



WESTERN ENERGY IMBALANCE MARKET BENEFITS REPORT

Third Quarter 2023 ■ ■ ■

Prepared by: Market Performance and Advanced Analytics

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CONTENTS

EXECUTIVE SUMMARY 3

BACKGROUND 4

WEIM ECONOMIC BENEFITS IN Q3 2023 5

 CUMULATIVE ECONOMIC BENEFITS SINCE INCEPTION..... 6

 INTER-REGIONAL TRANSFERS 6

 WHEEL-THROUGH TRANSFERS..... 9

REDUCED RENEWABLE CURTAILMENT AND GHG REDUCTIONS..... 16

FLEXIBLE RAMPING PROCUREMENT DIVERSITY SAVINGS 17

CONCLUSION..... 18

APPENDIX 1: GLOSSARY OF ABBREVIATIONS 19

APPENDIX 2: MAXIMUM TRANSFER CAPACITIES..... 20

APPENDIX 3: MINIMUM & MAXIMUM FLEXIBLE RAMPING REQUIREMENTS 36

EXECUTIVE SUMMARY

Gross benefits from WEIM since November 2014

\$4.66 billion

This report presents the benefits associated with participation in the Western Energy Imbalance Market (WEIM).

The measured benefits of participation in the WEIM include cost savings, increased integration of renewable energy, and improved operational efficiencies including the reduction of the need for real-time flexible reserves.

This analysis demonstrates the benefit of economic dispatch in the real time market across a larger WEIM footprint with diverse resources and geography.



*Avangrid office; generation-only BAA with distribution across multiple states. Map boundaries are approximate and for illustrative purposes only.

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Q3 2023 Gross Benefits by Participant

	<i>(millions \$)</i>
Arizona Public Service	\$19.90
AVANGRID	\$4.80
Avista	\$5.19
Balancing Authority of Northern California	\$22.17
Bonneville Power Administration	\$6.38
California ISO	\$34.88
El Paso Electric	\$5.96
Idaho Power Company	\$8.62
Los Angeles Dept. of Water & Power	\$64.78
NV Energy	\$60.30
NorthWestern Energy	\$6.34
PacifiCorp	\$37.37
Portland General Electric	\$16.92
Public Service Company New Mexico	\$8.53
Puget Sound Energy	\$10.06
Powerex	\$83.72
Seattle City Light	\$4.61
Salt River Project	\$19.10
Tacoma Power	\$8.19
Tucson Electric Power	\$7.17
Turlock Irrigation District	\$1.00
WAPA Desert Southwest Region	\$26.06
Total	\$462.05

2023

Q3 BENEFITS

ECONOMICAL

\$462.05 M

Gross benefits realized due to more efficient inter-and intra-regional dispatch in the Fifteen-Minute Market (FMM) and Real-Time Dispatch (RTD)*

ENVIRONMENTAL

25,728

Metric tons of CO₂** avoided curtailments

OPERATIONAL

59%

Average reduction in flexibility reserves across the footprint

*WEIM Quarterly Benefit Report Methodology: <https://www.westerneim.com/Documents/EIM-BenefitMethodology.pdf>.

**The GHG emission reduction reported is associated with the avoided curtailment only. The current market process and counterfactual methodology cannot differentiate the GHG emissions resulting from serving ISO load via the WEIM versus dispatch that would have occurred external to the ISO without the WEIM. For more details, see <http://www.caiso.com/Documents/GreenhouseGasEmissionsTrackingReport-FrequentlyAskedQuestions.pdf>

■ BACKGROUND

The Western EIM began financially binding operation on November 1, 2014, by optimizing resources across the ISO and PacifiCorp Balancing Authority Areas (BAAs). Since then, the WEIM has continued to grow and now includes 22 market participants and represents nearly 80% of the demand for electricity in the Western interconnection. Today, the Western EIM footprint includes portions of Arizona, California, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming, Texas and extends to the border with Canada.

California ISO	2014
PacifiCorp	2014
NV Energy	2015
Arizona Public Service	2016
Puget Sound Energy	2016
Portland General Electric	2017
Powerex	2018
Idaho Power Company	2018
Balancing Authority of Northern California	2019
Seattle City Light	2020
Salt River Project	2020
Turlock Irrigation District	2021
Public Service Company New Mexico	2021
Los Angeles Dept. of Water & Power	2021
NorthWestern Energy	2021
Tacoma Power	2022
Avista	2022
Tucson Electric Power	2022
Bonneville Power Administration	2022
AVANGRID	2023
El Paso Electric	2023
WAPA Desert Southwest Region	2023

TABLE 1: WEIM participants

■ WEIM ECONOMIC BENEFITS IN Q3 2023

Table 2 shows the estimated WEIM gross benefits by each region per month¹. The monthly savings presented show \$171.87 million for July, \$140.94 million for August and \$149.24 million for September with a total estimated benefit of \$462.05 million for this quarter². This level of WEIM benefits accrued from having additional WEIM areas participating in the market and economical transfers displacing more expensive generation.

<i>Region</i>	July	August	September	Total
<i>APS</i>	\$10.10	\$5.49	\$4.31	\$19.90
<i>AVRN</i>	\$2.58	\$0.37	\$1.85	\$4.80
<i>AVA</i>	\$1.71	\$1.77	\$1.71	\$5.19
<i>BANC</i>	\$6.17	\$9.48	\$6.52	\$22.17
<i>BPA</i>	\$1.93	\$2.61	\$1.84	\$6.38
<i>CISO</i>	\$16.36	\$5.06	\$13.46	\$34.88
<i>EPE</i>	\$3.07	\$1.66	\$1.23	\$5.96
<i>IPCO</i>	\$3.45	\$3.02	\$2.15	\$8.62
<i>LADWP</i>	\$12.67	\$17.65	\$34.46	\$64.78
<i>NVE</i>	\$25.32	\$19.96	\$15.02	\$60.30
<i>NWMT</i>	\$2.36	\$2.30	\$1.68	\$6.34
<i>PAC</i>	\$15.67	\$12.98	\$8.72	\$37.37
<i>PGE</i>	\$5.93	\$6.74	\$4.25	\$16.92
<i>PNM</i>	\$4.84	\$2.45	\$1.24	\$8.53
<i>PSE</i>	\$3.44	\$3.93	\$2.69	\$10.06
<i>PWRX</i>	\$29.50	\$23.16	\$31.06	\$83.72
<i>SCL</i>	\$1.76	\$2.00	\$0.85	\$4.61
<i>SRP</i>	\$5.80	\$6.05	\$7.25	\$19.10
<i>TPWR</i>	\$2.47	\$4.18	\$1.54	\$8.19
<i>TEP</i>	\$4.47	\$1.55	\$1.15	\$7.17
<i>TID</i>	\$0.42	\$0.31	\$0.27	\$1.00
<i>WALC</i>	\$11.85	\$8.22	\$5.99	\$26.06
Total	\$171.87	\$140.94	\$149.24	\$462.05

TABLE 2: Q3 2023 benefits in millions USD

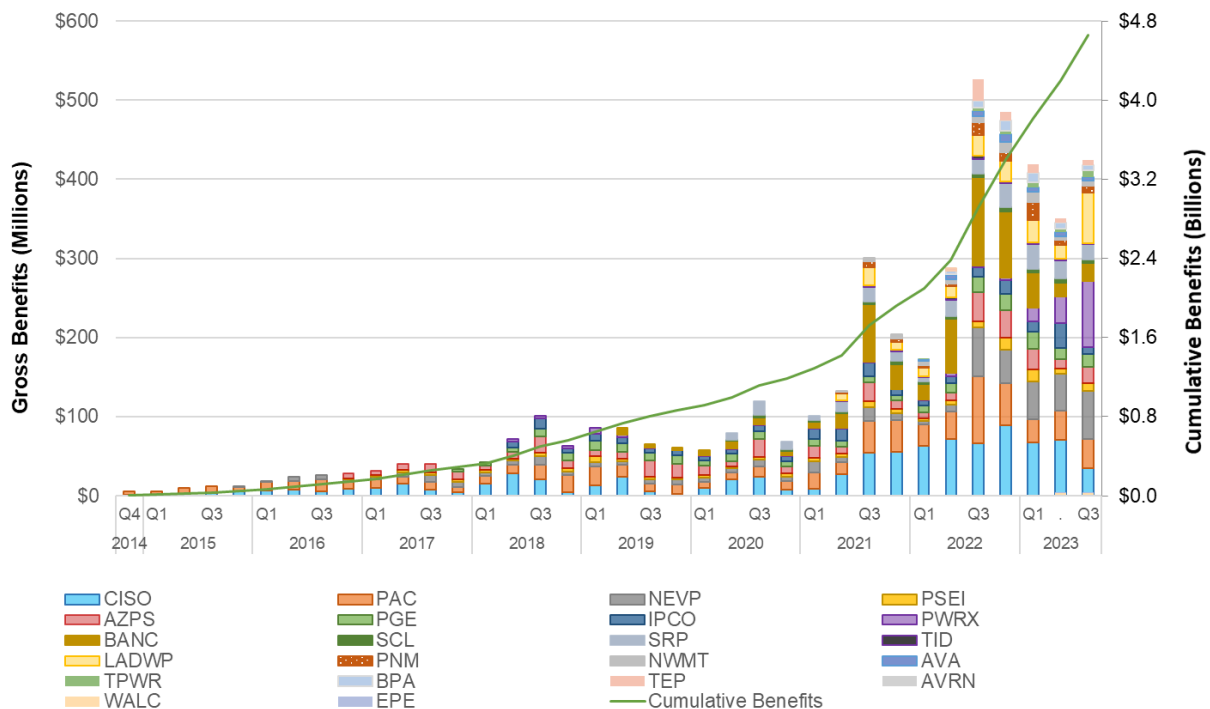
¹ The WEIM benefits reported here are calculated based on available data. Intervals without complete data are excluded in the calculation. The intervals excluded due to unavailable data are normally within a few percent points of the total intervals.

² For several quarterly estimates, CAISO benefits were calculated on a variation of the counterfactual methodology. For CAISO only the logic had considered offline resources as part of the bid stack in the counterfactual. In Q4 2021, CAISO identified some questionable results that drove persistent negative benefits for CAISO when considering offline resources. Since Q4 2021, the benefit calculation for CAISO area follows the same methodology applicable to all WEIM entities in which only online resources are used.

CUMULATIVE ECONOMIC BENEFITS SINCE INCEPTION

Since the start of the WEIM in November 2014, the cumulative economic benefits of the market have totaled \$4.66 billion. The quarterly benefits have grown over time as a result of the participation of new BAAs, which results in benefits for both the individual BAA but also compounds the benefits to adjacent BAAs through additional transfers. The ISO began publishing quarterly WEIM benefit reports in April 2015.³

Graph 1 illustrates the gross economic benefits of the WEIM by quarter for each participating BAA.



GRAPH 1: Cumulative economic benefits for each quarter by BAA

INTER-REGIONAL TRANSFERS

A significant contributor to WEIM benefits is transfers across balancing areas, providing access to lower cost supply, while factoring in the cost of compliance with greenhouse gas (GHG) emissions regulations when energy is transferred into the ISO. As such, the transfer volumes are a good indicator of a portion of the benefits attributed to the WEIM. Transfers can take place in both the 15-Minute Market and Real-Time Dispatch (RTD).

Generally, transfer limits are based on transmission and interchange rights that participating balancing authority areas make available to the WEIM, with the exception of the PacifiCorp West (PACW) -ISO transfer limit and the Portland General Electric (PGE) -ISO transfer limit in RTD. These RTD transfer capacities between PACW/PGE and the ISO are determined based on the allocated dynamic transfer capability driven by system operating conditions. This report

³ Prior reports are available at <https://www.westerneim.com/Pages/About/QuarterlyBenefits.aspx>

does not quantify a BAA's opportunity cost that the utility considered when using its transfer rights for the WEIM.

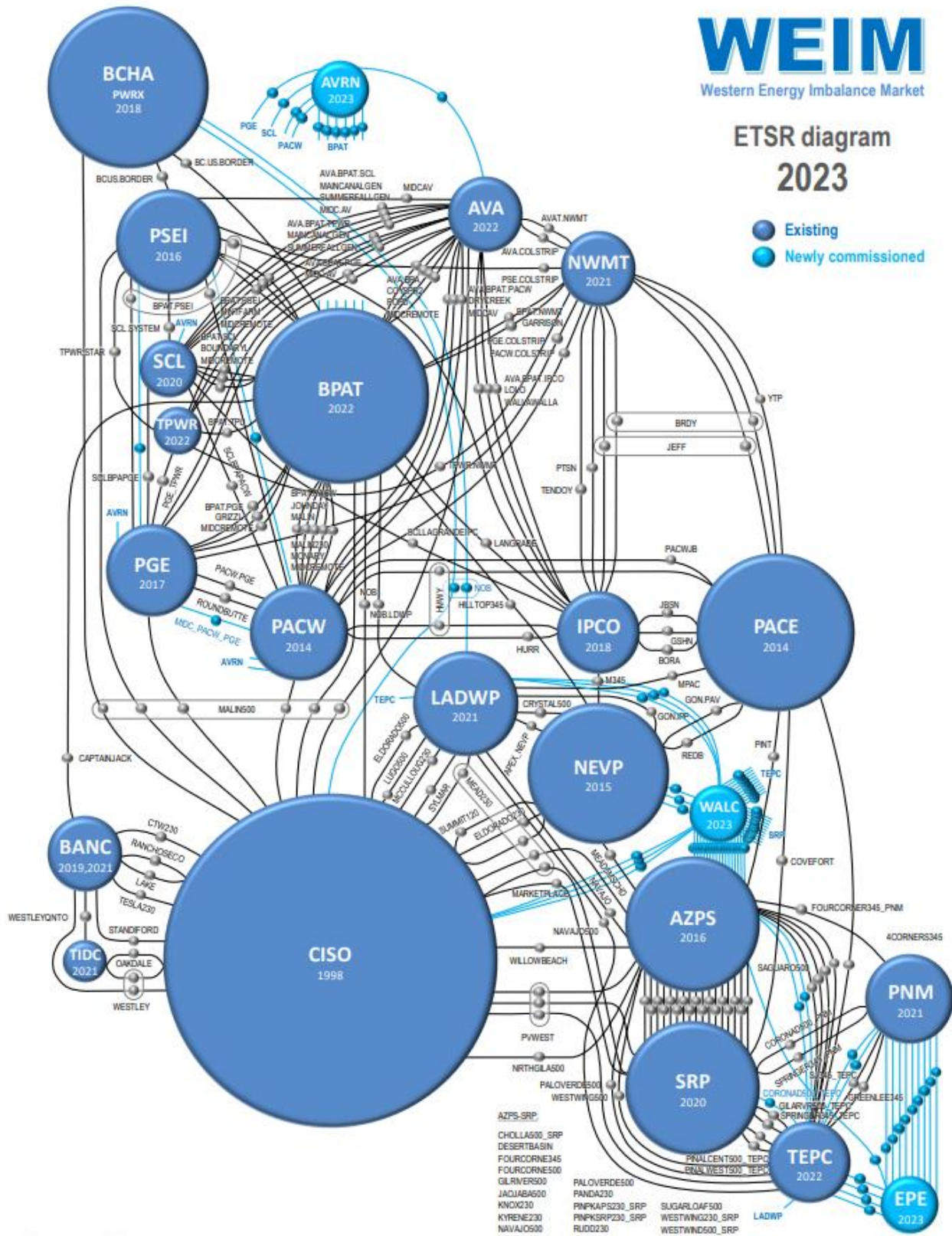
Appendix 2 provides the 15-minute and 5-minute WEIM transfer volumes with base schedule transfers excluded. The WEIM entities submit inter-BAA transfers in their base schedules. The benefits quantified in this report are only attributable to the transfers that occurred through the WEIM. The benefits do not include any transfers attributed to transfers submitted in the base schedules that are scheduled prior to the start of the WEIM.

The transfer from BAA_x to BAA_y and the transfer from BAA_y to BAA_x are separately reported. For example, if there is a 100 Megawatt-Hour (MWh) transfer during a 5-minute interval, in addition to a base transfer from ISO to NVE, it will be reported as 100 MWh from_BAA ISO to_BAA NEVP, and 0 MWh from_BAA NEVP to_BAA ISO in the opposite direction. The 15-minute transfer volume is the result of optimization in the 15-minute market using all bids and base schedules submitted into the WEIM. The 5-minute transfer volume is the result of optimization using all bids and base schedules submitted into WEIM, based on unit commitments determined in the 15-minute market optimization.



ETSR diagram
2023

- Existing
- Newly commissioned



GRAPH 2: WEIM transfer

■ WHEEL-THROUGH TRANSFERS

As the footprint of the WEIM grows, wheel-through transfers may become more common. In order to derive the wheel-through transfers for each WEIM BAA, the ISO uses the following calculation for every real-time interval dispatch:

- *Total import*: summation of transfers above base transfers coming into the WEIM BAA under analysis
- *Total export*: summation of all transfers above base transfers going out of the WEIM BAA under analysis
- *Net import*: the maximum of zero or the difference between total imports and total exports
- *Net export*: the maximum of zero or the difference between total exports and total imports
- *Wheel-through*: the minimum of the WEIM transfers into (total import) or WEIM transfer out (total export) of a BAA for a given interval

All wheel-through transfers are summed over both the month and the quarter.

Currently, a WEIM entity facilitating a wheel through receives no direct financial benefit for facilitating the wheel; only the sink and source directly benefit. As part of the WEIM Consolidated Initiatives stakeholder process, the ISO committed to monitoring the wheel through volumes to assess whether, after the addition of new WEIM entities, there is a potential future need to pursue a market solution to address the equitable sharing of wheeling benefits.

The ISO will continue to track the volume of wheel-through transfers in the WEIM market in the quarterly reports.

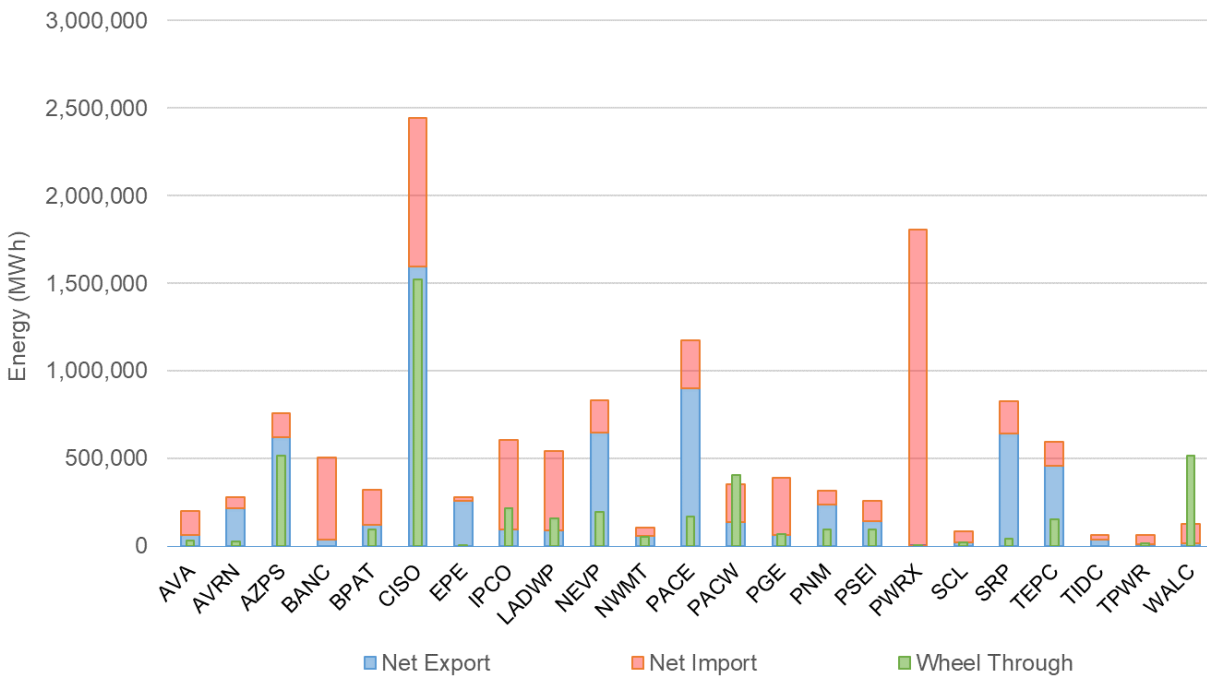
This volume reflects the total wheel-through transfers for each WEIM BAA, regardless of the potential paths used to wheel through. The net imports and exports estimated in this section reflect the overall volume of net imports and exports; in contrast, the imports and exports provided in Table 2 reflect the gross transfers between two WEIM BAAs.

The metric is measured as energy in MWh for each month and the corresponding calendar quarter, as shown in Tables 3 through 6 and Graphs 3 through 6.

BAA	Net Export	Net Import	Wheel Through
AVA	62,092	136,535	34,445
AVRN	214,898	65,970	28,245
AZPS	621,649	136,576	518,268
BANC	36,177	468,297	-
BPAT	119,588	204,114	94,270

CISO	1,594,917	845,875	1,519,554
EPE	258,984	22,139	547
IPCO	93,616	513,524	213,914
LADWP	87,844	455,981	161,045
NEVP	647,385	184,058	197,945
NWMT	60,034	46,759	53,009
PACE	900,987	271,007	171,326
PACW	139,648	215,872	407,477
PGE	63,682	324,094	71,384
PNM	236,007	79,202	94,031
PSEI	144,519	115,727	96,632
PWRX	389	1,808,142	6,762
SCL	22,880	61,630	22,255
SRP	643,065	184,906	41,429
TEPC	457,708	136,907	151,627
TIDC	35,675	26,744	-
TPWR	9,235	53,625	17,148
WALC	16,383	110,081	514,101

TABLE 3: Estimated wheel-through transfers in Q3 2023

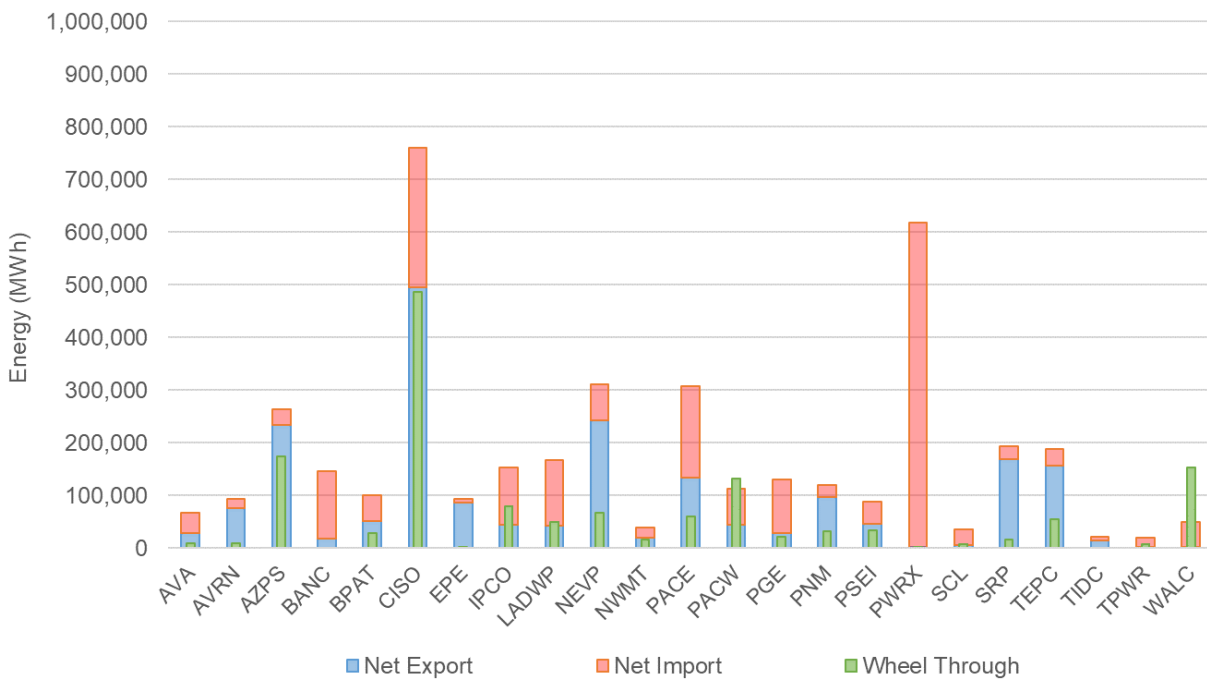


GRAPH 3: Estimated wheel-through transfers in Q3 2023

BAA	Net Export	Net Import	Wheel Through
AVA	27,950	38,627	9,301
AVRN	76,490	17,212	9,719
AZPS	234,218	28,786	173,899
BANC	17,474	127,733	-
BPAT	51,932	48,285	28,801
CISO	495,944	264,639	486,393
EPE	86,481	6,712	11
IPCO	44,837	108,245	79,206
LADWP	42,629	123,881	49,073
NEVP	242,824	67,633	67,572
NWMT	20,311	18,402	15,528
PACE	133,437	173,378	60,592
PACW	44,207	67,672	132,457

PGE	28,141	101,627	21,160
PNM	96,399	23,274	31,074
PSEI	45,416	41,844	34,246
PWRX	340	617,515	2,872
SCL	5,986	29,929	7,454
SRP	168,163	25,228	15,347
TEPC	155,837	33,029	54,601
TIDC	13,778	8,259	-
TPWR	2,056	18,105	6,713
WALC	2,482	47,315	152,946

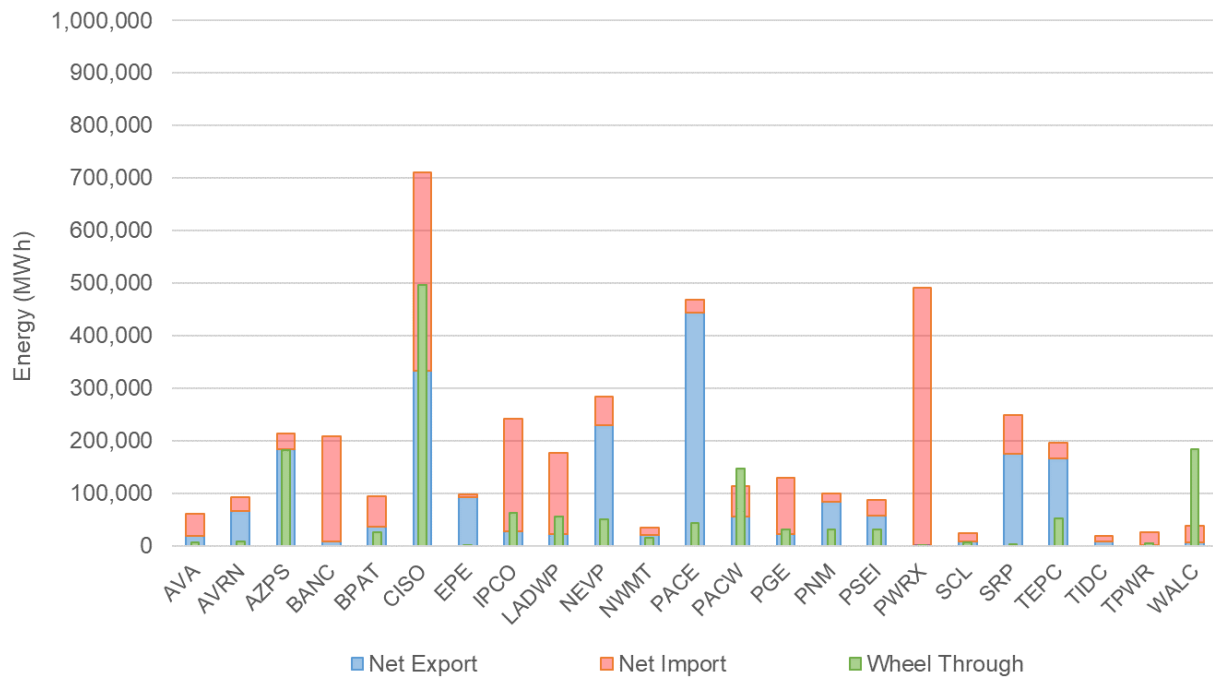
TABLE 4: Estimated wheel-through transfers in July 2023



GRAPH 4: Estimated wheel-through transfers in July 2023

BAA	Net Export	Net Import	Wheel Through
AVA	20,073	41,344	7,736
AVRN	66,780	26,230	9,605
AZPS	184,407	29,471	181,917
BANC	9,633	200,018	-
BPAT	37,016	57,318	26,757
CISO	334,312	376,646	496,054
EPE	93,845	3,648	35
IPCO	27,527	215,295	62,575
LADWP	23,570	153,200	56,810
NEVP	229,579	54,086	51,701
NWMT	21,436	14,425	16,513
PACE	444,016	24,075	43,915
PACW	56,903	57,986	146,813
PGE	22,567	106,679	31,979
PNM	84,308	15,914	30,974
PSEI	57,556	29,946	32,232
PWRX	50	491,039	1,099
SCL	8,399	16,763	7,303
SRP	175,934	73,359	3,081
TEPC	167,617	28,620	53,584
TIDC	8,370	11,463	-
TPWR	2,062	23,734	5,898
WALC	6,670	31,774	183,944

TABLE 5: Estimated wheel-through transfers in August 2023

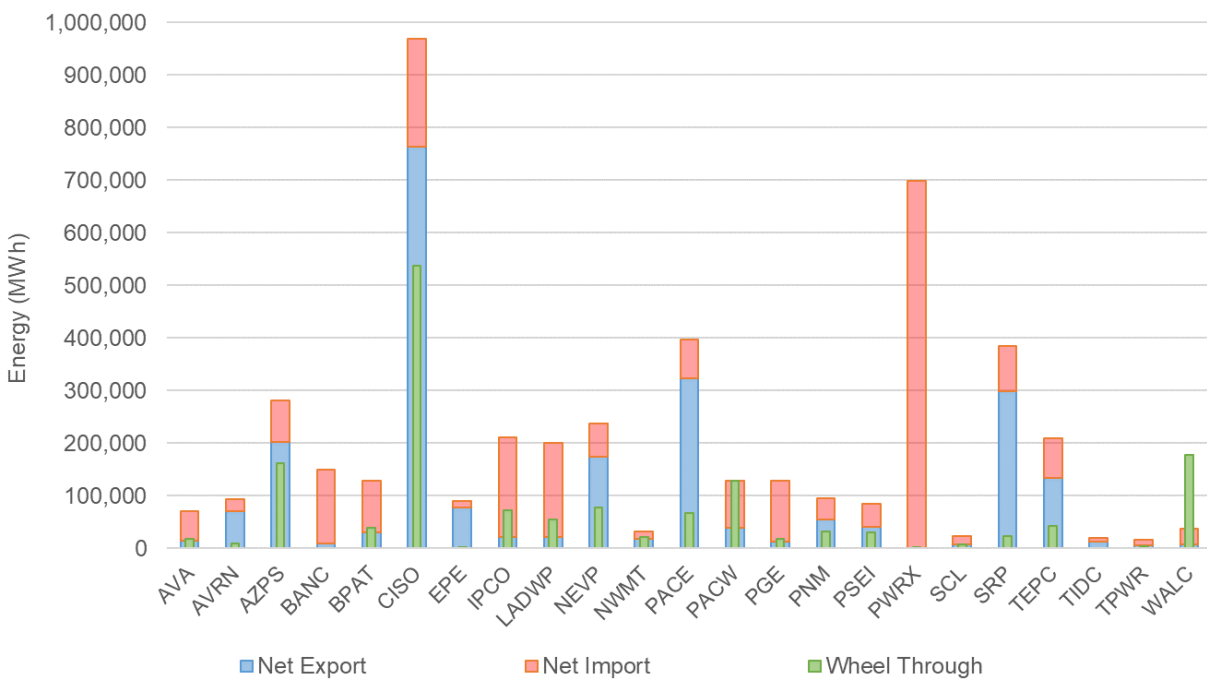


GRAPH 5: Estimated wheel-through transfers in August 2023

BAA	Net Export	Net Import	Wheel Through
AVA	14,069	56,564	17,408
AVRN	71,628	22,529	8,920
AZPS	203,024	78,319	162,453
BANC	9,071	140,545	-
BPAT	30,640	98,510	38,712
CISO	764,661	204,591	537,107
EPE	78,658	11,779	501
IPCO	21,251	189,985	72,133
LADWP	21,646	178,900	55,162
NEVP	174,983	62,338	78,673
NWMT	18,287	13,932	20,969
PACE	323,533	73,554	66,819

PACW	38,537	90,214	128,207
PGE	12,975	115,788	18,244
PNM	55,300	40,013	31,983
PSEI	41,547	43,938	30,154
PWRX	-	699,588	2,791
SCL	8,494	14,938	7,498
SRP	298,968	86,318	23,002
TEPC	134,254	75,259	43,442
TIDC	13,527	7,022	-
TPWR	5,117	11,786	4,537
WALC	7,231	30,992	177,210

TABLE 6: Estimated wheel-through transfers in September 2023



GRAPH 6: Estimated wheel-through transfers in September 2023

■ REDUCED RENEWABLE CURTAILMENT AND GHG REDUCTIONS

The WEIM benefit calculation includes the economic benefits that can be attributed to avoided renewable curtailment within the ISO footprint. If not for energy transfers facilitated by the WEIM, some renewable generation located within the ISO would have been curtailed via either economic or exceptional dispatch. The total avoided renewable curtailment volume in MWh for Q3 2023 was calculated to be 17,760 MWh (July) + 15,406 MWh (August) + 26,947 MWh (September) = 60,113 MWh total.

There are environmental benefits of avoided renewable curtailment as well. Under the assumption that avoided renewable curtailments displace production from other resources at a default emission rate of 0.428 metric tons CO₂/MWh, avoided curtailments displaced an estimated 25,728 metric tons of CO₂ for Q3 2023. Avoided renewable curtailments also may have contributed to an increased volume of renewable credits that would otherwise have been unavailable. This report does not quantify the additional value in dollars associated with this benefit. Total estimated reductions in the curtailment of renewable energy in the ISO footprint, along with the associated reductions in CO₂, are shown in Table 7.

Year	Quarter	MWh	Eq. Tons CO₂
2015	1	8,860	3,792
	2	3,629	1,553
	3	828	354
	4	17,765	7,521
2016	1	112,948	48,342
	2	158,806	67,969
	3	33,094	14,164
	4	23,390	10,011
2017	1	52,651	22,535
	2	67,055	28,700
	3	23,331	9,986
	4	18,060	7,730
2018	1	65,860	28,188
	2	129,128	55,267
	3	19,032	8,146
	4	23,425	10,026
2019	1	52,254	22,365
	2	132,937	56,897
	3	33,843	14,485

	4	35,254	15,089
2020	1	86,740	37,125
	2	147,514	63,136
	3	37,548	16,071
	4	39,956	17,101
2021	1	76,147	32,591
	2	109,059	46,677
	3	23,042	9,862
	4	38,044	16,283
2022	1	94,168	40,304
	2	118,352	50,655
	3	42,468	18,176
	4	25,609	10,960
2023	1	53,002	22,685
	2	148,938	63,745
	3	60,113	25,728
Total		2,112,850	904,219

TABLE 7: Total reduction in curtailment of renewable energy and associated reductions in CO₂

■ FLEXIBLE RAMPING PROCUREMENT DIVERSITY SAVINGS

The WEIM facilitates procurement of flexible ramping capacity in the FMM to address variability that may occur in the RTD. Because variability across different BAAs may happen in opposite directions, the flexible ramping requirement for the entire WEIM footprint can be less than the sum of individual BAA's requirements. This difference is known as flexible ramping procurement diversity savings.

Starting in 2016, the ISO replaced the flexible ramping constraint with flexible ramping products that provide both upward and downward ramping. The minimum and maximum flexible ramping requirements for each BAA and for each direction are listed in Appendix 3: Minimum & Maximum Ramping Requirements.

The flexible ramping procurement diversity savings for all the intervals averaged over the month are shown in Table 7. The percentage savings is the average MW savings divided by the sum of the individual BAA requirements.

<i>Direction</i>	July		August		September	
	Up	Down	Up	Down	Up	Down
<i>Average MW saving</i>	1,880	2,164	1,915	2,184	1,920	2,086
<i>Sum of BAA requirements</i>	3,309	3,391	3,399	3,553	3,409	3,440
<i>Percentage savings</i>	57%	64%	56%	61%	56%	61%

Table 8: Flexible ramping procurement diversity savings in Q3 2023

Flexible ramping capacity may be used in RTD to handle uncertainties in the future interval. The RTD flexible ramping capacity is prorated to each BAA. Flexible ramping surplus MW is defined as the awarded flexible ramping capacity in RTD minus its share, and the flexible ramping surplus cost is defined as the flexible ramping surplus MW multiplied by the flexible ramping WEIM-wide marginal price. A positive flexible ramping surplus MW is the capacity that a BAA provided to help other BAAs, and a negative flexible ramping surplus MW is the capacity that a BAA received from other BAAs.

The WEIM dispatch cost for a BAA with positive flexible ramping surplus MW is increased because some capacities are used to help other BAAs. The flexible ramping surplus cost is subtracted from the BAA's WEIM dispatch cost to reflect the true dispatch cost of a BAA. Please see the Benefit Report Methodology for more details.

■ CONCLUSION

Using state-of-the-art technology to find and deliver low-cost energy to meet real-time demand, the WEIM demonstrates that utilities can realize financial and operational benefits through increased coordination and optimization. In addition to these benefits, the WEIM provides significant environmental benefits through the reduction of renewable curtailments during periods of oversupply.

Sharing resources across a larger geographic area reduces greenhouse gas emissions by using renewable generation that otherwise would have been turned off. The quantified environmental benefits from avoided curtailments of renewable generation from 2015 to-date reached 904,219 metric tons of CO₂, roughly the equivalent of avoiding the emissions from 190,108 passenger cars driven for one year.

APPENDIX 1: GLOSSARY OF ABBREVIATIONS

Abbreviation	Description
APS	Arizona Public Service
AVA	Avista Utilities
AVRN	Avangrid
BAA	Balancing Authority Area
BANC	Balancing Authority of Northern California
BPA	Bonneville Power Administration
CISO, ISO	California ISO
EIM	Energy Imbalance Market
EPE	El Paso Electric
FMM	Fifteen Minute Market
GHG	Greenhouse Gas
IPCO	Idaho Power
LADWP	Los Angeles Department of Water and Power
MW	Megawatt
MWh	Megawatt-Hour
NVE	NV Energy
NWMT	NorthWestern Energy
PAC	PacifiCorp
PACE	PacifiCorp East
PACW	PacifiCorp West
PGE	Portland General Electric
PNM	Public Service Company of New Mexico
PSE	Puget Sound Energy
PWRX	Powerex
RTD	Real Time Dispatch
SCL	Seattle City Light
SRP	Salt River Project
TEP	Tucson Electric Power
TID	Turlock Irrigation District
TPWR	Tacoma Power
WALC	Western Area Power Administration Desert Southwest
WEIM	Western Energy Imbalance Market

APPENDIX 2: WEIM Transfer Volume (MWh)

Month	From BAA	To BAA	15min WEIM transfer (15m – base)	5min WEIM transfer (5m – base)
July	AVA	AVRN	56	88
	AVA	BPAT	5,256	4,959
	AVA	CISO	0	0
	AVA	IPCO	15,839	19,290
	AVA	NWMT	6,238	7,416
	AVA	PACW	4,945	5,497
	AVA	PGE	0	0
	AVA	PSEI	26	0
	AVA	SCL	5	0
	AVA	TPWR	0	0
	AVRN	AVA	0	4
	AVRN	BPAT	25,480	18,762
	AVRN	PACW	55,124	49,140
	AVRN	PGE	18,052	13,963
	AVRN	SCL	6,330	4,341
	AZPS	CISO	243,105	226,973
	AZPS	EPE	894	0
	AZPS	LADWP	26,895	29,364
	AZPS	NEVP	0	0
	AZPS	PACE	159,165	126,911
	AZPS	PNM	12,210	18,546
	AZPS	SRP	4,538	1,949
	AZPS	TEPC	1,494	800
	AZPS	WALC	3,267	3,575
	BANC	BPAT	0	0
	BANC	CISO	19,337	17,474
	BANC	TIDC	77	0
	BPAT	AVA	4,909	5,581

<i>July</i>	BPAT	AVRN	4,107	5,815
	BPAT	BANC	0	0
	BPAT	CISO	3,527	9,165
	BPAT	IPCO	3,740	1,687
	BPAT	LADWP	0	0
	BPAT	NEVP	0	0
	BPAT	NWMT	6,936	2,916
	BPAT	PACW	3,449	3,993
	BPAT	PGE	16,966	19,017
	BPAT	PSEI	19,110	18,625
	BPAT	PWRX	7,916	0
	BPAT	SCL	3,251	2,512
	BPAT	TPWR	11,629	11,421
	CISO	AVA	0	0
	CISO	AZPS	44,835	54,376
	CISO	BANC	117,339	127,733
	CISO	BPAT	2,703	6,498
	CISO	LADWP	24,348	31,887
	CISO	NEVP	41,966	45,724
	CISO	PACW	9,355	31,169
	CISO	PGE	25,987	41,582
	CISO	PWRX	567,046	591,404
	CISO	SRP	21,075	28,376
	CISO	TEPC	50	198
	CISO	TIDC	5,841	8,259
	CISO	WALC	10,779	14,353
	EPE	AZPS	2,411	0
	EPE	PNM	28,419	28,813
	EPE	TEPC	62,678	57,679
	IPCO	AVA	25,693	24,009
	IPCO	BPAT	13,938	12,288
	IPCO	NEVP	21,958	17,736

<i>July</i>	IPCO	NWMT	2,777	4,609
	IPCO	PACE	15,850	10,290
	IPCO	PACW	40,061	33,517
	IPCO	PSEI	12,400	11,585
	IPCO	SCL	11,415	10,010
	LADWP	AZPS	793	905
	LADWP	BPAT	0	0
	LADWP	CISO	74,046	60,511
	LADWP	NEVP	22,951	24,685
	LADWP	PACE	5,748	4,650
	LADWP	TEPC	0	0
	LADWP	WALC	3,941	951
	NEVP	AZPS	0	0
	NEVP	BPAT	0	0
	NEVP	CISO	108,872	90,389
	NEVP	IPCO	105,308	88,200
	NEVP	LADWP	44,630	46,193
	NEVP	PACE	85,556	80,721
	NEVP	WALC	4,519	4,894
	NWMT	AVA	20,275	15,451
	NWMT	BPAT	5,994	2,994
	NWMT	IPCO	5,075	6,181
	NWMT	PACE	14,005	11,213
	NWMT	PACW	88	0
	NWMT	PGE	83	0
	NWMT	PSEI	245	0
	NWMT	TPWR	0	0
	PACE	AZPS	19,555	14,740
	PACE	IPCO	54,555	48,055
	PACE	LADWP	54,750	50,053
	PACE	NEVP	5,675	8,546
	PACE	NWMT	21,346	18,989

<i>July</i>	PACE	PACW	65,191	53,646
	PACE	SRP	0	0
	PACE	TEPC	0	0
	PACW	AVA	3,166	2,882
	PACW	AVRN	9,634	17,651
	PACW	BPAT	4,206	2,074
	PACW	CISO	29,773	52,889
	PACW	IPCO	22,574	19,438
	PACW	NWMT	12	0
	PACW	PGE	52,865	47,271
	PACW	PSEI	35,975	33,173
	PACW	SCL	1,640	1,286
	PGE	AVA	0	0
	PGE	AVRN	986	1,750
	PGE	BPAT	16,913	12,968
	PGE	CISO	17,993	16,435
	PGE	NWMT	92	0
	PGE	PACW	17,081	17,211
	PGE	PSEI	1	0
	PGE	SCL	1,228	937
	PGE	TPWR	0	0
	PNM	AZPS	131,039	118,573
	PNM	EPE	2,613	3,366
	PNM	SRP	2,160	2,223
	PNM	TEPC	3,094	3,312
	PSEI	AVA	124	0
	PSEI	BPAT	11,279	10,823
	PSEI	IPCO	0	0
	PSEI	NWMT	70	0
	PSEI	PACW	2,150	5,366
	PSEI	PGE	0	0
	PSEI	PWRX	32,234	28,983

<i>July</i>	PSEI	SCL	19,464	18,298
	PSEI	TPWR	12,421	13,398
	PWRX	BPAT	5,599	0
	PWRX	CISO	0	0
	PWRX	PSEI	1,648	3,212
	SCL	AVA	4	0
	SCL	AVRN	708	1,627
	SCL	BPAT	841	838
	SCL	IPCO	3,492	4,599
	SCL	PACW	290	592
	SCL	PGE	664	954
	SCL	PSEI	3,119	4,830
	SRP	AZPS	18,822	13,173
	SRP	CISO	155,135	146,656
	SRP	PACE	0	0
	SRP	PNM	11	13
	SRP	TEPC	17,860	18,611
	SRP	WALC	8,862	5,055
	TEPC	AZPS	1,964	0
	TEPC	CISO	26,663	20,566
	TEPC	EPE	2,491	3,357
	TEPC	LADWP	0	0
	TEPC	PACE	95	186
	TEPC	PNM	11,448	6,976
	TEPC	SRP	8,422	7,919
	TEPC	WALC	180,771	171,433
	TIDC	BANC	601	0
	TIDC	CISO	14,033	13,778
	TPWR	AVA	0	0
	TPWR	BPAT	4,201	4,883
	TPWR	NWMT	0	0
	TPWR	PGE	0	0

	TPWR	PSEI	3,753	3,887
	WALC	AZPS	3,896	917
	WALC	CISO	107,868	93,400
	WALC	LADWP	20,465	15,458
	WALC	NEVP	41,939	38,515
	WALC	SRP	366	108
	WALC	TEPC	5,742	7,030
<i>August</i>	AVA	AVRN	0	0
	AVA	BPAT	5,869	4,697
	AVA	CISO	0	0
	AVA	IPCO	11,503	17,567
	AVA	NWMT	1,924	2,275
	AVA	PACW	4,504	3,270
	AVA	PGE	147	0
	AVA	PSEI	0	0
	AVA	SCL	6	0
	AVA	TPWR	0	0
	AVRN	AVA	461	492
	AVRN	BPAT	28,719	20,512
	AVRN	PACW	46,236	39,399
	AVRN	PGE	17,474	12,572
	AVRN	SCL	5,831	3,410
	AZPS	CISO	256,721	272,450
	AZPS	EPE	1,382	0
	AZPS	LADWP	48,939	30,424
	AZPS	NEVP	0	0
	AZPS	PACE	71,566	33,189
	AZPS	PNM	6,804	8,984
	AZPS	SRP	20,505	17,511
	AZPS	TEPC	1,517	1,125
	AZPS	WALC	3,439	2,642
	BANC	BPAT	0	0

<i>August</i>	BANC	CISO	8,430	9,633
	BANC	TIDC	110	0
	BPAT	AVA	4,732	4,716
	BPAT	AVRN	2,111	3,199
	BPAT	BANC	0	0
	BPAT	CISO	4,438	11,023
	BPAT	IPCO	3,978	1,387
	BPAT	LADWP	0	0
	BPAT	NEVP	0	0
	BPAT	NWMT	7,533	2,835
	BPAT	PACW	1,756	1,331
	BPAT	PGE	16,308	15,670
	BPAT	PSEI	10,585	10,748
	BPAT	PWRX	5,547	0
	BPAT	SCL	2,336	1,271
	BPAT	TPWR	12,101	11,592
	CISO	AVA	0	0
	CISO	AZPS	7,609	14,756
	CISO	BANC	189,869	200,018
	CISO	BPAT	3,417	7,354
	CISO	LADWP	17,565	26,702
	CISO	NEVP	8,462	8,417
	CISO	PACW	7,401	28,196
	CISO	PGE	21,812	33,411
	CISO	PWRX	428,847	458,644
	CISO	SRP	27,852	30,848
	CISO	TEPC	9	15
	CISO	TIDC	10,041	11,463
	CISO	WALC	7,035	9,615
	EPE	AZPS	1,410	0
	EPE	PNM	37,223	34,689
EPE	TEPC	59,458	59,191	

<i>August</i>	IPCO	AVA	28,896	19,342
	IPCO	BPAT	4,437	3,083
	IPCO	NEVP	11,260	17,844
	IPCO	NWMT	451	1,407
	IPCO	PACE	2,589	1,467
	IPCO	PACW	38,005	29,046
	IPCO	PSEI	14,100	10,121
	IPCO	SCL	11,344	7,794
	LADWP	AZPS	1,014	571
	LADWP	BPAT	0	0
	LADWP	CISO	47,987	55,524
	LADWP	NEVP	19,887	11,058
	LADWP	PACE	11,342	12,496
	LADWP	TEPC	0	0
	LADWP	WALC	8,034	731
	NEVP	AZPS	0	0
	NEVP	BPAT	0	0
	NEVP	CISO	121,333	135,290
	NEVP	IPCO	99,608	67,488
	NEVP	LADWP	47,847	47,248
	NEVP	PACE	30,475	17,075
	NEVP	WALC	10,554	14,178
	NWMT	AVA	25,907	18,025
	NWMT	BPAT	8,553	6,446
	NWMT	IPCO	5,812	9,715
	NWMT	PACE	4,608	3,763
	NWMT	PACW	46	0
	NWMT	PGE	50	0
	NWMT	PSEI	65	0
	NWMT	TPWR	0	0
	PACE	AZPS	65,880	84,056
	PACE	IPCO	188,310	158,580

<i>August</i>	PACE	LADWP	87,167	92,060
	PACE	NEVP	36,887	42,600
	PACE	NWMT	31,730	24,420
	PACE	PACW	104,113	86,208
	PACE	SRP	0	0
	PACE	TEPC	19	6
	PACW	AVA	6,974	6,504
	PACW	AVRN	10,072	29,216
	PACW	BPAT	5,321	2,126
	PACW	CISO	16,632	41,737
	PACW	IPCO	18,414	18,602
	PACW	NWMT	0	0
	PACW	PGE	86,206	75,197
	PACW	PSEI	37,006	29,391
	PACW	SCL	1,497	941
	PGE	AVA	4	0
	PGE	AVRN	556	1,021
	PGE	BPAT	18,030	17,274
	PGE	CISO	34,366	28,459
	PGE	NWMT	62	0
	PGE	PACW	5,202	7,137
	PGE	PSEI	33	17
	PGE	SCL	854	637
	PGE	TPWR	0	0
	PNM	AZPS	117,623	106,771
	PNM	EPE	1,005	1,663
	PNM	SRP	6,005	4,188
	PNM	TEPC	3,271	2,660
	PSEI	AVA	0	0
	PSEI	BPAT	17,944	17,192
	PSEI	IPCO	0	0
	PSEI	NWMT	34	0

<i>August</i>	PSEI	PACW	3,872	9,483
	PSEI	PGE	298	643
	PSEI	PWRX	35,670	33,494
	PSEI	SCL	9,410	9,987
	PSEI	TPWR	17,660	18,040
	PWRX	BPAT	6,032	0
	PWRX	CISO	0	0
	PWRX	PSEI	310	1,149
	SCL	AVA	16	0
	SCL	AVRN	850	2,398
	SCL	BPAT	822	785
	SCL	IPCO	2,563	4,531
	SCL	PACW	139	389
	SCL	PGE	866	1,165
	SCL	PSEI	4,065	6,434
	SRP	AZPS	8,957	4,248
	SRP	CISO	148,736	168,057
	SRP	PACE	0	0
	SRP	PNM	3	8
	SRP	TEPC	5,476	4,538
	SRP	WALC	12,564	2,164
	TEPC	AZPS	1,089	0
	TEPC	CISO	6,780	6,710
	TEPC	EPE	1,245	2,020
	TEPC	LADWP	137	0
	TEPC	PACE	220	0
	TEPC	PNM	7,742	3,208
	TEPC	SRP	29,521	22,876
	TEPC	WALC	190,744	186,388
	TIDC	BANC	4,101	0
	TIDC	CISO	5,571	8,370
	TPWR	AVA	0	0

	TPWR	BPAT	4,097	4,569
	TPWR	NWMT	0	0
	TPWR	PGE	0	0
	TPWR	PSEI	2,776	3,391
	WALC	AZPS	3,816	984
	WALC	CISO	120,219	134,497
	WALC	LADWP	24,800	13,577
	WALC	NEVP	41,552	25,868
	WALC	SRP	1,493	1,017
	WALC	TEPC	11,545	14,670
<i>September</i>	AVA	AVRN	0	0
	AVA	BPAT	20,462	12,449
	AVA	CISO	0	0
	AVA	IPCO	7,577	11,604
	AVA	NWMT	2,565	2,737
	AVA	PACW	10,315	4,688
	AVA	PGE	15	0
	AVA	PSEI	30	0
	AVA	SCL	3	0
	AVA	TPWR	0	0
	AVRN	AVA	3,183	3,857
	AVRN	BPAT	24,119	22,326
	AVRN	PACW	32,996	37,223
	AVRN	PGE	15,081	11,776
	AVRN	SCL	7,054	5,365
	AZPS	CISO	173,194	211,601
	AZPS	EPE	643	0
	AZPS	LADWP	55,622	42,243
	AZPS	NEVP	0	0
	AZPS	PACE	114,324	59,736
	AZPS	PNM	32,462	42,797
	AZPS	SRP	5,612	4,297

September

AZPS	TEPC	972	657
AZPS	WALC	4,320	4,147
BANC	BPAT	0	0
BANC	CISO	6,930	9,071
BANC	TIDC	84	0
BPAT	AVA	4,157	5,991
BPAT	AVRN	7,128	6,560
BPAT	BANC	0	0
BPAT	CISO	4,624	6,920
BPAT	IPCO	3,850	3,402
BPAT	LADWP	0	0
BPAT	NEVP	0	0
BPAT	NWMT	4,836	2,844
BPAT	PACW	2,451	2,170
BPAT	PGE	17,402	16,124
BPAT	PSEI	11,566	14,696
BPAT	PWRX	7,611	0
BPAT	SCL	1,195	1,327
BPAT	TPWR	7,934	9,316
CISO	AVA	0	0
CISO	AZPS	80,461	97,171
CISO	BANC	142,848	140,545
CISO	BPAT	22,931	37,631
CISO	LADWP	64,195	66,827
CISO	NEVP	46,824	40,888
CISO	PACW	16,051	59,180
CISO	PGE	29,743	51,828
CISO	PWRX	648,780	674,024
CISO	SRP	90,085	97,995
CISO	TEPC	550	320
CISO	TIDC	7,075	7,022
CISO	WALC	24,737	27,581

<i>September</i>	EPE	AZPS	1,529	0
	EPE	PNM	27,842	27,608
	EPE	TEPC	53,395	51,552
	IPCO	AVA	56,531	34,243
	IPCO	BPAT	17,270	12,182
	IPCO	NEVP	7,951	12,843
	IPCO	NWMT	597	1,088
	IPCO	PACE	3,006	2,167
	IPCO	PACW	35,518	19,359
	IPCO	PSEI	7,125	3,438
	IPCO	SCL	12,623	8,064
	LADWP	AZPS	1,875	1,032
	LADWP	BPAT	0	0
	LADWP	CISO	24,515	31,674
	LADWP	NEVP	23,332	18,645
	LADWP	PACE	24,639	24,103
	LADWP	TEPC	0	0
	LADWP	WALC	2,997	1,354
	NEVP	AZPS	0	0
	NEVP	BPAT	0	0
	NEVP	CISO	38,226	56,791
	NEVP	IPCO	107,834	75,240
	NEVP	LADWP	43,938	48,676
	NEVP	PACE	78,091	52,210
	NEVP	WALC	17,424	20,737
	NWMT	AVA	27,166	21,752
	NWMT	BPAT	17,019	11,370
	NWMT	IPCO	2,127	3,976
	NWMT	PACE	2,645	2,157
	NWMT	PACW	35	0
	NWMT	PGE	56	0
	NWMT	PSEI	19	0

<i>September</i>	NWMT	TPWR	0	0
	PACE	AZPS	35,344	56,521
	PACE	IPCO	200,269	148,450
	PACE	LADWP	41,157	50,403
	PACE	NEVP	20,557	32,661
	PACE	NWMT	39,176	28,232
	PACE	PACW	94,698	74,072
	PACE	SRP	0	0
	PACE	TEPC	14	14
	PACW	AVA	5,463	8,130
	PACW	AVRN	20,429	20,625
	PACW	BPAT	7,174	6,483
	PACW	CISO	6,690	21,971
	PACW	IPCO	11,265	15,755
	PACW	NWMT	0	0
	PACW	PGE	65,963	53,401
	PACW	PSEI	40,717	39,541
	PACW	SCL	1,023	837
	PGE	AVA	15	0
	PGE	AVRN	1,375	1,912
	PGE	BPAT	13,599	12,424
	PGE	CISO	8,736	5,910
	PGE	NWMT	33	0
	PGE	PACW	7,380	10,270
	PGE	PSEI	170	68
	PGE	SCL	636	636
	PGE	TPWR	0	0
	PNM	AZPS	78,570	73,830
	PNM	EPE	8,828	11,396
	PNM	SRP	1,361	981
	PNM	TEPC	1,804	1,076
	PSEI	AVA	0	0

<i>September</i>	PSEI	BPAT	18,419	16,787
	PSEI	IPCO	0	0
	PSEI	NWMT	65	0
	PSEI	PACW	10,191	11,126
	PSEI	PGE	0	0
	PSEI	PWRX	29,782	28,355
	PSEI	SCL	6,973	6,206
	PSEI	TPWR	8,192	7,007
	PWRX	BPAT	4,861	0
	PWRX	CISO	0	0
	PWRX	PSEI	2,440	2,791
	SCL	AVA	3	0
	SCL	AVRN	1,351	2,351
	SCL	BPAT	1,250	2,223
	SCL	IPCO	1,685	3,689
	SCL	PACW	264	334
	SCL	PGE	868	903
	SCL	PSEI	4,462	6,492
	SRP	AZPS	27,200	11,452
	SRP	CISO	241,965	271,729
	SRP	PACE	0	0
	SRP	PNM	242	155
	SRP	TEPC	26,357	29,232
	SRP	WALC	22,169	9,401
	TEPC	AZPS	565	0
	TEPC	CISO	24,627	24,782
	TEPC	EPE	729	884
	TEPC	LADWP	527	0
	TEPC	PACE	10	0
	TEPC	PNM	3,364	1,435
TEPC	SRP	7,136	5,611	
TEPC	WALC	145,492	144,983	

<i>September</i>	TIDC	BANC	3,555	0
	TIDC	CISO	9,688	13,527
	TPWR	AVA	0	0
	TPWR	BPAT	3,649	3,347
	TPWR	NWMT	0	0
	TPWR	PGE	0	0
	TPWR	PSEI	5,009	6,308
	WALC	AZPS	1,998	766
	WALC	CISO	75,956	85,503
	WALC	LADWP	40,643	25,912
	WALC	NEVP	46,566	35,973
	WALC	SRP	1,098	436
	WALC	TEPC	30,997	35,850

APPENDIX 3: Minimum & Maximum Flexible Ramping Requirements

Month	BAA	Direction	Minimum requirement	Maximum requirement
July	AVA	up	0	85
	AVRN	up	8	272
	AZPS	up	0	341
	BANC	up	0	116
	BPAT	up	9	462
	CISO	up	0	2,409
	EPE	up	0	75
	IPCO	up	0	169
	LADWP	up	0	384
	NEVP	up	0	533
	NWMT	up	10	131
	PACE	up	0	521
	PACW	up	0	160
	PGE	up	0	214
	PNM	up	0	170
	PSEI	up	0	238
	PWRX	up	41	274
	SCL	up	3	50
	SRP	up	0	233
	TEPC	up	0	186
	TIDC	up	0	17
	TPWR	up	2	25
	WALC	up	0	30
	ALL EIM	up	0	2,898
	AVA	down	0	103
	AVRN	down	17	294
	AZPS	down	0	327
	BANC	down	0	158
	BPAT	down	43	597
	CISO	down	0	2,221
	EPE	down	0	70
	IPCO	down	0	237

	<i>LADWP</i>	down	0	391
	<i>NEVP</i>	down	0	595
	<i>NWMT</i>	down	0	129
	<i>PACE</i>	down	0	631
	<i>PACW</i>	down	0	199
	<i>PGE</i>	down	0	230
	<i>PNM</i>	down	12	243
	<i>PSEI</i>	down	6	265
	<i>PWRX</i>	down	32	325
	<i>SCL</i>	down	1	47
	<i>SRP</i>	down	0	233
	<i>TEPC</i>	down	0	136
	<i>TIDC</i>	down	0	21
	<i>TPWR</i>	down	1	21
	<i>WALC</i>	down	0	32
	ALL EIM	down	0	3,223
<i>August</i>	<i>AVA</i>	up	0	85
	<i>AVRN</i>	up	6	272
	<i>AZPS</i>	up	10	341
	<i>BANC</i>	up	0	116
	<i>BPAT</i>	up	3	462
	<i>CISO</i>	up	0	2,330
	<i>EPE</i>	up	2	75
	<i>IPCO</i>	up	25	169
	<i>LADWP</i>	up	17	405
	<i>NEVP</i>	up	0	540
	<i>NWMT</i>	up	2	131
	<i>PACE</i>	up	12	521
	<i>PACW</i>	up	0	162
	<i>PGE</i>	up	0	214
	<i>PNM</i>	up	0	170
	<i>PSEI</i>	up	0	239
	<i>PWRX</i>	up	22	333
	<i>SCL</i>	up	3	50
	<i>SRP</i>	up	32	233
	<i>TEPC</i>	up	0	186

August	TIDC	up	0	18	
	TPWR	up	1	25	
	WALC	up	4	30	
	ALL WEIM	up	0	3,156	
	AVA	down	0	103	
	AVRN	down	0	294	
	AZPS	down	0	327	
	BANC	down	0	158	
	BPAT	down	0	597	
	CISO	down	0	2,221	
	EPE	down	0	70	
	IPCO	down	31	237	
	LADWP	down	23	391	
	NEVP	down	0	601	
	NWMT	down	0	129	
	PACE	down	42	631	
	PACW	down	0	199	
	PGE	down	0	230	
	PNM	down	21	243	
	PSEI	down	0	265	
	PWRX	down	0	285	
	SCL	down	4	353	
	SRP	down	0	233	
	TEPC	down	0	136	
	TIDC	down	0	21	
	TPWR	down	0	22	
	WALC	down	6	39	
	ALL EIM	down	0	3,305	
	September	AVA	up	0	85
		AVRN	up	0	272
		AZPS	up	0	341
BANC		up	5	116	
BPAT		up	0	462	
CISO		up	0	2,596	
EPE		up	0	75	

September	<i>IPCO</i>	up	0	169
	<i>LADWP</i>	up	0	405
	<i>NEVP</i>	up	15	540
	<i>NWMT</i>	up	0	131
	<i>PACE</i>	up	0	521
	<i>PACW</i>	up	0	153
	<i>PGE</i>	up	0	214
	<i>PNM</i>	up	10	170
	<i>PSEI</i>	up	0	256
	<i>PWRX</i>	up	0	333
	<i>SCL</i>	up	2	36
	<i>SRP</i>	up	0	221
	<i>TEPC</i>	up	0	186
	<i>TIDC</i>	up	2	18
	<i>TPWR</i>	up	2	20
	<i>WALC</i>	up	2	30
	ALL WEIM	up	0	3,433
	<i>AVA</i>	down	0	103
	<i>AVRN</i>	down	0	294
	<i>AZPS</i>	down	0	327
	<i>BANC</i>	down	5	158
	<i>BPAT</i>	down	0	582
	<i>CISO</i>	down	0	2,221
	<i>EPE</i>	down	1	70
	<i>IPCO</i>	down	30	237
	<i>LADWP</i>	down	0	391
	<i>NEVP</i>	down	15	648
	<i>NWMT</i>	down	3	129
	<i>PACE</i>	down	71	631
	<i>PACW</i>	down	0	199
	<i>PGE</i>	down	9	230
	<i>PNM</i>	down	19	243
	<i>PSEI</i>	down	0	265
	<i>PWRX</i>	down	0	263
<i>SCL</i>	down	0	31	
<i>SRP</i>	down	0	233	

<i>TEPC</i>	down	18	136
<i>TIDC</i>	down	2	21
<i>TPWR</i>	down	0	18
<i>WALC</i>	down	4	39
ALL WEIM	down	0	3,249