WESTERN ENERGY IMBALANCE MARKET BENEFITS REPORT

Second Quarter 2024

Prepared by: Market Performance and Advanced Analytics

July 30, 2024

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EXECUTIVE SUMMARY

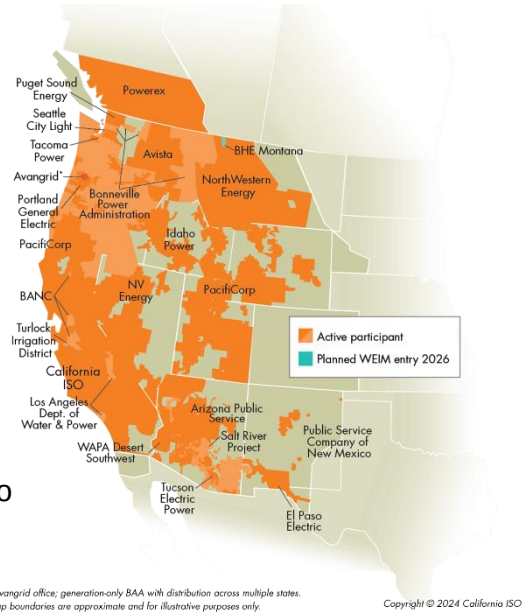
Gross benefits from WEIM since November 2014

$5.85 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.

The WEIM also provides significant reliability benefits by enhancing situational awareness and supporting access to surplus renewable energy across a broader western footprint.



Q2 2024 Gross Benefits by Participant (entry year)

	($ millions)
Arizona Public Service (2016)	$4.57
AVANGRID (2023)	$8.56
Avista (2022)	$2.95
Balancing Authority of Northern California (2019)	$49.90
Bonneville Power Administration (2022)	$4.72
California ISO (2014)	$36.02
El Paso Electric (2023)	$3.09
Idaho Power Company (2018)	$15.57
Los Angeles Dept. of Water & Power (2021)	$30.52
NV Energy (2015)	$33.65
NorthWestern Energy (2021)	$7.88
PacifiCorp (2014)	$27.35
Portland General Electric (2017)	$11.25
Public Service Company New Mexico (2021)	$11.21
Puget Sound Energy (2016)	$8.26
Powerex (2018)	$18.73
Seattle City Light (2020)	$4.87
Salt River Project (2020)	$20.93
Tacoma Power (2022)	$5.44
Tucson Electric Power (2022)	$8.02
Turlock Irrigation District (2021)	$0.98
WAPA Desert Southwest Region (2023)	$50.57
Total	$365.04

2024 Q2 BENEFITS

ECONOMICAL

$365.04 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

55,921

Metric tons of CO_2** avoided curtailments

OPERATIONAL

61%

Average reduction in flexibility reserves across the footprint

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

*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 WEIM 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 WEIM footprint includes portions of Arizona, California, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming, Texas and extends to the border with Canada.

WEIM ECONOMIC BENEFITS IN Q2 2024

Table 2 shows the estimated WEIM gross benefits by each region per month[1]. The monthly savings presented show $127.33 million for April, $116.26 million for May and $121.45 million for June with a total estimated benefit of $365.04 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.

[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.

Region	April	May	June	Total
APS	$1.05	$1.61	$1.91	$4.57
AVRN	$1.68	$3.92	$2.96	$8.56
AVA	$0.87	$0.96	$1.12	$2.95
BANC	$13.26	$12.03	$24.61	$49.90
BPA	$1.65	$1.46	$1.61	$4.72
CISO	$10.70	$12.03	$13.29	$36.02
EPE	$1.17	$0.83	$1.09	$3.09
IPCO	$5.51	$6.68	$3.38	$15.57
LADWP	$15.08	$9.64	$5.80	$30.52
NVE	$9.82	$12.24	$11.59	$33.65
NWMT	$1.57	$3.57	$2.74	$7.88
PAC	$7.27	$9.64	$10.44	$27.35
PGE	$4.20	$3.88	$3.17	$11.25
PNM	$3.60	$4.30	$3.31	$11.21
PSE	$1.94	$2.92	$3.40	$8.26
PWRX	$7.61	$5.22	$5.90	$18.73
SCL	$1.01	$1.50	$2.36	$4.87
SRP	$6.62	$8.67	$5.64	$20.93
TPWR	$0.72	$3.28	$1.44	$5.44
TEP	$2.89	$2.99	$2.14	$8.02
TID	$0.36	$0.30	$0.32	$0.98
WALC	$28.75	$8.59	$13.23	$50.57
Total	$127.33	$116.26	$121.45	$365.04

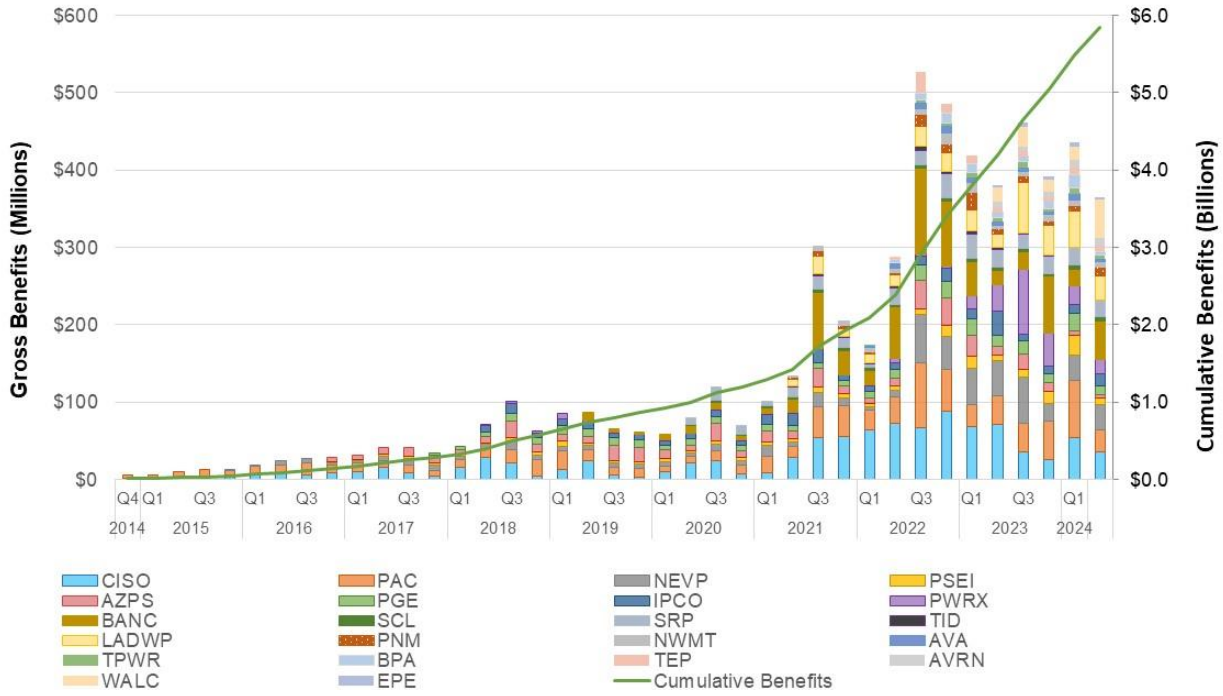
TABLE 1: Q2 2024 benefits in millions USD

CUMULATIVE ECONOMIC BENEFITS SINCE INCEPTION

Since the start of the WEIM in November 2014, the cumulative economic benefits of the market have totaled $5.85 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.

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



GRAPH 1: Cumulative economic benefits for each quarter by BAA

INTER-REGIONAL TRANSFERS

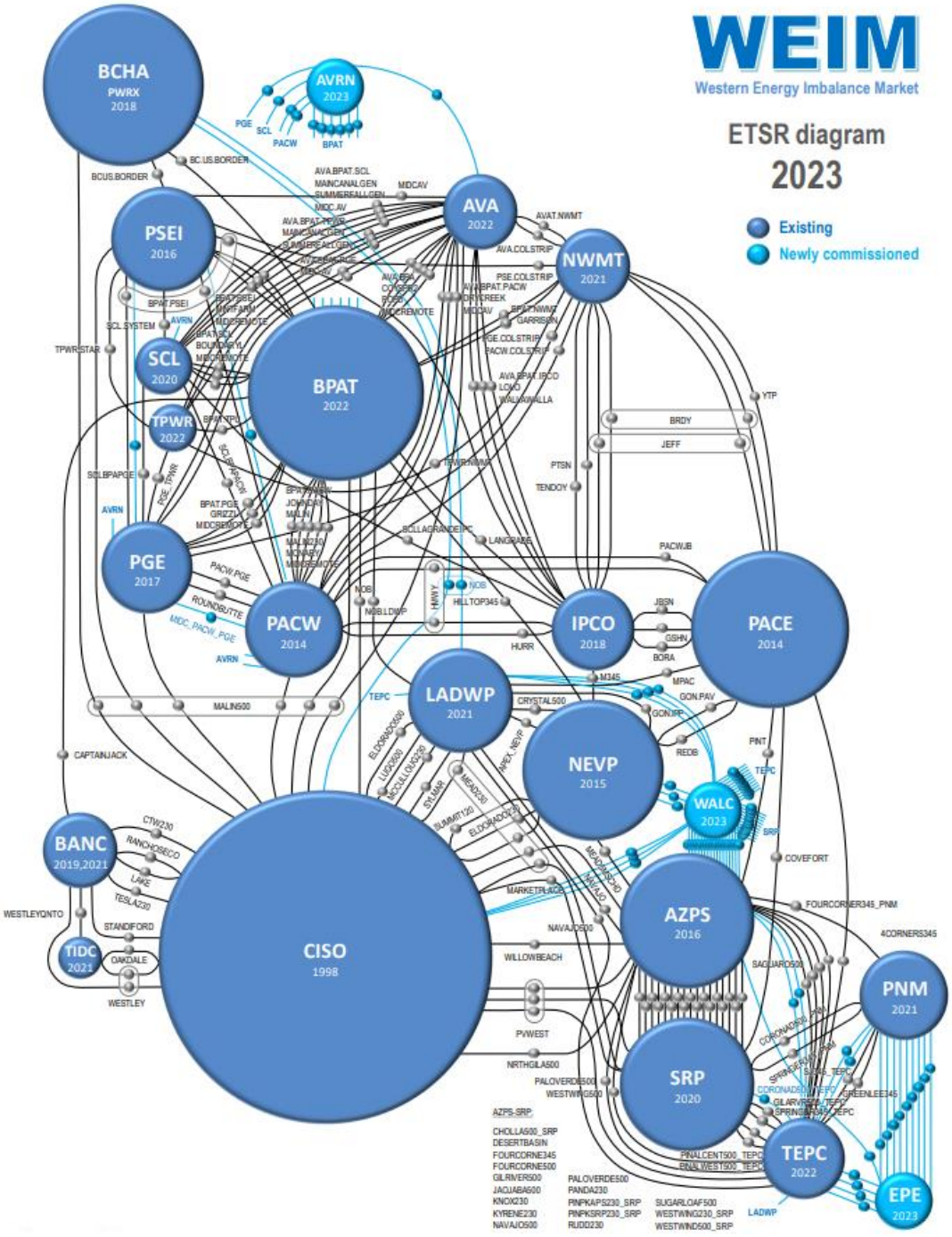
A significant contributor to WEIM benefits is transfers across balancing areas, providing access to lower cost supply, while factoring in the cost of compliance with greenhouse gas (GHG) emissions regulations when energy is transferred into the ISO. As such, the transfer volumes are a good indicator 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 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.



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.

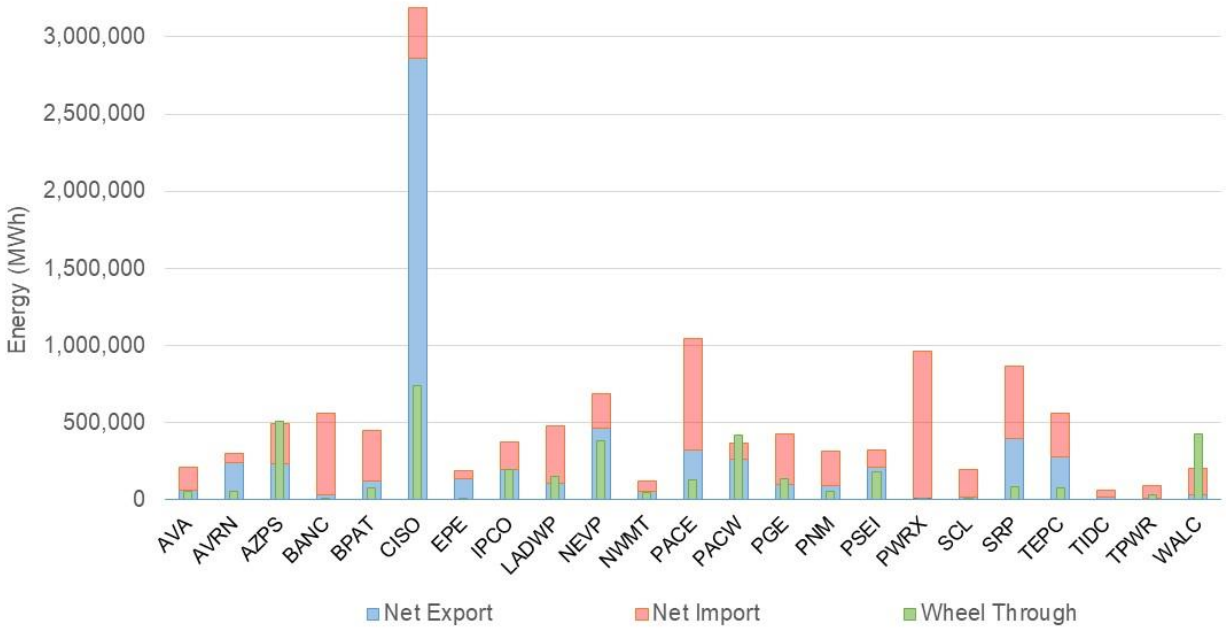
This volume reflects the total wheel-through transfers for each WEIM BAA, regardless of the potential paths used to wheel through. The net imports and exports estimated in this section reflect the overall volume of net imports and exports; in contrast, the imports and exports provided in Table 2 reflect 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	62,489	150,588	53,072
AVRN	242,905	55,842	55,493
AZPS	234,259	260,640	508,707
BANC	30,676	534,382	6
BPAT	119,159	328,485	77,980
CISO	2,864,134	323,564	736,433
EPE	134,093	55,003	635
IPCO	195,274	176,520	198,542
LADWP	109,251	373,087	149,473

NEVP	464,133	223,463	381,828
NWMT	57,579	65,211	49,778
PACE	323,613	724,563	130,914
PACW	260,940	107,031	419,025
PGE	99,334	328,126	139,676
PNM	93,662	225,007	52,940
PSEI	209,650	111,455	184,018
PWRX	1,162	965,287	9,644
SCL	14,774	184,721	13,057
SRP	395,542	473,319	88,836
TEPC	277,677	281,015	79,919
TIDC	14,579	47,612	-
TPWR	12,129	81,332	32,184
WALC	32,768	173,528	430,880

TABLE 2: Estimated wheel-through transfers in Q2 2024

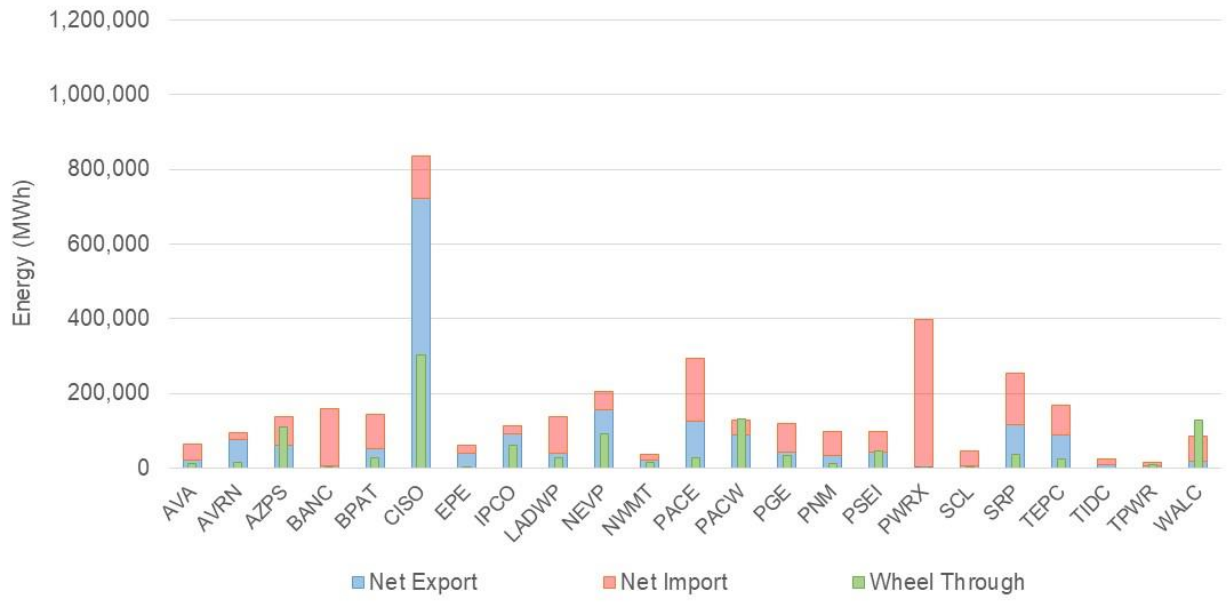


GRAPH 3: Estimated wheel-through transfers in Q2 2024

BAA	Net Export	Net Import	Wheel Through
AVA	19,931	44,713	12,982
AVRN	76,268	17,145	15,046
AZPS	61,638	74,983	109,614
BANC	4,855	154,473	6
BPAT	51,491	92,414	28,759
CISO	722,492	113,106	302,078

EPE	39,325	21,772	199
IPCO	92,481	21,938	62,388
LADWP	40,747	98,176	28,894
NEVP	155,208	50,131	92,568
NWMT	20,117	18,000	16,588
PACE	126,817	167,906	27,702
PACW	87,341	40,781	132,315
PGE	44,196	76,460	34,745
PNM	33,058	64,496	11,865
PSEI	42,212	56,316	46,717
PWRX	91	398,376	1,667
SCL	6,360	39,080	3,732
SRP	117,251	136,840	35,148
TEPC	89,504	77,630	25,784
TIDC	7,612	17,011	-
TPWR	5,545	10,887	9,235
WALC	17,464	69,370	128,758

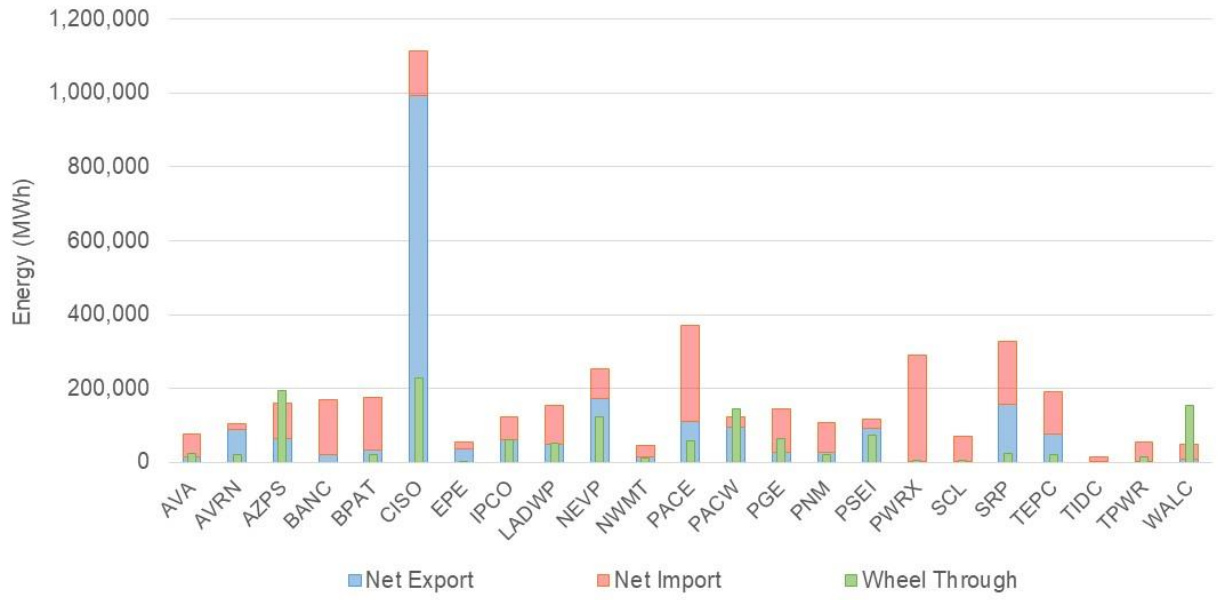
TABLE 3: Estimated wheel-through transfers in April 2024



GRAPH 4: Estimated wheel-through transfers in April 2024

BAA	Net Export	Net Import	Wheel Through
AVA	14,944	60,174	23,594
AVRN	88,156	16,261	21,243
AZPS	65,603	94,824	193,557
BANC	22,123	148,429	-
BPAT	33,355	143,397	22,018
CISO	993,183	120,575	227,856
EPE	34,786	21,101	232
IPCO	60,778	63,489	60,946
LADWP	47,723	106,104	52,739
NEVP	173,028	81,033	123,933
NWMT	13,769	33,343	13,024
PACE	111,939	257,312	57,202
PACW	94,487	27,709	144,473
PGE	25,893	119,754	63,853
PNM	26,915	79,788	19,328
PSEI	91,251	26,814	74,173
PWRX	795	288,041	3,994
SCL	3,597	65,552	6,346
SRP	156,457	170,145	23,624
TEPC	75,588	115,911	21,214
TIDC	2,565	12,476	-
TPWR	1,136	53,618	13,919
WALC	7,937	40,157	154,527

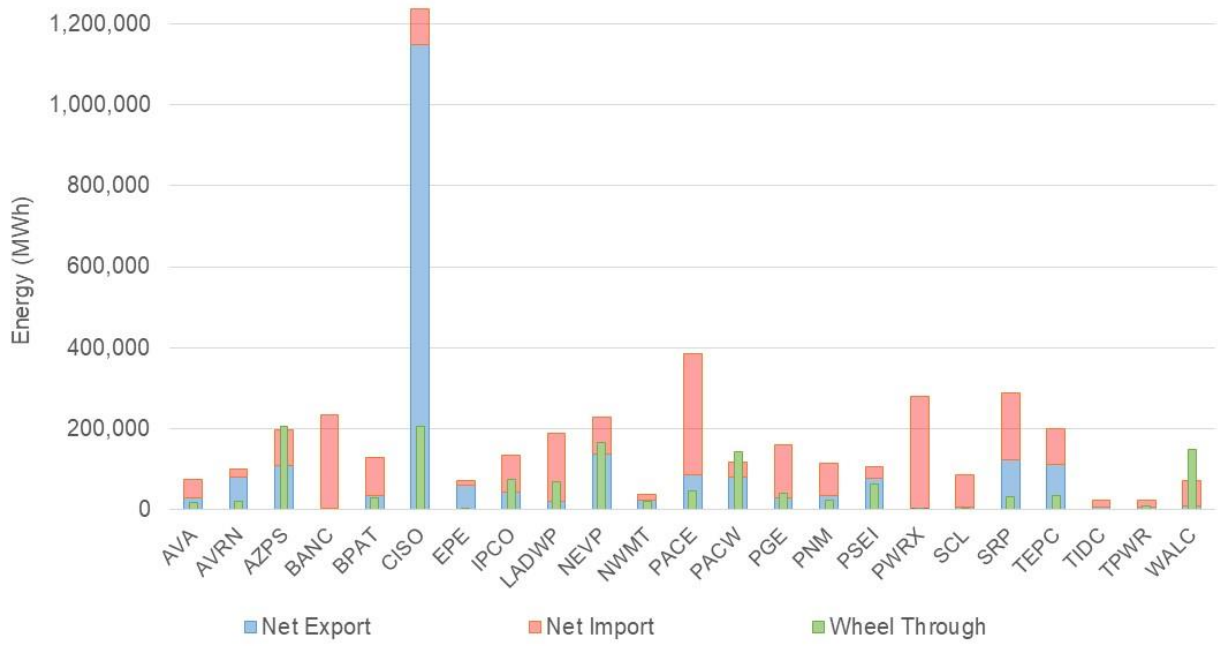
TABLE 4: Estimated wheel-through transfers in May 2024



GRAPH 5: Estimated wheel-through transfers in May 2024

BAA	Net Export	Net Import	Wheel Through
AVA	27,614	45,700	16,497
AVRN	78,482	22,436	19,204
AZPS	107,018	90,833	205,536
BANC	3,699	231,480	-
BPAT	34,313	92,673	27,204
CISO	1,148,459	89,883	206,499
EPE	59,982	12,130	205
IPCO	42,014	91,093	75,208
LADWP	20,781	168,807	67,841
NEVP	135,898	92,298	165,327
NWMT	23,694	13,868	20,165
PACE	84,857	299,346	46,011
PACW	79,112	38,540	142,237
PGE	29,244	131,911	41,078
PNM	33,688	80,723	21,747
PSEI	76,188	28,325	63,128
PWRX	276	278,870	3,982
SCL	4,817	80,089	2,979
SRP	121,835	166,335	30,064
TEPC	112,584	87,474	32,921
TIDC	4,402	18,125	-
TPWR	5,447	16,827	9,029
WALC	7,366	64,001	147,595

TABLE 5: Estimated wheel-through transfers in June 2024



GRAPH 6: Estimated wheel-through transfers in June 2024

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 2024 was calculated to be 35,852 MWh (April) + 48,461 MWh (May) + 46,343 MWh (June) = 130,656 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 55,921 metric tons of CO_2 for Q2 2024. 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 6.

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
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
	4	49,880	21,349
2024	1	60,285	25,802
	2	130,656	55,921

Total	2,353,671	1,007,291

TABLE 6: 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	2,151	1,953	2,232	2,092	2,222	2,273
Sum of BAA requirements	3,527	3,280	3,624	3,329	3,722	3,549
Percentage savings	61%	60%	62%	63%	60%	64%

Table 7: Flexible ramping procurement diversity savings in Q2 2024

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. The WEIM provides significant reliability benefits by enhancing situational awareness and supporting access to surplus energy across a broader western footprint. 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 1,007,291 metric tons of CO_2, roughly the equivalent of avoiding the emissions from 211,778 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)
	AVA	AVRN	1,157	2,029
April	AVA	BPAT	6,469	7,406
	AVA	CISO	0	0
	AVA	IPCO	6,687	6,255
	AVA	NWMT	11,847	14,651
	AVA	PACW	1,649	2,572
	AVA	PGE	0	0
	AVA	PSEI	0	0
	AVA	SCL	8	0
	AVA	TPWR	0	0
	AVRN	AVA	7,008	6,014
	AVRN	BPAT	32,744	29,780
	AVRN	PACW	46,406	38,243
	AVRN	PGE	12,334	9,189
	AVRN	SCL	9,866	8,087
	AZPS	CISO	64,081	58,837
April	AZPS	EPE	2,085	0
	AZPS	LADWP	16,692	13,340
	AZPS	NEVP	0	0
	AZPS	PACE	38,695	33,830
	AZPS	PNM	36,402	43,797
	AZPS	SRP	10,181	16,964
	AZPS	TEPC	697	406
	AZPS	WALC	4,005	4,077
	BANC	BPAT	0	0
	BANC	CISO	5,310	4,841
	BANC	TIDC	147	19
	BPAT	AVA	13,174	9,949

	BPAT	AVRN	4,682	5,086
April	BPAT	BANC	0	0
	BPAT	CISO	6,094	16,557
	BPAT	IPCO	5,269	1,848
	BPAT	LADWP	0	0
	BPAT	NEVP	0	0
	BPAT	NWMT	10,669	6,091
	BPAT	PACW	8,170	3,050
	BPAT	PGE	12,684	10,609
	BPAT	PSEI	12,167	10,931
	BPAT	PWRX	4,691	0
	BPAT	SCL	7,722	6,304
	BPAT	TPWR	11,957	9,826
	CISO	AVA	0	0
	CISO	AZPS	83,626	78,508
	CISO	BANC	138,489	149,435
	CISO	BPAT	11,209	26,290
	CISO	LADWP	74,238	58,792
	CISO	NEVP	54,659	48,764
	CISO	PACW	5,826	35,281
	CISO	PGE	40,080	57,749
	CISO	PWRX	337,851	368,072
April	CISO	SRP	161,006	145,140
	CISO	TEPC	41	94
	CISO	TIDC	16,169	16,992
	CISO	WALC	45,312	35,458
	EPE	AZPS	914	0
	EPE	PNM	17,547	19,704
	EPE	TEPC	22,906	19,820
	IPCO	AVA	23,045	22,426
	IPCO	BPAT	1,672	2,498
	IPCO	NEVP	34,022	43,007

	IPCO	NWMT	4,372	6,420
April	IPCO	PACE	68,196	54,452
	IPCO	PACW	8,967	11,224
	IPCO	PSEI	10,528	13,866
	IPCO	SCL	867	976
	LADWP	AZPS	2,756	4,067
	LADWP	BPAT	0	0
	LADWP	CISO	31,160	28,190
	LADWP	NEVP	18,111	14,106
	LADWP	PACE	13,042	10,981
	LADWP	TEPC	0	0
	LADWP	WALC	12,361	12,297
	NEVP	AZPS	0	0
	NEVP	BPAT	0	0
	NEVP	CISO	55,653	60,559
	NEVP	IPCO	39,263	28,992
	NEVP	LADWP	22,107	29,457
	NEVP	PACE	91,622	76,026
April	NEVP	WALC	43,585	52,741
	NWMT	AVA	9,707	10,321
	NWMT	BPAT	4,729	3,038
	NWMT	IPCO	2,092	3,028
	NWMT	PACE	23,913	20,318
	NWMT	PACW	6	0
	NWMT	PGE	187	0
	NWMT	PSEI	95	0
	NWMT	TPWR	0	0
	PACE	AZPS	42,654	62,226
	PACE	IPCO	12,895	14,424
	PACE	LADWP	8,352	8,030
	PACE	NEVP	15,872	17,491
	PACE	NWMT	6,248	7,427

	PACE	PACW	40,621	44,921
April	PACE	SRP	0	0
	PACE	TEPC	0	0
	PACW	AVA	9,044	8,985
	PACW	AVRN	6,141	19,388
	PACW	BPAT	9,662	11,651
	PACW	CISO	29,348	59,943
	PACW	IPCO	45,661	27,636
	PACW	NWMT	7	0
	PACW	PGE	33,935	32,815
	PACW	PSEI	48,345	57,646
	PACW	SCL	1,589	1,592
	PGE	AVA	0	0
	PGE	AVRN	2,845	4,633
	PGE	BPAT	28,085	26,549
	PGE	CISO	19,049	17,459
	PGE	NWMT	95	0
	PGE	PACW	26,800	28,176
April	PGE	PSEI	775	636
	PGE	SCL	1,602	1,488
	PGE	TPWR	0	0
	PNM	AZPS	25,364	21,564
	PNM	EPE	12,862	12,797
	PNM	SRP	1,352	2,155
	PNM	TEPC	10,084	8,407
	PSEI	AVA	0	0
	PSEI	BPAT	11,062	7,178
	PSEI	IPCO	6	4
	PSEI	NWMT	83	0
	PSEI	PACW	6,627	9,426
	PSEI	PGE	575	351
	PSEI	PWRX	34,000	31,971

	PSEI	SCL	27,564	24,366
April	PSEI	TPWR	9,269	10,297
	PWRX	BPAT	4,131	0
	PWRX	CISO	0	0
	PWRX	PSEI	506	1,758
	SCL	AVA	2	0
	SCL	AVRN	298	1,055
	SCL	BPAT	2,039	1,896
	SCL	IPCO	1,968	2,138
	SCL	PACW	84	204
	SCL	PGE	373	492
	SCL	PSEI	2,601	4,307
	SRP	AZPS	10,515	13,922
	SRP	CISO	104,505	93,663
	SRP	PACE	0	0
	SRP	PNM	69	414
	SRP	TEPC	40,684	34,896
	SRP	WALC	10,764	9,505
	TEPC	AZPS	447	0
	TEPC	CISO	7,451	6,272
	TEPC	EPE	9,707	9,173
	TEPC	LADWP	0	0
	TEPC	PACE	8	0
	TEPC	PNM	9,355	12,446
	TEPC	SRP	6,484	3,349
	TEPC	WALC	93,842	84,049
	TIDC	BANC	5,746	5,043
	TIDC	CISO	2,981	2,569
April	TPWR	AVA	0	0
	TPWR	BPAT	3,991	4,887
	TPWR	NWMT	0	0
	TPWR	PGE	0	0

	TPWR	PSEI	12,211	9,894
	WALC	AZPS	2,818	4,309
	WALC	CISO	71,441	60,958
	WALC	LADWP	17,675	17,452
	WALC	NEVP	17,620	19,332
	WALC	SRP	4,067	4,381
	WALC	TEPC	34,011	39,791
May	AVA	AVRN	1,692	1,764
	AVA	BPAT	9,510	7,349
	AVA	CISO	0	0
	AVA	IPCO	11,482	8,461
	AVA	NWMT	17,995	19,266
	AVA	PACW	2,122	1,697
	AVA	PGE	0	0
	AVA	PSEI	0	0
	AVA	SCL	13	0
	AVA	TPWR	0	0
	AVRN	AVA	10,514	10,113
	AVRN	BPAT	52,340	46,886
	AVRN	PACW	38,815	34,486
	AVRN	PGE	13,480	10,210
	AVRN	SCL	8,708	7,704
	AZPS	CISO	51,497	41,757
	AZPS	EPE	1,410	0
	AZPS	LADWP	7,682	7,212
	AZPS	NEVP	0	0
	AZPS	PACE	115,858	98,942
May	AZPS	PNM	56,061	67,238
	AZPS	SRP	35,851	38,541
	AZPS	TEPC	1,072	654
	AZPS	WALC	4,740	4,818
	BANC	BPAT	0	0

	BANC	CISO	25,193	22,123
May	BANC	TIDC	66	0
	BPAT	AVA	11,392	4,373
	BPAT	AVRN	5,687	5,181
	BPAT	BANC	0	0
	BPAT	CISO	11,199	15,382
	BPAT	IPCO	1,924	172
	BPAT	LADWP	0	0
	BPAT	NEVP	0	0
	BPAT	NWMT	5,489	775
	BPAT	PACW	2,538	259
	BPAT	PGE	9,567	9,075
	BPAT	PSEI	2,822	2,251
	BPAT	PWRX	4,498	0
	BPAT	SCL	1,658	1,211
	BPAT	TPWR	19,228	16,694
	CISO	AVA	0	0
	CISO	AZPS	204,546	194,747
	CISO	BANC	140,336	148,429
	CISO	BPAT	7,665	26,080
	CISO	LADWP	100,581	82,523
	CISO	NEVP	133,503	117,165
	CISO	PACW	13,953	58,610
	CISO	PGE	72,421	107,483
	CISO	PWRX	237,544	264,420
	CISO	SRP	158,227	147,167
May	CISO	TEPC	3,052	2,607
	CISO	TIDC	12,205	12,476
	CISO	WALC	58,329	53,761
	EPE	AZPS	888	0
	EPE	PNM	13,857	15,162
	EPE	TEPC	22,045	19,855

	IPCO	AVA	34,930	32,804
May	IPCO	BPAT	2,464	1,944
	IPCO	NEVP	18,711	18,569
	IPCO	NWMT	4,111	6,119
	IPCO	PACE	37,638	30,339
	IPCO	PACW	12,095	11,671
	IPCO	PSEI	22,816	20,158
	IPCO	SCL	154	120
	LADWP	AZPS	3,764	5,693
	LADWP	BPAT	0	0
	LADWP	CISO	25,140	23,428
	LADWP	NEVP	25,558	21,083
	LADWP	PACE	38,203	33,033
	LADWP	TEPC	319	445
	LADWP	WALC	17,554	16,780
	NEVP	AZPS	0	0
	NEVP	BPAT	0	0
	NEVP	CISO	26,289	27,533
	NEVP	IPCO	71,496	59,652
	NEVP	LADWP	24,106	27,936
	NEVP	PACE	157,776	139,891
	NEVP	WALC	31,382	41,949
	NWMT	AVA	15,368	10,203
	NWMT	BPAT	4,869	2,113
	NWMT	IPCO	2,358	2,169
	NWMT	PACE	16,725	12,308
May	NWMT	PACW	0	0
	NWMT	PGE	121	0
	NWMT	PSEI	136	0
	NWMT	TPWR	0	0
	PACE	AZPS	25,618	35,396
	PACE	IPCO	32,111	32,494

	PACE	LADWP	25,779	30,039
	PACE	NEVP	13,121	16,871
May	PACE	NWMT	18,160	20,207
	PACE	PACW	37,135	34,134
	PACE	SRP	0	0
	PACE	TEPC	0	0
	PACW	AVA	20,121	26,275
	PACW	AVRN	10,688	25,641
	PACW	BPAT	9,550	9,928
	PACW	CISO	19,894	42,964
	PACW	IPCO	18,273	16,708
	PACW	NWMT	3	0
	PACW	PGE	56,508	55,338
	PACW	PSEI	50,382	59,939
	PACW	SCL	2,282	2,166
	PGE	AVA	0	0
	PGE	AVRN	1,990	3,847
	PGE	BPAT	55,662	51,102
	PGE	CISO	14,041	13,111
	PGE	NWMT	12	0
	PGE	PACW	16,875	18,750
	PGE	PSEI	1,128	1,335
	PGE	SCL	1,672	1,602
	PGE	TPWR	0	0
May	PNM	AZPS	27,173	20,321
	PNM	EPE	14,487	15,205
	PNM	SRP	390	91
	PNM	TEPC	10,422	10,627
	PSEI	AVA	0	0
	PSEI	BPAT	13,302	8,329
	PSEI	IPCO	54	58
	PSEI	NWMT	135	0

	PSEI	PACW	10,035	12,462
	PSEI	PGE	987	1,037
	PSEI	PWRX	28,465	27,615
	PSEI	SCL	60,963	59,094
	PSEI	TPWR	47,418	50,844
	PWRX	BPAT	3,870	0
	PWRX	CISO	0	0
	PWRX	PSEI	3,014	4,789
	SCL	AVA	5	0
	SCL	AVRN	462	1,071
May	SCL	BPAT	2,434	2,320
	SCL	IPCO	4,073	4,721
	SCL	PACW	41	112
	SCL	PGE	373	464
	SCL	PSEI	613	1,254
	SRP	AZPS	22,013	28,246
	SRP	CISO	131,059	117,523
	SRP	PACE	0	0
	SRP	PNM	504	703
	SRP	TEPC	31,331	26,962
	SRP	WALC	5,553	6,645
	TEPC	AZPS	386	0
May	TEPC	CISO	438	288
	TEPC	EPE	6,077	6,128
	TEPC	LADWP	0	0
	TEPC	PACE	20	0
	TEPC	PNM	13,860	16,013
	TEPC	SRP	6,470	3,642
	TEPC	WALC	77,994	70,731
	TIDC	BANC	32	0
	TIDC	CISO	3,023	2,565
	TPWR	AVA	0	0

May	TPWR	BPAT	8,548	9,365
	TPWR	NWMT	0	0
	TPWR	PGE	0	0
	TPWR	PSEI	6,274	5,691
	WALC	AZPS	3,684	3,978
	WALC	CISO	40,696	35,773
	WALC	LADWP	13,195	11,133
	WALC	NEVP	29,774	31,278
	WALC	SRP	4,338	4,328
	WALC	TEPC	69,447	75,976
June	AVA	AVRN	1,770	2,439
	AVA	BPAT	4,842	4,436
	AVA	CISO	0	0
	AVA	IPCO	22,009	23,384
	AVA	NWMT	9,264	10,454
	AVA	PACW	2,559	3,398
	AVA	PGE	0	0
	AVA	PSEI	37	0
	AVA	SCL	9	0
	AVA	TPWR	0	0
	AVRN	AVA	5,466	4,474
	AVRN	BPAT	42,075	39,290
	AVRN	PACW	45,854	40,349
	AVRN	PGE	11,683	8,786
	AVRN	SCL	5,936	4,785
	AZPS	CISO	75,846	53,950
	AZPS	EPE	526	0
	AZPS	LADWP	11,111	8,209
	AZPS	NEVP	0	
	AZPS	PACE	117,454	108,116
	AZPS	PNM	51,722	67,037
	AZPS	SRP	56,172	54,390

	AZPS	TEPC	2,425	1,254
	AZPS	WALC	19,417	19,596
June	BANC	BPAT	0	0
	BANC	CISO	4,689	3,699
	BANC	TIDC	29	0
	BPAT	AVA	7,973	5,967
	BPAT	AVRN	5,284	4,997
	BPAT	BANC	0	0
	BPAT	CISO	6,589	12,805
	BPAT	IPCO	3,124	2,627
	BPAT	LADWP	0	0
	BPAT	NEVP	0	0
	BPAT	NWMT	7,043	4,379
	BPAT	PACW	1,750	1,326
	BPAT	PGE	12,194	9,863
	BPAT	PSEI	5,078	5,060
	BPAT	PWRX	4,137	0
	BPAT	SCL	7,914	6,121
	BPAT	TPWR	11,237	8,371
	CISO	AVA	0	0
	CISO	AZPS	219,913	217,457
June	CISO	BANC	219,826	231,480
	CISO	BPAT	12,306	25,565
	CISO	LADWP	150,897	132,958
	CISO	NEVP	149,388	144,194
	CISO	PACW	5,691	43,867
	CISO	PGE	83,517	110,799
	CISO	PWRX	229,772	256,325
	CISO	SRP	114,672	120,213
	CISO	TEPC	9,878	9,903
	CISO	TIDC	18,019	18,125
	CISO	WALC	35,087	40,760

	EPE	AZPS	1,307	0
	EPE	PNM	21,377	21,654
June	EPE	TEPC	44,017	38,533
	IPCO	AVA	21,195	19,730
	IPCO	BPAT	2,919	2,624
	IPCO	NEVP	30,370	28,018
	IPCO	NWMT	935	1,558
	IPCO	PACE	36,645	32,582
	IPCO	PACW	23,853	19,292
	IPCO	PSEI	13,075	13,301
	IPCO	SCL	117	118
	LADWP	AZPS	767	1,892
	LADWP	BPAT	0	0
	LADWP	CISO	21,194	16,048
	LADWP	NEVP	41,212	29,065
	LADWP	PACE	39,349	30,028
	LADWP	TEPC	0	0
	LADWP	WALC	10,013	11,589
	NEVP	AZPS	0	0
	NEVP	BPAT	0	0
June	NEVP	CISO	40,327	27,063
	NEVP	IPCO	83,316	69,187
	NEVP	LADWP	32,005	30,778
	NEVP	PACE	184,002	155,696
	NEVP	WALC	14,408	18,500
	NWMT	AVA	20,994	19,398
	NWMT	BPAT	2,887	882
	NWMT	IPCO	5,188	4,666
	NWMT	PACE	19,017	18,913
	NWMT	PACW	0	0
	NWMT	PGE	408	0
	NWMT	PSEI	150	0

	NWMT	TPWR	0	0
	PACE	AZPS	11,788	15,288
June	PACE	IPCO	28,245	26,103
	PACE	LADWP	27,434	26,098
	PACE	NEVP	12,863	12,715
	PACE	NWMT	15,515	17,642
	PACE	PACW	39,679	33,022
	PACE	SRP	0	0
	PACE	TEPC	0	0
	PACW	AVA	9,550	12,627
	PACW	AVRN	16,255	28,653
	PACW	BPAT	7,062	4,071
	PACW	CISO	7,822	37,089
	PACW	IPCO	39,169	39,718
	PACW	NWMT	1	0
	PACW	PGE	45,201	42,702
	PACW	PSEI	59,486	54,553
	PACW	SCL	2,173	1,936
	PGE	AVA	0	0
June	PGE	AVRN	2,927	4,743
	PGE	BPAT	27,976	27,492
	PGE	CISO	11,815	10,928
	PGE	NWMT	273	0
	PGE	PACW	22,930	25,066
	PGE	PSEI	691	609
	PGE	SCL	1,604	1,484
	PGE	TPWR	0	0
	PNM	AZPS	44,045	36,616
	PNM	EPE	9,393	9,900
	PNM	SRP	1,750	1,212
	PNM	TEPC	10,711	7,708
	PSEI	AVA	0	0

	PSEI	BPAT	9,776	5,311
	PSEI	IPCO	346	616
June	PSEI	NWMT	118	0
	PSEI	PACW	7,194	14,159
	PSEI	PGE	97	238
	PSEI	PWRX	29,586	26,527
	PSEI	SCL	71,514	68,625
	PSEI	TPWR	15,144	17,485
	PWRX	BPAT	2,787	0
	PWRX	CISO	0	0
	PWRX	PSEI	2,097	4,258
	SCL	AVA	4	0
	SCL	AVRN	269	807
	SCL	BPAT	2,153	2,766
	SCL	IPCO	0	0
	SCL	PACW	117	297
	SCL	PGE	425	601
	SCL	PSEI	2,285	3,325
June	SRP	AZPS	18,222	19,856
	SRP	CISO	89,676	84,752
	SRP	PACE	0	0
	SRP	PNM	181	254
	SRP	TEPC	25,254	26,540
	SRP	WALC	17,627	20,497
	TEPC	AZPS	1,109	0
	TEPC	CISO	13,759	13,204
	TEPC	EPE	2,046	2,434
	TEPC	LADWP	0	0
	TEPC	PACE	35	21
	TEPC	PNM	11,959	13,525
	TEPC	SRP	20,589	15,667
	TEPC	WALC	108,947	100,655

June	TIDC	BANC	61	0
	TIDC	CISO	5,090	4,402
	TPWR	AVA	0	0
	TPWR	BPAT	5,875	7,440
	TPWR	NWMT	0	0
	TPWR	PGE	0	0
	TPWR	PSEI	9,467	7,037
	WALC	AZPS	4,321	5,260
	WALC	CISO	33,086	26,088
	WALC	LADWP	38,289	38,604
	WALC	NEVP	42,680	43,633
	WALC	SRP	5,326	4,917
	WALC	TEPC	32,149	36,459

APPENDIX 3: Minimum & Maximum Flexible Ramping Requirements

Month	BAA	Direction	Minimum requirement	Maximum requirement
	AVA	up	11	83
April	*AVRN*	up	7	352
	AZPS	up	12	394
	BANC	up	0	145
	BPAT	up	22	445
	CISO	up	42	2,710
	EPE	up	0	93
	IPCO	up	35	223
	LADWP	up	0	342
	NEVP	up	0	620
	NWMT	up	18	112
	PACE	up	0	587
	PACW	up	0	158
	PGE	up	0	102
	PNM	up	5	291
	PSEI	up	15	220
	PWRX	up	35	272
	SCL	up	0	42
	SRP	up	0	269
	TEPC	up	28	177
	TIDC	up	0	22
	TPWR	up	3	21
	WALC	up	0	50
	ALL EIM	**up**	**161**	**3,814**
	AVA	down	0	102
	AVRN	down	0	461
	AZPS	down	0	462
	BANC	down	0	93
April	*BPAT*	down	0	473
	CISO	down	0	2,047
	EPE	down	0	92
	IPCO	down	0	290

	LADWP	down	0	336
April	*NEVP*	down	0	530
	NWMT	down	0	118
	PACE	down	0	687
	PACW	down	0	216
	PGE	down	7	246
	PNM	down	0	251
	PSEI	down	0	191
	PWRX	down	25	239
	SCL	down	0	37
	SRP	down	0	288
	TEPC	down	0	146
	TIDC	down	0	17
	TPWR	down	1	22
	WALC	down	0	62
	ALL EIM	**down**	**0**	**3,117**
May	*AVA*	up	12	83
	AVRN	up	0	361
	AZPS	up	32	426
	BANC	up	0	145
	BPAT	up	35	367
	CISO	up	342	2,749
	EPE	up	0	92
	IPCO	up	0	223
	LADWP	up	26	345
	NEVP	up	0	623
	NWMT	up	13	117
	PACE	up	0	574
	PACW	up	7	159
	PGE	up	29	226
	PNM	up	34	302
	PSEI	up	22	232
	PWRX	up	0	260
	SCL	up	5	42
	SRP	up	1	269
	TEPC	up	0	177

	TIDC	up	0	20
	TPWR	up	0	20
May	*WALC*	up	0	49
	ALL WEIM	**up**	**0**	**3,684**
	AVA	down	9	104
	AVRN	down	0	383
	AZPS	down	0	521
	BANC	down	0	120
	BPAT	down	0	435
	CISO	down	0	1,657
	EPE	down	0	92
	IPCO	down	0	290
	LADWP	down	0	306
	NEVP	down	0	566
	NWMT	down	0	118
	PACE	down	0	724
	PACW	down	0	191
	PGE	down	0	235
	PNM	down	17	151
	PSEI	down	0	215
	PWRX	down	0	243
	SCL	down	1	40
	SRP	down	12	213
	TEPC	down	0	149
	TIDC	down	0	17
	TPWR	down	0	22
	WALC	down	0	61
	ALL EIM	**down**	**0**	**2,830**
June	*AVA*	up	11	83
	AVRN	up	9	395
	AZPS	up	0	426
	BANC	up	0	139
	BPAT	up	27	367
	CISO	up	0	2,513
	EPE	up	0	96

June	*IPCO*	up	23	223
	LADWP	up	0	314
	NEVP	up	0	620
	NWMT	up	20	17
	PACE	up	0	574
	PACW	up	0	158
	PGE	up	24	210
	PNM	up	19	305
	PSEI	up	9	232
	PWRX	up	35	240
	SCL	up	6	39
	SRP	up	0	269
	TEPC	up	0	187
	TIDC	up	0	16
	TPWR	up	1	21
	WALC	up	0	53
	ALL WEIM	**up**	**0**	**3,238**
	AVA	down	16	117
	AVRN	down	0	383
	AZPS	down	0	521
	BANC	down	0	126
	BPAT	down	32	436
	CISO	down	0	1,629
	EPE	down	0	92
	IPCO	down	0	296
	LADWP	down	0	354
	NEVP	down	0	511
	NWMT	down	0	118
	PACE	down	0	732
June	*PACW*	down	15	191
	PGE	down	36	218
	PNM	down	50	251
	PSEI	down	0	215
	PWRX	down	19	233
	SCL	down	0	33
	SRP	down	4	214

	TEPC	down	0	149
	TIDC	down	0	19
	TPWR	down	0	20
	WALC	down	0	49
	ALL WEIM	**down**	**0**	**2,666**