IMO Independent
Electricity
Market Operator

Market Rule Amendment Submission

This form is used to request an amendment to, or clarification of, the *Market Rules*. Please complete the first four parts of this form and submit the completed form by email or fax to the following:

Email Address: Rule.Amendments@theIMO.com
Fax No.: (416) 506-2847 Attention: Market Rules Group
Subject: *Market Rule Amendment Submission*

All information submitted in this process will be used by the *IMO* solely in support of its obligations under the *Electricity Act, 1998,* the *Ontario Energy Board Act, 1998,* the *Market Rules* and associated policies, standards and procedures and its licence. All submitted information will be assigned the *confidentiality classification* of "public" upon receipt. You should be aware that the *IMO* will *publish* this *amendment submission* if the *Technical Panel* determines it warrants consideration and may invite public comment.

Terms and acronyms used in this Form that are italicized have the meanings ascribed thereto in Chapter 11 of the *Market Rules*.

PART 1 – SUBMITTER'S INFORMATION

Please enter contact information in full

Name: IMO Staff	
(if applicable) *Market Participant / Metering Service Provider* No.[1]:	*Market Participant* Class:
Telephone: 416 506-2801	Fax: 416 506-2847
Email Address: rule.amendments@theimo.com	

PART 2 – *MARKET RULE AMENDMENT SUBMISSION* INFORMATION

Subject: Market Clearing and Pricing Process
Title: Non-Material Corrections to Market Rules Dispatch Scheduling Algorithm Specification
Nature of request (please indicate with X): _X_ Alteration__Deletion__Addition ___Clarification
Chapter: Appendix: 7.5   Sections:
Sub-sections proposed for amending/clarifying :

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[1] This number is a maximum of 12 characters and does not include any spaces or underscore.

PART 3 – DESCRIPTION OF THE ISSUE

Provide a brief description of the issue and reason for the proposed amendment. If possible, provide a qualitative and quantitative assessment of the impacts of the issue on you and the *IMO-administered markets.* Include the Chapter and Section number of the relevant market rules.

Under the market rules (chapter 7 section 4.2.4) the IMO is required to commission a periodic independent review of the dispatch scheduling algorithm and related dispatch processes and procedures. As part of that review undertaken in 2004, a number of non-material discrepancies were identified in the market rule specification of the dispatch algorithm i.e. the market rules do not correctly identify what the algorithm is actually and properly doing. Although the discrepancies are non-material in nature, they should be corrected in order to reduce the potential for confusion regarding the operation of the dispatch scheduling algorithm.

The identified non-material discrepancies are described below:

1. Nodal Price Calculation

    The equation defining how nodal prices are to be calculated is not consistent with the optimization objective function. Section 6.7.1 of Appendix 7.5 describes the relationship of the Nodal Prices to the shadow prices of constraints and the sensitivity factors of transmission and security constraints. The current equation is as follows:

    $$l_n = l_s + (DF_n - 1) * l_s + \sum_k a_{nk} * m_k$$

    where:

    l_n nodal price at an injection or withdrawal node *n* (i.e., a node connected to a *generation facility* or *load facility*)

    l_s system marginal cost

    DF_n delivery factor for node *n* (reciprocal of penalty factor)

    a_{nk} sensitivity factor for injection at node *n* on *transmission* line *k*

    m_k shadow price for *transmission* line *k* constraint

    The equation as currently written is not correct given the description of the Objective Function in Appendix 7.5 and does not reflect changes to the software that correct for an omission. Specifically the product within the summation expression on the right hand side of the equation should also be multiplied by the Delivery Factor corresponding to node "n". The correct equation is:

    $$l_n = l_s + (DF_n - 1) * l_s + \sum_k DF_n * a_{nk} * m_k$$

2. Ramp Rates and Related Constraints in Real-Time Market and Dispatch Schedules

    The current market rules inconsistently describe the ramp rates and related constraints in the real-time market and dispatch schedules. Section 7.6.1 of Appendix 7.5 states: "The market constraints for ramping are identical to the dispatch constraints for ramping as described in section 6.5". However section 6.4.2 of Chapter 7 lists a number of potential differences in the data used between the real-time market and real-time dispatch schedules. These differences include facility ramping capability and initial conditions. Section 7.6.1 should be amended to recognize the differences

PART 3 – DESCRIPTION OF THE ISSUE

between the real-time market and dispatch schedules.

3. Transmission Losses

Section 2.4.5 of Appendix 7.5 states "Transmission losses shall be calculated using an AC power flow and shall be modeled using penalty factors for the power balance requirements". This section implies a relationship between transmission losses determined by the AC power flow solution and the power balance that is different than that actually implemented. The IMO actually incorporates transmission losses into the power balance by adjusting offer and bid prices by static loss penalty factors. This treatment was introduced prior to market commencement (refer to MR-00193) to reduce the volatility in dispatch of resources in response to small changes in transmission losses as determined using the AC power flow analysis. This treatment is specified in sections 4.6.2 and 5.1 of Appendix 7.5. Section 2.4.5 of Appendix 7.5 should be amended to reflect actual practice.

PART 4 – PROPOSAL (BY SUBMITTER)

Provide your proposed amendment. If possible, provide suggested wording of proposed amendment.

The following amendments should be made:

Appendix 7.5 The Market Clearing and Pricing Process

2.4   The IMO-Controlled Grid

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2.4.5   The *IMO* shall estimate static t~~T~~ransmission losses and shall ~~be calculated using an AC power flow and shall be~~ model~~led~~ transmission losses using penalty factors ~~for the power balance requirements~~. The penalty factors shall be used to adjust the applicable *bid* and *offer prices.*

6.7   Nodal Price Calculation

6.7.1 $1_n = 1_s + (DF_n - 1) * 1_s + \sum_k DF_n * a_{nk} * m_k$

where:

1_n nodal price at an injection or withdrawal node *n* (i.e., a node connected to a *generation facility* or *load facility*)

l_s system marginal cost

DF_n delivery factor for node n (reciprocal of penalty factor)

a_{nk} sensitivity factor for injection at node n on *transmission* line k

m_k shadow price for *transmission* line k constraint

7.6   Ramping

7.6.1   Subject to the information and data differences specified in section 6.4 of Chapter 7, Tthe mathematical description of the market constraints for ramping isare identical to the mathematical description of the *dispatch* constraints for ramping as described in section 6.5.

PART 5 – FOR *IMO* USE ONLY

Technical Panel **Decision on Rule** *Amendment Submission*
MR number: MR-00263-Q00
Date submitted to *Technical Panel*: 8 June 2004

Accepted by *Technical Panel* as: __General __Urgent _X_Minor (please indicate with X)	Date: 15 June 2004

Criteria for acceptance:
•   It identifies an error or inconsistency within the Market Rules: the market rules do not accurately specify some elements of the Dispatch Scheduling Algorithm.
Priority: Low
Criteria for assigning priority:
The existing market rule errors are not affecting market participants in any material way – the Dispatch Scheduling Algorithm is operating correctly.
Not accepted (please indicate with X)**:**
Clarification/interpretation required (please indicate with X):
Technical Panel **minutes reference: IMOTP 145-1**
Technical Panel **Comments:**