



FERC Order 831 – Emergency, Compliance and Enhancements Initiatives

Cynthia Hinman
Lead Client Trainer
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Agenda

In this training, you will learn about these topics:

- FERC Order 831 Background
- Offer Cap Details
- Maximum Import Bid Price
- Penalty Price Enhancements



Acronyms

Abbreviation	Definition
BAA	Balancing Authority Area
BPM	Business Practice Manual
BRS	Business Requirements Specification
CAISO	California Independent System Operator
CCDEBE	Commitment Costs and Default Energy Bid Enhancements
CIDI	Customer Inquiry, Dispute, and Information System
DA	Day-Ahead Market
DEB	Default Energy Bid
EIM	Energy Imbalance Market
FERC	Federal Energy Regulatory Commission
IFM	Integrated Forward Market
MIBP	Maximum Import Bid Price

Acronyms

Abbreviation	Definition
MLC	Minimum Load Cost
NGR	Non-Generating Resource
NRS	Non-Resource Specific
Pmin	Minimum Load
RA	Resource Adequacy
RSR	Resource Specific Resource
RUC	Residual Unit Commitment
SC	Scheduling Coordinator
SIBR	Scheduling Infrastructure and Business Rules Application
SMEC	System Marginal Cost of Energy
RT	Real-Time Market

FERC 831 Implementation Timeline

2/17/2021: CAISO files emergency provision with FERC to allow for after-the-fact cost recovery on incremental energy costs above the \$1000/MWh bid cap

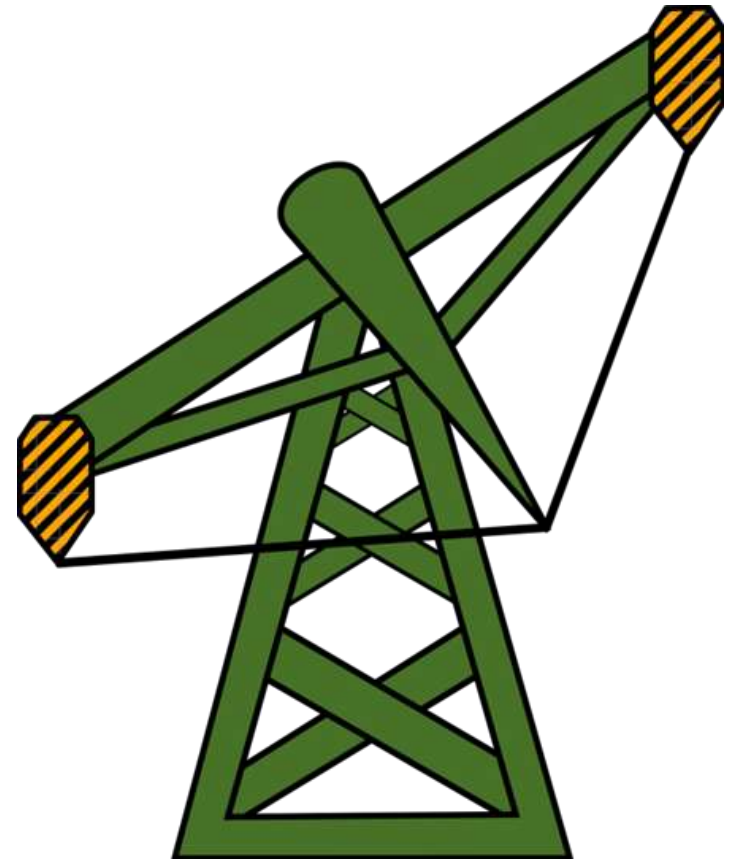
3/20/2021: CAISO implements FERC Order 831 Phase 1 “Compliance” provisions

6/15/2021: CAISO plans to implement FERC Order 831 Phase 2 “Enhancements” provisions

EMERGENCY FERC ORDER EFFECTIVE 2/17/21

Key Points

- Filed in response to extreme weather conditions and ensuing high natural gas prices during mid-February
- Allowed Scheduling Coordinators (SC) to submit fuel or fuel-equivalent costs to the ISO if their incremental energy costs exceeded \$1000/MWh



FERC 831 COMPLIANCE (PHASE 1) EFFECTIVE 3/20/21

Phase 1: Key Points



- Raised the Hard Energy Bid Cap to \$2,000/MWh
 - Market Penalty Parameters are scaled as applicable based on new Hard Energy Bid Cap
- Implemented a Soft Energy Bid Cap of \$1,000/MWh
- Implemented a Minimum Load Cost Hard Cap of \$2,000/MWh
- After-the-fact cost recovery
 - Eligible energy bids above the Hard Energy Bid Cap
 - Eligible minimum load bids above the Minimum Load Cost Hard Cap

Tariff language regarding bid caps

- Hard Energy Bid Cap
 - The maximum Energy Bid price the CAISO will use for purposes of clearing the CAISO Market Processes. The Hard Energy Bid Cap is \$2,000/MWh.
- Soft Energy Bid Cap
 - The maximum Energy Bid price submitted by Scheduling Coordinators for resources, except for Virtual Bids and Bids for Non-Resource-Specific System Resources, the CAISO will use for purposes of clearing the CAISO Market Processes without cost verification pursuant to Section 30.11. The Soft Energy Bid Cap is \$1,000/MWh.
- Minimum Load Cost Hard Cap
 - The maximum Minimum Load Cost used in the CAISO markets. The Minimum Load Cost Hard Cap is \$2,000/MWh, calculated as the resource's Minimum Load Cost divided by its Minimum Load (P_{min}).

Phase 1: Offer Cap Details

- Intertie resources, non-participating load, and virtual supply/demand bids can bid up to \$2,000/MWh with no justification required
- Non-Generating Resources (NGRs) can bid up to \$1,000/MWh
- Resource-Specific Resources can submit bids up to \$1,000/MWh without justification at any time
 - Bids submitted above \$1,000/MWh will be reduced to the maximum of \$1,000/MWh and the resource's DEB as modified by a Reference Level Change Request
 - To modify their DEB, these resources can submit:
 - an automated DEB adjustment via SIBR
 - a manual reference level change request via CIDI

Phase 1: Market Penalty Parameters

- New Market Parameter values for the Integrated Forward Market (IFM), Residual Unit Commitment (RUC), and Real-Time:
 - Scheduling Run values based on \$2000/MWh cap
 - Pricing Run values based on \$2000/MWh cap
- Other penalty prices scaled based on \$2000/MWh Cap
- See Section 6.6.5 of the Market Operations BPM

Phase 1: After-the-Fact Cost Recovery

- Submittal of fuel/fuel-equivalent costs is a similar process to CCDEBE (see Market Instruments BPM Attachment O.3)
- Costs that exceed the Hard Energy Bid Cap or Minimum Load Cost Hard Cap are eligible for after-the-fact cost recovery, if the SC can provide supporting documentation of costs above those values
- Once the updated costs have been received and approved, the ISO will update those costs and the revised cost amounts will be included in the next possible settlements statement
- There is no new charge code or change to existing charge code configuration/calculation, instead:
 - If there is a change to the Minimum Load Cost (MLC) it will impact Bid Cost Recovery settlements
 - If there is a change to the Energy Bid, it will impact both Bid Cost Recovery and Exceptional Dispatch settlements

Questions

FERC 831 ENHANCEMENTS (PHASE 2) PROPOSED EFFECTIVE DATE 6/15/21

Phase 2: Key Points



- Implements various sets of market penalty parameters that will be effective depending on market conditions
- Implements price screening methodology for virtual bids, demand bids, and non-resource-specific system resource (import and export) bids that are more than \$1000/MWh
 - Establishes the Maximum Import Bid Price (MIBP)
 - Differentiation between RA and non-RA Non-Resource Specific System Resource Import Bids

OFFER CAP DETAILS

Phase 2: Offer Cap Details

For the purposes of the next few slides, use the following definitions:

- Routine conditions:
 - the CAISO-calculated Maximum Import Bid Price has not exceeded \$1,000/MWh for any hour, and
 - there are no cost-verified bids greater than \$1,000/MWh for any hour
- High-priced conditions:
 - the CAISO-calculated Maximum Import Bid Price has exceeded \$1,000/MWh for at least one hour, or
 - there is at least one cost-verified bid greater than \$1,000/MWh for any hour

Phase 2: Offer Cap Details (cont.)

- **Non-Resource-Specific (NRS) RA Imports**
 - Routine conditions: NRS RA imports can bid up to \$1,000/MWh
 - High-priced conditions: SIBR will reduce NRS RA import bids priced higher than \$1,000/MWh to the greater of the MIBP or the highest-priced cost-verified bid
- **NRS Non-RA System Resources (Imports and Exports), Virtual Bids, and Demand (Non-Participating Load)**
 - Routine conditions: these resources can bid up to \$1,000/MWh
 - High-priced conditions: these resources can bid up to \$2,000/MWh

Phase 2: Offer Cap Details (cont.)

- Non-Generating Resources (NGRs)
 - Routine conditions: NGRs can bid up to \$1,000/MWh
 - High-priced conditions: NGRs can bid up to \$1,000/MWh
- Resource-Specific (Generating) Resources
 - At any time, resource-specific resources can submit bids above \$1,000/MWh and up to \$2,000/MWh
 - Bids submitted above \$1,000/MWh will be reduced to the maximum of \$1,000/MWh and the resource's DEB as modified by a Reference Level Change Request

Phase 2: No changes to the after-the-fact cost recovery process

MAXIMUM IMPORT BID PRICE

Why is the Maximum Import Bid Price (MIBP) used?

- Used to screen the cost of non-resource-specific import bids over \$1,000/MWh
- Used as one factor to determine how market pricing parameters will be scaled

Let's go through an example of how the MIBP is calculated and then describe how its used.

The calculation for the MIBP looks like this:

$$\text{MIBP} = (\text{Electric Hub Price} * \text{Hourly Energy Price Shaping Factor}) * 1.1$$

Where:

Electric Hub Price = maximum of the Mid-Columbia or Palo Verde day-ahead bilateral electric prices

Hourly Energy Price Shaping Factor =

$$1 + \frac{\text{CAISO Hourly DA SMEC} - \text{CAISO Average DA SMEC}_{\text{on or off-peak hrs}}}{\text{CAISO Average DA SMEC}_{\text{on or off-peak hrs}}}$$

DA SMEC: Day-ahead System Marginal Energy Cost

Example Step 1: Source Electric Hub prices

Example calculation for trade date 9/25/2020

<i>Hub</i>	<i>TOU</i>	<i>Price (\$/MWh)</i>
Mid-Columbia	Peak	150.00
Mid-Columbia	Off-Peak	87.00
Palo Verde	Peak	125.00
Palo Verde	Off-Peak	90.00

- The ISO will use the highest bilateral electric hub price for each peak and off-peak period from either Mid-Columbia or Palo Verde trading hubs for the applicable trade date

Example Step 2: Apply lookback implementation logic to find the most recent high-priced day

- Find the most recent “high-priced day” where DA SMEC was above \$200/MWh for at least one hour
- In this example, the calculation is being performed in the “summer season” and the most recent high priced day was 9/15/20
 - In hour 19 the DA SMEC was \$215/MWh

Summer Season: April 1 – October 31

Winter Season: November 1 – March 31

Further lookback logic is in the BRS Section 7.2

Example: September 15, 2020 (High-priced day)

Hour	DA SMEC (\$/MWh)
1	37
2	35
3	34
4	33
5	35
6	37
7	40
8	35
9	30
10	28
11	31
12	35

Hour	DA SMEC (\$/MWh)
13	38
14	42
15	49
16	55
17	57
18	84
19	215
20	110
21	59
22	50
23	41
24	39

Example Step 3: Calculate the average DA SMEC per peak and off-peak period for high-priced day 9/15/20

<i>Trade Date</i>	<i>TOU</i>	<i>Average DA SMEC (\$/MWh)</i>
9/15/2020	Off-Peak	36.29
9/15/2020	On-Peak	58.47

- Off-Peak: Hours 1 – 6 and 23 – 24
- On-Peak: Hours 7 - 22

Example Step 4: Calculate the Hourly Energy Price Shaping Factor for trade date 9/25 (hours 13 - 24)

Hour	Peak Flag	DA SMEC (\$/MWh)	Shaping Factor
13	On-Peak	47	0.804
14	On-Peak	75	1.283
15	On-Peak	80	1.368
16	On-Peak	120	2.052
17	On-Peak	125	2.138
18	On-Peak	250	4.276
19	On-Peak	400	6.841
20	On-Peak	380	6.499
21	On-Peak	290	4.960
22	On-Peak	150	2.565
23	Off-Peak	140	3.858
24	Off-Peak	100	2.756

$$\text{Shaping Factor} = \frac{1 + \text{CAISO Hrly DA SMEC} - \text{CAISO Avg DA SMEC}_{\text{on/off-peak hrs}}}{\text{CAISO Average DA SMEC}_{\text{on/off-peak hrs}}}$$

Example Step 5: Calculate Day-Ahead Maximum Import Bid Price for trade date 9/25 (hours 13-24)

Hour	Peak Flag	Shaping Factor	Hub Price	Max Import Bid Price (\$/MWh)
13	On-Peak	0.804	150.00	132.63
14	On-Peak	1.283	150.00	211.64
15	On-Peak	1.368	150.00	225.75
16	On-Peak	2.052	150.00	338.63
17	On-Peak	2.138	150.00	352.74
18	On-Peak	4.276	150.00	705.48
19	On-Peak	6.841	150.00	1128.77
20	On-Peak	6.499	150.00	1072.33
21	On-Peak	4.960	150.00	818.38
22	On-Peak	2.565	150.00	423.29
23	Off-Peak	3.858	90.00	381.97
24	Off-Peak	2.756	90.00	272.83

$$\text{MIBP} = (\text{Shaping Factor} * \text{Hub Price}) * 1.1$$

An example using the MIBP

Hour	DA Max Import Bid Price (\$/MWh)	Cost verified bid over \$1000/MWh in day-ahead?	RT Max Import Bid Price (\$/MWh)	Cost verified bid over \$1000/MWh in real-time?
19	1128.77	No	800.00	No
20	1072.33	No	900.00	No

Result:

- The energy offer cap is raised to \$2000/MWh for:
 - Day-ahead market for HE19-20
 - Real-time market for HE19-20
- SIBR will display a notification of new bid cap these hours

For more examples, review the “SIBR Logic” examples in the BRS

SIBR

OASIS – Shaping Factor, Day-Ahead and Real-Time



California ISO

OASIS



ATLAS REFERENCE REPORT DEFINITION PRICES TRANSMISSION SYSTEM DEMAND ENERGY ANCILLARY SERVICES CONGESTION REVENUE RIGHTS PUBLIC BIDS

Date From: 04/01/2021 To: 04/30/2021 Market: DAM Apply Reset

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Hourly Energy Price Shaping Factor

Market	Opr Date	HE01	HE02	HE03	HE04	HE05	HE06	HE07	HE08	HE09	HE10	HE11	HE12	HE13	HE14	HE15	HE16	HE17	HE18	HE19	HE20	HE21	HE22	HE23	HE24	HE25
DAM	04/22/2021	0.72070	0.72070	0.72070	0.75693	0.81619	1.00351	0.74975	0.72874	0.48797	0.39322	0.28414	0.16009	0.10358	0.05151	0.04902	0.10363	0.08829	0.47681	0.70505	0.93858	0.69471	0.68059	1.03537	0.92532	
DAM	04/23/2021	0.72070	0.73061	0.73061	0.75040	0.78229	1.02217	0.81126	0.72382	0.50332	0.35128	0.15961	0.05764	0.01400	0.00245	0.00620	0.05318	0.08829	0.47008	0.78872	1.01557	0.78794	0.81126	1.15001	1.01550	
DAM	04/24/2021	0.72458	0.72070	0.73054	0.76314	0.81619	1.00587	0.76025	0.73145	0.47724	0.29525	0.12726	0.03252	0.01400	0.00016	0.00111	0.03770	0.04483	0.44304	0.64380	0.88586	0.65223	0.64955	1.01338	0.90572	



California ISO

OASIS



ATLAS REFERENCE REPORT DEFINITION PRICES TRANSMISSION SYSTEM DEMAND ENERGY ANCILLARY SERVICES CONGESTION REVENUE RIGHTS PUBLIC BIDS

Date From: 04/01/2021 To: 04/30/2021 Market: RTM Apply Reset

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Hourly Energy Price Shaping Factor

Market	Opr Date	HE01	HE02	HE03	HE04	HE05	HE06	HE07	HE08	HE09	HE10	HE11	HE12	HE13	HE14	HE15	HE16	HE17	HE18	HE19	HE20	HE21	HE22	HE23	HE24	HE25
RTM	04/10/2021	0.60000	0.70000	0.80000	0.90000	1.00000	1.10000	1.20000	1.30000	1.40000	1.50000	1.60000	1.70000	1.80000	1.90000	2.00000	2.10000	2.20000	2.30000	2.40000	2.50000	2.60000	2.70000	2.80000	2.90000	
RTM	04/13/2021	0.02954	0.05542	0.08130	0.10717	0.13305	0.15893	0.11361	0.12952	0.14542	0.16133	0.17724	0.19315	0.20906	0.22496	0.24087	0.25678	0.27269	0.28860	0.30450	0.32041	0.33632	0.35223	0.59885	0.62473	
RTM	04/21/2021	0.72070	0.72070	0.72070	0.75693	0.81619	1.00351	0.74975	0.72874	0.48797	0.39322	0.28414	0.16009	0.10358	0.05151	0.04902	0.10363	0.08829	0.47681	0.70505	0.93858	0.69471	0.68059	1.03537	0.92532	
RTM	04/22/2021	0.06440	0.06440	0.06440	0.06764	0.07293	0.08967	0.12879	0.12518	0.08382	0.06755	0.04681	0.02750	0.01779	0.00885	0.00842	0.01780	0.01517	0.08191	0.12111	0.16123	0.11933	0.11691	0.09252	0.08268	
RTM	04/23/2021	0.72458	0.72070	0.73054	0.76314	0.81619	1.00587	0.76025	0.73145	0.47724	0.29525	0.12726	0.03252	0.01400	0.00016	0.00111	0.03770	0.04483	0.44304	0.64380	0.88586	0.65223	0.64955	1.01338	0.90572	



Questions

PENALTY PRICES

How does this impact penalty prices?

- The ISO proposes to set the power balance penalty price used by the market to \$2,000/MWh and scale related price parameters accordingly, when either of the following conditions occur:
 - Cost verified energy bid submitted from a resource-specific resource over \$1,000/MWh or
 - ISO-calculated Maximum Import Bid Price is over \$1,000/MWh
- Under routine conditions, the power balance penalty price will remain at \$1,000/MWh and all other market constraint penalty prices will remain scaled to \$1,000/MWh

Penalty Parameter Details

- Day-Ahead, IFM
 - Bid cap will be increased to \$2000/MWh and penalty prices scaled based on the new cap all day when specified criteria occurs
 - If one hour qualifies it's applicable for all hours of IFM
- Real-Time
 - Bid cap will be increased to \$2000/MWh and penalty prices scaled based on the new cap for the following applicable times
 - If set for DA market, all hours in real time would apply
 - If not in the DA but shows up in real time, then cap applies for all intervals of overlapping real-time market horizons
 - Has stepped threshold for pricing

Penalty Parameter Details-Threshold

- Real-Time only
- Based on size of infeasibility - meant to scale pricing for varying size of shortage
- Threshold utilizes the BAALow (reliability standard) limit to define the threshold value for each balancing authority area in the EIM
- First segment shortage (greater than 0 but less than the threshold)
 - Price set to higher of soft cap of \$1000/MWh or the highest cleared bid
- Second segment shortage (greater than threshold)
 - \$2000/MWh price cap

OASIS – Constraint Relaxation Threshold



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Date From: 04/01/2021 To: 04/30/2021 BAA [ALL] Apply Reset

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Constraint Relaxation Threshold			
Effective Start Date	Effective End Date	BAA	Constraint Relaxation Threshold
01/01/2021	12/31/2030	AZPS	67.80
01/01/2021	12/31/2030	BCHA	77.20
01/01/2021	12/31/2030	CISO	233.70
01/01/2021	12/31/2030	IPCO	25.80
01/01/2021	12/31/2030	NEVP	43.10
01/01/2021	12/31/2030	PGE	27.00
01/01/2021	12/31/2030	PSEI	24.00
01/01/2021	12/31/2030	SCL	26.70
01/01/2021	12/31/2030	SRP	38.80
01/15/2021	12/31/2030	PACE	61.50
01/15/2021	12/31/2030	PACW	31.50
01/27/2021	12/31/2030	BANC	19.40
01/27/2021	12/31/2030	TIDC	5.50
01/30/2021	12/31/2030	LADWP	39.60
01/30/2021	12/31/2030	NWMT	13.50
01/30/2021	12/31/2030	PNM	25.70

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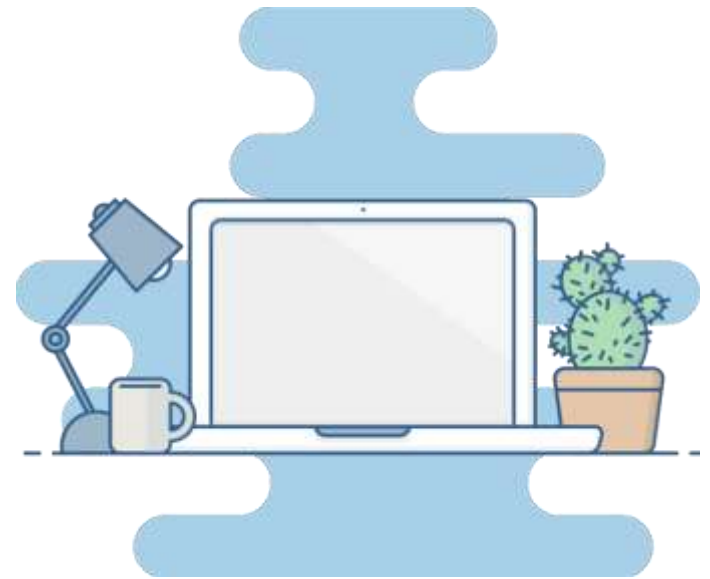


Questions

MARKET SIMULATION

Market Simulation Information

- Market Simulation Training 5/18
 - Structured scenarios will be reviewed
 - <http://www.caiso.com/Documents/MarketSimulationStructuredScenarios-FERCOrder831.pdf>
- Market Simulation Starts 5/25



Summary



- The FERC Order 831 Enhancements project:
 - Implements various sets of market penalty parameters that will be effective depending on market conditions
 - Implements price screening methodology for virtual bids, demand bids, and non-resource-specific system resource (import and export) bids that are more than \$1000/MWh
- Scheduled effective date is 6/15/21

Final Questions



For more detailed information on anything presented, please
visit our website at:

www.caiso.com

Or send an email to:
CustomerReadiness@caiso.com