FERC Order 2222:

New Heterogeneous Distributed Energy Resource Aggregate (HDERA) Type to Support Underlying Distributed Energy Resources (DERs) and Distributed Curtailments Resources (DCRs)

Today's Trainer

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Sr. Customer Readiness Trainer

Updated 09/23/24
- Slide 9: Added clarification
- Slide 26: Modified layout
- Slide 27: New slide to emphasize Concurrence Letter
- Slide 39: New slide to clarify monitoring data submission for MRI-S
- Slide 45-46: Rearranged slide sequence
- Slide 61-62: Added additional reference links and modified the page into two slides

Agenda

- FERC 2222 Background
- Introduce the new Masterfile resource type, ‘HDERA’
- Review impacted applications and processes
- Review Unstructured Market Simulation
- Wrap Up

Who does this impact?

Distributed resource developers, aggregators, and associated Scheduling Coordinator Metered Entities (SCMEs) that are participating in the day-ahead and real-time markets.

Initiative timeline

To learn more about FERC Order 2222, check out the Release Planning page

Background on initiative FERC Order 2222 mandate

FERC ORDER 2222

Seeks to remove barriers for DCR (Distributed Curtailment Resources) participation in RTO/ISO markets.

CAISO SUPPORT

Through its prior initiatives, CAISO already supports DER (Distributed Energy Resource) market participation.

AMEND EXISITING DER POLICY

CAISO will amend its existing DER policy to accommodate FERC Order 2222, which will include reducing the maximum capacity requirement and introducing a new DERA resource type with underlying DCR.

FERC Order 2222 requires RTOs/ISOs to revise the Tariff to establish a DERA participation model

- ❑ Allow DERAs to participate in the markets and establish DERAs as a type of market participant (existing)
- ❑ Allow aggregators to register operational characteristics of a DERA (existing)
- ❑ Establish maximum capacity requirements for DERAs (existing)
- ❑ Allow for coordination between necessary entities (existing)
- ❑ Reduce the minimum aggregate capacity limit of DERs from 500kW to 100kW for a DERA. (new)
- ❑ Address: (existing)
  - Locational requirements
  - Distribution and bidding
  - Data and information
  - Metering and telemetry
  - Modifications to the list of resources in DERA
  - Market participation agreements

New Master File Resource Type

What is HDERA?

DEFINITION

Heterogeneous Distributed Energy Resource Aggregation (HDERA) is an aggregate resource type that must have at least one underlying DCR (Distributed Curtailment Resource)

What is a DERA, DER, and DCR?

Distributed Energy Resource Aggregation (DERA): A resource comprised of one or more Distributed Energy Resources

Distributed Energy Resource (DER): Any resource located on the distribution system, any subsystem thereof, or behind a customer meter in a Utility Distribution Company or a Metered Subsystem

Distributed Curtailment Resources (DCR): DER that provides demand curtailment in a Heterogeneous Distributed Energy Resource Aggregation (HDERA)

New Masterfile Resource Type

HDERA Example

DCR would behave like demand response, providing its supply as the amount of demand curtailment below baseline, while DER injects energy directly onto the grid.

Examples:

HDERA resources may include either:

- DCR + DER (battery storage, rooftop solar)
- DCR (no DER)

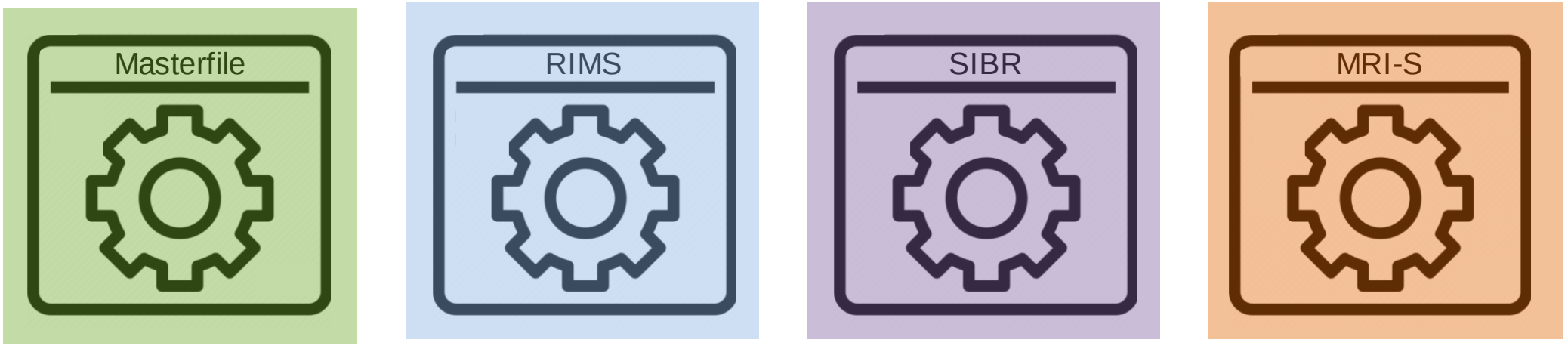
Technology types of generator resources for DER, (associated with either DERA or HDERA resource types):

- Any technology capable of injecting energy to the grid is eligible.
- Certain technology types, however, may be restricted by the local regulatory authorities and may be ineligible to participate as a DCR. CAISO will not need to track those ineligibilities; however, there are specific requirements to track HDERA resource type submissions.

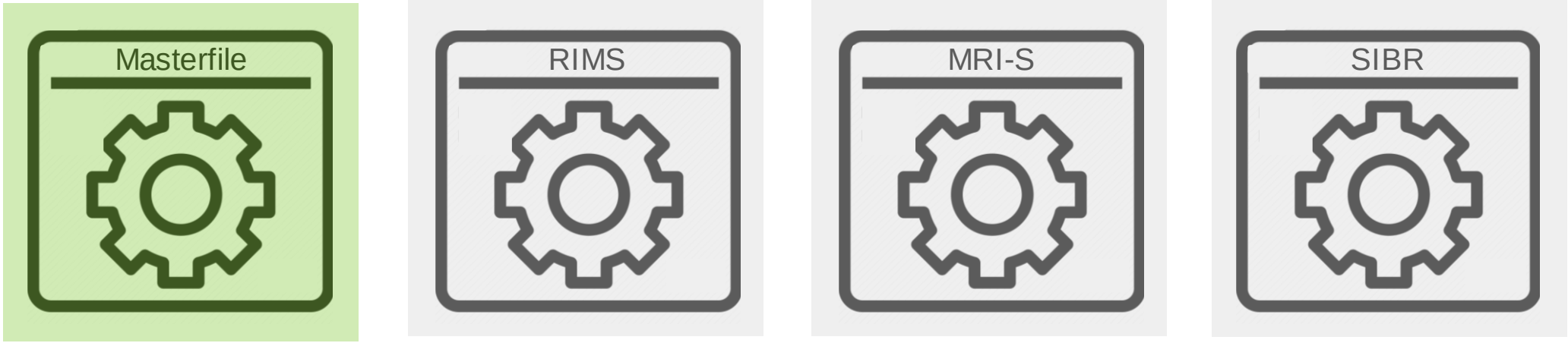
What Questions Do You Have?

Unmute yourself <u>or</u>

Raise your hand



Impacted Applications



Master File

- New fields on the Master File GRDT
- Resource attribute submissions
- System validations and requirements
- How is it modeled?

Update to the Generator Resource Data Template (GRDT)

Adding two new fields on the GRDT **RESOURCE** tab (Reference-only Data)

Masterfile

	A	B	C	BR	BW	BX	BY	BZ	CA	CB
1	PGA Name	Scheduling Coordinator ID	Resource ID	Minimum Load O&M Add	Discrete Dispatch	Bid Dispatchable Option - DR	Distributed Resource Type	Baseline Methodology - HDERA	RMR	Maximum Ramp Rate
2	PGA_NAME	SC_ID	RES_ID	ML_ADDER	DISCRETE_DISP	BID_DISP_OPT	HDERA_YN	BASELINE_METHOD	RMR	MAX_RR
3										
4										
5										
6										
7										
8										

Instruction | Definition-GRDT | Code | **RESOURCE** | RE ...

If flag = N, the resource type is DERA
If flag = Y, the resource type is HDERA
If flag is null, the resource is not DERA or HDERA

Distributed Resource Type
HDERA_Y/N column

PRR 1586 (Market Instrument BPM) - https://bpmcm.caiso.com/Pages/View.PRR.aspx?PRRID=1586&IsDlg=0
Generator Resource Data Template (GRDT) v 18.1 – Draft - https://www.caiso.com/documents/generator-resource-data-template-version-18-1-draft.xlsx

Update to the Generator Resource Data Template (GRDT)

Adding two new fields on the GRDT **RESOURCE** tab (Reference-only Data)

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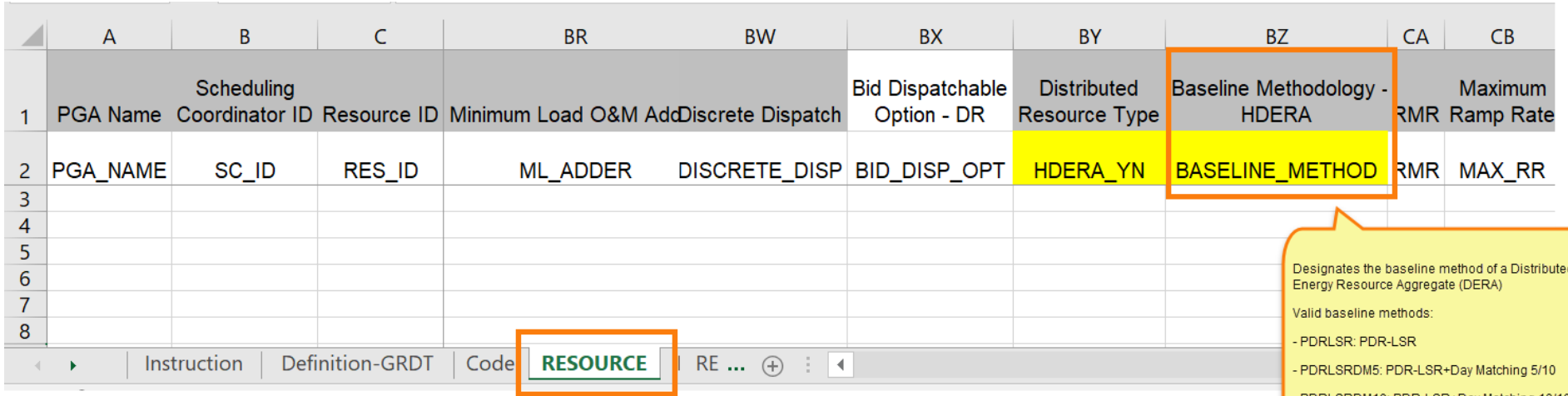


	A	B	C	BR	BW	BX	BY	BZ	CA	CB
1	PGA Name	Scheduling Coordinator ID	Resource ID	Minimum Load O&M Add	Discrete Dispatch	Bid Dispatchable Option - DR	Distributed Resource Type	Baseline Methodology - HDERA	RMR	Maximum Ramp Rate
2	PGA_NAME	SC_ID	RES_ID	ML_ADDER	DISCRETE_DISP	BID_DISP_OPT	HDERA_YN	BASELINE_METHOD	RMR	MAX_RR
3										
4										
5										
6										
7										
8										

Instruction | Definition-GRDT | Code | **RESOURCE** | RE ...

Designates the baseline method of a Distributed Energy Resource Aggregate (DERA)

Valid baseline methods:

- PDRLSR: PDR-LSR
- PDRLSRDM5: PDR-LSR+Day Matching 5/10
- PDRLSRDM10: PDR-LSR+Day Matching 10/10
- PDRLSRWM: PDR-LSR+Weather Matching
- PDRLSRDMC: PDR-LSR+Day Matching Combined
- MGODM5: MGO+Day Matching 5/10
- MGODM10: MGO+Day Matching 10/10
- MGODMC: MGO+Day Matching Combined
- MGOWM: MGO+Weather Matching
- WM: Weather Matching
- MGO: Meter Generation Output
- DMC: Day Matching Combined
- DM10: Day Matching 10/10
- DM5R: Day Matching 5/10 (Residential Only)
- CG: Control Group

Baseline Methodology – HDERA
BASELINE_METHOD column

PRR 1586 (Market Instrument BPM) - https://bpmcm.caiso.com/Pages/View.PRR.aspx?PRRID=1586&IsDlg=0
Generator Resource Data Template (GRDT) v 18.1 – Draft - https://www.caiso.com/documents/generator-resource-data-template-version-18-1-draft.xlsx

Update to the MFRD – Technical Specification

Published **MFRD Technical Specification Version 8.4.1** for Independent 2024 Release

- ❑ Added below 2 new elements in RegisteredGenerator class in GeneratorRDT_v5.xsd
  - baselineMethodology
  - HDERAFlag

- ❑ Updated **Technical Specification Version 8.4.1** can be found at:
  - Clean version
    https://developer.caiso.com/Artifacts/MFRD/TechSpecs/Master%20File%20Technical%20Specification%208.4.1.pdf

  - Redline version
    https://developer.caiso.com/Artifacts/MFRD/TechSpecs/Master%20File%20Technical%20Specification%208.4.1%20 REDLINE.pdf

ISO Developer Site: https://developer.caiso.com/Pages/default.aspx

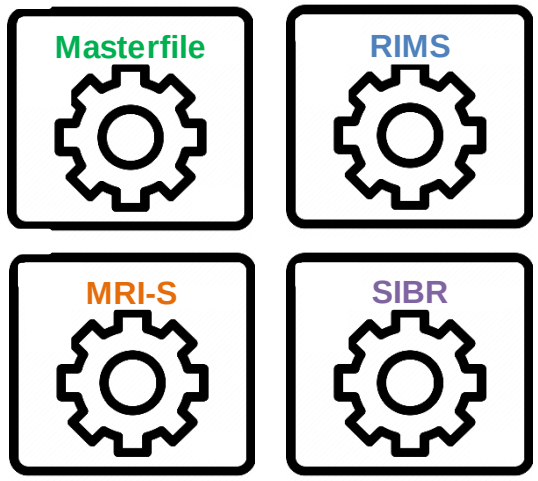
Update to the Generator Resource Data Template (GRDT)

HDERA/DERA resource attributes

Master File contains the following DERA/HDERA resource attributes to downstream systems (as applicable)

Resource data may include (but is not limited to):

- Scheduling Coordinator ID
- Resource ID
- HDERA_YN flag
- Baseline Methodology
- Pnode(s)
- Default GDF(s)
- SubLAP



Downstream systems

DERA and HDERA resource attribute submissions

- Master File **can only receive** DERA and HDERA resource attributes through the existing New Resource Implementation (NRI) process

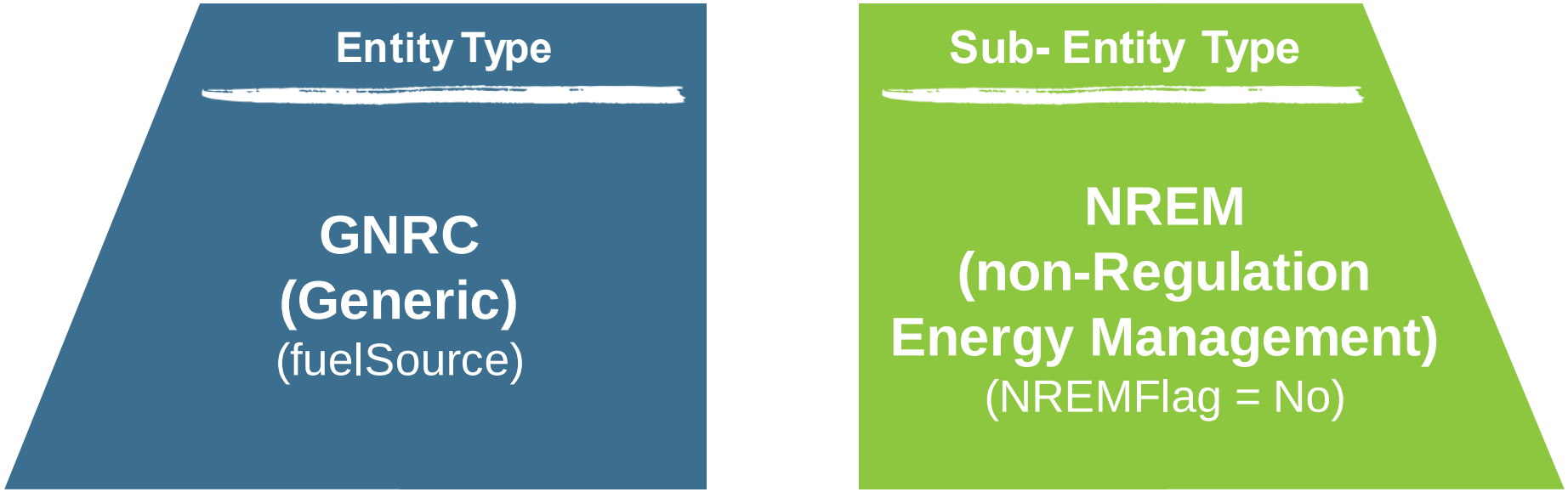
- DERA/HDERA resource data **modifications** (e.g. changes to Baseline Methodology, GDF, DCR/DER locations, etc.) must also follow the same NRI process

- Any **submission of DERA and HDERA Master File data will be rejected** if submitted through the following methods:
  - Master File GRDT xls template
  - Master File submitGeneratorRDT API

DERA/HDERA resources are modeled as generic NGRs

Masterfile

Master File models the DERA/HDERA resources as generic NGRs (non-generating resources)



GDFs applicable to HDERA/DERA aggregates

Master File defines the default Generation Distribution Factors (GDFs) that apply to the HDERA/DERA aggregates

When are Default GDFs designated for DERA and HDERA resources?

- During the NRI process and will be read-only in the GRDT and submitResourceGRDT web service

Are there any restrictions?

- Only a single GDF is allowed per Pnode
- If new resource-level GDFs are not submitted with hourly/daily IFM/RTM bids in SIBR, SIBR will use the default value in Masterfile

Pmax validation requirement for DERA & HDERA resources

Each DERA and HDERA resource must have a **Pmax greater or equal than 100 kW** in aggregate

Note: Master File will reject the request if it does not meet the requirement

4.6.3.2 Exemption for Generating Units Less Than One (1) MW

A Generator with a Generating Unit directly connected to a Distribution System will be exempt from compliance with this Section 4.6 and Section 10.1.3 in relation to that Generating Unit provided that (i) the rated capacity of the Generating Unit is less than one (1) MW, and (ii) the Generator does not use the Generating Unit to participate in the CAISO Markets. This exemption in no way affects the calculation of or any obligation to pay the appropriate charges or to comply with all the other applicable Sections of this CAISO Tariff. A Generating Unit with a rated capacity of less than 500 kW, unless the Generating Unit is (a) participating in an aggregation agreement approved by the CAISO or (b) a storage resource with a rated capacity of 100 kW or more, is not eligible to participate in the CAISO Markets and the Generator is not a Participating Generator for that Generating Unit.

With regard to any Generating Unit directly connected to a UDC system, a Participating Generator shall comply with applicable UDC tariffs, interconnection requirements and generation agreements. With regard to a Participating Generator's Generating Units directly connected to a UDC system, the CAISO

Retrieve DERA/HDERA attributes via the GRDT spreadsheet or webservices

Masterfile

Initial HDERA resource attributes must be submitted through the NRI process

Master File will display **DERA** and **HDERA** resource attributes for associated SCs to download and/or retrieve via GRDT webservices or spreadsheet.

Baseline methodology for HDERA resources

Master File shall indicate the assigned baseline methodology used for HDERA resources via GRDT

Baseline methodology will be uploaded to Master File through the NRI process once the methodology is approved for the resource

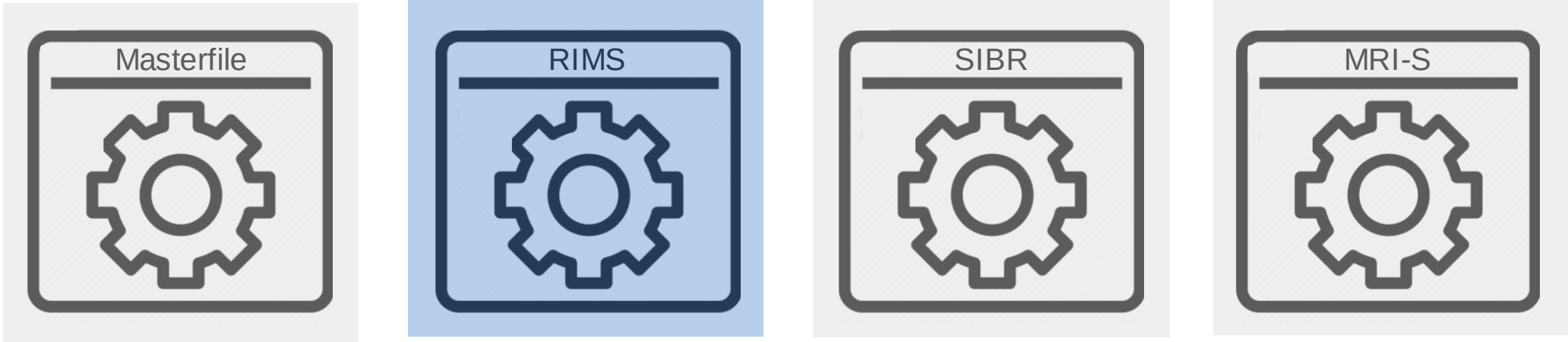
Note: HDERA data will be read-only in both the Generator Resource Data Template (GRDT) and submitResourceGRDT web service

What Questions Do You Have?

Unmute yourself

or

Raise your hand



Resource Interconnection Management System (RIMS)

- Initiation of the Distributed Energy Resource Provider Agreement
- Project Detail Form requirements
- Baseline methodology approval
- Modification of existing data

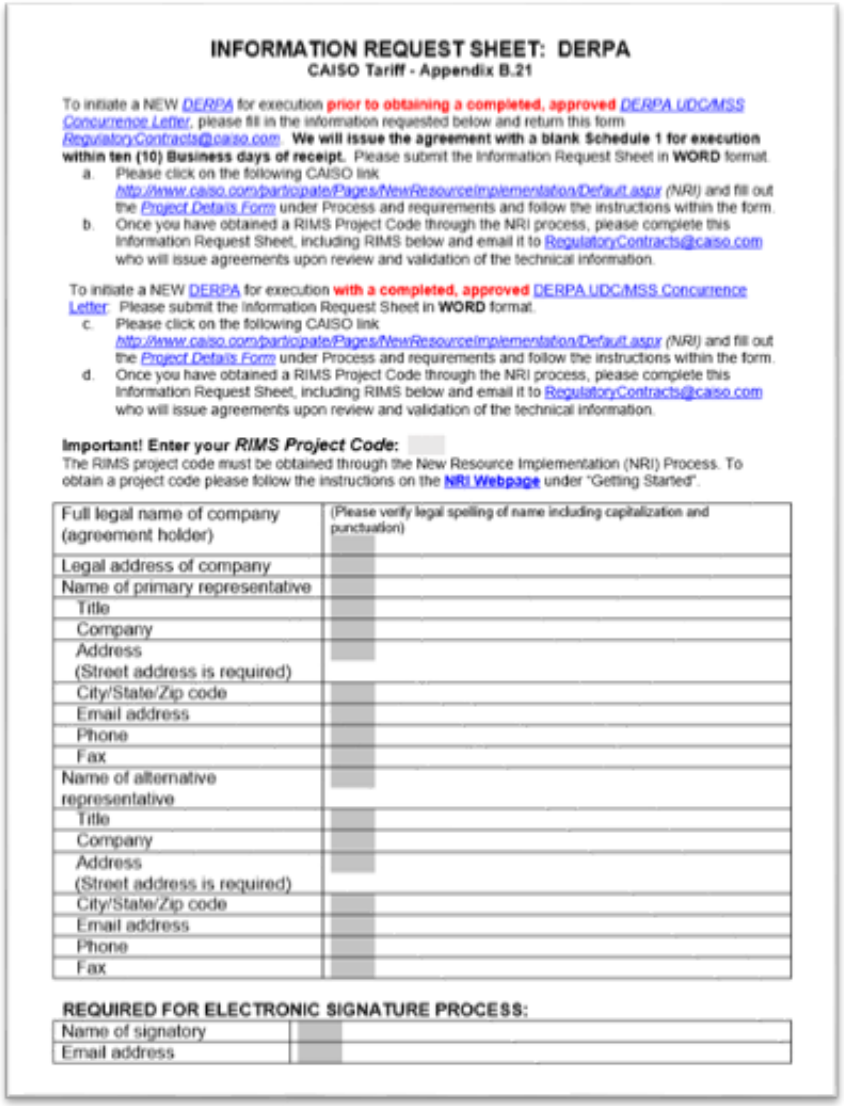
Initiation of the Distributed Energy Resource Provider Agreement

DERPA Information Request Sheet

RIMS

To initiate a new **Distributed Energy Resource Provider Agreement (DERPA)**, Regulatory Contracts must:

- ✓ Receive a DERPA Information Request Sheet
- ✓ Process the UDC/MSS Concurrence Letter with resource information listed on attachment A.
- ✓ Execute the DERPA with blank Schedule 1
- ✓ Send a copy the pdf to the customer once the DERPA is fully completed



INFORMATION REQUEST SHEET: DERPA
CAISO Tariff - Appendix B.21

To initiate a NEW DERPA for execution **prior to obtaining a completed, approved** DERPA UDC/MSS Concurrence Letter, please fill in the information requested below and return this form RegulatoryContracts@caiso.com. **We will issue the agreement with a blank Schedule 1 for execution within ten (10) Business days of receipt.** Please submit the Information Request Sheet in **WORD** format.

a. Please click on the following CAISO link http://www.caiso.com/participate/Pages/NewResourceImplementation/Default.aspx (NRI) and fill out the Project Details Form under Process and requirements and follow the instructions within the form.
b. Once you have obtained a RIMS Project Code through the NRI process, please complete this Information Request Sheet, including RIMS below and email it to RegulatoryContracts@caiso.com who will issue agreements upon review and validation of the technical information.

To initiate a NEW DERPA for execution **with a completed, approved** DERPA UDC/MSS Concurrence Letter: Please submit the Information Request Sheet in **WORD** format.

c. Please click on the following CAISO link http://www.caiso.com/participate/Pages/NewResourceImplementation/Default.aspx (NRI) and fill out the Project Details Form under Process and requirements and follow the instructions within the form.
d. Once you have obtained a RIMS Project Code through the NRI process, please complete this Information Request Sheet, including RIMS below and email it to RegulatoryContracts@caiso.com who will issue agreements upon review and validation of the technical information.

Important! Enter your *RIMS Project Code*:
The RIMS project code must be obtained through the New Resource Implementation (NRI) Process. To obtain a project code please follow the instructions on the **NRI Webpage** under "Getting Started".

Full legal name of company (agreement holder)	(Please verify legal spelling of name including capitalization and punctuation)
Legal address of company	
Name of primary representative	
Title	
Company	
Address (Street address is required)	
City/State/Zip code	
Email address	
Phone	
Fax	
Name of alternative representative	
Title	
Company	
Address (Street address is required)	
City/State/Zip code	
Email address	
Phone	
Fax	

REQUIRED FOR ELECTRONIC SIGNATURE PROCESS:

Name of signatory	
Email address	

Initiation of the Distributed Energy Resource Provider Agreement

Concurrence Letter Submission

RIMS

Customer to send **Regulatory Contracts** a request for the DERA Schedule 1 after they are in the NRI process:

- ✓ Contact NRI for project information
- ✓ Add information in Schedule 1 from UDC/MSS concurrence letter attachment A (see screenshot)
- ✓ SC information is captured on the Entity (DERPA agreement holder) MSASC Schedule 1
- ✓ RDT approval required
- ✓ Place RDT approved email response in *Historical*
- ✓ Send customer copy of updated and completed Agreement

Concurrence Letter Submission Sample

RIMS

ATTACHMENT A
(In lieu of Schedule 1 tendering)
DISTRIBUTED ENERGY RESOURCE PARTICIPATION
(MASTER FILE RELEVANT INFORMATION WILL BE INSERTED INTO THE DERPA SCHEDULE 1 BY THE ISO)

1) Distributed Energy Resource Aggregation Name (DERA):									
List of DERs in the aggregation	UDC or MSS	SubLAP	Type of Resource	Net Capacity[1]	Location Address	Location City	Location Zip	EfftDt	Service Account # (Not used by ISO)

Aggregators/SCMEs must provide info for each underlying DCR/DER component for the HDERA resource.

SAMPLE BELOW

1) Distributed Energy Resource Aggregation Name (DERA): NorCalEVtransportaion									
List of DERs in the aggregation	UDC or MSS	SubLAP	Type of Resource	Net Capacity[1]	Location Address	Location City	Location Zip	Effective Date	Service Account # (Not used by ISO)
Location A	NorthUDC	PGSF	Storage	.75MW[1]	123 First Blvd	San Bruno	94066	7/1/16 – ()	NoABC-1234
Location B	NorthUDC	PGSF	PV	.25MW[1]	ABC Bay Street	San Francisco	94114	7/1/16 – 7/1/17	NoDEF-5678
2) Distributed Energy Resource Aggregation Name (DERA): SoBayIEVtransportaion									
List of DERs in the aggregation	UDC or MSS	SubLAP	Type of Resource	Net Capacity[1]	Location Address	Location City	Location Zip	Effective Date	Service Account # (Not used by ISO)
Location A	NorthUDC	PGSB	Storage	.50MW[1]	1000 Second Lane	Milpitas	95035	8/1/16 – ()	SoGE001234
Location B	NorthUDC	PGSB	EV	.50MW[1]	1234567 So Bay Rd	Sunnyvale	94089	8/1/16 – 7/1/17	SoGE005678

Important: Not only is the Concurrence Letter required for a new DERA resource type, but it is also required anytime the information listed above changes. This form must be submitted to RegulatoryContracts@caiso.com for approval.

Project Details Form

Requirements for HDERA and DERA Resources

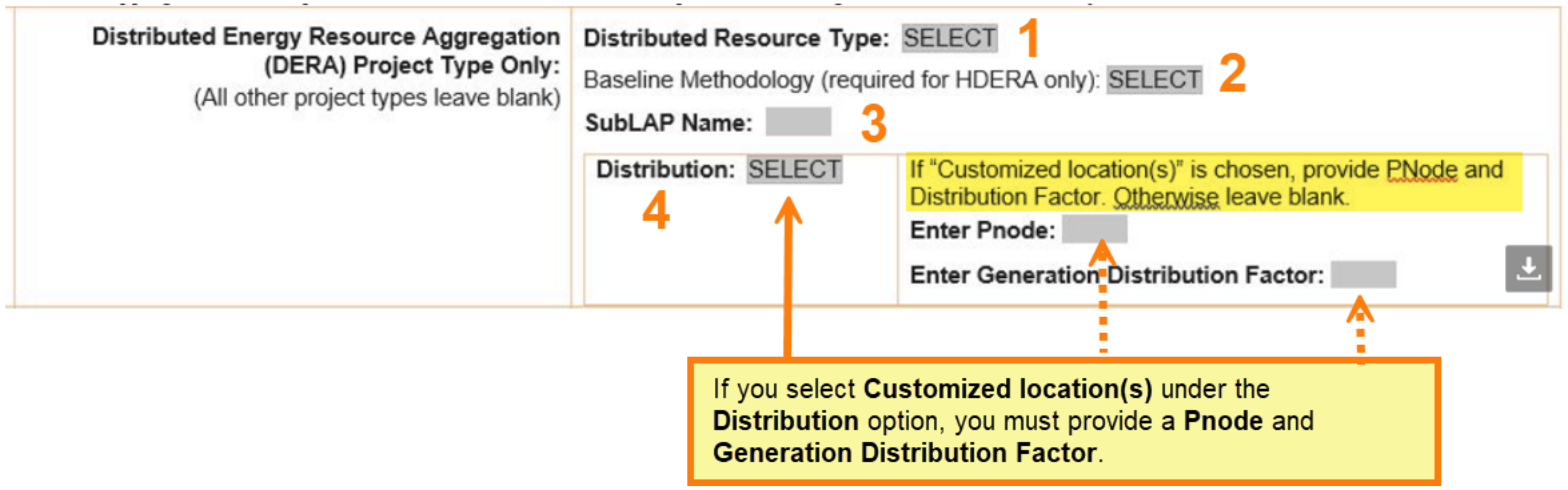
RIMS

1. Select the **Distributed Resource Type** (required) Indicate HDERA or DERA

2. Select the **Baseline Methodology** (required) for HDERA only not DERA)

3. Enter the **SubLAP Name** (required) All underlying locations must be associated w/in the same SubLAP

4. Select the **Distribution** (Predefined/Customized) If the 'Customized location(s)' is chosen, the **Pnode** and **Generation Distribution Factor** info must be provided. The total sum of the resources GDF must equal 1.



Project Details Form

Maximum nameplate and required field validations

RIMS will validate each DERA and HDERA aggregate resource to ensure it has a maximum Nameplate MW >= 0.1 MW

- If the value is invalid, the system will display a yellow banner error message
- The maximum capacity value may not be saved until a valid setting is submitted or the submission is cancelled

Note: If any of the required fields are not populated/selected, RIMS will not allow the user to save changes and will post relevant fail errors in the user display's yellow banner.

Baseline methodology

Approval prior to uploading to Master File

RIMS

All **HDERA Scheduling Coordinator Metered Entities (SCMEs)** submitting resource-level Baseline Methodologies in the Project Details display form **must receive an ISO approval** of their selected baseline methodology prior to uploading to Master File.

Requirements for modifying existing HDERA resource information

DERP/SC wanting modifications to technical details of an existing HDERA resource
Changes may only be processed by initiating the concurrence submission process, where updated data is provided to the ISO.

Examples of modifications include *(not limited to)*:

- New/removed underlying locations
- Modified maximum capacity amount
- New baseline methodology
- Change in resource SC

If the updated resource's technical characteristics no longer support HDERA qualification the resource technical data must be updated accordingly by the DERP/SC.

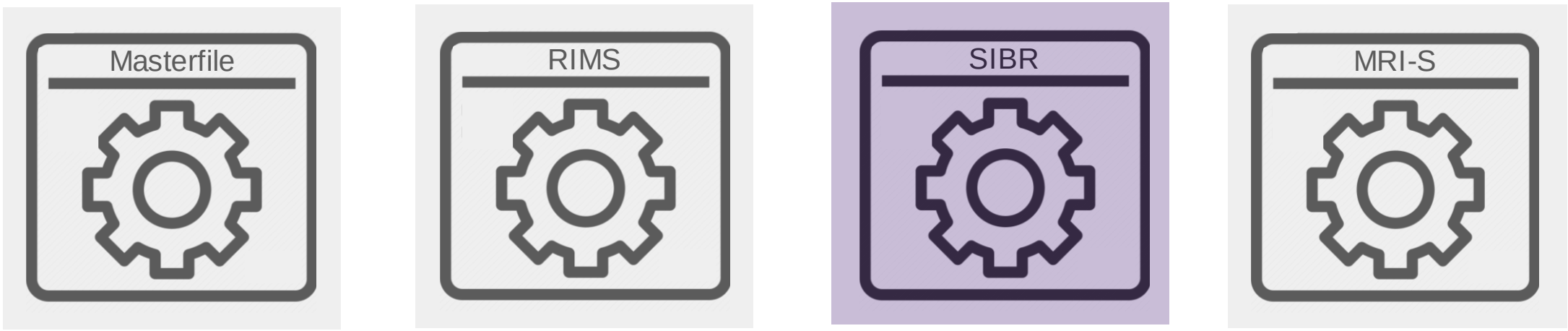
Example of this could be:

- No underlying DCR resources are present or the aggregate max capacity of the resource falls below 100 kW.

What Questions Do You Have?

Unmute yourself <u>or</u>

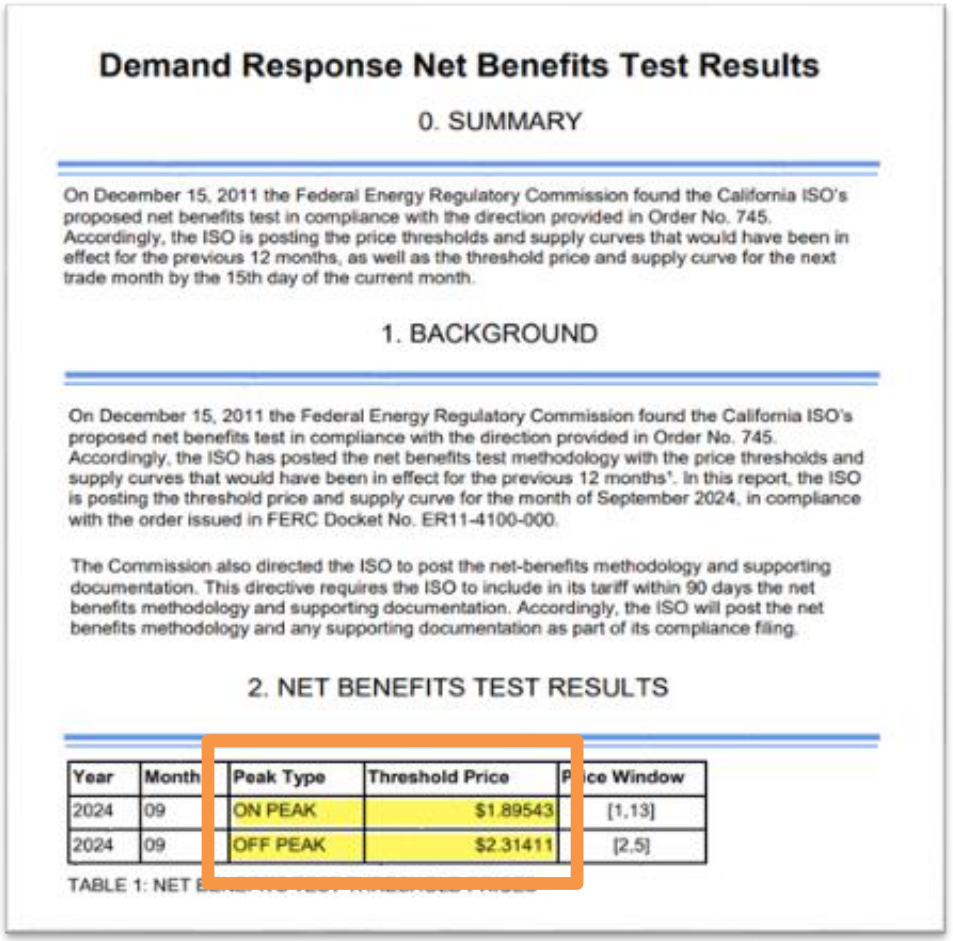
Raise your hand



Scheduling Interface Business Rules (SIBR)

- Master File resource attributes
- Net benefit test
- GDF submission

Apply Net Benefit Test to all HDERA resource bid submission



Demand Response Net Benefits Test Results

0. SUMMARY

On December 15, 2011 the Federal Energy Regulatory Commission found the California ISO's proposed net benefits test in compliance with the direction provided in Order No. 745. Accordingly, the ISO is posting the price thresholds and supply curves that would have been in effect for the previous 12 months, as well as the threshold price and supply curve for the next trade month by the 15th day of the current month.

1. BACKGROUND

On December 15, 2011 the Federal Energy Regulatory Commission found the California ISO's proposed net benefits test in compliance with the direction provided in Order No. 745. Accordingly, the ISO has posted the net benefits test methodology with the price thresholds and supply curves that would have been in effect for the previous 12 months'. In this report, the ISO is posting the threshold price and supply curve for the month of September 2024, in compliance with the order issued in FERC Docket No. ER11-4100-000.

The Commission also directed the ISO to post the net-benefits methodology and supporting documentation. This directive requires the ISO to include in its tariff within 90 days the net benefits methodology and supporting documentation. Accordingly, the ISO will post the net benefits methodology and any supporting documentation as part of its compliance filing.

2. NET BENEFITS TEST RESULTS

Year	Month	Peak Type	Threshold Price	ce Window
2024	09	ON PEAK	$1.89543	[1,13]
2024	09	OFF PEAK	$2.31411	[2,5]

TABLE 1: NET

SIBR will apply Net Benefit Test to all HDERA resource bid submissions using the same price threshold as for PDRs.

SIBR rule to only accept bids at or above the Net Benefits Test price for these resources.

If a resource is flagged as HDERA they are subject to the price in the bid to be above the Net Benefit floor price for On or Off Peak.

GDF submissions from its associated SC

SIBR UI & API

- Accepts DERA/HDERA resource GDF with hourly/daily bid submission from its associated SC.
  - Only one set of GDFs may be submitted for a given hour.
  - If no GDFs are submitted, default Master File GDFs shall apply.

Master File GDFs *(determined during the NRI process in RIMS)*

- Used by default unless the SC assigns new GDFs with the hourly bid submission.
- The only time the NRI process would need to be re-initiated is if the HDERA is modified.

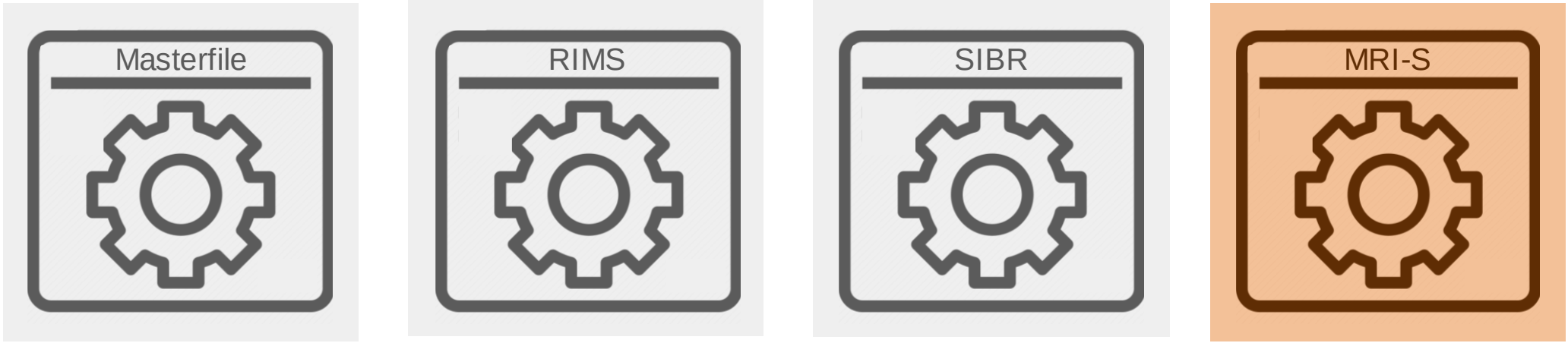
  Examples of modification include *(not limited to)*:
  - Removal or addition of underlying DER/DCR
  - Changes to HDERA or DER/DCR capacities
  - Changes in ownership or SC
  - Modified baseline methodology

What Questions Do You Have?

Unmute yourself

or

Raise your hand



Market Results Interface – Settlements (MRI-S)

- Metering measurement data submission for HDERA and DERA
- Sample equations on how the HDERAs' combined baseline are calculated
- Metering and monitoring measurement data

Metering measurement data submission for HDERA and DERA resources

MRI-S

For **Meter data** file submission, the measurement type (MSMT_TYPE) should be ‘GEN’ (Generation) for DERA and HDERA resources.

There are **no** change to the process for uploading meter data values for DERA or HDERA resources via API and UI.

Sample meter measurement data CSV file submission

	A	B	C	D	E	F	G
1	RES_ID	MSMT_TYPE	INTERVAL_END_TIME	VALUE	UOM	INTERVAL_LENGTH	MSMT_QU
2	ABC_TEST1_123	GEN	2024-07-12T09:00:00.000+00:00	6000.22	k	60	A
3	ABC_TEST1_123	GEN	2024-07-12T10:00:00.000+00:00	6001.23	k	60	A
4	ABC_TEST1_123	GEN	2024-07-12T11:00:00.000+00:00	6002.5	k	60	A
5	ABC_TEST1_123	GEN	2024-07-12T12:00:00.000+00:00	6003.597	k	60	A
6	ABC_TEST1_123	GEN	2024-07-12T13:00:00.000+00:00	6004.737	k	60	A
7	ABC_TEST1_123	GEN	2024-07-12T14:				A
8	ABC_TEST1_123	GEN	2024-07-12T15:				A
9	ABC_TEST1_123	GEN					A
10	ABC_TEST1_123	GEN					A
11	ABC_TEST1_123	GEN	2024-07-12T18:				A
12	ABC_TEST1_123	GEN	2024-07-12T19:00:00.000+00:00	6011.577	k	60	A
13	ABC_TEST1_123	GEN	2024-07-12T20:00:00.000+00:00	6012.717	k	60	A
14	ABC_TEST1_123	GEN	2024-07-12T21:00:00.000+00:00	6013.857	k	60	A
15	ABC_TEST1_123	GEN	2024-07-12T22:00:00.000+00:00	6014.997	k	60	A
16	ABC_TEST1_123	GEN	2024-07-12T23:00:00.000+00:00	6016.137	k	60	A
17	ABC_TEST1_123	GEN	2024-07-13T00:00:00.000+00:00	6017.277	k	60	A
18	ABC_TEST1_123	GEN	2024-07-13T01:00:00.000+00:00	6018.417	k	60	A
19	ABC_TEST1_123	GEN	2024-07-13T02:00:00.000+00:00	6019.557	k	60	A
20	ABC_TEST1_123	GEN	2024-07-13T03:00:00.000+00:00	6020.697	k	60	A
21	ABC_TEST1_123	GEN	2024-07-13T04:00:00.000+00:00	6021.837	k	60	A
22	ABC_TEST1_123	GEN	2024-07-13T05:00:00.000+00:00	6022.977	k	60	A

MSMT_TYPE = GEN

Note: HDERA resources requires the SC entity submitting metering data to register as an SCME.

MRI-S Data Submittal Requirements for Demand Curtailment Resources in an HDERA for monitoring purposes

This is a sample list of different baseline methodologies and the monitoring data that is required for each type:

- User must submit **one** value for each measurement type required
- Data is submitted in aggregate
  - for all DCR(s);
  - to the HDERA resource ID

NOTE:
GEN data is submitted as a single value to the HDERA resources for all responses from DERs and DCRs combined.

	AS Resource Only					
Baseline Method	LOAD	MBMA	LOAD	CBL	TMNT	BASE
Control Group	X	X		X	X	X
Day Matching 5/10	X	X		X		X
Day Matching 10/10	X	X		X		X
Day Matching Combined	X	X		X		X
Weather Matching	X	X		X		X
MGO	X	X			X	
MGO with Day Matching 5/10	X	X		X	X	X
MGO with Day Matching 10/10	X	X		X	X	X
MGO with Day Matching Combined	X	X		X	X	X
MGO with Weather Matching	X	X		X	X	X
PDR-LSR (Curtailment)	X	X			X	
PDR-LSR (Consumption)			X		X	
PDR-LSR (Curtailment only) with Day Matching 5/10	X	X		X	X	X
PDR-LSR (Curtailment only) with Day Matching 10/10	X	X		X	X	X
PDR-LSR (Curtailment only) with Day Matching Combined	X	X		X	X	X
PDR-LSR (Curtailment only) with Weather Matching	X	X		X	X	X
EVSE res	X	X				
EVSE res with Day Matching 5/10	X	X		X	X	X
EVSE res with Day Matching 10/10	X	X		X	X	X
EVSE res with Day Matching Combined	X	X		X	X	X
EVSE res with Weather Matching	X	X		X	X	X
EVSE non-res	X	X				
EVSE non-res with Day Matching 10/10	X	X		X	X	X
EVSE non-res with Day Matching Combined	X	X		X	X	X
EVSE non-res with Weather Matching	X	X		X	X	X

ESDER Phase 3B Presentation - https://www.caiso.com/documents/energystorage_distributedenergyresources_phase3b.pdf

Demand Response Monitoring data

MRI-S

The measurement type for the submission of monitoring data must specify if it is GEN (Generation), CBL (Customer Baseline Load), LOAD, etc.

Depends on what Baseline Methodology you were approved for.

Trade Date	Interval End Time GMT	Interval End Time PPT	Interval Length	Interval ID	Resource ID	SCID	Measurement Type	Resource type	UOM	Value	Batch Id	Percent Residential
3/30/2024	3/30/2024	3/30/2024	60	1	ABC_1_RDRR08	ABC	BASE	GEN	MWH	137.54095100	12993070	
3/30/2024	3/30/2024	3/30/2024	60	1	ABC_1_RDRR08	ABC	CBL	GEN	MWH	124.38473800	12993035	
3/30/2024	3/30/2024	3/30/2024	60	2	ABC_1_RDRR08	ABC	BASE	GEN	MWH	136.60737900	12993070	
3/30/2024	3/30/2024	3/30/2024	60	2	ABC_1_RDRR08	ABC	CBL	GEN	MWH	122.32801100	12993035	
3/30/2024	3/30/2024	3/30/2024	60	3	ABC_1_RDRR08	ABC	BASE	GEN	MWH	136.40793100	12993070	
3/30/2024	3/30/2024	3/30			BC_1_RDRR08	ABC	CBL	GEN	MWH	122.98427400	12993035	
3/30/2024	3/30/2024	3/30			BC_1_RDRR08	ABC	BASE	GEN	MWH	135.50262800	12993070	
3/30/2024	3/30/2024	3/30			BC_1_RDRR08	ABC	CBL	GEN	MWH	122.37992700	12993035	
3/30/2024	3/30/2024	3/30			BC_1_RDRR08	ABC	BASE	GEN	MWH	136.37901800	12993070	
3/30/2024	3/30/2024	3/30/2024	60	5	ABC_1_RDRR08	ABC	CBL	GEN	MWH	123.52736100	12993035	
3/30/2024	3/30/2024	3/30/2024	60	6	ABC_1_RDRR08	ABC	BASE	GEN	MWH	137.75306900	12993070	
3/30/2024	3/30/2024	3/30/2024	60	6	ABC_1_RDRR08	ABC	CBL	GEN	MWH	123.15562400	12993035	
3/30/2024	3/30/2024	3/30/2024	60	7	ABC_1_RDRR08	ABC	BASE	GEN	MWH	133.84400300	12993070	
3/30/2024	3/30/2024	3/30/2024	60	7	ABC_1_RDRR08	ABC	CBL	GEN	MWH	121.16549000	12993035	
3/30/2024	3/30/2024	3/30/2024	60	8	ABC_1_RDRR08	ABC	BASE	GEN	MWH	129.68729100	12993070	
3/30/2024	3/30/2024	3/30/2024	60	8	ABC_1_RDRR08	ABC	CBL	GEN	MWH	119.57461300	12993035	
3/30/2024	3/30/2024	3/30/2024	60	9	ABC_1_RDRR08	ABC	BASE	GEN	MWH	128.34872600	12993070	
3/30/2024	3/30/2024	3/30/2024	60	9	ABC_1_RDRR08	ABC	CBL	GEN	MWH	118.85518400	12993035	
3/30/2024	3/30/2024	3/30/2024	60	10	ABC_1_RDRR08	ABC	BASE	GEN	MWH	128.67121400	12993070	
3/30/2024	3/30/2024	3/30/2024	60	10	ABC_1_RDRR08	ABC	CBL	GEN	MWH	118.85518400	12993035	

Measurement type = GEN (Generation), CBL (Customer Baseline Load), LOAD, etc.

Demand Response Monitoring data

Associated SCMEs submits the following HDERA resource **monitoring** data for the DCRs in MRI-S:

1) Demand curtailment provided by DCRs

2) Customer Load Baseline used to calculate the demand curtailment for the DCR

3) Actual underlying consumption or energy during all hourly intervals for the calendar days for which the Meter Data was collected to develop the baseline

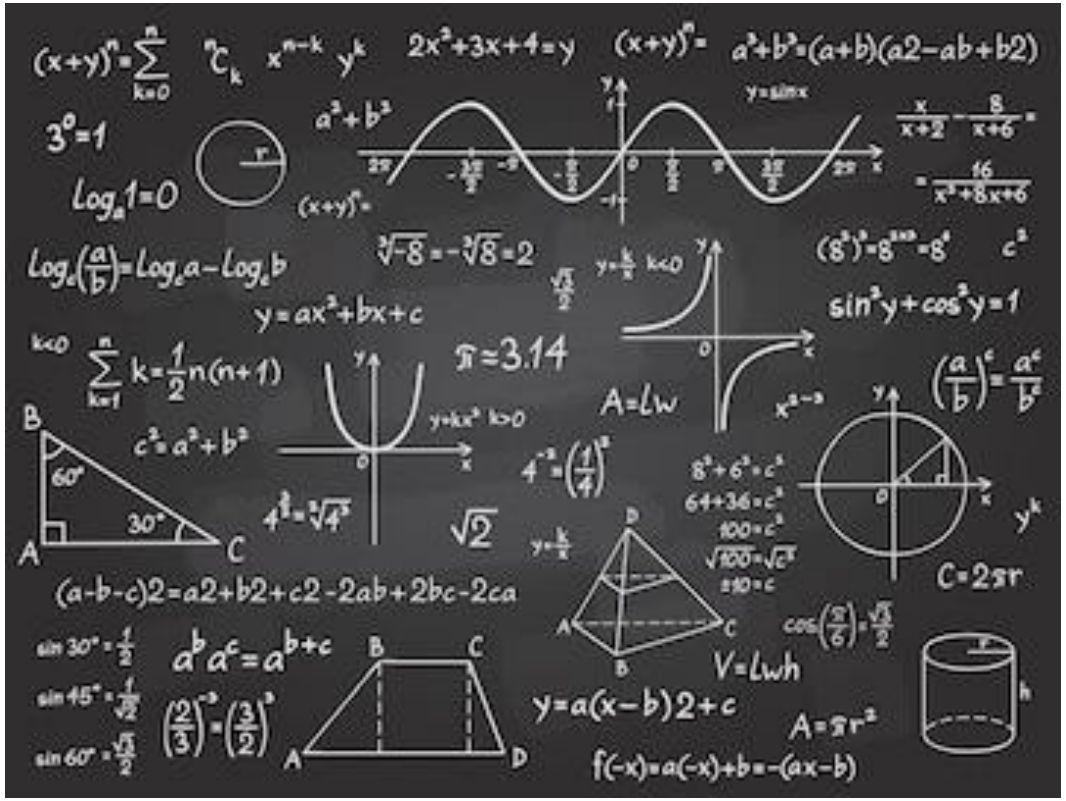
Monitoring measurement data submission for HDERA resources

Sample equations on how the HDERAs' combined baseline are calculated

MRI-S

An HDERA's demand curtailment resource DCR has multiple baseline calculation options

Examples are available in the Demand Response BPM in Section 5 and explained in the CAISO Tariff section 4.13.4 Performance Evaluation Methodologies for PDRs and RDRRs.



Settlements

- Generic NGR NREM resource
- HDERA Composition Example

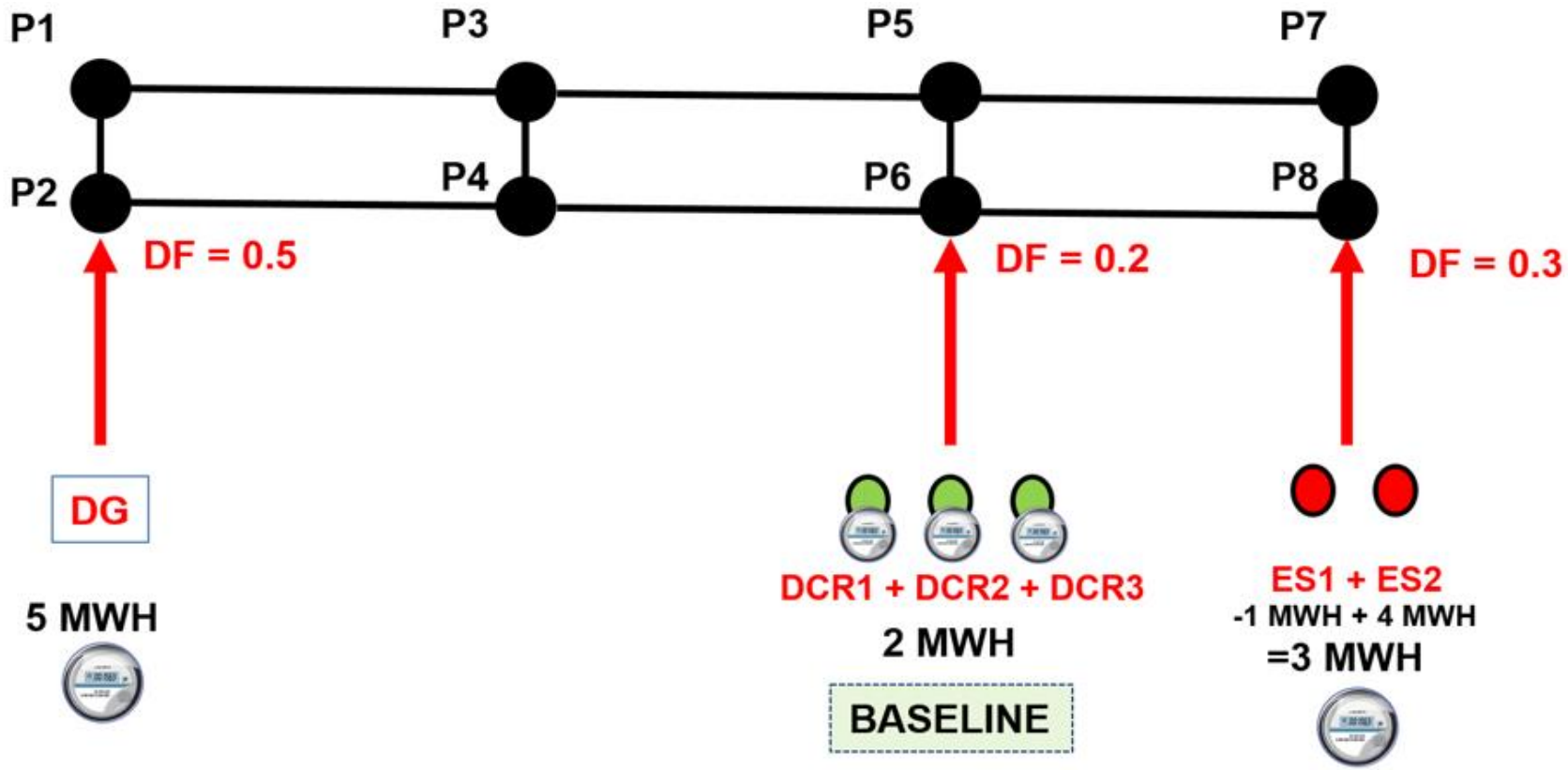
Settlements for HDERA

- HDERA settlement energy quantity shall be determined as the aggregate sum of net energy provided by the DERs (accounting for Load and any negative energy) and DCRs (demand curtailment represented as positive supply)
- Settlement of HDERA resources will be reflected as a generic NGR NREM resource.
- No new charge codes

HDERA Composition

FERC Order 2222 BRS - Appendix A illustration

See next slide for an explanation of the example



DCR = Distributed Curtailment Resource (supply is curtailment amount below baseline demand)

DER = Distributed Energy Resource (supply is amount injected to grid)

DF = Distribution Factor (max 1.0, min 0.0, total sum must = 1.0)

DG = Distributed Generation (type DER)

ES = Energy Storage (type DER)

P1 through P8 are separate Pnodes in Market

[Business Requirements Specification FERC Order 2222]

HDERA Composition

FERC Order 2222 BRS - Appendix A example explanation

Example of the mathematical equation for the HDERA settlement energy quantity and how it determines the aggregate, the sum of net energy from both DER and DCR. This is when DCR curtailment amounts (i.e. MWh reduction below the calculated baseline) are reflected as **positive supply** to the grid in both the market instruction and metering measurement.

HDERA net energy > 0 MWh: (where net positive supply occurs due to the aggregate DER charging MWh being exceeded by the aggregate HDERA supply MWh)
$= MWh_{DER(DG)} + MWh_{DCR1} + MWh_{DCR2} + MWh_{DCR3} + MWh_{DER(ES1)} + MWh_{DER(ES2)}$
= 1.2 + 0.5 + 0.2 + 0.2 + 0.8 + (-0.4)
= **2.5 MWh**

HDERA net energy = 0: (Scenario where net zero supply occurs due to the aggregate DER charging MWh matching the aggregate HDERA supply MWh)
$= MWh_{DER(DG)} + MWh_{DCR1} + MWh_{DCR2} + MWh_{DCR3} + MWh_{DER(ES1)} + MWh_{DER(ES2)}$
= 0.8 + 0.1 + 0 + 0.1 + (-0.6) + (-0.4)
= **0 MWh**

HDERA net energy < 0 (where net negative supply occurs due to the aggregate DER battery charging MWh exceeding aggregate HDERA supply MWh):
$= MWh_{DER(DG)} + MWh_{DCR1} + MWh_{DCR2} + MWh_{DCR3} + MWh_{DER(ES1)} + MWh_{DER(ES2)}$
= 0 + 0 + 0.2 + 0 + (-0.3) + (-0.1)
= -0.2 MWh

Note: Settlements does not have visibility to the underlying resources [DER (DG), DCR1, DCR2, DCR3, DER (ES1), and DER (ES2)] within an HDERA. CAISO will settle based on the aggregated meter submitted by market participants.

What Questions Do You Have?

Unmute yourself

or

Raise your hand

Market Simulation

Unstructured Guided Scenario

48

Unstructured Guided Scenario:
Verify HDERA resources in CAISO market

Begins Sep. 16 – Oct. 11, 2024

ISO Actions	ISO will provision HDERA resources in CAISO markets
WEIM Market Participant Actions	• Submit HDERA resources GRDT for CAISO Masterfile • Verify resource availability in SIBR NBT process and GDF submissions with bids • Verify MRIS meter and monitor measurement data submission for the resources • Verify RIMS data and Settlements results for the resources
ISO Market Participant Actions	• Submit HDERA resources GRDT for CAISO Masterfile • Verify resource availability in SIBR NBT process and GDF submissions with bids • Verify MRIS meter and monitor measurement data submission for the resources • Verify RIMS data and Settlements results for the resources
Expected Outcome	Resources are available/visible in CAISO systems
Anticipated Settlement Outcome	N/A
Expected Settlement Outcome	N/A

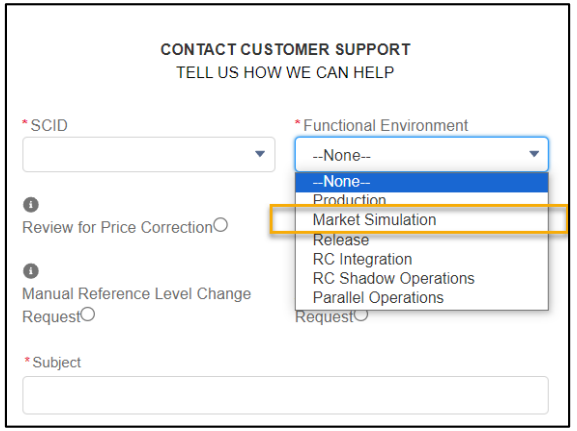
Participate in Market Simulation

Register to participate in the simulation at MarketSim@caiso.com mailbox by September 11, 2024

Attend Market Simulation Forum calls to stay informed on timing of activities for this and other release

- Mondays and Thursdays 2pm PPT

Submit questions and additional scenario requests to the ISO via the CIDI application



- The market sim window includes a two week connectivity period
- September 16, 2024 will kick off the two week connectivity period where the ISO will conduct their end to end
- Customers will begin on 9/30/24

What Questions Do You Have?

Unmute yourself <u>or</u>

Raise your hand

Wrap Up

Summary

- Recap
- Q&A

Recap

- Reduced DERA and HDERA minimum participation capacity to 100kW from 500kW
- Introduced HDERA Resource in Master File aggregates with underlying DCR
- Added new fields/elements in the GRDT spreadsheet and web service for retrieval
- Consume of HDERA resources in multiple applications
- Follow NRI business process requirements for the Project Details Form
- Apply the same Net Benefits testing as PDR for HDERAs
- See settlements for HDERAs

What Questions Do You Have?

Unmute yourself <u>or</u>

Raise your hand

Helpful References

Glossary

Terms	Description	Definition
DCR	Distributed Curtailment Resource	Demand Energy Resource (DER) that provides demand curtailment in a Heterogeneous Distributed Energy Resource Aggregation
DER	Distributed Energy Resource	Distributed energy resources (DER) are smaller power sources that can be aggregated to provide power necessary to meet regular demand. Any resource located on the distribution system, any subsystem thereof, or behind a customer meter in a Utility Distribution Company or a Metered Subsystem. DER systems typically use renewable energy sources, including small hydro, biomass, biogas, solar power, wind power, and geothermal power.
DERA	Distributed Energy Resource Aggregation	Virtual resources formed by aggregating multiple distributed generation, behind the meter generation, or energy storage devices at different points of interconnection on the distribution system. The bulk electric system may model a DERA as a single resource at its 'virtual' point of interconnection at a particular transmission-distribution interface even though individual distributed energy resource comprising the DERA may be located at multiple T-D interfaces. A resource comprised of one or more Distributed Energy Resources.
DERP	Distributed Energy Resource Provider	A provider of energy whose resources are on the customer side or the distribution grid side of the electric system, such as rooftop solar, energy storage, plug-in electric vehicles, and demand response.
GDF	Generation Distribution Factor	At an aggregate DERA or HDERA resource level, GDFs define the ratio of distribution in generation output and LMP composition across more than one pricing node ("PNode") in the market. At the resource level, the sum of each GDF should equal to 1 (or 100%)
GNRC	Generic (Fuel type)	Master File requires a Fuel Type for all generators, even those that require no fuel. Non-generating resources (NGRs) or Tie-NGRs, such as batteries, are specified in Master File to have a GNRC.
GRDT	Generator Resource Data Template	Spreadsheet designed to capture data specific to a particular unit type and includes fields for dozens of elements that describe the resource required for the Master File database.

Glossary (Cont.)

Terms		Description
HDERA	Heterogeneous Distributed Energy Resource	The capability of the aggregate to support both DCR and DER underlying resources. At least one of the underlying resources must be DCR. Underlying DER resources are also allowed. A Distributed Energy Resource providing Demand curtailment as part of a heterogeneous Distributed Energy Resource Aggregation.
MF or MFRD	Master File or Master File Reference Data	MFRD and MF can be considered interchangeable.
MRI-S	Market Results Interface – Settlements	This Interface allows Scheduling Coordinators to retrieve read only files containing Settlements data related to market transactions specific to their resources.
NBT	Net Benefits Test	Establishes a price threshold above which demand response resource bids are deemed cost effective. The ISO must perform a monthly analysis based on historical data from the previous year's supply curve to identify the price threshold estimate that shows where customer net benefits occur.
NGR	Non-Generating Resource	Resources that produce energy but do not generate it, such as batteries, pumped hydro, flywheels, electric cars.
NREM	Non-Regulation Energy Management	Is where resource does not perform Regulation Energy Management in the Real-Time Market.
NRI	New Resource Implementation	The process by which a new resource joins the ISO. NRI ensures that a resource meets all requirements before initial synchronization and commercial operations.
SCME	Scheduling Coordinator Meter Entity	Submits net meter of load representing load being offset by the behind meter generation.

Impacted Business Practice Manuals (BPMs)

Definitions and Acronyms

Include HDERA and DCR terms

Distributed Generation for Deliverability

Addition of the HDERA resource type.

Generator Management

Inclusion of DCR in DERPAs, Schedule 1, and Concurrence Letter A template (add HDERA language)

Market Instruments

Revision to minimum allowed Pmax limit; and HDERA (aggregate includes both DER and DCR child units, models as an aggregate generic. NGR, bids have NBT applied, may submit GDFs with bids else default used).

PRR_1586 - https://bpmcm.caiso.com/Pages/ViewPRR.aspx?PRRID=1586&IsDlg=0

Demand Response

Elaboration of net benefit testing

PRR_1588 - https://bpmcm.caiso.com/Pages/ViewPRR.aspx?PRRID=1588&IsDlg=0

Market Operations

Revision to minimum allowed Pmax limit; and HDERA (aggregate includes both DER and DCR child units, models as an aggregate generic NGR, bids have NBT applied, may submit GDFs with bids else default used)

Metering

New HDERA resource type includes net energy meter submission for DERA, as well as monitoring requirement data from DCR and underlying consumption/energy data used with metering basis for baseline

BPM Page URL

Impacted Tariffs

Roles and Responsibilities

Section 4.17.7
Section 4.6.3.2

CAISO Settlements and Billing

Section 11.6.5.1

Bid & Self- Schedule Submission for all CAISO Markets

Section 30.5.2.6

Appendix K

- A 1.1
- B 1.1
- C 1.1 (existing)

Tariff Page URL

Impacted Business Practice Manuals (BPMs)

Definitions and Acronyms

Include HDERA and DCR terms

Distributed Generation for Deliverability

Addition of the HDERA resource type.

Generator Management

Inclusion of DCR in DERPAs, Schedule 1, and Concurrence Letter A template (add HDERA language)

Market Instruments

Revision to minimum allowed Pmax limit; and HDERA (aggregate includes both DER and DCR child units, models as an aggregate generic. NGR, bids have NBT applied, may submit GDFs with bids else default used).

PRR_1586 - https://bpmcm.caiso.com/Pages/ViewPRR.aspx?PRRID=1586&IsDlg=0

Demand Response

Elaboration of net benefit testing

PRR_1588 - https://bpmcm.caiso.com/Pages/ViewPRR.aspx?PRRID=1588&IsDlg=0

Market Operations

Revision to minimum allowed Pmax limit; and HDERA (aggregate includes both DER and DCR child units, models as an aggregate generic NGR, bids have NBT applied, may submit GDFs with bids else default used)

Metering

New HDERA resource type includes net energy meter submission for DERA, as well as monitoring requirement data from DCR and underlying consumption/energy data used with metering basis for baseline

BPM Page URL

List of Valid Base Methodologies

Pursuant to Section 4.13.4 of the tariff, the following PEMs will be available for request:

- Weather Matching
- Control Group
- Day Matching 10-in-10
- Day Matching 5-in-10 (residential only)
- Day Matching Combined
- Meter Generator Output
- Meter Generation Output with Day Matching 5-in-10
- Meter Generation Output with Day Matching 10-in-10
- Meter Generation Output with Day Matching Combined
- Meter Generation Output with Weather Matching
- Electric Vehicle Supply Equipment (EVSE) non-residential
- Electric Vehicle Supply Equipment (EVSE) non-residential with Day Matching 10-in-10
- Electric Vehicle Supply Equipment (EVSE) non-residential with Day Matching Combined
- Electric Vehicle Supply Equipment (EVSE) non-residential with Weather Matching
- Electric Vehicle Supply Equipment (EVSE) residential
- Electric Vehicle Supply Equipment (EVSE) residential with Day Matching 5-in-10
- Electric Vehicle Supply Equipment (EVSE) residential with Day Matching 10-in-10
- Electric Vehicle Supply Equipment (EVSE) residential with Day Matching Combined
- Electric Vehicle Supply Equipment (EVSE) residential with Weather Matching
- PDR-LSR
- PDR-LSR with Day Matching 5-in-10
- PDR-LSR with Day Matching 10-in-10
- PDR-LSR with Day Matching Combined
- PDR-LSR with Weather Matching

Helpful Links

Business Requirements Specification FERC Order 2222
https://www.caiso.com/documents/business-requirements-specification-ferc-order-2222.pdf

Market Sim Scenarios
https://www.caiso.com/documents/market-simulation-scenarios-ferc-order-2222.pdf

Pending Tariff Language – Compliance Filing – FERC Order No. 2222 (ER21-2455)
https://www.caiso.com/documents/pendingtarifflanguage-compliancefiling-ferc-order-no-2222-er21-2455-4-11-30-a-b21.pdf

Pending Tariff Language - Amendment regarding Compliance with FERC Order No. 2222 (ER21-2455)
https://www.caiso.com/documents/pendingtarifflanguage-amendment-regarding-compliance-ferc-order-no-2222-er21-2455.pdf

Impacted Tariffs - https://www.caiso.com/legal-regulatory/tariff
Roles & Responsibilities (Tariff Section 4.17.7 & 4.6.3.2)
Settlements & Billing (Tariff Section 11.6.5.1)
Bid and Self-Schedule Submission (Tariff Section 30.5.2.6)

Impacted Business Practice Manuals - https://bpmcm.caiso.com/Pages/BPMLibrary.aspx

- Definitions and Acronyms
- Distributed Generation for Deliverability
- Generator Management
- Market Instruments
- Demand Response
- Market Operations
- Metering

Helpful Links (cont.)

PRR 1588 (Demand Response)
https://bpmcm.caiso.com/Pages/ViewPRR.aspx?PRRID=1588&IsDlg=0

PRR 1586 (Market Instruments)
https://bpmcm.caiso.com/Pages/ViewPRR.aspx?PRRID=1586&IsDlg=0

Generator Resource Data Template Version 18.1 – draft
https://www.caiso.com/documents/generator-resource-data-template-version-18-1-draft.xlsx

GRDT and IRDT Definitions V18.1 – draft
https://www.caiso.com/documents/grdt-and-irdt-definitions-v18-1-draft.xls

New Resource Implementation page
https://www.caiso.com/generation-transmission/generation/new-resource-implementation

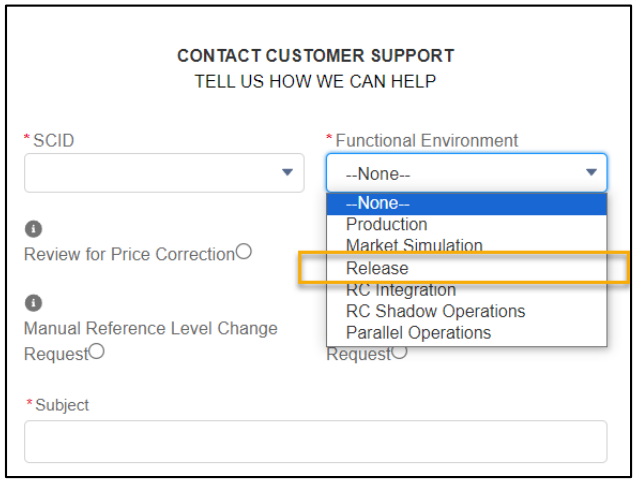
Project Details form
https://www.caiso.com/documents/projectdetailsform.docx

Distributed Energy Resource Provided UDC/MSS Concurrence Letter Template
https://www.caiso.com/documents/distributedenergyresourceproviderudc_mssconcurrencelettertemplate.doc

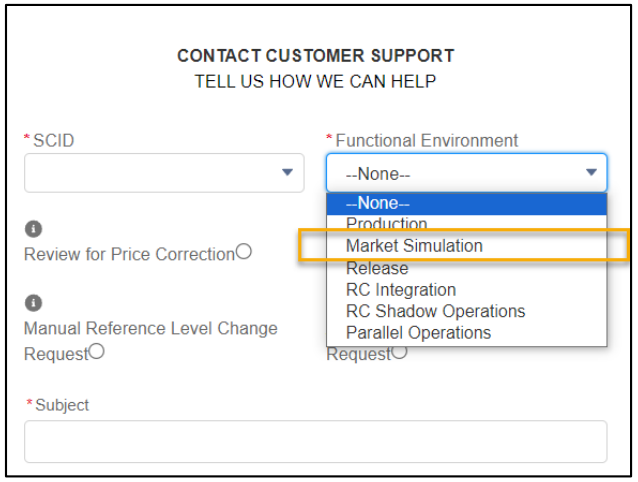
Demand response net benefits test results reports
https://www.caiso.com/library/demand-response-net-benefits-test-results

Presentation - ESDER Phase 3B
https://www.caiso.com/documents/energystorage_distributedenergyresources_phase3b.pdf

Functional Environment Options for CIDI Cases



- Inquiries are not directly related to Market Simulation issues & when there is no environment impact
  - Ex. Business Requirements Specifications (BRS) comments, implementation questions, feedback, etc.
- Contact: release@caiso.com



- Inquires that are related to the MAP-Stage Environments (non-production)
  - Ex. Connectivity, unanticipated simulation results, etc.
- Contact: MarketSim@caiso.com

REGISTRATION IS OPEN

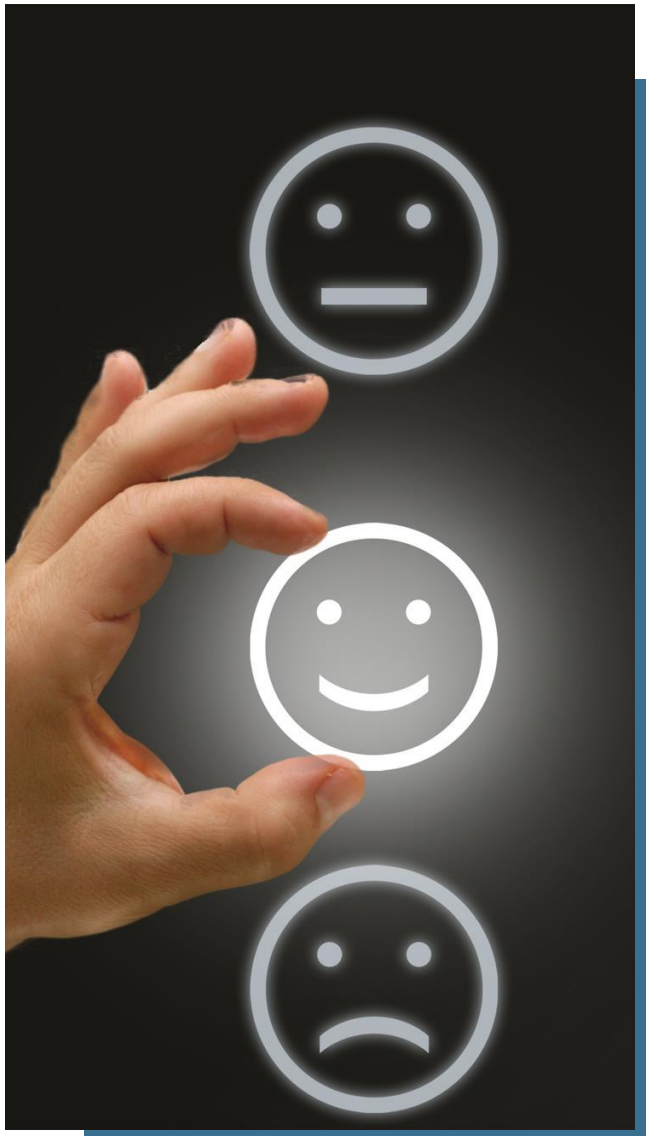
2024 STAKEHOLDER SYMPOSIUM

Welcome reception - Oct. 29
at Kimpton Sawyer Hotel, Sacramento, CA

Symposium program - Oct. 30
SAFE Credit Union Convention Center
Sacramento, CA

Visit the event website: www.reg.eventmobi.com/2024stakeholdersymposium

SPONSORSHIP OPPORTUNITIES AVAILABLE



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Instructor Monica
Training course Other: FERC Order 2222

Thank you for your participation!

For clarification on anything presented in this training, send an email to: CustomerReadiness@caiso.com

For other questions or stakeholder specific questions or concerns use one of these methods:

- Submit a CIDI ticket
- Contact your Scheduling Coordinator
- Use the "Contact us" page on caiso.com to submit questions