



Market Rule Amendment Proposal

PART 1 – MARKET RULE INFORMATION

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|-------------------------------------|--|-----------------------------------|-----------------------------------|
| Identification No.: | MR-00299-R00 | | |
| Subject: | Operating Reserve Requirements | | |
| Title: | Regional Reserve Sharing | | |
| Nature of Proposal: | <input checked="" type="checkbox"/> Alteration | <input type="checkbox"/> Deletion | <input type="checkbox"/> Addition |
| Chapter: | 5 | Appendix: | |
| Sections: | 4.5 | | |
| Sub-sections proposed for amending: | 4.5.1; 4.5.6B (new); 4.5.13; 4.5.13A | | |

PART 2 – PROPOSAL HISTORY

| Version | Reason for Issuing | Version Date |
|--------------------------------------|--|--------------------|
| 1.0 | Draft for Technical Panel Review | August 17, 2005 |
| 2.0 | Draft for Technical Panel Review | September 30, 2005 |
| 3.0 | Publish for Stakeholder Review and Comment | October 6, 2005 |
| 4.0 | Draft for Technical Panel Review and Vote | October 20, 2005 |
| 5.0 | Recommended by Technical Panel and Submitted for IESO Board Approval | October 25, 2005 |
| 6.0 | Approved by IESO Board | November 18, 2005 |
| Approved Amendment Publication Date: | | November 22, 2005 |
| Approved Amendment Effective Date: | | December 14, 2005 |

PART 3 – EXPLANATION FOR PROPOSED AMENDMENT

Provide a brief description of the following:

- The reason for the proposed amendment and the impact on the *IESO-administered markets* if the amendment is not made.
- Alternative solutions considered.
- The proposed amendment, how the amendment addresses the above reason and impact of the proposed amendment on the *IESO-administered markets*.

Summary

This amendment proposes to enable the IESO to participate in the Northeast Power Coordinating Council (NPCC) Regional Reserve Sharing program. The objective of the program is to improve regional reserve market efficiency by allowing a certain amount of ten-minute operating reserve to be shared on a regional basis in a manner that maintains reliability in each of the participating control areas.

The specific proposed changes are as follows:

- Add a provision that permits the IESO to participate in reserve sharing programs with neighbouring control areas, and
- Indicate that by participating in the program, the IESO may count a contribution of up to 100 MW towards its ten-minute operating reserve requirement from nearby systems in accordance with the applicable reliability standards.

The NPCC Regional Reserve Sharing program currently specifies that each participating control area may count a contribution of 50 MW towards its ten-minute operating reserve requirement. NPCC originally proposed to allow a sharing of 100 MW but limited that amount to 50 MW for the first six months of the program as a transitional measure. NPCC will be reviewing the program impacts after the first six months of implementation and may increase the amount that may be shared from 50 MW to 100 MW pending the outcome of their review.

If NPCC increases the amount of reserve that may be shared from 50 MW to 100 MW, the proposed amendments eliminate the need for a subsequent rule amendment thereby enabling the Ontario market to respond quickly to the anticipated change. The proposed amendments also limit market impact by specifying an upper bound on the amount of reserve that may be shared.

It is also proposed to:

- Make a number of changes of clarification, and
- Change all “IMO” references in Chapter 5 to “IESO” in keeping with the organization name change resulting from the passage of Bill 100.

Background

The Northeast Power Coordinating Council (NPCC) is one of ten Regional Reliability Councils responsible for the implementation of industry-wide reliability standards established by the North American Electric Reliability Council (NERC). NPCC was formed to promote the reliability and efficiency of the interconnected power systems within its geographic area. As a member of NPCC, the IESO is required to operate in accordance with all applicable reliability standards.

On June 1, 2005, the NPCC Reliability Coordinating Committee gave approval for the implementation

PART 3 – EXPLANATION FOR PROPOSED AMENDMENT

of an NPCC Regional Reserve Sharing (RRS) program that will allow for the sharing of ten-minute non-synchronised operating reserve among participating control areas. The program will commence after November 1, 2005 and it's expected that all NPCC participating areas will be ready to participate by February 1, 2006.

Participation in the Regional Reserve Sharing program is voluntary. The primary objective of the RRS program is to improve regional reserve market efficiency in a manner that maintains reliability. Reserve sharing groups already exist in other NERC regions, including the Southwest Power Pool (SPP) Region and the East Central Area Reliability Coordination Agreement (ECAR) Region. Initially, the areas that will be participating in the RRS program are the IESO, NYISO, ISO-NE and the Maritimes.

Discussion

New section 4.5.6B – Regional Reserve Sharing

This section would enable the IESO to participate in the NPCC Regional Reserve Sharing program and specifies that the IESO may count towards its ten-minute operating reserve requirement a contribution from nearby systems in accordance with the applicable reliability standards.

The IESO would not count such a contribution towards its ten-minute operating reserve requirement if:

- the associated energy could not be delivered to Ontario due to transmission constraints within, or external to, Ontario;
- the associated energy could not be delivered to Ontario due to transmission constraints on the interties; or
- the associated energy is not available from at least one of the other participating areas.

Each participating control area will, subject to availability and deliverability of the associated energy:

- share 100 MW of ten-minute non-synchronised operating reserve and
- count a contribution of up to 100 MW towards its ten-minute non-synchronised operating reserve requirement thereby reducing their purchases of domestic supply of ten-minute non-synchronised operating reserve by that amount.

Initially, each control area participating in the NPCC Regional Reserve Sharing program may count a contribution of up to 50 MW of towards its ten-minute non-synchronised operating reserve requirement¹. NPCC will review the impacts of the RRS program following the first six months of implementation. Pending the outcome of the review, NPCC has indicated that it may consider allowing each participating control area to count a contribution of 100 MW towards its ten-minute non-synchronised operating reserve requirement. Any increases or changes to the RRS program will require NPCC Reliability Coordinating Committee approval.

¹ The NPCC procedure document for Regional Reserve Sharing (NPCC Procedure C-38) is available at <http://www.npcc.org/publicFiles/reliability/criteriaGuidesProcedures/c-38.pdf>

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The proposed amendments limit market impact by providing an upper bound on the amount of reserve that may be shared while providing flexibility to the IESO such that a subsequent rule amendment is not required if the NPCC approves the increase.

NPCC conducted a study to determine the impact on reliability of the Regional Reserve Sharing program. The study examined the increased probability of an adverse reliability event occurring with the implementation of the RRS program. The results of the study indicated that the probability of such an event occurring increased from once in every 1,114 years to once in 1,079 years with the implementation of the RRS program. Based on these results, NPCC concluded that the RRS program would have no significant impact on reliability. The IESO will monitor the impact on reliability of this program and will opt out of the program if any significant adverse reliability impacts are identified.

The results of an IESO simulation indicate that reducing domestic resources scheduled to meet the ten-minute non-synchronised operating reserve requirement would decrease market prices for both operating reserve and, to a lesser degree, energy prices. (See attachment for simulation details and results.)

Other Changes

It is also proposed to make the following changes:

- Change all “IMO” references in Chapter 5 to the “IESO” to reflect the name change required under Bill 100.
- Insert titles within section 4.5 to identify rule provision subject matter to assist the reader. These titles are only to improve ease of reference and do not affect the interpretation of the rules.
- Specify in section 4.5.1 that operating reserve may also be provided by neighbouring control areas through shared activation of operating reserve and regional reserve sharing programs.
- Remove section 4.5.13A and related references because the provision is no longer relevant. This section specifies a provision that only applies during the first six months of the market.

PART 4 – PROPOSED AMENDMENT

4.5 Operating Reserve

- 4.5.1 *Operating reserve* is capacity that, for any given operating interval or *dispatch interval*, is in excess to that required to meet anticipated requirements for *energy* for that operating interval or dispatch interval, and is available to the *integrated power system* for *dispatch* by the ~~IMO~~*IESO* within a specified time period, such as 10 minutes or 30 minutes. *Operating reserves* may be provided by *generation facilities*, *dispatchable loads* and *boundary entities* to the extent that each meets the applicable requirements to be a *registered facility* in respect of each category of *operating reserves*. Neighbouring control areas may also provide operating

reserve through shared activation of operating reserve and regional reserve sharing programs. *Operating reserve* is required to:

- 4.5.1.1 cover or offset unanticipated increases in load during a *dispatch day* or *dispatch hour*;
 - 4.5.1.2 replace or offset capacity lost due to the *forced outage* of generation or transmission equipment; or
 - 4.5.1.3 cover uncertainty associated with the performance of *generation facilities* or *dispatchable loads* in responding to the IMOIESO's *dispatch instructions*.
- 4.5.2 The IMOIESO shall maintain sufficient *operating reserve* to meet all applicable *reliability standards*.
- 4.5.3 The IMOIESO shall maintain, as a minimum, total *operating reserve* that is the sum of the *ten-minute operating reserve* requirement and the *thirty-minute operating reserve* requirement.
- 4.5.4 Part of the requirement for *ten-minute operating reserve* shall be synchronised with the IMOIESO-controlled *grid* consistent with section 4.5.9.
- 4.5.5 The IMOIESO shall ensure that *operating reserve* is distributed throughout the IMOIESO-controlled *grid* such that sufficient *operating reserve* can be activated and delivered to any location on the *integrated power system*.

Shared Activation of Reserve

- 4.5.6 The IMOIESO may share with nearby systems in *NPCC* and *PJM* the activation of its *ten-minute operating reserve* to respond to *contingency events* in accordance with agreements between the IMOIESO and such systems. Similarly, such systems may activate their *operating reserve* when requested to meet *contingency events* in the IMOIESO control area in accordance with agreements between the IMOIESO and such systems. Such shared activation of *operating reserve* is solely for the purpose of maintaining the *reliability* of *interconnection systems* and shall not alter the *operating reserve* requirements of the IMOIESO.

Control Action Operating Reserve

- 4.5.6A The IMOIESO may include voltage reductions, and reductions in the *thirty-minute operating reserve* requirements within allowable *reliability standards* as standing *offers* in the *operating reserve markets* subject to the following conditions:
- 4.5.6A.1 the IMOIESO shall introduce such standing *offers* in increasing quantities;

- 4.5.6A.2 the quantities referred to in section 4.5.6A.1 and the prices therefore shall be determined by the *IMOIESO Board* and such quantities and prices shall be *published* by the *IMOIESO*;
- 4.5.6A.3 the *IMOIESO Board* may specify the circumstances under which any one or more of the quantities may either be withdrawn or not introduced and the manner in which any such withdrawal will be effected and the *publishing* thereof;
- 4.5.6A.4 the *IMOIESO* shall *publish* the times and quantities of the voltage reductions and reduction in *thirty-minute operating reserve* when these sources of *operating reserve* have been scheduled to provide *operating reserve*; and
- 4.5.6A.5 the prices and quantities of the standing *offers* set by the *IMOIESO Board* in accordance with section 4.5.6A.2 shall be monitored by the *IMOIESO* to assess their impacts and that any changes to the prices and quantities would be recommended to the *IMOIESO Board* as necessary.

Regional Reserve Sharing

4.5.6B The IESO may participate in regional reserve sharing programs with neighbouring control areas. Subject to availability and deliverability of the associated energy, the IESO may count towards its non-synchronised ten-minute operating reserve requirement a contribution of up to 100 MW from neighbouring control areas in accordance with applicable regional reserve sharing programs and applicable reliability standards. The IESO shall activate energy from regional reserve sharing programs in accordance with applicable reliability standards.

Ten-Minute Operating Reserve

- 4.5.7 *Ten-minute operating reserve* is capacity that is available to the *integrated power system* in excess of anticipated requirements for *energy* and that can be made available and used within ten minutes. It includes resources that are either synchronised or non-synchronised with the *IMOIESO-controlled grid*.
- 4.5.8 The *IMOIESO* shall maintain sufficient *ten-minute operating reserve* to meet the requirements of all applicable *reliability standards*. This shall be at least equal to the largest first contingency loss sustainable on the *IMOIESO-controlled grid*.
- 4.5.9 *Ten-minute operating reserve* shall be synchronised with the *IMOIESO-controlled grid* to the extent required by all applicable *reliability standards*.
- 4.5.10 If, for any reason, there is a deficiency of *ten-minute operating reserve*, the *IMOIESO* shall replace such *reserve* in accordance with the applicable *reliability standards* referenced in the *market manuals*.

- 4.5.11 The *IMOIESO* shall, in accordance with Chapter 7, *publish* daily its estimates of the quantity of *ten-minute operating reserve* that is required for each hour of the following day.
- 4.5.12 A registered facility that is a dispatchable load or boundary entity that is used as ten-minute operating reserve shall be treated as operating reserve that is non-synchronised with the *IMOIESO-controlled grid*.
- 4.5.13 ~~Subject to section 4.5.13A, the~~ The reduction in load that can be effected by curtailing pumping hydroelectric *generation facilities* is eligible to be treated as *operating reserve* that is synchronised with the *IMOIESO-controlled grid*.
- 4.5.13A ~~Until the date that is the first day of the seventh calendar month following the market commencement date, the reduction in load that can be effected by curtailing pumping hydroelectric generation facilities shall not be treated as operating reserve that is synchronised with the IMO-controlled grid.~~ [Intentionally left blank – section deleted]
- 4.5.14 [Intentionally left blank]
- 4.5.15 [Intentionally left blank]
- 4.5.16 [Intentionally left blank]
- 4.5.17 [Intentionally left blank]

PART 5 – IESO BOARD COMMENTS

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| <p>These amendments will improve regional reserve market efficiency in a manner that maintains reliability.</p> |
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Price Impacts of Participation in NPCC Regional Reserve Sharing Program

IESO Simulation and Results
September 19, 2005





Assumptions and Limitations of Simulation

- **Reduced 10-minute non-synchronized operating reserve by 100 MW and 50 MW, respectively.**
- **Analysis based on interval 6 for hours 2-24 from May 2002 through December 2004.**
 - Interval 6 is assumed to be an approximation for the average hourly price in each hour.
 - The data does not include delivery hour 1 due to modelling constraints.
 - Assumed that the simulated average price impacts would not change by including delivery hour 1 in the analysis.
- **Simulation does not account for changes in participant behaviour.**
- **The O/R associated with RRS is assumed to be available and deliverable in all hours.**



Simulation Results

| Year | Sim. Actual Energy MCP (\$/MWh) <i>A</i> | Sim. Energy MCP with 100 MW Reduction in OR (\$/MWh) <i>B</i> | Difference (\$/MWh) <i>B - A</i> | Sim. Energy MCP with 50 MW Reduction in OR (\$/MWh) <i>C</i> | Difference (\$/MWh) <i>C - A</i> |
|------|---|--|-------------------------------------|---|-------------------------------------|
| 2002 | 51.81 | 51.22 | -0.59 | 51.46 | -0.35 |
| 2003 | 53.87 | 53.46 | -0.41 | 53.63 | -0.24 |
| 2004 | 49.81 | 49.36 | -0.45 | 49.58 | -0.23 |
| Avg | 51.86 | 51.39 | -0.47 | 51.59 | -0.27 |
| Year | Sim. Actual 10 S Price (\$/MWh) <i>A</i> | Sim. 10 S Price with 100 MW Reduction in OR (\$/MWh) <i>B</i> | Difference (\$/MWh) <i>B - A</i> | Sim. 10 S Price with 50 MW Reduction in OR (\$/MWh) <i>C</i> | Difference (\$/MWh) <i>C - A</i> |
| 2002 | 6.94 | 6.03 | -0.91 | 6.40 | -0.54 |
| 2003 | 5.38 | 4.36 | -1.02 | 4.79 | -0.59 |
| 2004 | 5.89 | 5.02 | -0.87 | 5.47 | -0.42 |
| Avg | 5.96 | 5.02 | -0.94 | 5.42 | -0.54 |
| Year | Sim. Actual 10 N Price (\$/MWh) <i>A</i> | Sim. 10 N Price with 100 MW Reduction in OR (\$/MWh) <i>B</i> | Difference (\$/MWh) <i>B - A</i> | Sim. 10 N Price with 50 MW Reduction in OR (\$/MWh) <i>C</i> | Difference (\$/MWh) <i>C - A</i> |
| 2002 | 3.40 | 2.33 | -1.07 | 2.77 | -0.63 |
| 2003 | 4.12 | 2.96 | -1.16 | 3.45 | -0.67 |
| 2004 | 3.87 | 2.87 | -1.00 | 3.34 | -0.53 |
| Avg | 3.84 | 2.77 | -1.07 | 3.24 | -0.60 |
| Year | Sim. Actual 30 R Price (\$/MWh) <i>A</i> | Sim. 30 R Price with 100 MW Reduction in OR (\$/MWh) <i>B</i> | Difference (\$/MWh) <i>B - A</i> | Sim. 30 R Price with 50 MW Reduction in OR (\$/MWh) <i>C</i> | Difference (\$/MWh) <i>C - A</i> |
| 2002 | 2.76 | 2.02 | -0.74 | 2.36 | -0.40 |
| 2003 | 3.48 | 2.60 | -0.88 | 2.96 | -0.52 |
| 2004 | 3.56 | 2.74 | -0.82 | 3.15 | -0.41 |
| Avg | 3.33 | 2.51 | -0.82 | 2.88 | -0.45 |



Summary of Results

| | | 100 MW Reduction in OR | | 50 MW Reduction in OR | |
|--------|-------------------------------|---|--|---|--|
| | Average Annual Quantity (TWh) | Simulated Average Price Change (\$/MWh) | Average Annual Price Impact (\$ Million) | Simulated Average Price Change (\$/MWh) | Average Annual Price Impact (\$ Million) |
| Energy | 153.0 | -0.47 | -71.9 | - 0.27 | - 41.3 |
| 10 S | 2.5 | -0.94 | - 2.3 | - 0.54 | - 1.4 |
| 10 N | 6.8 | -1.07 | - 7.3 | - 0.60 | - 4.1 |
| 30 R | 3.4 | -0.82 | - 2.8 | - 0.45 | - 1.5 |
| | | Total | - 84.3 | Total | -48.3 |

Total Price Impacts

- Sum of annual costs of energy and OR reduced by \$84 million or approximately 0.8% of total annual physical market charges when OR was reduced by 100 MW in the simulation.
- Sum of annual costs of energy and OR reduced by \$48 million or approximately 0.5% of total annual physical market charges when OR was reduced by 50 MW in the simulation.