Real-Time Binding Constraints and Real-Time Binding Constraints Overrides Report Readers' Guide

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1 Disclaimer

The data provided in this Readers' Guide is provided for informational purposes only and does not contain information related to the settlement of the MISO's Energy Markets and shall not be relied upon for such purpose. Any party relying on the data provided in this report is doing so at its own risk. The Midwest ISO shall not be liable for any consequences or damages to any party relying on the data provided herein.

2 Introduction

The document provides an explanation or Readers' Guide to understanding the Binding Constraints Report for the Real-Time Market Report and its companion override file. For questions or comments regarding the report please contact Client Relations at 866-296-6476 or email at clientrelations@midwestiso.org.

3 Glossary

Item	Description
"Binding" Constraint	A constraint becomes "Binding" once a unit is dispatched out of merit and sets the LMP. Any constraint can potentially affect the market, but only on the condition that the constraint equation becomes binding. When the constraint equation becomes binding, the power flow between locations is limited by the constraint. This may influence the spot price as generators may be dispatched at higher levels than their offers may indicate, to keep the network within operating limits
Constraint	A constraint is an element on the network system that has a limit and must be monitored or calculated to maintain the flow at or below the limit.
EST	Eastern Standard Time
LMP	Locational Marginal Price
TCDC	Transmission Constraint Demand Curve – a 2 step approach to mitigating LMP volatility by not penalizing the lower level exceedances as the higher level exceedances. See Schedule 28a for more information.

4 Report

4.1 Description

These two reports provides 5 minute binding constraints by constraint names and branch information (monitored elements) and the reasons for overriding the default TCDC curve if needed.

A constraint is an element on the transmission network that has a limit and must be monitored or calculated to maintain the flow of electricity at or below the system operating limit. A constraint becomes "Binding", once a unit is dispatched out of merit and sets the LMP. Any constraint can potentially affect the market, but only on the condition that the constraint equation becomes

binding. When the constraint equation becomes binding, the power flow between locations is limited by the constraint. This may influence the spot price as generators may be dispatched at higher levels than their offers may indicate, to keep the network within operating limits

A flowgate is a representative modelling of a transmission facility or groups of transmission facilities that may act as potential constraints on the power system.

The 2 main types of constraints are Transmission (that has no corresponding Constraint Description in the report) and Reserve Procurement Constraints. The latter can be of 3 categories: Regulation Up, Regulation Down, and Contingency Reserve Loss (CR). CRs in turn can affect multiple reserve zones. A single constraint can bind at the same moment for any combination of these reasons, hence there may be multiple lines referring to the same constraint in the report. Multiple constraints have a cumulative effect on the congestion component of the LMP; therefore one entry does not override the other.

For more details please refer to BPM-002, sections 5.1.1 and 5.1.1.2.

Each constraint is assigned a TCDC curve. It may be necessary at times to temporarily override the default TCDC curve depending on the operation conditions at the time. If a curve has been overridden an override file will be posted after the fact that will list the reason for the override.

4.2 Report Availability Time

The binding constraint report is executed 7 days a week, 365 days a year, and includes data from midnight to midnight of the market date. The report is available on a daily basis at 08:00 Eastern Standard Time of the day following the close of the Real-Time Market. The report is available in Microsoft Excel.

The override report will be available within 2-3 business days of the original binding constraint report. If no overrides occurred during the market day then the override report will only contain header information and no data. The report is available in Microsoft Excel.

The report is posted to MISO internet site.

4.3 How to use this Report

The guide includes an example of the Binding Constraints and Binding Constraint Overrides Report for the Real-Time Market in the Report Layout section of the document. The column headers are defined in the Data Definitions section of the document

4.4 Report Layout

Figure 1 - Report Example of the Real-Time Binding constraint file.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Binding Constraints Report - Real-Time Market													
2	Market Date: 04/20/2014													
3	Publish Date: 04/21/2014													
4	Flowgate NERC ID	Constraint ID	Constraint Name	Branch Name (Branch Type / From CA / To CA)	Contingency Description	Hour of Occurrence	Preliminary Shadow Price	Constraint Description	Override	Curve Type	BP1	PC1	BP2	PC2
5		20155	ALW16079_GLENWTH_TR1_TR1	GLENWTH TR1 TR1 (XF/ALTW/*)	GLENWTH-HAYWARD 161	00:05	($24.13)		0	PERCENT	100.0	400.0	102.0	500.0
6		20156	ALW16080_LIME_CK_LIME_EMERY16_1_1	LIME_CK LIME_EMERY16_1 1 (LN/ALTW/ALTW)	WORTH CO-GLENWTH 161	00:05	($79.33)		0	PERCENT	100.0	1000.0	102.0	2000.0
7		20157	NIP13052_GOODLAND_B_NO_1_XFMR	GOODLAND B NO_1_XFMR (XF/NIPS/*)	REYNOLDS-GOODLAND 138 (13857)	00:05	($10.80)		0	PERCENT	100.0	700.0	102.0	1000.0
8	2286	20158	NIP13052_HONEYC_T_69103_C	HONEYC_T 69103 C (LN/NIPS/NIPS)	REYNOLDS-GOODLAND 138 (13857)	00:05	($43.46)		0	PERCENT	100.0	700.0	102.0	1000.0
9		20159	ALW16079_GLENWTH_TR1_TR1	GLENWTH TR1 TR1 (XF/ALTW/*)	GLENWTH-HAYWARD 161	00:10	($2.50)		0	PERCENT	100.0	400.0	102.0	500.0
10		20160	ALW16080_LIME_CK_LIME_EMERY16_1_1	LIME_CK LIME_EMERY16_1 1 (LN/ALTW/ALTW)	WORTH CO-GLENWTH 161	00:10	($65.16)		0	PERCENT	100.0	1000.0	102.0	2000.0
11		20161	NIP13052_GOODLAND_B_NO_1_XFMR	GOODLAND B NO_1_XFMR (XF/NIPS/*)	REYNOLDS-GOODLAND 138 (13857)	00:10	($11.07)		0	PERCENT	100.0	700.0	102.0	1000.0
		20162	NIP13052_HONEYC_T_69103_C	HONEYC_T 69103 C (LN/NIPS/NIPS)	REYNOLDS-GOODLAND 138 (13857)	00:10	($0.21)		0	PERCENT	100.0	700.0	102.0	1000.0

Figure 2 - Report Example of the Real-Time Binding Constraint Override file (note additional column of "Reason").

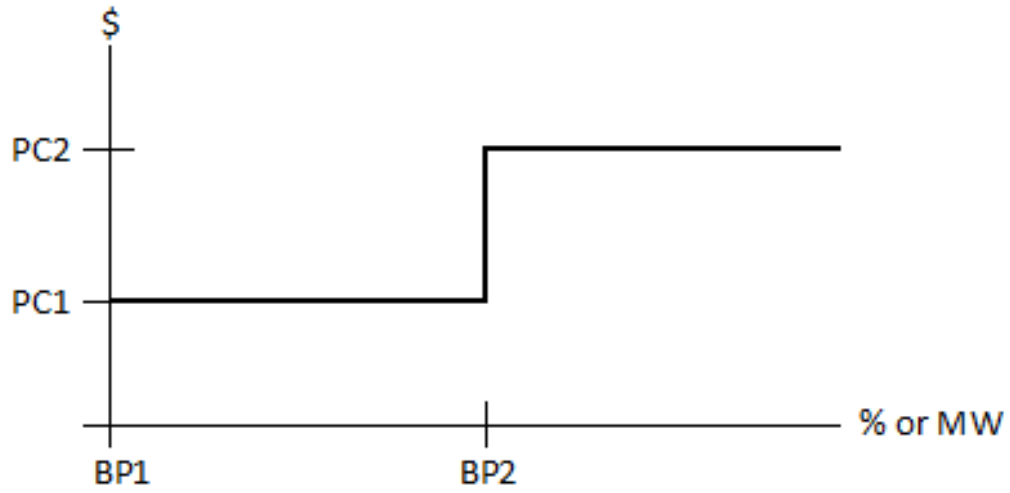
	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Binding Constraints Report - Real-Time Market													
2	Market Date: 04/20/2014													
3	Publish Date: 04/21/2014													
4	Flowgate NERC ID	Constraint ID	Constraint Name	Branch Name (Branch Type / From CA / To CA)	Contingency Description	Hour of Occurrence	Preliminary Shadow Price	Constraint Description	Override	Curve Type	BP1	PC1	BP2	PC2

*Note: Column names have been rotated for readability.

4.5 Data Definitions

Column Name	Definition / Description / Calculation
Flowgate NERC ID	The NERC ID of the Flowgate that the constraint is occurring on. The Flowgate NERC ID may be blank in this field. Flowgates are boundaries between two parts of a transmission system across which there may be congestion i.e. a limitation in the amount of power allowed to flow across the boundary.
Constraint ID	A unique Identifier for “Binding Constraint”. This field can be used to
Constraint Name	The name of the constraint. A constraint is a bottleneck or choke-point on the transmission network.
Branch Name (BranchType/FromCA/ToCA)	Branch Name: The name of the monitored facility, interface, device, or transformer (Branch) in the constraint. Multiple Branch Names may be listed in this field. The branch name is prefixed with ‘INTF:’ for monitored interfaces. The valid Branch Types are: LN (Line), XF (Transformer), ZBR (zero-impedance branch) and DC (HVDC line). From CA: The Control Area from which the flow of energy came. To CA: The Control Area to which the flow of energy was going.
Contingency Description	Contingencies are simulated equipment outages that are analysed to ensure that no emergency limit is violated on any equipment following the loss of the contingency equipment. The text: “ACTUAL” refers to constraints found in the base case. Description of the contingency for this constraint. If no data is present for the Contingency Description, then the Constraint is a non-Contingency Constraint.
Hour of Occurrence	The end of 5 minute period in which the constraint was bound in the Real-Time Market. MISO uses a 24-hour clock.
Preliminary Shadow Price	A “shadow price” is the cost of relieving one MW of congestion on a constraint. The preliminary Shadow Price is calculated as an hourly average of Ex-Post Price (i.e.) the sum of Ex-Post price for each Real-Time 5 minute interval within an hour is divided by 12 (the total number of 5 minute intervals in an hour).
Constraint Description	Describes why the constraint was bound. Only available for Reserve Procurement Constraints, not for Transmission Constraint types.
Override	(0,1) If the TCDC curve has been overridden then this field will contain a 1, otherwise it will be 0
Curve Type	(Percent, MW) If the value is "Percent", then the curve break points will represent the percent that each pricing curve will be effective. If the value is "MW" then the curve break points will represent the Mega Watt levels of the Break Points that each pricing curve will be effective.
BP1	The Breakpoint at which the first step of the TCDC is activated.
PC1	The maximum shadow price for exceedances between BP1 and BP2
BP2	The Breakpoint at which the second step of the TCDC is activated
PC2	The maximum shadow price for exceedances Greater than or equal to BP2.
Reason	The reason for overriding the TCDC curve. This will only be populated if the override column contains a "1".

Figure 3 - TCDC Conceptual Illustration:



5 References

BMP 100 - Business Practices Manual for Definitions
BPM 003 - Business Practices Manual for Energy Markets Instruments

6 Revision History

Version	Date	Description
1.0	08-02-2005	Initial Draft
1.1	10-18-2005	Updated images and added date fields.
1.2	10-20-2005	Final review before posting
1.3	10-25-2005	Updated to display Hour of Occurrence and modified Preliminary Shadow Priced description. Also updated images to reflect changes.
1.4	12-12-2005	Updated for version 1.3. Changed the delineator for the Branch field to be a "/" instead of a ",".
1.5	01-30-2006	Updated images for version 1.3.
1.6	02-01-2006	Updated Contingency Description definition.
1.7	03-27-2006	Updated section 1.3
1.8	04-21-2006	Updated for version 1.4 of the report.
1.9	11-14-2008	Update for new version with clarifying information.
3.0	11-20-2009	Updated to new logo and template
3.1	01-09-2014	Updated for TCDC corrections and new logo
3.2	04-15-2014	Updated for unique Constraint Identifier.
3.3	05-02-2014	Added description of multiple constraints appearing