+L) at the NYCA peak hour for the Capability Year during which the calculation is being performed
  - Evaluating TO and MES Regional Load Growth Factors (RLGFs)
  - Calculating the forecasted NYCA ICAP peak and each TO and MES load at the same one hour on the same date as the forecasted NYCA peak.

### 2.1 Notification Procedures to be followed by the ISO

The Capability Year Peak for purposes of this section of the Load Forecasting Manual is defined to be the highest hourly load that occurs from May 1 to August 31, inclusive.

Information and data provided to members of the LFTF will include:

1. **ICAP Load Forecast Schedule:** The ISO will release a schedule (Schedule) by September 1 of every year that will list the dates by which data and analyses are to be completed and submitted to the ISO.
2. **Capability Year Peak and Date and Hour of Occurrence:** The ISO will provide these data points to the TOs and MESs by September 1.
3. **EDRP, DADRP, and SCR Performance during the NYCA Peak Hour:** The ISO will provide these data points by October 15.
4. **Evaluation of TO and MES Weather-Normalized Loads:** in November, in accordance with the Schedule.
5. **Evaluation of TO and MES RLGFs:** in December, in accordance with the Schedule
6. **Preliminary ICAP Load Forecast:** in December, as determined in the Schedule
7. **Final ICAP Load Forecast:** in December, as determined in the Schedule.

## 2.2 Data submission requirements for TOs, MESs, LSEs, CSPs, and RIPS

TOs and MESs shall submit to the ISO:

1. Hourly loads for each quarter-year (first quarter is January – March, etc.) within 90 days after the quarter’s end;
2. Actual load during the hour and on the date of the NYCA peak, and including a statement of whether or not transmission losses are included ;
3. The weather-normalized load during the hour and on the date of the NYCA peak;
4. The previous five years’ values for Subsection 2 and 3 of this Section 2.2;
5. The MW impact of Emergency Operating Procedures (EOPs) and load modifiers operating during the hour and on the date of the NYCA peak;
6. For TOs with Locational Minimum Unforced Capacity Requirements, the actual and weather-normalized Locality noncoincident peak load;
7. Regional Load Growth Factors.

LSEs, CSPs, and RIPS shall submit to the ISO and to the TO providing transmission service to the respective load, the load reduction resulting from the LSE, CSP, or RIP’s own dispatchable load management programs that were in effect during the hour and on the date of the NYCA peak and during the hour and on the date of the Locality peak.

The due dates for items required by Subsections 2 through 7 will be set forth in the Schedule.

### 2.2.1 Hourly Loads

TO and MES hourly loads are necessary for verification of the load at the time of the NYCA peak and for other purposes as described in Section 3 of this manual. Data may be submitted in any electronic format acceptable to the ISO.

### 2.2.2 Actual Load at the Time of the NYCA Peak

TOs and MESs shall provide their load in MW during the hour and on the date of the NYCA peak for the current Capability Year together with a statement stating whether this load includes transmission losses.

### 2.2.3 Weather-Normalized Load at the Time of the NYCA Peak and Supporting Material

TOs and MESs shall provide the weather-normalized load corresponding to their actual load (provided pursuant to Section 2.2.2). TOs and MESs may calculate their weather-normalized load using their own procedures. However, the design criteria employed by each TO and MES shall be such that it ensures, at a maximum, a 0.50 probability of occurrence on an annual basis.

TOs and MESs shall provide the following supporting material:

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1. A written description of the method used to derive the weather-normalized load from the actual load;
2. If a statistical model is used, the model, its statistics, and the data from which weather-normalized load was derived;
3. A description of and supporting data for the design conditions used in calculating the weather-normalized load.

#### **2.2.4 Actual and Weather-Normalized Load at the Time of the NYCA Peak for the Five Preceding Years**

TOs and MESs shall provide historical values of the actual and weather-normalized loads for each of the five Capability Years preceding each ICAP forecast. This data is used by the ISO to evaluate regional load growth factors (RLGFs) provided by TOs and MESs. If requested, the TOs and MESs shall provide supporting documentation. Results submitted by a TO or MES in respect of an ICAP forecast for a previous Capability Year need not be resubmitted unless the TO or MES has revised actual or weather-normalized data or resulting computation of its actual or weather-normalized load.

#### **2.2.5 MW Impact of EOPs and Load Modifiers Operating at, and MW Reductions from Programs Achieved During the Time of the NYCA Peak**

TOs and MESs shall provide the MW reduction achieved by Emergency Operating Procedures (EOPs) and Load modifiers during the hour and on the date of the NYCA peak. TOs and MESs shall provide supporting documentation if requested by the ISO.

LSEs, CSPs, and RIPS that activate resources in their own dispatchable load management programs during the hour and on the date of either the NYCA peak or a Locality peak, shall report to the ISO and the TO providing transmission service to the respective load, the MW reduction achieved by these resources at the time of each peak. LSEs, CSPs, and RIPS shall provide supporting documentation to the ISO and the respective TO if requested.

TOs, MESs, LSEs, CSPs, and RIPS shall compare the MW reduction from Demand Side Resources and their other respective dispatchable load management programs with those of the ISO's SCR, DADRP, and EDRP programs to ensure that impacts are properly accounted for.

The ISO shall verify data submitted by LSEs, CSPs, and RIPS on MW reductions achieved from programs that the ISO uses in computing the NYCA Adjusted Actual Load. Each TO and MES shall verify the data submitted by LSEs, CSPs, and RIPS on MW reductions achieved from programs that the TO or MES uses in computing the Transmission District Adjusted Actual Load. Each TO and MES shall submit such verified data to the ISO and any revisions or updates the data. TOs and MESs shall provide supporting documentation if requested by the ISO.

**2.2.6 Actual and Weather-normalized Locality Peaks**

TOs and MESs may have Locality peaks that occur at a different time than the NYCA peak hour. If that is the case, they shall also provide the data required by Sections 2.2.2 – 2.2.5 for the hour of their Locality peak.

**2.2.7 Regional Load Growth Factors (RLGFs)**

Each TO and MES shall provide RLGfS to the ISO. An RLGfS is the ratio of its projected load during the hour and on the date of the NYCA peak for the next Capability Year to the weather-normalized actual load during the hour and on the date of the NYCA peak in the current Capability Year. RLGfS shall be provided on the date set forth in the Schedule.

**2.3 Procedures for Determining the ISO ICAP Load Forecast**

This section describes procedures the ISO will follow to produce the ICAP Load Forecast for the each Capability Year. The following analyses will be performed.

1. Reconciliation of Transmission District loads at NYCA Peak
2. Calculation of TO and MES Load Less Losses (LLL)
3. Deduction of Station Power
4. Evaluation of TO and MES Weather-normalized Load and Losses
5. Allocation of Weather-normalized Losses to TOs and MESs
6. Evaluation of TO and MES RLGfS
7. Forecast of TO and MES loads at time of predicted NYCA Peak
8. Forecast of Locality peaks

**2.3.1 Reconciliation of Transmission District Load at Time Of NYCA Peak**

TOs and MESs submit their above-described load data for the time and date of the NYCA peak in accordance with Subsection 2.2.2 of this manual. The ISO will calculate Transmission District (TD) loads by adding TO and appropriate MES loads. The ISO will compare the TD peak loads reported by the TOs and MESs to TD billing loads with the ISO Decision Support System (DSS). The ISO will make adjustments necessary to account consistently for losses, Load modifiers, EOPs, SCRs, DADRP, EDRP, and reductions from dispatchable demand resource programs of LSEs, CSPs, and RIPS not otherwise accounted for.

The ISO will perform a reconciliation of TD peak load prior to weather normalization as follows. If the TD loads calculated from data submitted to the ISO does not match the ISO's calculations of TD load, the ISO will discuss and try to resolve the difference with the TO, MES, LSEs, CSPs, or RIPS, as appropriate. If the unresolved difference in Transmission District load is less than 1%, the ISO will accept the TD peak load reported by the TO or MES. If the unresolved difference exceeds 1%, the ISO will determine the

appropriate TD load and submit it for comment to the Load Forecasting Task Force. In its discretion, the ISO may also submit it for comment to the ICAP Working Group.

### **2.3.2 Calculation of TO and MES Load Less Losses (LLL)**

Losses will be obtained from the ISO DSS for each TD. In cases where TOs reported their peak load inclusive of losses, the LLL will be calculated by deducting the ISO DSS losses from the reported peak load. In cases where the TO reported peak load does not include losses, no loss deduction is necessary. MES loads are reported net of losses.

### **2.3.3 Deduction of Station Power**

Station Power delivered that is not being self-supplied pursuant to Section 4.24 of the Tariff shall be deducted by TOs and MESs in calculating LLL. The Generator for which the deduction and the amount of the deduction shall be reported to the ISO

### **2.3.4 Evaluation of TO and MES Weather-Normalized Load and Losses**

The ISO shall also adjust Transmission District actual peak loads for the effects of weather and will produce its own estimate of the weather-normalized load for each TO and MES. These estimates will be produced using models and design criteria the ISO develops. The ISO will compare its own estimates with those submitted by the TOs and MESs according to Section 2.2.3 using two comparisons:

If the adjustments to the actual load calculated by the ISO and a TO or MES pursuant to §2.3 of this manual differ by 25% or less but more than 1%, the ISO will accept the submitted estimate;

**Or**

If the weather-normalized adjusted load calculated by the ISO differs from that calculated by the TO or MES differs by 1% or less, the ISO will accept the submitted estimate.

If the differences between the ISO and TO or MES calculations of both the actual load and the weather normalized exceed the above thresholds, the ISO and TO or MES will investigate and attempt to reconcile it.

If it is not possible to reconcile the difference within a period of time that comports with the development of the respective peak load forecast, the ISO will use its own estimate of the weather-normalized load for that TO. The TO may dispute the ISO's decision to substitute its weather-normalized load for the TO's, pursuant to the Expedited Dispute Resolution Procedures specified in the ISO Services Tariff Section 5.16.

If an MES does not submit a weather-normalized load, the ISO will calculate one for it by applying the ratio of (a) the weather-normalized to actual load of the TO in whose TD the MES is located to (b) the MES actual load.

Losses will be weather-normalized for each TO and MES using the same proportion of weather-normalized load to actual load as was determined for the TO or MES load.

### 2.3.5 Allocation of Weather-Normalized Losses to TOs and MESs

The total of all TO and MES weather-normalized loads will be calculated by the ISO. The sum of the calculation is the NYCA weather-normalized peak load less losses (W/N LLL). The total of all weather-normalized losses will be calculated by adding all TO weather-normalized losses.

Total weather-normalized losses will be allocated to each TO and MES according to the ratio of its W/N LLL to the NYCA W/N LLL. The result will be the weather-normalized load plus losses (W/N L+L) for each TO and MES.

The sum of all TO and MES W/N L+Ls will be the NYCA weather-normalized peak load for the Capability Year.

Each TO and MES W/N L+L will be the basis to which its RLGf will be applied by the ISO to calculate respective TO or MES forecasted load coincident with the NYCA peak in the next Capability Year.

### 2.3.6 Evaluation of TO and MES Regional Load Growth Factors

The ISO will evaluate Capability Year RLGf's using the following criterion:

1. *Criterion 1: Index of Recent Historical Peak Load Growth* – RLGf's should be within a range of historical year-to-year growth rates of actual adjusted peak load (AAPL) experienced in the previous five Capability Years.
2. *Criterion 2: Index of the Ratio of Peak Load Growth to Economic Growth* – The ISO will clearly outline for all market participants the economic parameters it will use in developing these relationships no less than fifteen calendar days before date the TOs and MESs are required to submit RLGf's.
  - a. The ratio of (i) the annual historic growth in the TO or MES load at the time of NYCA peak, reflected in the RLGf's for the respective historic period, to (ii) annual growth in economic indicators, as provided to the ISO by its economic forecasting consultant. The ISO shall calculate the ratio for each TO for the previous five Capability Years
  - b. The ratio of each predicted RLGf to the predicted growth in economic indicators, as provided to the ISO by its economic forecasting consultant, shall be calculated by the ISO for the current Capability Year.
  - c. The ratios calculated in 2.a. should be consistent with the ratios calculated in 2.b. The selection of indicators and criteria for deciding consistency between 2.a. and 2.b. are to be determined by the LFTF.
3. *Criterion 3: Projections performed by ISO* – The ISO will develop independent projections of RLGf's and use them in evaluating the RLGf's submitted by the TOs and MESs pursuant to Subsection 2.2.7. The ISO will post on the ISO website for all Market Participants the assumptions and methodologies used to develop its projected RLGf's for each Transmission District.

The ISO will develop a range for each of the three criteria above. If the ISO determines that a TO or MES forecast is not within the established range for at least two of the three



criteria above, the ISO and the TO or MES will attempt to reconcile and explain the difference. If the difference cannot be reconciled, the ISO will inform the TO or MES of that fact and that it intends to substitute its RLGf for the submitted one. The TO or MES may dispute the ISO's decision to substitute the ISO RLGf, pursuant to the Expedited Dispute Resolution Procedures specified in the ISO Services Tariff Section 5.16.

If, as a result of the deliberations between the ISO and TO required under Section 5.16.1, the ISO decides to accept a TO forecast that does not fall within the range provided for at least two out of three above criteria, any Market Participant may dispute that decision pursuant to the Expedited Dispute Resolution Procedures specified in the [NYISO Services Tariff Section 5.16](#).

The only RLGfs which may be disputed under the Expedited Dispute Resolution Procedures are those developed by the TO or MES and the ISO.

### **2.3.7 Forecast of TO and MES Load at Time of Predicted NYCA Peak**

The ISO will calculate a forecast of each TO and MES load during the hour and on the date of the forecast NYCA peak for the next Capability Year as the product of (a) the W/N L+L for each TO and MES, as determined in Section 2.3.5, and (b) the RLGf determined for the respective TO or MES, calculated in Section 2.3.6.

The sum of the TO and MES peak forecast loads during the hour and on the date of the NYCA peak will be the NYCA Installed Capacity peak forecast for the Capability Year.

### **2.3.8 Forecast of Locality Peaks**

To determine LSE Locational Unforced Capacity Requirements, Locality peaks forecasts need to be determined. The ISO shall determine the forecast of the peaks for the Localities as follows:

1. Each TO and MES in a Locality will provide an actual and weather-normalized peak for its Load in the Locality.
2. The adjustments to actual load shall include Load reductions due to dispatchable load management programs, as follows:
  - a. Any SCRs, DADRP, EDRP, or other EOPs invoked by the ISO shall be included in any adjustments to the TO or MES's actual peak Load within the Locality.
  - b. The TO or MES shall adjust its actual Locality Peak for the verified load reductions of EOPs or dispatchable load management programs of any LSE or RIP in its Transmission District, if these impacts were submitted in accordance with Section 2.2.5.
  - c. The TO or MES shall adjust its actual Locality peak for the load reductions of EOPs and dispatchable load management programs that it implemented.

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3. The TO or MES Losses in the Locality shall be weather-normalized, but should not be otherwise adjusted in relation to Losses elsewhere in the NYCA.
4. The TO shall determine its Adjusted Actual Peak Load (AAPL) within the Locality by accounting for the affects of weather on Loads and Losses, and after adjusting for reductions of dispatchable load management programs as set forth in Subsection 2.3.8.2.
5. The ISO shall also adjust actual Locality peak loads for the effects of weather normalization and will produce its own estimate of the weather-normalized load for each TO and MES. These estimates will be produced using models and design criteria the ISO develops.
6. The ISO shall then review each TO and MESs Adjusted Actual Peak Load for the Locality. In the event of a difference that exceeds both one percent (1%) of the AAPL and twenty-five percent (25%) of the adjustment, the ISO and TO or MES will investigate and attempt to reconcile the difference. If it is not possible to reconcile the difference within a period of time that comports with the development of the respective peak load forecast, the ISO will use its own estimate of the Actual Adjusted Peak Load for the Locality peak. The TO or MES may dispute the ISO's decision to use its AAPL, pursuant to the Expedited Dispute Resolution Procedures specified in the ISO Services Tariff Section 5.16.
7. The TO will use the RLGf for the TD in which the Locality is located, as determined in Section 2.3.6.
8. The Locality Peak forecast shall be calculated as the product of the Adjusted Actual Peak Load in the Locality and the applicable RLGf.

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