Western Energy Imbalance Market Training for Body of State Regulators

June 1, 2022
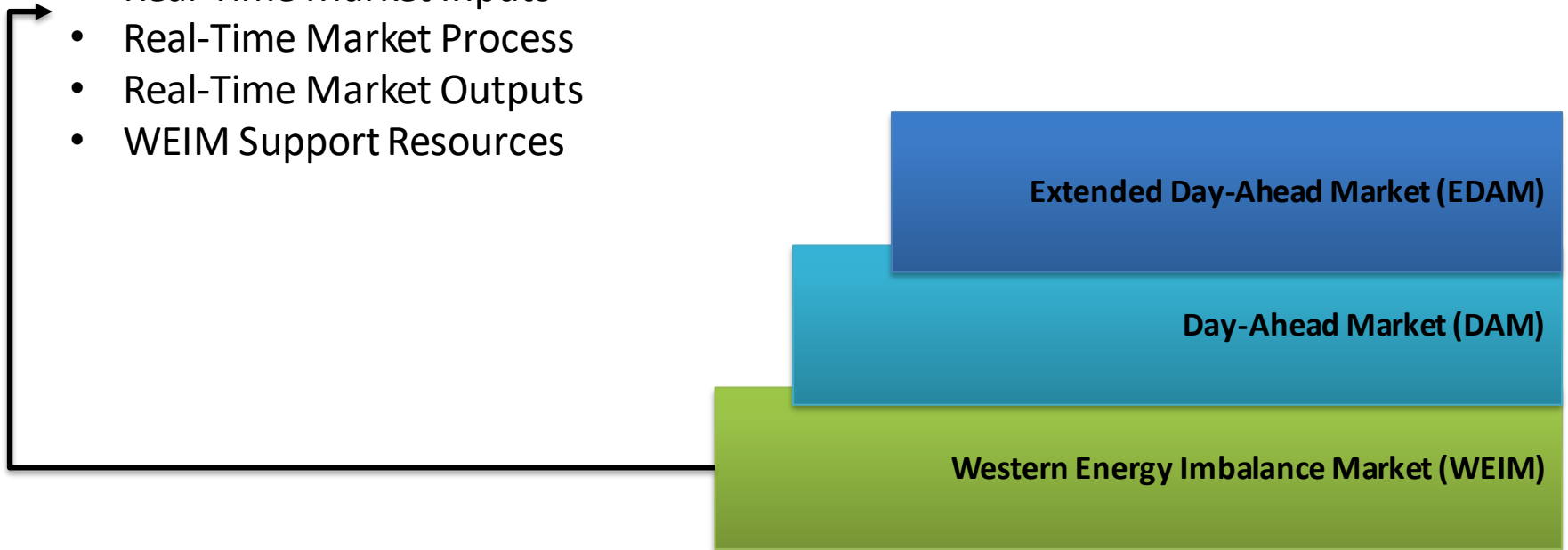
Heidi Carder, Lead Client Trainer

Customer Readiness

Today's Agenda

Western Energy Imbalance Market (WEIM) Training:
- WEIM Concepts: The Basics
- Real-Time Market Inputs
- Real-Time Market Process
- Real-Time Market Outputs
- WEIM Support Resources

Extended Day-Ahead Market (EDAM)

Day-Ahead Market (DAM)

**Western Energy Imbalance Market (WEIM)**

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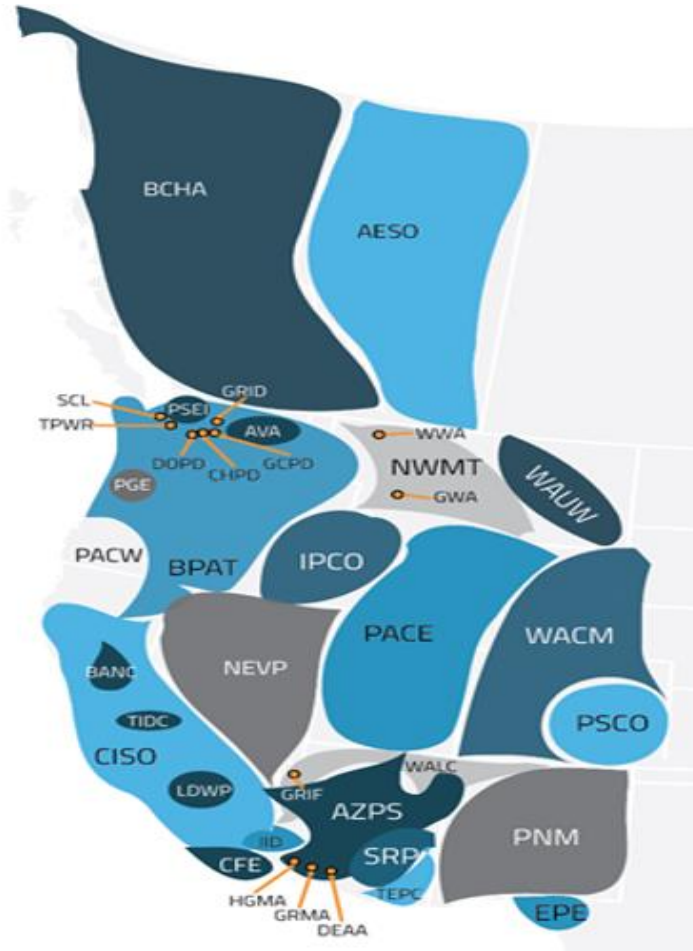
WEIM Concepts

LET'S REVIEW THE BASICS

The goal is to keep the electric system balanced

Demand

60 HZ

Supply

ENERGY + RESERVES
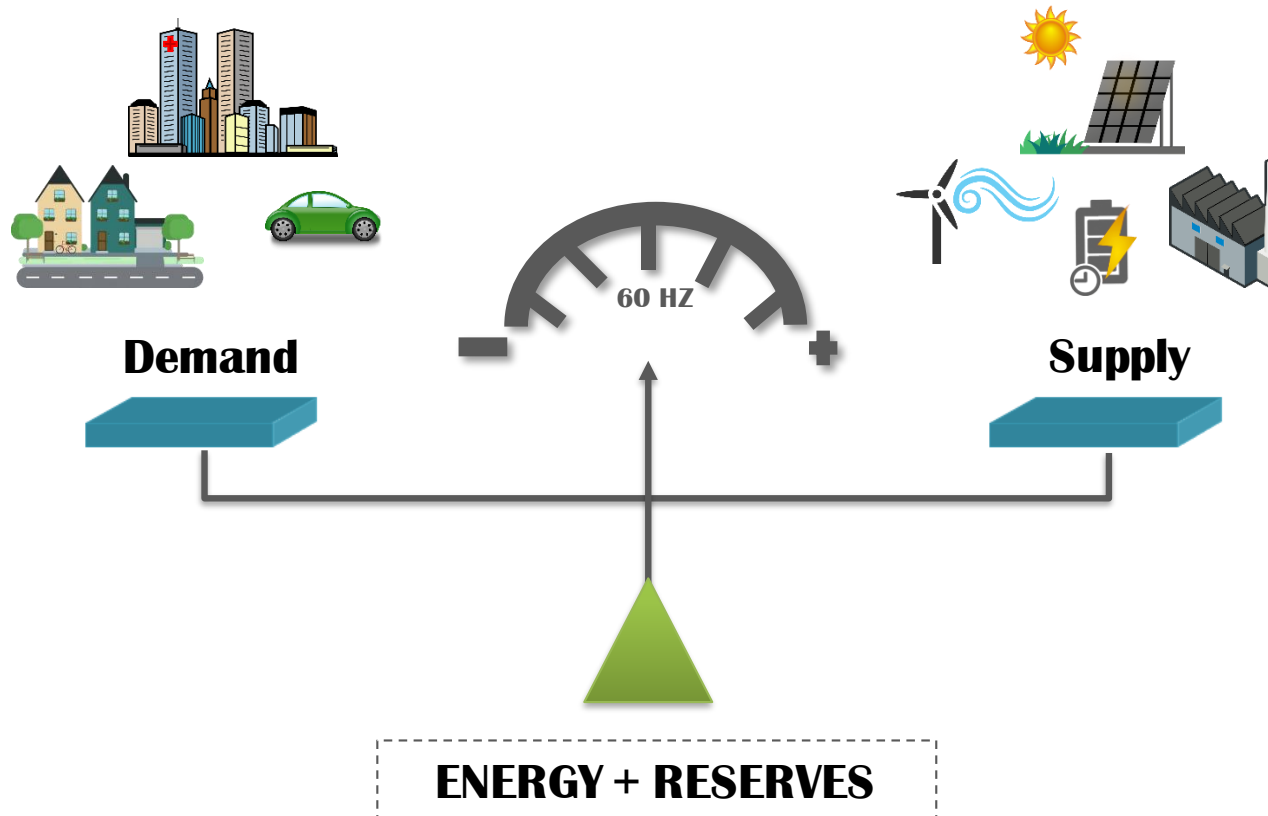
Western Interconnection Balancing Authorities (BAs) maintain balance within their areas

- Reliably planning and operating high voltage grid

- Meeting import and export obligations between areas

- Adhering to federal and industry regulations

The ISO provides two markets to optimize for reliability and economics

Day-Ahead Energy Market

Real-time Energy Market

Commits the most cost-effective and reliable mix of generation for the region

Enables parties to schedule contracted supply/demand

Enables suppliers to offer excess supply in the form of energy or reserves

Enables Load Serving Entities to secure pricing to meet their demand for energy

Economically dispatches resources to balance real-time supply and demand, while ensuring system reliability
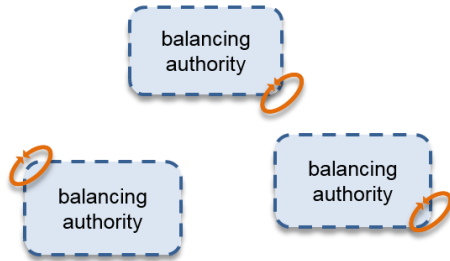
Extends beyond California to other western states

Hour-ahead scheduling for intertie resources

Optimization every 15-min for intra-hour variability and every 5-min to meet instantaneous demand
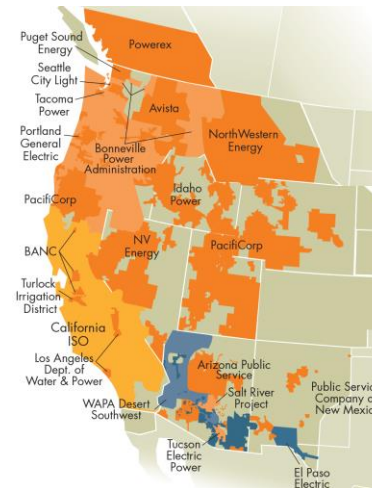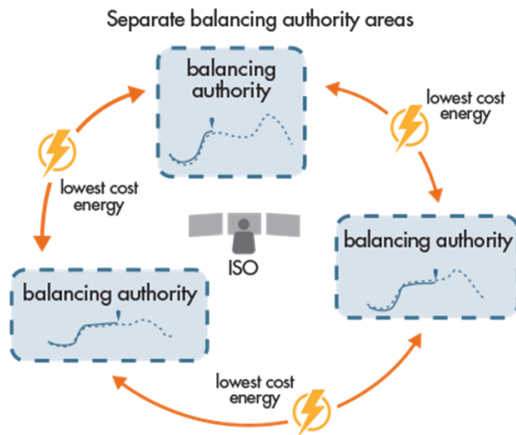
WEIM

California ISO

BA responsibilities inside and outside of WEIM

In a non-WEIM environment, each BA balances loads and resources within its borders

balancing authority
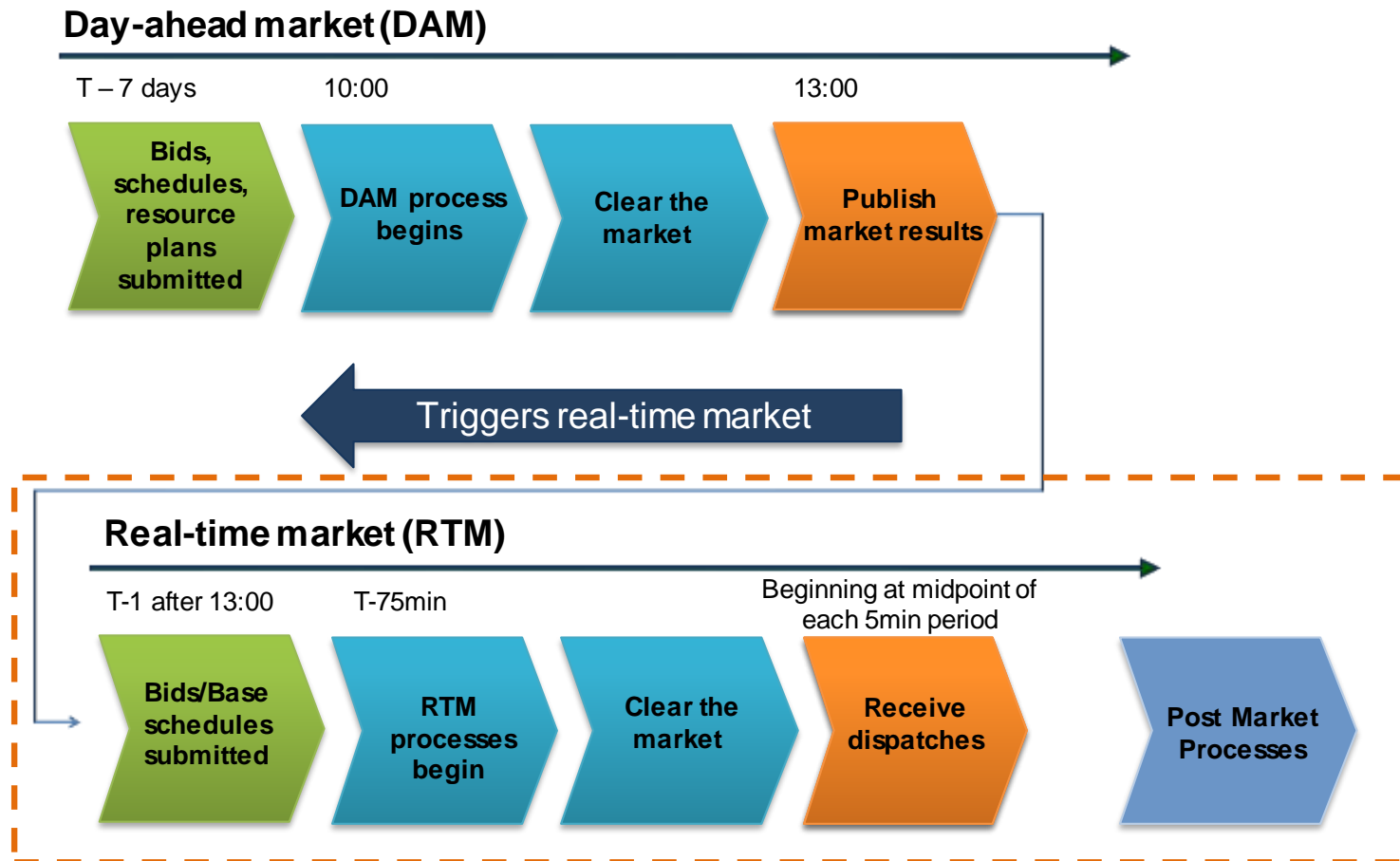
balancing authority

balancing authority

WECC

In the WEIM, resources are dispatched across BAAs to balance energy

Separate balancing authority areas

balancing authority

lowest cost energy

lowest cost energy

ISO

balancing authority

balancing authority

lowest cost energy

Puget Sound Energy
Seattle City Light
Tacoma Power
Portland General Electric
Avista
NorthWestern Energy
Bonneville Power Administration
Idaho Power
PacifiCorp
NV Energy
PacifiCorp
BANC
Turlock Irrigation District
California ISO
Los Angeles Dept. of Water & Power
Arizona Public Service
Salt River Project
Public Service Company of New Mexico
WAPA Desert Southwest
Tucson Electric Power
El Paso Electric

Powerex

Entities are still responsible for running their own BAAs

We will be focusing on the RTM and Post Market Processes

Day-ahead market (DAM)

T – 7 days	10:00		13:00

- Bids, schedules, resource plans submitted
- DAM process begins
- Clear the market
- Publish market results

Triggers real-time market

Real-time market (RTM)

T-1 after 13:00	T-75min		Beginning at midpoint of each 5min period	

- Bids/Base schedules submitted
- RTM processes begin
- Clear the market
- Receive dispatches
- Post Market Processes

INPUTS   PROCESS   OUTPUTS

WEIM Real-Time Market

INPUTS, PROCESSES & OUTPUTS

Inputs and outputs that are optimized in the Real-Time Market

INPUTS	PROCESS	OUTPUTS

INPUTS

- Real-time data:
  - *Grid and resource information*
  - *Resource plans:*
    - *Energy bids*
    - *Base schedules*
  - *Resource outages*
  - *Operator instructions*

- Day-ahead data:
  - *Grid and resource information*
  - *Energy delivery schedules*
  - *Capacity Reserve awards*

PROCESS

Data Evaluation & Optimization

OUTPUTS
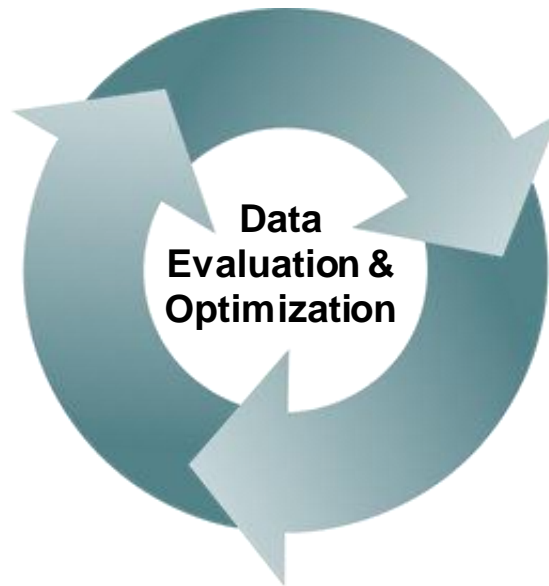
- Real Time Dispatch (RTD)
  - *resource dispatches for each 5-min interval*

- Fifteen Minute Market (FMM)
  - *resource sufficiency instructions for each 15-min interval*
  - *changes in energy transfers between BAAs*

- Settlement values
 - *Hourly, 15-min and 5-min intervals*

INPUTS   PROCESS   OUTPUTS

WEIM Real-Time Market

INPUTS

The resource plan ensures the balance, feasibility and flexibility of the BAA's base schedules and bids

- Base schedules provide:
  - Hourly load forecasts, generation and interchange schedules
  - Financial settlement baseline for participating and non-participating resources

- Bids provide:
  - Indicators of willingness to buy/supply energy and capacity into the energy market for participating resources

Hourly base schedules

Actual Load

Bid range

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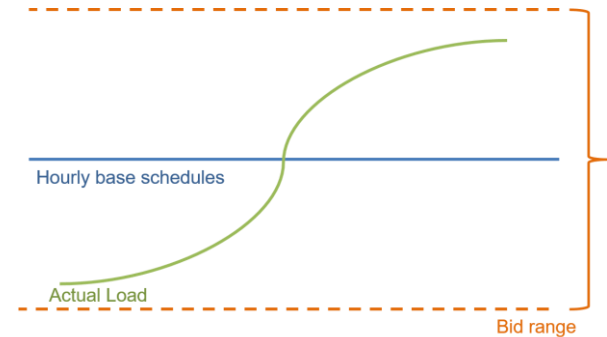
Load forecasts help WEIM Entities determine the base schedule for their BAA

- Demand forecast is used to determine the amount of supply that will be needed.

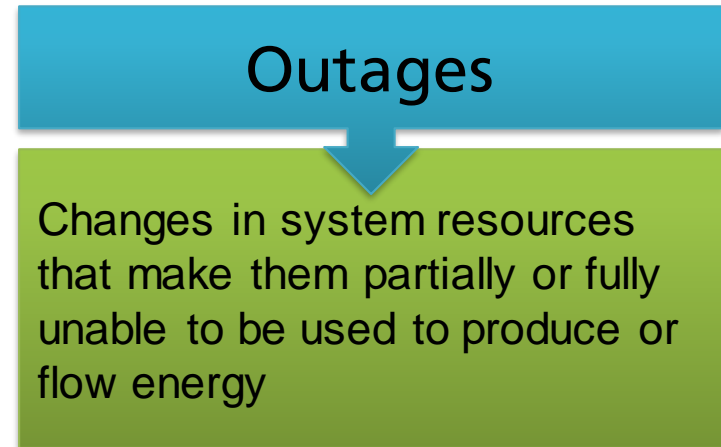- For load and renewable resources, WEIM entities can choose to use:
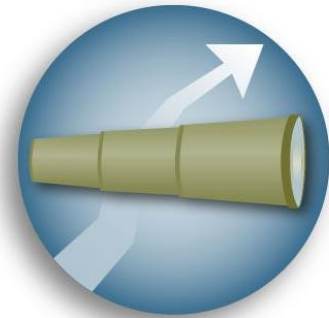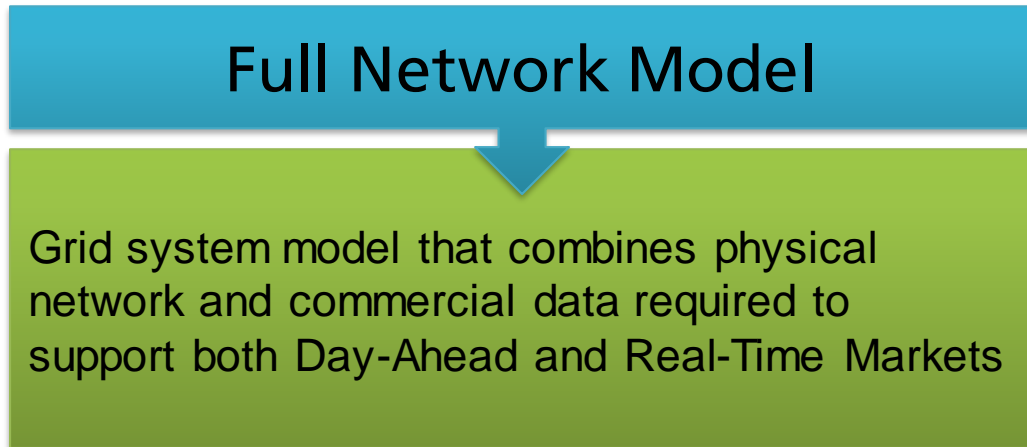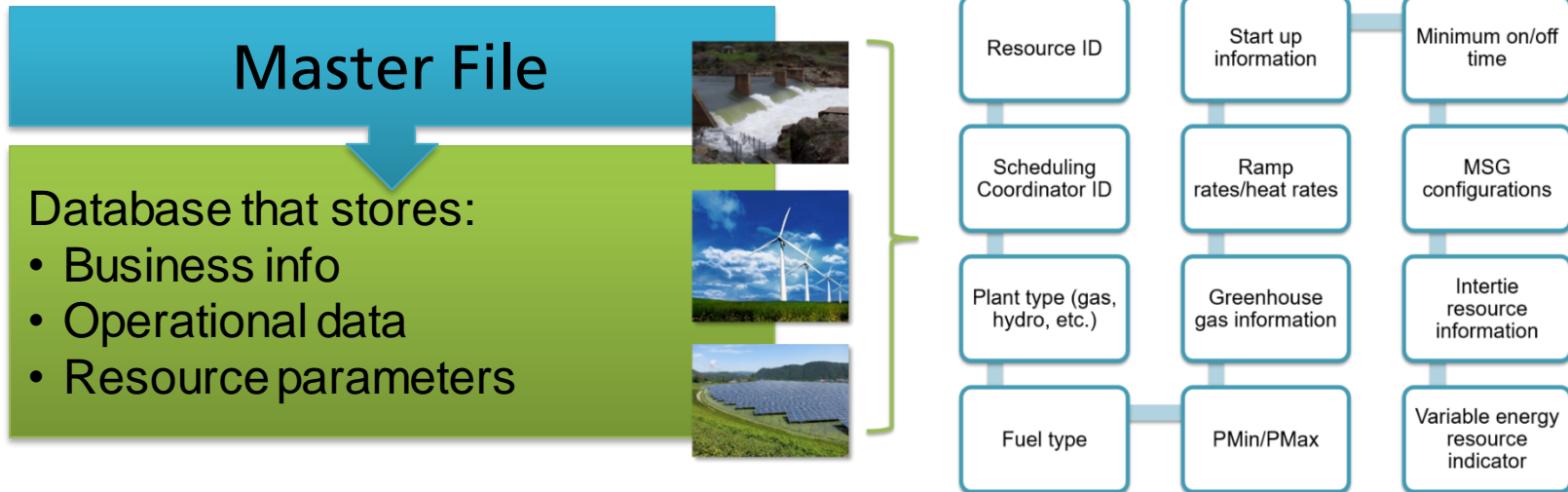
| ISO Forecast | *or* | WEIM Entity Forecast |

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Critical resource data used in determining efficient market optimizations

Master File

Database that stores:
- Business info
- Operational data
- Resource parameters

Resource ID	Start up information	Minimum on/off time
Scheduling Coordinator ID	Ramp rates/heat rates	MSG configurations
Plant type (gas, hydro, etc.)	Greenhouse gas information	Intertie resource information
Fuel type	PMin/PMax	Variable energy resource indicator

Full Network Model

Grid system model that combines physical network and commercial data required to support both Day-Ahead and Real-Time Markets

Outages

Changes in system resources that make them partially or fully unable to be used to produce or flow energy

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WEIM Real-Time Market

PROCESS

Real-Time Market process timelines

75 minutes prior to each operating hour
bids and hourly base schedules submitted

Resource Sufficiency Evaluations

37.5 minutes prior to each operating hour
market instructions

Market Optimization

15 Minute Market Resource Instructions

5 Minute Market Resource Dispatches
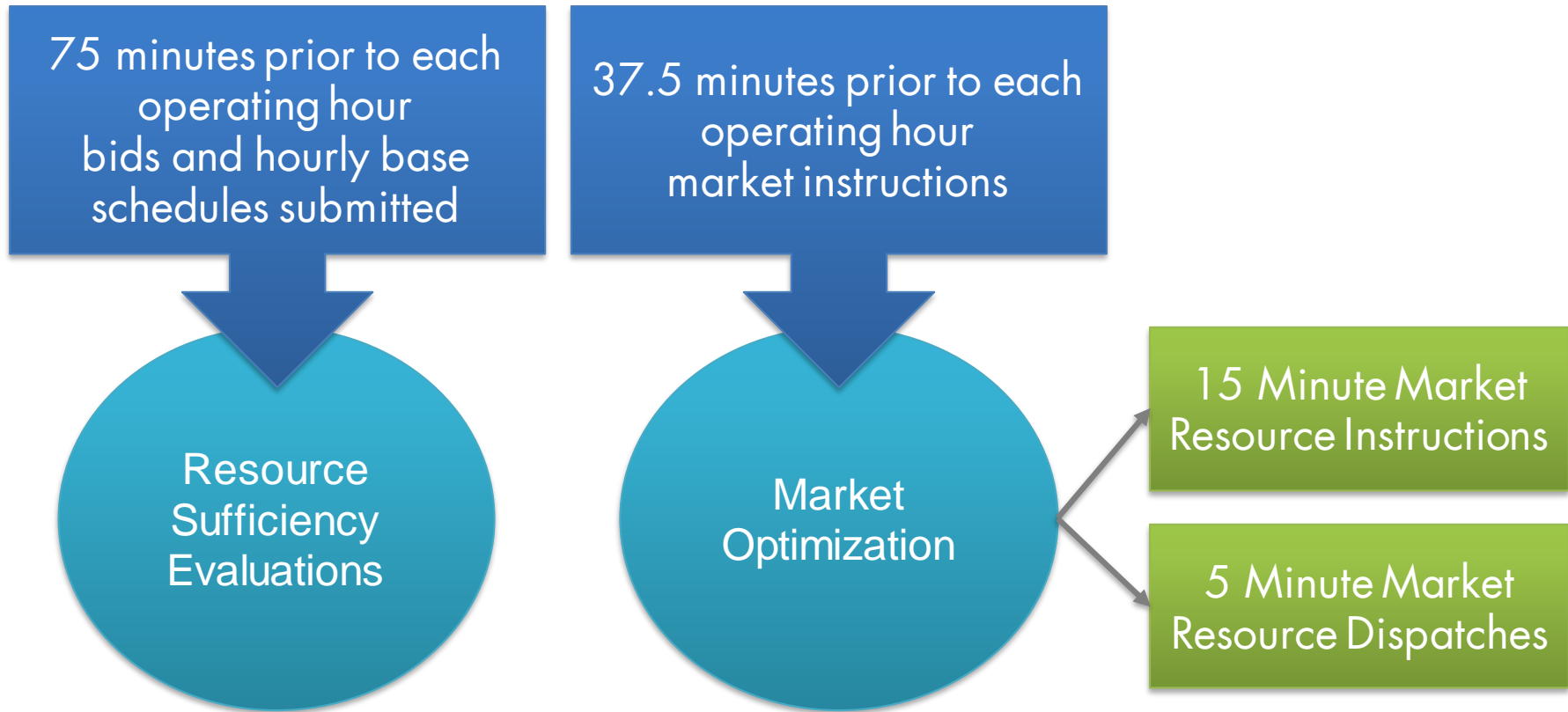
Resource Sufficiency Evaluations assess each BAA to avoid negative grid reliability impacts to other BAAs
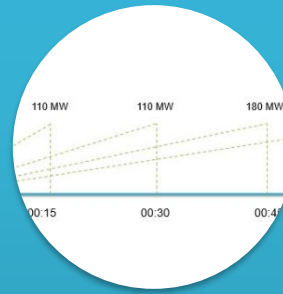
Balancing
Ensures each BA is capable of balancing their area for each operating hour

Bid range capacity
Ensures participating resources can support the MW range submitted in the bids

Flexible ramp
Ensures the aggregation of all resources to be able to meet projected load curves

Feasibility
Ensures a base schedule would not overload a line

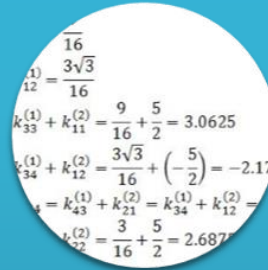INPUTS   PROCESS   OUTPUTS

WEIM Real-Time Market

OUTPUTS

The settlement cycle processes market activity to produce payments and charges

Inputs from day-ahead and real-time markets and meter

Calculations of formulas and settlement rules

Publishing of settlement statements, invoices and payment advices

WEIM Support

WEIM SUPPORT RESOURCES

The ISO provides robust WEIM stakeholder support

Customer Engagement

WEIM Training Resources

Situational Awareness tools

Transparency

Robust market

Operational Guidance

Real-time Operational Best Practices

Technical innovation

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