Notice of Market Rules Modification

Paper No.: EMC/RCP/33/2007/263(R)
Rule reference: Chapter 6, Appendix 6D
Proposer: Market Operations, EMC
Date received by EMC: 22 September 2006
Category allocated: 2
Status: Approved by EMA
Effective Date: 6 September 2007

Summary of proposed rule modification:
This rule change is made to correct a rule transcription error in a previously approved rule change proposal to improve the modelling of regulation constraints.

Date considered by Rules Change Panel: 3 July 2007
Date considered by EMC Board: 26 July 2007
Date considered by Energy Market Authority: 22 August 2007

Proposed rule modification:
See attached paper.

Reasons for rejection/referral back to Rules Change Panel (if applicable):
Executive Summary

This rule change proposal is made to correct a rule transcription error in a previously approved rule change proposal to improve the modelling of regulation constraints.

The RCP unanimously recommends that the EMC Board adopt this proposal.
1 Introduction

This rule change proposal is to correct an error in section D.18.3.6 of Appendix 6D of Chapter 6 of the Market Rules. This rule has previously been approved by EMA but has not been implemented.\(^1\)

2 Background

At the 30\(^{th}\) RCP meeting, the Panel supported the proposal in the rule change paper “263: MIXED INTEGER PROGRAM BASED MODELING OF REGULATION CONSTRAINTS”. The proposal was to introduce Mixed Integer Programming (MIP) into the Market Clearing Engine (MCE) to remedy possible regulation anomalies.\(^2\) Subsequently, this rule change was adopted by the EMC Board and approved by EMA. However, the rules have not been put into effect.

Among other changes, the rule change proposal introduced seven new MIP-based constraints as listed in Table 1.\(^3\)

<table>
<thead>
<tr>
<th>Table 1 MIP-based Regulation Constraints</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIP1 Regulation Min Generation + Regulation + DeficitRegGen + E * z ≥ RegulationMin</td>
</tr>
<tr>
<td>MIP2 Regulation Max Generation + Regulation - ExcessRegGen - E * z ≤ RegulationMax</td>
</tr>
<tr>
<td>MIP3 Regulation Availability Switch at Regulation Min Regulation - E * y_{RegMin} ≤ 0</td>
</tr>
<tr>
<td>MIP4 Generation Switch at Regulation Min Generation + E * y_{RegMin} ≤ RegulationMin</td>
</tr>
<tr>
<td>MIP5 Regulation Availability Switch at Regulation Max Regulation - E * y_{RegMax} ≤ 0</td>
</tr>
<tr>
<td>MIP6 Generation Switch at Regulation Max Generation + E * y_{RegMax} ≥ RegulationMax</td>
</tr>
<tr>
<td>MIP7 Binary Restrictions (z + y_{RegMin} + y_{RegMax} = 2)</td>
</tr>
</tbody>
</table>

where,
E: a big positive constant number
\(z, y_{RegMax}, y_{RegMin}\): binary integer variables of value 0 or 1.

3 Analysis

A rule transcription error was discovered when EMC verified the set of approved rules with the coding change of MCE that is required for implementation. The error was found in the proposed formula D.18.3.6 of Appendix 6D of Chapter 6.

---
\(^1\) Implementation was scheduled on 5 July 07. Implementation is deferred pending EMA approval of the correction
\(^2\) Please refer to rule change paper No. EMC/RCP/30/2007/263
\(^3\) Details of how the MIP-based constraints work are explained in Annex 1 of paper EMC/RCP/30/2007/263
D.18.3.6 Generation Switch at Regulation Min

\[ \text{Generation}_{g(l)} + \text{InfinitePositiveValue} \times \text{RegulationSegmentSelector}_1 \leq \text{RegulationMin}_{g(l)} \]

\[ \{ l \in \text{REGULATIONOFFERS} \} \]

This D.18.3.6 constraint corresponds with the constraint “MiP4 Generation Switch at Regulation Min” in Table 1, which is:

\[ \text{Generation} - E \times y_{\text{RegMin}} \leq \text{RegulationMin} \]

Thus, the correct formula should have been:

D.18.3.6 Generation Switch at Regulation Min

\[ \text{Generation}_{g(l)} - \text{InfinitePositiveValue} \times \text{RegulationSegmentSelector}_1 \leq \text{RegulationMin}_{g(l)} \]

\[ \{ l \in \text{REGULATIONOFFERS} \} \]

Note that the “+” after \( \text{Generation}_{g(l)} \) should have been “-” instead.

This error was made when transcribing the text of the proposed rules. Nonetheless, the prototype MCE was developed using the correct formula. Hence, all testings were conducted with a prototype MCE that is correctly specified. Therefore, every test result and impact analysis presented in rule change paper EMC/RCP/30/2007/263 remains valid.

4 Conclusion

The proposed rule change merely corrects the rule transcription error described in section 3 and has no impact on the proposal.

5 Recommendation

The RCP unanimously recommends that the EMC Board

a) support the rule modification proposal as set out in Annex 1;

b. seek the Authority’s approval for the rule modification proposal; and

c) recommend that the rule modification proposal come into force one week after the date on which the approval of the Authority is published by the EMC.
<table>
<thead>
<tr>
<th>Rules Approved by EMA on 13 March 2007</th>
<th>Proposed Rules (Deletion represented by strikethrough text and addition underlined.)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CHAPTER 6</strong></td>
<td></td>
</tr>
<tr>
<td><strong>APPENDIX D  MARKET CLEARING FORMULATION</strong></td>
<td></td>
</tr>
<tr>
<td><strong>SECTION A: DEFINITIONS</strong></td>
<td></td>
</tr>
<tr>
<td><strong>D.18 REGULATION</strong></td>
<td></td>
</tr>
<tr>
<td>D.18.3.6 Generation Switch at Regulation Min</td>
<td></td>
</tr>
<tr>
<td>$\text{Generation_{g0}} + \text{InfinitePositiveValue} \times \text{RegulationSegmentSelector}<em>1, \leq \text{RegulationMin}</em>{g0}$</td>
<td>$\text{Generation}_{g0} + \text{InfinitePositiveValue} \times \text{RegulationSegmentSelector}<em>1, \leq \text{RegulationMin}</em>{g0}$</td>
</tr>
<tr>
<td>${l \in \text{REGULATIONOFFERS}}$</td>
<td>${l \in \text{REGULATIONOFFERS}}$</td>
</tr>
</tbody>
</table>