WESTERN ENERGY IMBALANCE MARKET BENEFITS REPORT

Second Quarter 2023

Prepared by: Market Analysis and Forecasting

July 31, 2023

CONTENTS

EXECUTIVE SUMMARY

Gross benefits from WEIM since November 2014

$4.20 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.

Q2 2023 Gross Benefits by Participant

	(millions $)
Arizona Public Service	$11.95
AVANGRID	$8.78
Avista	$4.98
BANC	$17.72
BPA	$7.49
California ISO	$70.47
EPE	$3.04
Idaho Power	$31.52
LADWP	$17.09
NV Energy	$46.16
NorthWestern Energy	$4.44
PacifiCorp	$37.49
Portland General Electric	$13.84
PNM	$7.29
Puget Sound Energy	$6.46
Powerex	$34.09
Seattle City Light	$5.14
Salt River Project	$22.83
Tacoma Power	$4.86
TEP	$5.43
TID	$1.72
WALC	$17.12
Total	$379.91

2023 Q2 BENEFITS

ECONOMICAL

$379.91 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

63,745

Metric tons of CO_2** avoided curtailments

OPERATIONAL

49%

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	2018
BANC	2019
Seattle City Light	2020
Salt River Project	2020
TID	2021
PNM	2021
LADWP	2021
NorthWestern Energy	2021
Tacoma Power	2022
Avista	2022
TEP	2022
BPA	2022
AVANGRID	2023
EPE	2023
WALC	2023

TABLE 1: WEIM participants

WEIM ECONOMIC BENEFITS IN Q2 2023

Table 2 shows the estimated WEIM gross benefits by each region per month[1]. The monthly savings presented show $150.21 million for April, $105.89 million for May, and $123.81 million for June with a total estimated benefit of $379.91 million for this quarter[2]. This level of WEIM benefits accrued from having additional WEIM areas participating in the market and economical transfers displacing more expensive generation.

Region	April	May	June	Total
APS	$6.78	$2.48	$2.69	$11.95
AVRN	$4.48	$2.46	$1.84	$8.78
AVA	$2.44	$1.50	$1.04	$4.98
BANC	$9.74	$4.79	$3.19	$17.72
BPA	$3.60	$2.29	$1.60	$7.49
CISO	$25.29	$19.98	$25.20	$70.47
EPE	$1.41	$0.79	$0.84	$3.04
IPCO	$8.43	$17.86	$5.23	$31.52
LADWP	$6.59	$6.28	$4.22	$17.09
NVE	$20.32	$8.89	$16.95	$46.16
NWMT	$2.75	$0.99	$0.70	$4.44
PAC	$10.78	$11.87	$14.84	$37.49
PGE	$5.87	$3.82	$4.15	$13.84
PNM	$3.93	$1.75	$1.61	$7.29
PSE	$3.44	$1.06	$1.96	$6.46
PWRX	$12.25	$3.15	$18.69	$34.09
SCL	$2.33	$1.21	$1.60	$5.14
SRP	$11.05	$5.34	$6.44	$22.83
TPWR	$3.00	$0.59	$1.27	$4.86
TEP	$3.09	$1.30	$1.04	$5.43
TID	$0.90	$0.53	$0.29	$1.72
WALC	$1.74	$6.96	$8.42	$17.12
Total	$150.21	$105.89	$123.81	$379.91

TABLE 2: Q2 2023 benefits in millions USD

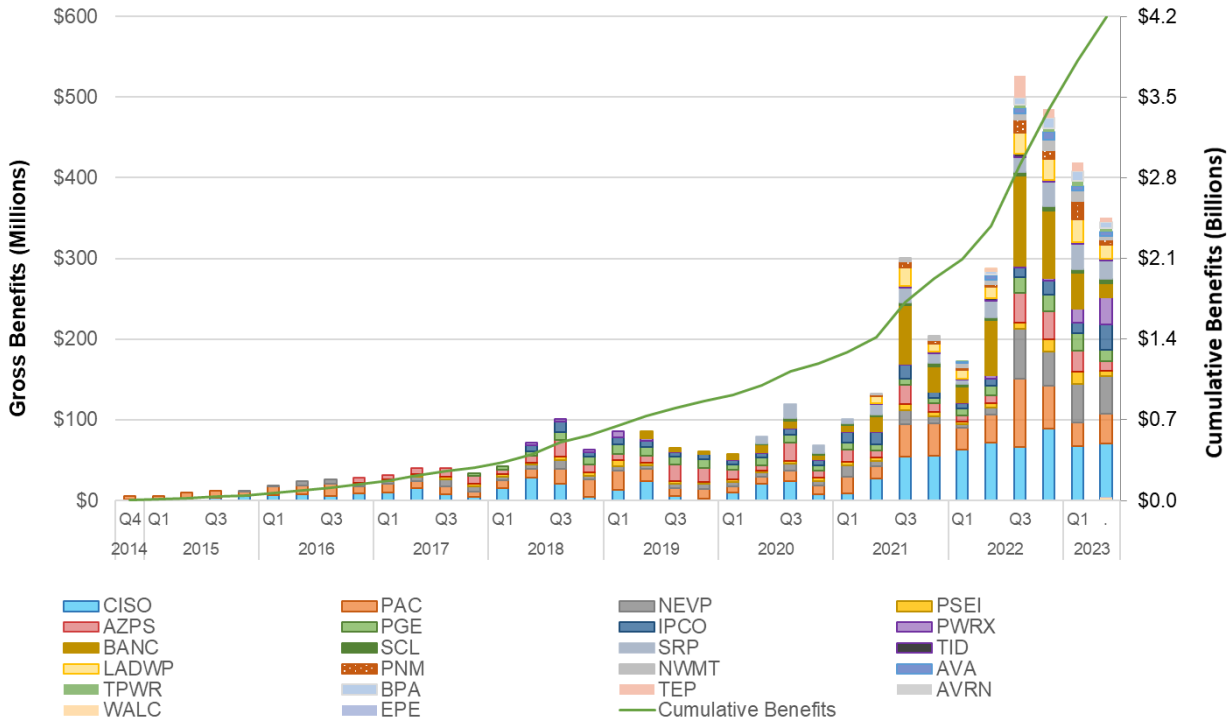
[1] The WEIM benefits reported here are calculated based on available data. Intervals without complete data are excluded in the calculation. The intervals excluded due to unavailable data are normally within a few percent points of the total intervals.

[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 $4.20 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).

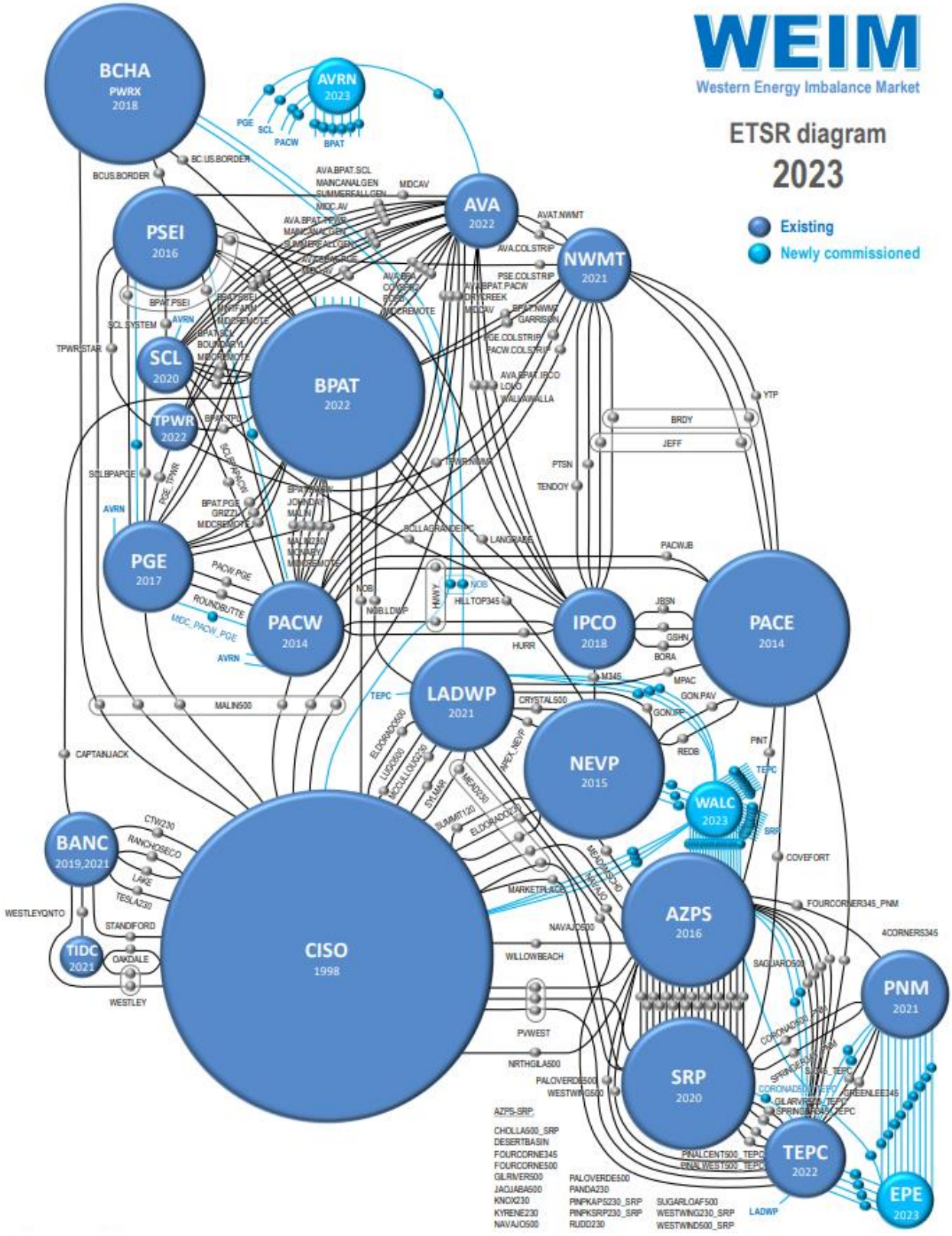
Generally, transfer limits are based on transmission and interchange rights that participating balancing authority areas make available to the WEIM, with the exception of the PacifiCorp West (PACW) -ISO transfer limit and the Portland General Electric (PGE) -ISO transfer limit in RTD. These RTD transfer 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. The maximum transfer capacities between WEIM entities are shown in Appendix 2: Maximum Transfer Capacities.



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.

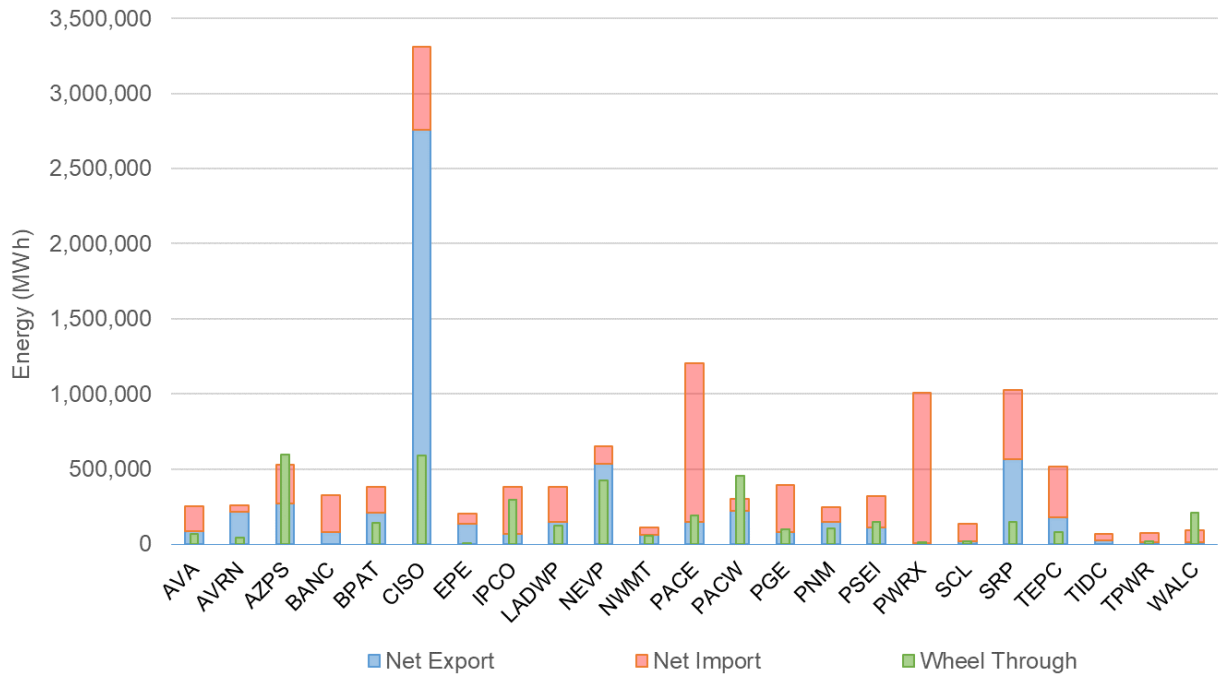
This volume reflects the total wheel-through transfers for each WEIM BAA, regardless of the potential paths used to wheel through. The net imports and exports estimated in this section reflect the overall volume of net imports and exports; in contrast, the imports and exports provided in Table 2 reflect 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	83,708	170,476	65,387
AVRN	215,524	42,904	42,335
AZPS	268,828	262,500	594,887
BANC	82,686	242,637	-
BPAT	206,468	177,798	141,432

CISO	2,758,377	552,611	588,055
EPE	135,298	70,983	72
IPCO	66,404	314,349	296,746
LADWP	146,132	233,543	121,801
NEVP	531,979	122,291	423,789
NWMT	65,081	48,051	57,983
PACE	145,515	1,057,669	191,496
PACW	222,215	76,703	455,045
PGE	81,416	310,021	100,230
PNM	148,523	97,109	106,910
PSEI	114,170	203,698	147,262
PWRX	4,583	1,005,970	13,819
SCL	16,380	116,835	21,663
SRP	564,023	461,313	150,218
TEPC	178,019	337,524	78,230
TIDC	26,769	40,453	-
TPWR	10,154	64,412	18,361
WALC	15,285	77,686	206,647

TABLE 3: Estimated wheel-through transfers in Q2 2023

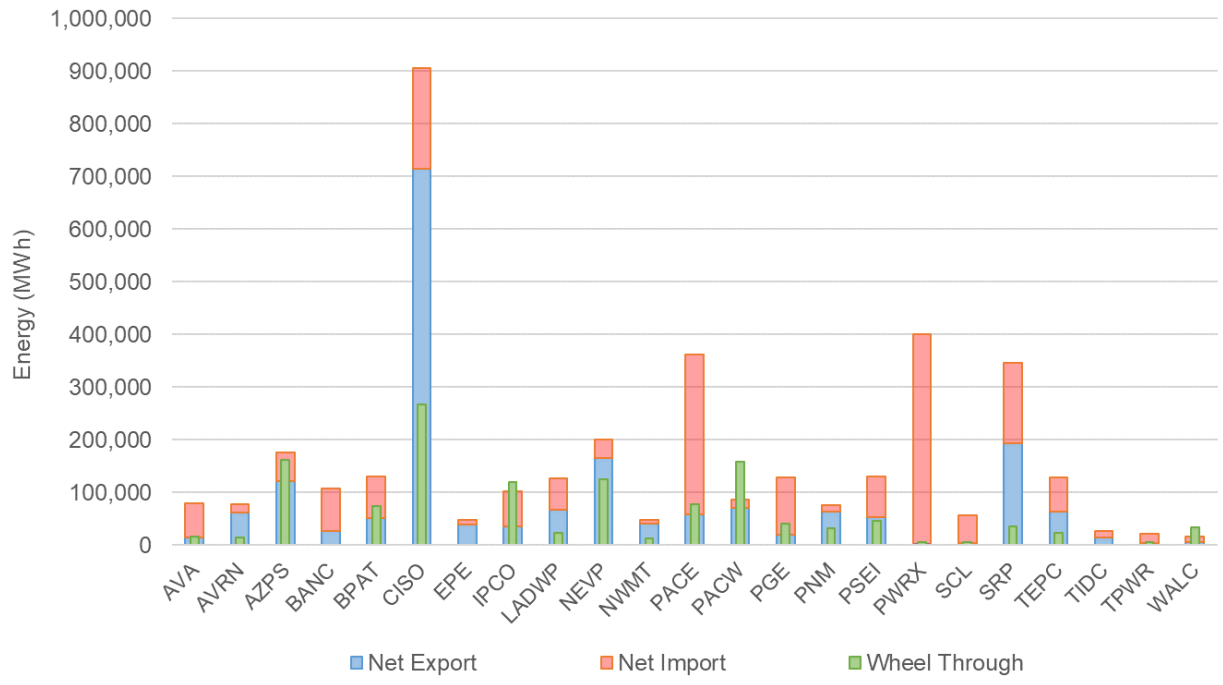


GRAPH 3: Estimated wheel-through transfers in Q2 2023

BAA	Net Export	Net Import	Wheel Through
AVA	13,905	64,563	15,506
AVRN	61,861	14,989	13,969
AZPS	121,457	53,838	161,576
BANC	26,610	80,005	-
BPAT	51,839	78,988	73,511
CISO	714,265	192,065	267,543
EPE	38,198	9,655	-
IPCO	36,160	66,661	120,424
LADWP	66,911	60,296	23,187
NEVP	165,012	35,659	124,786
NWMT	40,411	6,877	12,557
PACE	58,542	303,973	77,749
PACW	71,031	15,652	158,406

PGE	18,789	110,173	41,402
PNM	63,906	11,852	31,180
PSEI	53,791	75,682	46,512
PWRX	907	399,482	5,695
SCL	3,866	52,064	5,777
SRP	193,201	152,145	35,154
TEPC	63,820	63,807	23,184
TIDC	14,504	12,730	-
TPWR	3,646	17,733	5,147
WALC	6,072	9,818	33,303

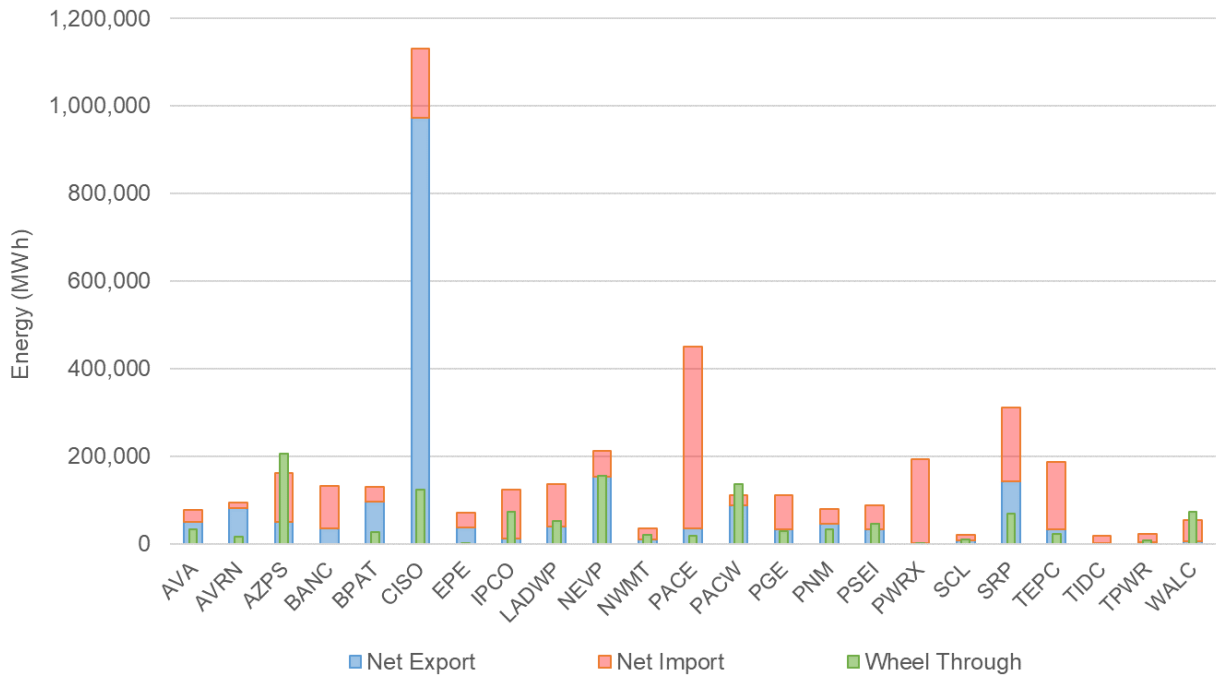
TABLE 4: Estimated wheel-through transfers in April 2023



GRAPH 4: Estimated wheel-through transfers in April 2023

BAA	Net Export	Net Import	Wheel Through
AVA	50,639	27,639	33,824
AVRN	82,119	12,298	16,028
AZPS	51,454	110,503	206,315
BANC	35,715	97,092	-
BPAT	97,642	33,326	27,192
CISO	972,500	158,792	123,775
EPE	37,229	34,252	34
IPCO	12,228	112,093	73,833
LADWP	39,248	97,536	53,494
NEVP	153,920	58,504	155,017
NWMT	11,336	23,734	20,108
PACE	34,958	416,454	19,433
PACW	88,983	22,901	137,422
PGE	33,934	77,365	30,163
PNM	45,526	33,534	32,972
PSEI	33,478	55,684	45,514
PWRX	2,521	191,180	2,801
SCL	7,839	13,176	11,153
SRP	142,958	169,501	69,867
TEPC	33,498	153,387	22,389
TIDC	2,242	17,621	-
TPWR	4,852	17,611	8,247
WALC	6,693	47,329	74,400

TABLE 5: Estimated wheel-through transfers in May 2023

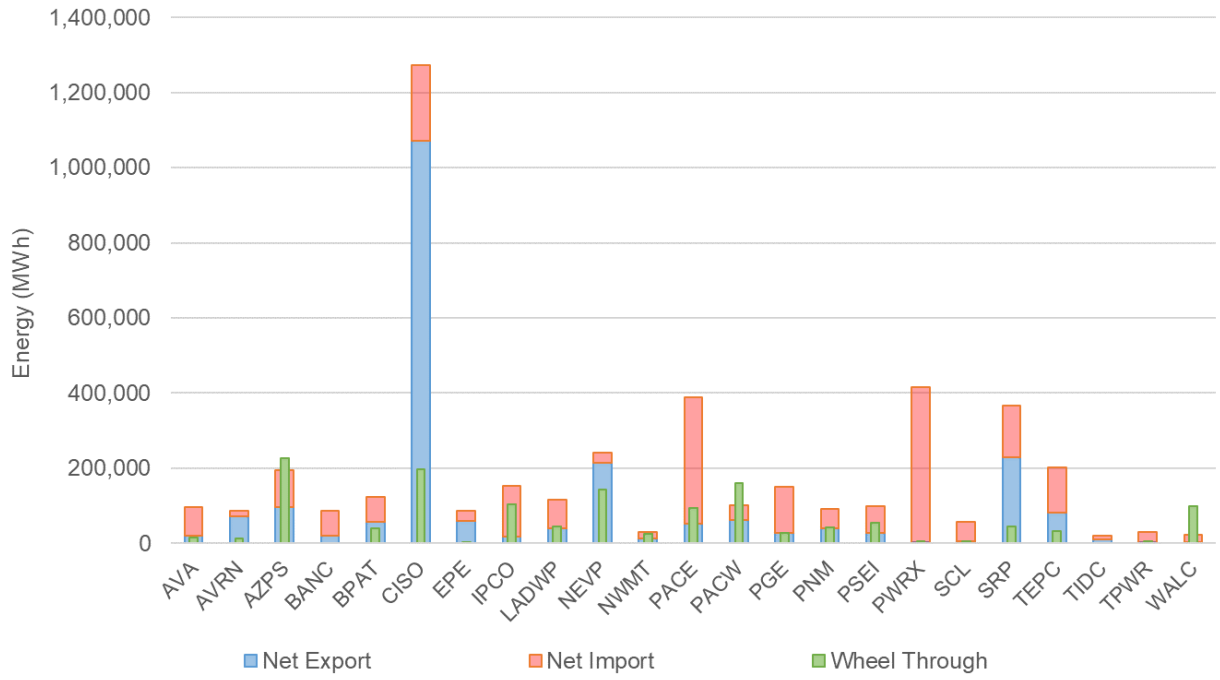


GRAPH 5: Estimated wheel-through transfers in May 2023

BAA	Net Export	Net Import	Wheel Through
AVA	19,164	78,274	16,057
AVRN	71,544	15,617	12,339
AZPS	95,917	98,159	226,996
BANC	20,361	65,540	-
BPAT	56,987	65,484	40,729
CISO	1,071,612	201,754	196,737
EPE	59,871	27,076	38
IPCO	18,015	135,595	102,490
LADWP	39,973	75,712	45,120
NEVP	213,046	28,128	143,986
NWMT	13,334	17,440	25,318
PACE	52,016	337,242	94,314

PACW	62,201	38,150	159,217
PGE	28,693	122,483	28,666
PNM	39,092	51,723	42,758
PSEI	26,901	72,332	55,236
PWRX	1,154	415,308	5,323
SCL	4,674	51,595	4,734
SRP	227,863	139,667	45,197
TEPC	80,701	120,330	32,657
TIDC	10,023	10,103	-
TPWR	1,656	29,068	4,967
WALC	2,520	20,538	98,944

TABLE 6: Estimated wheel-through transfers in June 2023



GRAPH 6: Estimated wheel-through transfers in June 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 Q2 2023 was calculated to be 38,770 MWh (April) + 57,896 MWh (May) + 52,272 MWh (June) = 148,938 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 CO_2/MWh, avoided curtailments displaced an estimated 63,745 metric tons of CO_2 for Q2 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 CO_2, are shown in Table 7.

Year	Quarter	MWh	Eq. Tons CO_2
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
	1	52,254	22,365

2019	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
Total		2,052,737	878,491

TABLE 7: Total reduction in curtailment of renewable energy and associated reductions in CO_2

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.

	April		May		June	
Direction	Up	Down	Up	Down	Up	Down
Average MW saving	1,747	1,006	1,745	1,668	1,744	1,227
Sum of BAA requirements	3,057	2,900	3,127	3,078	3,258	3,265
Percentage savings	57%	35%	56%	54%	54%	38%

Table 8: Flexible ramping procurement diversity savings in Q2 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 878,491 metric tons of CO_2, roughly the equivalent of avoiding the emissions from 184,699 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
PAC	PacifiCorp
PACE	PacifiCorp East
PACW	PacifiCorp West
PGE	Portland General Electric
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: Maximum Transfer Capacities

Month	From BAA	To BAA	15min WEIM transfer (15m – base)	5min WEIM transfer (5m – base)
	AVA	AVRN	8	0
April	AVA	BPAT	13,044	13,809
	AVA	CISO	0	0
	AVA	IPCO	10,714	7,409
	AVA	NWMT	9,124	6,251
	AVA	PACW	1,262	1,941
	AVA	PGE	0	0
	AVA	PSEI	0	0
	AVA	SCL	4	0
	AVA	TPWR	0	0
	AVRN	AVA	0	0
	AVRN	BPAT	33,026	32,478
	AVRN	PACW	17,869	24,875
	AVRN	PGE	18,395	16,586
	AVRN	SCL	1,862	1,890
	AZPS	CISO	84,067	68,551
	AZPS	EPE	2,289	0
	AZPS	LADWP	21,672	24,834
	AZPS	NEVP	5,481	6,376
	AZPS	PACE	152,693	153,445
	AZPS	PNM	13,235	13,894
	AZPS	SRP	7,404	8,791
	AZPS	TEPC	4,790	6,674
April	AZPS	WALC	1,344	468
	BANC	BPAT	0	0

	BANC	CISO	27,573	23,849
	BANC	TIDC	3,101	2,761
	BPAT	AVA	10,083	6,765
	BPAT	AVRN	4,770	5,601
	BPAT	BANC	0	0
	BPAT	CISO	14,597	21,086
	BPAT	IPCO	9,354	3,702
	BPAT	LADWP	0	0
	BPAT	NEVP	0	0
	BPAT	NWMT	10,368	4,644
	BPAT	PACW	4,335	1,393
	BPAT	PGE	23,818	21,309
	BPAT	PSEI	30,438	37,541
	BPAT	PWRX	7,414	0
	BPAT	SCL	9,095	8,420
	BPAT	TPWR	12,087	14,888
	CISO	AVA	0	0
	CISO	AZPS	101,243	82,079
	CISO	BANC	59,773	71,661
	CISO	BPAT	23,030	30,020
	CISO	LADWP	40,607	38,677
	CISO	NEVP	78,374	81,354
	CISO	PACW	16,540	48,624
	CISO	PGE	30,429	56,245
	CISO	PWRX	359,142	379,151
April	CISO	SRP	165,944	169,621
	CISO	TEPC	1,073	1,589
	CISO	TIDC	8,787	9,969

	CISO	WALC	11,867	12,819
	EPE	AZPS	1,273	0
	EPE	PNM	16,971	16,594
	EPE	TEPC	23,328	21,604
	IPCO	AVA	39,888	44,792
	IPCO	BPAT	21,816	24,317
	IPCO	NEVP	24,852	15,033
	IPCO	NWMT	241	523
	IPCO	PACE	31,419	20,816
	IPCO	PACW	39,170	37,424
	IPCO	PSEI	1,943	1,864
	IPCO	SCL	11,383	11,815
	LADWP	AZPS	6,195	8,551
	LADWP	BPAT	0	0
	LADWP	CISO	32,904	23,616
	LADWP	NEVP	35,387	36,659
	LADWP	PACE	22,448	20,960
	LADWP	TEPC	0	0
	LADWP	WALC	1,273	312
	NEVP	AZPS	535	977
	NEVP	BPAT	0	0
	NEVP	CISO	48,753	31,656
	NEVP	IPCO	83,761	76,691
	NEVP	LADWP	17,106	14,723
	NEVP	PACE	175,549	161,882
April	NEVP	WALC	6,298	3,870
	NWMT	AVA	13,690	15,554
	NWMT	BPAT	2,988	2,774

	NWMT	IPCO	11,557	11,329
	NWMT	PACE	28,867	23,312
	NWMT	PACW	19	0
	NWMT	PGE	47	0
	NWMT	PSEI	163	0
	NWMT	TPWR	0	0
	PACE	AZPS	33,678	25,536
	PACE	IPCO	56,365	56,020
	PACE	LADWP	4,469	2,457
	PACE	NEVP	7,673	7,494
	PACE	NWMT	8,048	8,016
	PACE	PACW	41,911	36,768
	PACE	SRP	0	0
	PACE	TEPC	13	0
	PACW	AVA	12,170	12,958
	PACW	AVRN	12,309	20,889
	PACW	BPAT	8,817	8,763
	PACW	CISO	22,237	41,312
	PACW	IPCO	24,451	24,641
	PACW	NWMT	7	0
	PACW	PGE	54,950	54,762
	PACW	PSEI	57,681	64,230
	PACW	SCL	1,855	1,883
	PGE	AVA	0	0
	PGE	AVRN	708	1,184
April	PGE	BPAT	18,280	21,335
	PGE	CISO	26,381	23,320
	PGE	NWMT	47	0

	PGE	PACW	7,365	8,525
	PGE	PSEI	3,309	4,422
	PGE	SCL	1,412	1,405
	PGE	TPWR	0	0
	PNM	AZPS	92,070	72,206
	PNM	EPE	4,505	5,932
	PNM	SRP	1,762	1,544
	PNM	TEPC	16,319	15,404
	PSEI	AVA	0	0
	PSEI	BPAT	13,123	14,337
	PSEI	IPCO	4,389	3,321
	PSEI	NWMT	76	0
	PSEI	PACW	12,851	14,179
	PSEI	PGE	1,759	2,021
	PSEI	PWRX	26,166	26,026
	PSEI	SCL	35,070	32,428
	PSEI	TPWR	7,732	7,992
	PWRX	BPAT	9,317	0
	PWRX	CISO	0	0
	PWRX	PSEI	6,228	6,603
	SCL	AVA	9	0
	SCL	AVRN	818	1,284
	SCL	BPAT	604	538
	SCL	IPCO	4,462	3,973
	SCL	PACW	249	329
April	SCL	PGE	558	652
	SCL	PSEI	1,475	2,868
	SRP	AZPS	25,472	25,068

	SRP	CISO	173,447	169,708
	SRP	PACE	0	0
	SRP	PNM	107	104
	SRP	TEPC	28,530	31,886
	SRP	WALC	2,369	1,590
	TEPC	AZPS	633	18
	TEPC	CISO	44,257	38,474
	TEPC	EPE	3,187	3,723
	TEPC	LADWP	0	0
	TEPC	PACE	1,724	1,307
	TEPC	PNM	12,055	12,439
	TEPC	SRP	11,966	6,979
	TEPC	WALC	25,210	24,064
	TIDC	BANC	8,866	8,344
	TIDC	CISO	7,866	6,160
	TPWR	AVA	0	0
	TPWR	BPAT	4,293	4,127
	TPWR	NWMT	0	0
	TPWR	PGE	0	0
	TPWR	PSEI	3,767	4,666
	WALC	AZPS	2,948	979
	WALC	CISO	15,034	11,877
	WALC	LADWP	3,624	2,792
	WALC	NEVP	16,692	13,528
	WALC	SRP	1,017	364
	WALC	TEPC	9,752	9,835
May	AVA	AVRN	0	0
	AVA	BPAT	2,132	1,656

	AVA	CISO	0	0
	AVA	IPCO	60,157	54,960
	AVA	NWMT	29,351	24,539
	AVA	PACW	1,600	3,307
	AVA	PGE	25	0
	AVA	PSEI	2	0
	AVA	SCL	4	0
	AVA	TPWR	0	0
	AVRN	AVA	0	0
	AVRN	BPAT	24,758	19,509
	AVRN	PACW	57,227	61,645
	AVRN	PGE	16,588	12,735
	AVRN	SCL	5,799	4,258
	AZPS	CISO	34,589	20,557
	AZPS	EPE	2,020	0
	AZPS	LADWP	15,897	19,460
	AZPS	PACE	180,841	160,032
	AZPS	PNM	46,416	51,501
	AZPS	SRP	3,012	2,727
	AZPS	TEPC	896	2,917
	AZPS	WALC	719	575
	BANC	BPAT	0	0
	BANC	CISO	37,078	34,579
	BANC	TIDC	1,329	1,136
	BPAT	AVA	22,203	20,161
May	BPAT	AVRN	10,902	13,333
	BPAT	BANC	0	0
	BPAT	CISO	4,856	9,479

	BPAT	IPCO	3,714	3,127
	BPAT	LADWP	0	0
	BPAT	NEVP	0	0
	BPAT	NWMT	6,142	3,400
	BPAT	PACW	1,527	2,047
	BPAT	PGE	20,563	23,364
	BPAT	PSEI	27,271	30,466
	BPAT	PWRX	7,184	0
	BPAT	SCL	2,094	1,821
	BPAT	TPWR	15,171	17,635
	CISO	AVA	0	0
	CISO	AZPS	216,535	196,667
	CISO	BANC	83,645	97,000
	CISO	BPAT	1,550	2,232
	CISO	LADWP	87,510	87,553
	CISO	NEVP	168,668	151,426
	CISO	PACW	9,939	35,070
	CISO	PGE	30,197	46,690
	CISO	PWRX	151,219	168,662
	CISO	SRP	235,483	232,733
	CISO	TEPC	977	882
	CISO	TIDC	16,158	16,485
	CISO	WALC	64,657	60,874
	EPE	AZPS	1,511	0
	EPE	PNM	10,794	10,747
May	EPE	TEPC	30,524	26,516
	IPCO	AVA	16,909	13,892
	IPCO	BPAT	2,251	1,057

	IPCO	NEVP	20,519	17,085
	IPCO	NWMT	2,720	3,384
	IPCO	PACE	39,701	34,663
	IPCO	PACW	5,280	3,300
	IPCO	PSEI	9,089	8,712
	IPCO	SCL	3,712	3,967
	LADWP	AZPS	5,405	9,514
	LADWP	BPAT	0	0
	LADWP	CISO	15,210	9,967
	LADWP	NEVP	36,602	30,878
	LADWP	PACE	36,458	40,358
	LADWP	TEPC	0	0
	LADWP	WALC	1,796	2,025
	NEVP	AZPS	0	0
	NEVP	BPAT	0	0
	NEVP	CISO	29,448	17,082
	NEVP	IPCO	80,596	74,156
	NEVP	LADWP	24,596	23,719
	NEVP	PACE	196,834	180,685
	NEVP	WALC	7,065	13,297
	NWMT	AVA	6,773	7,584
	NWMT	BPAT	3,612	157
	NWMT	IPCO	3,353	3,627
	NWMT	PACE	23,747	20,075
	NWMT	PACW	169	0
	NWMT	PGE	164	0
May	NWMT	PSEI	167	0
	NWMT	TPWR	0	0

	PACE	AZPS	10,978	15,931
	PACE	IPCO	11,582	8,716
	PACE	LADWP	11,140	9,840
	PACE	NEVP	2,660	2,283
	PACE	NWMT	12,361	12,519
	PACE	PACW	9,118	5,101
	PACE	SRP	0	0
	PACE	TEPC	0	0
	PACW	AVA	21,880	19,825
	PACW	AVRN	3,021	11,256
	PACW	BPAT	4,796	861
	PACW	CISO	35,550	98,588
	PACW	IPCO	32,905	29,667
	PACW	NWMT	30	0
	PACW	PGE	31,047	23,827
	PACW	PSEI	42,672	41,260
	PACW	SCL	1,276	1,120
	PGE	AVA	0	0
	PGE	AVRN	1,155	2,539
	PGE	BPAT	22,280	20,838
	PGE	CISO	12,786	11,820
	PGE	NWMT	112	0
	PGE	PACW	22,875	27,652
	PGE	PSEI	0	0
	PGE	SCL	1,450	1,247
	PGE	TPWR	0	0
May	PNM	AZPS	52,734	38,942
	PNM	EPE	22,758	26,509

	PNM	SRP	1,488	1,197
	PNM	TEPC	14,412	11,850
	PSEI	AVA	0	0
	PSEI	BPAT	14,194	11,665
	PSEI	IPCO	0	0
	PSEI	NWMT	49	0
	PSEI	PACW	12,951	21,675
	PSEI	PGE	126	195
	PSEI	PWRX	26,368	25,319
	PSEI	SCL	12,966	11,915
	PSEI	TPWR	7,145	8,224
	PWRX	BPAT	4,242	0
	PWRX	CISO	0	0
	PWRX	PSEI	4,408	5,322
	SCL	AVA	6	0
	SCL	AVRN	441	1,197
	SCL	BPAT	254	372
	SCL	IPCO	13,038	11,671
	SCL	PACW	245	526
	SCL	PGE	514	716
	SCL	PSEI	3,058	4,510
	SRP	AZPS	40,578	54,084
	SRP	CISO	82,843	64,900
	SRP	PACE	0	0
	SRP	PNM	186	219
	SRP	TEPC	78,547	85,430
May	SRP	WALC	8,175	8,192
	TEPC	AZPS	1,144	422

	TEPC	CISO	8,588	4,277
	TEPC	EPE	7,530	7,777
	TEPC	LADWP	0	0
	TEPC	PACE	133	75
	TEPC	PNM	6,028	4,039
	TEPC	SRP	3,797	2,531
	TEPC	WALC	46,872	36,766
	TIDC	BANC	102	93
	TIDC	CISO	2,628	2,149
	TPWR	AVA	0	0
	TPWR	BPAT	1,983	2,171
	TPWR	NWMT	0	0
	TPWR	PGE	0	0
	TPWR	PSEI	8,913	10,928
	WALC	AZPS	2,169	1,257
	WALC	CISO	18,414	9,168
	WALC	LADWP	12,849	10,458
	WALC	NEVP	13,976	11,849
	WALC	SRP	709	180
	WALC	TEPC	48,612	48,180
June	AVA	AVRN	66	192
	AVA	BPAT	14,440	11,504
	AVA	CISO	0	0
	AVA	IPCO	13,168	13,227
	AVA	NWMT	7,240	8,847
	AVA	PACW	1,620	1,451
June	AVA	PGE	0	0
	AVA	PSEI	5	0

	AVA	SCL	18	0
	AVA	TPWR	0	0
	AVRN	AVA	232	111
	AVRN	BPAT	30,742	24,649
	AVRN	PACW	45,377	43,293
	AVRN	PGE	11,143	8,869
	AVRN	SCL	7,872	6,960
	AZPS	CISO	51,913	45,605
	AZPS	EPE	2,432	0
	AZPS	LADWP	21,865	22,227
	AZPS	PACE	233,964	190,540
	AZPS	PNM	47,971	57,499
	AZPS	SRP	4,336	3,356
	AZPS	TEPC	2,669	3,328
	AZPS	WALC	1,597	357
	BANC	BPAT	0	0
	BANC	CISO	18,337	20,361
	BANC	TIDC	29	0
	BPAT	AVA	8,615	9,128
	BPAT	AVRN	2,678	4,496
	BPAT	BANC	0	0
	BPAT	CISO	1,770	5,711
	BPAT	IPCO	3,279	2,916
	BPAT	LADWP	0	0
	BPAT	NEVP	0	0
	BPAT	NWMT	6,779	3,520
June	BPAT	PACW	1,910	972
	BPAT	PGE	9,307	9,560

	BPAT	PSEI	28,238	31,588
	BPAT	PWRX	7,247	0
	BPAT	SCL	5,014	4,908
	BPAT	TPWR	24,624	24,918
	CISO	AVA	0	0
	CISO	AZPS	204,909	212,561
	CISO	BANC	63,913	65,540
	CISO	BPAT	6,201	13,822
	CISO	LADWP	70,197	61,917
	CISO	NEVP	150,132	127,174
	CISO	PACW	14,998	60,569
	CISO	PGE	68,472	94,909
	CISO	PWRX	371,977	396,272
	CISO	SRP	175,740	178,273
	CISO	TEPC	2,728	3,050
	CISO	TIDC	10,378	10,103
	CISO	WALC	43,523	43,878
	EPE	AZPS	806	0
	EPE	PNM	20,102	22,661
	EPE	TEPC	43,588	37,248
	IPCO	AVA	56,664	56,242
	IPCO	BPAT	13,342	10,263
	IPCO	NEVP	3,929	4,563
	IPCO	NWMT	2,628	3,410
	IPCO	PACE	15,560	15,007
	IPCO	PACW	35,097	20,233
June	IPCO	PSEI	0	0
	IPCO	SCL	12,294	10,788

	LADWP	AZPS	3,373	5,972
	LADWP	BPAT	0	0
	LADWP	CISO	23,324	16,377
	LADWP	NEVP	18,926	18,488
	LADWP	PACE	46,345	42,882
	LADWP	TEPC	0	0
	LADWP	WALC	1,961	1,374
	NEVP	AZPS	0	0
	NEVP	BPAT	0	0
	NEVP	CISO	35,458	29,212
	NEVP	IPCO	152,301	129,532
	NEVP	LADWP	17,733	17,850
	NEVP	PACE	192,023	171,510
	NEVP	WALC	7,325	8,930
	NWMT	AVA	25,159	22,839
	NWMT	BPAT	4,075	1,666
	NWMT	IPCO	2,471	2,796
	NWMT	PACE	10,859	11,350
	NWMT	PACW	51	0
	NWMT	PGE	181	0
	NWMT	PSEI	197	0
	NWMT	TPWR	0	0
	PACE	AZPS	9,082	11,983
	PACE	IPCO	65,870	53,651
	PACE	LADWP	9,080	7,559
	PACE	NEVP	1,199	1,381
	PACE	NWMT	27,193	26,982
June	PACE	PACW	66,664	44,774

	PACE	SRP	0	0
	PACE	TEPC	0	0
	PACW	AVA	4,842	6,011
	PACW	AVRN	8,379	20,194
	PACW	BPAT	4,230	3,230
	PACW	CISO	18,356	40,432
	PACW	IPCO	32,686	32,624
	PACW	NWMT	3	0
	PACW	PGE	49,457	37,457
	PACW	PSEI	83,598	79,470
	PACW	SCL	2,140	2,000
	PGE	AVA	0	0
	PGE	AVRN	1,143	2,363
	PGE	BPAT	28,959	26,687
	PGE	CISO	6,088	6,057
	PGE	NWMT	163	0
	PGE	PACW	17,425	20,372
	PGE	PSEI	2	0
	PGE	SCL	1,962	1,881
	PGE	TPWR	0	0
	PNM	AZPS	65,637	54,775
	PNM	EPE	16,894	18,559
	PNM	SRP	732	566
	PNM	TEPC	9,838	7,949
	PSEI	AVA	1	0
	PSEI	BPAT	13,887	12,682
	PSEI	IPCO	0	0
June	PSEI	NWMT	89	0

	PSEI	PACW	2,982	5,538
	PSEI	PGE	0	0
	PSEI	PWRX	26,709	24,359
	PSEI	SCL	32,854	29,791
	PSEI	TPWR	8,701	9,118
	PWRX	BPAT	3,439	0
	PWRX	CISO	0	0
	PWRX	PSEI	5,201	6,477
	SCL	AVA	57	0
	SCL	AVRN	405	711
	SCL	BPAT	382	434
	SCL	IPCO	2,697	3,339
	SCL	PACW	60	165
	SCL	PGE	315	354
	SCL	PSEI	3,863	4,405
	SRP	AZPS	30,465	39,142
	SRP	CISO	185,801	173,627
	SRP	PACE	0	0
	SRP	PNM	736	980
	SRP	TEPC	49,690	56,201
	SRP	WALC	3,838	3,109
	TEPC	AZPS	1,016	0
	TEPC	CISO	35,169	26,948
	TEPC	EPE	6,699	8,555
	TEPC	LADWP	0	0
	TEPC	PACE	252	267
	TEPC	PNM	12,188	13,341
June	TEPC	SRP	3,844	2,412

	TEPC	WALC	65,876	61,834
	TIDC	BANC	33	0
	TIDC	CISO	9,836	10,023
	TPWR	AVA	0	0
	TPWR	BPAT	1,132	1,277
	TPWR	NWMT	0	0
	TPWR	PGE	0	0
	TPWR	PSEI	5,206	5,347
	WALC	AZPS	2,590	722
	WALC	CISO	30,840	23,488
	WALC	LADWP	10,081	11,279
	WALC	NEVP	26,096	20,508
	WALC	SRP	869	256
	WALC	TEPC	46,586	45,211

APPENDIX 3: Minimum & Maximum Flexible Ramping Requirements

Month	BAA	Direction	Minimum requirement	Maximum requirement
April	*AVA*	up	5	99
	AVRN	up	0	165
	AZPS	up	0	298
	BANC	up	0	103
	BPAT	up	9	426
	CISO	up	0	2,404
	EPE	up	0	53
	IPCO	up	11	155
	LADWP	up	0	415
	NEVP	up	0	478
	NWMT	up	0	138
	PACE	up	0	479
	PACW	up	0	185
	PGE	up	0	192
	PNM	up	0	165
	PSEI	up	0	230
	PWRX	up	0	325
	SCL	up	0	51
	SRP	up	0	280
	TEPC	up	0	195
	TIDC	up	0	20
	TPWR	up	0	22
	WALC	up	0	27
	ALL EIM	**up**	**315**	**2,771**
	AVA	down	0	97
	AVRN	down	0	142
	AZPS	down	0	226

April	*BANC*	down	0	130
	BPAT	down	0	647
	CISO	down	0	1,896
	EPE	down	0	68
	IPCO	down	0	209
	LADWP	down	0	313
	NEVP	down	0	469
	NWMT	down	0	116
	PACE	down	0	511
	PACW	down	0	196
	PGE	down	0	267
	PNM	down	0	158
	PSEI	down	0	262
	PWRX	down	0	359
	SCL	down	0	38
	SRP	down	0	200
	TEPC	down	0	160
	TIDC	down	0	19
	TPWR	down	0	23
	WALC	down	0	30
	ALL EIM	**down**	**0**	**2,175**
	AVA	up	4	99
May	*AVRN*	up	1	165
	AZPS	up	0	298
	BANC	up	0	103
	BPAT	up	3	426
	CISO	up	0	2,419
	EPE	up	0	53
	IPCO	up	0	155
	LADWP	up	0	448
	NEVP	up	0	478

		NWMT	up	1	131
		PACE	up	0	479
		PACW	up	0	185
		PGE	up	2	192
		PNM	up	0	165
		PSEI	up	0	275
		PWRX	up	0	303
	May	*SCL*	up	0	51
		SRP	up	0	235
		TEPC	up	0	195
		TIDC	up	0	18
		TPWR	up	0	22
		WALC	up	0	28
		ALL WEIM	**up**	**395**	**2,771**
		AVA	down	0	87
		AVRN	down	0	142
		AZPS	down	0	226
		BANC	down	0	130
		BPAT	down	14	607
		CISO	down	20	1,896
		EPE	down	0	68
		IPCO	down	0	209
		LADWP	down	12	313
		NEVP	down	0	491
		NWMT	down	0	116
		PACE	down	0	511
		PACW	down	0	196
		PGE	down	0	269
		PNM	down	0	158
		PSEI	down	0	252
		PWRX	down	0	359

	SCL	down	0	38
	SRP	down	0	200
	TEPC	down	0	138
	TIDC	down	0	19
	TPWR	down	0	23
	WALC	down	0	29
	ALL EIM	**down**	**0**	**2,175**
June	*AVA*	up	0	92
	AVRN	up	0	272
	AZPS	up	0	341
	BANC	up	0	116
	BPAT	up	0	462
	CISO	up	0	2,251
	EPE	up	0	75
	IPCO	up	6	169
	LADWP	up	22	432
	NEVP	up	0	531
	NWMT	up	0	127
	PACE	up	0	521
	PACW	up	0	168
	PGE	up	4	214
	PNM	up	0	170
	PSEI	up	0	256
	PWRX	up	5	291
	SCL	up	0	38
	SRP	up	0	248
	TEPC	up	0	295
	TIDC	up	0	18
	TPWR	up	1	24
	WALC	up	0	30
	ALL WEIM	**up**	**385**	**2,771**

June	AVA	down	4	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	0	237
	LADWP	down	0	382
	NEVP	down	0	648
	NWMT	down	0	129
	PACE	down	0	631
	PACW	down	9	199
	PGE	down	0	236
	PNM	down	0	243
	PSEI	down	11	265
	PWRX	down	0	359
	SCL	down	0	30
	SRP	down	0	233
	TEPC	down	0	148
	TIDC	down	0	21
	TPWR	down	0	20
	WALC	down	0	34
	ALL WEIM	**down**	**0**	**2,175**