



# Energy Storage Enhancements Training, Track 1

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# Scheduling Coordinators with Storage Resources

Market  
Optimization

Ancillary  
Services

Default  
Energy Bids

# Housekeeping



Make sure to keep yourself muted unless you have a question

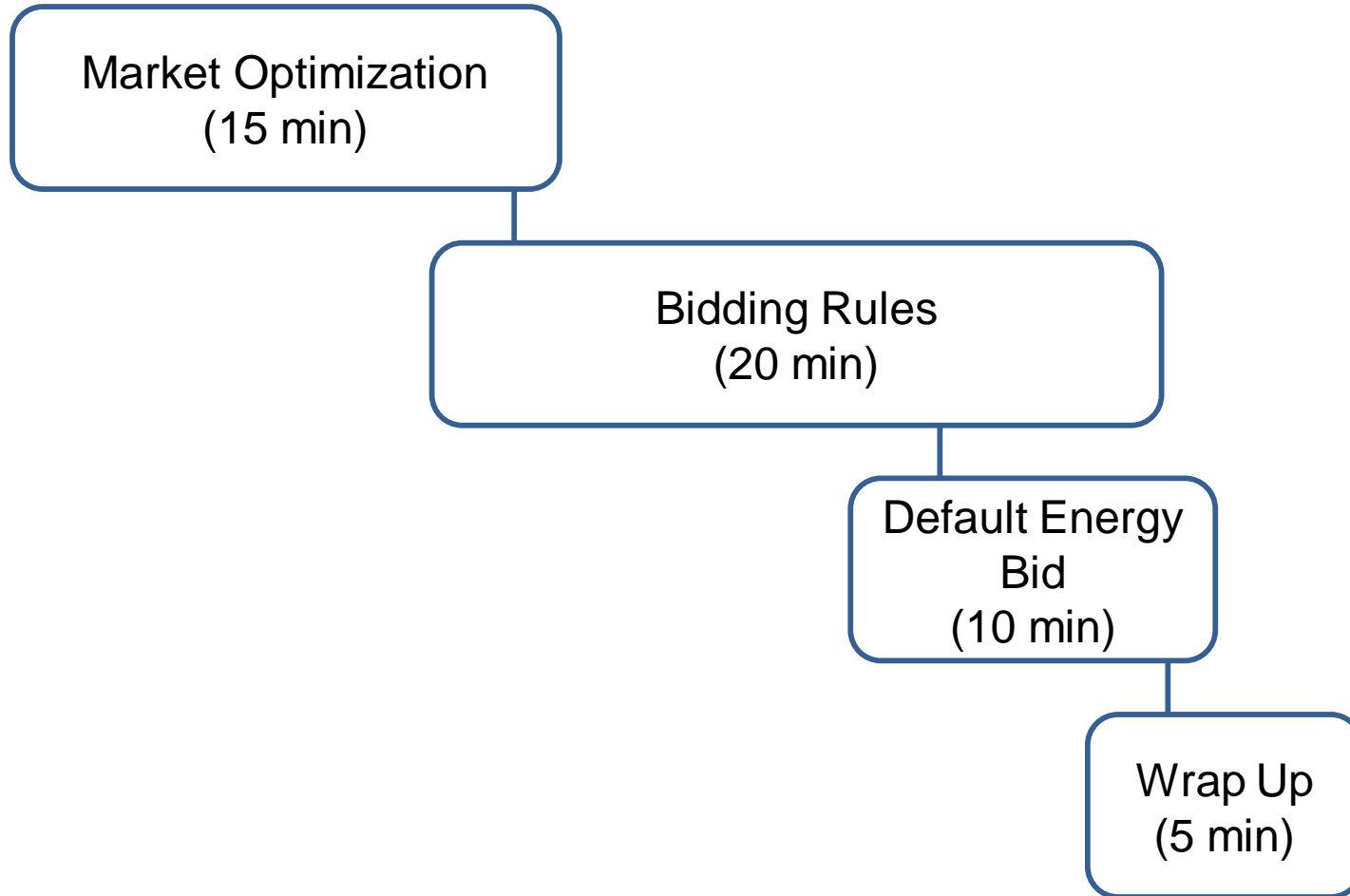


If you have a question, you may either ask over the phone or in the chat

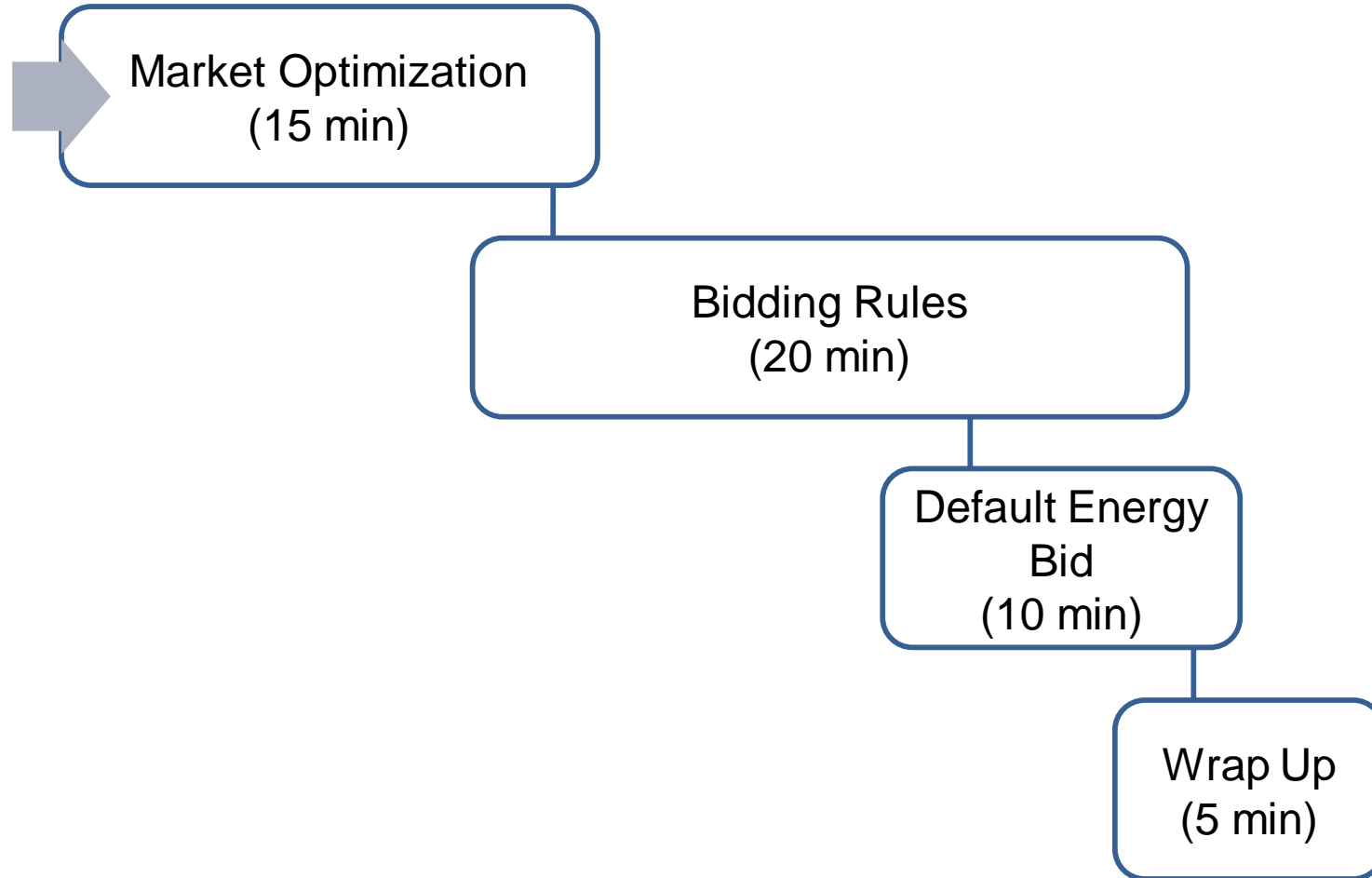


If you want to ask a question, you can virtually “raise your hand” in WebEx

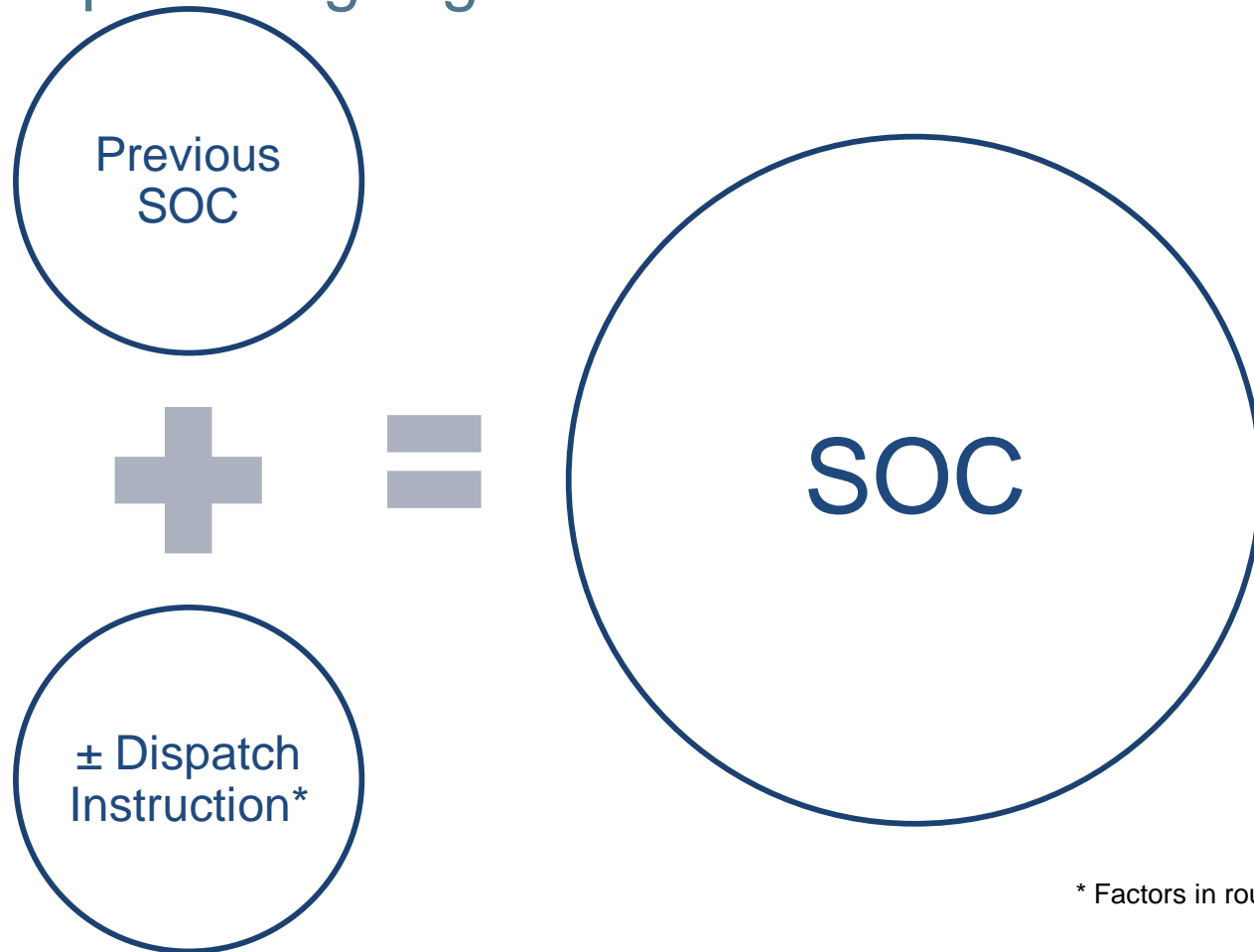
# In today's session we'll cover:



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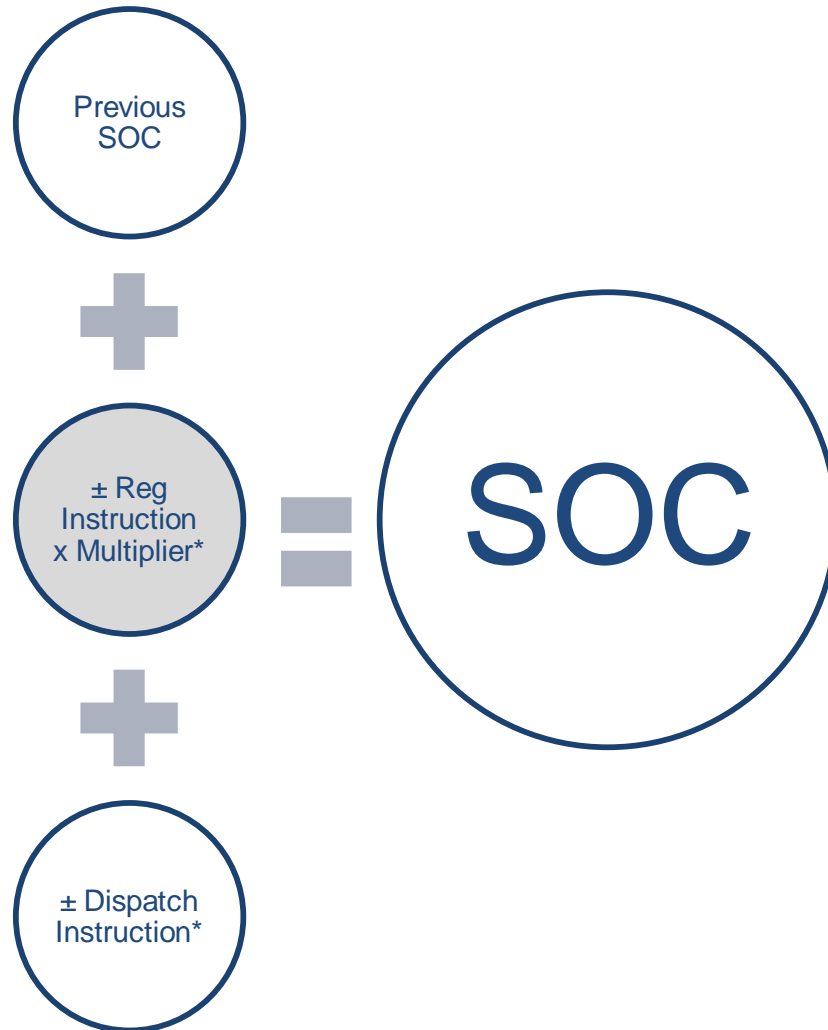


The issue: The state of charge (SOC) optimization does not anticipate the energy that will be gained or lost when providing regulation



\* Factors in round-trip efficiency

# The solution: Consider regulation up and regulation down in the SOC optimization

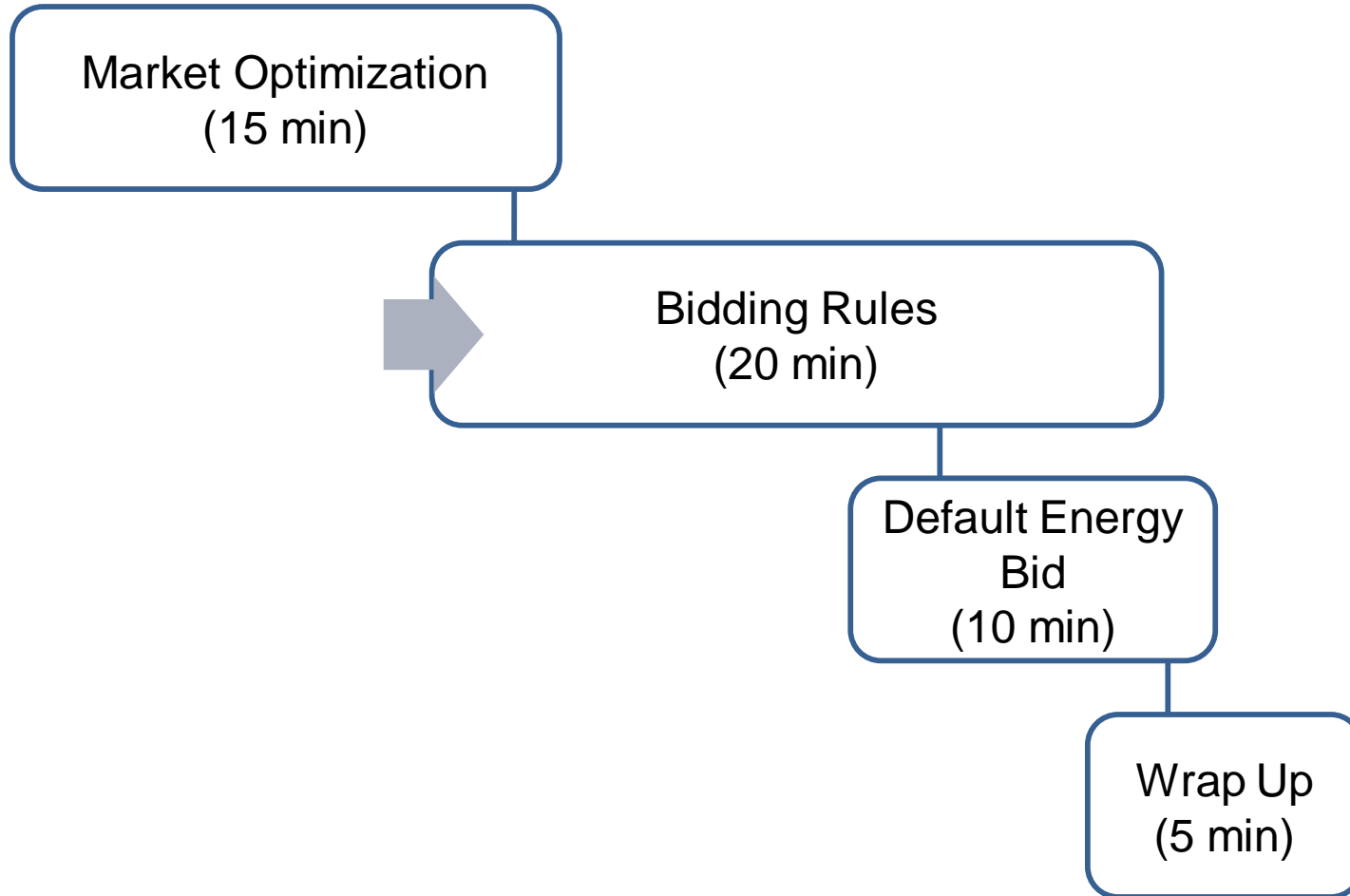


\* Factors in round-trip efficiency

# Q&A



# In today's session we'll cover:



## Storage resources that are awarded ancillary services in the day-ahead market have new bidding rules

In real-time an energy bid is required to cover at least 50% of the AS award, in the opposite direction.

If AS award is for regulation up, spinning reserve or non-spinning reserve

- Real-time energy bid must be for charging

If AS award is for regulation down

- Real-time energy bid must be for discharging

Examples: A storage 48MWh resource with a  $\pm 12$  MW range.

Day-ahead

Real-time

12 MW regulation  
up award

Bid at least 6  
MW of energy to  
charge (negative  
range)

12 MW regulation  
down award

Bid at least 6  
MW of energy to  
discharge  
(positive range)

Examples: A storage 48MWh resource with a  $\pm 12$  MW range.

Day-ahead

8 MW regulation up  
and 8 MW  
regulation down  
awards

Real-time

Bid the remaining  
4 MW of  
discharging and  
charging range as  
energy



Link to Energy Storage Enhancements Final Proposal:  
[FinalProposal-EnergyStorageEnhancements.pdf \(caiso.com\)](#)

## Other details about the real-time energy bids.

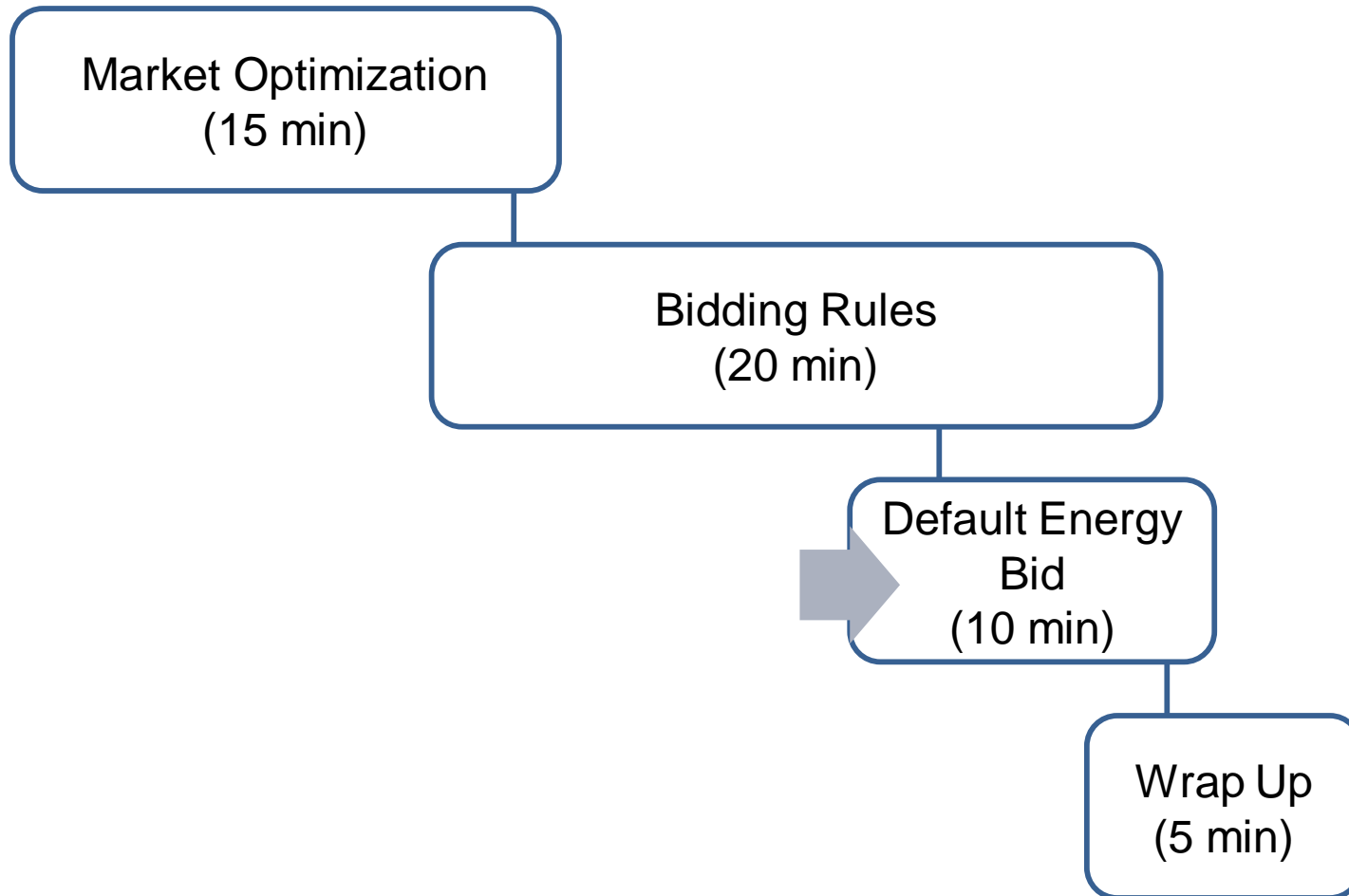
Energy self-schedules are not considered bids for this rule

If SC's energy bid does not equal at least 50% of the AS award, the bid will be extended

If SC does not submit an energy bid in SIBR, a bid will be inserted at the default energy bid price

# Q&A

# In today's session we'll cover:



The issue: There were instances in the day-ahead market when the storage default energy bid (DEB) caused unanticipated results.

(Maximum of the energy cost and zero) plus the variable costs



10% adder



Day-ahead Storage Default Energy Bid

$$DA \text{ Storage DEB} = (\text{MAX}(En_{\delta/\eta}, 0) + \rho) * 1.1$$



The solution: Include opportunity costs in the day-ahead storage DEB formula (mirrors the real-time storage DEB).

The maximum of the opportunity cost and:

(Maximum of the energy cost and zero) plus the variable costs



10% adder

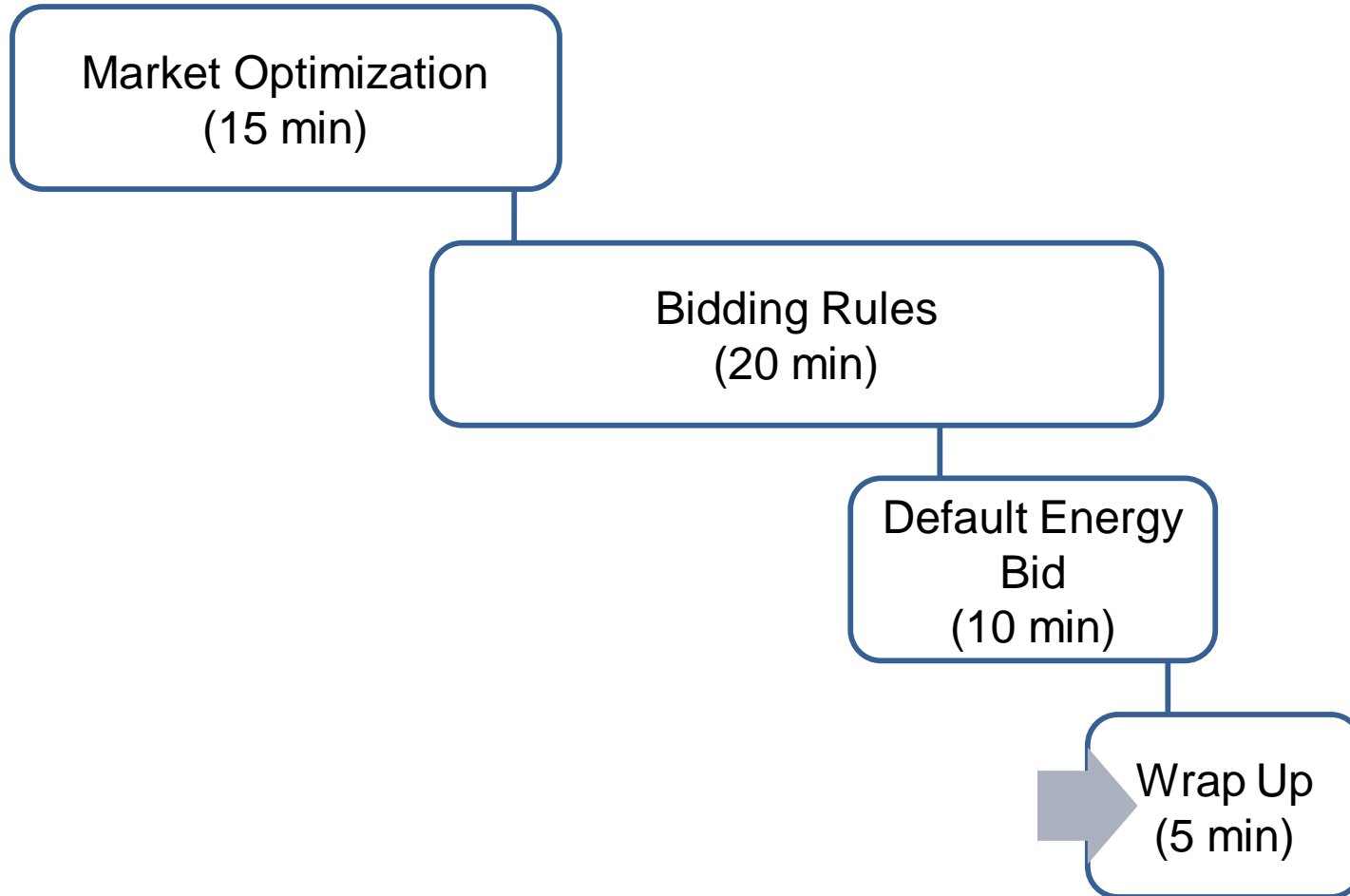


Day-ahead Storage Default Energy Bid

$$DA \text{ Storage DEB} = \text{Max}[(\text{MAX}(En_{\delta/\eta}, 0) + \rho), OC_{\delta}] * 1.1$$

# Q&A

# In today's session we'll cover:



## ESE Track 1– Action Items

- ❑ Attend RUG and TUG meetings

Market sim starts on 05/01/23

- ❑ Attend market sim meetings (started 04/27/23)
- ❑ Submit questions and concerns in CIDI

- ❑ Prior to 6/1/23

- ❑ Submit questions: [CustomerReadiness@caiso.com](mailto:CustomerReadiness@caiso.com).

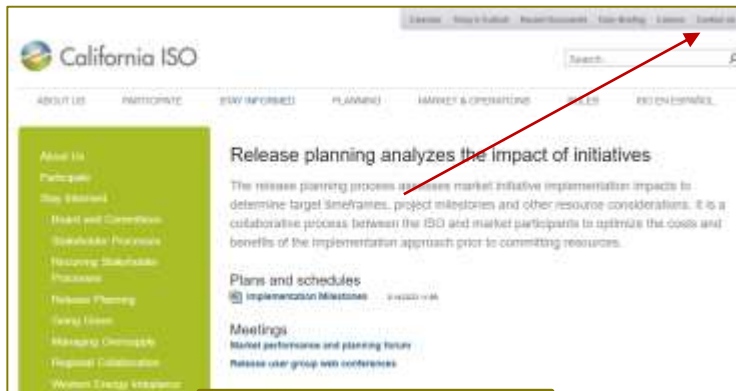
- ❑ After 6/1/23

- ❑ With day-ahead AS awards, submit real-time energy bids that are at least 50% of the day-ahead ancillary service awards in the opposite direction
- ❑ Submit questions and concerns in CIDI

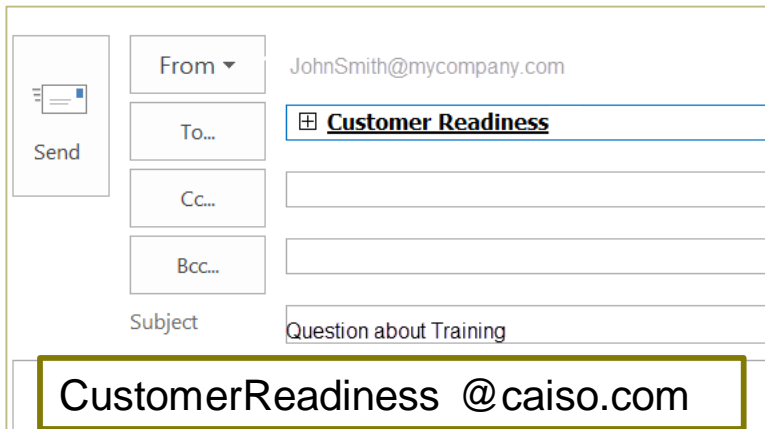


# Final Q&A

# Still have questions?



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Thank you for your participation!