Data Release & Accessibility Initiative
Phase 1: Transmission Constraints

Wade McCartney
Sr. Market & Product Developer

Stakeholder Conference Call
January 13, 2010
Data Release & Accessibility Initiative

Phase 1: Transmission Constraints

Wade McCartney
Sr. Market & Product Developer

Introduction and Overview
January 13, 2010
ISO Stakeholder Process
Data Release and Accessibility
Phase 1: Transmission Constraints

1. Issue Paper on 11/5 Conference Call on 11/12
2. Straw Proposal and Draft Tariff Language on 12/3 Meeting on 12/10
3. Draft Final Proposal 1/6 Conf Call 1/13 Comments 1/15

We are here

Opportunities for Stakeholder Input

Board of Governors on 2/10 – 2/11

October 2nd FERC Order

FERC Filing on 12/31
## Agenda for Phase 1 Transmission Constraints Conference Call, Jan-13-2010

<table>
<thead>
<tr>
<th>ESTIMATED TIME</th>
<th>TOPIC</th>
<th>PRESENTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:00 – 1:05</td>
<td>Introduction</td>
<td>Chris Kirsten</td>
</tr>
<tr>
<td>1:05 – 1:15</td>
<td>Initiative Overview</td>
<td>Wade McCartney</td>
</tr>
<tr>
<td>1:15 – 1:30</td>
<td>Daily Constraint &amp; Contingency Lists</td>
<td>Mark Rothleder</td>
</tr>
<tr>
<td>1:30 – 1:45</td>
<td>Network Terminology &amp; Nomenclature</td>
<td>Mark Rothleder</td>
</tr>
<tr>
<td>1:45 – 2:00</td>
<td>Conforming Constraint Report</td>
<td>Brian Jacobsen</td>
</tr>
<tr>
<td>2:00 – 2:15</td>
<td>Advance Notifications</td>
<td>Dinesh Salem-Natarajan</td>
</tr>
<tr>
<td>2:15 – 2:30</td>
<td>Binding Constraint Cause Data</td>
<td>Darren Lamb, Wade McCartney</td>
</tr>
<tr>
<td>2:30 – 2:55</td>
<td>Discussion and Questions/Answers</td>
<td>All</td>
</tr>
<tr>
<td>2:55 – 3:00</td>
<td>Next Steps</td>
<td>Wade McCartney</td>
</tr>
</tbody>
</table>
Three phases, staggered start dates, some overlap.

- **Phase 1:** Transmission Constraints
  Detail on Slide 3.

- **Phase 2:** Convergence Bidding Information Release
  Issue Paper 12/3; Straw Proposal on 12/31.

- **Phase 3:** Other types of market data to support well-functioning, competitive ISO spot markets, including price discovery and outage information. An issue paper was planned for December 2009, but put on hold to focus on resolution of Phases 1 & 2 at the February 2010 Board of Governors Meeting.
New Data Elements

- Daily Constraint and Contingency Lists
  The ISO proposes to release two constraint lists that would be published daily for information associated with the day-ahead market: the Post-Market Constraints List and the Pre-Market Constraints List. These lists will identify and include definitions for all constraints, including contingencies and nomograms and identification if the constraint is enforced in the ISO day-ahead market.

- Binding Constraint Cause Data
- Conforming Constraint Report

Advance Notifications

Terminology & Nomenclature
Mark Rothleder
Director, Market Analysis & Development

Daily Constraint & Contingency Lists
January 13, 2010
The ISO proposes to release constraints and contingency lists twice daily for information associated with the day-ahead market.

- **The Post-Market Constraints List** would be published daily simultaneous with the results of the day-ahead market.

- **The Pre-Market Constraints List** would be published daily after a preliminary market run that the ISO performs to review issues in preparing for the next day’s day-ahead market (known as the D+2 process) at approximately 1800 hours.

- This process is shown in the diagram on the next slide.
Constraint & Contingency Lists in the DFP
In the Draft Final Proposal

Figure 1
Daily Constraint and Contingency Lists
Posted to Secure Website, NDA Required

Daily Market Runs and Related Analysis

Daily Post-Market Constraints List
Estimated Posting: 1300 Hours
Tables 1, 2, 3, & 4 as modified from Phase 1 Straw Proposal
Data Source: Day-Ahead Market Run

Daily Pre-Market Constraints List
Estimated Posting: 1800 Hours
Tables 1, 2, 3, & 4 as modified from Phase 1 Straw Proposal
Data Source: D+2 Process

Source: Above diagram was derived from the Daily Market Runs and Related Analysis Diagram in CAISO Operating Procedure M-401F Pre-Market Validation, page 2,
Constraint & Contingency Lists in the DFP Data in the Pre- & Post-Market Constraints Lists

- **Table 1: Flowgate Constraints.** Data fields: Name of the Flowgate, Type of Flowgate (e.g., Line, Transformer, Phase Shifter, Series Device (Capacitor Reactor), or Transmission Corridor), Enforcement Status, and Competitive constraint flags (yes/no).

- **Table 2: Transmission Corridor Constraints.** Data Fields: Name of the Branch Group, Equipment Type (e.g., Line or Transformer), Station Name, Voltage Level, and Equipment Name.

- **Table 3: Nomogram Constraints.** Data fields: Nomogram Name, Resource Name, Coefficient, Corridor Name, Flowgate, Station Name, Enforcement Status, and Competitive Constraint Flags (yes/no).

- **Table 4: List of Transmission Contingencies.** Data fields: Contingency Title, Enforcement Status Flag (yes/no), TAC Area, Equipment Station, Equipment Voltage, Equipment Status, and Equipment Name.
Constraint & Contingency Lists
In the Draft Final Proposal

Revisions in the Draft Final Proposal from the Straw Proposal

- **Table 2:** To Be Published Daily at Close of the Day Ahead Market
  In the straw proposal, this table was to be made available with each model build, but it was determined that it would be more efficient to provide Table 2 on a daily basis, which would also provide flexibility for future use.

- **Table 4:** PTI Data Fields Replaced with Equipment Name Field
  The PTI data fields in Table 4 have been replaced with an equipment name field in order to be consistent with the data in Tables 1, 2, and 3. For contingencies that are associated with temporary outages, equipment name may not always be available at the time of posting information.
**Table 4**

<table>
<thead>
<tr>
<th>Contingency Title</th>
<th>Enforced</th>
<th>TAC Area</th>
<th>Equipment Station</th>
<th>Equipment Voltage</th>
<th>Equipment Name</th>
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<tr>
<td>mTC1-SUNNY-CLOUDY</td>
<td>Yes</td>
<td>TAC-1</td>
<td>SUNNYSB</td>
<td>115</td>
<td>15XX1_SUNNY_500_1XX1_CLOUDY_500_BR_1_1</td>
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<tr>
<td>mTC1-SUNNY-CLOUDY</td>
<td>Yes</td>
<td>TAC-1</td>
<td>SUNNYSB</td>
<td>115</td>
<td>15XX1_SUNNY_500_1XX1_EXTSUBA_500_BR_2_1</td>
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<tr>
<td>mTC1-SUNNY-CLOUDY</td>
<td>Yes</td>
<td>TAC-1</td>
<td>CLOUDYSB</td>
<td>115</td>
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<tr>
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<td>TAC-1</td>
<td>CLOUDYSB</td>
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<tr>
<td>mTC2-OUTAGE-SPECIAL</td>
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<td>TAC-2</td>
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</tr>
</tbody>
</table>
Modification to CRR FNM NDA

- Propose Modification of CRR FNM NDA form as follows:
  - “The purpose of this Agreement is to permit the Receiving Party to review and use the Confidential Information disclosed by the CAISO, solely in connection with the Receiving Party’s review and analysis of the CAISO’s CRR M markets, which include the Day-Ahead Market, the Hour Ahead Scheduling Process, the Real-Time Market, transmission, and the release of CRRs.”

- May require modifications to the ISO Tariff.

- The ISO would continue to prepare the network model and related data released as the CRR FNM for the CRR processes.
Network Terminology & Nomenclature
In the Draft Final Proposal

The ISO is committed to the development and use of improved network terminology & nomenclature.

- Exploring the possibility of:
  - Creating additional data mapping that would correlate the transmission facilities in outage reports with the proposed constraints list.
  - Using naming conventions and common data elements that could be eventually linked between outage information and other ISO data.
Network Terminology & Nomenclature

Example:

Line/Branch
12345_STATIONA_VLL_54321_STATIONB_VLL_BR_1_1

Transformer
12345_STATIONA_VLL_54321_STATIONA_VLL_XF_1_1
Network Terminology & Nomenclature

Example:

Corridor-Market Scheduling Limit
  INTERTIENAME_MSL

Corridor-Branch Group
  DESCRIPTIVENAME_BG

Corridor-Used to Create Nomogram
  DESCRIPTIVENAME_NG
Network Terminology & Nomenclature

Examples:

Nomogram

T-XXX_DESCRIPTION_NG_SUM/WIN (Trans. Procedure)
T-XXX_DESCRIPTION_NG_SUM/WIN (Gen. Procedure)
DESCRIPTIVENAME_NG (Major Path)
SLICNUMBER_NG (Temp. constraint to support outage)

Contingency:

mTC1_STATIONFROM-STATIONTO
Data Release & Accessibility Initiative
Phase 1: Transmission Constraints

Brian Jacobsen
Manager, Market Operations

Conforming Constraints Report
January 13, 2010
Conforming Constraints Report
In the Draft Final Proposal

The ISO proposes to provide a periodic Conforming Constraint Report that would be issued on a monthly basis.

- This report would be similar to the biased flowgate information provided in the DMM Q3 2009 Report. Department of Market Monitoring (DMM) Quarterly Report on Market Issues and Performance, October 30, 2009, Table 5.1 RTD Biased Flowgates and Frequency of Biasing with Additional Statistics http://www.caiso.com/2457/2457987152ab0.pdf

- Report on activity for both the day-ahead and real-time markets.

- List all flowgates in which limits were adjusted in respective DAM and RTM runs, along with the percentage of hours that each flowgates’ limit was adjusted, and other related statistics (i.e., average, minimum, and maximum percent of actual limit adjustment).
Conforming Constraints Report
Similar to DMM Report

<table>
<thead>
<tr>
<th>Number</th>
<th>Flowgate Name</th>
<th>Hours Which Blasing Was Applied In RTD Run During Q3</th>
<th>Hours Which the Applied Level of Blasing was Different In RTD and RTUC Runs</th>
<th>Hours Which Blasing Was Only Applied In RTD Market and not RTPD Runs</th>
<th>RTD Avg Blasing Limit In Q3</th>
<th>RTD Min Blasing Limit In Q3</th>
<th>RTD Max Blasing Limit In Q3</th>
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<td>120%</td>
<td>120%</td>
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<tr>
<td>2</td>
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<td>3</td>
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<td>1%</td>
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<td>117%</td>
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<tr>
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<td>15%</td>
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<td>5</td>
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<tr>
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<tr>
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<td>4%</td>
<td>145%</td>
<td>10%</td>
<td>175%</td>
<td>175%</td>
</tr>
</tbody>
</table>
Data Release & Accessibility Initiative
Phase 1: Transmission Constraints

Dinesh Salem-Natarajan
Lead Operations Engineer

Advance Notifications
January 13, 2010
Advance Notifications
In the Draft Final Proposal

The ISO proposes to establish several new advance notifications that will inform stakeholders of any significant changes to the transmission constraints included in the ISO’s market systems.

- Intended to inform market participants of upcoming changes prior to actual implementation in the market systems.
- However, in some instances, an event or operating condition that require the new constraint or contingency may not allow such lead time due to reliability issues.
- In the case where the ISO cannot provide ten days notice, the ISO proposes to provide notice to the participants as soon as possible outlining the new constraint or contingency.
Advance Notifications
In the Draft Final Proposal

The ISO proposes to establish several new advance notifications that will inform stakeholders of any significant changes to the transmission constraints included in the ISO’s market systems.

1. To the extent feasible, the ISO proposes to issue a notice ten (10) days before implementation of a new FNM and/or Base Market Model (BMM) in the market systems, which generally occurs every 4 to 8 weeks.

2. If the list of model changes is different when a FNM and/or BMM is deployed, to the extent feasible, the ISO proposes to issue a notice on the Trade Day the model goes into effect.

3. If the deployment date changes after the notice has been issued, the ISO proposes to provide a new notice with the revised date. In some instances, the ISO has needed to modify the deployment date for various reasons, including but not limited to, a change required in the model, a software issue, or a new issue being raised in end-to-end testing or events on the real-time grid.

(continued)
Advance Notifications
In the Draft Final Proposal

New advance notifications that will inform stakeholders of any significant changes to the transmission constraints included in the ISO’s market systems.

4. In some instances, primarily in response to operating issues, the ISO may need to add a new constraint or contingency into the market systems in between model builds. In these instances (where changes are likely to persist in future model builds) the ISO proposes to make every effort to provide participants with the ten (10) days advance notice prior to deployment into production.

5. If there are instances when an event or operating condition requires that a new constraint or contingency may not allow for a 10-day lead time due to reliability issues, the ISO proposes to provide notice to the participants as soon as possible outlining the new constraint or contingency.
Data Release & Accessibility Initiative
Phase 1: Transmission Constraints

Darren Lamb
Sr. Market Design Specialist
and
Wade McCartney
Sr. Market & Product Developer

Binding Constraint Cause Data

January 13, 2010
When constraints bind, shadow prices are produced.

Binding constraints are caused either due to:

- Base case conditions (no outages or derates), or
- Contingency conditions.

Other ISOs provide data on monitored constraints, as well as the associated contingencies, in the event that a constraint becomes binding under contingency conditions. MISO, ISO-NE, NYISO, PJM.

The ISO provides the shadow price and identifies the binding constraint but does not provide the cause for a constraint was binding or a description of the associated contingency where applicable.
CAISO only reports monitored single line facilities, as shown above.

The reason for the constraint is not provided, i.e., we do not know what facility is associated with the Binding element – the contingency or base case.
The ISO proposes to provide Binding Constraint Cause Data in addition to the shadow price information currently provided on its OASIS website.

The ISO proposes to provide the cause for each binding constraint by identifying whether the constraint was binding under the base case (base operating conditions relevant to the different markets) or due to contingency conditions.

If the constraint was binding due to a contingency, the ISO proposes to identify the associated contingency; otherwise the binding constraint cause would be identified as base case (non-contingency) condition.
The ISO proposes to provide Binding Constraint Cause Data in a format similar to the SCE Proposed Binding Constraint & Contingency Report Format as shown below:

<table>
<thead>
<tr>
<th>Constraint ID</th>
<th>Constraint Name</th>
<th>Monitored Description</th>
<th>Contingency ID</th>
<th>Contingency Description</th>
<th>HE1</th>
<th>HE2</th>
<th>HE3</th>
<th>...</th>
<th>HE24</th>
</tr>
</thead>
<tbody>
<tr>
<td>999</td>
<td>Line 1 L/O Xfmr 4</td>
<td>Line 1</td>
<td>888</td>
<td>Xmfr 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>21</td>
</tr>
<tr>
<td>1234</td>
<td>IPPDCADLN_BG</td>
<td>IPPDCADLN_BG</td>
<td>Base Case</td>
<td></td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This format is similar to that provided by other ISOs.
Existing Information on OASIS (Prices)

- **Nomogram/Branch Shadow Prices:**
  Posts the hourly constraint pricing at each Nomogram and Branch, for each Market Process (DAM, HASP) in $/MWh, and the 15-Minute Shadow Price in $/MWh for the RTPD run in RTM.

- **Intertie Constraint Shadow Prices:**
  Posts the hourly constraint pricing at Transmission Interfaces and Intertie Constraints, for each Market Process (DAM, HASP) in $/MWh, and the 15-Minute Shadow Price in $/MWh for the RTPD run in RTM.

- **Interval Intertie Constraint Shadow Prices:**
  Posts the 5-Minute constraint pricing at Transmission Interfaces and Intertie Constraints in $/MWh, for the RTD run in the RTM.

- **Interval Nomogram/Branch Shadow Prices:**
  Posts the 5-Minute constraint pricing at each Nomogram and Branch in $/MWh, for the RTD run in the RTM.
Open Forum

Discussion

and

Questions/Answers (Q&A)
Next Steps

- Stakeholder comments the Draft Final Proposal due January 15, 2010
- ISO Board of Governors Meeting February 10-11, 2010
- FERC Third Quarter 2010