

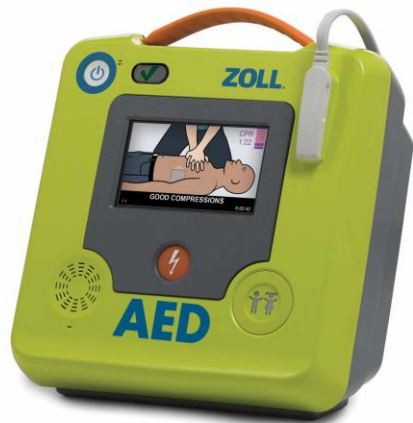
Western States Markets Training

09/22-23/2026, Folsom, CA

Presented by:
Beau Beljean, Lead Bulk Power System Trainer



Safety Briefing



WELCOME



Introductions

- **Name**
- **State/Region**
- **Role**

2026 Agenda – Day 1

Morning (08:00am-12:00pm)

Introduction

- Safety Briefing
- Welcoming Remarks
- Group Introductions
- Overview of Agenda

CAISO Overview

- Key Terms & Functions

Market Overview

- WEIM Review
- EDAM Processes & Timelines

Lunch + Tour

Afternoon (01:30pm-5:00pm)

Market Pricing

- LMP
- Scarcity Pricing
- Pricing of IR & RC

Transmission

- Transmission Utilization in EDAM
- Exercising Transmission Rights in EDAM
- Transmission Revenue Recovery in EDAM
- Congestion Revenue and Transfer Revenue Allocation

Resource Sufficiency Evaluation

- Component Tests
- EDAM vs WEIM RSEs
- 2026 EDAM Performance metrics

2026 Agenda – Day 2

Morning (08:30am-12:00pm)

EDAM Benefit Calculation Methodology

- Methodology
- Formulas
- Assumptions

Bidding & Settlements

- Resolution of Day-Ahead Positions in Real-Time
- Settlements
- Bidding Examples

Closing

CAISO OVERVIEW



What is the CAISO's focus?



Coordinate, control and monitor the electrical power system.

Act as a marketplace for wholesale power.

Coordinate and consolidate transmission needs of the CAISO Balancing Authority Area.

Support ambitious environmental and regional goals with more distributed & clean power products.

The CAISO provides grid reliability and market operation services

Grid Operator

maintains **reliability** by:

- balancing supply and demand
- operating transmission system within limits
- ensuring grid is secure in case of a contingency event
- orchestrating restoration in case of a system outage

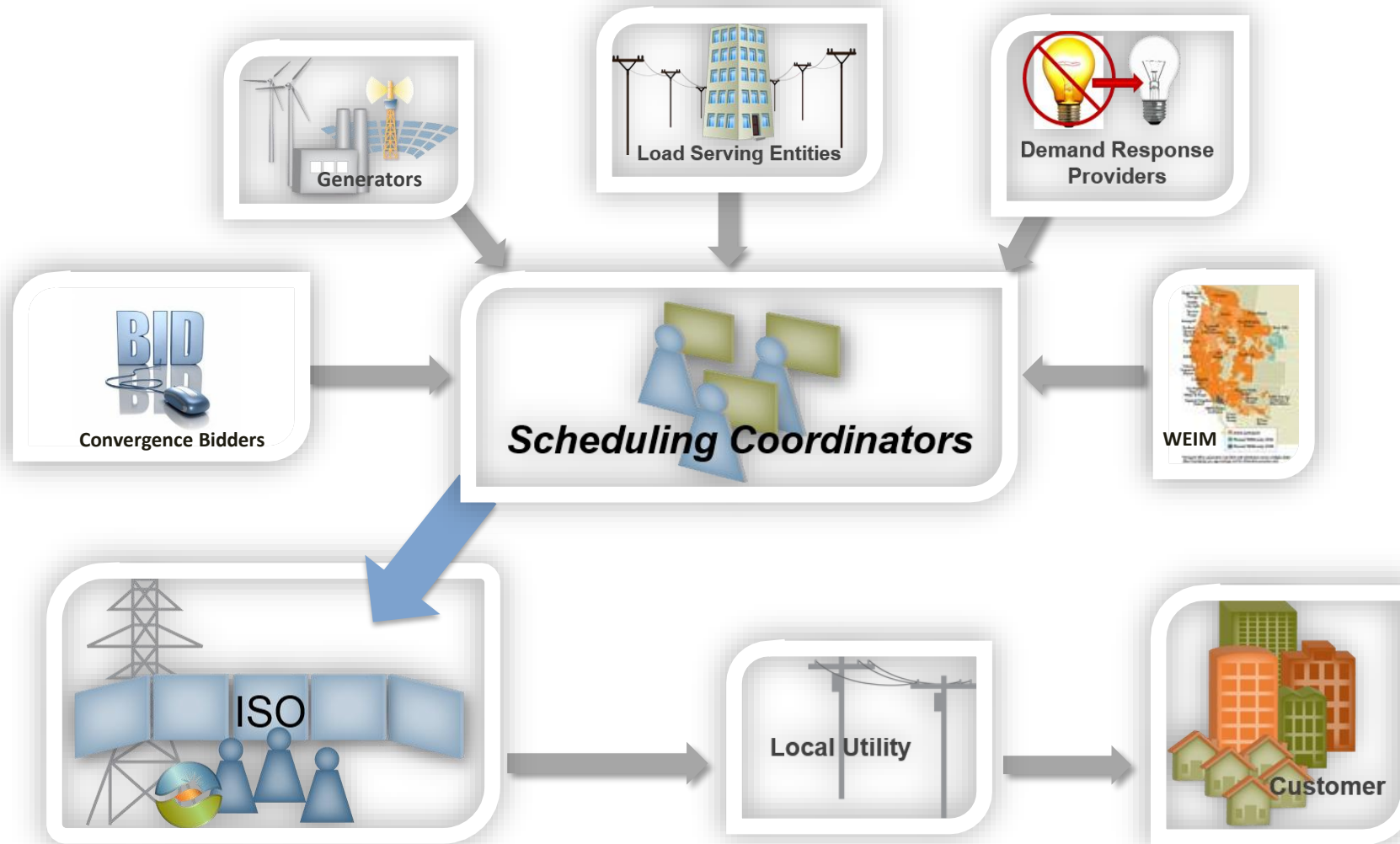
Market Operator

supports **reliability** by providing:

- a larger operational footprint
- cost minimization to balance supply and demand
- non-discriminatory grid access to supply and demand
- price transparency reflective of system conditions
- compensation for grid services

The ISO is also the Reliability Coordinator (i.e RC West) for the majority of the Western Electricity Coordinating Council (WECC) territory.

Participation with the CAISO depends on the service to be provided



Comparison of market participants to SCs:

- approx. **366** market participants
- most participants act as their own SC
- approx. **15%** use an SC Agent

(as of 08/01/26)

Definition of Terms: BAA vs. BA

physical area & assets

Balancing Authority Area (BAA)

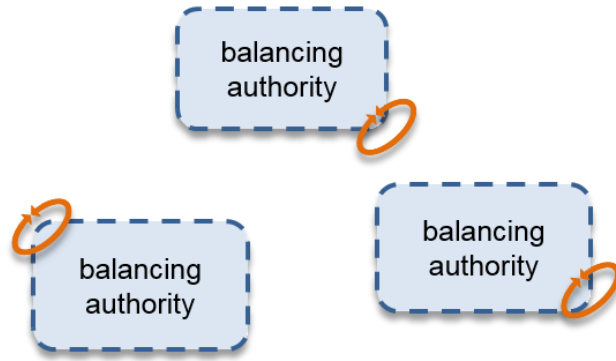
The collection of generation, transmission, and loads within the metered boundaries of the Balancing Authority. The Balancing Authority maintains load-resource balance within this area.

manages the area

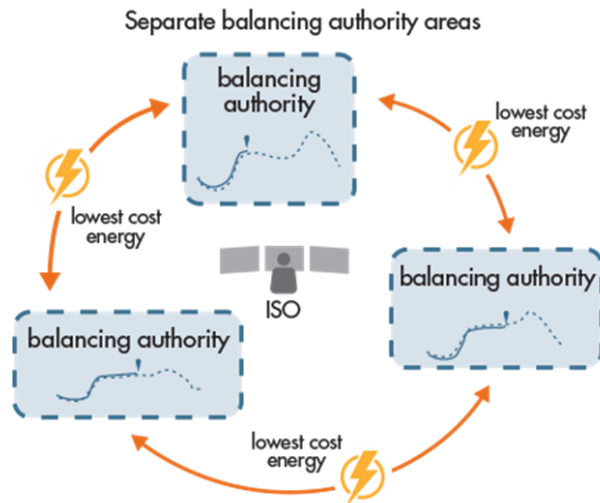
Balancing Authority (BA)

The responsible entity that integrates resource plans ahead of time, maintains load-interchange generation balance within a Balancing Authority Area, and supports interconnection frequency in real time.

BA of today outside of a market vs. market participation



- Focused on balanced schedules
- Load-serving entities (LSEs) within BA identify their supplies
- BA ensures sum of LSEs demand equals the sum of supplies
- BA ensures each LSE is sufficient
- Some drawbacks of this construct are:
 - LSEs lose economic benefits of regional supply
 - Supply may have limited number of LSEs to serve

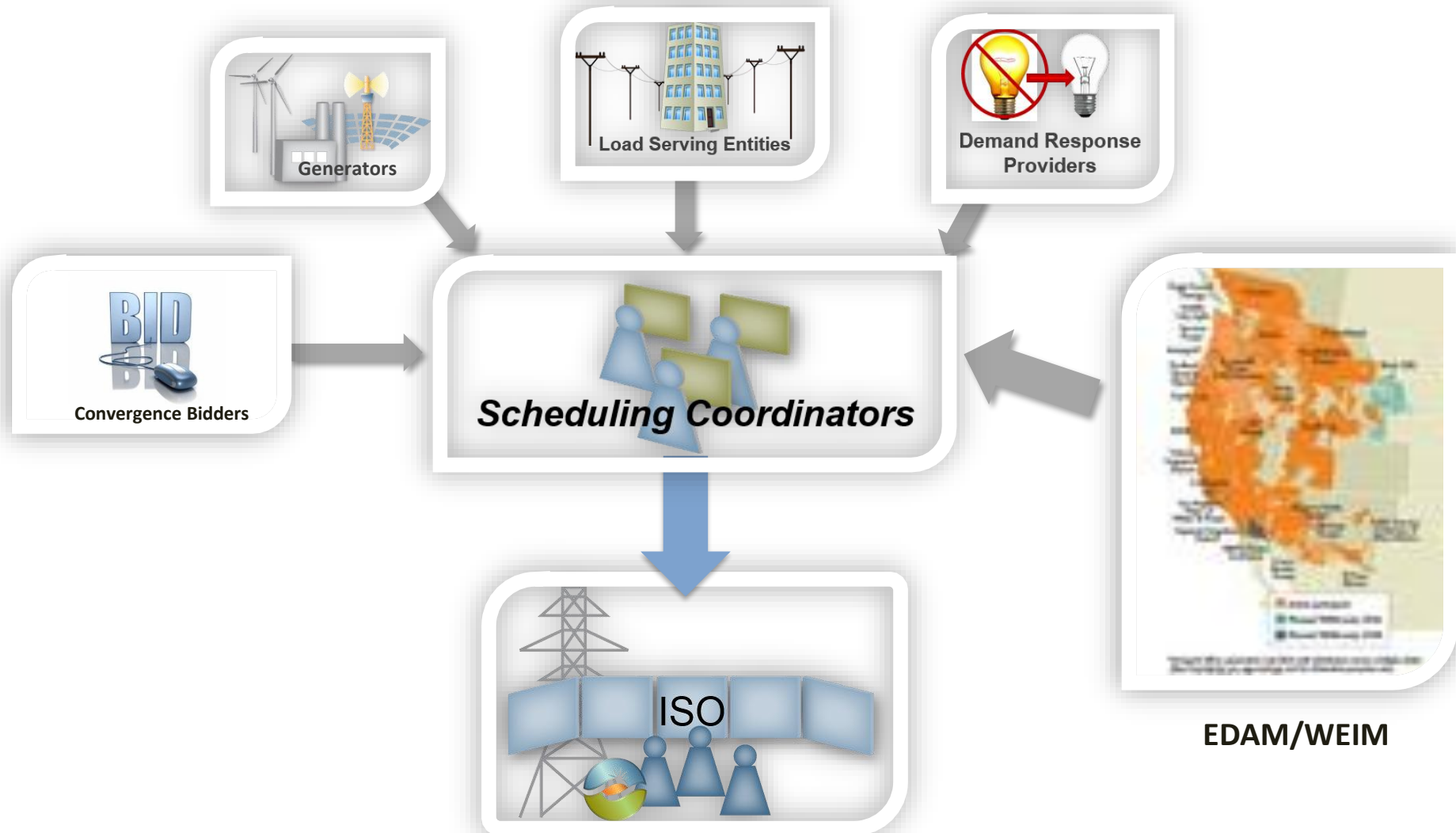


- Market changes concept of LSE coming in with balanced schedule
- Instead, LSEs independently bid in demand and resources independently bid in supply
- Gives LSEs access to larger supply footprint and resources access to larger pool of demand customers
- Market finds the most economic supply to meet demand at least cost while respecting transmission constraints

Defining Roles & Responsibilities

Role	Definition
EDAM Entity	A Balancing Authority that participates in the EDAM market (this includes the CAISO BA). EDAM entities provide inputs such as market limits, outages and transmission constraints specifically for their BA. <u>EDAM entities can also be an SC</u> representing loads and resources within their BA should they hold such responsibilities.
Market Operator/ Real Time Market Operator	The Market Operator is a separate role within the CAISO that is staffed by personnel dedicated to the equal and independent operation of both regional markets – EDAM and WEIM.
Scheduling Coordinator (SC)	The SC is a certified entity that participates in the market by submitting bids and outages and managing the coordinated operations of its facilities.

Participation with the CAISO depends on the service to be provided

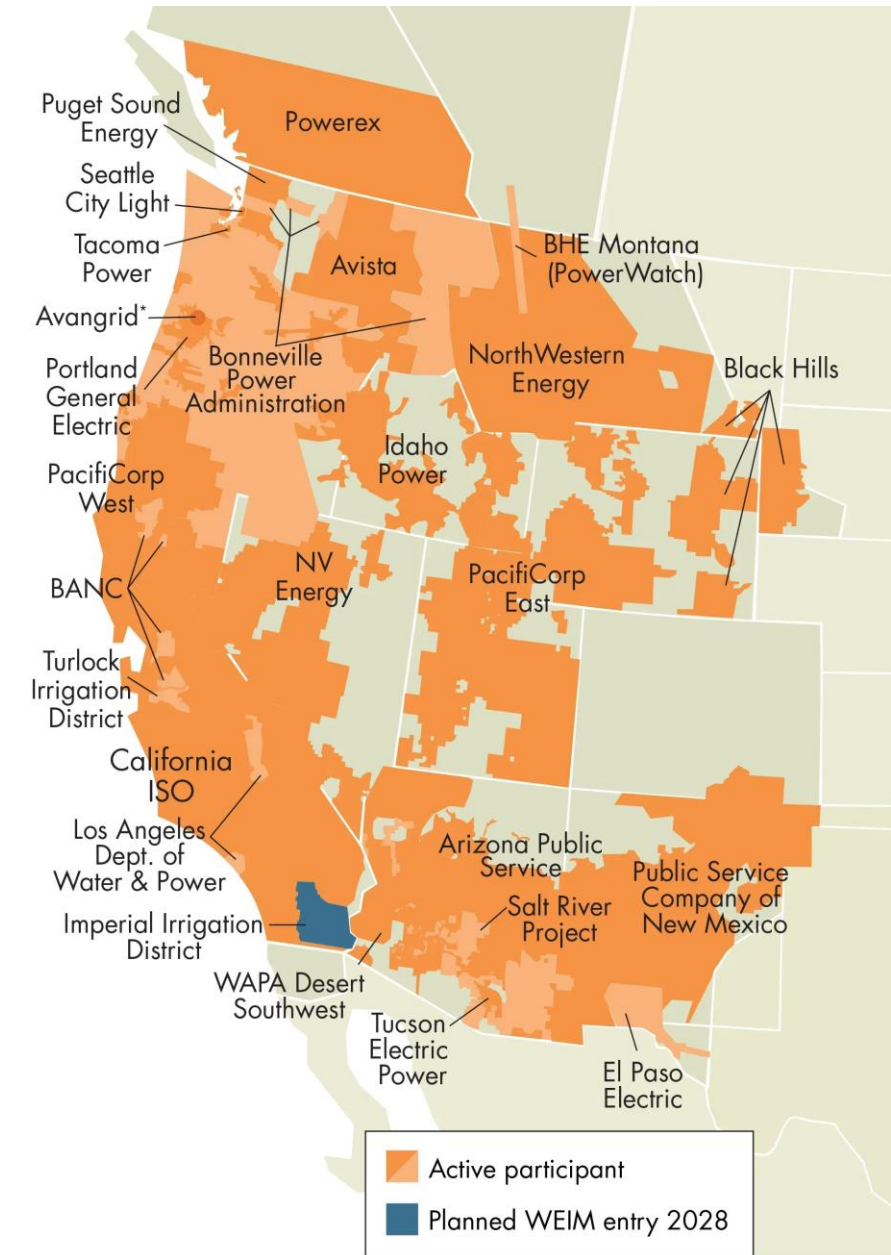


WEIM OVERVIEW



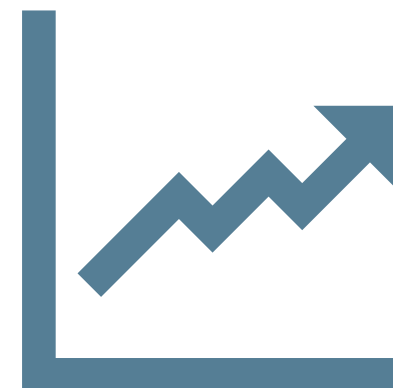
Western Energy Imbalance Market (WEIM) = Real-Time Market

- Operates across a large footprint in the West
- Procures additional energy to manage deviations or imbalances from the hourly market and scheduled transactions across the market footprint
- Enables optimized transfer of energy across the West using available transmission
- The market procures energy and ancillary services for the CAISO BAA
- “Energy only” for all other BAAs



Review of 15-minute and 5-minute market activity

- For each **15-minute** interval the market is:
 - Starting-up or shutting down resources
 - Transitioning multi-stage generators
- For each **5-minute** interval the market is:
 - Issuing real-time dispatch instructions
- These market instructions are communicated to participants through an automated dispatch system (software application)



Key elements

Hourly Resource Sufficiency Evaluation

- Market footprint includes WEIM participants
- WEIM participation is for energy only and does not include ancillary services
- Load forecasts for each entity drive market awards
- Each entity ensures sufficiency of resources available for their area on an hourly basis



Balancing



Bid Capacity



Flex Ramp



Feasibility

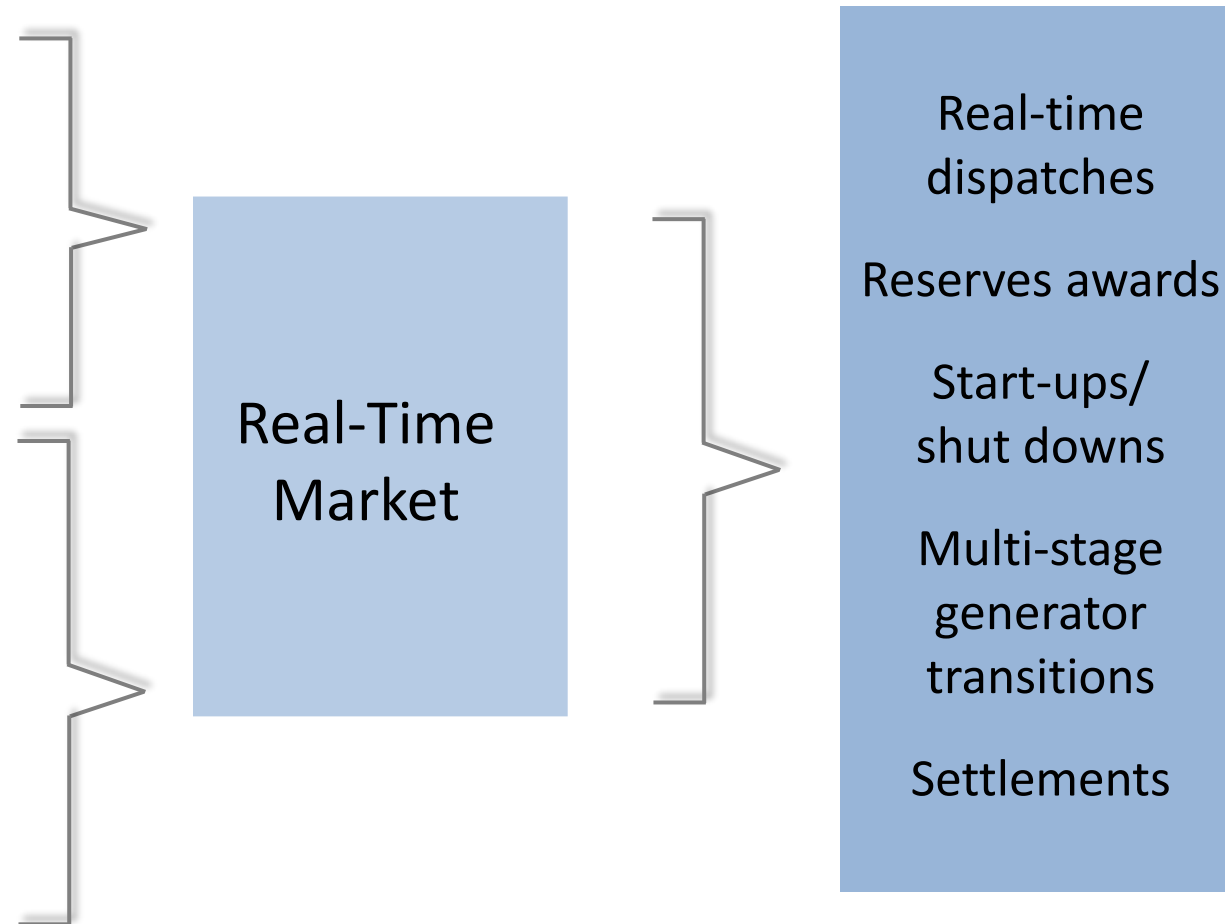
Inputs and outputs

From **Day-Ahead**:

- System info
- Energy schedules
- Reserves awards
- Master file data

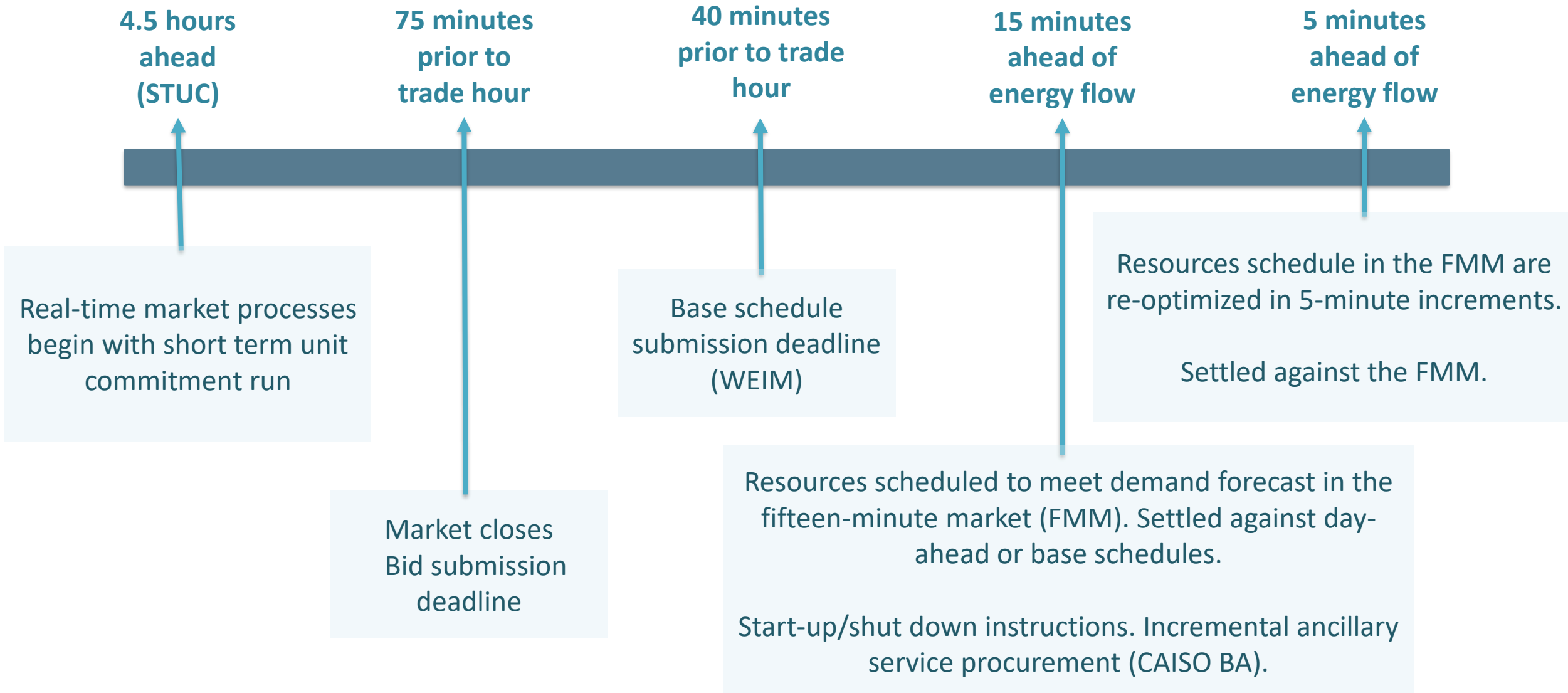
From **Real-Time**:

- State estimator
- Supplemental energy & ancillary service bids
- Base schedules
- Outages
- Transmission limits



Day-Ahead results set the plan for the following day, while the Real-Time Market adjusts to meet actual conditions based on real-time forecasts.

Milestones



Processes

Short Term Unit Commitment (STUC)	• Occurs once per trade hour • Examines the potential demand requirements for the next 4 ½ trade hours • Issues start up/shut down instructions to short start resources to meet anticipated demand
Hour-Ahead Scheduling Process (HASP)	• Produces HASP advisory schedules and advisory AS awards • Binding HASP intertie schedules with hourly block bids • Advisory schedules for internal resources and intertie resources that do not have hourly block bids/schedules
Fifteen-Minute Market (FMM)	• Issues start-up/shut down instructions to short and fast start units, and transition instructions to multi-stage generators • Procures ancillary services as needed • Provides advisory instructions for as many as 7 future 15-min intervals
Real-Time Dispatch (RTD)	• Occurs every five minutes to meet energy imbalances • Resources dispatched in real-time • Provides advisory dispatch instructions for as many as 12 future dispatch intervals

EDAM OVERVIEW

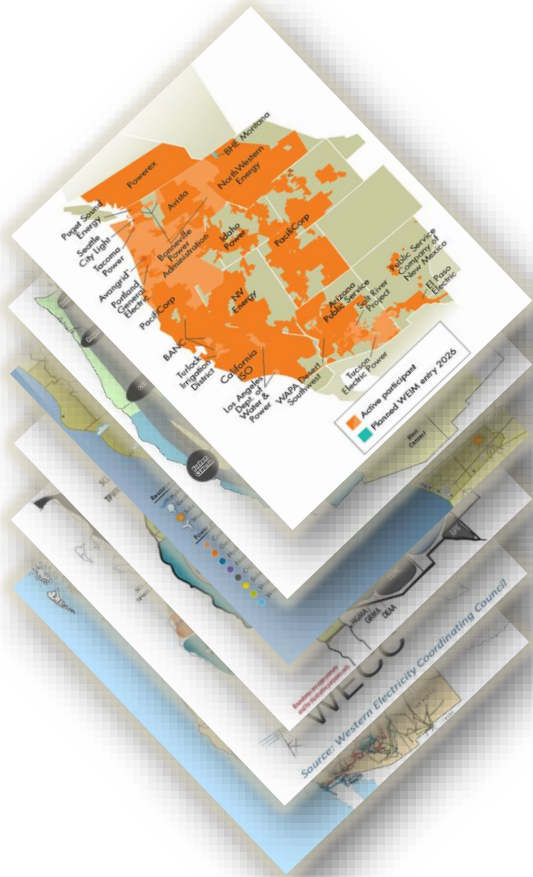


Extended Day-Ahead Market (EDAM)



- Day-ahead capabilities extended to WEIM participants who voluntarily opt in, providing additional benefits
- ISO market will manage energy schedules and optimize efficient transfers of energy between balancing authority areas (BAAs)
- Expands access to full complement of wholesale energy market services and builds upon WEIM to optimize commitment of generation a day in advance

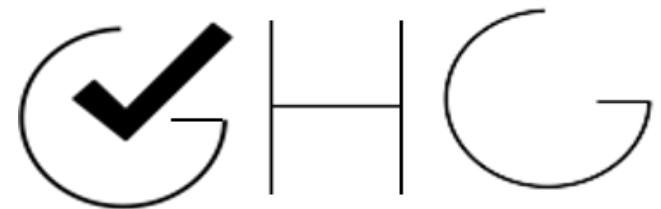
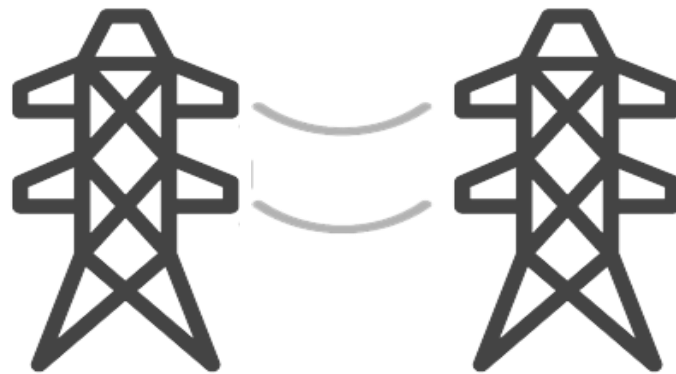
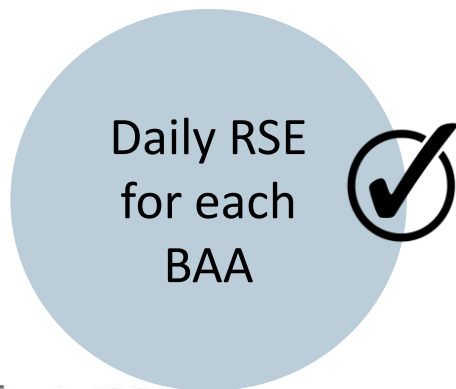
What are some of the ways EDAM provides benefit to participants?



- Enhances, supports, and complements bilateral trading activity that takes place today
- Increases reliability due to greater situational awareness
- Lowers greenhouse gas emissions
- Allows participants to share surplus renewable energy across a broad footprint
- Participating BAs retain resource planning, transmission planning, and reliability functions

Elements of the EDAM program

- Daily Resource Sufficiency Evaluation (RSE) across full 24-hour time horizon
 - RSE is universal adaptor that connects entities with varying resource adequacy programs to efficiently commit/dispatch resources
- Transmission capability on internal system and interties with other EDAM BAs made available to optimize transfers between participating areas
- Bidding and attribution to multiple state Greenhouse Gas regulation areas as well as accommodation for non-priced GHG programs



How is the EDAM participation model different than WEIM?

WEIM has two participation models

Participating Resource (PR)

- Submits economic bids that allow the market to dispatch the resource in real-time.

Non-Participating Resource (NPR)

- Operates in the BA at a base scheduled output but **does not** get economically dispatched in real-time.

EDAM has one model

- All EDAM resources are required to be **participating resources**, even if they will only submit self-schedule bids.
- Submit Economic bids and self-schedule bids submitted
- Follows the existing process to convert **NPR** to **PR**.

Western Energy Markets operated by the California ISO



REAL-TIME MARKET (CAISO BA & WEIM ENTITIES)

WEIM participation is for
Energy only



EXTENDED DAY-AHEAD MARKET (CAISO BA & EDAM ENTITIES)

This market will procure:

- Energy
- Imbalance Reserves
- Reliability Capacity
- Ancillary Services (CAISO BA only)

What should market participants keep in mind when preparing for EDAM?

What changes?

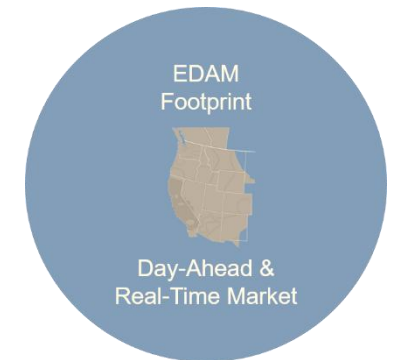
- All loads and resources in EDAM area submit offers (economic bids or self-schedule bids).
- Base schedules will no longer be submitted in EDAM areas.
- “Non-participating” resources will no longer exist.
- New market products: Imbalance Reserves, Reliability Capacity.
- Settlement of day-ahead transactions.

What stays the same?

- EDAM entities continue to retain their resource planning, transmission planning and reliability functions.

Decisions to make:

- EDAM entities and EDAM SCs work together to determine who will schedule:
 - Third-party resources
 - Third-party load



KNOWLEDGE CHECK

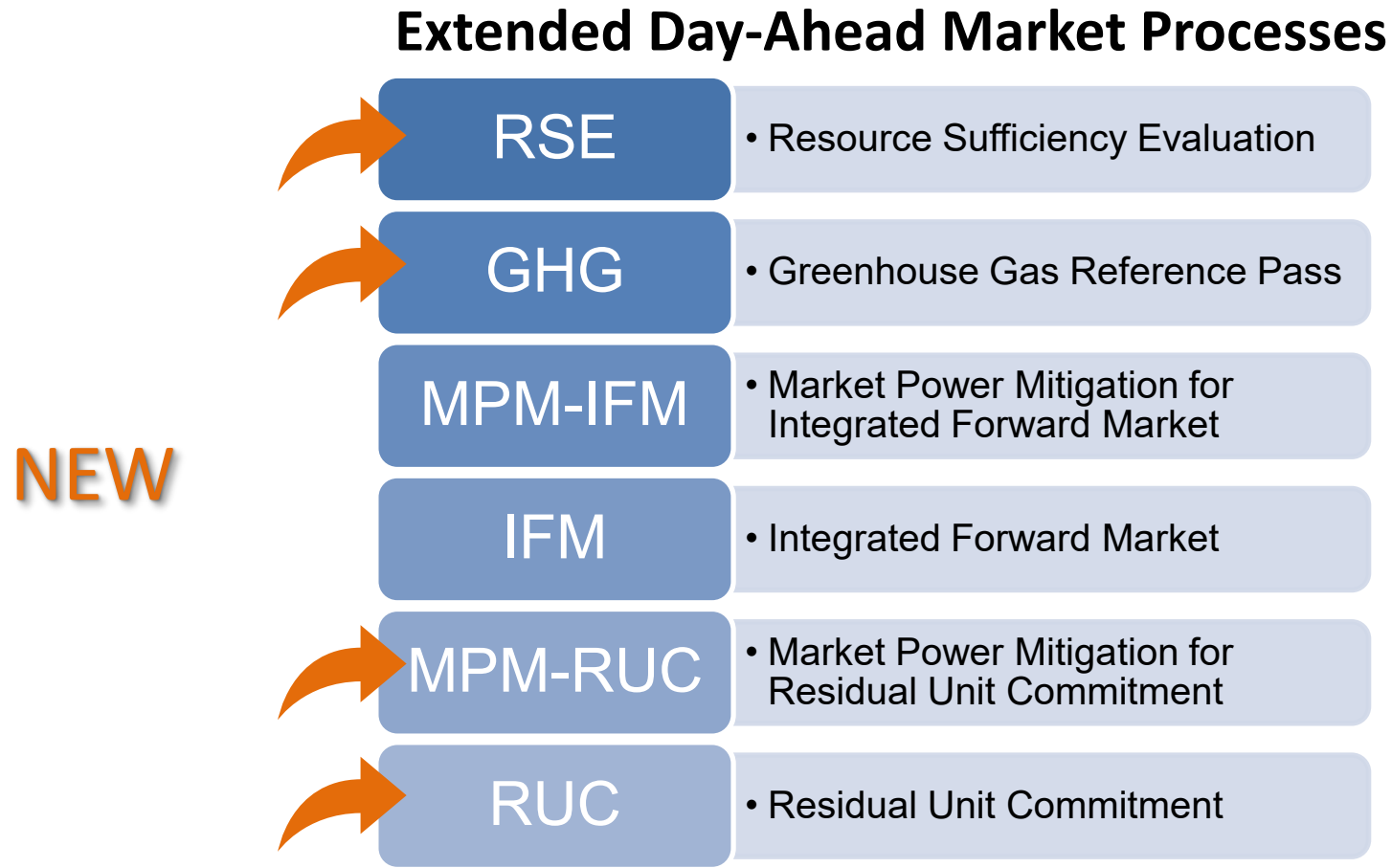


Which products are procured through EDAM?

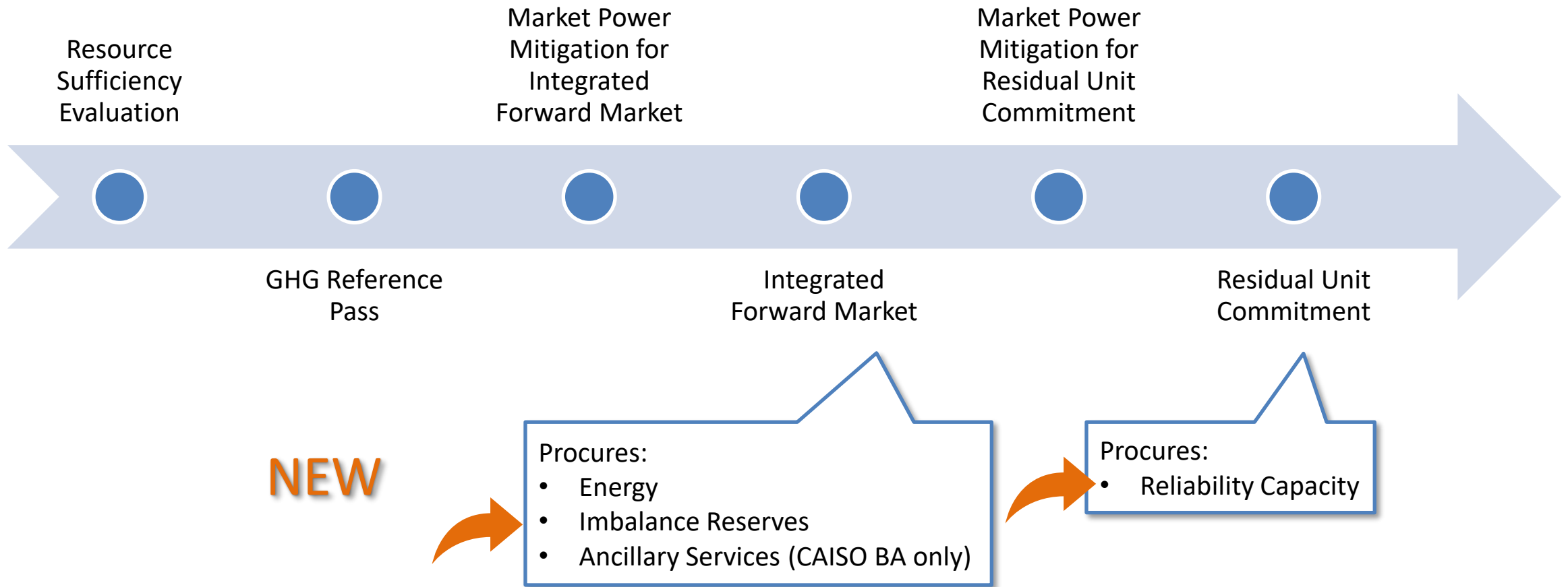


- ☒ A. **Day-Ahead Capacity**
- ☐ B. Month-Ahead Energy
- ☒ C. **Day-Ahead Energy**
- ☐ D. Year-Ahead Capacity

Extended Day-Ahead Market processes



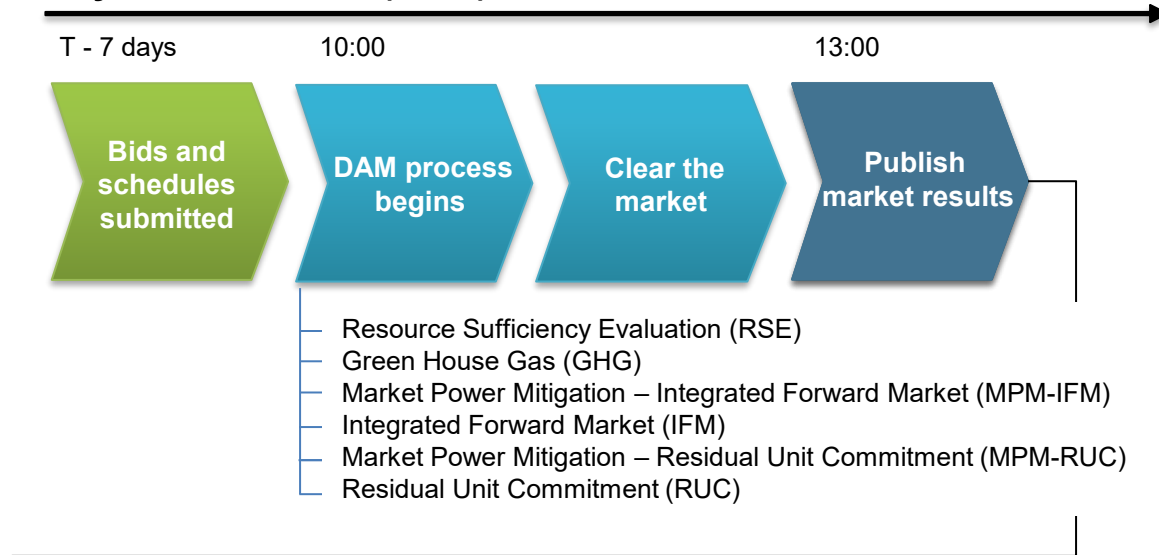
Which processes procure each new market product?



Let's review each process, starting with the Resource Sufficiency Evaluation!

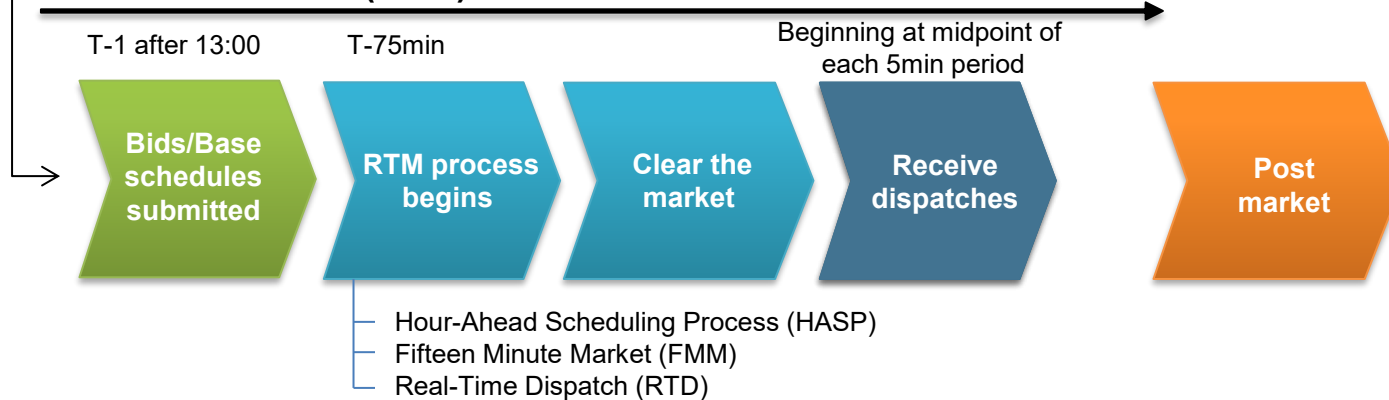
From Day Ahead to Real Time

Day-Ahead Market (DAM)



Triggers Real-Time Market

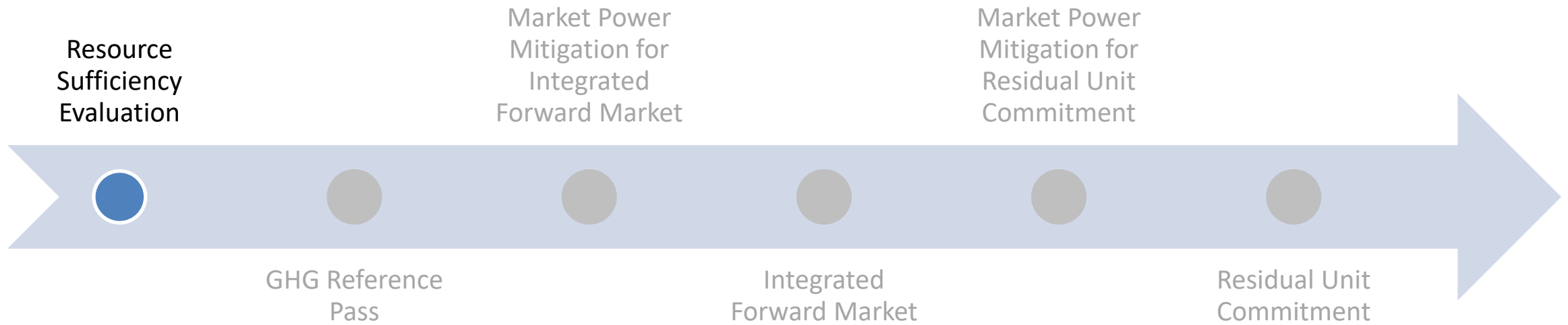
Real-Time Market (RTM)



RESOURCE SUFFICIENCY EVALUATION (RSE)



Market Process: Resource Sufficiency Evaluation



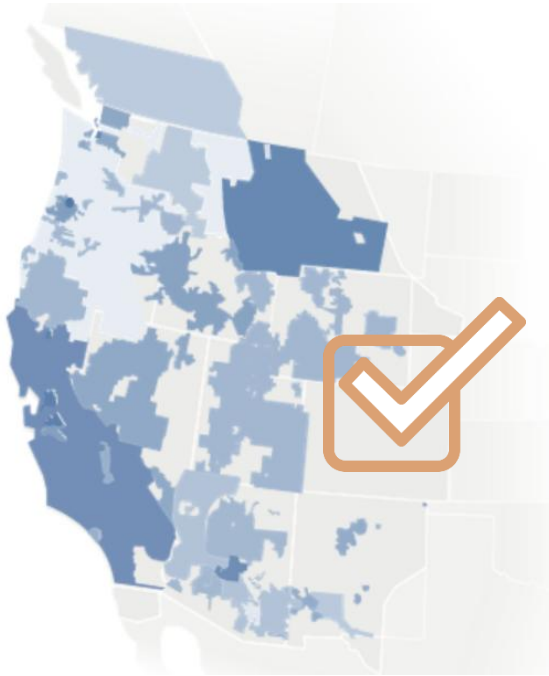
Let's review the GHG Reference Pass!

Resource Sufficiency Evaluation (RSE) for each BAA



Purpose:

1. *Prevent Over-Reliance on Market Transfers*
2. *Promote Fairness and Reliability*
3. *Support Market Efficiency*

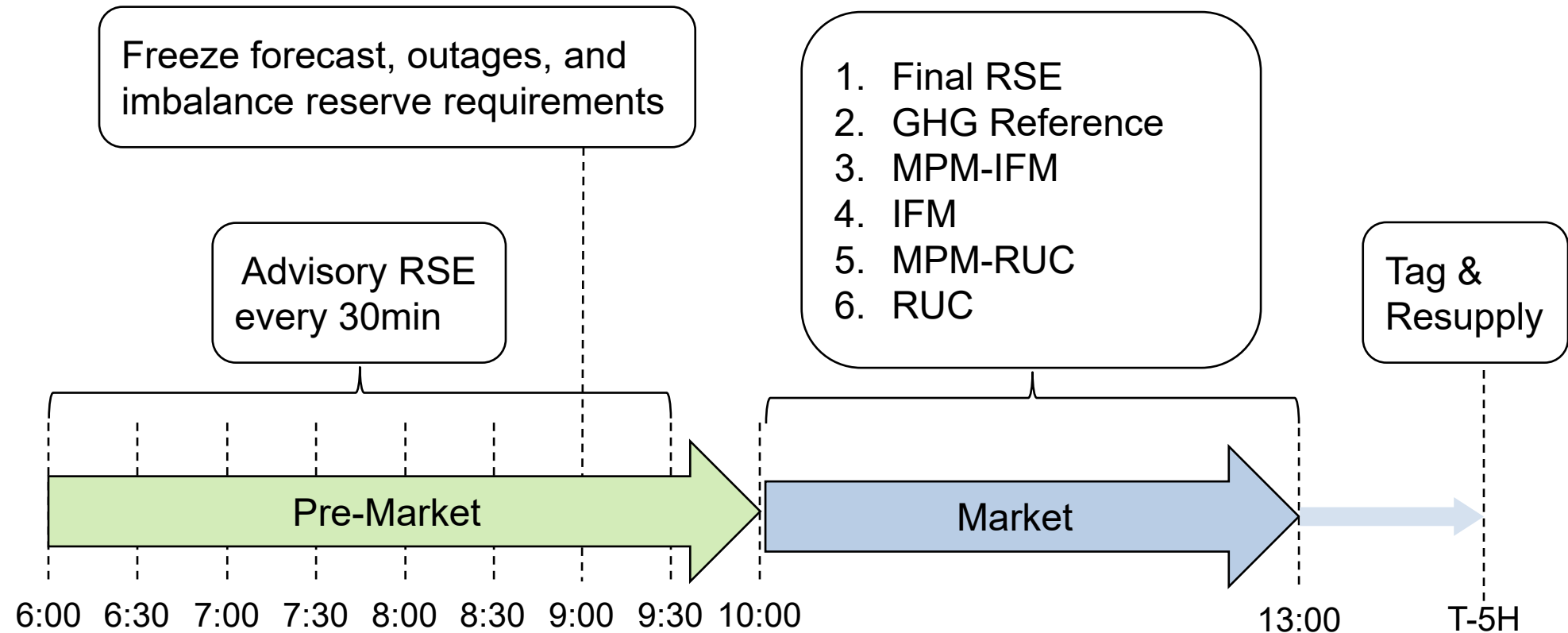
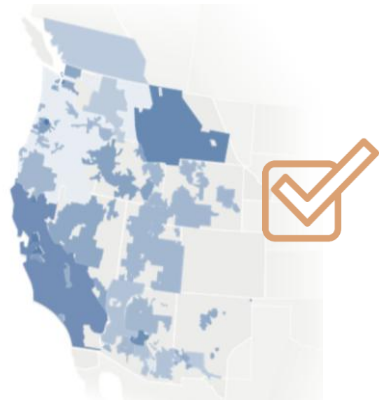


- Each BAA's offered supply is evaluated against its demand forecast, imbalance reserve requirements and ancillary service requirements across the 24-hour intervals of the day-ahead market.
- Designed to ensure that each entity has enough supply to meet the next day's obligations.
- If an EDAM entity fails the RSE, the entity may be exposed to a financial penalty which incentivizes to take proactive actions to meet the RSE requirements.

1:00 2:00 3:00 4:00 5:00 6:00 7:00 8:00 9:00 10:00 11:00 12:00 13:00 14:00 15:00 16:00 17:00 18:00 19:00 20:00 21:00 22:00 23:00 24:00

24-hour time horizon

Day Ahead RSE Timeline



EDAM RSE Component Tests



The EDAM RSE includes three tests:

1

Demand Test: assesses whether there are sufficient energy bids or self-schedules to meet an EDAM entity's forecasted load needs.

2

Imbalance Reserve Test: ensures the EDAM entity has sufficient bid-in capacity to meet uncertainty between day-ahead and real-time. ***The EDAM diversity benefit applies to this test.***

3

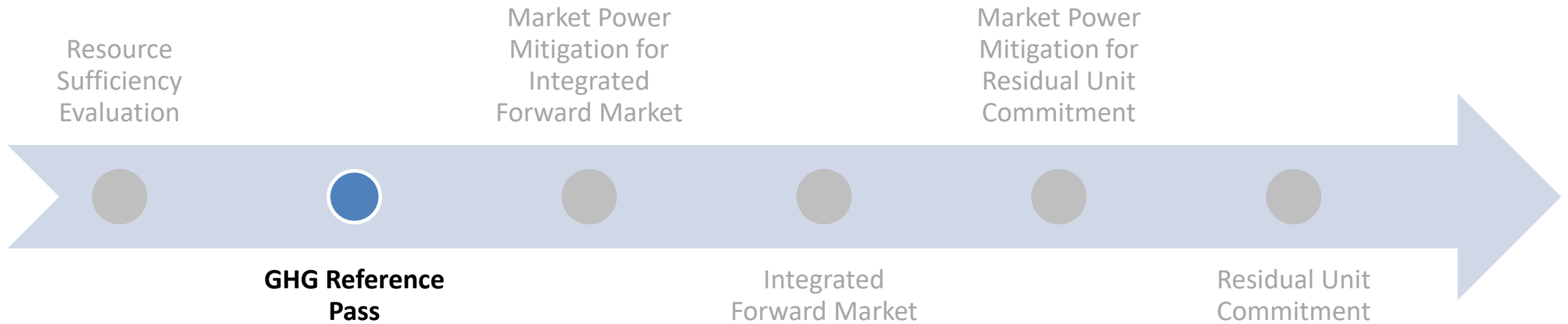
Ancillary Services Test: ensures that a BA has sufficient contingency reserve capacity available to cover AS (self-provisioned for all non-CAISO BAA's)
(Reminder: EDAM BAAs maintain responsibility for procuring their own AS)

Evaluations for 24-hour period

GREENHOUSE GAS (GHG)



Market Process: GHG Reference Pass



Let's review the GHG Reference Pass!

Greenhouse Gas (GHG) Reference Pass



- EDAM's expanded GHG regulation model incentivizes resources from multiple western states to supply energy to climate-focused states.
- Participants can indicate their willingness to serve demand in GHG regulation areas through voluntary bid adders to their energy bids.
- To reduce emissions leakage, the reference pass establishes a GHG attribution baseline prior to the binding market run.
- The baseline is determined by calculating resource dispatch levels in a market simulation with no energy exported to a GHG regulation area.
- During the binding market run resources only receive GHG attributions above their baseline dispatch level.

GHG Model

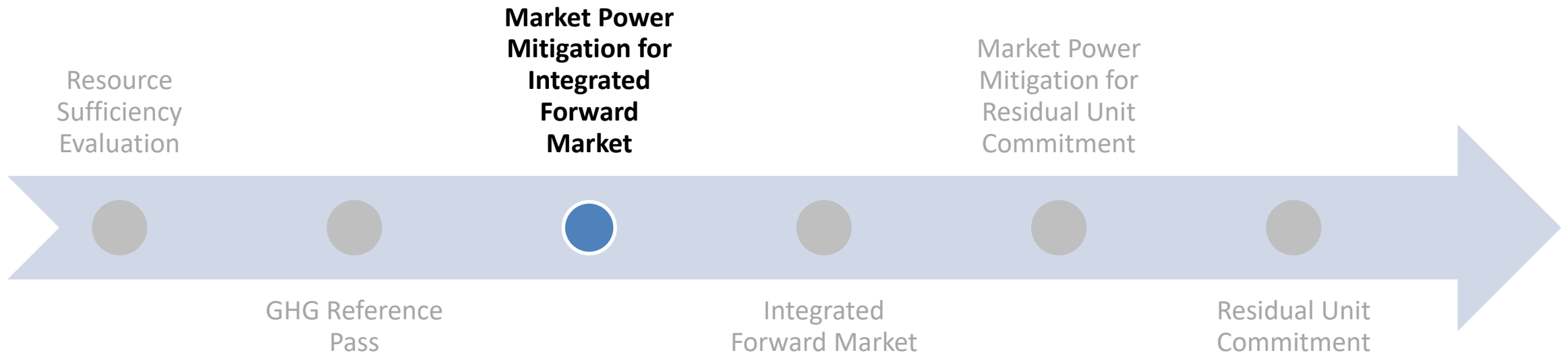


- EDAM allows utilities and other market participants to bid on energy for the next day, facilitating efficient resource allocation.
- Emissions from the identified resources are considered in market optimization processes
- GHG regulation area boundaries are determined by state mandates rather than BAs
- Model is scalable to allow for future non-overlapping GHG regulation areas

MARKET POWER MITIGATION (MPM) FOR INTEGRATED FORWARD MARKET (IFM)



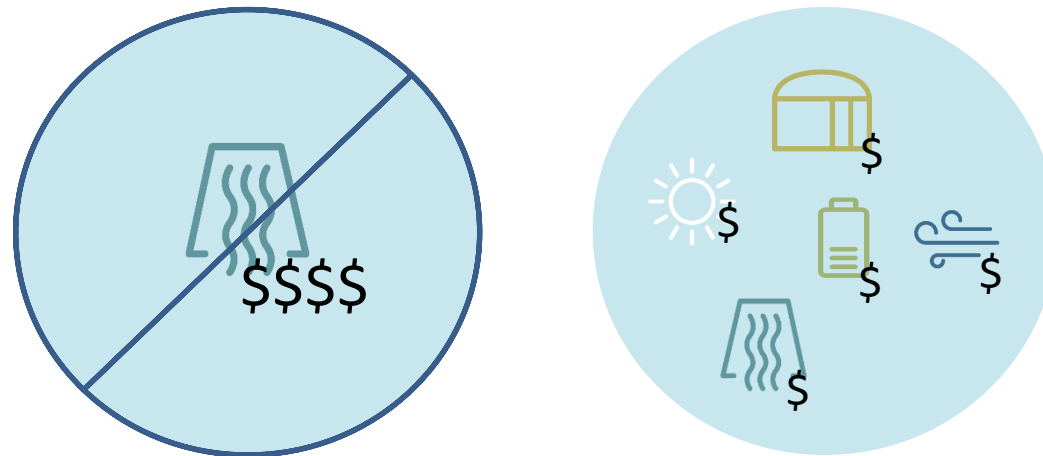
Market Process: Market Power Mitigation for Integrated Forward Market



Let's review Market Power Mitigation for the Integrated Forward Market!

Market Power Mitigation (MPM) for Integrated Forward Market (IFM)

- At times there can be localized congestion that can result in market power being exercised.
- MPM detects and mitigates (lowers) the bids in those localized cases to ensure prices remain competitive throughout the system.



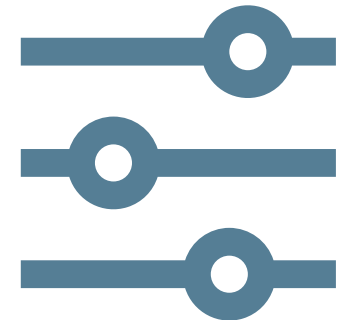
Market Power Mitigation (MPM) for Integrated Forward Market (IFM)

- If the potential for market power in a location is determined, the market analyzes the related bids and, if necessary, will replace the bids based on the following criteria:
 - **Energy bid** with the higher of the **default energy bid** or the **competitive LMP**
 - **Imbalance reserve** bid with the higher of the competitive Imbalance Reserve Up Marginal Price (IRUMP) or the **default availability bid**
- There are no schedules or dispatches as a result of this process.
- The output of the MPM process is referred to as the clean bid set that is used in the next process.



Default Energy Bids

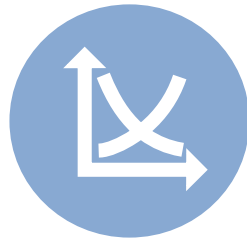
- The ISO calculates Default Energy Bids (DEBs) for resources to be used when Market Power Mitigation is triggered
 - There are 5 calculation options for DEBs:
 - Variable Cost DEB
 - LMP-Based DEB
 - Negotiated DEB
 - Hydro DEB
 - Storage DEB*
- Additional registration required*



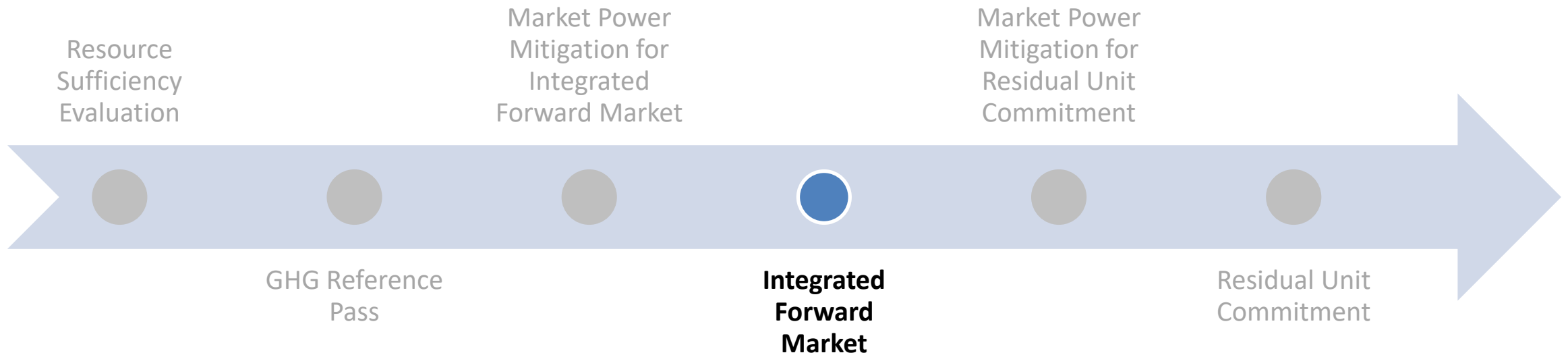
For more information, refer to the BPM for Market Instruments, Attachment D.

*Note: Storage DEB in WEIM for CAISO only, Storage DEB in EDAM for CAISO and EDAM entities.

INTEGRATED FORWARD MARKET (IFM)



Market Process: Integrated Forward Market



Let's review the Integrated Forward Market!

Integrated forward market (IFM)

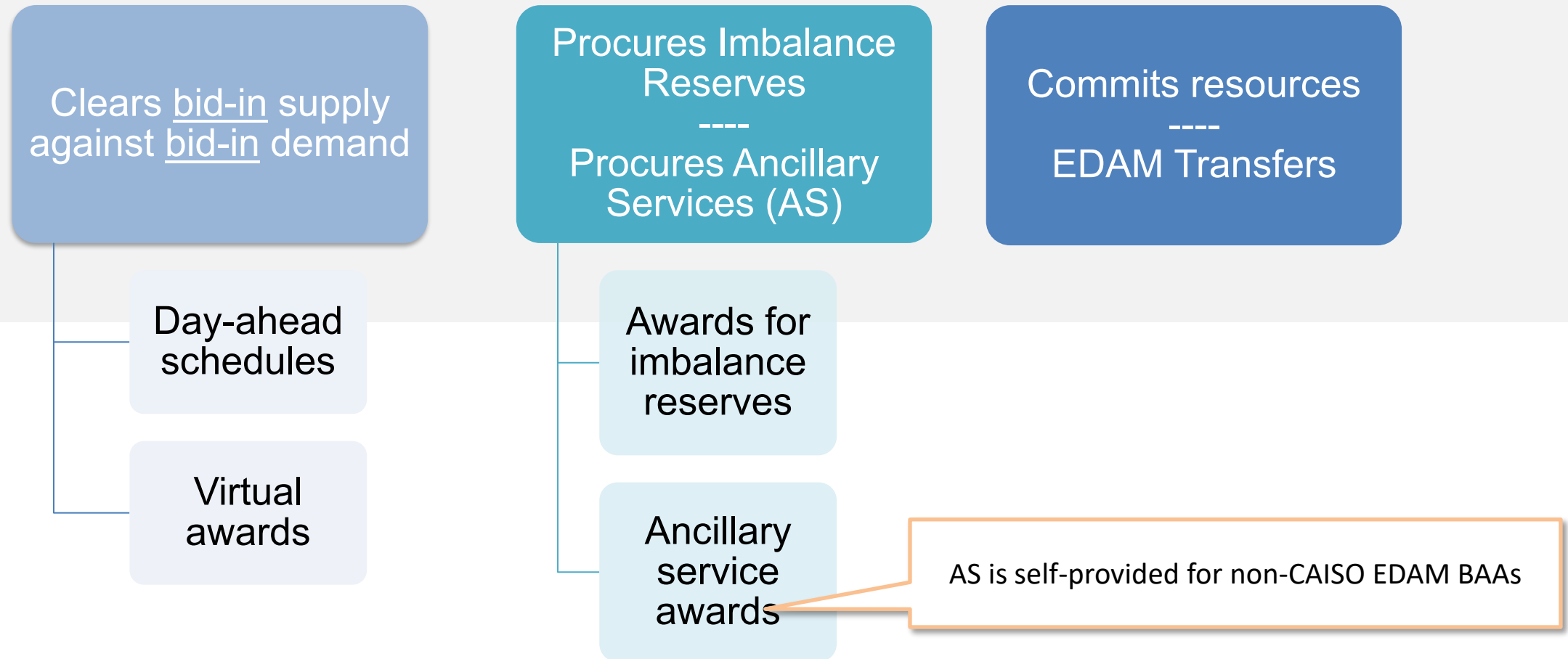
Clears bid-in supply
against bid-in
demand

- As a result, sufficient capacity may not be committed to meet forecast demand
- More on this during Step 6 (RUC)

Day-ahead
schedules

Virtual
awards

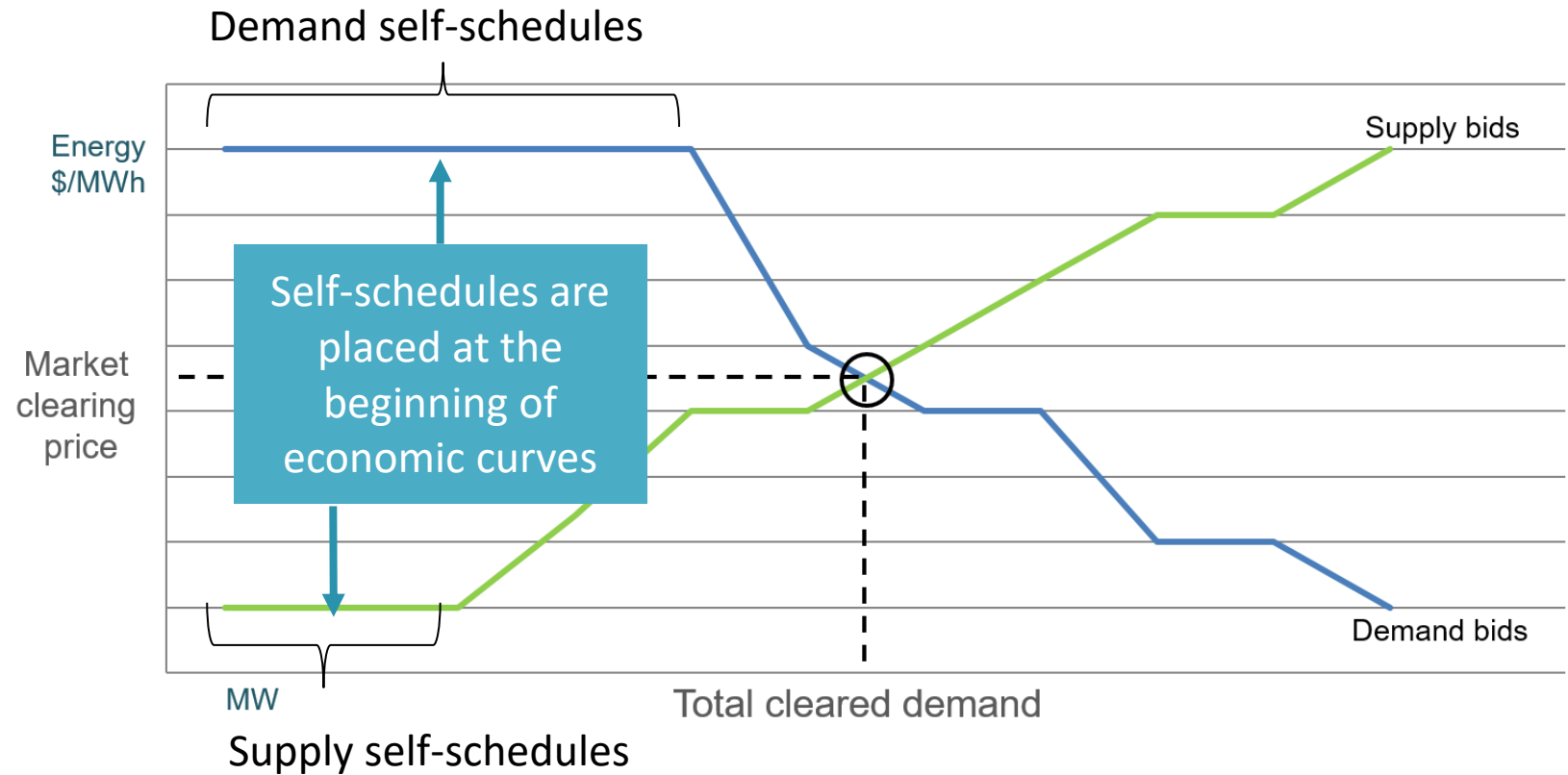
What is procured in the Integrated forward market (IFM)?



How does the IFM clear supply bids against demand bids?

Day-ahead supply bids clear against demand bids.

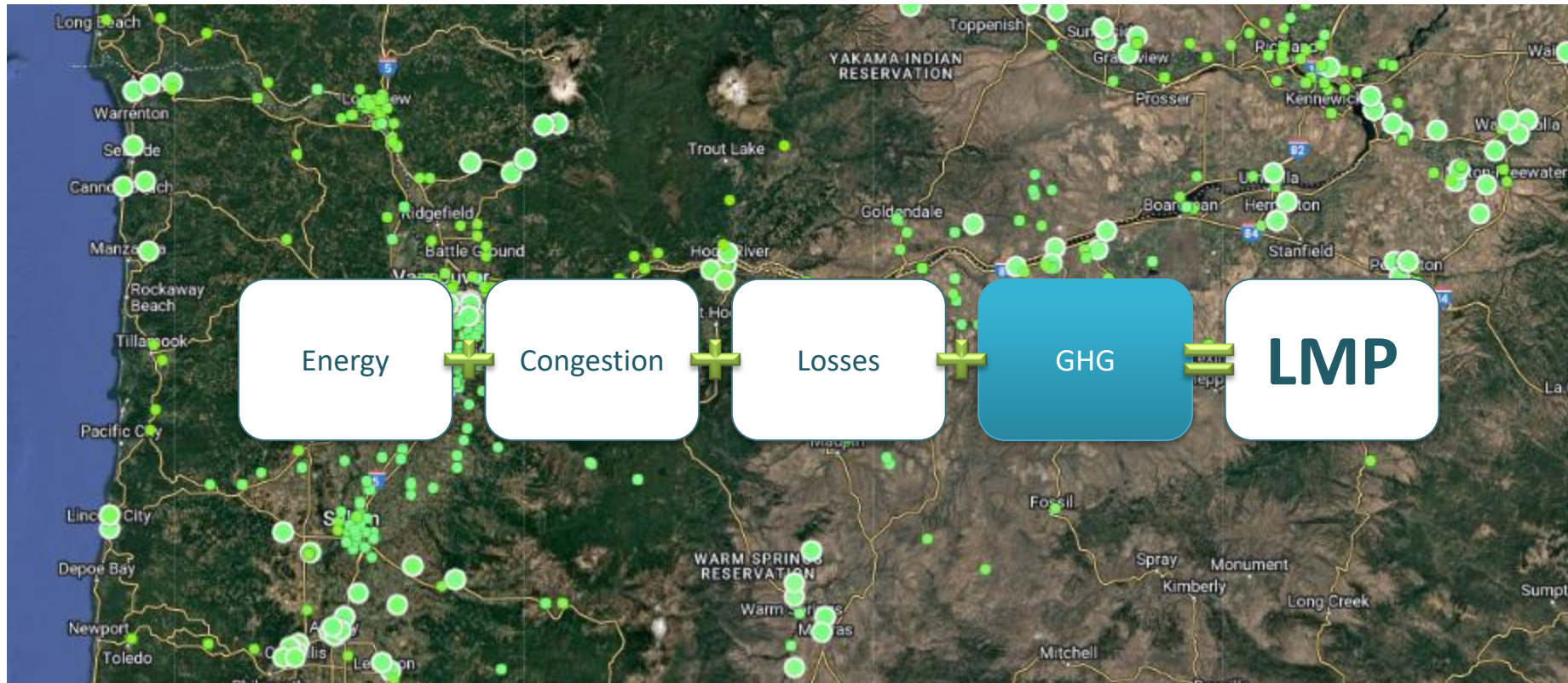
Real-time supply clears against load forecast.



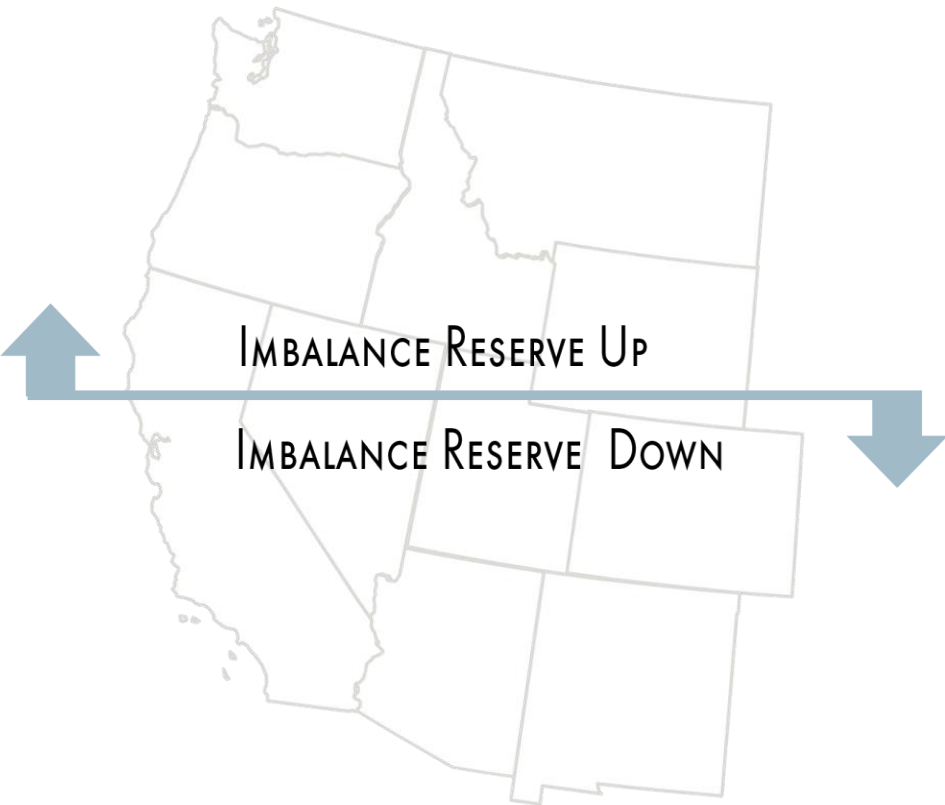
Note that accepted bids are paid the LMP which incorporates the market clearing price, not the bid price.

Locational Marginal Price

Locational Marginal Pricing enables the actual operating conditions on the transmission system to be factored into the price of electricity at different locations.



Imbalance Reserves: consistent method for evaluating & addressing uncertainty needs in each BA



Imbalance reserve products provide the market with a mechanism to address each BAA's expected range of uncertainty when comparing the day-ahead load forecast to real-time consumption and comparing solar and wind forecasts to their real-time outputs.

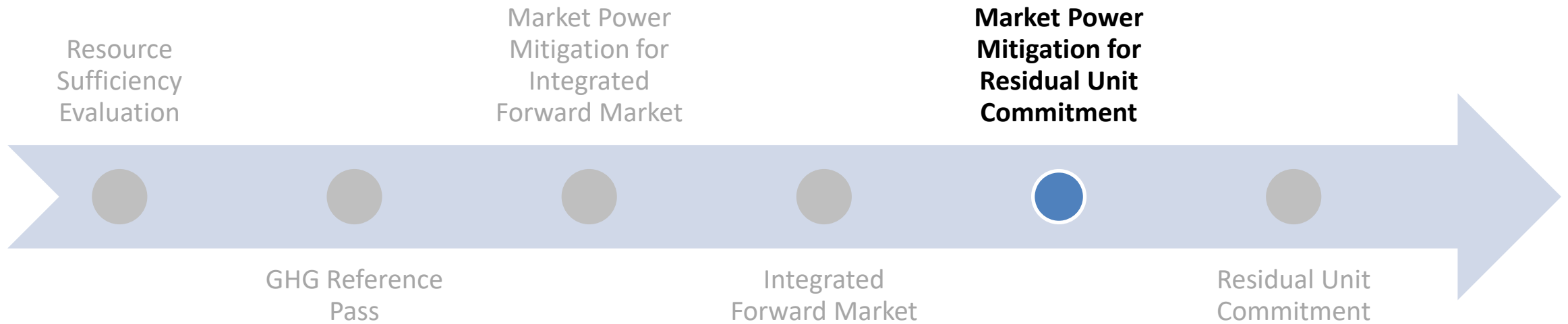
Procurement of reserves will be done on an hourly basis for each BA from the bids that are submitted by SCs across the EDAM footprint.

SCs submit bids for **imbalance reserve up** and **imbalance reserve down** and may receive hourly awards for **one or both** products.

MARKET POWER MITIGATION (MPM) FOR RESIDUAL UNIT COMMITMENT (RUC)



Market Process: Market Power Mitigation for Residual Unit Commitment



Let's review Market Power Mitigation for Residual Unit Commitment!

Market Power Mitigation (MPM) for Residual Unit Commitment (RUC)

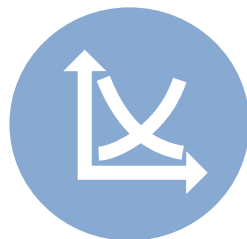


Prior to the Residual Unit Commitment process, there is a second Market Power Mitigation run that analyzes the bids submitted for reliability capacity and mitigates these bids, if necessary, to the **default availability bid**.

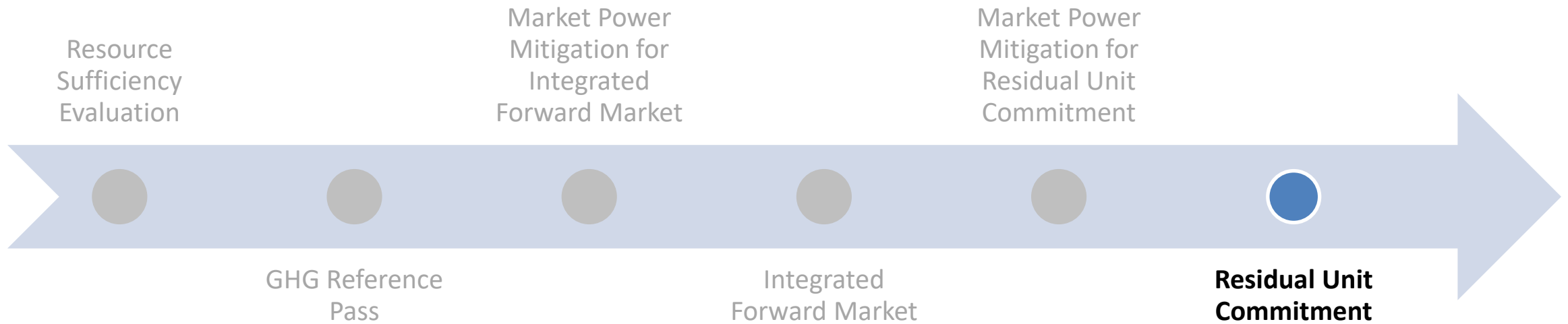


Default availability bid approximates the costs related to a resource's ability to provide reserve products.

RESIDUAL UNIT COMMITMENT (RUC)

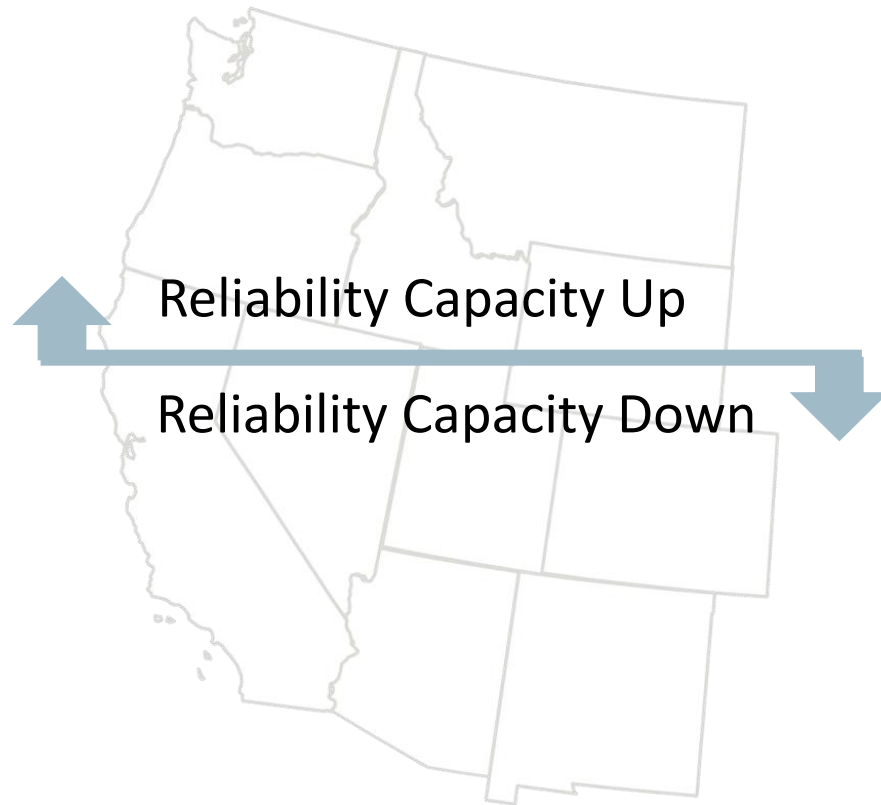


Market Process: Residual Unit Commitment



Let's review Residual Unit Commitment!

Residual Unit Commitment (RUC): procures reliability capacity products to ensure sufficient physical supply scheduled in day-ahead



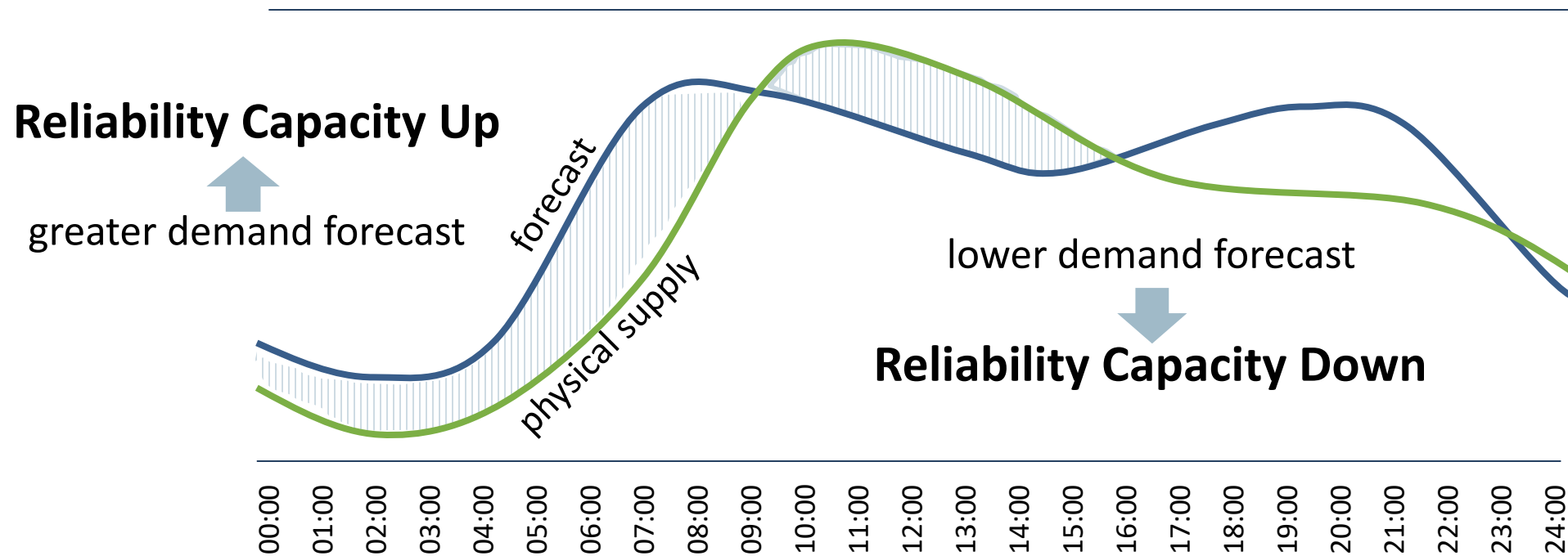
Today's RUC process procures additional capacity to meet forecasted demand.

With EDAM, Reliability Capacity (RC) provides BAs with upward **or** downward dispatch capability, ensuring sufficient physical supply scheduled in day-ahead.

Procurement of RC will be done on an hourly basis for each BA from the bids that are submitted by SCs across the EDAM footprint.

SCs submit bids for **Reliability Capacity Up (RCU)** and **Reliability Capacity Down (RCD)** and may receive hourly awards for **only one** of the products.

Reliability Capacity is procured in RUC, which compares the demand forecast to physical supply that clears the market



Comparison of Ancillary Services, Imbalance Reserves, and Reliability Capacity

Feature	Ancillary Services (AS)	Imbalance Reserves (IR)	Reliability Capacity (RC)
Purpose	Maintain grid reliability through frequency regulation and spinning/non-spinning reserves.	Address net load uncertainty and real-time ramping needs not covered by hourly day-ahead schedules.	Ensure sufficient physical supply to meet differences between cleared supply and net load forecast .
Market Timing	CAISO BAA: Procured in both Day-Ahead and Real-Time Markets. EDAM BAA: <u>Self-provided</u> in Day-Ahead Market.	Procured in the Day-Ahead Market (IFM), co-optimized with energy and ancillary services (CAISO BA).	Procured in the Day-Ahead Market via enhanced Residual Unit Commitment (RUC) process.
Dispatchability Requirement	Must be able to respond within seconds to minutes depending on service type.	Must be dispatchable within 15 minutes ; awards capped at 15-minute ramping capability.	Must be dispatchable within 60 minutes ; awards capped at 60-minute ramping capability.
Bid Structure	Price and quantity bids for each service type.	Separate bids for upward and downward IR.	Separate bids for upward and downward RC.
Eligibility	Typically includes fast-responding resources like batteries, gas turbines, and demand response.	Resources capable of 15-minute ramping; excludes self-scheduled resources.	Resources capable of 60-minute ramping; includes multi-stage generating units.
Obligations	Must offer into real-time market if awarded (economic bid or self-schedule bid).	<u>Must submit</u> economic energy bids in real-time for awarded capacity.	<u>Must submit</u> economic energy bids in real-time for awarded capacity.

KNOWLEDGE CHECK



Which EDAM market product ensures there is sufficient capacity to meet real-time load uncertainty and ramping needs ?



- ☐ A. Energy
- ☐ B. Reliability Capacity
- ☒ C. Imbalance Reserves
- ☐ D. AS - Spinning Reserves

LOCATIONAL MARGINAL PRICE (IFM)



What is Locational Marginal Pricing?



The **Locational Marginal Price (LMP)** for wholesale electricity is based on local supply and demand conditions. Locational Marginal Pricing reflects the price of energy at the time it is supplied to the grid or when it is used by load serving entities.

Depending on power flows, transmission lines may become congested. In these situations, it costs more to deliver energy to a congested location. More expensive generation may be used to mitigate congestion and deliver electricity to the destination.

How does the tariff define Locational Marginal Price?

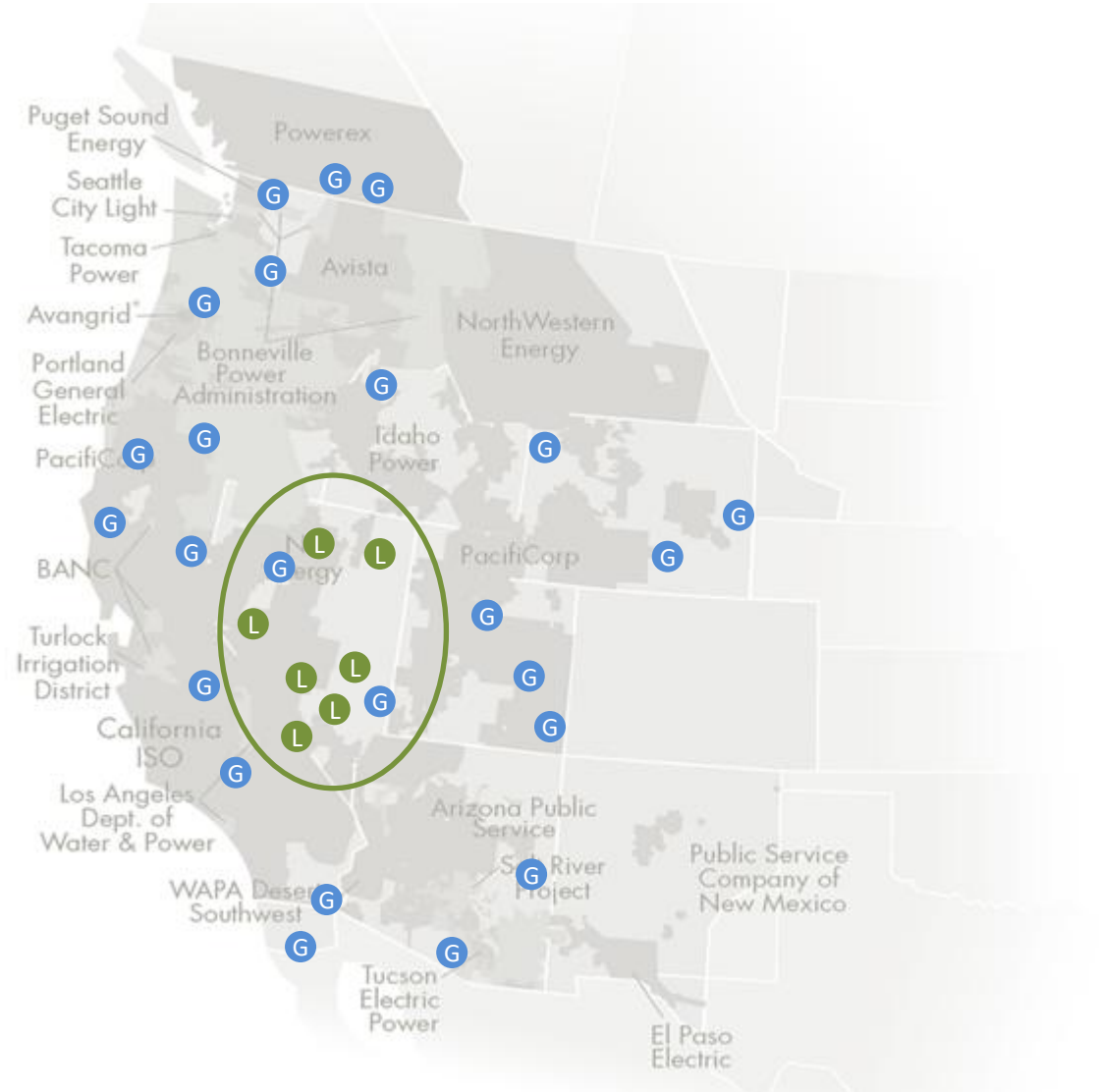
Locational Marginal Price (LMP)

The marginal cost (\$/MWh) of serving the next increment of demand at that price node consistent with existing transmission constraints and the performance characteristics of resources.

Nodal pricing is the price paid for electricity generated or consumed at a specific location

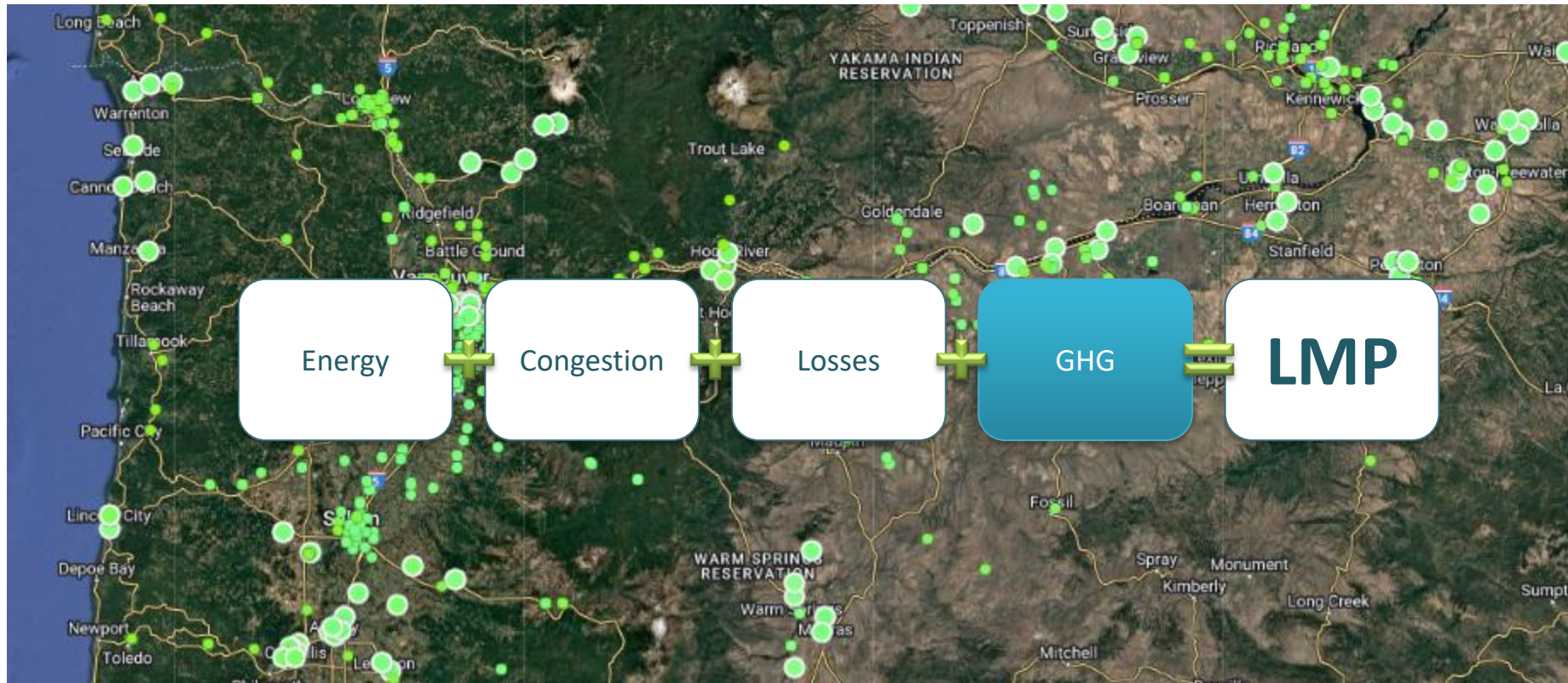
Resources are paid **the nodal** price at their physical location.

Load pays the **weighed average** price of all load nodes in its specific load aggregation.



Components of the Locational Marginal Price

Locational Marginal Pricing enables the actual operating conditions on the transmission system to be factored into the price of electricity at different locations.



Locational Marginal Price: Energy

Locational Marginal Price

Energy

Congestion

Losses

GHG

EDAM schedules energy for each hour of the next day by matching bid-in supply with bid-in demand.

Energy prices can vary by hour and across different Balancing Authority Areas. **This is a new aspect of the LMP with the introduction of EDAM.**

Transmission capacity is optimized to enable energy transfers, subject to scheduling constraints.

When transfer limits are reached, price differences occur between Balancing Authority Areas, resulting in distinct energy prices for each area.

How does Locational Marginal Price formation impact the Real-Time Market and WEIM?



In today's market, the energy component of the LMP is a System Marginal Energy Cost, which means the energy component is the same across the market footprint.



With the implementation of EDAM and the change to a Marginal Energy Cost that reflects price separation, the potential for a different Marginal Energy Cost per BAA and the concept of transfer revenue will be introduced to WEIM as well.

– This is because the Real-Time Market is an imbalance settlement from the Day-Ahead Market; as such, the LMP formulation should be the same.



Note that the Marginal Energy Cost can be the same across multiple WEIM BAAs.

– If this is the case, it means the market did not have a binding transfer constraint between those BAAs.

Locational Marginal Price: Congestion

Locational Marginal Price

Energy

Congestion

Losses

GHG

Congestion occurs when electricity cannot flow freely to an area due to high transmission use, limited capacity, or outages.

To mitigate congestion, more expensive generation may be used, increasing load-serving costs.

These costs are reflected in the congestion component of the LMP, affecting charges to demand and payments to supply.

In addition to scheduling constraints, market prices are also affected by transmission constraints.

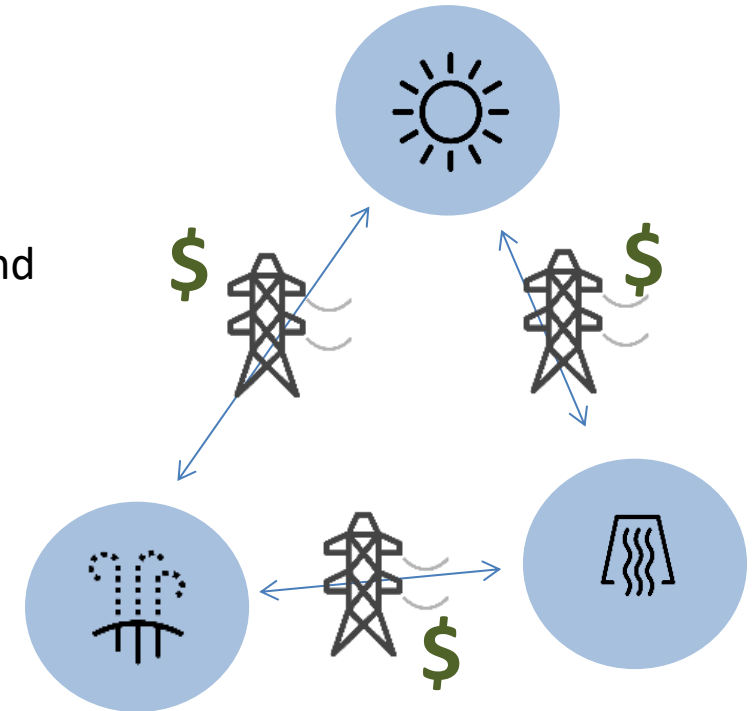
Transmission Constraints: Physical and operational limits that restrict electricity flow across regions, impacting grid reliability and efficiency.

Line Capacity: Determined by thermal limits, voltage stability, and engineering standards—exceeding these can damage equipment or destabilize the grid.

Congestion Management: Pricing mechanisms are used to reduce congestion and prevent overloading.

Key Questions:

- *What is the line rating?*
 - (Defines the maximum safe capacity of a transmission line)
- *What is the cost of the next MW?*
 - (Reflects the marginal cost of delivering one more megawatt across a constrained line)



Locational Marginal Price: Losses

Locational Marginal Price

Energy

Congestion

Losses

GHG

Energy losses occur as electricity is transmitted across transmission lines due to wire resistance.

Losses are similar to a light dimming as you move farther away from the source.

The market uses the Full Network Model to calculate actual losses but bases the LMP loss component at a node on marginal losses from serving an additional increment of load from an injection at that node.

Locational Marginal Price: Greenhouse Gas (GHG)

Locational Marginal Price

Energy

Congestion

Losses

GHG

Participants can use voluntary bid adders to indicate their willingness to serve demand in GHG regulation areas.

EDAM's GHG regulation model minimizes market-wide costs using price signals that account for different state regulations that price GHG emissions.

The GHG component is separate to ensure that supply and demand in non-GHG areas avoid GHG costs, while resources outside GHG areas can earn additional revenue to offset GHG regulation costs.

Energy delivered to GHG areas will have an LMP that includes GHG costs for imports.

KNOWLEDGE CHECK



Which item below is NOT a component of Energy LMPs?



- ☐ A. Marginal Loss Cost
- ☒ B. **Marginal Capacity Cost**
- ☐ C. Marginal Energy Cost
- ☐ D. Marginal Congestion Cost

KNOWLEDGE CHECK



What causes the Marginal Energy Cost component of LMPs to vary across BAAs?



- ☐ A. Line Losses
- ☐ B. Start-up times
- ☒ C. Intertie Transfer limits
- ☐ D. GHG bid adders

MARKET PRICING



IMBALANCE RESERVES & RELIABILITY CAPACITY PRICING



High Level Comparison

Imbalance Reserves (IR)

- Clears in the IFM
- Procured with energy and AS
- Reserve flexible capacity for uncertainty that may materialize in real time
- Energy and IR compete for the same resource capability

Reliability Capacity (RC)

- Clears later in RUC (after the IFM)
- Addresses differences between the demand forecast and physical supply scheduled in the IFM
- IFM energy, AS, and IR awards are already established



What Drives the Imbalance Reserve Price?

Cost of providing IR

- What suppliers offer (bid) to provide the product

Opportunity cost

- What the resource gives up for the market to reserve its capacity for IR instead of another service (energy or AS)

Location/deliverability

- Transmission constraints can make IR more valuable in some locations than others.

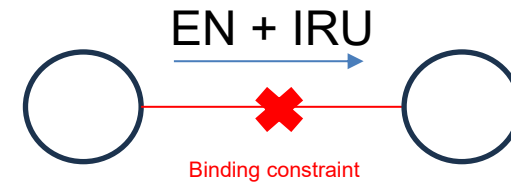
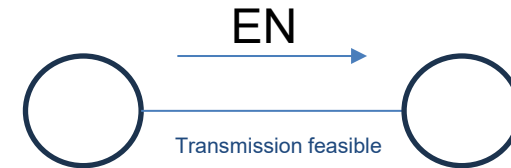
Why is Imbalance Reserve Priced by Location?

The market tests whether the reserve could be delivered if it were needed.

The IFM models:

1. A base scenario (energy only)
2. An upward deployment scenario (energy + IRU)
3. A downward deployment scenario (energy - IRD)

Binding constraints mean the market may have to award more expensive units.



The IR Requirement is Not Always a “Must Buy” Quantity

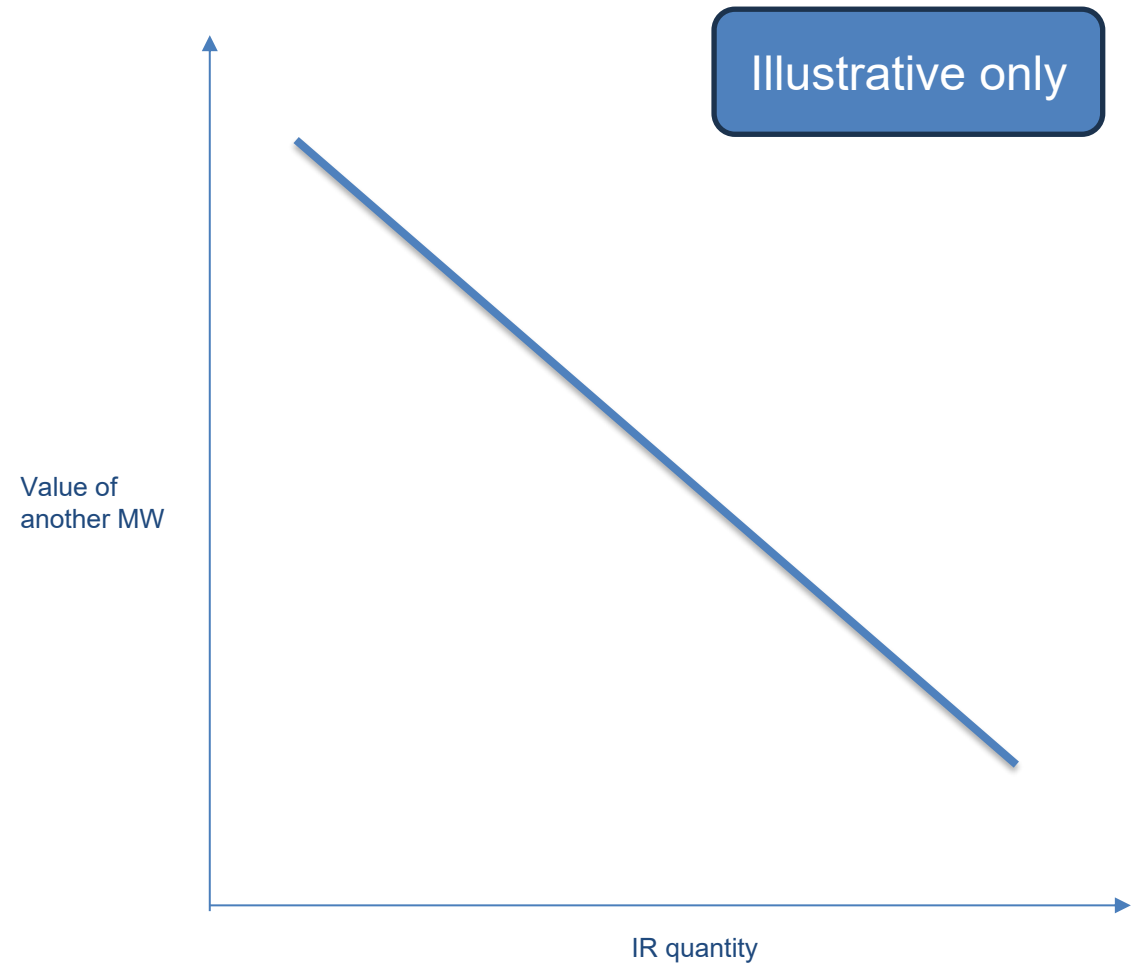
Each BAA has an hourly IRU and IRD requirement.

The IFM evaluates that requirement using an IR demand curve:

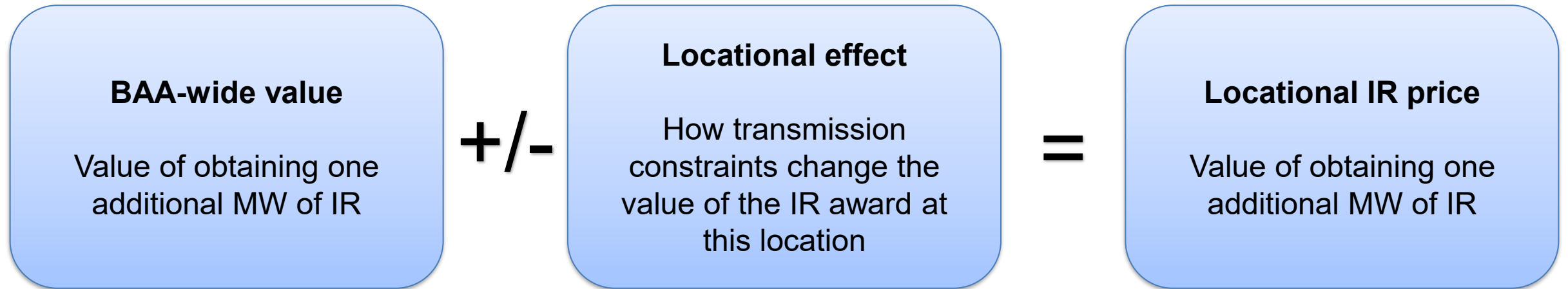
The demand curve asks:

“How much is another MW of IR worth?”

As buying IR becomes more expensive, the market may not buy the full requirement.



Putting the IR Price Together



After the IFM clears, RUC compares:

**Demand
Forecast**

>

**Physical
supply
scheduled in
IFM**

=

**Reliability
Capacity Up
(RCU)**

**Demand
Forecast**

<

**Physical
supply
scheduled in
IFM**

=

**Reliability
Capacity
Down (RCD)**

What Drives the Reliability Capacity Price?



BAA reliability capacity value

The marginal value of another MW of RCU or RCD for the BAA



Transmission losses

Location affects how much capability effectively reaches the load



Congestion

Transmission constraints can make RCU/RCD more or less valuable at different locations

Why Can Reliability Capacity Prices Differ by Location?

Resource A

1 MW of RCU

- ✓ Located where additional capability can reach the reliability need
- ✓ Little transmission impact

Result: capacity is broadly useful to the system

Resource B

1 MW of RCU

- ▲ Located behind a binding transmission constraint

Result: Capacity may be less useful to the rest of the system

What Can Make These Prices High?

Imbalance Reserves

Prices may rise when:

- IR supply is expensive
- Preserving IR creates meaningful opportunity costs
- Transmission limits make deliverable IR scarce in a location

Reliability Capacity

Prices may rise when:

- The gap between forecast and IFM physical supply is large
- Available RC supply is expensive or limited
- Transmission constrains limit where useful capability can come from

Takeaways

1. **IR and RC are not interchangeable.** They solve different reliability needs in different market passes.
2. **Both products are locational.** Transmission constraints will change the prices.
3. **IR is co-optimized with energy and AS.** Opportunity cost is an important part of its economics.
4. **The IR demand curve allows an economic tradeoff.** The IFM may procure less than the full IR requirement.
5. **RCU/RCD is determined after IFM.** It prices the remaining upward or downward reserve need.

KNOWLEDGE CHECK



Which EDAM products produce nodal prices?



- ☐ A. Energy
- ☐ B. Imbalance Reserves
- ☐ C. Reliability Capacity
- ☒ D. All the above

SCARCITY PRICING



Scarcity Is Not the Same as Congestion

Scarcity

There is limited supply or reserve capability relative to system need.

Congestion

Transmission limits prevent the lowest-cost supply from reaching a location.

The system can experience:

Scarcity without
congestion

•

Congestion without
scarcity

•

Both at the same
time

Scarcity is about available capability. Congestion is about the ability to move power to where it's needed.

Why Do Prices Rise During Scarcity?

Normal conditions

- Another MW can usually be supplied without much increase in price.



Tightening conditions

- Each remaining MW of available capacity becomes more and more costly.

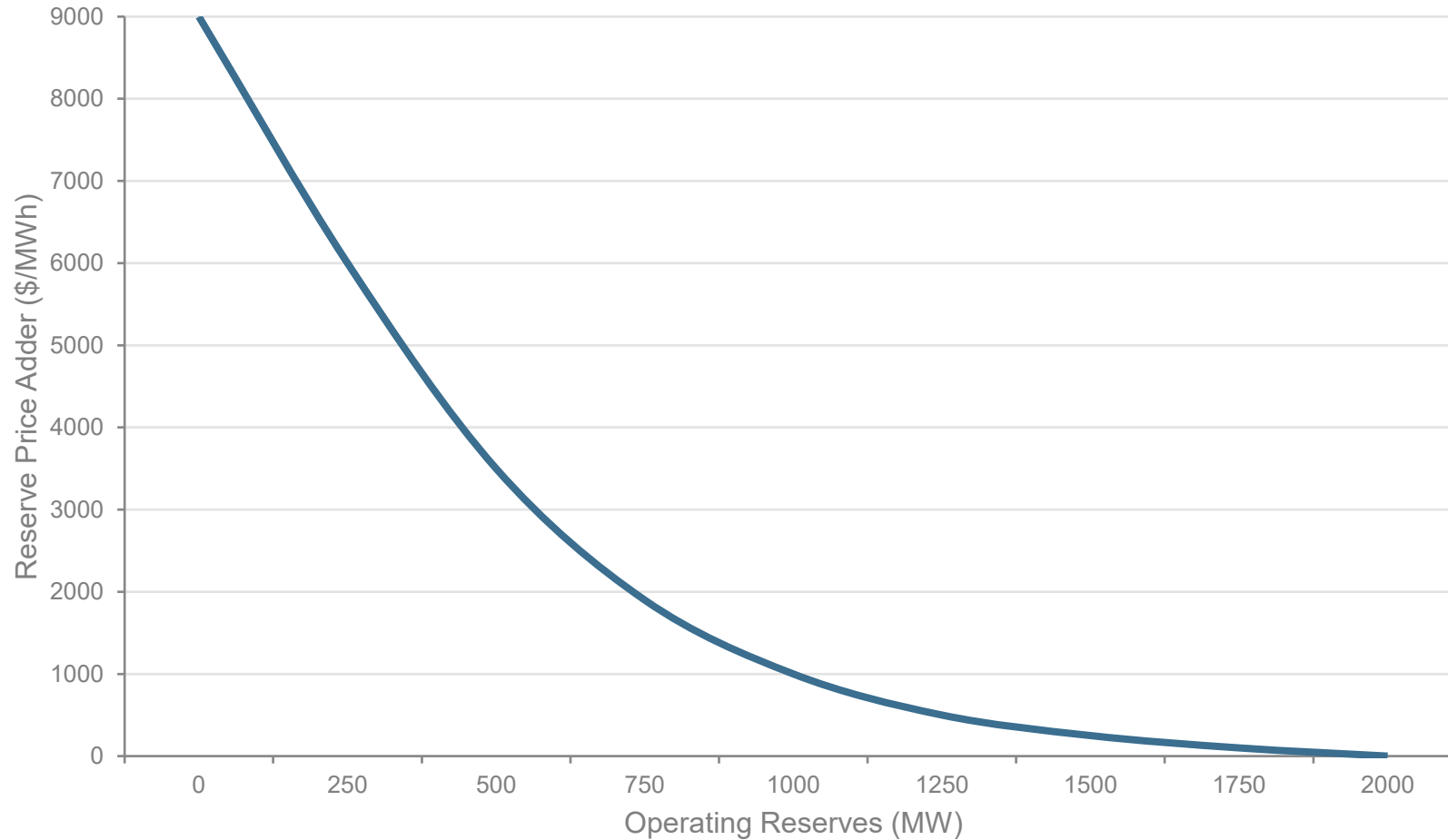


Very tight conditions

- Using capacity for energy may mean giving up reserves needed to protect reliability.

One-Way Markets Represent the Value of Reserves

Generic ISO/RTO
concept – not current
CAISO design



Reading the curve

All else equal, fewer reserves means lower reliability. As available reserves fall, the value of another MW rises. Markets can represent this with demand curves or escalating penalty prices. The exact design differs by market.

How Reserve Scarcity Can Affect the Energy Price

A resource may be capable of providing either:

- **Energy**
- or
- **Reserves**

If the market uses that capability for energy, it may have to give up reserves.

When reserves are scarce:

- **Giving up reserve capability has an opportunity cost.**
That opportunity cost can be reflected in the marginal energy price.

CAISO/EDAM Has Several Pricing Mechanisms Related to Scarcity

Mechanism	Where	What it does
Scarcity Reserve Demand Curve (SRDC)	CAISO BAA	Raises AS prices during reserve shortages
Flexible Ramping Product (FRP) demand curve	Real-time market	Prices the value of real-time flexible ramp capability
Imbalance Reserve demand curve	EDAM day-ahead market	Price the value of procuring additional IR
Power balance penalties	All markets	Can produce high prices when modeled supply cannot satisfy demand

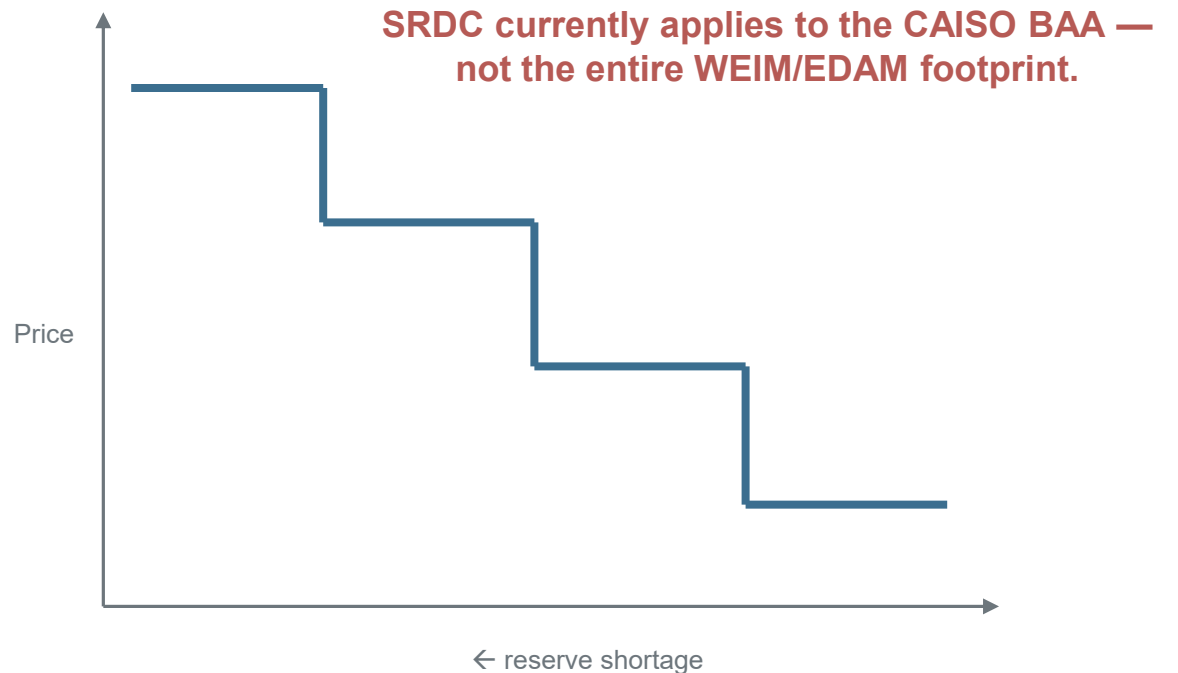
Scarcity Reserve Demand Curve

What the SRDC does

Applies when ancillary service supply becomes short in the CAISO BAA.

As the reserve shortage deepens:

- Reserve prices increase in predetermined steps
- The increasing reserve value can also affect the energy price



FRP and IR Demand Curves Also Signal Tight System Conditions

Flexible Ramping Product

Real time / WEIM

- Values flexible capability needed for near-term uncertainty
- The market can procure less when incremental capability becomes more expensive than the curve's value

Imbalance Reserves

Day ahead / EDAM

- Values flexible capability for DA-to-RT uncertainty
- The IFM can likewise economically procure less than the full IR target

When the Market Cannot Balance Supply and Demand

The market normally tries to satisfy:

SUPPLY = DEMAND

If no feasible solution exists...

- The optimization may relax the power balance requirement at a high penalty price*.
- That penalty price can become part of the resulting market price.
- This is a severe pricing mechanism of last resort – not the normal way scarcity prices form.

*Penalty prices are fixed values defined in the Tariff.

Where Can Today's Scarcity Price Signal Break Down?

SRDC footprint

- Applies only where the market procures ancillary services – currently the CAISO BAA

Real-time AS

- Ancillary services are not fully re-optimized in real time

5-minute RTD

- RTD does not independently procure ancillary services

Operator actions

- Emergency actions can change the physical system without creating a matching market price signal

Why CAISO Scarcity Pricing Looks Different From Eastern Markets

1. Use of contingency reserves

- Many Eastern markets can economically trade off contingency reserves against energy.
- CAISO generally treats contingency reserve awards (spin/non-spin) as fixed until specified contingencies occur.

2. Depth of the reserve stack

- Some Eastern markets procure additional reserve products, such as longer-duration replacement reserves.
- CAISO has a different product structure.

Emergency Actions Can Create a Pricing Problem

Arming load / releasing contingency reserves

- Frees up capacity for additional energy
- But consuming that capacity for energy reduces the reserve margin

Do the prices reflect the value of the reserve that was consumed?

Firm load shedding

- Physically reduces connected demand
- The market may “see” the lower demand and produce a price that understates the severity of the event

Does the price still reflect the unserved demand?

A Broader Scarcity Pricing Redesign Is a Separate Effort

- ❶ FRP/IR performance
 - Evaluate FRP/IR performance after EDAM
 - Examine price impacts and demand curve performance
 - Study their interactions
- ❷ Ancillary service procurement
 - Consider broader real-time redesign
 - Potentially expand AS procurement beyond the CAISO BAA
- ❸ Mechanisms that allow prices to rise earlier as supply tightens
 - Address the current CAISO/WEIM/EDAM asymmetry
 - Allows market participants to respond to scarcity before they become shortages

Takeaways

- 1. Scarcity and congestion are different concepts.**
- 2. Scarcity prices reflect the increasing value of remaining capacity as conditions tighten.**
- 3. Reserve scarcity can raise energy prices through opportunity cost.**
- 4. CAISO has several scarcity-related mechanisms rather than one comprehensive and symmetric design.**
- 5. The Price Formation Enhancements initiative identifies gaps and improvements.**

KNOWLEDGE CHECK



Which EDAM construct can generate scarcity price signals and applies to all EDAM BAAs?



- ☒ A. Imbalance Reserves
- ☐ B. Market Power Mitigation
- ☐ C. Scarcity Reserve Demand Curve
- ☐ D. Flexible Ramping Product

TRANSMISSION UTILIZATION IN EDAM

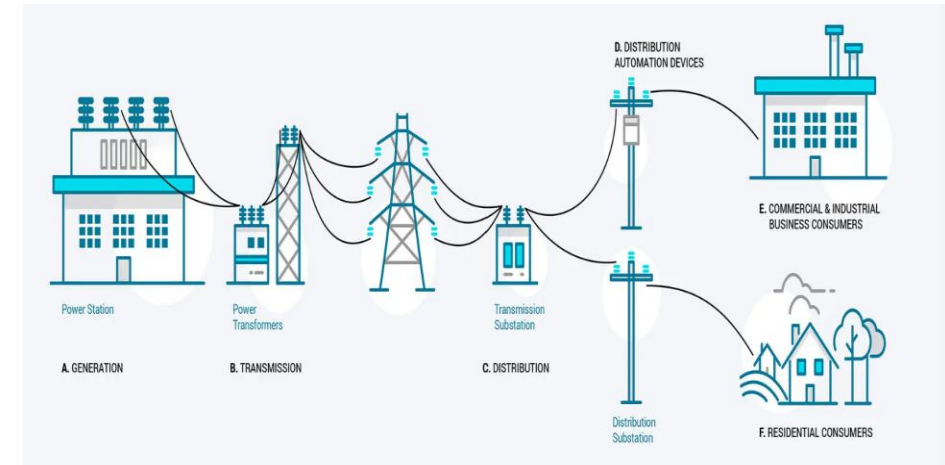


Transmission Requirements for Participating Resources

- The EDAM design requires resources in an OATT-based EDAM BAA to secure transmission from the EDAM BAA in order to participate in the market.
- This design feature prevents free-riding and the shift of transmission costs to load serving EDAM participants or transmission providers within the EDAM BAA.
- The transmission requirement for a generator can be satisfied through one of the following mechanisms:
 - The resource is a designated network resource under the terms of the EDAM entity OATT
 - The resource has reserved firm point to point transmission service of any duration, long-term or short-term, under the terms of the EDAM entity OATT, or otherwise holds a legacy (pre-OATT) transmission contract; or
 - If neither of the requirements above are met, the EDAM entity transmission service provider will assess a transmission charge on the resource based on the transmission rate for the lowest duration of firm transmission service offered under its OATT.

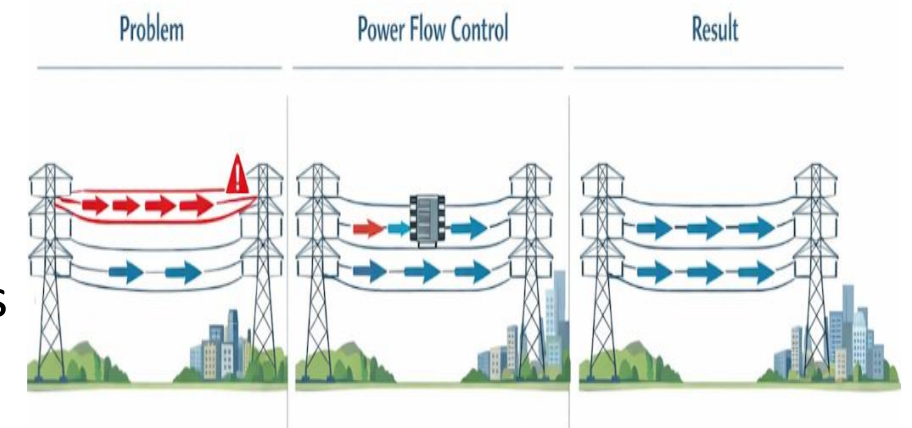
Transmission Provider continued administration of its transmission Tariff

- Transmission providers in EDAM retain autonomy over key functions.
- **Tariff administration** – continued administration and oversight over their open access transmission tariff (OATT) governing use and reservation of transmission service across their transmission system.
- **Transmission planning** – continued administration of transmission planning terms and processes across their transmission system.
- The **Balancing Authority** retains responsibility for compliance with relevant standards and maintaining reliability on their transmission system.



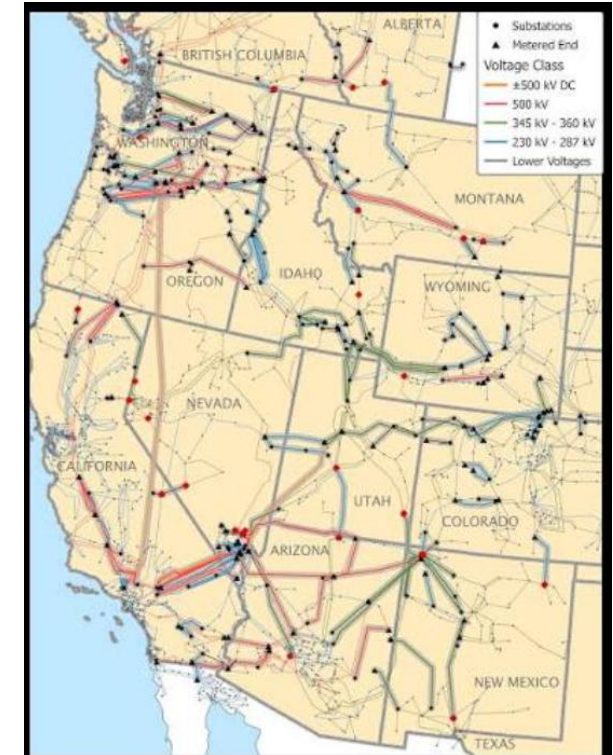
Transmission system and constraint modeling

- The market operator models the entire transmission network within an EDAM balancing area.
 - Modeled within the *Full Network Model*
- This includes modeling of high-voltage transmission lines, substations, and other transmission elements.
- Identification of transmission limits and constraints across the transmission network.
 - Identification of transmission line limits and flow limits under different operating conditions
 - Interface limits between balancing areas
 - Flow related constraints considering transmission paths



Transmission availability for market optimization

- The available flow capability of the internal transmission network within an EDAM balancing area is available to the market to support efficient dispatch of generation to serve demand in the market footprint.
 - Accounting for transmission outages
- The flow capability may fluctuate based on transmission outages or other limitations that may be present on the grid.
- The market considers the available generation and transmission flow capability to identify the most efficient solution to meet the needs in the market footprint.



Maximizing transmission capability supporting efficient energy transfers between EDAM balancing areas

- Transmission capability at the interties between two EDAM balancing areas is also made available to the market for optimization to support efficient energy transfers.
- Transmission availability at EDAM interties to support energy transfers:
 - *Transmission rights (firm) supporting the resource sufficiency evaluation* – transmission supporting delivery of contracted generation in one EDAM balancing area to another
 - *Transmission rights (firm) released by transmission customers ahead of the day-ahead market* – a transmission customer not exercising its firm transmission rights can release these for market optimization ahead of the day-ahead market (receives direct allocation of transfer revenues)
 - *Unscheduled transmission rights (firm) by the time of day-ahead market* – transmission capacity not exercised by the transmission customer nor released ahead of the day-ahead market automatically becomes available to the market to support efficient optimization.
 - *Unsold firm transmission capacity* – firm transmission capability that is unsold by the transmission provider at the EDAM interties also is available to the market to support optimized generation commitment.

Transmission customers exercising transmission rights

- Transmission rights granted by transmission providers under their tariffs on their systems in an EDAM balancing area are registered with the market operator.
 - Market operator provides a contract reference number (CRN)
- Transmission customers – represented by a scheduling coordinator – can exercise these transmission rights in the market.
 - Submission of a self-schedule + a CRN indicates to the market the exercise of the transmission rights
- The market will afford a clearing priority to these self-schedules exercising their transmission rights in the Day-Ahead and/or the Real-Time Market.
 - The market may need to redispatch generation in real-time to accommodate an exercise of transmission rights



Transmission Provider recovery of historical transmission revenues through EDAM

- Participation in the EDAM may impact transmission provider sales of short-term transmission products (firm and non-firm) under their tariff.
- The EDAM design provides a mechanism for transmission provider recovery of historical transmission revenues to mitigate cost shift among transmission customers.
- Revenue recovery supported for:
 - Historical short-term (firm and non-firm) transmission sales
 - Foregone short-term transmission revenues associated with transmission upgrades that increase transfer capability
 - Incremental use of transmission system supporting transfers wheeling through an EDAM balancing area

Congestion Revenue Allocation in EDAM

- Congestion revenue is generated when a transmission constraint within an EDAM balancing area is binding and affects the congestion component of the LMP at locations across the market footprint.
- Congestion revenues are allocated as follows (current design):
 - EDAM balancing area is allocated congestion revenues stemming from a transmission constraint internal to its balancing area; and
 - EDAM balancing area is also allocated congestion revenues resulting from a constraint in a neighboring balancing area to provide a congestion hedge for the exercise of long-term and monthly firm OATT rights through a self-schedule.
- Congestion revenues are allocated to the EDAM entity who in turn sub-allocates the revenues under the terms of its OATT.

Locational Marginal Price (LMP):

- **Marginal Energy Component (MEC)**
- **Marginal Congestion Component (MCC)**
- **Marginal Losses Component (MLC)**

Transfer Revenues in EDAM

- Transfer revenue is generated when a balancing area transfer constraint is binding creating price separation in the energy component of the LMP between the balancing areas at the transfer locations.
- Transfer revenue is allocated in the following manner:
 - Shared equally (50/50) between the EDAM balancing areas at the intertie location with the binding scheduling limit
- Transfers revenues are allocated by the market operator to the EDAM entity to sub-allocate under their OATT.
- Market operator allocates transfer revenues directly to transmission customers that release transmission rights at EDAM intertie locations prior to the Day-Ahead Market.

Locational Marginal Price (LMP):

- **Marginal Energy Component (MEC)**
- **Marginal Congestion Component (MCC)**
- **Marginal Losses Component (MLC)**

KNOWLEDGE CHECK



Who does the Market Operator allocate the transfers revenues to directly?

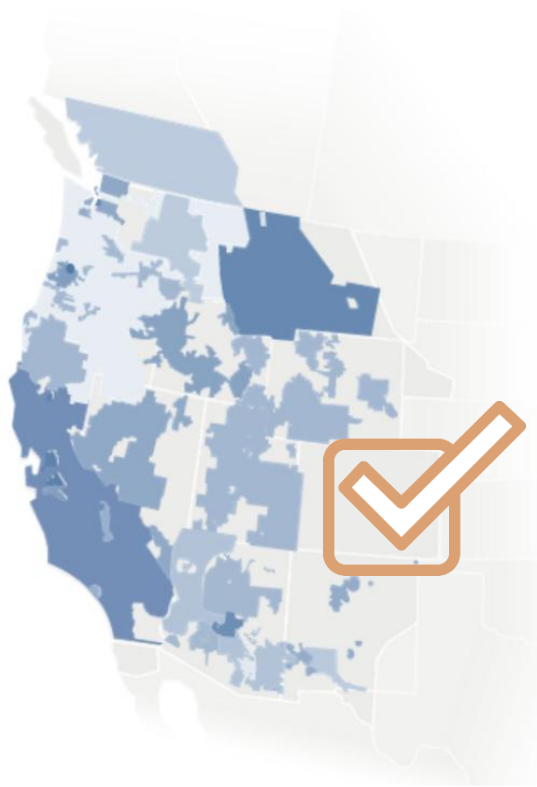


- ☒ A. EDAM BAA
- ☐ B. Resource Owner
- ☐ C. Transmission Provider
- ☐ D. All the above

RESOURCE SUFFICIENCY EVALUATIONS (RSE)



Daily Resource Sufficiency Evaluation (RSE) for each BAA



Each BAA's offered supply is evaluated against its demand forecast, imbalance reserve requirements and ancillary service requirements across the 24 hourly intervals of the day-ahead market.

The EDAM Entity is actively involved in the RSE process and works to pass the sufficiency test which is designed to ensure that each entity has enough supply to meet the next day's obligations.

If an EDAM entity fails the RSE, the entity may be exposed to surcharges which act as an incentive to take proactive actions to meet the RSE requirements.

1:00 2:00 3:00 4:00 5:00 6:00 7:00 8:00 9:00 10:00 11:00 12:00 13:00 14:00 15:00 16:00 17:00 18:00 19:00 20:00 21:00 22:00 23:00 24:00

24-hour time horizon

Resource Sufficiency Evaluation: Purpose

EDAM and the WEIM co-optimize dispatch across participating BAAs, but each BAA remains responsible for its own resource adequacy and reliability obligations.

Purpose

RSE serves as a risk mitigation measure:

- The EDAM and WEIM RSEs mitigate against the risk that one BAA will lean on the spot markets in lieu of procuring sufficient resources.
- Leaning would shift one BAA's reliability cost onto others and can strain the market footprint in tight conditions.

EDAM and WEIM RSEs ensure each BAA enters the market with adequate supply to cover its projected load.

- EDAM RSE runs prior to the EDAM market run – looks at resource sufficiency for the entire day-ahead period.
- WEIM RSE runs each hour – looks at resource sufficiency for each upcoming real-time hour.
- Failure of the EDAM RSE results in financial surcharges applied to IFM transfers.
- Failure of the WEIM RSE results in capped inter-BAA transfers for the failed hours.
 - *BAAs can opt-in to keep receiving WEIM Assistance Energy Transfers (AET) at a penalty rate.*

EXTENDED DAY-AHEAD MARKET RSE



EDAM RSE: Overview

Design:

- RA construct agnostic – accepts each BAA's own resource-adequacy / capacity framework on a common basis.
- Leverages diversity of load uncertainty across BAAs to reduce total required uncertainty capacity for the EDAM footprint.
- Transmission constraints internal to EDAM BAAs are not accounted for in the RSE; though transmission capacity on interties between EDAM BAAs that is released to the market does impact outcomes.

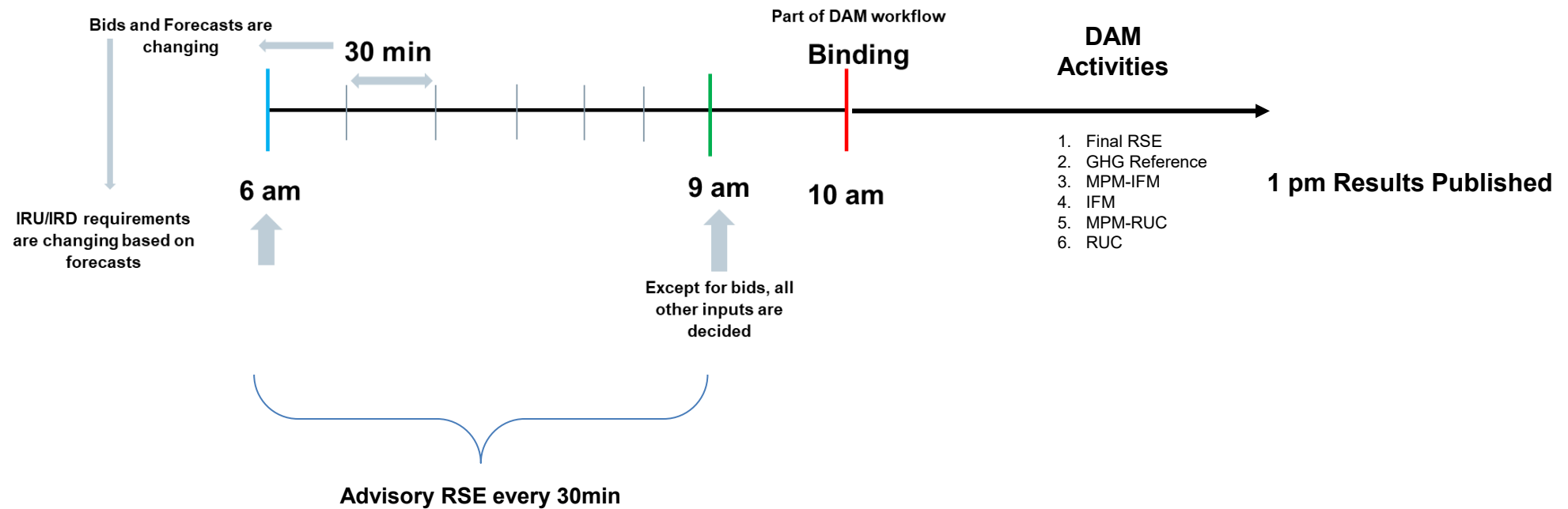
Process:

- Runs before the Integrated Forward Market (IFM); advisory runs let a BAA cure a projected shortfall; one binding run (10 a.m.) determines a BAA's pass/fail status.
- Evaluates all 24 hours of the next day together, minimizing any deficiencies across the entire day.

Outcomes: To pass the EDAM RSE a BAA must meet RSE requirements in all 24 hourly intervals in the day-ahead timeframe.

- Success – no surcharges; inclusion in the pooled set of BAAs for the WEIM RSE.
- Failure – financial surcharges on IFM transfers; exclusion from pooled evaluation in the WEIM RSE. (EDAM RSE does not limit inter-BAA transfers.)

EDAM RSE Timeline



EDAM RSE Component Tests

The EDAM RSE includes three tests:

1

Demand Test: assesses whether there are sufficient energy bids or self-schedules to meet an EDAM entity's forecasted load needs.

2

Imbalance Reserve Test: ensures the EDAM entity has sufficient bid-in capacity to meet uncertainty between day-ahead and real-time. ***The EDAM diversity benefit applies to this test.***

3

Ancillary Services Test: ensures that a BA has sufficient contingency reserve capacity available per AS requirements (self-provisioned for non-CAISO BAAs).

EDAM RSE: What counts as supply?

- RSE-eligible supply is **reliable capacity** a BAA can use to meet its day-ahead requirement come real time.
- To be eligible as RSE supply, resources must be **bid-in to the market**, either economically and/or as self-schedules.
- **Forward contracted imports** into a BAA **are RSE-eligible** if they are paired with firm or conditional firm point-to-point or network integration transmission service. This condition increases confidence that contracted supply can reach the purchasing BAA in real-time.
 - Forward contracted imports can include WSPP Schedule C and CAISO RA imports, among others.
 - Forward contracted imports from non-specific resources require timely submission of e-tags. Failure to submit e-tags can result in exclusion from pooled evaluation in the WEIM RSE.
- Resources that are **pseudo-tied or dynamically scheduled** into an EDAM BAA also count as RSE-eligible supply.
- Resources with less assurance of availability do not count as RSE-eligible supply, such as:
 - Intertie bids at non-EDAM BAA interties
 - Imports without firm or conditional firm transmission

EDAM RSE: Transmission and Forward Contracted Resources

- EDAM RSE does not consider **transmission congestion** when performing its component tests. However, **transmission capacity** is considered when assessing forward contracted inter-BAA transfers for RSE inclusion.
- RSE-eligible transmission must be **firm or conditional firm** and the transmission must be released to EDAM for the EDAM RSE run at 10:00 am.
- Transmission-backed transfers of forward contracted energy shift RSE obligations between the Source and Sink BAAs.
 - The RSE obligations of the **exporting** (Source) BAA **increase** by the contracted amount
 - The **importing** (Sink) BAA is credited with an equivalent **increase** in its imports that count toward its RSE obligations.
- **For example:** **BAA-A** sells 100 MW to **BAA-B** on firm transmission → the transaction counts as:
 - +100 MW **Import** supply in **BAA-B**'s RSE
 - +100 MW **Export** obligation in **BAA-A**'s RSE

EDAM RSE: Imbalance Reserve Test & Diversity Benefits

- Beyond meeting forecast demand, each BAA must hold **reserve capacity** to cover **forecast uncertainty** between day-ahead and real-time. These requirements are called **Imbalance Reserves Up and Down**.
- The EDAM RSE Imbalance Reserve Test checks that BAAs can meet **both** Imbalance Reserve Requirements (Up and Down).
- **Requirement**: Sized to cover net-load (load – variable generation) forecast error from day-ahead to real-time, taken from the distribution of historical errors ($\approx$ the 2.5th–97.5th percentile band). Capacity meeting this requirement is held as up and down headroom.
- **Eligible capacity**: RSE-eligible supply that can ramp within the imbalance-reserve timeframe; a MW already committed to energy or ancillary services cannot be counted again here.
- **Diversity benefit**: forecast errors across BAAs are not perfectly correlated, so the pooled requirement across all EDAM BAAs is smaller than the sum of the individual BAA requirements.
 - **Diversity benefit = (sum of individual BAA requirements) – (EDAM footprint-wide requirement)**
 - Is **allocated pro rata** to EDAM BAAs based on their individual requirements. An BAA only has to meet its share of the reduced pooled requirement.
 - Represents the **capacity savings of optimizing transfers** across BAAs.

EDAM RSE: Consequences for failure

ON-PEAK UPWARD (tiered)

Applied to ALL 16 on-peak hours if even one hour fails.

Tiers — Penalties increase with the severity of the deficiency:

- ① **De minimis** — failure $\leq$ the higher of 10 MW or 1% of the upward IR requirement → **no surcharge**.
- ② above de minimis and $\leq 50\%$ of the upward IR requirement → multiplier **×1.25**.
- ③ $> 50\%$ of the upward IR requirement → multiplier **×2.0**.
Tier ② / ③ multiplier is adjusted by the Failure Scaling Factor.

Surcharge = highest hourly deficiency quantity across the 16 hours × max local bilateral price index × failure multiplier (× scaling factor).

Scaling factor: 1% increase to failure multiplier for each additional day the BAA experienced a tier 2 or tier 3 failure. Calculated on a 30-day rolling window.

Offset: reduced by an on-peak upward credit for each hour the upward requirement is satisfied.

Revenue → pro-rata to BAAs that passed upward RSE in **all** peak hours (if none passed all hours, the hourly passing group).

Pro-rata = BAA net EDAM exports ÷ summed net exports of all upward passing BAAs.

OFF-PEAK UPWARD

Not calculated for a de minimis failure (higher of 10 MW or 1% of the hour's upward IR requirement).

Applies only to failure hours — hour-by-hour, not the 8-hour block.

Surcharge = hourly deficiency quantity × load-weighted average LMP within the BAA × failure multiplier.

Revenue → distributed as for on-peak upward — pro-rata by net EDAM exports of BAAs passing the upward RSE.

DOWNWARD

Not calculated for a de minimis failure (threshold: 10 MW in the hour — only failures > 10 MW are charged).

Applies only to failure hours.

Surcharge = hourly downward deficiency quantity × BAA MEC (Marginal Energy Component).

Revenue → pro-rata to BAAs that passed the downward test the whole day; if none, those passing the hour in question.

Pro-rata share determined by net imports.

EDAM RSE: Pooling BAAs for Real-Time

EDAM RSE

All EDAM BAAs pooled to calculate Imbalance Reserve requirement diversity benefit.

Variation in the Load and VER forecasts between the different BAAs reduce the overall IR requirements as the BAAs are in different geographic/weather areas and are sharing IR

Pass EDAM RSE



Fail EDAM RSE, cure with EDAM transfers at surcharge rate



Fail EDAM RSE, EDAM transfers are insufficient to cure



WEIM RSE

WEIM BAAs pooled to calculate Flexible Ramping requirement diversity benefit.

Variation in VER forecast errors across BAAs reduces FR requirements for all pooled BAAs.

WEIM BAA **excluded from real-time pool**, receives no diversity benefits and must meet its full Flexible Ramping requirement.

EDAM RSE: Pooling BAAs for Real-Time

After the binding day-ahead RSE, the BAAs that pass are grouped into pools that carry into the real time WEIM RSE.

EDAM Upward Pool / Downward Pool — the set of BAAs that passed the EDAM RSE or failed and cured their RSE deficiencies with transfers.

In the pool → day-ahead position is trusted and BAAs is tested collectively in the WEIM RSE.

Out of the pool (failed or uncured) → BAA is tested individually in the WEIM RSE and does not benefit from the WEIM RSE diversity benefit.

WEIM RSE



WEIM RSE: Overview

The WEIM RSE is the real-time counterpart to the EDAM RSE. It runs prior to each hour, testing the next four 15-minute market (FFM) intervals.

Purpose: every WEIM BAA must show it has enough of its own bid-range capacity and ramping capability to cover its real-time net load, so it does not lean on WEIM transfers from neighbors.

Design:

- WEIM RSE conditions for WEIM energy transfer access on being resource sufficient.
- Applies to all WEIM BAAs, both EDAM BAAs operating into real time and WEIM-only BAAs.
 - Incremental energy supply and demand for EDAM BAAs is assessed relative to their EDAM market awards.
 - WEIM-only BAAs submit base schedules against which deviations are measured.
- Leverages diversity of load uncertainty across BAAs to reduce total required flexible ramping capacity.
- Unlike the EDAM RSE, the WEIM RSE **does** consider transmission constraints when performing its tests.

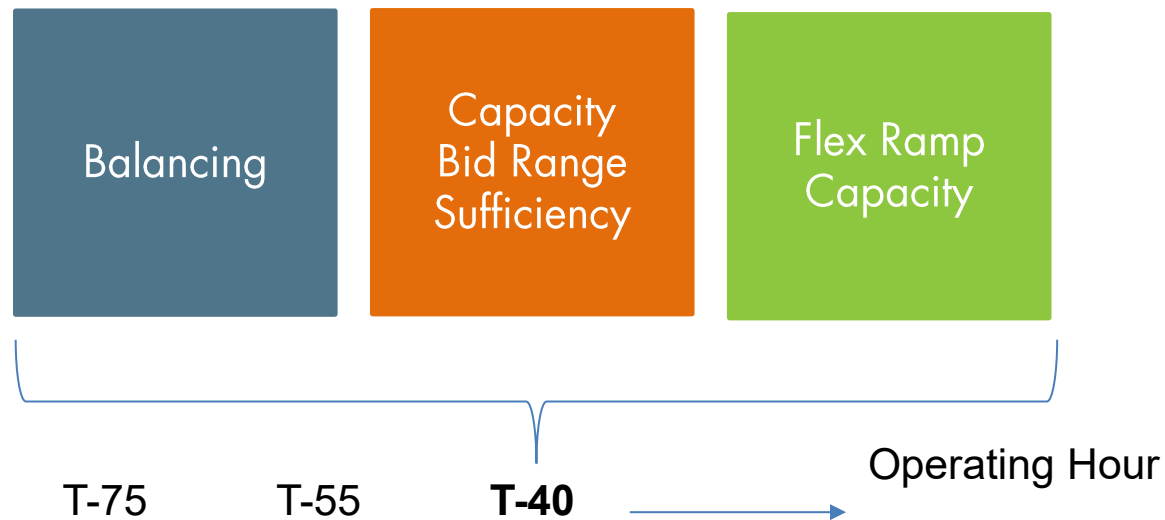
Process: runs in real time ahead of each trading hour (advisory runs at T-75, T-55 and a binding run at T-40 minutes), against the latest forecasts.

Outcomes: To pass the WEIM RSE a BAA must meet RSE requirements in all 4 fifteen-minute intervals in the next trade hour.

- Success – WEIM transfers are not limited.
- Failure – capped WEIM transfers so the BAA cannot lean further.
 - **Opt-in Assistance Energy Transfers:** a BAA that voluntarily opts into receiving assistance energy transfers (AETs) is not transfer-limited on failure. AETs provide access to excess supply offered by other WEIM entities at a surcharge rate.

WEIM RSE: Timeline

The WEIM Real-Time Resource Sufficiency Evaluation Tests:



Evaluations for each operating hour

WEIM RSE Component Tests

The WEIM RSE includes three tests:

1

Balancing test: the BAA's sum of EDAM or base schedules (generation + net scheduled interchange, including base transfers) must be within a 1% margin, over or under, of its hourly demand forecast.

2

Capacity Test: BAAs must have sufficient bid range - incremental / decremental energy bids above or below base schedules - to cover the difference between the demand forecast and the sum of base schedules.

3

Flexible Ramping Sufficiency Test: BAAs must have enough ramping capability to follow the net-load forecast +/- an uncertainty range based on historical load forecast errors. ***The pooled WEIM diversity benefit applies to this test.***

WEIM RSE: Effects of EDAM RSE Outcomes

- EDAM BAAs that **pass** the EDAM RSE or cure their deficiency with IFM transfers will be evaluated **as a pooled group** in the WEIM RSE. *WEIM-only BAAs are included in the pool of passing EDAM BAAs by default.*
- WEIM RSE pooling applies to the **Flexible Ramping Sufficiency Test**. A diversity benefit similar to the EDAM RSE diversity benefit is calculated for all pooled WEIM BAAs.
- Flexible Ramping requirements are calculated for both the **Upward and Downward** directions. In each case a BAA's individual ramping requirement is reduced by its pro-rata share of the diversity benefit.
- Diversity benefit = (sum of individual BAA flexible ramping requirements) – (flexible ramping requirement for the pool as a whole)
- Because real-time uncertainty is also not perfectly correlated across BAAs, the pooled flexible ramping requirement may be lower than the sum of individual BAA requirements.
- *Un-pooled EDAM BAAs are evaluated individually in the WEIM RSE and face greater flexible ramping requirements.*

EDAM and WEIM RSEs: Side by Side Comparison

Feature	WEIM Real-Time RSE	EDAM Day-Ahead RSE
Market Timing	Real-time (15-minute and hourly intervals)	Day-ahead (evaluates next-day operating plan)
Purpose	Ensure BAAs are not leaning on others in real-time	Ensure BAAs can meet obligations independently in the day-ahead market
Test Focus	Balancing, bid capacity and flexible ramping capability	Capacity, uncertainty, and self-provisioned ancillary services
Forecast Inputs	Load and variable energy resource (VER) forecasts	Demand forecast and uncertainty requirements (ISO or BAA provided)
Consequences of Failure	Limits on real-time market transfers	Financial penalties
Transmission Modeling	Includes transmission constraints	Does <i>not</i> model transmission constraints in RSE application
Participation Scope	Partial BAA participation possible	All load in BAA subject to EDAM RSE requirements

RSE PERFORMANCE



Recent RSE Performance: EDAM

Table 1: RSE monthly passing rate by BAA for upward and down requirements

BAA	IRU RSE Passing Rate (%)			IRD RSE Passing Rate (%)		
	May	June	July	May	June	July
CAISO	100	100	100	100	100	100
PACE	100	99.86	100	100	100	100
PACW	98.92	100	100	99.87	100	100

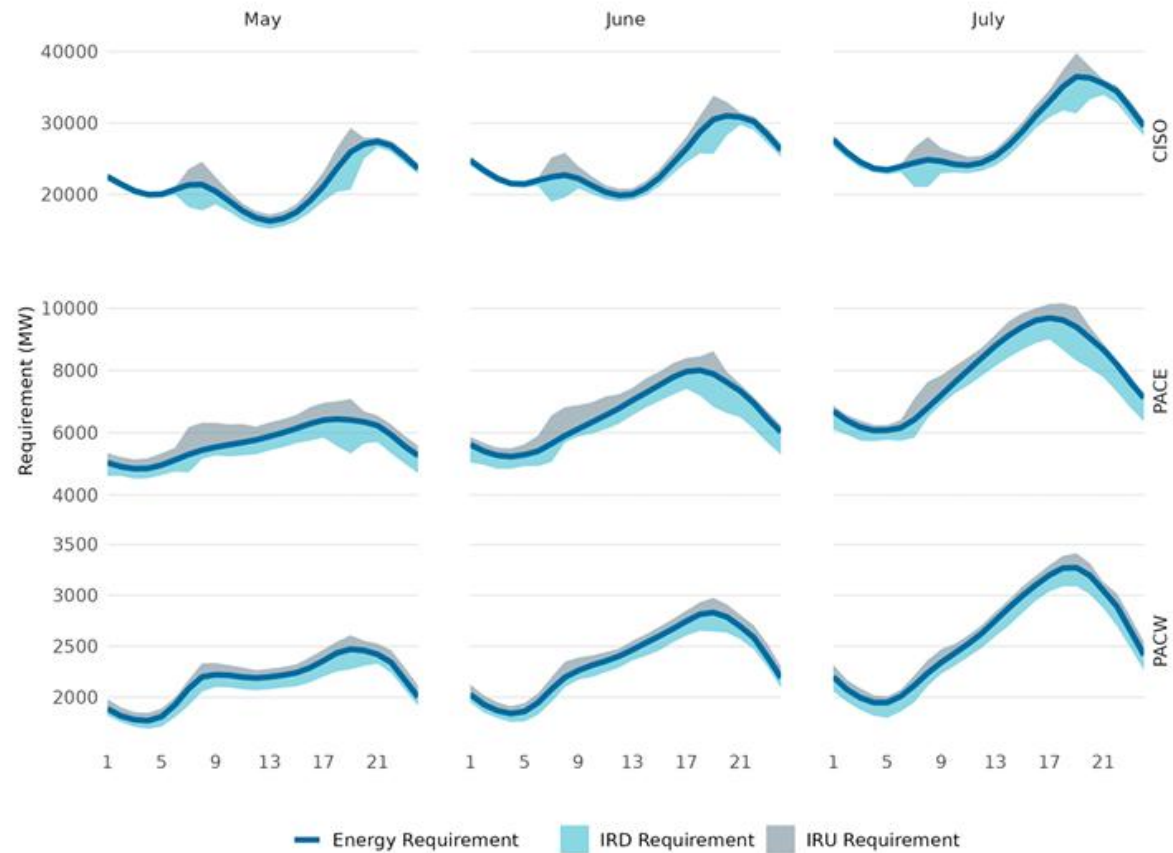
Table 2: Maximum imbalance reserve requirements by BAA

BAA	Maximum IRU Requirement (MW)			Maximum IRD Requirement (MW)		
	May	June	July	May	June	July
CAISO	3,629	3,486	3,312	5,320	5,487	5,142
PACE	1,028	1,028	834	1,099	1,125	1,090
PACW	225	228	143	241	259	192

Source: [monthly-extended-day-ahead-market-edam-performance-report-for-jul-2026.pdf](#)

Recent RSE Performance: EDAM

Figure 2: Average upward and downward requirements by area and month



Source: [monthly-extended-day-ahead-market-edam-performance-report-for-jul-2026.pdf](#)

KNOWLEDGE CHECK



Which of the following is not a component test of the EDAM RSE?

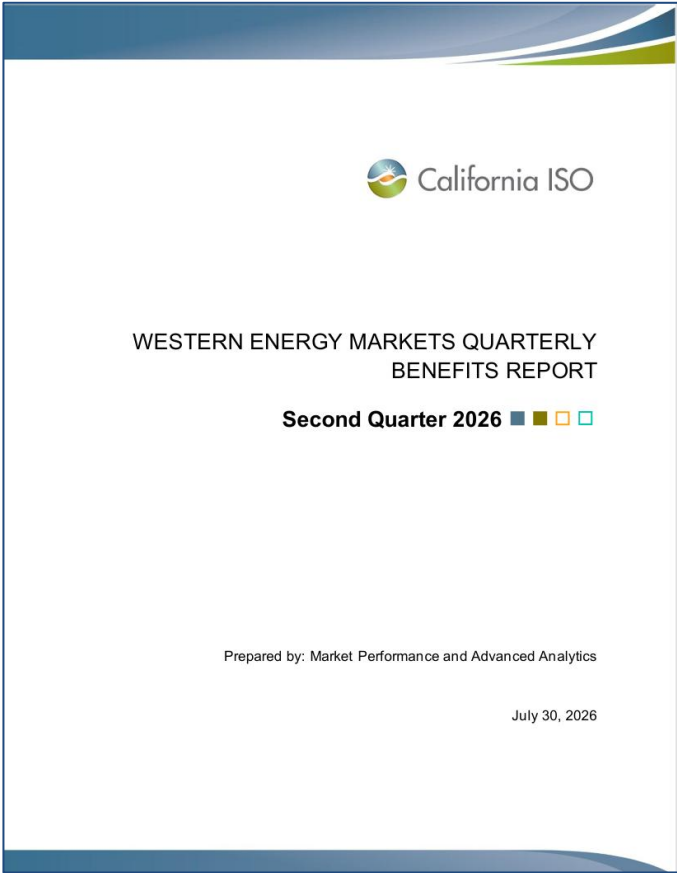
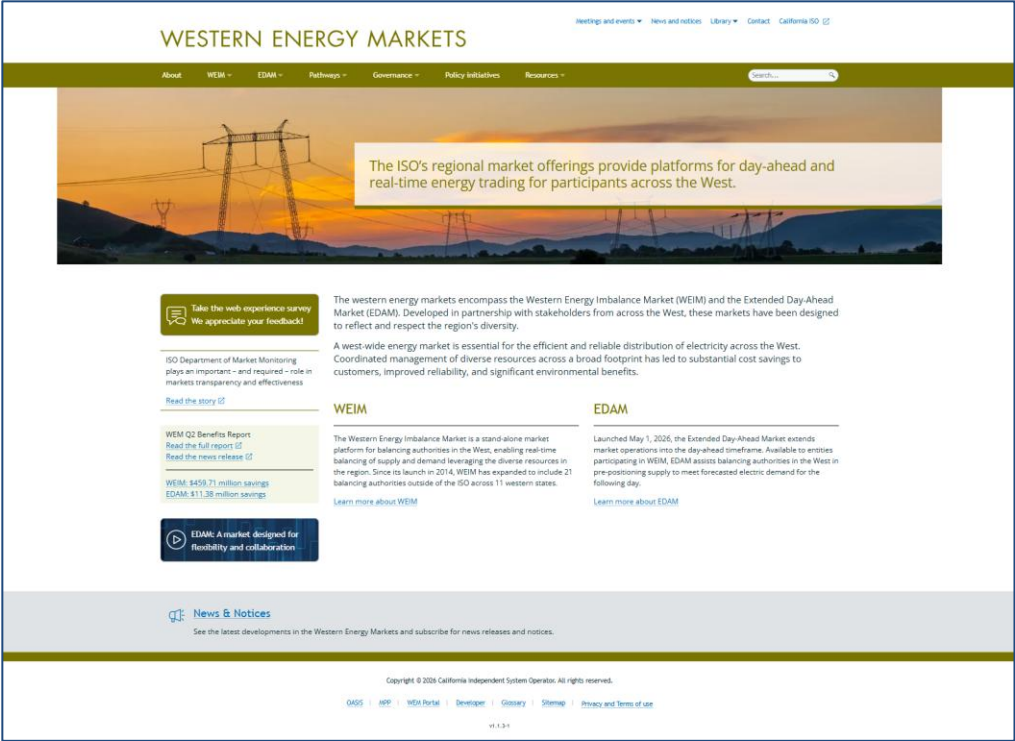
- ☐ A. Imbalance Reserve Test
- ☐ B. Demand Test
- ☒ C. Deliverability Test
- ☐ D. Ancillary Services Test



EDAM BENEFIT CALCULATION METHODOLOGY



Western Energy Markets website



How EDAM Economic Benefits Are Calculated

Calculation of Economic benefits across a larger Day Ahead footprint with diverse resources and geography

- How the dollar value of EDAM benefits is calculated
- The core formula, the data that feeds it, and the key assumptions behind it.
- The methodology is what produces the figures in CAISO's published quarterly benefits reports.

EDAM Benefits Components: Energy, IR/RC & GHG

Energy

The cost of generating and dispatching electricity to meet the load.

Imbalance Reserves (IR)

Capacity held to manage uncertainty, in both the up and down directions.

Reliability Capacity (RC)

Capacity committed for reliability, in both the up and down directions.

Greenhouse Gas (GHG)

GHG allocation costs and revenues. This component appears on the EDAM side only.

EDAM Benefits Formula:

Counterfactual production cost

dispatch + commitment + energy transfer + IR transfer + IR + RC transfer + RC

minus

EDAM production cost

dispatch + commitment + energy transfer + GHG revenue + GHG cost + IR transfer + IR + RC transfer + RC

EDAM Benefits Formula Inputs

Market dispatch data

The MW awarded to each resource for energy, imbalance reserves, reliability capacity, and GHG.

Bids

Each resource's bid segments (MW and price) for energy, imbalance reserve, reliability, and GHG.

Transfers

The energy, imbalance reserve, and reliability capacity moving between EDAM areas.

Prices

GHG prices, energy tie and ELAP prices, imbalance reserve prices, and reliability capacity prices, by area.

Key Assumptions

- Production costs are estimated using the prices participants submit in their bids, used at face value.
- **Two refinements the methodology applies:**
 - Hydro: if an energy bid segment is priced above its Default Energy Bid (DEB), it is capped at the DEB, checked segment by segment.
 - Commitment costs (start-up, no-load, transition) are capped by the CAISO system. The same capped values used in the market are used here.

Why it matters

The benefit reflects bid-based costs. It is a consistent, transparent estimate drawn from the same bids the market itself used, rather than a reconstruction of each resource's true operating cost.

Dispatch-Cost Rules and Exclusions

- Only resources online in the day-ahead market (IFM) with economic bids are counted. Virtual resources are excluded.
- Self-scheduled megawatts are excluded because they are not economically optimized. Only the portion dispatched above a self-schedule is counted.
- Batteries, hybrids, and pumped storage are counted only when they are supplying, that is, discharging or generating.
- Multi-stage generators are measured at the specific configuration that is online, including during a transition.
- If a dispatch falls outside a resource's bid range, it is pulled back to the nearest bid limit before the cost is calculated.

Commitment Cost

$$\text{Commitment cost} = \text{start-up cost} + \text{no-load cost} + \text{transition cost}$$

- Counted when a resource is committed in the day-ahead market (IFM) or in the reliability unit commitment (RUC).
- The applicable costs are taken from wherever the commitment actually occurred, IFM or RUC.
- Resource-level costs are summed to the area (BAA) level for each hour.

Transfer Costs: Pricing Energy That Moves Between Areas

“How the value of shared energy is priced into each area's cost”

$$\text{Energy transfer cost} = \text{net transferred MW} \times \text{transfer price}$$

- By convention, imports are positive and exports are negative.
- The transfer price is the simple average of the energy prices in the two areas involved.
- Self-scheduled transfers are excluded because they are not market-optimized.
- Transfers involving CAISO are priced at the relevant intertie point, either Malin or MDWP, depending on the area.

Imbalance Reserves and Reliability Capacity

“The same pattern as energy: an award times a bid price, split into up and down.”

Imbalance Reserves (IR)

- Cost = award MW × bid price.
- Calculated separately for up (IRU) and down (IRD), then summed to the area for each hour.
- Transfers are priced like energy: net transfer × the average of the two areas' IR prices.

Reliability Capacity (RC)

- Cost = award MW × bid price.
- Calculated separately for up (RCU) and down (RCD), then summed to the area for each hour.
- Transfers use the marginal RC prices from the reliability unit commitment (RUC).

Greenhouse Gas: Cost and Revenue

“GHG appears on the EDAM side, because it arises from transfers into CAISO BAA.”

$$\text{GHG cost} = \text{GHG allocation MW} \times \text{GHG bid}$$

$$\text{GHG revenue} = \text{GHG allocation MW} \times (- \text{GHG price})$$

- The GHG price is positive and is assigned to resources in the CAISO area, so its sign is reversed in the revenue term.
- GHG cost and revenue appear only on the EDAM side of the comparison, not in the counterfactual.

Building the Counterfactual

- It meets the same day-ahead load forecast as EDAM.
- There are no transfers between CAISO and PacifiCorp. Each area re-dispatches its own units by economic merit order, respecting transmission limits.
- The transfer limit between PACE and PACW is still enforced, so PacifiCorp can still shift energy between its two areas.
- It uses the same bids as EDAM. The dispatch, transfers, and prices come from a dedicated counterfactual re-run.

What the Counterfactual Leaves Out

- No GHG revenue or GHG cost. With no transfers between CAISO and PacifiCorp, no GHG allocation is needed.
- No energy, imbalance reserve, or reliability capacity transfer costs for CAISO.
- Transfer costs remain for PacifiCorp, because transfers between PACE and PACW still occur.
- Every other cost is calculated exactly as it is on the EDAM side.

The Pro-Rata Adjustment

- The counterfactual can clear a different amount of demand, IR, or RC than EDAM.
- That difference is not a real EDAM benefit. It is simply a different volume of supply.
- So each counterfactual cost is scaled to the same level as EDAM using a simple ratio.
- Applied to dispatch, commitment, IR, and RC costs, each using its matching volume. If a counterfactual value is zero, no adjustment is made.

Summarized:

Adjusted Counterfactual (CF) cost = CF cost × (EDAM level ÷ CF level)

The Final Benefit Formula

“The same structure as before, now with the adjusted counterfactual terms”.

Adjusted counterfactual production cost

adjusted dispatch + adjusted commitment + energy transfer + IR transfer + adjusted IR + RC transfer + adjusted RC

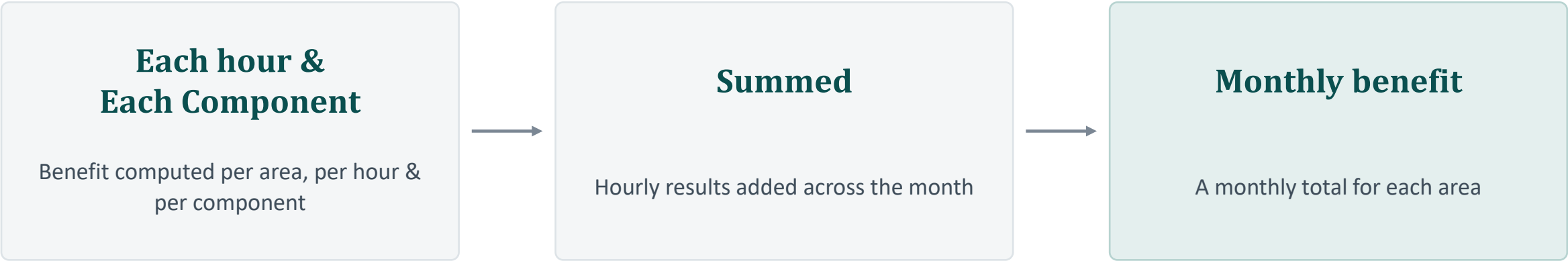
minus

EDAM production cost

dispatch + commitment + energy transfer + GHG revenue + GHG cost + IR transfer + IR + RC transfer + RC

The four adjusted terms are dispatch, commitment, IR, and RC. The transfer-cost terms are not pro-rata adjusted.

Summation across time and component



Key assumptions at a glance

- Same load forecast in both worlds. Only the ability to share across areas differs.
- Costs are bid-based and used at face value, with hydro DEB caps and capped commitment costs.
- Self-scheduled energy and transfers, and virtual resources, are excluded.
- Transmission limits are respected, and the limit between PACE and PACW is enforced in the counterfactual.
- Counterfactual costs are pro-rata aligned to EDAM volumes before the comparison is made.

The result is a transparent, bid-based estimate of production-cost savings.

In Summary

“EDAM's benefits are the measured cost savings from serving the same load across a larger, coordinated footprint.”

- Every hour, each area's cost with EDAM is compared to its cost in a modeled world without EDAM transfers.
- The comparison is built from bid-based costs, aligned with a pro-rata step, and summed into monthly and quarterly totals.
- It is a consistent, transparent way to show the value that market coordination delivers across the West.

Source: Western Energy Markets Benefit Methodology, Effective Q2 2026, Market Performance and Advanced Analytics, CAISO (Public).

BIDDING



Economic bids and self-schedules for physical energy can be submitted in the Day-Ahead Market by SCs for supply or demand

Economic Bids

- An economic bid includes both a specific **quantity** of MW and a specific **price** or **price range**. Economic bids tell the market how many additional MW SCs are willing to **buy** or **sell** when the price reaches a certain level.
- SCs for **supply** can also submit economic bids or self-schedules for physical energy in the Real-Time Market.
- SCs for **demand** do not submit bids in the Real-Time Market as the market clears supply against the load forecast.

Self-Schedule Bids

- In contrast to an economic bid, a self-schedule is an offer to **generate** or **consume** energy regardless of price. These offers only specify a **quantity**.
- Self-schedules are also known as “price takers” because they agree to take the market clearing price for the MW offered, foregoing start-up and minimum load costs.

Market Optimization and Results



SCs bid their resources into a variety of market products and the market processes run to determine the optimal solution for the trade date.

The methodology used to determine market awards is called **Security Constrained Unit Commitment (SCUC)**. The SCUC methodology maximizes economic efficiency, relieves network congestion, and considers physical constraints to achieve least-cost resource commitment and scheduling across the full 24-hours of the trade date.

Market results are published to provide **demand** and **supply** with their day-ahead schedules and awards.

What are the bidding parameters for the different products?

Energy

- Maximum of 10 segments
- Supply bids (\$/MWh) have a monotonically increasing bid curve
- Demand bids (\$/MWh) have a monotonically decreasing bid curve
- Subject to energy soft bid cap of \$1000/hard cap of \$2000 and floor of -\$150
- Default Energy Bid used for Market Power Mitigation

Imbalance Reserves

- One segment curve, bid + MW
- Default Availability Bid used for Market Power Mitigation

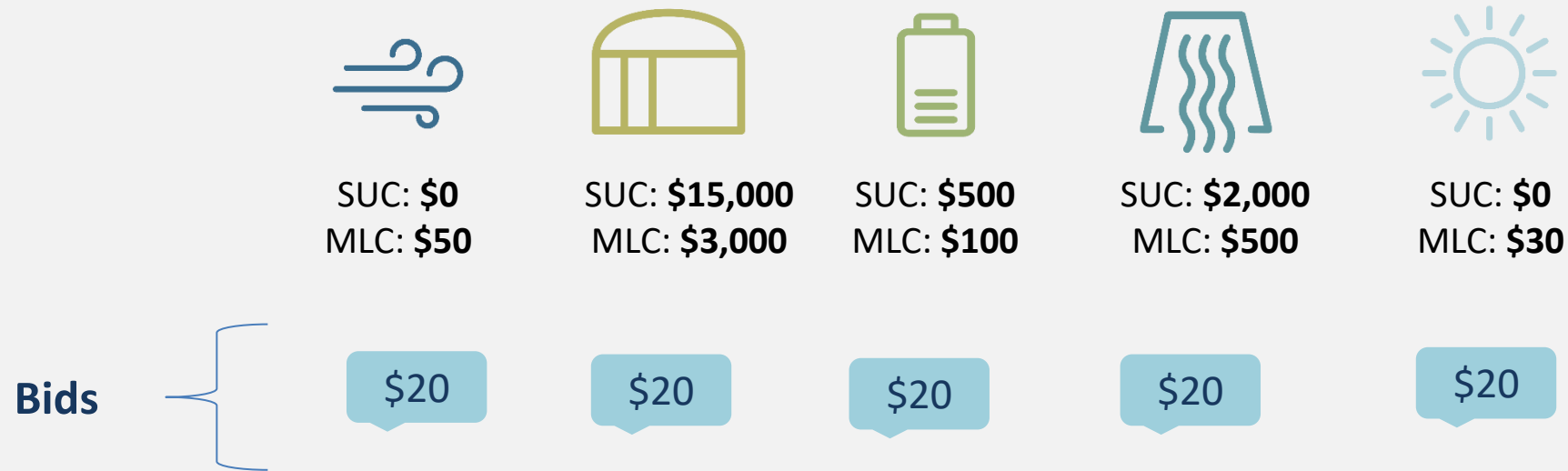
Reliability Capacity

- One segment curve, bid + MW
- Default Availability Bid used for Market Power Mitigation
- Automatic RCU bid insertion for certified resources

Note that there is a bid cap, not a price cap.

See
Tariff
section
39.6 for
more
bidding
rules

How does the Market decide which resources to commit?



Three-part energy bid includes:

- SUC: Start-Up cost (one time)
- MLC: Minimum Load Cost (hourly)
- Energy bid curve above minimum load (\$/MWh)

(These are example values meant for educational purposes and do not reflect actual market bids.)

Security Constrained Unit Commitment

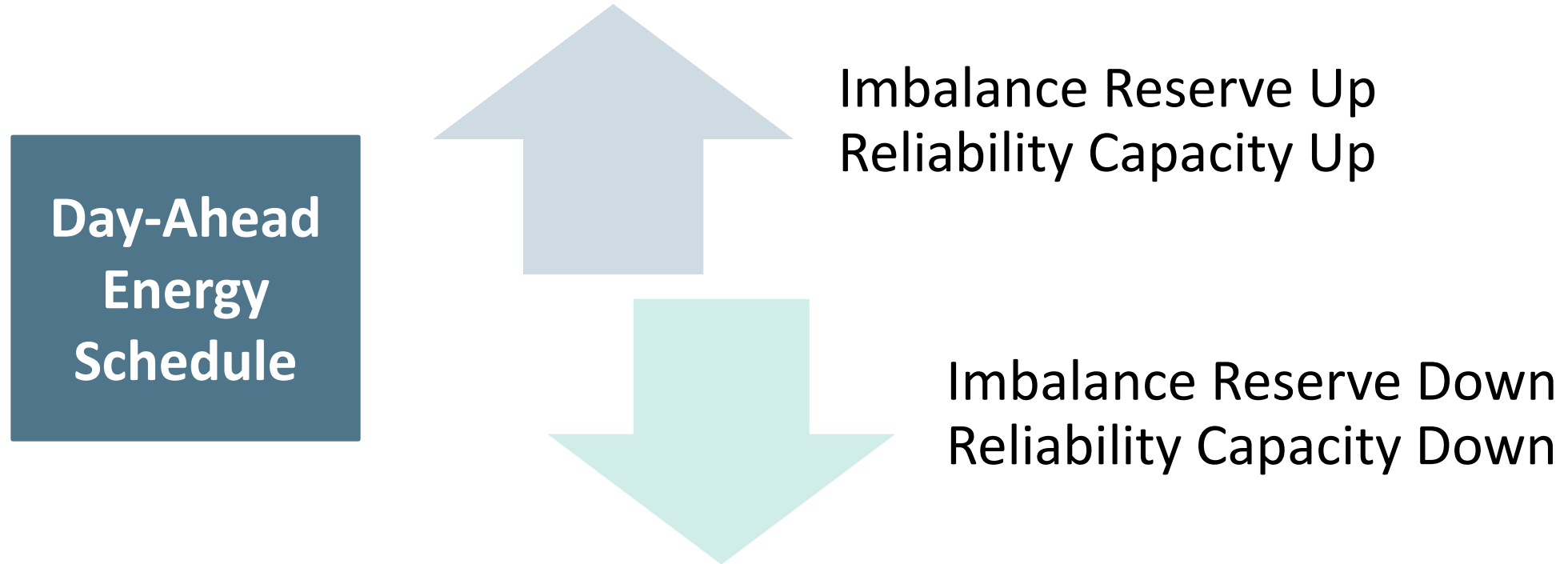
Nuances re: Self-provision of Ancillary Services (for EDAM BAAs)

- EDAM Entity determines amount and types of AS it requires for each hour of the trade date.
- EDAM SCs submit self-provided AS to meet EDAM Entity AS requirement.
 - Submissions contain MW quantity only, no price.
- No payment to resources for self-provision of AS.
- Used to ensure EDAM Entity has enough resources committed to meet AS requirements and pass the EDAM Resource Sufficiency Evaluation.



Impact of Capacity Awards on Day-Ahead Energy Schedules

A resource's awards in the day-ahead (EDAM) timeframe have a **must offer obligation** to submit bids for energy in real-time (WEIM) to cover the range of market awards. If the SC does not submit bids, the market will insert bids to ensure the resource meets its must offer obligation.



How does the day-ahead award affect a resource's real-time position?

- The Day-Ahead Market is a financial position only.
- Day-ahead awards directly affects the real-time position.
- Scheduling Coordinators are expected to deliver their day-ahead award in real-time or bid something else.
- Day-ahead awards for energy becomes a resource's day-ahead schedule. These MWs can be:
 1. Re-bid economically
 2. Bid as a self-schedule, or
 3. Submitted as a combination of self-schedule bids and economic bids.

EDAM Products and Services

Financial and physical resource capabilities determine how customers can participate in the Extended Day-Ahead Market.

Energy

- Physical supply and demand
- Virtual supply and demand (optional feature of EDAM)

Transmission

- Transfer Capacity Limit made available by EDAM Entities and EDAM SCs (transmission customers)

Capacity

- Ancillary Services (self-provided)
 - Regulation up & down
 - Spin & non-spin operating reserves
- Imbalance Reserves
- Reliability Capacity
- Flexible ramping product (Real-Time Market)

Awarded from
Energy bids

Day-Ahead and Real-Time Market: Potential market outcomes

Day-ahead awards can be for:

- Energy
- Ancillary Services (self-provided for non-CAISO EDAM BAA)
- Imbalance Reserves
- Reliability Capacity

Real-time awards can be for:

- Energy
- Flexible Ramping Product

Changes that occur post day-ahead and pre real-time may trigger redispatch in the Real-Time Market.

Bid Cost Recovery Overview

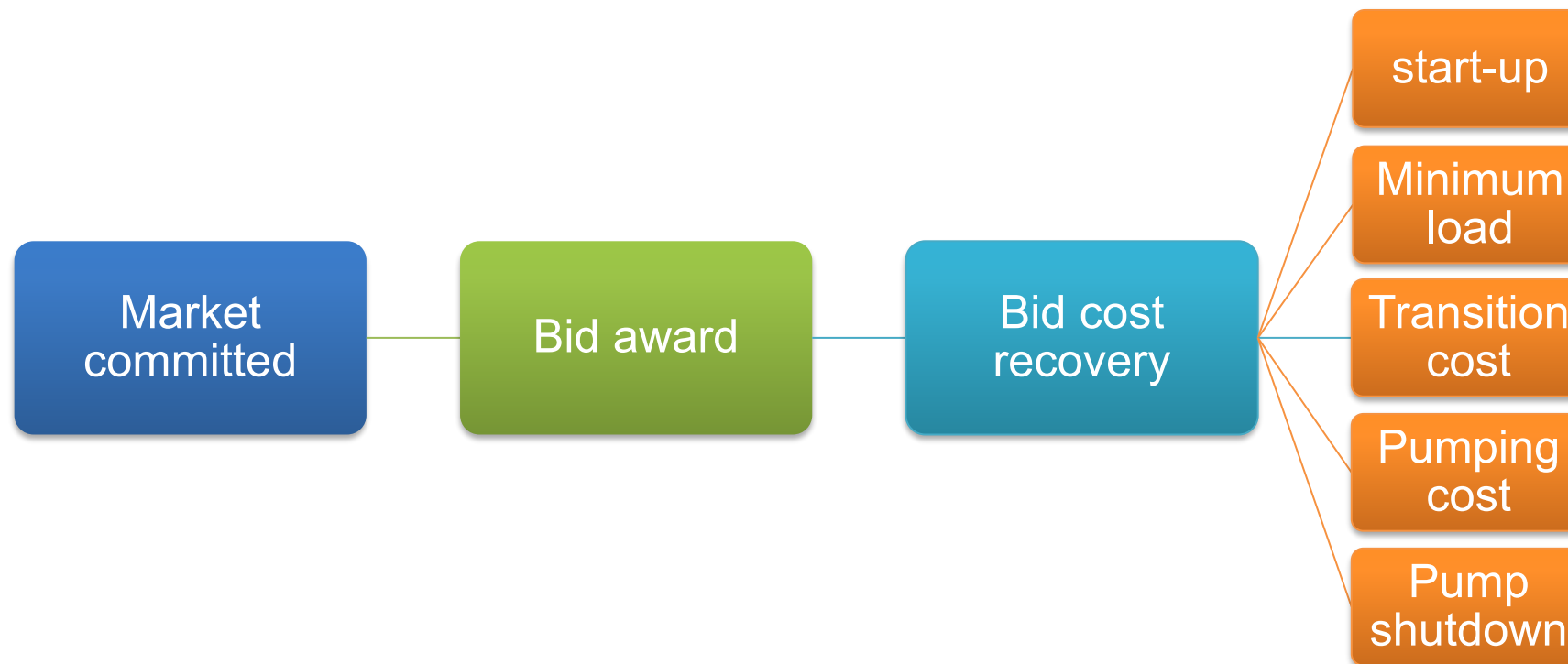
- Acts as a financial safeguard to prevent market participants from incurring losses when they follow dispatch instructions.
- Provides compensation when a resource's total market revenue for the operating day is less than its submitted bid costs.
- SCs can submit **self-schedule bids** and/or **economic bids**, which influence a resource's commitment status and eligibility for cost recovery.
- Resources that are **self-scheduled** are **not eligible** for bid cost recovery, since the SC has voluntarily chosen to start up the resource.



* If a resource submits economic bids on top of a self-schedule they could be eligible to recover the energy bid amount, but they would not recover start-up and minimum load costs

Bid Cost Recovery Overview (cont.)

If a resource submits **economic bids** and receives a market award, it becomes eligible for bid cost recovery because the market has chosen to start-up the resource. These SCs may receive a payment for bid cost recovery if they have a revenue shortfall.



Things to Keep in Mind



The **Security Constrained Unit Commitment** methodology maximizes economic efficiency, relieves network congestion, and considers physical constraints to achieve least-cost resource commitment and scheduling across the full 24-hours of the trade date.



A resource's awards in the day-ahead (EDAM) timeframe have a **must offer obligation** to submit bids for energy in real-time (WEIM) to cover the range of market awards. If the SC does not submit bids, the market will insert bids to ensure the resource meets its must offer obligation.



A unique aspect of **ancillary services** is that although they are included in the economic bid curve, the market will protect this capacity to be used as operating reserves for the EDAM Balancing Authority Area should the need arise.

Bidding nuances for battery resources

Battery

Economic Bids

Economic bid curve can combine “charging” and “discharging” in same bid curve

Self-Schedules

Demand

Self-schedule submitted for demand can only be “charging”

Supply

Self-schedule submitted for supply can only be “discharging”

Battery resources: bid curve that combines charging / discharging

Bids to charge are structured like demand bids.

Bids to discharge are structured like supply bids.

MW	\$
-10	-\$1
-.01	\$1.01
0	\$5
5	\$20
10	\$20

Day-Ahead Bid Curve

To interpret the bid curve, start by looking at the 0 in the middle and then read up and to the right for the charging bids:

- charge up to -.01 MW if the price is \$1.01 or less
- charge up to -10 MW if the price is \$-1 or less

For discharging, start by looking at the 0 in the middle and then read down and to the right:

- discharge up to 5 MW if the price is \$5 or more
- discharge up to 10 MW if the price is \$20 or more

Treatment of variable energy resource (VER) forecasts in Day-Ahead vs. Real-Time

Day-Ahead

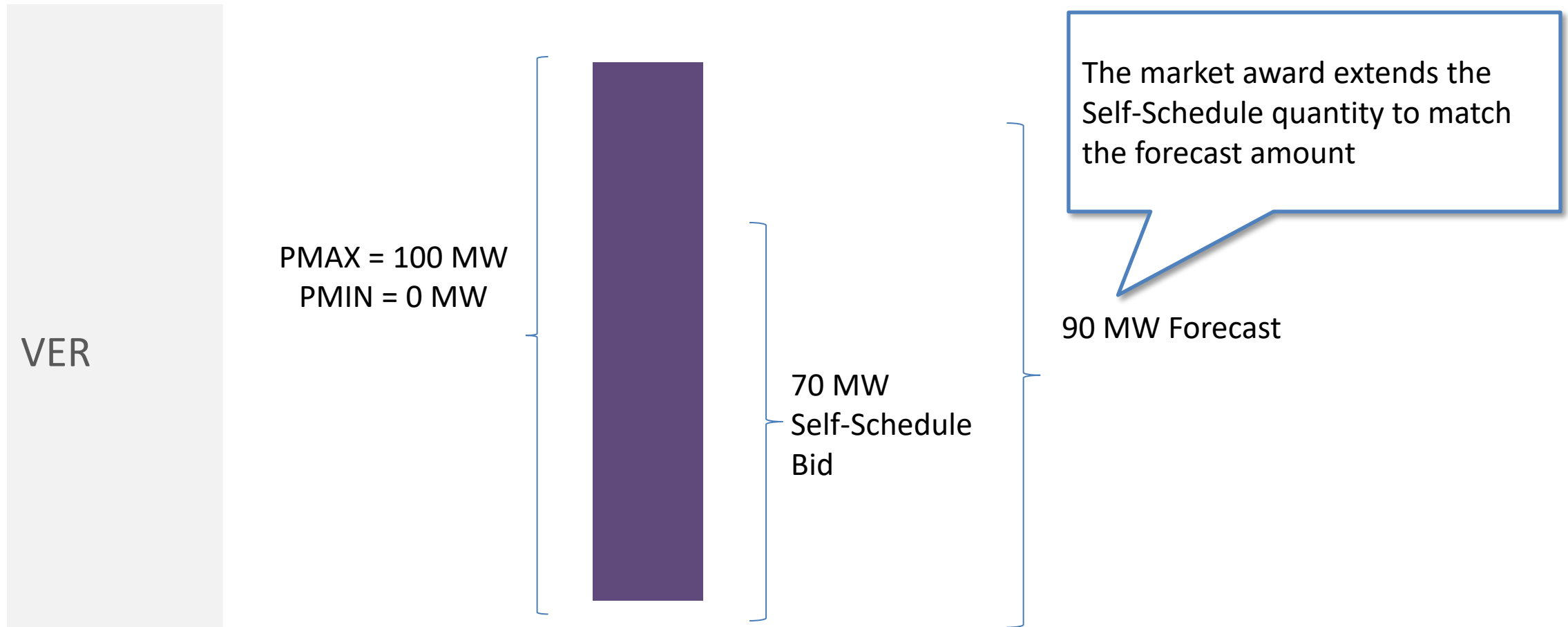
- (Today's world) The forecast is advisory and the market doesn't consider the forecast when awarding/optimizing.
- (With EDAM) The VER forecast will be used in IFM/RUC/Day-Ahead RSE

Real-Time

- For **self-schedule bids**, the market defaults to the forecast amount.
- For **economic bids**, the market will cap or extend the awarded MWs to the forecasted amount, or to the MW amount that respects the bid curve.

The market assumes the economic bid extends to the PMAX of the resource

Supplier: **Real-time** bidding activity Variable Energy Resource



KNOWLEDGE CHECK



In the Security Constrained Unit Commitment process, which of the following is NOT a part of a resource's three-part bid?

- ☐ A. Minimum Load Cost
- ☐ B. Start-up Cost
- ☒ **C. Fixed Capital Costs**
- ☐ D. Incremental Energy Cost



SETTLEMENTS



Market Settlements



- ISO provides settlement services for both Day-Ahead and Real-Time energy markets
- Settlements are conducted with SCs representing market participants
- Applies to resources and loads that bid into and are awarded by the market
- Covers settlements for energy produced/consumed and associated charges
- ISO settles directly with EDAM entity SCs for certain transactions
- EDAM entities can allocate settlements within their own balancing area
- More details available in the EDAM entity's Tariff



Annual

Month Ahead

Day-Ahead

Hour-Ahead

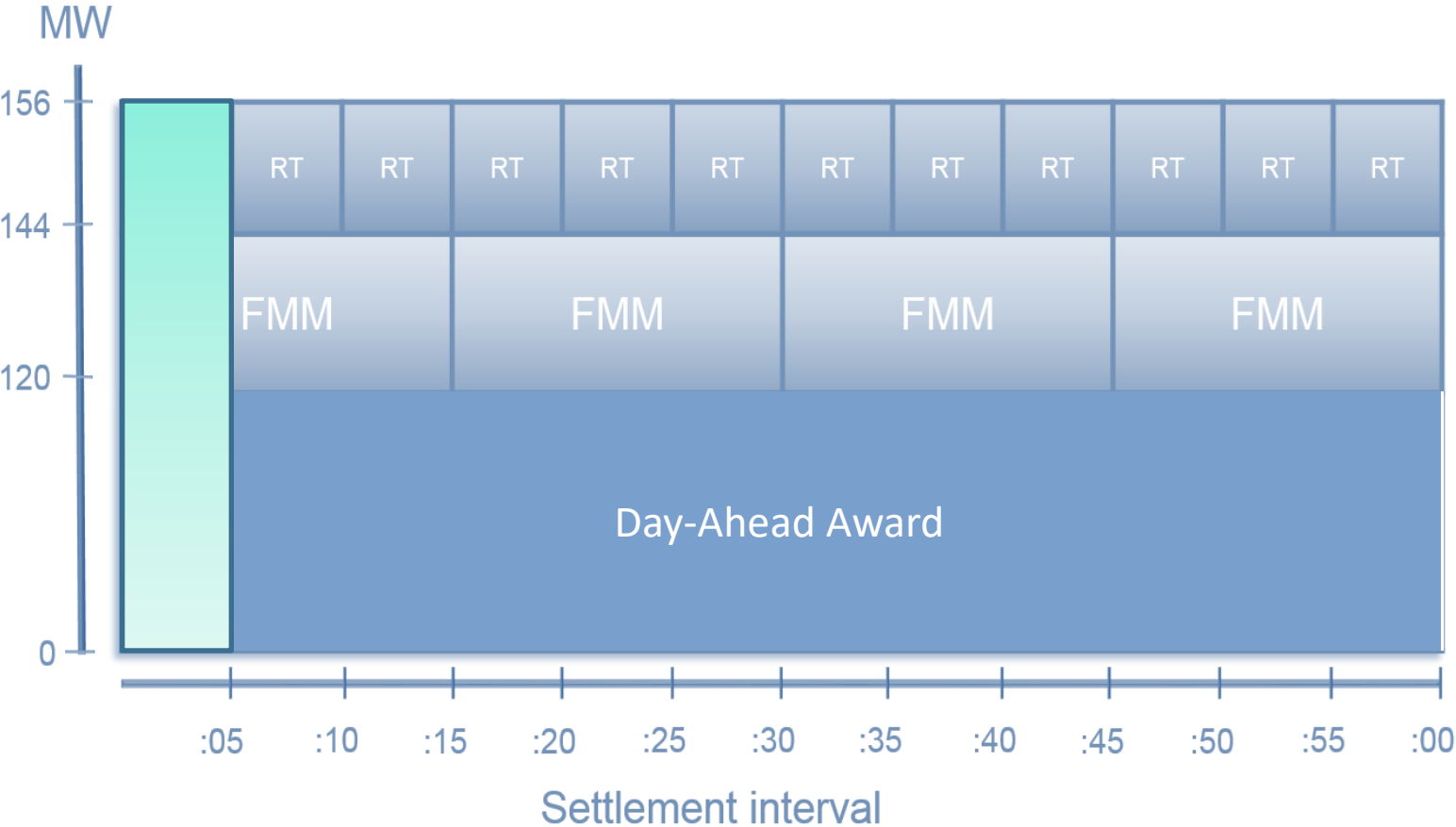
Fifteen Minute

Five-Minute

Energy settlements occur in day-ahead, the fifteen-minute and real-time markets



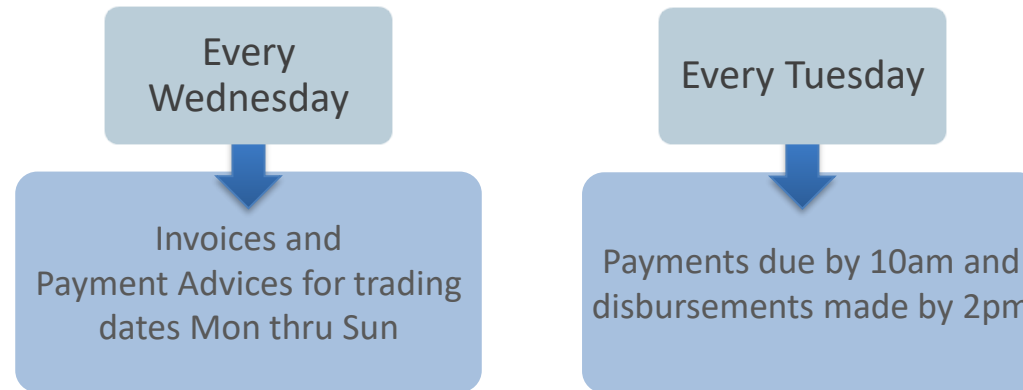
Energy settlements are calculated in 5- minute intervals



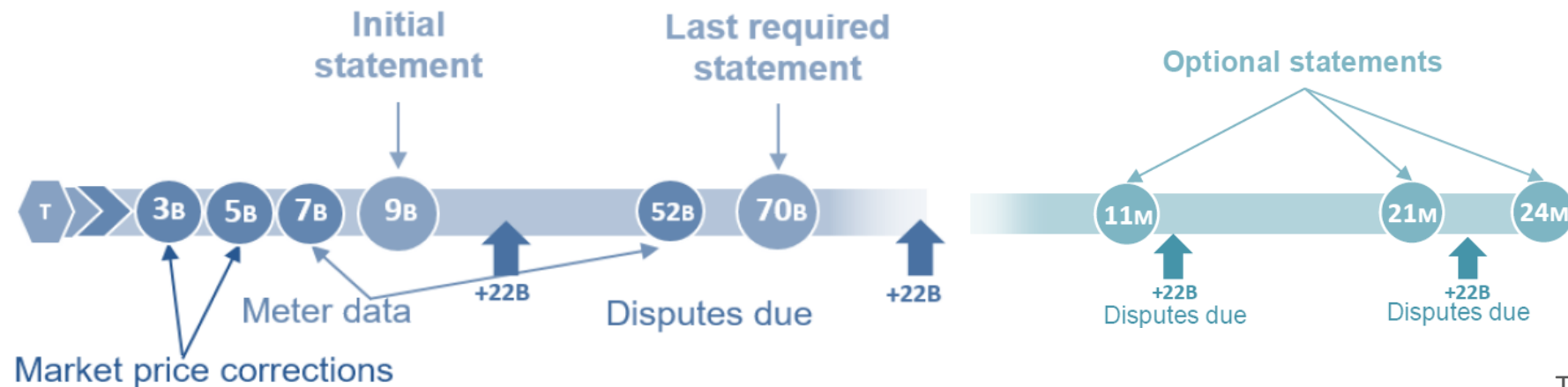
Key Settlement dates remain the same



Invoices & payment advices



Settlement Timeline



T = Trade Date
B = Business Days
M = Months

EXAMPLES: BID TO BILL



Simplified Bidding and Settlements Examples

Assumptions for Simplicity

- These examples assume hourly transactions and that the resource's meter data aligns with real-time dispatch instructions.

Actual Settlement Operations

- In practice, each hour is divided into 5-minute intervals.
- Market awards are compared against 5-minute meter data values for settlement accuracy.

Supply

Resources are compensated based on the Locational Marginal Price (LMP) associated with when the market award was issued:

- Day-Ahead Market (DAM)
- Real-Time Fifteen-Minute Market (FMM)
- Real-Time Five-Minute Dispatch (RTD)

Demand

Load is settled at a weighted average hourly real-time market price, based on:

- Four FMM prices
- Twelve RTD prices
- Deviations between DAM load and FMM forecast
- Deviations between FMM forecast and RTD forecast

Reminder: Accepted bids are paid the LMP not the bid price.

Scenario 1: Generator receives an energy award in DA and an **INCREMENTAL** energy award in RT

Generator Characteristics



Generator 1
Capacity: 100 MW

DA & RT Bids

MW	Price (\$/MW)
50	\$10
100	\$20

Market Outcomes

Day-Ahead Market (EDAM) Results

Day-Ahead LMP = \$15

Energy Award: 50 MW

Demand
Increases



Real-Time Market (WEIM) Results

Real-Time LMP = **\$20**

Energy Award: 100 MW

Generator Produces 100 MW

Market Settlements

Market	Amount (MW)	Price (\$/MW)	Revenue (\$)
Day-Ahead	50	15	750
Real-Time	100 – 50 = 50	20	1,000
			1,750

Generator Costs

Cost	Amount (MW)	Price (\$/MW)	Amount (\$)
Offer Segment 1	50	10	500
Offer Segment 2	50	20	1,000
			1,500

Profit **\$1,750 (revenue) - \$1,500 (costs) = \$250**

Scenario 2: Generator receives an energy award in DA and a **DECREMENTAL** energy award in RT

Generator Characteristics



Generator 1
Capacity: 100 MW

DA & RT Bids

MW	Price (\$/MW)
50	\$10
100	\$20

Market Outcomes

Day-Ahead Market (EDAM) Results

Day-Ahead LMP = **\$20**

Energy Award: 100 MW

Demand
Decreases



Real-Time Market (WEIM) Results

Real-Time LMP = **\$10**

Energy Award: 50 MW

Generator Produces 50 MW & "Buys" 50 MW

Market Settlements

Market	Amount (MW)	Price (\$/MW)	Revenue (\$)
Day-Ahead	100	20	2,000
Real-Time (buy-back)	50 – 100 = (50)	10	(500)
			1,500

Generator Costs

Cost	Amount (MW)	Price (\$/MW)	Amount (\$)
Offer Segment 1	50	10	500
Offer Segment 2	0	20	0
			500

Profit **\$1,500 (revenue) - \$500 (costs) = \$1,000**

Scenario 3: Generator receives **NO ENERGY** award in DA and an incremental energy award in RT

Generator Characteristics



Generator 2

Capacity: 200 MW

DA & RT Bids

MW	Price (\$/MW)
100	\$40
200	\$50

Market Outcomes

Day-Ahead Market (EDAM) Results

Day-Ahead LMP = \$30

Energy Award: 0 MW

Demand
Increases



Real-Time Market (WEIM) Results

Real-Time LMP = **\$60**

Energy Award: 200 MW

G3 Produces 200 MW

Market Settlements

Market	Amount (MW)	Price (\$/MW)	Revenue (\$)
Day-Ahead	0	30	0
Real-Time	$200 - 0 = 200$	60	12,000
			12,000

Generator Costs

Cost	Amount (MW)	Price (\$/MW)	Amount (\$)
Offer Segment 1	100	40	4,000
Offer Segment 2	100	50	5,000
			9,000

Profit **\$12,000 (revenue)** - **\$9,000 (costs)** = **\$3,000**

Scenario 4: Load receives energy award in DA and increments in RT

Generator Characteristics



Load

DA: 100 MW

RT: 250 MW

DA Bids

MW	Price (\$/MW)
100	\$40
250	\$70

Market Outcomes

Day-Ahead Market (EDAM) Results

Day-Ahead LMP = \$50

DA Energy Award: 100 MW



Real-Time Market (WEIM) Results

Real-Time LMP = \$60

Load Meter Value 250 MW

Market Settlements

Market	Amount (MW)	Price (\$/MW)	Charge (\$)
Day-Ahead	100	50	5,000
Real-Time	250 – 100 = 150	60	9,000
			16,000

Scenario 5: Load receives energy award in DA and decrements in RT

Generator Characteristics



Load

DA: 250 MW

RT: 100 MW

DA Bids

MW	Price (\$/MW)
100	\$20
250	\$30

Market Outcomes

Day-Ahead Market (EDAM) Results

Day-Ahead LMP = \$30

DA Energy Award: 250 MW



Real-Time Market (WEIM) Results

Real-Time LMP = \$25

Load Meter Value 100 MW

Market Settlements

Market	Amount (MW)	Price (\$/MW)	Charge (\$)
Day-Ahead	250	30	7,500
Real-Time (sell-back)	250 – 100 = 150	25	(3,750)
			3,750

CLOSING



Find helpful training resources on the ISO Training Center

Don't see the training you need?

Submit a CIDI ticket to request training or request your SC to submit one on your behalf

The screenshot shows the California ISO website's Training Center. The navigation bar includes links for About, Stakeholder center (highlighted with an orange box), Generation and transmission, Market and operations, and Legal and regulatory. Below the navigation bar, the Training center section is visible, followed by Upcoming meetings and Training topics. The Training topics section contains a grid of eight topics: Releases, initiatives and readiness notes; Markets and operations; Settlements and metering; Computer-based training library; Scheduling coordinator; Western Energy Imbalance Market (highlighted with an orange box); Congestion revenue rights; and Reference. Below the Training topics section is the Recent materials section, which includes a search bar and a table of recent materials.

California ISO

Systems and applications ▾ Library ▾ Meetings and events ▾ Daily Briefing

About ▾ Stakeholder center ▾ Generation and transmission ▾ Market and operations ▾ Legal and regulatory ▾ Search...

Stakeholder center / Training center

Training center

The California ISO is committed to providing our customers with a broad menu of high-quality training courses on the ISO market functionality, as well as individual market applications. These self-paced courses are organized into training topics that are designed to be an industry resource for market participants and the general public to learn about electric grids and markets, and the ISO's role in the electricity system.

On this page

- [Upcoming meetings](#)
- [Topics](#)
- [Recent materials](#)

Upcoming meetings

ONLINE

Session 2 - New CAISO Website Overview Webinar Training

05/29/2024 10:00 AM - 11:00 AM

Training topics

Click on a training topic to view the available courses. Our courses are intended for market participants and the general public. Please note, course content is subject to change based on the implementation of new market functionality, rules, or processes.

- Releases, initiatives and readiness notes
- Markets and operations
- Settlements and metering
- Computer-based training library
- Scheduling coordinator
- Western Energy Imbalance Market
- Congestion revenue rights
- Reference

Recent materials

Search by title

TITLE	TYPE	POSTED
Presentation - Resource Operations Readiness Training Batteries May 13, 2024	Presentation	05/16/2024, 2:09 PM
Presentation - Resource Operations - Readiness Training	Presentation	05/07/2024, 3:37 PM

Computer-Based Training Courses:

- EDAM Overview Video
- EDAM Processes & Timelines
- EDAM Pricing Model
- EDAM GHG Regulation Obligations
- EDAM Bidding: Basic Concepts
- EDAM Integration with WEIM

Additional resources



EDAM FAQ Guide



EDAM Resource Guide



REGISTRATION CLOSES ON SEPT. 30

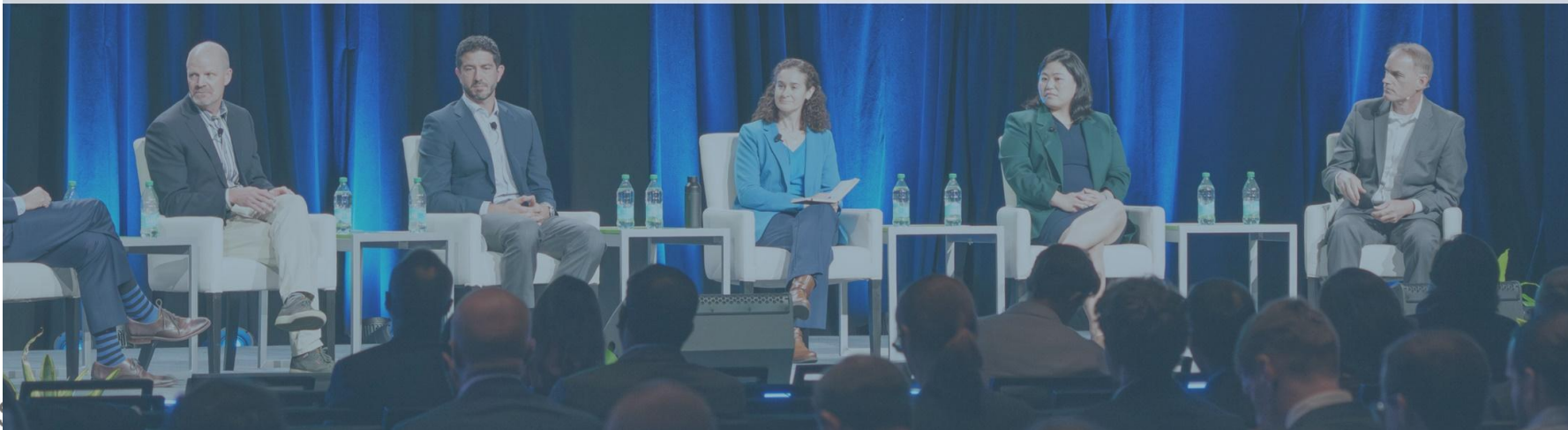
2026 STAKEHOLDER SYMPOSIUM

Welcome reception - Oct. 5 at Kimpton Sawyer Hotel, Sacramento, CA

Symposium program - Oct. 6 at SAFE Credit Union Convention Center, Sacramento, CA

7:30-9:00 a.m.	Registration and networking breakfast
9:00-9:15 a.m.	Welcome and opening remarks
9:15-9:45 a.m.	Opening Keynote
9:45-10:30 a.m.	The EDAM experience: Perspectives from the first movers
Break	
11:00-11:45 a.m.	The Road to ROWE: Navigating the 2027 transition

1:30-2:15 p.m.	Power Shifts: Short talks on big change
2:15-3:00 p.m.	Success through partnership: Building the future together
Break	
3:30-4:30 p.m.	CAISO's strategy for the next 5 years
4:30-4:45 p.m.	Closing remarks
5:00-7:00 p.m.	Networking reception



Thank you for your participation!



For more detailed information on anything presented, please visit our website at:
www.caiso.com

Or send an email to: CustomerReadiness@caiso.com