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IMP_PRO_0033

PROCEDURE

Market Manual 7: System Operations

Part 7.2: Near-Term Assessments and Reports

Issue 37.0

This procedure describes the process by which the IESO undertakes short-term weekly and daily forecasts and assessments of expected system conditions on the IESO-controlled grid.

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Document ID	IMP_PRO_0033
Document Name	Part 7.2: Near-Term Assessments and Reports
Issue	Issue 37.0
Reason for Issue	Issue released in advance of Baseline 36.0
Effective Date	June 21, 2016

Document Change History

Issue		
For history prior to 2011, refer to version 26.0 and prior.		
25.0	Issue released for Baseline 25.0	March 2, 2011
26.0	Issued in advance of Baseline 26.1 for the implementation of EDAC.	October 12, 2011
27.0	Issue released for Baseline 27.0	March 7, 2012
28.0	Issue released for Baseline 27.1	June 6, 2012
29.0	Issue released for Baseline 29.1	June 5, 2013
30.0	Issue released for Baseline 30.0	September 11, 2013
31.0	Issue released in advance of Baseline 31.1 for the implementation of the Demand Forecast System Refresh project	April 15, 2014
32.0	Issue released for Baseline 32.1	December 3, 2014
33.0	Issue released for Baseline 33.0	March 4, 2015
34.0	Issue released for Baseline 34.0	September 9, 2015
35.0	Issue released for Baseline 34.1	December 2, 2015
36.0	Issue released for Baseline 35.0	March 2, 2016
37.0	Issue released in advance of Baseline 36.0	June 21, 2016

Related Documents

Document ID	
N/A	

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Reference (Section)	
Section 2 (new)	Moved section 1.2 “Security and Adequacy Assessment Reports and the SSR” content to section 2 “Adequacy and Transmission Limits Reports” and section 3 “Advisory Notices”. Updated content to reflect changes to reporting tool and processes.
Sections 2.4, 2.5 and 2.6	Added new sections for producing and publishing the Ontario Zonal Demand Forecast Report, the Transmission Facility All in Service Limits Report, and the Transmission Facility Outage Limits Reports.
Sections 2 and 3 (old)	Removed Procedural Work Flow and Procedural Steps sections. Applicable procedural information is now included in Section 2 (new).
Section 4 (new)	Moved “Surplus Baseload Generation” from section 1.3 to 4. Updated content to reflect changes to reporting tool and processes.
Section 4.4 (formerly 1.3.4)	Added new condition for curtailing wheel-through transactions to prevent a nuclear shutdown if a shutdown is indicated in pre-dispatch (IMDC-31).
Section 5 (new)	Moved “Control Action Operating Reserve” from section 1.4 to 5. Updated content to reflect changes to reporting tool and processes.
Appendix A (old)	Removed the “Forms” appendix.
Appendix A (formerly B)	Created placeholder for sample Adequacy Report screen, which will be added in the September 2016 release.
Appendix B (formerly C)	Updated content to reflect changes to reporting tool and processes.
Appendix C (formerly D)	• Updated content to reflect changes to reporting tool and processes. • Removed “Intrahour Margin” subsection as content was outdated. • Added new “Total Supply and Total Requirement” subsection (C.3). • Removed subsections related to “Minimum Operating Reserve Requirements”, “System Advisory Notices”, “SAA Notes”, and “Summary Information”, as the information no longer applies. • Moved “Ancillary Services” subsection to section 3.1 and updated content. • Moved “Transmission Interface” subsection (formerly subsection D.10) to a separate appendix (D) and updated content.
Appendix E	Modified content to reflect changes to reporting tool and processes.

Market Manuals

The *Market Manuals* consolidate the market procedures and associated forms, standards, and policies that define certain elements relating to the *operation* of the *IESO-administered markets*. Market procedures provide more detailed descriptions of the requirements for various activities than is specified in the "Market Rules". Where there is a discrepancy between the requirements in a document within a *market manual* and the *market rules*, the *Market Rules* shall prevail. Standards and policies appended to, or referenced in, these procedures provide a supporting framework.

The "System Operations Manual" is Series 7 of the *market manuals*, where this document forms "Part 7.2: Near-Term Assessments and Reports".

A list of the other component parts of the "System Operations Manual" is provided in "Part 7.0: System Operations Overview", in section 2, "About This Manual".

– End of Section -

1. Introduction

1.1 Purpose

The *market rules* describe long-term (18-month) forecasts and assessments as well as near-term (up to 34 days out) forecasts and assessments (C. 5, S.7.11 of the *market rules*). The *market rules* also require us to produce advisory notices, as required, to notify *market participants* of any additional information pertaining to market and system conditions.

We inform *market participants* of expected conditions on the *IESO-controlled grid* and in the *IESO-administered markets* in the near-term through a number of reports and advisories:

- *Adequacy* Reports for the period that is 0-34[1] days out,
- Ontario Zonal *Demand* Forecast Report for the period that is 0-34 days out,
- Transmission *Facility* Limits Reports for the period that is 0-34 days out,
- Advisory notices, published as required, and
- Surplus Baseload Generation (SBG) report for the period that is 1-10 days out.

This manual describes how we prepare and *publish* these reports.

The procedures for preparing and publishing the long-term forecasts and assessments are described in "Market Manual 2: Market Administration"[2].

1.2 Roles and Responsibilities

Responsibility for performing near-term *security* and *adequacy* assessments and publishing reports and advisories is shared among:

- **All *market participants***, who are responsible for providing the *outage* information described in "Part 7.3: Outage Management",
- ***Market participants* operating *energy*-limited resources**, who are responsible to provide pre-schedule information of the daily *energy* availability of their *energy*-limited resources for the *Adequacy* Report, and to update this data for any material change,
- ***Transmitters***, who are responsible for providing transmission rating change information as it occurs,
- ***Self-scheduling, Intermittent* and *Transitional Scheduling Generators***, who are responsible for providing generation schedule information to the *IESO* as *dispatch data*,

[1] The current day is referred to as day 0.

[2] The relevant parts of "Market Manual 2: Market Administration" are:

- "Part 2.8: Reliability Assessments Information Requirements,", and
- "Part 2.11: 18-Month Outlook and Related Information Requirements".

- ***Market participants,*** who are responsible for submitting requests for *segregated mode of operation*, as described in "Part 7.3 Outage Management".
- The ***IESO***, who is responsible for:
  - Preparing the *demand* forecast,
  - Preparing the *variable generation* forecast,
  - Calculating the operating *security limits* for the *IESO-controlled grid*,
  - Performing the *security* and *adequacy* assessments for each hour and each day, as appropriate,
  - *Publishing* the *Adequacy* Report, the Ontario Zonal *Demand* Forecast Report, the Transmission *Facility* All-in-Service Limits Report, the Transmission Facility *Outage* Limits Report and the SBG Forecast Report, and
  - Notifying *market participants*, through advisory notices, of additional information not addressed through the *security* and *adequacy* assessments.

All *published* reports and advisory notices are available on the *IESO* website.

1.3 Contact Information

As part of the participant authorization and registration process, *applicants* are able to identify a range of contacts within their organization that address specific areas of market operations. For near term assessments and reports, this contact will most likely be the *Outage* Planner Market Contact Type as indicated in the *IESO* Registration Solution - *market participant* Contacts screens. If you have not identified a specific contact, we will seek to contact the Main Contact in the IESO Registration Solution that is established during the participant authorization process. We will seek to contact these individuals for activities within this procedure, unless alternative arrangements have been established between the *IESO* and the *market participant*. For more information on the IESO Registration Solution and the participant authorization process see "Market Manual 1: Market Entry, Maintenance & Exit, Part 1.1: Participant Authorization, Maintenance and Exit".

If you wish to contact us, you can email *IESO* Customer Relations at customer.relations@ieso.ca or contact us by telephone or mail. Our telephone numbers and mailing address can be found on the IESO website (http://www.ieso.ca/Pages/Contact-Us.aspx). Customer Relations staff will respond as soon as possible.

– End of Section –

2. Adequacy and Transmission Limits Reports

We regularly produce four near-term reports relating to the *security* and *adequacy* of the *IESO-controlled grid*:

- *Adequacy* Report
- Ontario Zonal *Demand* Forecast Report
- Transmission *Facility* All in Service Limits Report
- Transmission *Facility Outage* Limits Report

The *Adequacy* Report covers days 0-34 and has hourly granularity. Reports published on day 0, as well as all reports published on day 1 after successful completion of the day-ahead commitment process, will include aggregated values of the capacity offered and *bid* by *market participants* for the *dispatch day* and the aggregated *pre-dispatch schedules*. Each day, we *publish* an Adequacy Report that includes a new day 34.

The Ontario Zonal *Demand* Forecast Report covers days 0-34 and has hourly granularity. The report is published daily and provides additional information on the *demand* forecast for the East and West systems.

The Transmission *Facility* All in Service Limits Report is published daily and provides *market participants* with information on available transfer capabilities under all-in-service conditions.

The Transmission *Facility Outage* Limits Report covers days 0-34 and provides *market participants* with information on available transfer capabilities under *outage* conditions.

2.1 Market Participant Requirements to Submit Data

We need inputs from you to produce the daily assessments (C. 5, S.7.1.5 of the *market rules*). Each Tuesday by 17:00 EST, *market participants* that operate *energy*-limited *generators* are required to provide us with a pre-schedule of these resources for the period beginning the following day and going out 34 days. The pre-schedule defines the total hourly and daily *energy* content of all aggregated *energy*-limited resources. You need to update the *energy*-limited resource pre-schedule for any changes to the information previously provided.

2.1.1 Data Submission Instructions

All *market participants* who operate *energy*-limited generation resources submit, via Online *IESO*:

- A forecast of the daily aggregated *energy* production of all resources for the days of week 4 (i.e., days 28 to 34), and
- An updated forecast of the daily aggregated *energy* production for all other days of the period.

2.2 Producing and Publishing the Adequacy Report for Days 0 and 1

Each day, we prepare and *publish Adequacy* Reports for the current day and the following day, with the following schedule (C. 7, S. 12.1. 1 of the *market rules*):

- Two times per hour, for the current day,
- By 05:30 EST, for tomorrow,
- By 09:00 EST, for tomorrow,
- After each successful run of the day-ahead commitment process, for tomorrow,
- Hourly after 15:00 EST, for tomorrow.

These reports are updated to provide *market participants* with any new information since the previous scheduled publication. This may include changes in *demand*, *generation capacity* and *variable generation* forecast.

2.3 Producing and Publishing the Adequacy Report for Days 2 to 34

Each day by 17:00 EST, we prepare and *publish Adequacy* Reports for 2 to 34 days beyond the current day (C. 5, S.7.1.1.2 of the *market rules*). Reports are published at approximately 09:00 and 15:30 EST, for each day in the assessment period.

These reports are updated to provide *market participants* with any new information since the previous scheduled publication. This may include changes in *demand*, *generation capacity* and *variable generation* forecast.

2.4 Producing and Publishing the Ontario Zonal Demand Forecast Report

Each day by 17:00 EST, we prepare and *publish* the Ontario Zonal *Demand* Forecast Report that spans the period from the current day to 34 days out. The report provides the Ontario total *demand* forecast, as well as the *demand* forecast for the East and West systems, with hourly granularity.

2.5 Producing and Publishing the Transmission Facility All in Service Limits Report

Each day by 17:00 EST, we prepare and *publish* a Transmission *Facility* All in Service Limits Report to provide *market participants* with information on available transfer capabilities on major interfaces, assuming all critical elements are in service.

2.6 Producing and Publishing the Transmission Facility Outage Limits Reports

Each day, we prepare and *publish* Transmission *Facility Outage* Limits Reports to provide *market participants* with information on available transfer capabilities for internal interfaces and interties[3], considering anticipated *outage* conditions.

Separate reports are published twice per hour for the day 0 to 2 period and twice per day for the day 3 to 34 period.

The publication of these reports will provide *market participants* with updates on available transfer capability since the previous scheduled publication.

– End of Section –

[3] The list of internal interfaces and interties is given in Appendix D.

3. Advisory Notices

Advisory notices allow us to present information to *market participants* that is not addressed through the *Adequacy* Report and the Transmission Limits Reports. Publication of advisory notices is exception-based, since advisory notices are intended to provide information on events that are not captured through the regularly scheduled publication of the reports noted above. For example, if we need to identify that an external jurisdiction has made a *reliability* declaration calling upon Ontario capacity for firm *energy* exports, this will be communicated via an advisory notice.

Changes in expected load, *generation* or *transmission capacity* will normally be captured through the regularly scheduled publications of the *Adequacy* Report and the Transmission *Facility Outage* Limits Report. A Major Change Advisory will be published in the event of any change that the *IESO* deems significant, for example during adverse system events causing loss of a substation or an entire interface.

Four types of advisory notices may be published (C. 7, S. 12.1.3 of the *market rules*):

- A **Major Change Advisory** if a major change in expected load, *generation*, or *transmission capacity* has occurred.
- A **System Advisory** if we expect over-generation, under-generation, or shortfalls in *operating reserve* or *contracted ancillary services.* The System Advisory includes the actions we intend to take if the market does not or cannot respond sufficiently to eliminate the problem.
- A **System *Emergency* Advisory** if we expect an *emergency operating state*, or a *high risk operating state.*[4] Any such System *Emergency* Advisory includes the actions we intend to take if the market does not or cannot respond sufficiently to eliminate the problem.
- A **Market Suspension Advisory** or **Market Resumption Notice** if we are suspending or resuming *operation* of all or part of the *IESO-administered markets*.

Advisory notices are categorized as Normal and *Emergency*:

- A 'Normal' advisory notice is one that has been *published* with a System Advisory or Major Change Advisory.
- An '*Emergency*' advisory notice is one that has been *published* with a System Emergency Advisory (excluding advisories for a *high risk operating state*), a Market Suspension / Resumption Advisory, or any message to *market participants* requiring their immediate action.

[4] High risk conditions that occur frequently as a result of weather conditions are reported through the Transmission *Facility Outage* Limits Report.

3.1 Ancillary Services

The *IESO* will forecast requirements and supply for *ancillary services*, and notify *market participants* of any updates through publication of an advisory notice:

- *Regulation* – the *Market Rules* identify that the minimum *regulation* requirements will be a range of ± 100 MW and a rate of 50 MW/minute (C.5, S. 4.4.2 of the *market rules*). For the purpose of the near-term *adequacy* assessments, the *IESO* will consider the required *regulation* range and rate as the minimum requirements specified in the *Market Rules.* The *IESO* will *publish* an advisory notice to notify *market participants* of any change to the *regulation* requirement. The *IESO* will also identify the *regulation* range available based on the contracted quantity of *regulation* range (minus *regulation* range unavailable due to *outages* or deratings).
- *Reliability* Must Run – the *IESO* will forecast the quantity (MW) of *generation capacity* for which it will invoke or expects to invoke *reliability* must run contracts for any day in the near-term assessment period. It is important to recall that *reliability* must run contracts are invoked to induce *market participants* to submit *offers* for generation. The quantity of *reliability* must run required does not represent a forecast of the amount of generation that may be constrained on in the *real-time schedules*. The *IESO* will notify *market participants* of any non-zero *reliability* must run quantity required through publication of an advisory notice.

– End of Section –

4. Surplus Baseload Generation

Surplus Baseload Generation (SBG) is a condition that occurs when baseload generation is expected to exceed Ontario *demand*. During SBG, the system is balanced via market mechanisms which may include *intertie* scheduling, dispatching hydroelectric generation, dispatching *variable generation*, and nuclear manoeuvring or shutdown. During SBG periods we expect that most, if not all, of Ontario's generation will be supplied by non-carbon sources.

4.1 Baseload Generation

Baseload generation is typically considered to be[5] the sum of the expected generation of all available:

- Nuclear *generators*,
- Must-run hydroelectric generation,
- *Self-scheduling generation facilities* (including commissioning units),
- *Intermittent generators*,
- *Variable generators* (including wind and solar *generators*), and
- Other *generators* that typically *offer* their generation at a value lower than the highest offer for nuclear generation.

4.2 SBG Reports

The purpose of the SBG Report is to identify those times when the output of Ontario's baseload *generators* is expected to be greater than the forecast Ontario *demand*. This will allow *market participants* to assess the potential impact of SBG on their facilities.

Each day, we *publish* an SBG report on the *IESO* public website:

- The report spans the period from tomorrow to 10 days out.
- We calculate SBG by subtracting the forecast Ontario *demand* from the forecast baseload generation. Exports are not factored in the calculation.
- Our SBG reports will include the amount of exports we reasonably estimate will be scheduled during the highest SBG period for the day.
- We expect to *publish* this report each day by 17:00 EST.
- We use the forecast Ontario *demand* based upon forecast weather and the embedded *variable generation* forecast for facilities ≥ 5MW.

[5] Depending on the timeframe of assessment, there may be slightly different definitions of baseload generation. This definition is used in the operational timeframe.

- We use the centralized *variable generation* forecast for Ontario's *variable generators* for days 1 to 7.
- We will issue Minimum Generation Alerts as per the conditions set out in section 4.3: Minimum Generation Alerts and Events.

4.3 Minimum Generation Alerts and Events

Some Ontario nuclear *generators* have the ability to reduce their output. Typically, this is accomplished by having some steam bypass the turbine, reducing the electrical output of the *generator* while keeping reactor power constant. However, due to the characteristics of nuclear station design and operation, the reduction often must be accomplished in a single block, and held at that level for some amount of time before being reloaded in a single block.

Given the unique operating characteristics of nuclear generation, we provide advance notice where possible of potential reductions of the output of nuclear *generators* for surplus baseload management – both for the benefit of the nuclear *facility* operators and for other *market participants*.

We will *publish* advisory notices with Minimum Generation Alerts under the following conditions:

- If we forecast a nuclear manoeuvre of at least 50 MW for 4 or more contiguous hours for a day that is 3-4 days out, we will *publish* an advisory notice with a Minimum Generation Alert for each impacted day. The alert will identify the potential for a nuclear manoeuvre and will include a forecast of expected export quantities during the SBG event. We may issue advisory notices further out than 3-4 days for holiday weekends or as necessary.
- If we forecast a nuclear manoeuvre of at least 50 MW for 2 or more contiguous hours for a day that is 1-2 days out, we will *publish* an advisory notice with a Minimum Generation Alert for each impacted day.
- If *pre-dispatch* shows a nuclear maneuver of 50 MW or more, we will *publish* an advisory notice indicating a Minimum Generation Alert[6].
- In real-time, if a nuclear manoeuvre is imminent or in progress, we will *publish* an advisory notice indicating a Minimum Generation Event.

Triggers that may exacerbate or lessen forecast SBG events include:

- Load is different (lighter or heavier) than forecast,
- *Forced outages* of dispatched generation or transmission facilities,
- Short notice changes of hourly export transactions (increase or decrease), and/or
- *Intermittent generators*, *self-scheduling generation facilities* and *variable generators* producing more or less than anticipated.

We will cancel a Minimum Generation Alert if conditions change such that we no longer expect nuclear manoeuvres. Table 1-1 provides a summary of the Minimum Generation conditions.

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[6] After the Day-Ahead Commitment Process completes, we will assess *pre-dispatch* results on an hourly basis. If we determine, with reasonable certainty, that a baseload generation manoeuvre exceeding 50 MW is likely for a future hour, we will issue a Minimum Generation Alert.

Table 1–1: Minimum Generation Status

Timeframe	Forecast Condition	Minimum Generation Status
3-4 days out	A nuclear manoeuvre of at least 50 MW is forecasted for four or more contiguous hours.	
1-2 days out	A nuclear manoeuvre of at least 50 MW is forecasted for two or more contiguous hours.	**Alert**
Pre-dispatch	*Pre-dispatch* shows a nuclear manoeuvre of 50 MW or more.	
Real-Time	A nuclear generation manoeuvre is imminent or in progress	**Event**

4.4 IESO Control Actions (Nuclear Manoeuvres Forecasted or Occurring)

If the *IESO* determines during *pre-dispatch* that we are forecasting a nuclear manoeuvre in future hours, or if a nuclear manoeuvre is imminent in real-time operations, we will ensure the nuclear reductions are managed in a manner that respects the characteristics of the nuclear *generation facility* while simultaneously satisfying our requirement to balance the power system.

The following actions are executed in the *pre-dispatch* timeframe:

If…	Then…
The Control Room Operator (CRO) determines that the use of average *demand* forecasting will mitigate nuclear generation manoeuvres	We will use the average *demand* forecast instead of the peak demand forecast for any or all of the defined ramp hours, and will issue an advisory notice stating the change.[7]
The two hour out *pre-dispatch* identifies nuclear units are being dispatched down by more than 50 MW	We may issue an advisory notice opening the mandatory window for *bids* and *offers*. We may expand the Net Interchange Scheduling Limit (NISL) to 1000 MW and issue an advisory notice indicating the NISL expansion. **Note:** We will only take these actions if they are likely to provide assistance in managing the SBG event.
One hour out, the *pre-dispatch schedule* identifies nuclear units are being dispatched down by more than 50 MW	We will curtail import transactions (including inadvertent payback) equal to the total MW reduction amount. Imports that are cut for this purpose will be tagged with ADQh.[8] **Note:** All imports will be cut economically on a best effort basis.

[7] The ramp hours are defined in Market Manual 4.2 Appendix E1.

If…	Then…
• The *dispatch* of a nuclear unit is not for the full amount of its manoeuverable capability, or • The nuclear unit cannot operationally respond to the instruction	We may manually adjust its schedule, requiring other *generators* (including variable) to respond in its place. **Note:** The manual adjustment may be to maintain the nuclear unit at its current output or to over-*dispatch* the nuclear unit for the full amount of its maneuverable capability. Manual adjustments to *generator* schedules are for the hour-at-hand and the next hour only. If adjustments were to extend further into the future, it is likely that *pre-dispatch* would schedule actions interfering with our management of the SBG event. For example, a constrained-off nuclear unit may result in pre-dispatch scheduling fewer export transactions in future hours. *Response* from other *generators* will result from (?) an automatic *dispatch* from the Dispatch Scheduling and Optimization (DSO) tool.
Prior to the last run of *pre-dispatch* for the *dispatch* hour, the *pre-dispatch schedule* indicates that nuclear units are being shut down	Approximately two hours before the dispatch hour, we will curtail linked wheel-through transactions to satisfy the total MW reduction amount required to avoid nuclear unit shutdown. **Note:** We will issue an advisory notice stating that the IESO may curtail transactions for reliability during HEXX - HEXX. **Note:** Such curtailments are tagged TLRe. All linked wheel-through transaction curtailments will be made pro-rata on a best effort basis.
All flexible *responses* from baseload generation are exhausted	We may need to implement nuclear unit shutdowns. **Note:** We will issue an advisory notice stating that a shutdown is in progress.

In the event we determine that the nuclear units are being dispatched down in real-time, we may take one or more of the following control actions, which may be performed in any order:

If…	Then…
Nuclear units are being dispatched down by more than 50 MW (possibly as a result of export failures)	We may curtail import transactions (including inadvertent payback) equal to the total MW reduction amount. **Note:** Imports cut for this purpose will be tagged with ADQh. All imports will be cut economically on a best effort basis.
• The *dispatch* of a nuclear unit is not for the full	We may manually adjust its schedule, requiring other *generators* (including variable) to respond in its place.

[8]ADQh is the code applied to transactions curtailed for *IESO Adequacy* (Surplus or Deficiency) Actions. These transactions are not eligible for CMSC and are exempt from real time failure charges.

If…	Then…
amount of its maneuverable capability, or • The nuclear unit cannot operationally respond to the instruction	**Note:** The manual adjustment may be to maintain the nuclear unit at its current output, or to over-*dispatch* the nuclear unit for the full amount of its maneuverable capability. Manual adjustments to *generator* schedules are for the hour-at-hand and the next hour only. If adjustments were to extend further into the future, it is likely that *pre-dispatch* would schedule actions interfering with our management of the SBG event. For example, a constrained-off nuclear unit may result in pre-dispatch scheduling fewer export transactions in future hours. *Response* from other *generators* will be an automatic *dispatch* from the DSO tool.
All flexible *responses* from baseload generation are exhausted	We may need to implement nuclear unit shutdowns. **Note:** We will issue an advisory notice stating that a shutdown is in progress.

– End of Section –

5. Control Action Operating Reserve

Control Action Operating Reserve (CAOR) *offers* represents the *IESO*'s ability to use the following control actions to meet *operating reserve* requirements:

- 3% and 5% voltage reductions
- Disregarding the 30-minute *operating reserve* requirement (for up to four hours)

Two fictitious (i.e., dummy) *generators* supply standing *offers* to the *operating reserve market* as follows:

- RICHVIEW-230.G_3VR: 400 MW for 30-minute reserve at $30/MW and for 10-minute reserve at $30.10/MW
- RICHVIEW-230.G_5VR: 200 MW for 10-minute reserve at $75/MW, 200 MW for 10-minute reserve at $100/MW

CAOR is only scheduled in the real-time *dispatch algorithm*, and is not part of the day-ahead commitment and pre-dispatch sequences.

5.1 Derating CAOR

When Ontario *demand* is sufficiently low, CAOR capacity backed by voltage reductions is required to be derated. This is because the MW relief associated with voltage reductions is proportional to system demand.

The *IESO* will manage derates to the CAOR resources in the following timeframes:

Day-ahead:

In the day-ahead timeframe, we will derate the RICHVIEW-230.G_3VR resource for the next day real-time scheduling. Derates will be based on the expected MW relief, achievable within 10 minutes, from implementing a 5% voltage reduction[9].

We will issue an advisory notice for the next day indicating that we have derated the RICHVIEW-230.G_3VR resource.

Real-time:

In real-time, *IESO* CROs will:

- Monitor Ontario *demand* changes from the day-ahead forecast. Any change to Ontario *demand* that results in a greater than 50 MW change in the day-ahead derate to the RICHVIEW-230.G_3VR resource will trigger an update to the CAOR derate.
- Derate the RICHVIEW-230.G_5VR if the real-time *dispatch* of CAOR for 10-minute reserve exceeds the expected MW relief (achievable within 10 minutes) from implementing a 5% voltage reduction.

[9] We assume that 85% of total voltage reduction capacity can be achieved within 10 minutes of a contingency.

We will issue an advisory notice, and include the start time and maximum MW amount of the derate, if we either:

- Modify the derate to the RICHVIEW-230.G_3VR resource, or
- Derate the RICHVIEW-230.G_5VR resource.

– End of Section –

Appendix A: Report Screens

Sample reports will be included in this Appendix in the September 2016 release.

– End of Section –

Appendix B: Method to Prepare Ontario Demand Forecast

In accordance with C.5, S 7.1.3 of the *market rules*, this appendix describes the method used to prepare the hourly Ontario *demand* forecasts used as an input to the near-term *adequacy* assessments and presented in the:

- *Adequacy* Report, and
- Ontario Zonal *Demand* Forecast Report.
- To prepare near-term hourly Ontario *demand* forecasts (i.e. from current day, including *pre-dispatch*, out to 34 days), the *IESO* uses a load forecast tool[10]. The tool uses models consisting of linear regressions and/or neural network analysis to produce the forecasts.

B.1 Input Drivers for Demand Forecasting

The following items are used as input drivers by the *demand* forecasting tool:

- Weather parameters
  - Dry-Bulb Temperature
  - Wet-Bulb Temperature
  - Dew-Point Temperature
  - Wind Speed
  - Wind Direction
  - Illumination
  - Cloud Cover
- Historical *Demand* Data
- Embedded Solar Generation Data
  - Historical
  - Forecast

– End of Section –

[10] At the discretion of the *IESO,* we may manually adjust the Ontario *demand* forecasts provided by the load forecast tool to account for conditions such as, but not limited to, actual weather that differs from forecast weather.

Appendix C: Definitions of Terms in Adequacy Reports

This appendix defines the terms used and presented in the *Adequacy* Report. In addition to the terms in this appendix, all reports published on day 0 and reports published on day 1 after successful completion of the day-ahead commitment process, will include aggregated values of the capacity offered and *bid* by *market participants* and the aggregated *pre-dispatch schedules* for the *dispatch day.*

C.1 Forecast Supply

The *IESO* will forecast the following elements of supply:

- ***Energy* (MWhr)** – the amount of *energy* available from generation sources in Ontario plus imports from other *control areas*[11]. This quantity is calculated from the relationship:

  [generating capacity in-service (MW)] * 1 hr

  - [capacity unavailable due to *outages* (MW)[12]} * 1 hr

  - [capacity of *energy*-limited resources (MW)] * 1 hr

  - [capacity of *variable generation* resources (MW)] * 1 hr

  + *energy* (forecast) of *variable generation* resources (MWhr)

  + *energy*-limited resource *energy* for the hour (MWhr)

  + [imports from other *control areas* (MW)] * 1 hr

  The *Adequacy* Report includes *energy* quantities for each hour.

- **Capacity (MW)** – the net amount of *generation capacity* in-service in Ontario. This number may be revised lower if a material quantity of capacity is bottled. The *Adequacy* Report includes capacity quantities for each hour.

- ***Intermittent generator* schedules (MWhr/hr)** – *market participants* provide *dispatch data* for *intermittent generator*s that represent the forecast *energy* output for these facilities. For the days of the *Adequacy* Report in which intermittent *generator* schedules are not available, the *IESO* will use an estimate of these schedules in the *adequacy* assessment.

- ***Self-scheduling generator* schedules (MWhr/hr)** – *market participants* provide *dispatch data* for *self-scheduling generators* including *transitional scheduling generators* that represent the forecast *energy* output for these *facilities*. For the days of the *Adequacy* Report in which *self-scheduling generator* schedules are not available, the *IESO* will use an estimate of these schedules in the *adequacy* assessment.

- ***Energy*-limited *energy* (MWhr)** – the *IESO publishes* the aggregate forecast amount of *energy* available from *energy*-limited *facilities*. An *energy*-limited *facility* is a generation

[11] An estimated value of imports is used prior to the initial *pre-dispatch* run on day 1.

[12] Excludes *outages* to *energy*-limited resources and *variable generation* resources.

resource that is unable to supply *energy* equal to the capacity for each of the hours of the day (e.g. a hydro-electric *facility* with limited water in the forebay that does not allow it to produce *energy* at its rated output for each of 24 hours in the day). *Market participants* use Online *IESO* to provide the *IESO* with an *energy*-limited forecast of hourly granularity (i.e. the total forecast daily quantity of *energy* available) for all relevant *facilities*. The *IESO publishes* the aggregate hourly energy profile of *market participant* forecasts for each day of the *Adequacy* Report.

- ***Energy*-limited capacity (MW)** – the *IESO publishes* the nominal capacity of those *facilities* that are *energy*-limited. On any day, the list of *facilities* that may be *energy*-limited may change. To place the *energy*-limited *energy* quantity in context, the nominal capacity of these *facilities* are provided to the *IESO* by the *market participants*, and the *IESO publishes* these quantities in the assessment reports. The *Adequacy* Report includes *energy*-limited capacity quantities for each hour.

- ***Variable Generation energy* (MWh) –** the *IESO publishes* the aggregate *variable generation* forecast amount of *energy* available from *variable generation* whose owners/operators are registered *market participants*. *Variable generation* means all wind and solar photovoltaic resources with an installed capacity of ≥ 5 MW, or all wind and solar photovoltaic resources that are directly connected to the *IESO-controlled grid*. The *IESO* produces and *publishes* the aggregated hourly quantities of forecast wind and solar generation for days 8 to 34 of the *Adequacy* Report, using a set of seasonal capacity factors. For days 0-7 of the Adequacy Report the *IESO* uses and *publishes* wind and solar generation forecasts produced by a *forecasting entity*[13].

- ***Variable generation* capacity (MW) –** the *IESO publishes* the nominal capacity of *variable generation* whose owners/operators are registered *market participants*. On any day, the list of *variable generation* may change. The *Adequacy* Report includes the aggregated quantities of wind *generation capacity* and solar generation capacity, for each hour.

- **Estimated imports (MW)** – the *IESO* will include, in its *adequacy* assessments, an amount to account for potential imports from other *control areas*. For day 0 and 1 a value of zero will be used. For all other days an estimate of up to 700 MW will be used. The 700 MW amount is based upon *IESO* experience with interchange transactions and is the amount of megawatts that are reasonably assumed to be available from the *interconnections* at any given time. A more conservative number will be used where available *interconnection* information indicates that less than 700 MW would be available. The total amount attributed to potential interchange assistance will be reviewed as the *IESO* gains more experience with the market. This quantity will be provided for each hour of each day of the *Adequacy* Report period.

  The *IESO* may increase *imports* above 700 MW to reflect outage replacement *energy imports.* The amount in excess of 700 MW may be an aggregate of *generators* arranging for replacement *energy*.

[13] At the discretion of the *IESO,* we may manually adjust the *variable generation* forecast provided by the *forecasting entity* to account for conditions such as, but not limited to, actual weather that differs from forecast weather.

- **Capacity Imports (MW)** – the *IESO publishes* the quantity of capacity imports that can be relied upon from other *control areas*. This quantity is included in capacity excess (shortfall) calculations for all days in the near-term assessment period.
- ***Outages*** **(MW)** – the *IESO publishes* the quantity of *generation facility* MWs, by fuel type, that are unavailable due to *outage* or de-rating. This quantity will be provided for each hour of each day of the *Adequacy* Report.
- **Bottled Capacity (MW)** – the *IESO* will include, in its *adequacy* assessments, an amount to account for the estimated quantity of bottled *generation capacity*. This amount will be the sum of all regional *generation capacity* in excess of regional *demand* that cannot be transferred to other internal areas as a result of transmission limitations.
- **Adjusted Capacity in the Adequacy Reports:** For all days of the *Adequacy* Report, an adjustment is made to the available *dispatchable* capacity/generation i.e. the "Total *Outages*" value is increased by 2% of available dispatchable generation. This adjustment is applied to compensate for the *outage* reporting deadband of the greater of 2% or 10 MW, and to better represent available capacity and reduce discrepancies between the forecast in the Adequacy Report and *pre-dispatch*. The adjustment factor of 2% may be varied by the *IESO* from time to time if considered appropriate for the above purposes.

C.2 Forecast Demand

The *IESO* will forecast the following components of *demand* in the *Adequacy* Report:

- **Ontario *Demand* (MW)** – the *IESO* will forecast the Ontario *demand* (*non-dispatchable load* + *dispatchable load* + losses) and provide the total of these three quantities for each hour of each day of the *Adequacy* Report. The *dispatchable load* component of Ontario *demand* is the *dispatchable load* that is expected to be supplied. The forecast Ontario *demand* for day 0 (current day) and day 1 (tomorrow) is the average *demand* forecast in all hours, with the exception of the *IESO*-defined ramp hours (defined in Market Manual 4.2, Appendix E.1), where it is the peak *demand* forecast. Both average and peak *demand* forecasts are provided in the Adequacy Reports for day 0 and day 1. The forecast Ontario *demand* for all days beyond day 1 is the average *demand* for the hour.
- ***Dispatchable load*** **(MW)** – the *IESO* will forecast the amount of *dispatchable load* that is expected to be available to be dispatched off. This information is presented for each hour of the *Adequacy* Reports for days 2 to 34, and the Adequacy Reports for day 1 published prior to the day-ahead commitment process. *Dispatchable load* forecasts are included in capacity excess (shortfall) calculations.
- **Capacity Exports (MW)** – the *IESO publishes* the quantity of capacity exports that the *IESO* is obligated to provide to other *control areas*. This quantity is included in capacity excess (shortfall) calculations for all days in the near-term assessment period.
- **Generation Reserve Holdback (MW)** – the *IESO* will forecast the Generation Reserve Holdback Requirements - *operating reserve*, load forecast uncertainty (LFU) and additional contingency allowance (ACA) - in accordance with the principles listed in Appendix E: Generation Reserve Holdback Requirements.
- **Minimum 10-minute *operating reserve* requirement (MW)** – the *IESO* will forecast its 10-minute *operating reserve* in accordance with *NPCC* Directory 5: Reserve. This information is

presented for each hour of each day of the *Adequacy* Report. Minimum 10-minute *operating reserve* requirements are not included in excess (shortfall) calculations.

- **Minimum 10-minute Spinning *operating reserve* Requirement (MW)** – the *IESO* will forecast its 10-minute spinning *operating reserve* in accordance with *NERC Reliability* Standard BAL-002-1 (Disturbance Control Performance) and *NPCC* Directory 5: Reserve. This information is presented for each hour of each day of the *Adequacy* Report. Minimum 10-minute spinning *operating reserve* requirements are not included in excess (shortfall) calculations.

C.3 Total Supply and Total Requirement

The *IESO* will include in the *Adequacy* Reports:

- Total supply, quantified by calculating and presenting the total forecasted amount of available resources, and
- Total requirement, quantified by calculating and presenting the total forecasted amount of *demand*.

The Total Supply (MW) for each hour is calculated from the following formulation:

generating capacity in-service (MW) – capacity unavailable due to *outages* (MW) – bottled capacity (MW) + estimated imports (MW) + capacity imports (MW)

The Total Requirement (MW) for each hour is calculated from the following formulation:

total hourly Ontario *demand* forecast (MW) + generation reserve holdback (MW) + capacity exports (MW) – *dispatchable load* (MW)

C.4 Energy and Capacity Excess (Shortfall)

The *IESO* will include in the *Adequacy* Reports:

- *Energy adequacy*, quantified by calculating and presenting the *energy* excess (or shortfall when there is insufficient *energy*), and
- Capacity *adequacy*, quantified by calculating and presenting the capacity excess (or shortfall when there is insufficient capacity).

The *Energy* Excess (MWhr) for each hour is calculated from the following formulation:

[generating capacity in-service (MW) + estimated imports (MW) + *dispatchable load*] * 1 hr

- [total hourly Ontario *demand* forecast (MW) + capacity unavailable due to *outages* (MW) + capacity of *energy*-limited resources (MW) + capacity of *variable generation* resources (MW)] * 1 hr

+ *energy*-limited resource *energy* for the hour (MWhr)

+ *energy* (forecast) of *variable generation* resources (MWhr)

IF (*energy* excess < 0), then there is a shortfall of *energy*.

The Capacity Excess (MW) for each hour is calculated from the following formulation:

[generating capacity in-service (MW) + estimated imports (MW) + capacity imports (MW) + *dispatchable load*]

- [total hourly Ontario *demand* forecast (MW) + capacity unavailable due to *outages* (MW) + generation reserve holdback (MW) + capacity exports (MW)]

IF (capacity excess < 0), then there is a shortfall of capacity.

The *Adequacy* Reports for day 0, and day 1 reports published after successful completion of the day-ahead commitment process, also include offered capacity excess (or shortfall when there is insufficient offered capacity). The Offered Capacity Excess (MW) for each hour is calculated from the following formulation:

[total internal generation offered/forecasted (MW/MWhr) + total offered imports (MW) – linked wheels + *dispatchable load bid*]

- [total peak hourly Ontario *demand* forecast (MW) + generation reserve holdback (MW)]

IF (offered capacity excess < 0), then there is a shortfall of offered capacity.

C.5 Over-Generation and Under-Generation

Over-Generation

An over-generation situation is deemed to occur when the amount of dispatched generation exceeds the Ontario *demand* and net interchange. This would likely occur in real-time *operation* in low *demand* periods when one or more *generators dispatch* more generation than the *dispatch instructions* issued by the *IESO* and are unable to respond to *IESO*'s subsequent *dispatch instructions* for immediate corrective actions. In the event of an actual, imminent or expected over-generation situation, the *IESO* will issue a Minimum Generation Alert / Event via an advisory notice, including the remedial actions that the *IESO* intends to take. The subsequent publication of the *Adequacy* Report will indicate the amounts of over-generation.

Under-Generation

An under-generation situation is expected to occur when a potential *energy* and capacity shortfall (see Appendix C.4) is identified in the *adequacy* assessment process for the day 2 to 34 period. In the event of an expected under-generation situation, the *IESO* will issue an advisory notice, including the remedial actions that the *IESO* intends to take. The expected amounts of under-generation will be included in the *Adequacy* Reports.

Maximum Generation Alert

If the *IESO* determines that there will be potential difficulty meeting *energy* and/or *operating reserve* requirements due to lack of *market participant offers*, the *IESO* will issue a Maximum Generation (MaxGen) Alert via an advisory notice, requesting *market participants* to consider placing additional *offers* into the electricity market.

– End of Section –

Appendix D: Transmission Interfaces

The Transmission Limits report provides deviations in transmission limits for major internal interfaces and all *intertie* interfaces (C.5, S. 7.4.4 of the *market rules*). These are the interfaces on which flows must be restricted below the limit specified to ensure reliable *operation* of the *IESO-controlled grid*.

The following is a list of internal interfaces and external interfaces for which the *IESO* will *publish* limits for all elements in-service and *outage* conditions (C.5, S. 7.4.4.1.2, 7.4.4.1.3 of the *market rules*). These interfaces are consistent with those included in long-term forecast publications (C.5 S. 7.4.2 of the *market rules*). The Maximum Interface Limits posted are representative of Available Transfer Capability (ATC) values. At any time, the actual maximum interface limits may deviate from these values. The table below provides the basis for interface reporting; additional interfaces may be included in the actual reports.

Table D-1: Operating Security Limits

Interface	Description of Interface	Notes
TEK	Transfer East of Kenora	Voltage violation
TWK	Transfer West into Kenora	Voltage violation
MMW	Mackenzie Moose Lake Flow West	No limit under normal conditions; voltage violation under outage or high risk conditions
LFE	Lakehead Flow East	No limit under normal conditions; voltage violation under outage or high risk conditions
EWTE	East-West Transfer East	Voltage violation
EWTW	East-West Transfer West	Voltage violation
TEM	Transfer East of Mackenzie	Voltage violation
TWM	Transfer West into Mackenzie	No limit under normal conditions; voltage violation/transient limit under *outage* or high risk conditions
WMFE-230-115	Wawa-MacKay Flow East on the 230 kV and 115 kV system	Voltage stability limit

Interface	Description of Interface	Notes
WMFE-230	Wawa-MacKay Flow East on the 230 kV system	Voltage violation
MissE	Transfer East of Mississaugi	Voltage violation
MissW	Transfer West into Mississaugi	Voltage violation
D501P+H9K(South)	Flow South on Circuits D501P plus H9K	No limit with G/R available, limit reduced to zero with D501P out of service
D501P+H9K(North)	Flow North on Circuits D501P plus H9K	No limit with L/R available, limit reduced to zero with D501P out of service
P502X+D3K(South)	Flow South on Circuits P502X plus D3K	No limit with G/R available, limit reduced to zero with P502X out of service
P502X+A8K+A9K (North)	Flow North on Circuits P502X plus A8K & A9K	No limit with L/R available, limit reduced to zero with P502X out of service or for high risk conditions over P502X
FS	Flow South (on Circuits X503E, X504E and D5H)	Stability limit
FN	Flow North (on Circuits X503E, X504E and D5H)	Voltage decline limit
P502X (South)	Flow South on Circuit P502X	Stability limit
Canyon 115kV Output	Canyon 115kV Output	Normal system configuration / Configuration with Otter Rapids connected to 115 kV system
FABCW	Flow Away From Bruce Complex and Wind output in Bruce area.	Voltage decline and stability limit
BLIP	Buchanan Longwood Input	Transient stability limit
NBLIP	Negative Buchanan Longwood Input	Voltage decline and stability limit
FETT	Flow East To Toronto	Voltage stability limit
CLAN	Claireville North	
FIO	Flow Into Ottawa	Voltage Stability Limit

Interface	Description of Interface	Notes
FID	Flow into Dobbin	These limits are to control post-contingency voltage decline at Dobbin area. The limits can be improved based on the amount of L/R armed.
X1P Flow Into Dobbin	X1P Flow Into Dobbin	This limit is to ensure angular stability of Mountain Chute and Chenaux generators.
115 kV Dobbin Area Load	115 kV Dobbin Area Load	**** No interface limit under normal conditions
Chats Falls Area Generation	Chats Falls GS 230 kV Area Generation	
P33C Inflow	P33C Chats Falls Inflow	P33C Chats Falls Inflow is limited to 310 MW when Chelsea generation is greater than 105 MW
P33C Inflow Plus Arnprior	P33C Chats Falls Inflow Plus Arnprior Generation	**** No interface limit under normal conditions
Madawaska Generation	Madawaska 115 kV Generation	This limit is based on Chats Falls G2 & G3 I/S and connected to C7BM or 230 kV system. The limit can be improved up to 400 MW with maximum G/R armed.
Beauharnois Delivery	Beauharnois Delivery	Beauharnois delivery is constrained by transient stability. The limit can be improved up to 800 MW with maximum G/R armed.
MacLaren D5A Import	D5A Import From Maclaren	D5A import limit is constrained by transient stability. The All I/S limit is 250 MW.
MacLaren D5A Export	D5A Export To Maclaren	The Export Limit of 200MW is not a security based limit, but is the agreed maximum amount of load that MacLaren may connect.
Beauharnois D5A Transfer	D5A Transfer	**** No interface limit under normal conditions
TEC	Transfer East From Cherrywood	**** No interface limit under normal conditions

Interface	Description of Interface	Notes
OMTE	Ontario-Manitoba Transfer East	Thermal limit
OMTW	Ontario-Manitoba Transfer West	Thermal limit
MPFN	Ontario-Minnesota Transfer North	Thermal limit
MPFS	Ontario-Minnesota Transfer South	Thermal limit
Ontario to Michigan Winter	Total line flow on B3N, L4D, L51D and J5D from Ontario to Michigan	This limit is based on winter thermal rating at 10 degree C with 0-4 km/hr wind. Ambient conditions will determine the applicable thermal limit of the tie lines.
Michigan to Ontario Winter	Total line flow on B3N, L4D, L51D and J5D from Michigan to Ontario	This limit is based on winter thermal rating at 10 degree C with 0-4 km/hr wind. Ambient conditions will determine the applicable thermal limit of the tie lines.
Ontario to Michigan Summer	Total line flow on B3N, L4D, L51D and J5D from Ontario to Michigan	This limit is based on summer thermal rating at 35 degree C with 0-4 km/hr wind. Ambient conditions will determine the applicable thermal limit of the tie lines.
Michigan to Ontario Summer	Total line flow on B3N, L4D, L51D and J5D from Michigan to Ontario	This limit is based on summer thermal rating at 35 degree C with 0-4 km/hr wind. Ambient conditions will determine the applicable thermal limit of the tie lines.
NY-ONT Stability Limit	New York to Ontario Stability Limit	
Ontario Niagara to New York Winter	Total line flow on PA301, PA302, PA27, BP76, L33P, and L34P from Ontario to New York	This limit is based on winter thermal rating at 10 degree C with 0-4 km/hr wind. Ambient conditions will determine the applicable thermal limit of the tie lines.
New York to Ontario Niagara Winter	Total line flow on PA301, PA302, PA27, BP76, L33P and L34P from New York to Ontario	This limit is based on winter thermal rating at 10 degree C with 0-4 km/hr wind. Ambient conditions will determine the applicable thermal limit of the tie lines.

Interface	Description of Interface	Notes
Ontario Niagara to New York Summer	Total line flow on PA301, PA302, PA27, BP76, L33P, and L34P from Ontario to New York	This limit is based on summer thermal rating at 35 degree C with 0-4 km/hr wind. Ambient conditions will determine the applicable thermal limit of the tie lines.
New York to Ontario Niagara Summer	Total line flow on PA301, PA302, PA27, BP76, L33P, and L34P from New York to Ontario	This limit is based on summer thermal rating at 35 degree C with 0-4 km/hr wind. Ambient conditions will determine the applicable thermal limit of the tie lines.
Ontario to Quebec Beauharnois 230 kV Winter	Line flow on B31L from Ontario to Quebec Beauharnois (radial connection)	Thermal limit of B31L may be more restrictive.
Ontario to Quebec Beauharnois 230 kV Summer	Line flow on B31L from Ontario to Quebec Beauharnois (radial connection)	This limit is based on summer thermal rating at 30 degrees C. Ambient conditions will determine the applicable thermal limit of the tie line to a maximum of 470 MW.
Quebec Beauharnois 230 kV to Ontario Winter or Summer	Total Line flow on B5D and B31L from Quebec Beauharnois to Ontario (radial connection)	This limit is the same as the interface limit for Beauharnois Delivery. Thermal limits of B5D and B31L may be more restrictive
Ontario to Quebec Maclaren - 230 kV - Winter or Summer	Line flow on D5A from Ontario to Maclaren	This limit is the same as the interface limit for D5A Export to Maclaren. Thermal limit of D5A may be more restrictive.
Quebec Maclaren to Ontario – 230 kV - Winter or Summer	Line flow on D5A from Maclaren to Ontario	This limit is the same as the interface limit for D5A Import from Maclaren. Thermal limit of D5A may be more restrictive.
Ontario to Quebec Masson - 115 kV - Winter or Summer	Line flow on H9A from Ontario to Masson	Concurrent *operation* of D5A with Maclaren and H9A with Masson is not permitted
Quebec Masson to Ontario - 115 kV - Winter or Summer	Line flow on H9A from Masson to Ontario	Concurrent *operation* of D5A with Maclaren and H9A with Masson is not permitted. Thermal limit of H9A may be more restricted

Interface	Description of Interface	Notes
Ontario to Quebec Outaouais – 230kV – Winter or Summer	Line flow on A41T and A42T from Ontario to Outaouais	Limit is the minimum of 1 or 2 below: 1. 1250MW with two convertors in service or 625MW with one convertor in service 2. FIO limit – (Ottawa area load and losses) + (Generation in the Ottawa Zone)
Quebec Outaouais to Ontario – 230kV – Winter or Summer	Line flow on A41T and A42T from Outaouais to Ontario	Limit is the minimum of 1 or 2 below: 1. 1250MW with two convertors in service or 625MW with one convertor in service 2. FIO limit – (Ottawa area load and losses) + (Generation in the Ottawa Zone)
Ontario to Quebec Paugan 230 kV Winter or Summer	Line flow on P33C from Ontario to Paugan	
Quebec Paugan to Ontario - 230 kV Winter or Summer	Line flow on P33C from Paugan to Ontario	P33C Chats Falls Inflow is limited to 310 MW when Chelsea generation is greater than 105 MW
Ontario to Quebec Quyon 230 kV Winter	Line flow on Q4C from Ontario to Quyon	
Quebec Quyon to Ontario 230 kV Winter	Line flow on Q4C from Quyon to Ontario	
Ontario to Quebec Quyon 230 kV Summer	Line flow on Q4C from Ontario to Quyon	
Quebec Quyon to Ontario 230 kV Summer	Line flow on Q4C from Quyon to Ontario	
Ontario to Quebec Bryson 115 kV Winter or Summer	Line flow on X2Y from Ontario to Bryson	
Quebec Bryson to Ontario - 115 kV Winter or Summer	Line flow on X2Y from Bryson to Ontario	
Quebec Rapide to Ontario (115kV) Import	Line flow on D4Z from Rapide-Des-Isles to Dymond	

Interface	Description of Interface	Notes
Ontario to Quebec Kipawa (115kV) Export	Line flow on H4Z from Holden to Kipawa	
* Note 1: Interface Limit may be lower than the maximum limit indicated due to dependencies on other interface flows or factors such as the number of generating units on-line, amount of generation rejection armed, amount of load rejection armed, voltage levels, etc.		
* Note 2: Limits based on thermal restrictions for pre-contingency flow or post-contingency flow are monitored online and are not included in the above list. Thermal limitations indicated above for external interfaces are estimated values based on specified assumptions.		

– End of Section –

Appendix E: Generation Reserve Holdback Requirements

Generation Reserve Holdback (GRH) is an amount of generating capacity that is needed to be held in reserve, to cover for uncertainty in load forecasting, generation availability, and for the effects of special protection schemes and the commissioning of large *generation units*, so that load may be supplied with an acceptable level of *reliability*. The distribution of the Generation Reserve Holdback throughout a year is based upon a method of levelizing the risk of unsupplied load for the peak hour of each week in a year. The probability of failure of units currently in *operation* increases as time progresses but tends to level off after about one month. The GRH that is required to levelize the risk due to generating unit unreliability will, therefore, increase up to a limit as time advances from the present. On occasion, some special protection schemes, and the commissioning of large generating units, can give rise to the potential for unusually high generation contingencies. When these are taken into account, significant GRH variations from week-to-week can result, especially in the near-term.

Therefore, GRH is comprised of the combination of requirements for *operating reserve* (OR), Load Forecast Uncertainty (LFU) and Additional Contingency Allowance (ACA) and is dependent on the day in the assessment period.

Table E-1: Generation Reserve Holdback Requirements

Type of Report		Time Period (beginning from present)	Generation Reserve Holdback (MW)
Adequacy Report	(a)	Days 0-2, where day 0 is the current day.	*Operating reserve* requirement consisting of 30-minute and 10-minute *operating reserve* requirements.
	(b)	Balance of the first two weeks (3-14 days out)	GRH = *operating reserve* + LFU + ACA That is, GRH equals the *operating reserve* Requirement (*operating reserve*) plus the Load Forecast Uncertainty (LFU) plus the Additional Contingency Allowance (ACA) In this period, the ACA consists of the next largest half contingency beyond the *operating reserve* requirement. For the Winter Period (December, January and February) a further amount equal to half of the next largest contingency will be added.

Type of Report		Time Period (beginning from present)	Generation Reserve Holdback (MW)
	(c)	Covers a total of 11-17 days from day 15 out to the end of Week 4[14].	Linear interpolation between (b) and (d), except for the Winter Period when it is the same as (d).
Period beyond the days of the Adequacy Report	(d)	Week 5 (this quantity is not included in the *Adequacy* Report, but is used to aid in the interpolation for the period from day 15 out to the end of Week 4.	The Week 5 Required Reserve is calculated and *published* in the Resources *Adequacy* Assessment Table, located in the "18-Month Outlook" as posted on the *IESO* website.

- **Total *operating reserve* (operating reserve)** forecast is comprised of the addition of the 30-minute *operating reserve* requirement and the 10-minute *operating reserve* requirement.
- **Load Forecast Uncertainty (LFU)** - The process of creating a realistic operational *energy* plan includes taking into account uncertainty in the major forecast components, including Ontario *demand*. Sensitivity to extreme weather conditions subjects the power system to large swings in load, particularly during the summer and winter peak periods. Only weather-related uncertainties are considered. Load Forecast Uncertainty (LFU) is included to reflect this sensitivity in the *adequacy* assessment reports.

  LFU is a statistical measure of deviations from the actual Ontario *demand* and can be considered as a target bandwidth for the forecasted error. It follows a normal distribution and is obtained from historical data. One standard deviation of error distribution becomes the factor used to determine LFU. The LFU is determined for both day 3 and for days further out.

  In the near-term, the *demand* forecast is derived using a load forecasting tool (for more information on preparing the *demand* forecast, see Appendix B). From day 0 to 10 days out, the current weather forecast is used as the basis for characterizing the forecast day. Beyond 10 days, normal (actual past) weather is used as the basis for characterizing the forecast day.

  From day 0 (current day) to 2 days out, there is less uncertainty in the weather forecast, therefore the LFU allowance is not included in this period. From 3 days out and beyond, the weather forecast contains more uncertainty, therefore LFU allowance is included to reflect the uncertainty. As the number of days out increases, uncertainty in the weather forecasted increases.

  For 3 days out to day 6, the LFU is a statistical measure of the error variability over the 3 to 6 day period. This data set consists of a calculated error (difference) between the forecasted and actual Ontario *demand* is evaluated to determine one standard deviation for each month. This deviation represents the uncertainty of 6 days out. As the days out decreases, the uncertainties in the forecasted weather decrease. Therefore, the LFU decreases.

[14] A week runs Monday – Sunday. The current week is defined as Week 0.

For 7 days out and beyond, the LFU is a statistical measure of past monthly Ontario *demand* peaks and monthly *energy* usage. This data set consists of 30 years of recorded actual (normal) weather, Ontario *demand* peaks and *energy* usage. To use this data, the assumption is made that the weather in the future will be similar to the weather in the past. Again, this data is evaluated to determine a standard deviation for each month using the Ontario *demand* peaks. This deviation represents the uncertainty for 7 days out and beyond.

- **Additional Contingency Allowance (ACA)** is the forecast for *demand* to allow for contingencies. The GRH requirements may be increased for special considerations in near-term planning, such as uncertainties in return-to-service dates, known problems of operating units, hydraulic flexibility, levels and types of transactions and prevailing weather conditions. Therefore, operability studies considering generation contingencies may also be required to ensure *energy adequacy*.

The Generation Reserve Holdback (GRH) component of the *Demand* Forecast for any given hour or day plays an important role in the decision-making process of the *IESO* and ultimately, for *market participants*. For example, the forecast accuracy of the capacity of *operating reserve* plus the *demand* required to fulfill uncertainties and contingencies in the *operation* of the *IESO*-administered grid impacts directly on requests for *outages* by *market participants*. A consistently adequate supply of generation to meet capacity and *energy* requirements will be maintained in the near-term.

– End of Section –

Acronyms

The following are some specific acronyms used in the near-term assessments and reports published by the *IESO*:

Acronym	Description
A/R	Auto reclose
ACE	Area Control Error
ARFS	Automatic Removal from Service
ATC	Available Transfer Capability
AVR	Automatic Voltage Regulator
BF	Breaker Failure
CT	Current Transformer
CTU	Combustion Turbine Unit
GR	Generation Rejection
GIC	Geomagnetic Induced Current
GS	Generating Station
HT	High Tension
I/S	In Service
L/R	Load Rejection
LGR	Load & Generation Rejection
LEO	Line End Open
LTR	Limited Time Rating
LT	Low Tension
LTE	Long Time Emergency Rating
O/S	Out of Service
O/V	Overvoltage
OAAT	One at a Time
PT	Potential Transformer
RTU	Remote Terminal Unit
SCO	System Control Order
SPS	Special Protection System

Acronym	Description
SS	Station Service
STE	Short Time Emergency Rating
Term. Brkr	Terminal Breaker
TLR	Transmission Loading Relief
TS	Transmission Station
U/A	Unavailable
U/V	Under Voltage
ULTC	Under Load Tap Changer

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References

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