



# Extended Day-Ahead Market Working Group 1: *Supply Commitment and Resource Sufficiency Evaluation*

## *Resource Sufficiency Evaluation details*

Facilitator: Phil Pettingill

Scribe: Bob Kott

February 25, 2022

# Agenda:

Time:	Topic:	Presenter:
9:00 – 9:05	Welcome/introductions	Kristina Osborne
9:05 – 9:10	Briefing by ISO	Phil Pettingill
9:10 – 10:50	Overview of Residual Unit Commitment and Convergence Bidding	James Friedrich
10:50 – 10:55	Recap of discussion	Bob Kott
10:55 – 11:00	Upcoming topics	Phil Pettingill

## Reminders:

- These collaborative working groups are intended to foster open dialogue and sharing of ideas and perspectives
- Please raise your hand if you have a question or comment at any time during the meeting and the facilitator will call on you
  - Please start by stating your name and affiliation
- Meetings are recorded and video files posted on corresponding working group webpages
- Stakeholders are welcome to present perspectives at these meetings
  - Please submit a request to present using the link located on the EDAM Resources slide at the end of this presentation

# Today's Objectives

## Briefing on Residual Unit Commitment and Convergence Bidding

- Gain an understanding of these two market elements to support the upcoming WG discussion on their potential application to EDAM



# Extended Day-Ahead Market

RUC and Convergence Bidding

James Friedrich

Sr. Policy Developer

# Purpose

- The purpose of today's session is to give an overview of the Residual Unit Commitment (RUC) process and the mechanics of convergence bidding in today's CAISO day-ahead market
- This session is intended to be educational in preparation for the upcoming working group discussion on extending the RUC process and convergence bidding to EDAM

# Residual Unit Commitment

- The CAISO day-ahead market consists of three sequential processes:
  - Market Power Mitigation; Integrated Forward Market; Residual Unit Commitment
- The purpose of the RUC process is to ensure sufficient capacity is committed to meet the gap between integrated forward market (IFM) physical schedules and the CAISO demand forecast
- Drivers of RUC supply:
  - Differences between bid-in load and forecasted load
  - Differences between variable energy resources schedules and forecasted output
  - Net virtual supply or net virtual demand

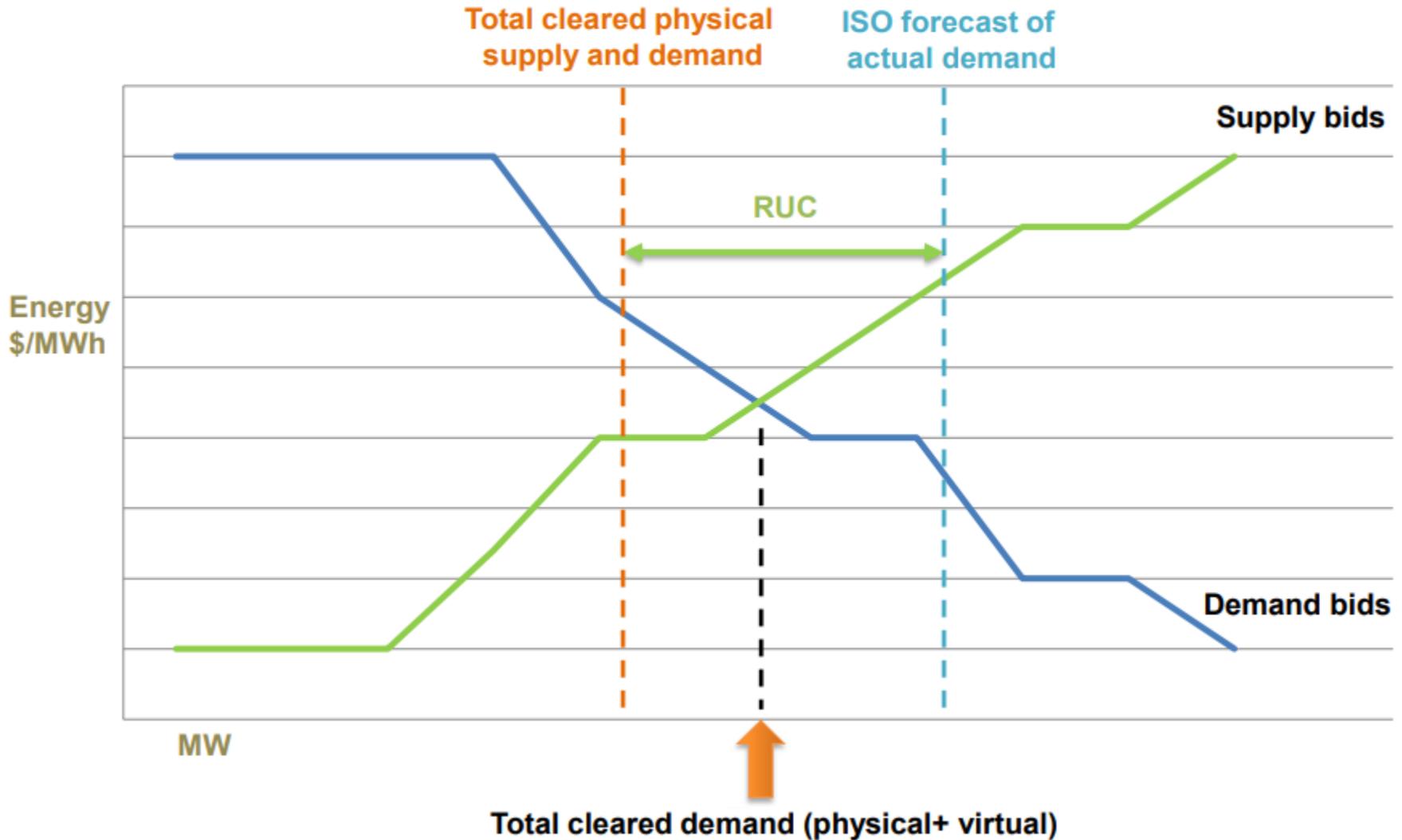
## Day-Ahead Market Enhancements (DAME) (1 of 2)

- DAME initiative proposes changes to the day-ahead market that will be implemented concurrently with EDAM
- Purpose of RUC remains the same; however, today CAISO operators use RUC to procure additional capacity to address load uncertainty through manual adjustments to the RUC load forecast
- DAME proposes to procure capacity to meet load uncertainty in the IFM through a new imbalance reserve product

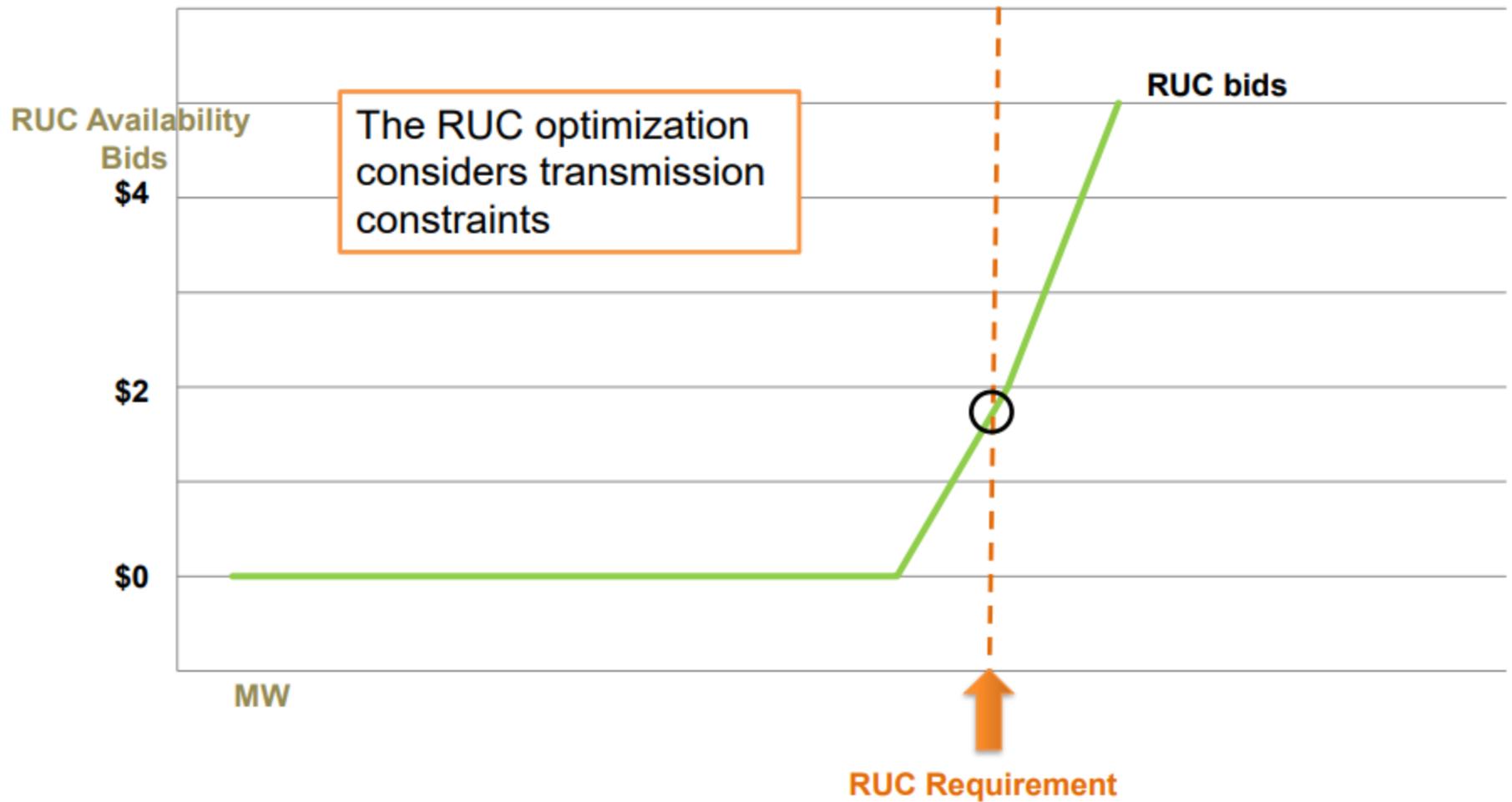
## Day-Ahead Market Enhancements (DAME) (2 of 2)

- RUC supply/availability = “reliability capacity up”
- New feature – “reliability capacity down”
  - Provides downward dispatch capability
  - Will not de-commit units but can transition down MSG resources
- Award results in an obligation to provide economic energy bids to the real-time market
- DAME introduces a new RUC market power mitigation pass

# RUC supply



# RUC bidding and procurement



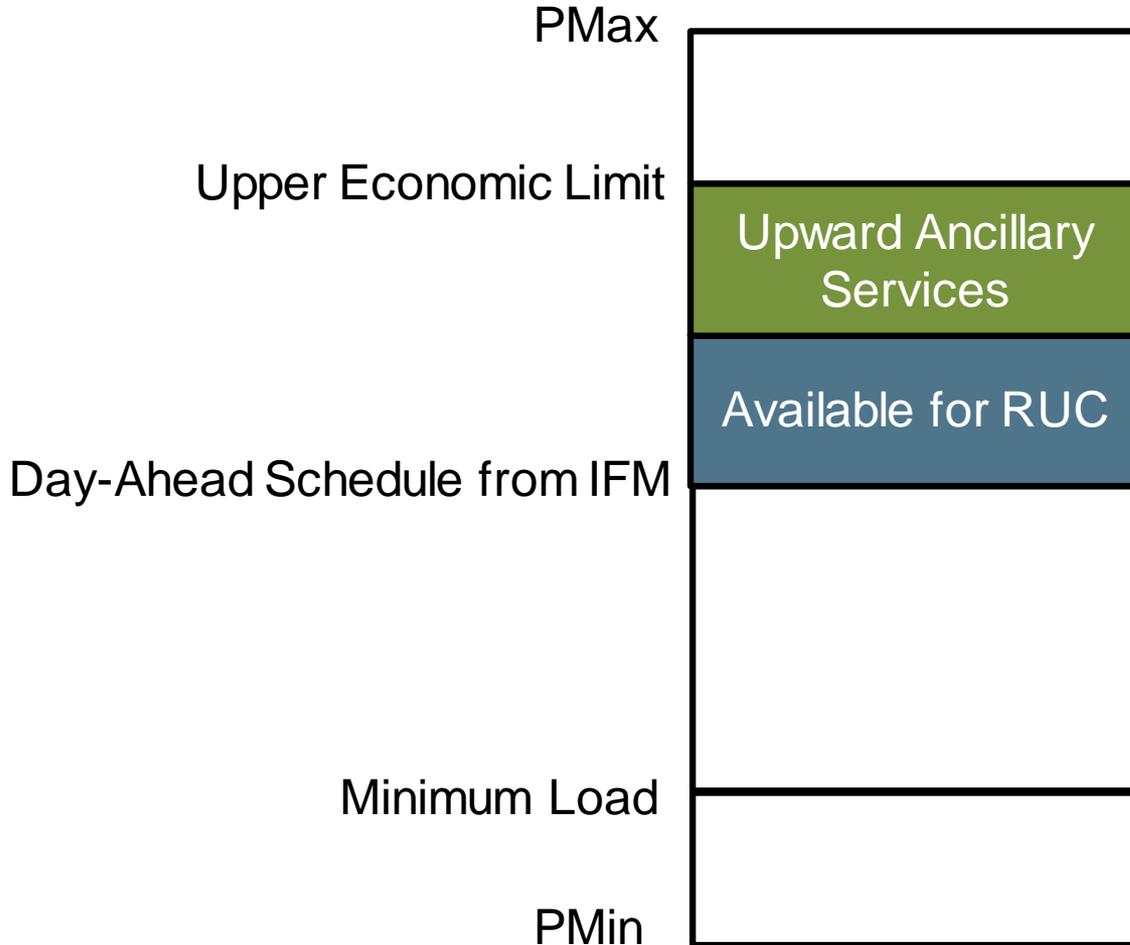
# RUC optimization

- RUC utilizes the same security-constrained unit commitment (SCUC) optimization and full network model (FNM) as IFM but uses demand forecast instead of demand bids
- IFM schedules are fixed in RUC
- RUC determines incremental unit commitments and schedules using RUC availability bids (as opposed to energy bids)
  - RUC does not automatically de-commit units but identifies resources that CAISO operators may want to manually de-commit
- RUC optimization objective is to minimize commitment costs and incremental RUC availability bids subject to RUC power balance constraint and other network/resource constraints

## RUC availability bids

- RUC availability is a single (\$/MW, MW) pair
- \$0/MW RUC Availability Bid is generated by CAISO on behalf of Resource Adequacy (RA) resources with a RUC obligation
- RUC capacity is limited by the upper economic limit minus the sum of day-ahead energy schedule and upward ancillary service awards
- RUC awards are limited to the resource's 60-minute ramping capability

# Capacity available for RUC



# RUC payments and cost allocation

- Non-RA resources that receive a RUC award are paid the locational marginal price for RUC capacity
  - Under DAME, all resources would receive payment for reliability capacity in the upward or downward direction, respectively
- All resources are eligible for RUC bid cost recovery
- RUC costs are allocated in two tiers:
  - Tier 1: Net negative CAISO demand deviations and positive net virtual supply awards
  - Tier 2: pro rata to metered demand
- Subject to no-pay provisions

# RUC optimization horizon

- RUC looks out further than the next trade date
- RUC can issue start-up instructions for long start (start time > 6 hours) and extremely long-start units (start time > 18 hours)
  - Produces advisory commitments for short start units
- Start-up instructions are generated by RUC or manually notified by the ISO operator and the process considers bids in the day-ahead market up to two days out

# REVIEW OF CONVERGENCE BIDDING

# CAISO allows financial and physical participation in its day-ahead market

- Physical participation
  - Supply: generators, imports
  - Demand: load, exports
- Financial participation
  - Virtual supply
  - Virtual demand

# Convergence bids represent financial participation in the market

- Virtual Demand
  - Bids to buy at the day-ahead price and liquidate at the 15-minute price
  - Equivalent to price-sensitive demand in IFM
- Virtual Supply
  - Bid to sell at the day-ahead price and liquidate at the 15-minute price
  - Equivalent to a dispatchable supply resource in IFM

# How convergence bids affect the physical market

- Convergence bids are not backed by physical assets and come with no obligation to deliver or consume physical energy
- For scheduling coordinators who submit both virtual and physical bids, there is no link between the bids
- Convergence bids can set the market clearing price
- The net virtual position affects the RUC procurement target
- Convergence bids affect congestion

# Summary of convergence bid features (1 of 2)

- Convergence bidding is allowed at eligible internal nodes, trading hubs, and load aggregation points
  - Convergence bidding is currently not allowed at inertia scheduling points
  - Convergence bids at internal nodes are subject to position limits
- Convergence bids are limited to energy bids (no ancillary services, imbalance reserves, RUC)
- No start up and minimum load bids

## Summary of convergence bid features (2 of 2)

- Cannot self-schedule
- Virtual supply bid curve must start at 0 MW and be monotonically increasing with up to 10 segments
- Virtual demand bid curve must start at 0MW and be monotonically decreasing with up to 10 segments
- Subject to the same bid deadline (10:00am), bid caps (\$1000, \$-150), and minimum bid volume (1 MW) as physical energy bids

# Why does convergence bidding exist and what are the benefits? (1 of 2)

- From a participant perspective
  - Opportunity to earn revenues (and risk losses) using their insights into system and market conditions that may result in LMP differences
  - Hedge differences in congestion between different locations within the ISO system
  - Can mitigate the risk of an outage that happens after the close of the day-ahead market
  - Hedge load's exposure to fifteen-minute market pricing
  - Allows variable energy resource suppliers to take a financial position in the day-ahead market unbound from the ISO forecast

# Why does convergence bidding exist and what are the benefits? (2 of 2)

- From a market perspective
  - Encourages bidding behavior that would tend to minimize differences between day-ahead and fifteen-minute market LMPs
  - Reduces incentives to under- or over-schedule physical demand in the day-ahead market
  - Increases market liquidity
  - Decreases potential for the exercise of market power
  - Should tend to lower costs and improve grid operations due to more efficient day-ahead schedules and commitments

## Additional information

- CAISO performs a dynamic credit check at bid submission to ensure bidding entities liabilities do not exceed its credit limits
- To submit convergence bids, must be certified by CAISO as a Convergence Bidding Entity
- CAISO has the authority to suspend or limit convergence bids

# Wrap Up

- Briefing on the function of:
  - Residual Unit Commitment
  - Convergence Bidding
  
- Next Steps
  
- Feb 28, 1 – 3pm
  - Discuss the application of RUC and Convergence Bidding in the EDAM design

# EDAM Resources

- List of [\*Common EDAM design principles and concepts\*](#)
- Initiative and working webpages:
  - EDAM initiative webpage:  
<https://stakeholdercenter.caiso.com/StakeholderInitiatives/Extended-day-ahead-market>
  - Working Group 1 webpage:  
<https://stakeholdercenter.caiso.com/StakeholderInitiatives/Extended-Day-Ahead-Market-Working-Group-1-Supply-Commitment-Resource-Sufficiency-Evaluation>
    - The working group webpages include meeting materials, initial scope items, and weekly summary reports
- Please submit EDAM WG inquiries and/or requests to present at <https://www.surveymonkey.com/r/EDAMWG-Inquiries>
  - Presentations due 5 business days prior to the meeting where they are scheduled to present, if time allows
- [Register](#) for working groups to help the ISO gauge interest and facilitate communication throughout process.
- Nov 30, 2021 Day-Ahead Market Overview Training: <https://youtu.be/lbXRsfVbCg>