



## 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](mailto: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

<b>Name: IMO Staff</b>	
(if applicable) <i>Market Participant / Metering Service Provider No.</i> <sup>1</sup> : N/A	<b>Market Participant Class: N/A</b>
<b>Telephone: 416 506-2801</b>	<b>Fax: 416 506-2847</b>
<b>Email Address: rule.amendments@theimo.com</b>	

### PART 2 – MARKET RULE AMENDMENT SUBMISSION INFORMATION

<b>Subject: Day-Ahead Market</b>
<b>Title: DAM Calculation Engine</b>
<b>Nature of request (please indicate with X):</b> <input type="checkbox"/> Alteration <input type="checkbox"/> Deletion <input checked="" type="checkbox"/> Addition <input type="checkbox"/> Clarification
<b>Chapter: 12 (new)                      Appendix:                      Sections:</b>
<b>Sub-sections proposed for amending/clarifying :</b>

<sup>1</sup> 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.

In consultation with market participants and other stakeholders, the IMO has developed a high level design of a day-ahead market (DAM)<sup>1</sup>. The IMO Board has endorsed proceeding with the development of a day-ahead market and has directed the IMO to proceed with the detailed design and market rule amendments for the DAM consistent with the high-level design. Market rule amendments are needed to specify the calculation engine used for determination of schedules and prices for the day-ahead market. The following is a brief summary of the calculation engine for the DAM. The calculation engine design document<sup>2</sup> provides further details.

The calculation engine is the core component of the DAM. The engine receives many different inputs from market participants and the IMO, and determines financially binding DAM schedules for energy and operating reserve and corresponding DAM prices. The calculation engine also produces advisory schedules and prices for information purposes. Market rule specification of the DAM calculation engine comparable in scope and level of detail to the existing specification of the real-time market dispatch algorithm, is necessary to establish and maintain transparency and stakeholder confidence regarding the determination of the DAM schedules and prices.

The key features of the DAM calculation engine are:

1. Simultaneous co-optimization of energy and operating reserve over the full 24 hours of the next dispatch day.
2. Maximize the gain from trade. This is the same optimization objective as the real-time dispatch algorithm. The DAM calculation engine uses the bids and offers from market participants as the measure of the value of buying and selling electricity and operating reserve.
3. A security assessment functionality and a dispatch functionality. The security assessment functionality determines the loss factors, loss adjustments and transmission limits (including pre and post-contingency limits) as conditions to be met by the dispatch functionality in determining the scheduling of bids and offers.
4. A sequence of five “passes” in order to determine the financially binding schedules and prices as well as the advisory schedules and prices. The first four of these passes use the same constrained model of the IMO-controlled grid as is used in the real-time constrained dispatch sequence. The fifth pass uses the same unconstrained IMO-controlled grid model as is used in the real-time unconstrained dispatch sequence.

The five passes are as follows:

“Pass 1” determines a security constrained, optimized load and generation resource unit commitment to

<sup>1</sup> High Level Design Strawman can be found at:

[http://www.theimo.com/imoweb/pubs/consult/mep/DAM\\_WG\\_Strawman-4\\_0.pdf](http://www.theimo.com/imoweb/pubs/consult/mep/DAM_WG_Strawman-4_0.pdf)

<sup>2</sup> Detailed design document for DAM Calculation Engine can be found at:

[http://www.theimo.com/imoweb/pubs/consult/mep/dam\\_wg\\_IMO\\_DES\\_0011\\_DAM\\_CalcEngine.pdf](http://www.theimo.com/imoweb/pubs/consult/mep/dam_wg_IMO_DES_0011_DAM_CalcEngine.pdf)

**PART 3 – DESCRIPTION OF THE ISSUE**

meet **DAM bid** load and IMO specified operating reserve requirements for the dispatch day. The results of this pass are **not** financially binding, but are used as inputs to “Pass 2”.

“Pass 2”, using the unit commitment results of “Pass 1”, determines a security constrained, optimized load and generation resource unit commitment to meet **IMO forecast** load and IMO specified operating reserve requirements for the dispatch day. This pass is intended to ensure that sufficient resources are committed and/or available to meet the IMO’s expectation of load for the dispatch day. The results of this pass are **not** financially binding, but are used as inputs to “Passes 3, 4 and 5”.

“Pass 3”, using the unit commitment results of Pass 2, determines a security constrained optimized dispatch schedule of generation, import and pride-responsive loads to meet **DAM bid** load and IMO specified operating reserve requirements for the dispatch day. These schedules are financially binding for DAM physical transactions as the schedules are used in Settlements to balance actual real-time physical injections, imports and withdrawals. This pass also produces a set of location prices for energy and operating reserve for information purposes only.

“Pass 4” using the unit commitment results of Pass 2, determines a security constrained optimized dispatch schedule of generation, import and pride-responsive loads to meet **IMO forecast** load and IMO specified operating reserve requirements for the dispatch day. The intent of this pass to provide information to the IMO and market participants as to what may occur on the dispatch day.

“Pass 5” using the unit commitment results of Pass 2, determines an **unconstrained** optimized dispatch schedule of generation, import and pride-responsive loads to meet **DAM bid** load and IMO specified operating reserve requirements for the dispatch day. This pass determines the uniform Ontario prices for energy and operating reserves that are used for settlement purposes. This pass also determines the unconstrained resource schedules used in the calculation of the Congestion Management Settlement Credit (CMSC) payments.

**PART 4 – PROPOSAL (BY SUBMITTER)**

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

Specification of the DAM calculation engine, comparable in scope and level of detail to the existing specification of the real-time market dispatch scheduling optimizer (Appendix 7.5), is to be included in the market rules. Due to the highly technical nature of this specification, these market rules are to be contained in an appendix or appendices in the new Chapter 12 being established for the DAM.

The proposed scope of the market rule specification of the DAM Calculation engine is:

Introduction

- Define scope and application of the market rules specification of the DAM calculation engine
- Establish any interpretations or clarifications necessary.

DAM Constrained Scheduling and Pricing Process

- Specify Passes 1 through 4 inputs, processing and outputs

DAM Unconstrained Scheduling and Pricing Process

- Specify Pass 5 inputs, processing and outputs

Glossary of Sets, Indices, Variables and Parameters

- Specification of sets, indices, variables, parameters e.g. parameters associated with offers and bids of DAM load and generation resource types; operating reserve, ramping etc

Optimization Objective Function

- Specify optimization objective in non-mathematical terms
- Mathematical specification of objective function used in each pass

Constraints

- Mathematical specification of constraints used in each pass. Some of these constraints are to ensure schedules do not violate participant bids and offers e.g. capacity constraints, ramping capability. Other constraints are to ensure schedules do not violate reliability criteria e.g. transmission limits

**PART 5 – FOR *IMO* USE ONLY**

<b><i>Technical Panel Decision on Rule Amendment Submission</i></b>	
<b>MR number: MR-00265</b>	
<b>Date submitted to <i>Technical Panel</i>: 16 Sep 04</b>	
<b>Accepted by <i>Technical Panel</i> as: <input type="checkbox"/> General <input type="checkbox"/> Urgent <input type="checkbox"/> Minor</b> (please indicate with X)	<b>Date: 21 Sep 04</b>
<b>Criteria for acceptance: N/A</b>	
<b>Priority: High</b>	
<b>Criteria for assigning priority: N/A</b>	
<b>Not accepted</b> (please indicate with X):	
<b>Clarification/interpretation required</b> (please indicate with X):	
<b><i>Technical Panel</i> minutes reference: IMOTP 150-1</b>	
<b><i>Technical Panel</i> Comments:</b>	