



Recreating Mosaic Requirement for Imbalance Reserves

With Data Available in OASIS

Short-term Forecasting

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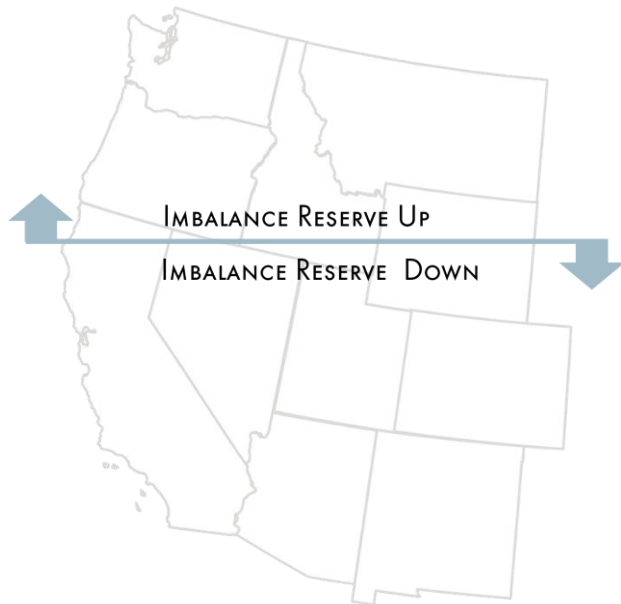
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Outline

- Introduction
- How to recreate mosaic requirement with data available in OASIS
 - This will have a companion Excel spreadsheet
 - Recreating requirement for
 - Trade Date: 3/18/26
 - HE 15 (hour-ending 15)
 - ‘DAM’ (Day-Ahead Market)

INTRODUCTION

Imbalance Reserves (IR)



- Imbalance reserve products provide the market with a mechanism to address each BAA's expected range of uncertainty when comparing the **day-ahead** load forecast to **real-time** consumption and comparing solar and wind **forecasts** to their **real-time outputs**.
- Procurement of reserves will be done on an hourly basis for each BA from the bids that are submitted by SCs across the EDAM footprint.
- SCs submit bids for **imbalance reserve up** and **imbalance reserve down** and may receive hourly awards for **one or both** products.

Mosaic

Define Uncertainty: DAM Uncertainty (RTPD binding – DAM)

D = Demand Uncertainty *

W = Wind Uncertainty

S = Solar Uncertainty

ND = Net-Demand Uncertainty

Define “histogram” for components: D,S,W

$$D_h = c_d$$

$$W_h = c_w$$

$$S_h = c_s$$

Define quantile regression model for components: D,S,W

$$D_q = c_d + b_d * \text{mosaic} + a_d * \text{mosaic}^2 **$$

$$W_q = c_w + b_w * \text{mosaic} + a_w * \text{mosaic}^2$$

$$S_q = c_s + b_s * \text{mosaic} + a_s * \text{mosaic}^2$$

Construct mosaic variable:

$$\text{mosaic} = ND_h + (D_q - D_h) - (W_q - W_h) - (S_q - S_h)$$

Define final Net-Demand Uncertainty model:

$$ND_M = c_m + b_m * \text{mosaic} + a_m * \text{mosaic}^2$$

Stage 1

Component-level
quantile regression

Stage 2

Net-demand-level
quantile regression

Equations taken from [Original White Paper](#)

*Demand is referred to as Load

** a,c are flipped in OASIS vs. how the equations are specified in this paper. Companion spreadsheet matches OASIS.

Mosaic (cont'd) – Applying thresholds

Define dynamic “threshold” for net Net-Demand: ND

$$ND_{dt} = c_{nd1}$$

Define static ceiling “threshold” for Net-Demand: ND

$$ND_{ct} = c_{nd2}$$

Define static floor “threshold” for Net-Demand : ND

$$ND_{ft} = c_{nd3}$$

Define final Net-Demand Uncertainty model:

$$ND_M = c_m + b_m * \text{mosaic} + a_m * \text{mosaic}^2$$

Apply Threshold :

$$\text{Down} = \text{MIN}(\text{MAX}(ND_{M_{down}}, ND_{dt_{down}}, ND_{ct_{down}}), ND_{ft_{down}})$$

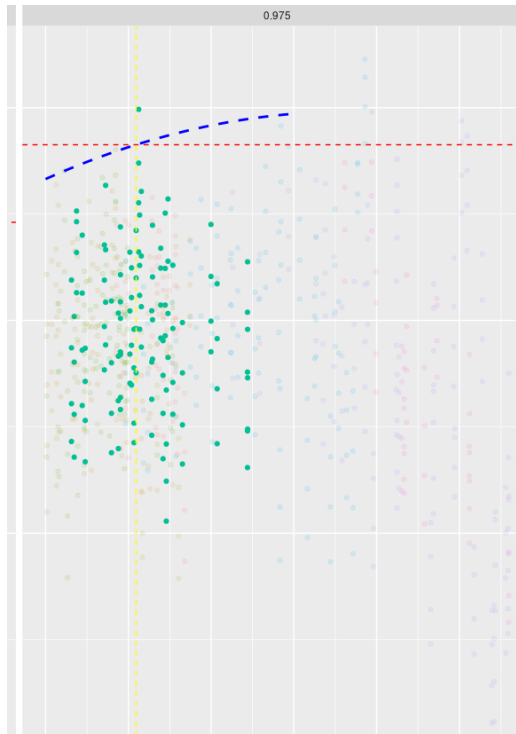
$$\text{Up} = \text{MAX}(\text{MIN}(ND_{M_{up}}, ND_{dt_{up}}, ND_{ct_{up}}), ND_{ft_{up}})$$

Stage 2 (cont.)

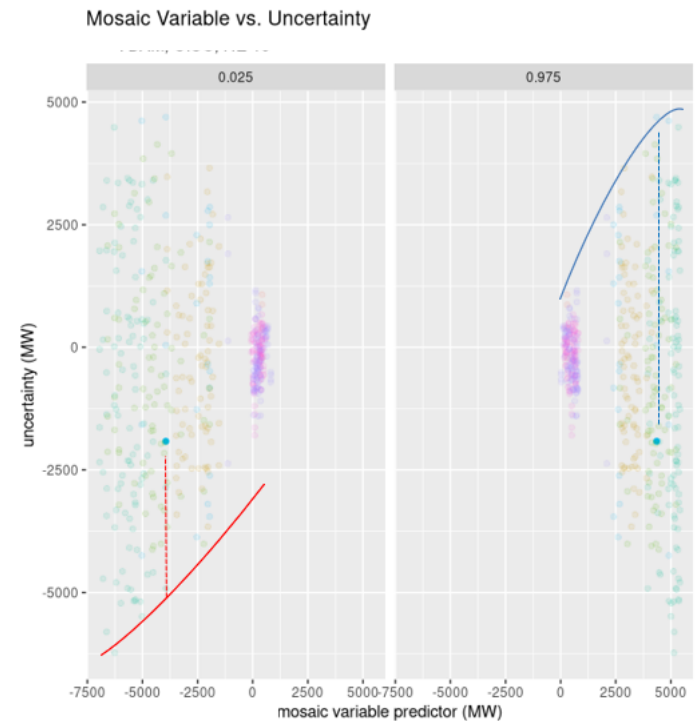
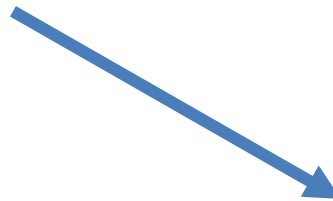
To ensure the CAISO does not set extreme requirements, the CAISO enforces 2 layers of thresholds to bound the IRU/IRD requirements, **dynamic** and **static** thresholds. **Dynamic** thresholds are updated daily and currently reflect the 1%,99%. The CAISO will evaluate these **static** thresholds every quarter, or as needed with changing weather conditions. To the extent permissible, the CAISO will provide EDAM entities a week’s notice prior to making any changes to the Max thresholds. Both sets of thresholds are posted publicly to OASIS.

Mosaic (cont'd) – Graphical depiction

Stage 1 – Component Level Quantile Regression (*showing just demand as example*)



Stage 2 – Net-Demand Level Quantile Regression



Note, this are illustrative examples – not directly tied to 10/5/25 trade date, HE 15

Open-Access Same-Time Information System (OASIS) provides a publications schedule of reports

OASIS > Atlas Reference > Publications >
 OASIS Publications Schedule
 Market = DAM
 OASIS Section = Energy

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OASIS Publications Schedule							
Section	Report Name	Report Description	Group Name	Market	Publication Type	Publication Interval	Description
ENERGY	AGG_BAA_LVL_FINAL_BIND	EDAM BAA RSE Test	DAM_AGG_BAA_LVL_FINAL_BIND_GRP	DAM	Daily	Every 30min between 6am and 10am	Published at TD+1 , Advisory is 6:00 AM through 9:30 AM ,Binding is 10:00 AM
ENERGY	CAP_REQ_AWRD	Imbalance Reserve Requirements and Imbalance Reserve/Reliability Capacity Awards	DAM_CAP_REQ_AWRD_GRP	DAM	Daily	13:00	BAA Hourly IRU/IRD Awards
ENERGY	CB_NODAL_LIMITS	Convergence Bidding Nodal MW Limits	CB_NODAL_LMT_GRP	DAM	N/A	Daily	Displays the MW limits used by the ISO in formulating nodal MW constraints in conjunction with convergence bidding
ENERGY	CMMT_RA_MLC	Resource Adequacy and Minimum Load	N/A	DAM	Daily	T+1 9:00am	ISO Committed resource data for the DAM
ENERGY	CMMT_RMR	RMR	DAM1_GRP	DAM	Daily	13:00	Pre-Dispatched and MPM Determined RMR
ENERGY	EDAM_NET_EXP_TRNS_CNSTR_INP_PRM	EDAM Net Export Transfer Constraint	EDAM_NET_EXP_TRNS_CNSTR_INP_PRM_GRP	DAM	Daily	13:00	Displays input parameters to the Net EDAM Export Transfer Constraint for each EDAM BAA (ISO BAA inclusive), Trade
ENERGY	EDAM_WND_SLR_FORECAST	EDAM Wind and Solar Forecast	EDAM_WND_SLR_FORECAST_GRP	DAM	Daily	Every 30min between 6am and 10am	Publishes the DA VER forecasts for EDAM entities for each RSE run
ENERGY	ENE_BASE_NSI	BAA Base NSI	N/A	DAM	Daily	Prior to the close of the DAM	DAM and RTM hourly base NSI for each EIM BAA. All data shall be from the latest DAM and the first RTPD 15-minute m
ENERGY	ENE_CB_AWARDS	Day Ahead Aggregate Convergence Bidding Awards	N/A	DAM	Daily	T-1 13:00	Displays Day Ahead Aggregate Convergence Bidding Awards for Energy.
ENERGY	ENE_CB_CLR_AWARDS	Net Cleared Convergence Bidding Awards	N/A	DAM	Daily	T 22:00	Displays Net Cleared MW for Virtual Bids for every Virtual Bidding Node per Trade Hour within a Trading Day.
ENERGY	ENE_CB_MKT_SUM	Day Ahead Market Summary Report	N/A	DAM	Daily	T-1 17:00	Displays the summary of the Day Ahead market data.
ENERGY	ENE_LOSS	Marginal Losses	DAM1_GRP	DAM	Daily	13:00	CAISO Total Marginal Losses for the DAM
ENERGY	ENE_MPM	Market Power Mitigation Status	DAM1_GRP	DAM	Daily	13:00	Mitigation Indicator flag
ENERGY	ENE_SCHED_BY_TIE	Schedule By Tie	DAM_ENE_SCH_BY_TIE_GRP	DAM	Daily	13:00	Publish gross import and export by tie and by direction for CAISO BAA only.
ENERGY	ENE_SLRS	System Load and Resource Schedules	DAM1_GRP	DAM	Daily	13:00	Load, Gen, Import/Export Schedules for the DAM
ENERGY	IMB_RSV_DC	Imbalance Reserve Demand Curves	DAM_IMB_RSV_DC_GRP	DAM	Daily	Hourly	Reports the IRU/IRD Demand Curves for next Trade Days (D+1, D+2, and D+3)
ENERGY	IMB_RSV_FCST	Imbalance Reserve Forecasts	DAM_IMB_RSV_FCST_GRP	DAM	Daily	Hourly	BAA Hourly IRU/IRD Forecasts
ENERGY	IMB_RSV_REQ_INP_POLY	Imbalance Reserve Requirements Input Polynomials	DAM_IMB_RSV_REQ_INP_POLY_GRP	DAM	Daily	Hourly	Reports the IRU/IRD Requirements Input Polynomials for next Trading day (D+1)
ENERGY	IMB_RSV_REQ_THRSH	Imbalance Reserve Requirement Thresholds	DAM_IMB_RSV_REQ_THRSH_GRP	DAM	Daily	Hourly	Reports the IRU/IRD BAA Hourly Requirements Thresholds for the next Trading day (D+1)
ENERGY	IMB_RSV_REQ_UNC_HSG	Imbalance Reserve Requirements Uncertainty Histograms	DAM_IMB_RSV_REQ_UNC_HSG_GRP	DAM	Daily	Hourly	Reports the IRU/IRD BAA Hourly Uncertainty histograms for the next Trading day (D+1)

RECREATING MOSAIC REQUIREMENT

3 Steps to Recreate Mosaic Requirement

- Gather Relevant Information from OASIS
- Perform two stages of calculations in line with the [BRS](#)
- Validate IR calculation with report in OASIS

All reports discussed the rest of presentation will be within
OASIS > Energy > Imbalance Reserve
OASIS > Energy > Flexible Ramping

The screenshot shows the OASIS website navigation menu. The 'ENERGY' menu item is highlighted in yellow, and its dropdown menu is open, showing several options. The 'Imbalance Reserve' option is highlighted in green. The dropdown menu includes the following items:

- Schedule
- System
- Flexible Ramping
- Convergence Bidding
- Energy Imbalance Market
- Uplift
- Imbalance Reserve** (highlighted in green)
 - Imbalance Reserve Requirement Thresholds
 - Imbalance Reserve Requirements Input Polynomials
 - Imbalance Reserve Requirements Uncertainty Histograms
 - Imbalance Reserve Forecasts
 - Imbalance Reserve Demand Curves
 - Imbalance Reserve Requirements and Imbalance Reserve/Reliability Capacity Awards
 - Imbalance Reserve Surplus
 - Imbalance Reserve Results
- EDAM

On the left side of the page, there is a welcome message: "Welcome to the California ISO Open Access Same-time Information System site. On OASIS you will find real-time data related to the ISO transmission system and its Market, such as system demand forecasts, transmission outage and status, market prices and market result data." Below this, there are sections for "Standards Information" (including NAESB, ISO Business Practice Manuals, and Available Transfer Capability Information) and "Transmission Information" (including Base Case Data and Interconnection Study Statistics).

GRAB INPUT FORECASTS

Market/Process= 'DAM'

HE15

OASIS > Energy > Imbalance Reserve > Imbalance Reserve Forecasts

Date: 03/18/2026 Market/Process: DAM BAA ID: CISO Apply Reset

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Imbalance Reserve Forecasts

Opr Date	Market	Balancing Authority	Area ID	Data Type	HE01	HE02	HE03	HE04	HE05	HE06	HE07	HE08	HE09	HE10	HE11	HE12	HE13	HE14	HE15	HE16	HE17	HE18	HE19	HE20	HE21	HE22	HE23	HE24
03/18/2026	DAM	CISO		Demand	23,408.51	22,079.96	21,025.54	20,409.61	20,500.92	21,427.56	23,168.94	24,370.19	24,029.76	22,922.34	21,924.65	21,848.51	22,299.38	23,580.1	25,459.46	7,804.71	30,158.48	32,568.01	33,718.84	33,260.88	31,761.07	30,270.89	28,075.26	25,613.55
03/18/2026	DAM	CISO		Solar	0.00	0.00	0.00	0.00	0.00	0.00	13.82	3,138.53	13,610.11	19,209.37	20,798.35	21,428.31	21,488.04	21,605.9	21,448.35	0,799.30	19,198.79	12,853.27	2,301.60	3.10	0.00	0.00	0.00	0.00
03/18/2026	DAM	CISO		Wind	1,256.96	1,160.96	1,176.94	1,121.65	1,081.31	970.49	879.23	655.65	440.17	349.62	338.39	282.70	281.19	327.4	395.11	550.49	858.60	1,162.59	1,354.41	1,701.11	1,923.32	2,117.29	2,337.33	2,374.78

Report Generated: 04/02/2026 20:33:00

HE15

25,459.46
21,448.35
395.11

Demand: 25459.46
Solar: 21448.46
Wind: 395.11

	A	B
1	INPUTS	
2	SOURCE	
3		Forecast
4	LOAD	25,459
5	SOLAR	21,448
6	WIND	395
7		
8	HE	15
9	INT	1
10		
11	red indicates corresponding field in OASIS have been substituted	
12	filled in from OASIS	
13	calculated	

GRAB INPUT POLYNOMIALS

Market/Process= 'DAM'

HE15

Ignore Percentile

OASIS > Energy > Imbalance Reserve > Imbalance Reserve Requirements Input Polynomials



Opr Date	Market Balancing Authority Area Group		Ramp Type	Percentile	Data Type	A Value	B Value	C Value
03/18/2026	DAM	CISO	DOWN	HIGH	SOLAR	-0.00001025595376781280	-0.09229437752825150000	6,758.43879972857000000000
03/18/2026	DAM	CISO	DOWN	HIGH	WIND	0.00003797656124780550	-0.10981999046538100000	582.65334747866600000000
03/18/2026	DAM	CISO	DOWN	LOW	DEMAND	0.00000022522947141940	0.01798675701008910000	-2,606.45821501562000000000
03/18/2026	DAM	CISO	DOWN	LOW	MOSAIC	-0.00007194434267812430	0.05466404495264270000	-2,507.56030486131000000000
03/18/2026	DAM	CISO	UP	HIGH	DEMAND	-0.00002821811618481660	1.12888348457597000000	-8,886.89297152709000000000
03/18/2026	DAM	CISO	UP	HIGH	MOSAIC	-0.00068060468594762400	4.64289839182958000000	-4,776.73663014479000000000
03/18/2026	DAM	CISO	UP	LOW	SOLAR	0.00001253256011624400	-0.39883577289476400000	1,377.64044457258000000000
03/18/2026	DAM	CISO	UP	LOW	WIND	0.000012454321574307000	-0.86201894088027900000	317.11225587628200000000

Report Generated: 04/02/2026 20:36:51

C	D	E	F
		Down component coefficient	Up component coefficient
A_LOAD		2.25229E-07	-2.82181E-05
B_LOAD		0.017986757	1.128883485
C_LOAD		-2606.458215	-8886.892972
A_SOLAR		-1.0256E-05	1.25326E-05
B_SOLAR		-0.092294378	-0.398835773
C_SOLAR		6758.4388	1377.640445
A_WIND		3.79766E-05	0.000124543
B_WIND		-0.10981999	-0.862018941
C_WIND		582.6533475	317.1122559
$P_{97.5}(d) - S_{5} P_{2.5}(s) - W_{5} P_{2.5}(w)$.			
		Down mosaic coefficient	Up mosaic coefficient
A		-7.19443E-05	-0.000680605
B		0.054664045	4.642898392
C		-2507.560305	-4776.73663

GRAB Histogram VALUES

Market/Process= 'DAM'

HE15

Ignore Percentile

OASIS > Energy > Imbalance Reserve > Imbalance Reserve Requirements Uncertainty Histograms

California ISO OASIS

Market/Process: DAM BAA Group: CISO

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Imbalance Reserve Requirements Uncertainty Histograms

Opr Date	Market	Balancing Authority	Area Group	Ramp	Type	Percentile	Data Type	HE01	HE02	HE03	HE04	HE05	HE06	HE07	HE08	HE09	HE10	HE11	HE12	HE13	HE14	HE15	HE16	HE17	HE18	HE19	HE20	HE21	HE22	HE23	HE24
03/18/2026	DAM	CISO		DOWN	HIGH	SOLAR		0.00	0.00	0.00	0.00	0.00	282.31	3,572.14	4,239.58	4,094.63	2,984.06	2,464.32	2,241.55	2,771.09	3,026.3	3,144.01	4,698.16	4,689.50	4,116.16	4,769.86	1,760.07	11.69	0.00	0.00	0.00
03/18/2026	DAM	CISO		DOWN	HIGH	WIND		568.32	655.70	706.39	703.24	788.25	833.41	902.93	959.11	998.96	978.90	901.49	714.10	620.79	640.2	591.27	577.80	726.88	748.25	626.31	614.32	571.95	576.41	653.23	726.12
03/18/2026	DAM	CISO		DOWN	LOW	DEMAND		-900.64	-821.65	-712.71	-552.31	-579.46	-973.21	-1,279.52	-1,193.29	-1,786.38	-2,252.39	-2,392.75	-2,213.23	-1,997.35	-1,999.6	-2,126.61	2,195.35	-2,244.17	-2,238.48	-1,855.25	-1,238.46	-1,163.54	-1,339.88	-1,362.68	-1,018.2
03/18/2026	DAM	CISO		DOWN	LOW	NET-DEMAND		-1,186.56	-961.01	-986.85	-1,019.41	-1,081.58	-1,438.42	-3,488.67	-5,106.41	-5,101.08	-3,265.50	-3,052.00	-2,956.23	-3,071.08	-3,461.9	-4,239.72	5,933.73	-5,459.50	-5,597.37	-6,312.04	-2,503.80	-1,365.40	-1,512.23	-1,649.30	-1,233.25
03/18/2026	DAM	CISO		UP	HIGH	DEMAND		761.96	731.81	735.84	545.71	532.60	818.29	927.74	620.28	1,031.11	1,640.14	2,062.19	1,925.20	1,976.75	2,076.0	2,042.27	2,259.70	2,005.87	1,767.75	1,229.78	811.03	734.97	795.25	950.07	890.67
03/18/2026	DAM	CISO		UP	HIGH	NET-DEMAND		968.95	984.01	848.68	673.10	652.06	986.52	2,796.22	4,190.68	4,184.08	3,167.78	3,059.82	2,740.24	2,547.25	2,649.1	3,033.88	4,379.33	5,622.50	4,898.51	4,218.20	1,699.34	1,164.00	1,178.76	1,456.58	1,277.80
03/18/2026	DAM	CISO		UP	LOW	SOLAR		0.00	0.00	0.00	0.00	0.00	-84.07	-2,827.63	-4,284.43	-3,955.14	-2,230.78	-1,896.08	-1,666.19	-1,566.26	-1,538.0	-1,617.94	3,028.70	-4,104.04	-3,907.92	-3,317.91	-1,594.38	-0.85	0.00	0.00	0.00
03/18/2026	DAM	CISO		UP	LOW	WIND		-677.71	-587.32	-628.74	-640.71	-565.05	-496.09	-510.67	-558.88	-612.30	-663.57	-738.57	-739.10	-855.10	-998.3	-853.28	-951.56	-899.44	-822.74	-672.28	-832.19	-840.09	-802.79	-735.23	-775.90

	L	M	N	HE15
				3,144.01
				591.27
				-2,126.61
				-4,239.72
NET LOAD		-4239.72	3033.88	2,042.27
LOAD		-2126.61	2042.27	3,033.88
SOLAR		3144.01	-1617.94	-1,617.94
WIND		591.27	-853.28	-853.28

GRAB Threshold VALUES

Market/Process= 'DAM'

HE15

Ignore Percentile

OASIS > Energy > Imbalance Reserve > Imbalance Reserve Requirement Thresholds

Opr Date	Market	Balancing Authority	Area Group	Ramp Type	Percentile	Data Type	HE01	HE15
03/18/2026	DAM	CISO		DOWN	HIGH	Histogram		3,347.30
03/18/2026	DAM	CISO		DOWN	HIGH	Mosaic	6,574.00	
03/18/2026	DAM	CISO		DOWN	LOW	Histogram		-4,547.30
03/18/2026	DAM	CISO		DOWN	LOW	Mosaic	0.10	
03/18/2026	DAM	CISO		UP	HIGH	Histogram		3,347.30
03/18/2026	DAM	CISO		UP	HIGH	Mosaic	4,844.00	
03/18/2026	DAM	CISO		UP	LOW	Histogram		-4,547.30
03/18/2026	DAM	CISO		UP	LOW	Mosaic	0.10	

Thresholds		
	Down Threshold	Up Threshold
Dynamic	-4547.3	3347.3
Static_Ceiling	6574	4844
Static_Floor	0.1	0.1

Use HE1 for mosaic threshold

Mosaic threshold = Static Threshold and is the same for all hours

(Stage 2 cont.)

Calculate Mosaic Net Load requirement, using “m” variables and polynomial coefficients

SUM		=E21+A19*E20+(A19^2)*E19				
A	B	C	D	E	F	G
1	INPUTS					
2	SOURCE					
3		Forecast		Down component coefficient	Up component coefficient	
4	LOAD	25,459	A_LOAD	2.25229E-07	-2.82181E-05	
5	SOLAR	21448	B_LOAD	0.017986757	1.128883485	
6	WIND	395	C_LOAD	-2606.458215	-8886.892972	
7			A_SOLAR	-1.0256E-05	1.25326E-05	
8	HE	15	B_SOLAR	-0.092294378	-0.398835773	
9	INT	1	C_SOLAR	6758.4388	1377.640445	
10			A_WIND	3.79766E-05	0.000124543	
11	red indicates corresponding field in OASIS have been substituted		B_WIND	-0.10981999	-0.862018941	
12	filled in from OASIS		C_WIND	582.6533475	317.1122559	
13	calculated					
14						
15	Model the calculation of m variable like presented in BRS...					
16	$M5 P97.5 (nd, d, s, w) \equiv ND5 H97.5 - (D5 H97.5 - S5 H2.5 - W5 H2.5) + (D5 P97.5 (d) - S5 P2.5 (s) - W5 P2.5 (w)).$					
17						
18	Down mosaic variable	Up mosaic variable		Down mosaic coefficient	Up mosaic coefficient	
19	-986.3100082	1,499.10	A	-7.19443E-05	-0.000680605	
20			B	0.054664045	4.642898392	
21			C	-2507.560305	-4776.73663	
22						
23						
24						
25	Down Final Uncertainty Requirement	Up Final Uncertainty Requirement				
26	=E21+A19*E20+(A19^2)*E19	653.9150232				

(Stage 2 cont.)

Apply Static and Dynamic thresholds

18	Down mosaic variable	Up mosaic variable		Down mosaic coefficient	Up mosaic coefficient		Down Threshold	Up Threshold
19	-986.310082	1,499.10	A	-7.19443E-05	-0.000680605	Dynamic	-4547.3	3347.3
20			B	0.054664045	4.642898392	Static_Ceiling	6574	4844
21			C	-2507.560305	-4776.73663	Static_Floor	0.1	0.1
22								
23								
24							Note, we multiply this by -1 in final requirement	
25	Down Final Uncertainty Requirement	Up Final Uncertainty Requirement						
26	-2631.463991	653.9150232						
27								
28								
29	Down Requirement w/ Thresholds	Up Requirement w/ Thresholds						
30	=MIN(MAX(A26,I19,I20*-1),I21*-1)	653.9150232						

Confirm calculation of IR requirement within OASIS

Pay Attention to the Publication Timestamp.
The latest publication timestamp per day should align with Binding Forecasts as Reported on OASIS.

California ISO OASIS

OASIS ATLAS REFERENCE REPORT DEFINITION PRICES TRANSMISSION SYSTEM DEMAND ENERGY ANCILLARY SERVICES CONGESTION REV

Date: 03/18/2026 Market/Process: DAM BAA ID: CISO Apply Reset

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Imbalance Reserve Results

121 - 140 of 336 15 GO

Market Publication Timestamp	Opr Date	Hour Ending	Balancing Authority Area ID	Product	Calculated Reserve	Diversity Benefit	Reserve Requirement
DAM 03/17/2026 15:05	03/18/2026	16	CISO	IRD	2,446.02	12.45	2,433.58
DAM 03/17/2026 15:05	03/18/2026	16	CISO	IRU	392.12	112.35	279.76
DAM 03/17/2026 15:36	03/18/2026	16	CISO	IRD	2,442.72	11.03	2,431.69
DAM 03/17/2026 15:36	03/18/2026	16	CISO	IRU	324.31	91.19	233.12
DAM 03/17/2026 20:00	03/18/2026	16	CISO	IRD	2,453.50	7.89	2,445.61
DAM 03/17/2026 20:00	03/18/2026	16	CISO	IRU	262.29	68.35	193.94
DAM 03/17/2026 13:06	03/18/2026	15	CISO	IRD	2,637.13	134.50	2,502.63
DAM 03/17/2026 13:06	03/18/2026	15	CISO	IRU	1,074.00	0.00	1,074.00
DAM 03/17/2026 13:35	03/18/2026	15	CISO	IRD	2,636.91	132.80	2,504.10
DAM 03/17/2026 13:35	03/18/2026	15	CISO	IRU	1,048.75	0.00	1,048.75
DAM 03/17/2026 14:06	03/18/2026	15	CISO	IRD	2,636.91	137.40	2,499.50
DAM 03/17/2026 14:06	03/18/2026	15	CISO	IRU	1,048.75	0.00	1,048.75
DAM 03/17/2026 14:35	03/18/2026	15	CISO	IRD	2,636.72	136.96	2,499.75
DAM 03/17/2026 14:35	03/18/2026	15	CISO	IRU	1,026.99	0.00	1,026.99
DAM 03/17/2026 15:05	03/18/2026	15	CISO	IRD	2,636.72	137.08	2,499.64
DAM 03/17/2026 15:05	03/18/2026	15	CISO	IRU	1,026.95	0.00	1,026.95
DAM 03/17/2026 15:36	03/18/2026	15	CISO	IRD	2,635.78	136.58	2,499.20
DAM 03/17/2026 15:36	03/18/2026	15	CISO	IRU	916.12	0.00	916.12
DAM 03/17/2026 20:00	03/18/2026	15	CISO	IRD	2,631.48	149.00	2,482.47
DAM 03/17/2026 20:00	03/18/2026	15	CISO	IRU	653.96	0.00	653.96

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OASIS > Energy > Imbalance Reserve > Imbalance Reserve Results

Other Considerations

- Putting in different scenario forecasts, with the same coefficients and other input data
- Advisory values, e.g., D2 and D3 are still predicting D1 uncertainty
- Calculating uncertainty (for validating performance)

CALCULATING DAM REALIZED UNCERTAINTY

DAM Realized Uncertainty must be derived

Recreating uncertainty calculations for:
4/07/2026 HE 18, Interval 4

DAM uncertainty (RTPD binding – DAM)



ENERGY ANCILLARY SERVICES CONGESTION REVENUE RIGHTS PUBLIC BIDS

Schedule	▶	
System	▶	
Flexible Ramping	▶	Flexible Ramp Requirements
Convergence Bidding	▶	Uncertainty Movement by Category
Energy Imbalance Market	▶	Flexible Ramp Aggregate Awards
Uplift	▶	Flexible Ramp Surplus Demand Curves
Imbalance Reserve	▶	Flexible Ramp Requirements Inputs and Outputs
EDAM	▶	Flexible Ramp Test Results Groups
4,623.13	14,149.06	13,960.55
		Flexible Ramp Forecasts
		Flexible Ramp Requirement Thresholds
		Flexible Ramp Requirements Input Polynomials
		Flexible Ramp Requirements Uncertainty Histograms

ENERGY ANCILLARY SERVICES CONGESTION REVENUE RIGHTS PUBLIC BIDS RESOURCE ADEQUACY

Schedule	▶							
System	▶							
Flexible Ramping	▶							
Convergence Bidding	▶							
Energy Imbalance Market	▶							
Uplift	▶							
HE06	HE07	HE08	HE09	HE10	HE11	HE12	HE13	HE14
Imbalance Reserve	▶	Imbalance Reserve Requirement Thresholds						
14	EDAM	Imbalance Reserve Requirements Input Polynomials						
14,623.13	14,149.06	13,960.55	Imbalance Reserve Requirements Uncertainty Histograms					
			Imbalance Reserve Forecasts					
			Imbalance Reserve Demand Curves					
			Imbalance Reserve Requirements and Imbalance Reserve/Reliability Capacity Awards					
			Imbalance Reserve Surplus					
			Imbalance Reserve Results					

RTPD Uncertainty Inputs

Flexible Ramp Forecasts

Market Opr Date	Balancing Authority Area ID	Run Type	Data Type	Interval	HE01	HE02	HE03	HE04	HE05	HE06	HE07	HE08	HE09	HE10	HE11	HE12	HE13	HE14	HE15	HE16	HE17	HE18	HE19	HE20	HE21	HE22	HE23	HE24
RTPD 04/07/2026	CISO	Binding	Demand	1																		4,846.13	26,827.22	27,231.95	25,488.49	25,168.46	23,463.29	
RTPD 04/07/2026	CISO	Binding	Demand	2																		23,531.77	5,522.66	27,112.04	27,198.48	26,237.51	24,700.24	22,641.96
RTPD 04/07/2026	CISO	Binding	Demand	3																		23,783.45	5,964.19	27,302.41	26,935.94	25,886.52	24,231.82	22,697.16
RTPD 04/07/2026	CISO	Binding	Demand	4																		24,485.70	6,613.01	27,360.78	26,503.41	25,483.56	23,828.82	22,414.82
RTPD 04/07/2026	CISO	Binding	Solar	1																		9,119.60	471.76	0.00	0.00	0.00	0.00	0.00
RTPD 04/07/2026	CISO	Binding	Solar	2																		16,568.22	6,243.69	43.81	0.00	0.00	0.00	0.00
RTPD 04/07/2026	CISO	Binding	Solar	3																		14,505.21	3,395.78	0.11	0.00	0.00	0.00	0.00
RTPD 04/07/2026	CISO	Binding	Solar	4																		11,926.31	1,383.63	0.00	0.00	0.00	0.00	0.00
RTPD 04/07/2026	CISO	Binding	Wind	1																		4,280.09	4,704.51	5,060.00	5,131.92	5,295.65	5,343.19	5,535.53
RTPD 04/07/2026	CISO	Binding	Wind	2																		4,466.03	4,969.22	5,013.70	5,242.69	5,426.77	5,512.14	5,284.05
RTPD 04/07/2026	CISO	Binding	Wind	3																		4,517.43	4,943.16	5,088.72	5,283.35	5,363.97	5,545.42	5,341.94
RTPD 04/07/2026	CISO	Binding	Wind	4																		22,030.85	4,778.84	26,728.68	27,296.00	26,457.63	25,089.76	23,993.43
RTPD 04/07/2026	CISO	Advisory	Demand	1	22,017.52	21,050.14	20,191.73	19,757.22	19,679.57	20,448.16	22,066.77	23,124.76	22,437.21	20,881.43	18,675.74	17,245.50	16,143.22	15,937.76	16,498.99	17,580.74	19,505.	22,030.85	5,315.27	27,049.72	27,048.02	26,243.50	24,703.13	23,027.44
RTPD 04/07/2026	CISO	Advisory	Demand	2	21,835.53	20,822.12	19,999.58	19,676.49	19,814.77	20,762.22	22,443.65	23,181.91	22,014.18	20,142.86	18,234.24	16,873.65	15,899.85	15,885.76	16,743.58	18,037.22	20,109.	22,827.29	5,964.19	27,302.41	26,935.94	25,886.52	24,231.82	22,697.16
RTPD 04/07/2026	CISO	Advisory	Demand	3	21,584.08	20,622.41	19,913.78	19,605.98	19,930.36	21,053.47	22,700.19	22,661.60	21,567.81	19,611.76	17,891.38	16,451.65	15,782.94	16,170.58	17,379.09	18,725.34	20,874.	24,180.07	5,964.19	27,302.41	26,935.94	25,886.52	24,231.82	22,697.16
RTPD 04/07/2026	CISO	Advisory	Demand	4	21,268.60	20,379.60	19,763.49	19,565.31	20,093.02	21,373.85	22,896.26	22,653.37	21,073.05	19,106.31	17,479.74	16,278.24	15,789.45	16,324.10	17,401.23	19,250.13	21,574.	24,417.14	6,320.84	27,374.63	26,624.38	25,476.49	23,766.82	22,352.44
RTPD 04/07/2026	CISO	Advisory	Solar	1	0.00	0.00	0.00	0.00	0.00	0.45	3,981.86	15,370.22	19,035.22	20,312.96	20,952.79	20,769.15	20,991.13	20,788.88	20,677.28	19,806.	17,762.71	9,239.54	475.91	0.00	0.00	0.00	0.00	0.00
RTPD 04/07/2026	CISO	Advisory	Solar	2	0.00	0.00	0.00	0.00	0.00	0.00	27.73	6,661.74	16,937.07	19,452.66	20,420.47	21,022.89	20,847.82	20,870.28	20,798.58	20,522.83	19,503.	16,621.75	6,279.36	44.09	0.00	0.00	0.00	0.00
RTPD 04/07/2026	CISO	Advisory	Solar	3	0.00	0.00	0.00	0.00	0.00	0.00	441.91	9,778.93	17,888.41	19,902.45	20,708.70	21,037.20	20,898.79	20,875.63	20,979.80	20,393.47	19,189.	14,725.98	3,439.86	0.09	0.00	0.00	0.00	0.00
RTPD 04/07/2026	CISO	Advisory	Solar	4	0.00	0.00	0.00	0.00	0.00	0.00	1,775.23	12,750.78	18,535.11	20,141.26	20,776.18	20,804.12	20,971.44	20,879.15	20,831.05	20,151.19	18,585.	12,033.84	1,406.00	0.00	0.00	0.00	0.00	0.00



Market Opr Date	Balancing Authority Area ID	Run Type	Data Type	Interval	HE18
RTPD 04/07/2026	CISO	Binding	Demand	1	
RTPD 04/07/2026	CISO	Binding	Demand	2	23,531.77
RTPD 04/07/2026	CISO	Binding	Demand	3	23,783.45
RTPD 04/07/2026	CISO	Binding	Demand	4	24,485.70
RTPD 04/07/2026	CISO	Binding	Solar	1	
RTPD 04/07/2026	CISO	Binding	Solar	2	16,568.22
RTPD 04/07/2026	CISO	Binding	Solar	3	14,505.21
RTPD 04/07/2026	CISO	Binding	Solar	4	11,926.31
RTPD 04/07/2026	CISO	Binding	Wind	1	4,280.09
RTPD 04/07/2026	CISO	Binding	Wind	2	4,466.03
RTPD 04/07/2026	CISO	Binding	Wind	3	4,517.43
RTPD 04/07/2026	CISO	Binding	Wind	4	4,517.43
RTPD 04/07/2026	CISO	Advisory	Demand	1	22,030.85
RTPD 04/07/2026	CISO	Advisory	Demand	2	22,827.29
RTPD 04/07/2026	CISO	Advisory	Demand	3	24,180.07
RTPD 04/07/2026	CISO	Advisory	Demand	4	24,417.14
RTPD 04/07/2026	CISO	Advisory	Solar	1	17,762.71
RTPD 04/07/2026	CISO	Advisory	Solar	2	16,621.75
RTPD 04/07/2026	CISO	Advisory	Solar	3	14,725.98
RTPD 04/07/2026	CISO	Advisory	Solar	4	12,033.84

1	INPUTS	
2	SOURCE	RTPD
3		FORECAST
4	DEMAND	24485.7
5	SOLAR	11926.31
6	WIND	4517.43
7	NET-DEMAND	8041.96
8		
9	HE	18
10	INTERVAL	4
11		
12	red indicates corresponding field in OASIS have been substituted	
13	filled in from OASIS	
14	calculated	

DAM Uncertainty Inputs

Imbalance Reserve Forecasts

Opr Date	Market	Balancing Authority Area ID	Data Type	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
04/07/2026	DAM	CISO	Demand	21,227.69	20,302.60	19,552.07	19,137.24	19,377.89	20,443.29	22,077.50	22,695.13	21,660.22	19,766.67	17,833.92	16,293.77	15,555.69	15,425.61	16,226.17	17,652.02	19,598.06	22,292.01	4,989.20	26,288.37	26,085.56	25,310.28	23,846.45	22,201.04	
04/07/2026	DAM	CISO	Solar	0.00	0.00	0.00	0.00	0.00	0.00	546.77	8,358.47	17,833.71	20,819.95	22,014.65	22,410.02	22,585.65	22,495.07	22,298.14	21,577.36	20,075.95	15,619.11	4,494.63	83.10	0.00	0.00	0.00	0.00	
04/07/2026	DAM	CISO	Wind	5,262.19	5,162.02	5,018.66	4,870.33	4,756.61	4,494.36	4,218.34	4,005.40	3,671.94	3,346.76	3,070.23	3,009.54	3,155.59	3,367.37	3,796.12	4,177.36	4,467.72	4,746.05	4,816.55	4,899.95	4,864.99	4,888.82	4,921.71	4,868.85	

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Opr Date	Market	Balancing Authority Area ID	Data Type	HE18
04/07/2026	DAM	CISO	Demand	22,292.01
04/07/2026	DAM	CISO	Solar	15,619.11
04/07/2026	DAM	CISO	Wind	4,746.05

1	INPUTS		
2	SOURCE	RTPD	DAM
3		FORECAST	
4	DEMAND		24485.7
5	SOLAR		11926.31
6	WIND		4517.43
7	NET-DEMAND		8041.96
8			
9	HE		18
10	INTERVAL		4
11			
12	red indicates corresponding field in OASIS have been substituted		
13	filled in from OASIS		
14	calculated		

Uncertainty Calculations

SUM : =B4-SUM(B5:B6)

	A	B	C	D
1	INPUTS			
2	SOURCE	RTPD	DAM	UNCERTAINTY
3		FORECAST		
4	DEMAND	24485.7	22292.01	2193.69
5	SOLAR	11926.31	15619.11	-3692.8
6	WIND	4517.43	4746.05	-228.62
7	NET-DEMAND	=B4-SUM(B5:B6)	1926.85	6115.11
8				
9	HE		18	
10	INTERVAL		4	
11				
12				
13				
14				

red indicates corresponding field in OASIS have been substituted
 filled in from OASIS
 calculated

SUM : =B7-C7

	A	B	C	D
1	INPUTS			
2	SOURCE	RTPD	DAM	UNCERTAINTY
3		FORECAST		
4	DEMAND	24485.7	22292.01	2193.69
5	SOLAR	11926.31	15619.11	-3692.8
6	WIND	4517.43	4746.05	-228.62
7	NET-DEMAND	8041.96	1926.85	=B7-C7
8				
9	HE		18	
10	INTERVAL		4	
11				
12				
13				
14				

red indicates corresponding field in OASIS have been substituted
 filled in from OASIS
 calculated

Additional references

- [California ISO - Imbalance Reserves Mosaic Parameter Requirements](#)

For questions, please reach out to
Short-Term Forecasting via CIDI

Recommended ticket details

Subject: Imbalance Reserves Requirement OASIS Training

Category: Forecasts

Responses and Comments from 12/9 Presentation

- CAISO will post an analogous presentation in pdf format for a trade date / trade hour once all reports are visible and correct
 - As of 12/11/2025 – “Imbalance Reserve Forecasts” report contains errant values for Wind and Solar (*not representative of upstream systems*)
 - As of 12/11/2025 – “Flexible Ramp Forecasts” report does not contain “Binding” RTPD forecasts – necessary for *precise* uncertainty replication
 - As of 12/11/2025 – “Imbalance Reserve Requirement Thresholds” report only lists “Mosaic” thresholds (e.g., Static) for HE 1 – they apply to all hours and will be changed to list for all 24 hours
- *Reference to reasoning around 2.5%, 97.5% for IR mentioned in [DAME tariff amendment filing to FERC](#) on pg. 69 (pg. 73 of pdf)*
- *Presenter mistakenly mentioned the downward requirement didn't match because the “advisory” RSE result was posted instead of binding, it was the threshold logic working as designed (see changes to the spreadsheet)*

4/10/2026 Relevant Reports Update

- CAISO will post an analogous presentation in pdf format for a trade date / trade hour once all reports are visible and correct
 - As of 3/12/2026 – “Imbalance Reserve Forecasts” report contains errant values for Wind and Solar (*not representative of upstream systems*)
 - As of 4/7/2026 – “Flexible Ramp Forecasts” report does not contain “Binding” RTPD forecasts – necessary for *precise* uncertainty replication



Thank you for your participation!

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