Market Enhancements for Summer 2021 Readiness
Draft Final Proposal

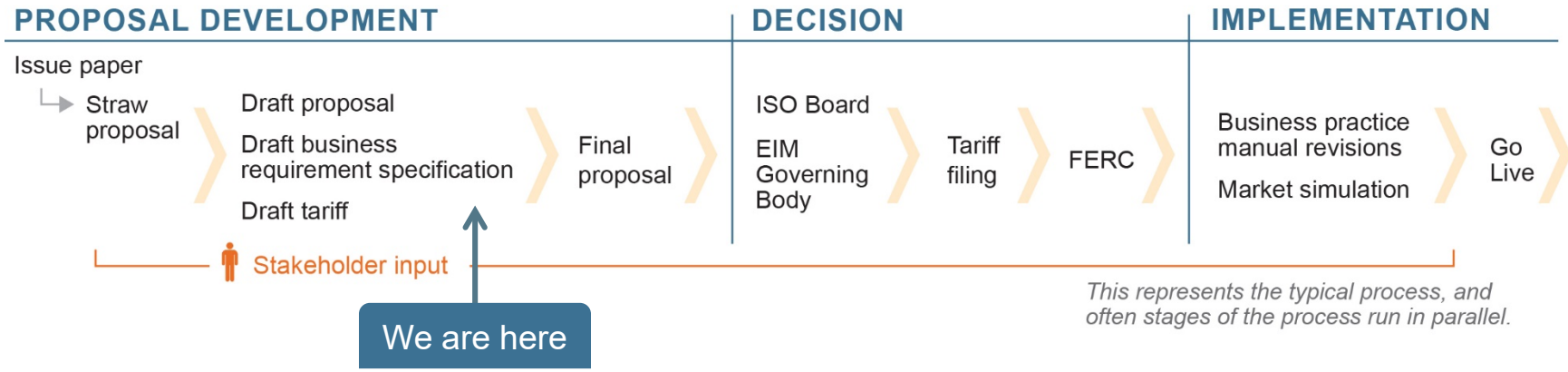
Stakeholder Meeting

February 22, 2021

Agenda

Time	Topic	Presenter
10:00 – 10:05	Welcome and Introduction	Kristina Osborne
10:05 – 10:15	Background and Stakeholder Comments	James Friedrich
10:15 – 12:00	Export, Load, and Wheeling Priorities	James Friedrich
12:00 – 1:00	Lunch	
1:00 – 2:55	Other Topics	Danny Johnson, Danielle Tavel, Perry Servedio, Gabe Murtaugh
2:55 – 3:00	Next Steps	Kristina Osborne

CAISO Policy Initiative Stakeholder Process



BACKGROUND AND STAKEHOLDER COMMENTS

Objectives for this initiative

- Equitably balance the reliability of serving CAISO balancing authority area load with the reliability of exports, while providing open access to the CAISO transmission system
- Better ensure each balancing authority area participates in the EIM with sufficient resources
- Provide improved incentives for supply to be available during tight system conditions
- Address findings in the Final Root Cause Analysis

CAISO proposes enhancements to address:

1. Export, load, and wheeling priorities
2. EIM coordination and resource sufficiency test review
3. Import market incentives during tight system conditions
4. Real-time scarcity price enhancements
5. Reliability demand response dispatch and real-time price impacts
6. Management of storage resources during tight system conditions
7. OASIS report and interconnection process enhancements

Stakeholder comments

Topic	Change from Straw Proposal	Reason for Proposed Change
General	CAISO removed certain items from the scope of this initiative and emphasized implementation feasibility in its decisions on which policies to pursue	Stakeholders were concerned with the feasibility and prudency of making all the changes proposed in the straw proposal this summer and encouraged CAISO to prioritize.
Export, Load, and Wheeling Priorities	PT export scheduling priority set equal to CAISO load	CPUC, IOUs, and CCAs did not support providing PT exports a higher priority than CAISO load and requested additional validation steps to ensure the supply is available through real-time. Validation of designated supply currently does not consider outages, commitment status, or deliverability. Additional validation rules to confirm the generation is available are highly complex and not implementable by summer 2021.
Export, Load, and Wheeling Priorities	Additional attestations that designated resource is contracted and capable of meeting PT export quantity	This addresses concerns that the designated resource may not be forward contracted or is a resource type that is unable to meet an hourly block schedule. This attestation will work in concert with the proposal to notify the scheduling coordinator of the resource whenever it is designated to support an export. The CAISO is creating a new flag in its Master File that the resource scheduling coordinator should select if it is unable to attest to the rules, which will prevent the resource by being designated by a scheduling coordinator of an export. In addition, the designated resource will need to participate in RUC.

Stakeholder comments

Topic	Change from Straw Proposal	Reason for Proposed Change
Export, Load, and Wheeling Priorities	PT export receives high priority into the real-time market based upon the RUC schedule of the designated resource. PT status can be given to exports that designate a resource with non-RA supply above the resource's RUC award.	Clarifies how scheduling coordinators can firm up their RUC schedules into real-time. Also supports eliminating the current practice of providing all RUC export schedules with higher priority than CAISO load in the real-time market
Export, Load, and Wheeling Priorities	Wheel through schedules that are price takers receive the same priority as PT exports	Prior proposal was to set the priority of all wheel through transactions at the LPT export level, which is below load. Some stakeholders expressed concern that this is inconsistent with open access. CAISO evaluated approaches to differentiate wheels between PT and LPT priority if the scheduling coordinator prepaid the wheeling access charge for the month. It was determined that this would not implementable for summer 2021. In addition, the preferred approach to leverage the out-of-balancing authority area load serving entity (OBAALSE) process would only allow monthly participation and import capability that had already been provided to CAISO load serving entities in the annual process.

Stakeholder comments

Topic	Change from Straw Proposal	Reason for Proposed Change
EIM Coordination and Resource Sufficiency Evaluation Review	Unable to prevent resources that cannot be dispatched within the operating hour to count towards the resource sufficiency evaluation capacity test	Considered simple rules to exempt resources from the capacity test, but implementation was not straightforward. In addition, DMM noted these simple rules might result in additional failures that are not warranted because unit commitment decisions can be made based upon the economics the EIM.
EIM Coordination and Resource Sufficiency Evaluation Review	Stakeholders supported a longer-term initiative to review changes to resource sufficiency evaluation	Comprehensive resource sufficiency evaluation discussion on the consequences of failing the tests will be considered in a separate stakeholder process starting in the near future.
Market Incentives for Imports during Tight System Conditions	Provide hourly block imports a make-whole payment versus paying/charging higher of HASP or FMM	Provides scheduling coordinators with real-time market imports additional protection during hours in which the CAISO anticipates an operating reserve deficiency. Incentivizes import offers because it ensures they will receive at least their bid price. Minimal concern about overlapping import/export bids with the make-whole payment option because real-time exports are less likely during periods when the CAISO anticipates an operating reserve deficiency. Alternative options using HASP pricing involved concerns with complex implementation and concerns with interaction with virtual bids.

Stakeholder comments

Topic	Change from Straw Proposal	Reason for Proposed Change
Real-time Scarcity Price Enhancements	Do not scale real-time market's penalty prices relative to a $2000/MWh power balance constraint penalty under tight system conditions.	Stakeholders expressed concern with interaction with proposed FERC Order 831 design. The CAISO determined this approach would require extensive effort to work out complex interactions and other summer 2021 proposals are higher priority given RUC will ensure sufficient supply to meet demand. The upcoming scarcity pricing initiative will address the issue that this proposal sought to address.
System Market Power Mitigation	The CAISO no longer plans to pursue system-level market power mitigation for summer 2021 to focus on the other important changes described in this draft final proposal. The CAISO's current system market power mitigation proposal will be reconsidered in conjunction with the comprehensive scarcity pricing initiative later this year.	Many stakeholders highlighted that the "scarcity pricing" elements considered in this initiative regarding pricing were not balanced with the system market power mitigation proposal and that CAISO and stakeholders should focus on the other proposals targeted at incentivizing supply during tight conditions. Because of the lack of evidence that suppliers have exerted system-level market power even during the most constrained of conditions, it is unreasonable to continue pursuing implementation of a system market power rule this summer at the expense of risking failing to implement other important measures and causing too many disruptions to the market rules this summer.
Reliability Demand Response Dispatch and Real-time Price Impacts	Propose to expand bid dispatchable option from 5 min to 5, 15 and 60 min.	Stakeholders supported proposed changes. These additional changes provide functionality that already is provided by PDRs.

Stakeholder comments

Topic	Change from Straw Proposal	Reason for Proposed Change
Reliability Demand Response Dispatch and Real-time Price Impacts	Propose to enable 5 and 15 min discrete RDRRs to set the price in FMM by treating the resource as discrete in the scheduling run but continuous in the pricing run.	Stakeholders supported proposed changes. This additional change further improves the ability for RDRR to set the price.
Management of Storage Resources during Tight System Conditions	No additional storage changes considered in this initiative.	Enhancements to the minimum state of charge constraint proposal in response to stakeholder concerns will be discussed in the Resource Adequacy Enhancements initiative along with other resource adequacy elements that may be implemented for summer 2021.

EXPORT, LOAD, AND WHEELING PRIORITIES

Proposed enhancements will equitably balance the reliability of serving CAISO BAA load with the reliability of exports, while providing open access to the CAISO transmission system

- Provide equal market priority to:
  - CAISO load
  - Exports supported by non-RA supply contracted to serve load outside the CAISO BAA
  - Wheel through self-schedules across the CAISO BAA
- Modify real-time market's export priorities that are based on RUC schedules

Export priorities – definitions

- **PT (price taker) export** – a self-scheduled export with a designated supporting resource with sufficient non-RA generation bid in the market
- **LPT (lower price taker) export** – a self-scheduled export that does not designate a supporting resource with sufficient non-RA generation bid in the market
- **Economic export** – an export with economic bid
- **RUC export** – any export deemed physically feasible in the residual unit commitment process

Export priorities – additional background

- Market software determines priority order in which various types of self-schedules are curtailed using market parameters known as “penalty prices”.
  - Same scheduling priority → same penalty prices, although they may not be curtailed equally due to congestion, loss factors, etc.
- Currently there are gaps in the process CAISO uses to validate the designated resource has sufficient non-RA supply participating in the market to support the export
  - Not re-verified in real-time
  - Compares RA showing to upper economic limit
  - Does not consider outages, commitment status, or deliverability

Current scheduling priorities

- **Day-Ahead Market**
  1. SS Wheel
  2. PT Export & Load
  3. LPT Export
  4. Economic Export & Economic Wheel
- **Real-Time Market**
  1. SS Wheel
  2. RUC Export
  3. PT Export & Load
  4. LPT Export
  5. Economic Export & Economic Wheel

Summary of changes to straw proposal – Export and load priorities (1 of 2)

- PT exports, load, and wheel throughs have same market priority in IFM/RUC/RTM
- Attestation that designated resource is contracted and capable of meeting PT export quantity
  - Tariff rule that if SC allows a resource to be designated it is affirming that the resource is contracted by the exporter
  - Tariff rule that SC is attesting that the resource is currently capable to support an hourly block schedule in the operating hour equal to the PT export quantity
- Designated resource must participate in RUC
  - Portion of the RUC bid up to the PT export quantity will be at $0.00/MW; portion of the RUC bid above the PT export quantity will be at the RUC bid price

Summary of changes to straw proposal – Export and load priorities (2 of 2)

- PT status in real-time can be provided through:
  - Lower of the designated resource's RUC schedule or day-ahead export RUC schedule because the CAISO automatically generates bids for RUC awards
  - A designated resource bids into the real-time market with available non-RA capacity above the resource's RUC schedule
- If designated resource does not receive a RUC award, SC must re-bid export in real-time market to maintain PT priority

Summary of changes to straw proposal – Wheel through scheduling priorities

- Wheel through self-schedules will receive PT Export priority
  - Proposed enhancements no longer provide highest priority to wheel through self-schedules
  - Planning a stakeholder initiative that will develop a process for suppliers to forward procure wheel through transmission capacity while ensuring RA transmission capability
- If there are self-scheduled imports, CAISO load will be met over a wheel through self-schedule because of the added cost to the objective function of relaxing the import self-schedule at its penalty price.

Proposed scheduling priorities

- **Day-Ahead Market**
  1. PT Export, Load & SS Wheel
  2. LPT Export
  3. Economic Export & Economic Wheel
- **Real-Time Market**
  1. PT Export, Load & SS Wheel
  2. RUC Export w/o Gen
  3. LPT Export
  4. Economic Export & Economic Wheel

Wheel examples in HASP

- Since wheels are hourly block schedules, HASP determines the real-time schedules.

Schedule or Constraint	Penalty Price
New LPT exports	$1150
New PT exports	$1450
RUC exports w/ Gen	$1800 (changing to $1450)
Power balance constraint > 300MW of regulation	$1450
Power balance constraint < 300MW of regulation	$1100
RUC self-schedule import	$-750
Real-time self-scheduled import	$-400

Example

- If a RUC import self-schedule is needed to meet the CAISO load forecast, the cost of not meeting load is $2200. The cost of the wheel is $1450. Load will be served before any RUC or RT wheel.
- If a real-time import self-schedule is needed to meet the CAISO load forecast, the cost of not meeting load is $1850. The cost of the wheel is $1450. Load will be served before any RUC or RT wheel.
- If a real-time import that economically bids less than $0/MWh (such as -$10) is needed to meet the CAISO load forecast, the cost of not meeting load is $1460. The cost of the wheel is $1450. Load will be served before any RUC or RT wheel.
- If a real-time import that economically bids greater than $0/MWh (such as $20) is needed to meet the CAISO load forecast, the cost of not meeting load is $1430. The cost of the wheel is $1450. The RUC or RT wheel will be served before CAISO load.

EIM COORDINATION AND RESOURCE SUFFICIENCY TEST REVIEW

Enhancements – Resource sufficiency evaluation

- Enhance resource sufficiency evaluation to ensure BAAs provide sufficient capacity to meet uncertainty needs in addition to forecasted load
  - Add uncertainty requirement to bid range capacity test
  - Flexible ramping product demand curve may lead to BAAs failing more often and sooner
  - Ensures BAAs do not lean on other BAAs for uncertainty
- Will continue stakeholder discussions on consequences for RSE failure

Enhancements – Resource sufficiency evaluation

- Better coordinate real-time system operations between BAAs in the EIM
- Resolve defects identified in review of August 2020 events
  - Accounting for resource derates/rerates
  - Resolve double counting of mirror resources

IMPORT MARKET INCENTIVES DURING TIGHT SYSTEM CONDITIONS

Proposing a make-whole payment during tight system conditions to incentivize import offers

- CAISO's current import settlement rules may not provide sufficient incentives for suppliers to offer hourly block economic import supply to the CAISO real-time market during tight system conditions
- Real-time market clears hourly block economic import bids based on HASP prices but settles at FMM prices
  - Operator out-of-market actions during tight system conditions tend to lower FMM prices relative to HASP prices
- Suppliers can be at risk of being paid less than their bid price
- Ruled out options based on HASP prices because of implementation complexity but will consider in scarcity pricing initiative

Propose to provide make-whole payment for real-time market hourly block economic imports during tight system conditions

- Tight system conditions defined by pre-established and public operator alerts/warnings
  - Day-ahead alert notice anticipating operating reserve deficiencies OR real-time warning notice indicating operating reserve deficiencies or emergency stages 1-3
- Real-time market imports defined as:
  - Real-time market imports incremental to day-ahead schedules
  - Day-ahead scheduled exports reduced in the real-time market
- Allocate uplift costs similar to real-time bid-cost recovery, i.e. to load, exports, and EIM transfers out

Example of multi-segment hourly block incremental import bid

- Assume tight system conditions based on the criteria described and assume the following:
  - A supplier submits an import bid priced at $100/MWh for 0-50 MW, and $150/MWh for 50-100 MW
  - HASP prices on the applicable intertie are greater than the import bid price and HASP schedules a 100 MW import based on the import bid
  - FMM prices decrease relative to HASP prices and average $90/MWh for the four FMM intervals in the hour

Make-whole payment = 50 MW * ($100-$90/ MWh) + 50 MW * ($150-$90/MWh) = $3,500, which equates to $35/MWh

Example of export scheduled in day-ahead market, rebid in real-time

- Assume tight system conditions have been identified based on the criteria and assume the following:
  - A supplier with 100 MW export scheduled in the day-ahead market rebids the export in the real-time market at $100/MWh
  - HASP prices on the applicable intertie are greater than the export bid price and HASP reduces the export schedule to 0 MW, making it effectively a 100 MW real-time market import
  - FMM prices decrease to an average of $90/MWh for the four FMM intervals in the hour

Make-whole payment = 100 MW * ($100-$90/MWh) = $1,000, which equates to $10/MWh

REAL-TIME SCARCITY PRICE ENHANCEMENTS

Propose to enhance real-time market pricing to better reflect scarcity during tight supply conditions

- Release reserves at bid cap price when short on contingency reserves from generation and resorting to arming load to meet contingency reserve requirement
  - Bid cap will be determined through 831 policy currently under consideration at FERC
- Will send stronger price signals for the need for supply
  - Current market rules can result in market prices decreasing when this occurs
- No longer proposing other change that would have set real-time market's penalty prices relative to $2000/MWh power balance constraint penalty under certain conditions but will continue discussion in the planned scarcity pricing initiative

RELIABILITY DEMAND RESPONSE DISPATCH AND REAL-TIME PRICE IMPACTS

Propose enhancements to reliability demand response to send appropriate price signals when dispatched

- Dispatch RDRR resources in RTPD rather than RTD
  - Dispatching RDRR in RTPD will lead to more efficient market results since the RTPD horizon covers the resources startup + min run time
- Enable 5, 15 min discrete RDRR to set the price in FMM by treating the resource as discrete in the scheduling run but continuous in the pricing run
  - 5-min dispatchable RDRR will be able to set price in RTD and FMM
  - 15-min dispatchable RDRR will be able to set price in FMM
  - 60-min dispatchable RDRR resources will be price takers in RTPD
- Adjust load forecast to recognize RDRR dispatch

MANAGEMENT OF STORAGE RESOURCES DURING TIGHT SYSTEM CONDITIONS

ISO continues to develop a proposal to manage state of charge for storage resources

- ISO expects about 1800 MW of storage capacity available to provide resource adequacy by August
  - There are about 400 MW of storage available for RA capacity currently
  - Most new storage will have an on-line date of August 1
- The minimum state of charge (MSOC) requirement will ensure state of charge availability for evening peak periods
  - Remains a component of the RA Enhancement initiative
  - Will request authority prior to summer 2021, instead of this fall
- This requirement will not be permanent
  - Propose a 2-year sunset period for proposed MSOC requirement
  - A new energy storage enhancements initiative will begin in Q2 2021 to develop a new, market based, tool to procure state of charge from storage resources and provide compensation for that product

The Resource Adequacy Enhancements final proposal includes several modifications to reduce impacts on storage

- Requirement will only be applied on days where needs are critical
  - ISO will use the results from the RUC process to determine days when minimum state of charge will be required
  - Minimums will only be imposed on days when RUC is infeasible
  - Operators will have further opportunity to drop or add requirements in real-time if conditions are different in the real-time market
- Requirements are designed to reduce impact to storage
  - A set of 'critical' hours will be determined by operations, which will be the only hours that the requirement is imposed for
  - Minimums will be imposed on hours directly prior to discharge schedules, and not in hours earlier in the day
- ISO will communicate when requirements are imposed
- ISO is committed to reporting on when the minimum state of charge is used and may estimate impacts to storage resources

OTHER ITEMS

Other items

- OASIS report of gross exports and imports by intertie
- Independent study interconnection enhancements
  - Remove 100MW / 125% cap on behind-the-meter expansion requests
  - Enable the CAISO to award available deliverability temporarily to online projects until earlier-queued project comes online
- Resource adequacy availability incentive mechanism
  - No proposed changes

EIM Governing Body Role

Topic	Approval Classification
Export, load, and wheeling priorities	Advisory
EIM coordination and EIM resource sufficiency test review	Primary
Market incentives for imports during tight system conditions	Not applicable
Real-time scarcity pricing enhancements	Advisory
Reliability demand response dispatch and real-time price impacts	Not applicable

NEXT STEPS

Schedule

Milestone	Date
Draft Final Proposal Posted	February 18, 2021
Stakeholder Meeting	February 22, 2021
Comments Due	February 26, 2021
Post Draft Tariff Language	February 18, 2021
Post Business Requirement Specifications (BRS)	Week of February 22, 2021
Stakeholder Meeting – Tariff and BRS	February 26, 2021
Comments Due – Tariff and BRS	March 3, 2021
Call to Adopt MSC Opinion	TBD
EIM Governing Body Meeting	March 10, 2021
CAISO Board of Governors Meeting	March 24-25, 2021
Implementation	June 1, 2021

Comments

- Submit comments on the draft final proposal and stakeholder call discussion by Feb. 26 using the comment template available on the initiative webpage at https://stakeholdercenter.caiso.com/StakeholderInitiatives/Market-enhancements-for-summer-2021-readiness.