


Grid Utilization Working Group: April 2010 Webinar

Proposed WECC Efficient Dispatch Toolkit:
Stakeholder Discussion and Comments

**Stephen Beuning
Xcel Energy, Director Market Operations
(WECC Seams Issues Subcommittee Chair)
303-571-2711**



What is the problem?

- **The West needs expanded reliability tools**
 - *Why? Future high penetration of renewables*
 - Less predictable flows
 - Less controllable flows
 - More difficult and expensive task to balance generation and load

Proposal Overview

WECC Efficient Dispatch Toolkit

Two Tools for Three Functions

■ Seams Coordination Tool

- Coverage: The entire WECC footprint
- Function: Flow impact calculator tied to transmission service use in real-time

■ Energy Imbalance Tool

- Coverage: Participating balancing areas in WECC footprint (not CAISO, possibly others)
- Two Functions for Energy Imbalance Tool:
 - Energy balancing service
 - Congestion redispatch service

Want more details?

**Let's start with the Seams
Coordination Tool...**

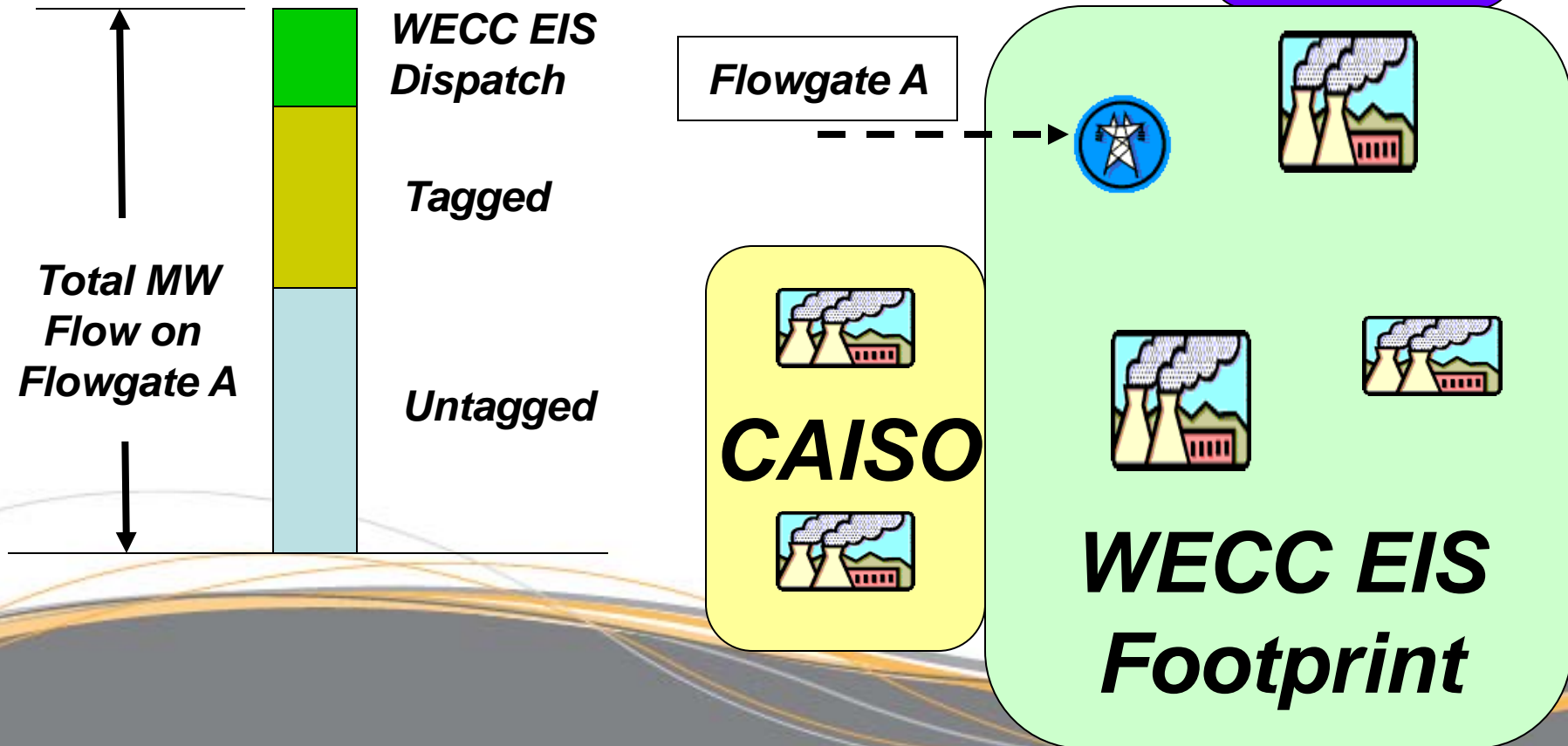
Seams Coordination Tool

■ Seams coordination tool

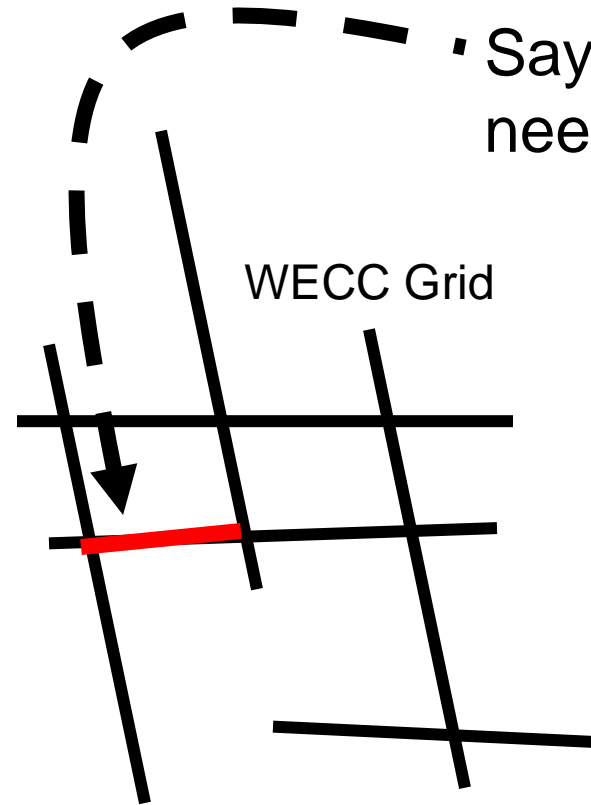
- **Determines transmission service curtailment priority for flow components on the grid, based on the transmission service reservation being used to deliver energy**
 - **Will include tagged flows and non-tagged flows**
- **Ranks which transactions must be assigned a curtailment obligation when congestion occurs**
- **See illustrations on next slides...**

Determining curtailment priority of transmission flows

The seams coordination tool calculates all components of flow on each grid element. For example with Flowgate "A":



Seams Coordination Tool



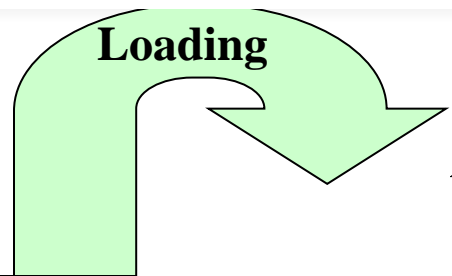
• Say this grid element is congested and needs relief...

The tool prepares the following list for the element:

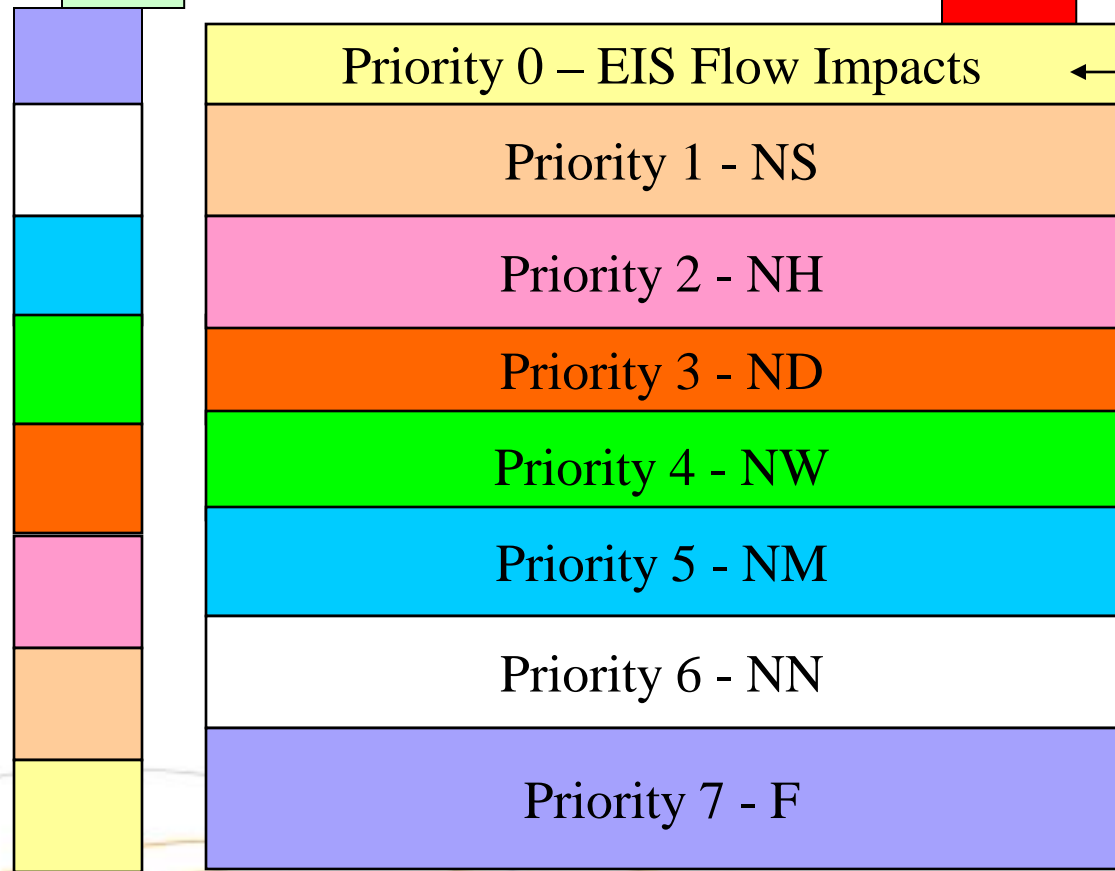
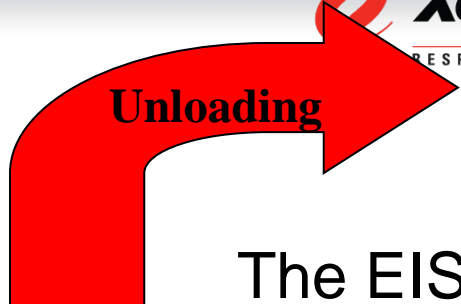
<u>Transaction ID</u>	<u>Service Priority</u>	<u>Transaction MW of flow on element</u>
Tag # x	2	13
Tag # y	2	4
Tag # z	6	20
BA1 – native	7	8
Tag # a	7	2
BA2 – native	7	6
.....

Curtailments are then allocated pro-rata within each service priority bucket up to the necessary amount of relief obligation.

Curtailment priority coordination concept:



Avoid Overflow



The EIS flows use unloaded line capability or else cause counterflow on a binding constraint

On Deck

Flowgate Loading

Notes: No displacement of same priority transactions except Firm. Firm curtails pro-rata.

Seams Coordination Tool

- The Seams Tool capability is useful to WECC even if the Energy Imbalance tool is not developed.
- WECC does not presently have the ability to perform the type of calculation just described for the seams tool.
- If the Energy Imbalance tool is developed, the new Seams Tool would be augmented to share coordinating information

Energy Imbalance Service Tool

**Two services provided by this tool, in
one package...**

Energy Imbalance Service Tool

- **Uses security-constrained economic dispatch to provide two functions:**
 - **Balancing Service**: Redispatch to balance deviations from scheduled generator output and errors in load schedules
 - **Congestion Redispatch Service**: Redispatch to relieve overload constraints on the grid

Are these new services?

- **Balancing Services**: Prior to the EIS tool, Balancing Areas provide these under their Tariff Schedules 4 & 9.
 - The EIS Tool replaces a part of the Balancing Area services, resulting in a “virtual consolidation”
 - Other roles and responsibilities for local services remain with the Balancing Areas
- **Redispatch Services**: This is a new regional service (outside of CAISO/AB).

How is balancing service provided?

- **Balancing Service is provided based on hourly MWH deviations from schedule**
 - **For example: load scheduled 15 MWH but actually consumed 18 MWH**
 - **Purchase of 3MWH of energy balancing service**
 - **For example: generator scheduled 200 MWH but actually produced 203 MWH**
 - **Sale of 3 MWH of energy balancing service**

How is congestion redispatch service provided?

- **Congestion Redispatch Service is provided to deliveries that have a new scheduled value due to curtailments issued from the Seams Coordination tool.**
 - **For example: Scheduled Tag for 100MWH was curtailed 20MWH by the seams tool, but continued to flow at 100MW. This results in an imbalance settlement.**
 - **Continued on next slide...**

How is congestion redispatch service provided?

- (continued)
 - The energy imbalance is calculated based on the reduced scheduled volume of 80MWH. This results in an imbalance settlement of 20MWH at both the source and sink of the tag. The difference in price between source and sink is the net congestion cost paid by the tag owner.
 - Continued on next slide...

How is congestion redispatch service provided?


- (continued)

- The revenues from this price difference are paid to the resources that cleared in the security-constrained dispatch.
- If the transaction delivery matches its new curtailed value, it has no imbalance and does not purchase redispatch service

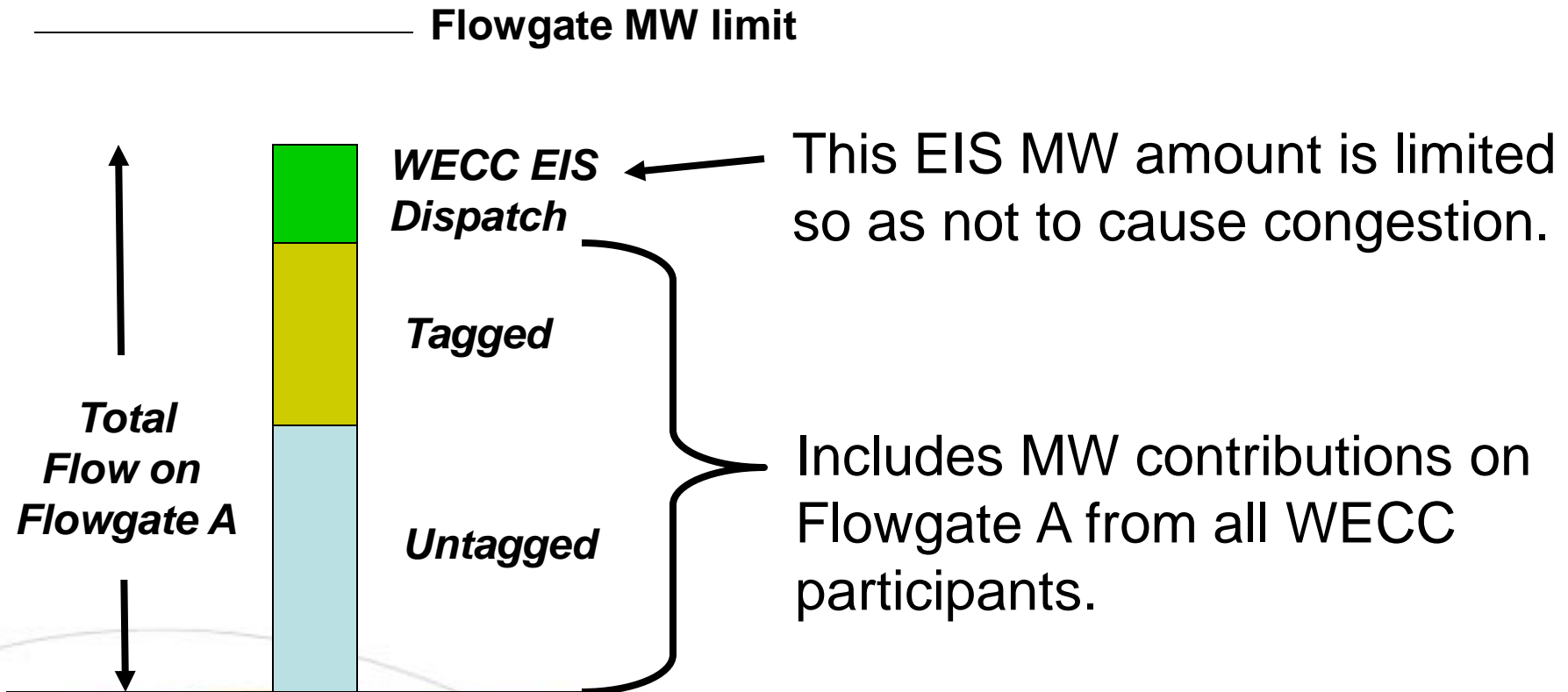
Who supplies energy balancing and congestion redispatch?

- **Balancing and congestion redispatch are provided by resources that have voluntarily offered responsive dispatch capability**
- **The resources are cleared by the security-constrained economic dispatch to meet the spot-forecasted balancing need plus any congestion redispatch**

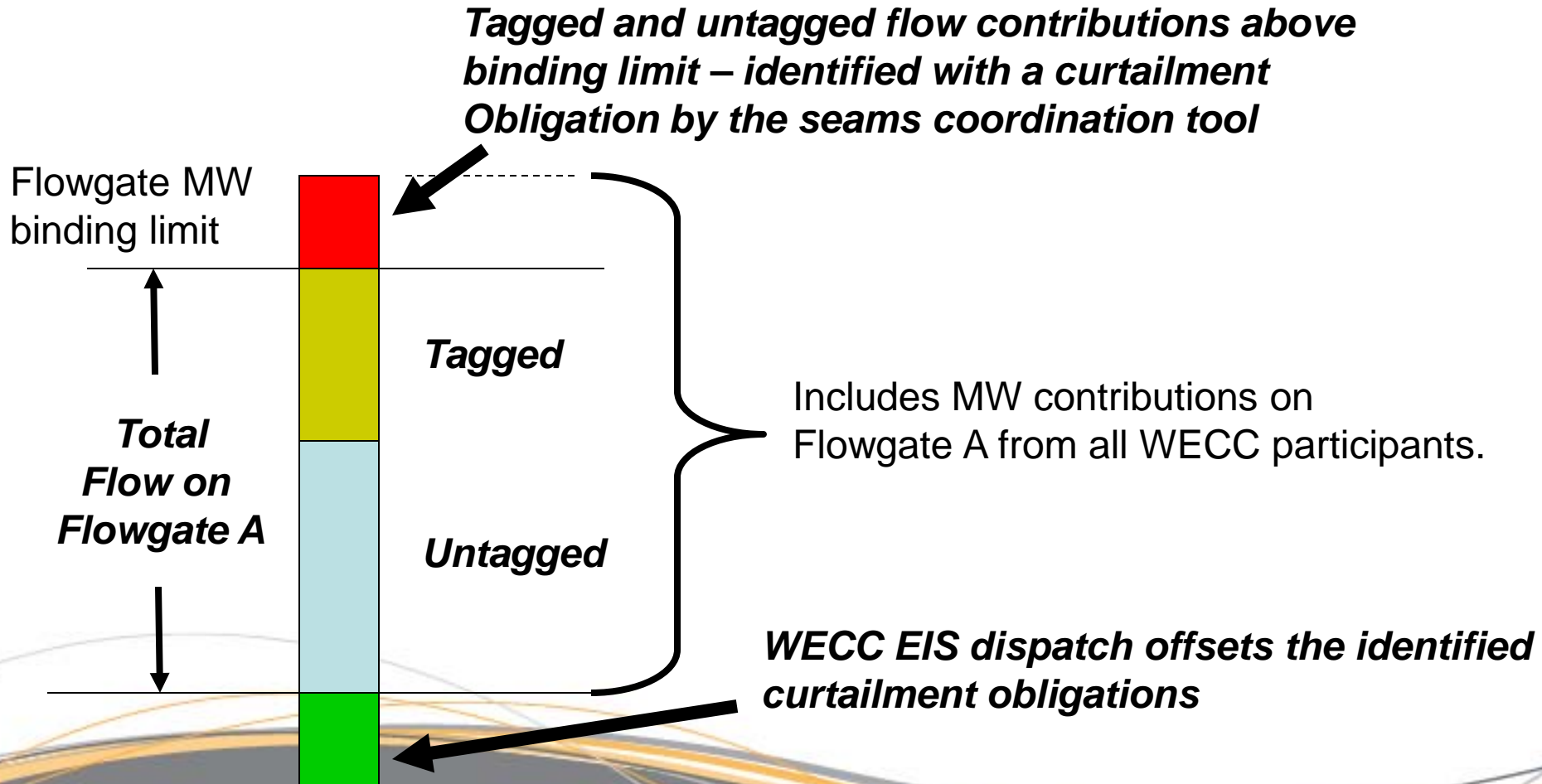
What transmission service is used to support the EIS function?

- All scheduled deliveries continue to use traditional reserved transmission service.
 - The EIS dispatch is provided without using pre-reserved transmission service.
 - The proposal for the EIS function includes an after-the-fact payment to participating transmission providers to recognize flow on their systems.
 - EIS flow has the lowest service priority, so it does not displace any reserved service.
- 

In this example EIS flows for imbalance are within the line loading limit:



In this example EIS flows offset the flow that has a curtailment obligation:



Additional Discussion

Next Steps and Open Items

What are the next steps?

- **Seek authorization on 4/30/10 from the WECC Board of Directors to perform a benefit/cost analysis.**
- **Regular WECC Seams Issues Subcommittee meeting scheduled for 5/4/10 - 5/5/10.**
- **Goal to complete analysis in first half of 2011.**
- **Over this period also continue to refine tool specifications and perform outreach on design details.**

Additional open items?

- **Need to develop the EIS service umbrella agreement (tariff?) for proposed use by participating systems**
 - **Address OATT Schedule 4 & 9**
 - **Address tool cost recovery**
 - **Address transmission service payment**
- **Need to specify the associated market monitor function that would be used to detect and mitigate abusive market or scheduling practices**

END

Bonus Material

For discussion if time permits...



Operation Timeline for the WECC EIS Toolkit

**Schedule Day-Ahead &
Up-to 30 minutes prior to
Operating Hour**

**Real-time
Dispatch**

Post-Operating

time 

Market Participant:

- ✓ Forecast and unit Commit
- ✓ Generators self-schedule
- ✓ Generators voluntary submit offers
- ✓ DSM resources voluntary submit offers
- ✓ Prepare and finalize pre-dispatch schedules

WECC EIS Market Operator:

- ✓ Perform security-constrained economic dispatch to keep balance
- ✓ Provide redispatch if any congestion occurs
- ✓ Send dispatch set points to generators
- ✓ Coordinate any contingency reserve deployments With EIS dispatch

- ✓ Gather meter data to support settlements
- ✓ Provide settlement statement and invoices

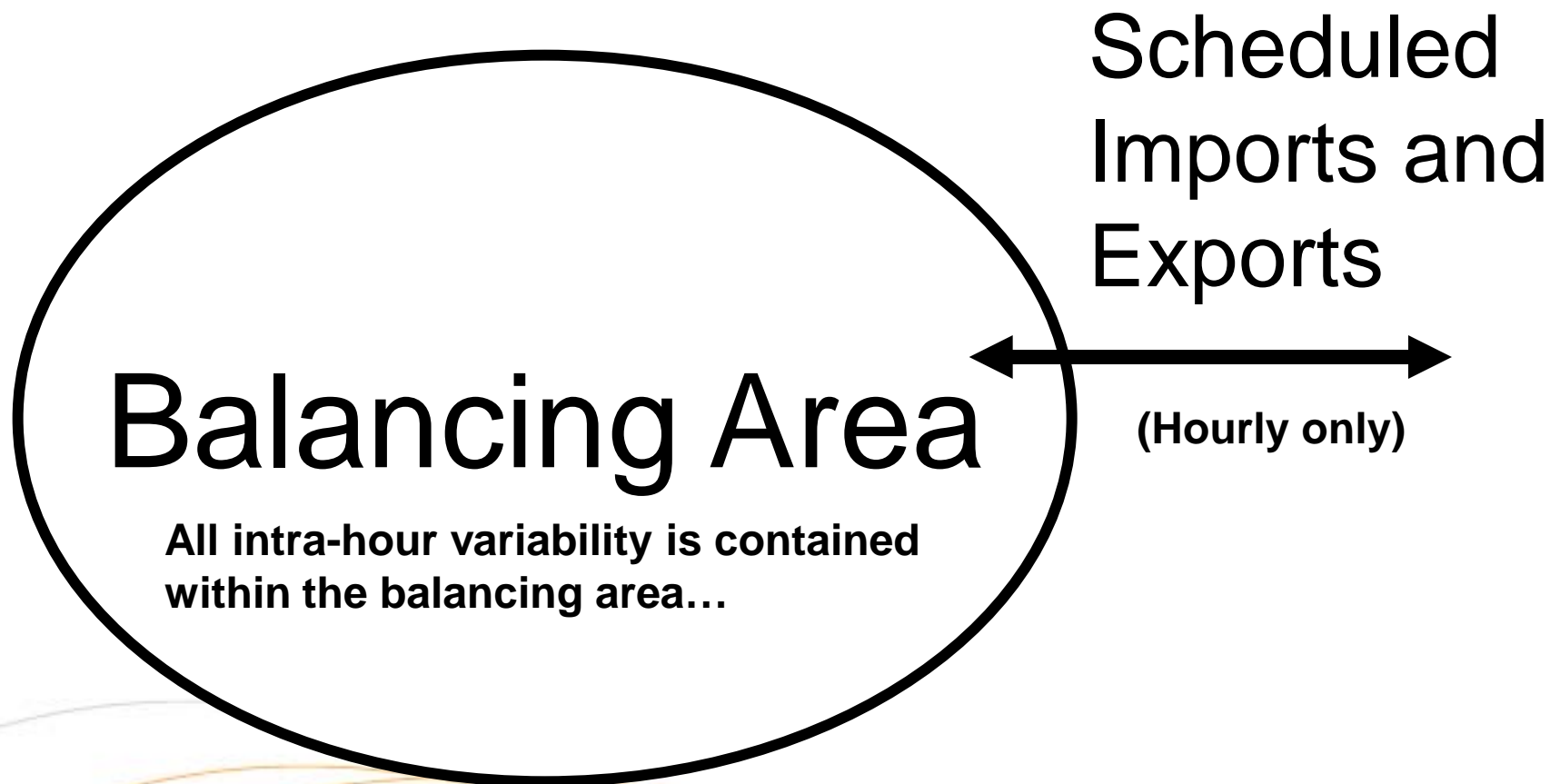
Transmission Provider:

- ✓ Provide meter data to support settlements

Contract with Balancing Areas Transfers compliance responsibility

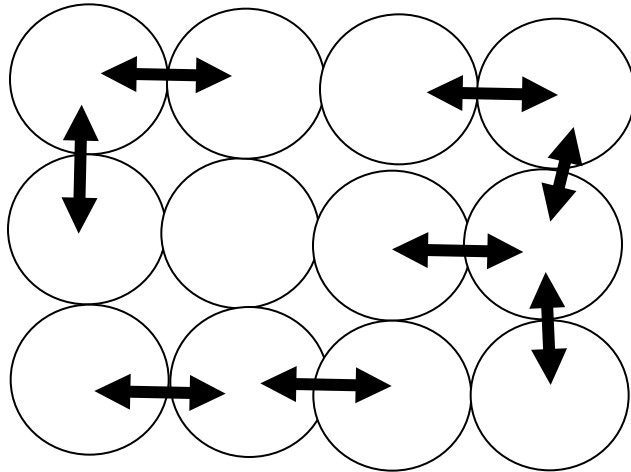
- ***Scheduled and Actual Interchange:***
 - *INT-002, -003 and -004; BAL-006*
- ***EIS Market:***
 - *IRO-006; BAL-006; INT-002, -003*
- ***Dynamic Scheduling and Inadvertent Interchange:***
 - *BAL-005, -006*
- ***Balancing Authority Area Control and Performance:***
 - *BAL-001, -002, 003; TOP-002; EOP-001*
- ***Data Exchange:***
 - *TOP-002, -005*
- ***Ancillary Services:***
 - *Section 3 of Open Access Tariff*
- ***Emergency Operations:***
 - *EOP-002, -003, -008*

Single Balancing Area Variability



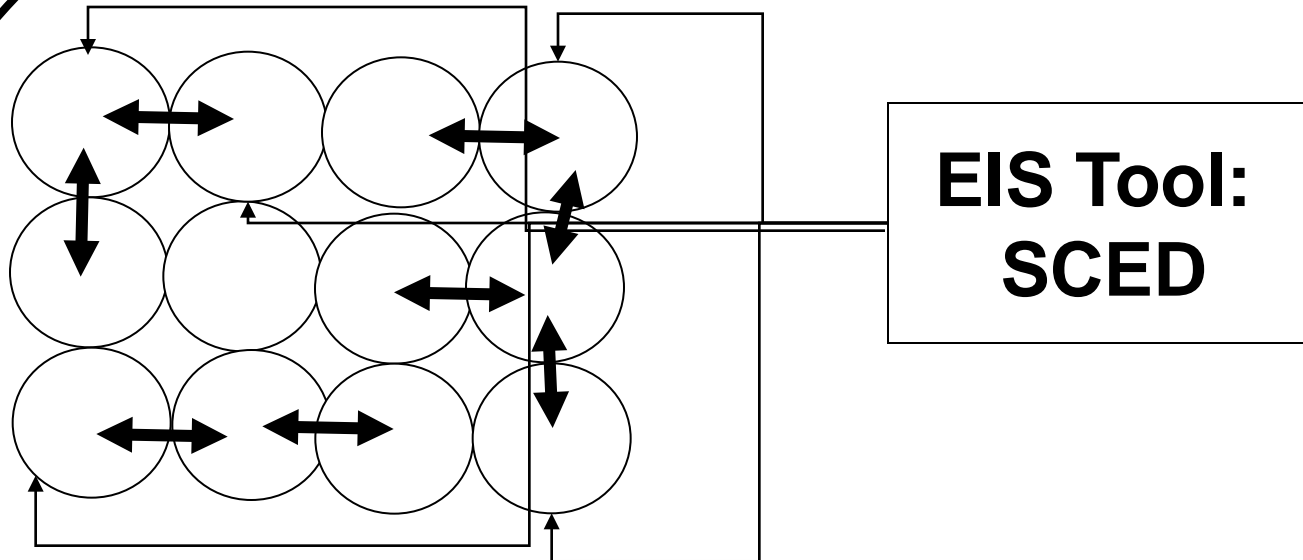
Multiple Balancing Areas

Each balancing area contains its own intra-hour variability...



Multiple BA with EIS

EIS Footprint



Intra-hour variability is captured and allocated in real-time within the entire region, limited by the physical capability of the wires.

Diversity benefit reduces operating costs for balancing.



Xcel Energy[®]

RESPONSIBLE BY NATURE™