



WestConnect EIS WG

December 19, 2011

Topics

- **Market Overview**
- **Locational Imbalance Pricing**
- **Resource Plans**
- **Resource Offers**
- **Dispatchable Range**
- **Deployment & Dispatch**
- **Uninstructed Deviation**

EIS Market Features

- **Spot Balancing energy market**
- **Locational Imbalance Pricing (nodal)**
- **Voluntary Offers on Resources**
- **Market settlement of Imbalance Energy**
- **Uninstructed Deviation Charge**
- **Hourly Settlements**
- **Weekly Invoicing**
- **Physical Transmission Rights**
- **Self-commitment of Resources by Owners**

EIS Market Highlights

- **All Load and resources within the Market footprint are subject to financial settlement of Imbalance Energy**
- **The financial impact on both resources and load is within the “control” of the participants through the use of energy schedules**
- **Hourly imbalance settlement for both load and resources are netted prior to invoicing**
- **Dispatch is regional and is calculated using a security constrained, offer-based economic dispatch (SCED) every 5 minutes**

EIS Market Highlights

- Resources may either offer to sell into the market or self-dispatched to serve scheduled transactions and/or native load
- Self-dispatched resource still subjected to imbalance settlement
- Any resource offered for dispatch has the entire asset subject to dispatch (within the "Dispatchable Range")

What is “Imbalance Energy”?

- Imbalance energy (or Energy Imbalance) is the difference between what actually happens for each generator and load location, and what they prearranged through schedules.

Energy Imbalance = Actual Production or Usage – Scheduled Production or Usage

$$EI = A - S$$

- Asset owners are instructed to move their generation output based on offer curves while maintaining reliability and balance (matching generation to load).

What is “Energy Imbalance Service”?

- EIS is the dollar amount associated with the imbalance energy.
- EIS is calculated by taking the amount of Energy Imbalance and multiplying by the price at a specific point on the energy grid.

Energy Imbalance Service = Imbalance Energy x Locational Imbalance Price (LIP)

$$**EIS = EI x LIP**$$

What is the “Energy Imbalance Service” Market?

- **The EIS Market provides asset owners the infrastructure necessary to offer their resources into the marketplace for use in providing Energy Imbalance.**
- **In the EIS marketplace, the Market Operator owns the responsibility of accounting for and financially settling all EIS amounts.**
- **Market Operator will remain revenue neutral**

What is the “Energy Imbalance Service” Market?

- **The EIS market does not supersede any MP’s obligations with respect to any other capacity or ancillary service obligations**
- **Balancing Authorities (BAs) and Load Serving Entities (LSE) will continue to use the same procedures used today to manage capacity adequacy, reserves, and other reliability-based concerns.**
- **All assets (loads and generation) must register**

Locational Imbalance Pricing

Locational Imbalance Pricing – Constrained System

- LIP recognizes that cost may vary at different times and locations based on real-time or near real-time system conditions
- With LIP, asset owners know the price per MWh of electricity at numerous busy intersections on the system
- Remember SPP LIP contour map?

Settling an Imbalance Financially

- Suppose the following:
 - LIP @ (Gen A) = \$20/MWh
 - LIP @ (Load B) = \$30/MWh
- The resulting charges would be:
 - EIS (Gen A) = \$20/MWh x 10 MWh = \$200 (paid)
 - EIS (Load B) = \$30/MWh x -10 MWh = -\$300 (pays)
- The net imbalance is zero (generation equaled load), but there is a net payment of \$100 (\$200+(-\$300)) at Load B because of different prices at different points in the system

Resource Plans

What is a Resource Plan?

- Enables the market system to assess Resource and Ancillary Service adequacy for the region, each BA, and each MP
- Plan of how you would operate your system absent the market
- The first submission of Resource Plans for an Operating Day must be made by 1100 the day prior to the Operating Day.
 - Resource Plans must cover a period of 7 days beginning with the Operating Day (168 hours)

Resource Plan Contents

- **Date, HE**
- **Resource Name**
- **Resource Status**
- **Operational Information**
 - **Planned MW**
 - **Min/Max**
 - **Ramp Rates**

Resource Status Descriptions

- **Available**
 - Resource is online and available for deployment
- **Unavailable**
 - Resource is offline and unavailable for deployment or other uses
- **Self Dispatch**
 - Resource is online and unavailable for deployment
- **Manual**
 - Not capable of following Dispatch Instructions; and
 - Not capable of adhering to a Schedule
 - Intermittent Resource; or
 - Testing, Startup, or Shutdown Mode

Resource Plan Use

- **For the Market**
 - **Used to determine dispatch instructions**
- **For Reliability**
 - **Used for SFT studies, Delivery Analysis, and Contingency Analysis**
- **MO Manual Overrides**
 - **Used to update Current Hour RP in the event MP is unable to do so during the current hour due to a physical change to the resource (e.g. unit contingency, tube leak, de-rate, etc)**
 - **OH-45 minutes closes MP changes to a RP**

Resource Offers

Offer Curves in the Market

- **Offer Curves**
 - **Used to determine the most economical dispatch of Market resources**
 - **Used in the calculation of LIP (Locational Imbalance Pricing)**
 - **Used with “Available” resources**
 - **Price of resource is specified through an offer curve**

Offer Curve Contents

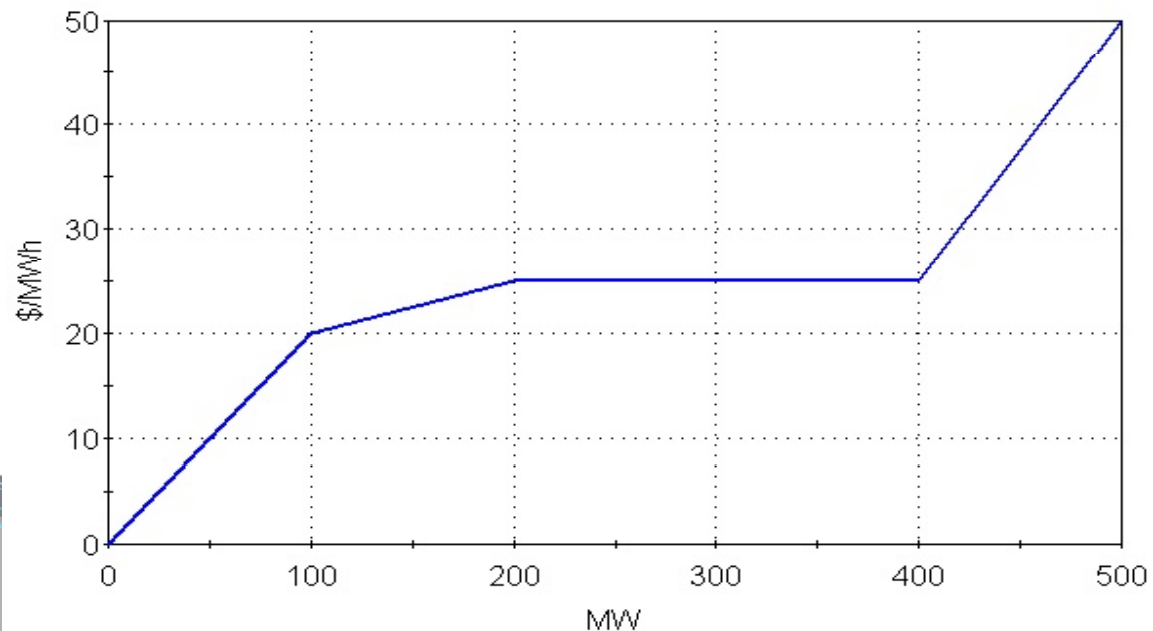
- Contents of the offer curve:
 - Market Date
 - Hour Ending
 - Resource Name
 - Price/MWh

Offer Curves in the Market

- Resources that offer energy into the EIS market must specify an offer price.
- The Offer Curve allows resources to offer multiple MW points at different prices.
- An offer curve is submitted for each resource and contains between two to ten monotonically increasing pairs of MW and price.

Submitted Data

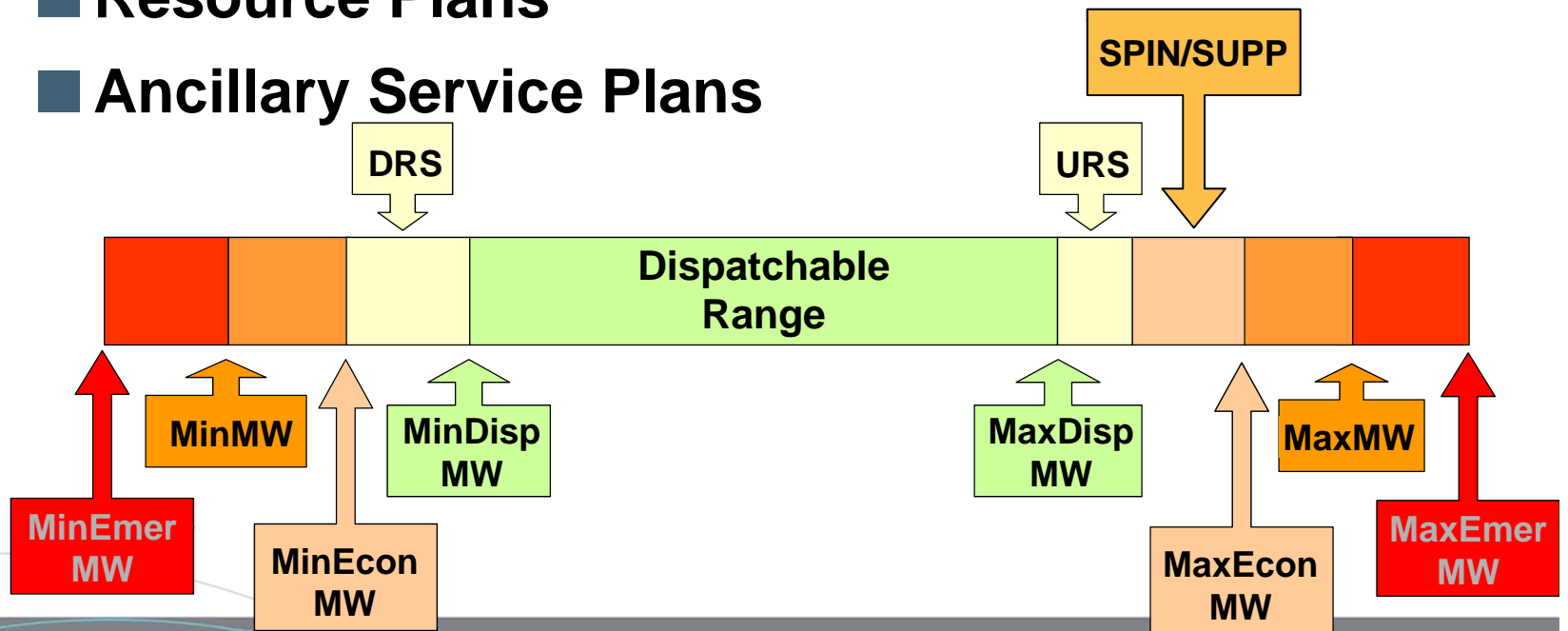
(MW)	\$
0	\$0.00
100	\$20.00
200	\$25.00
400	\$25.01
500	\$50.00



Dispatchable Range

Dispatchable Range

- Based upon data from
 - Offer Curves
 - Resource Plans
 - Ancillary Service Plans



Deployment & Dispatch

Deployment & Dispatch

- **SCED (Security Constrained Economic Dispatch)** determine the least costly means of obtaining energy to serve the next increment (MW) of load at each settlement location, while maintaining reliability.
- **SCED uses EIS offers that can serve the load at a bus at the lowest cost**
- **Data from the offer curves, resource plans, A/S plans, short-term load forecast, and SCADA are used along with the state estimator data to calculate dispatch instructions.**

Dispatch Instructions

- Dispatch instructions include:
 - Resource Name
 - Market Date
 - Interval Ending
 - Dispatch Type (EIS, OOME)
 - MW Set-Point
 - Locational Imbalance Price (LIP) (\$/MWh)
- The dispatch instruction is a set-point for the end of the deployment interval
- Deployment intervals are 5 minutes in length (12 per hour)

Introduction to Deployment

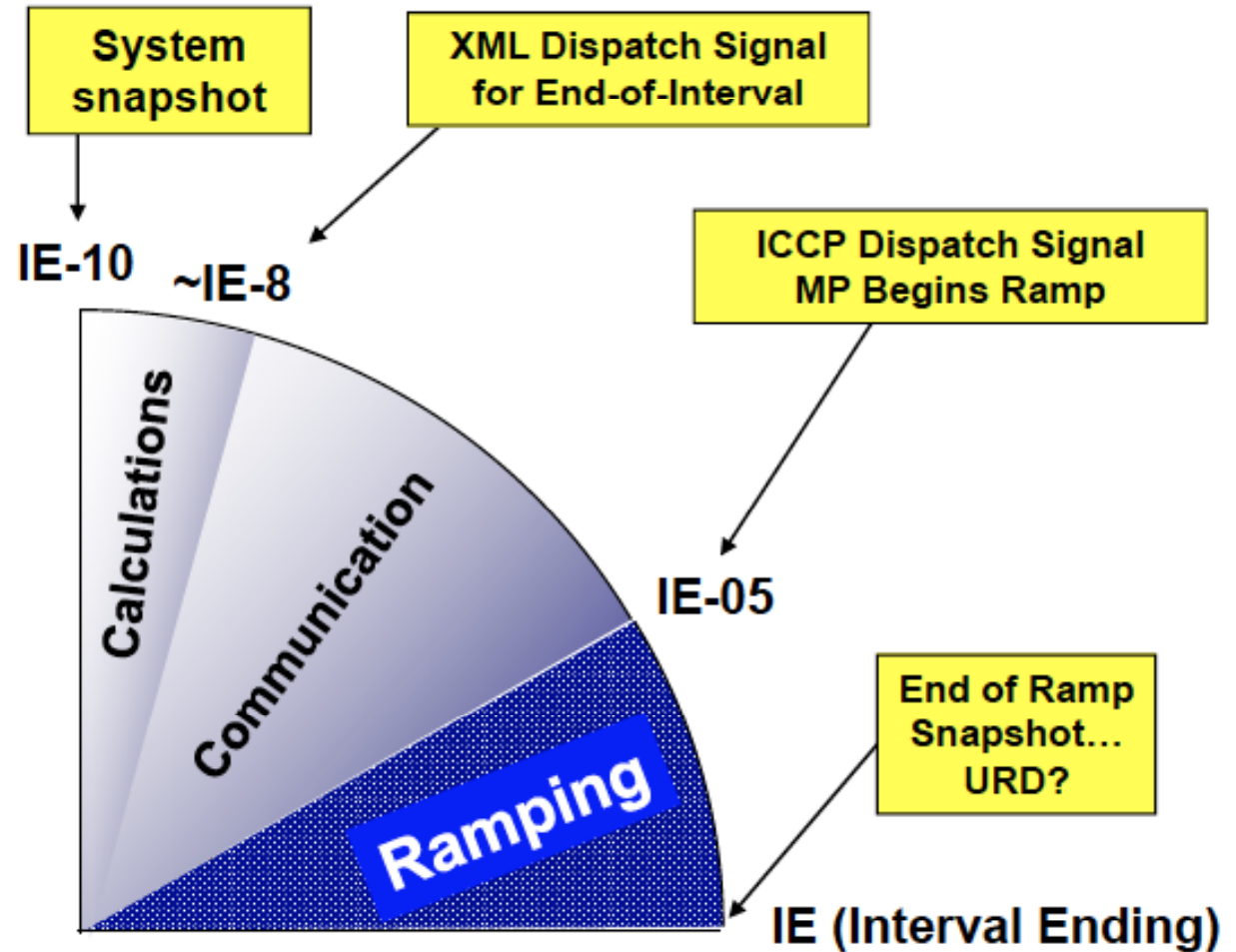
- **Dispatch instructions are calculated every 5 minutes**
- **The process of calculating deployment begins at 10 minutes prior to the end of the deployment interval.**
- **Ramp rate used in the dispatch instruction comes from the resource plan**
- **The ramping is for the 5 minutes of the deployment interval**

Introduction to Deployment

- **Dispatch instruction for a self-dispatched unit is equal to the sum of its schedules for the end of the interval**
- **At the end of each deployment interval, SPP takes a snapshot of each resource to determine if it is at the instructed level**

Ten-Minute Deployment Interval

Dispatch
Instruction
Timing



Uninstructed Deviation

Uninstructed Deviation and Imbalance

- **Uninstructed deviation is the difference between dispatch instructions and the actual performance of the resource measured at a point in time**
 - **Measured each five-minute set point**
- **Imbalance is the difference between actual production or usage and scheduled production or usage for each asset measured over a period of time.**
 - **Metered hourly**

Uninstructed Deviation Charge

- **Market participants that deviate from dispatch instructions will incur financial penalties - Uninstructed Deviation Charge**
 - **Offered Resources are dispatched economically based on the Offer Curves submitted**
 - **Self-dispatched Resources are sent a dispatch instruction based on the sum of their schedules.**
 - **Both types of resources will receive a dispatch instruction and they are both subject to Uninstructed Deviation charges**
 - **Intermittent resources (wind, etc) are not subject to UDC.**