WESTERN EIM BENEFITS REPORT

Third Quarter 2020

Prepared by: Market Analysis and Forecasting

October 29, 2020

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EXECUTIVE SUMMARY

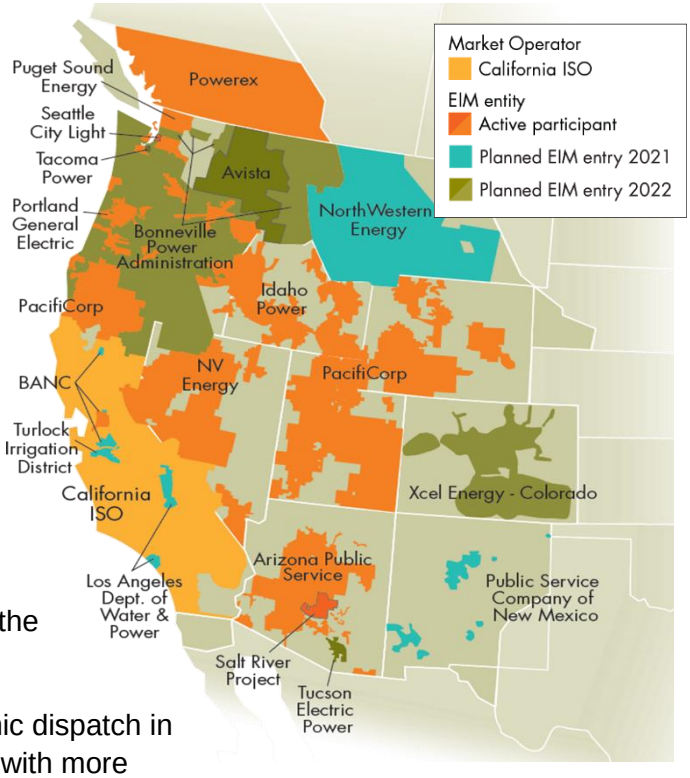
Gross benefits from EIM since November 2014

$1.11 billion

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

The measured benefits of participation in the Western EIM 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 EIM footprint with more diverse resources and geography.



Q3 2020 Gross Benefits by Participant

	(millions $)
Arizona Public Service	$22.60
BANC	$8.70
California ISO	$23.68
Idaho Power	$8.51
NV Energy	$8.81
PacifiCorp	$13.47
Portland General Electric	$8.95
Puget Sound Energy	$3.44
Powerex	$0.88
Seattle City Light	$2.87
Salt River Project	$17.41
Total	$119.32

2020 Q3 BENEFITS

ECONOMICAL

$119.32M

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

ENVIRONMENTAL

16,071

Metric tons of CO_2** avoided curtailments

OPERATIONAL

50%

Average reduction in flexibility reserves across the footprint

*EIM Quarterly Benefit Report Methodology, https://www.caiso.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 EIM versus dispatch that would have occurred external to the ISO without the EIM. 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). NV Energy began participating in December 2015, Arizona Public Service and Puget Sound Energy began participating in October 2016, and Portland General Electric began participating in October 2017. Idaho Power and Powerex began participating in April 2018, and the Balancing Authority of Northern California (BANC)[1] began participating in April 2019. Most recently, Seattle City Light (SCL) and Salt River Project (SRP) began participating in April 2020. The EIM footprint now includes portions of Arizona, California, Idaho, Nevada, Oregon, Utah, Washington, Wyoming, and extends to the border with Canada.

The ISO began publishing quarterly EIM benefit reports in April 2015[2].

WESTERN EIM ECONOMIC BENEFITS IN Q3 2020

Table 1 shows the estimated EIM gross benefits by each region per month[3]. The monthly savings presented show $25.00 million for July, $66.09 million for August, and $28.23 million for September with a total estimated benefit of $119.32 million for the quarter. This quarter observed high load conditions which drove tighter supply conditions and high prices. This was mainly observed in August due to the extreme heatwave that impacted the West.

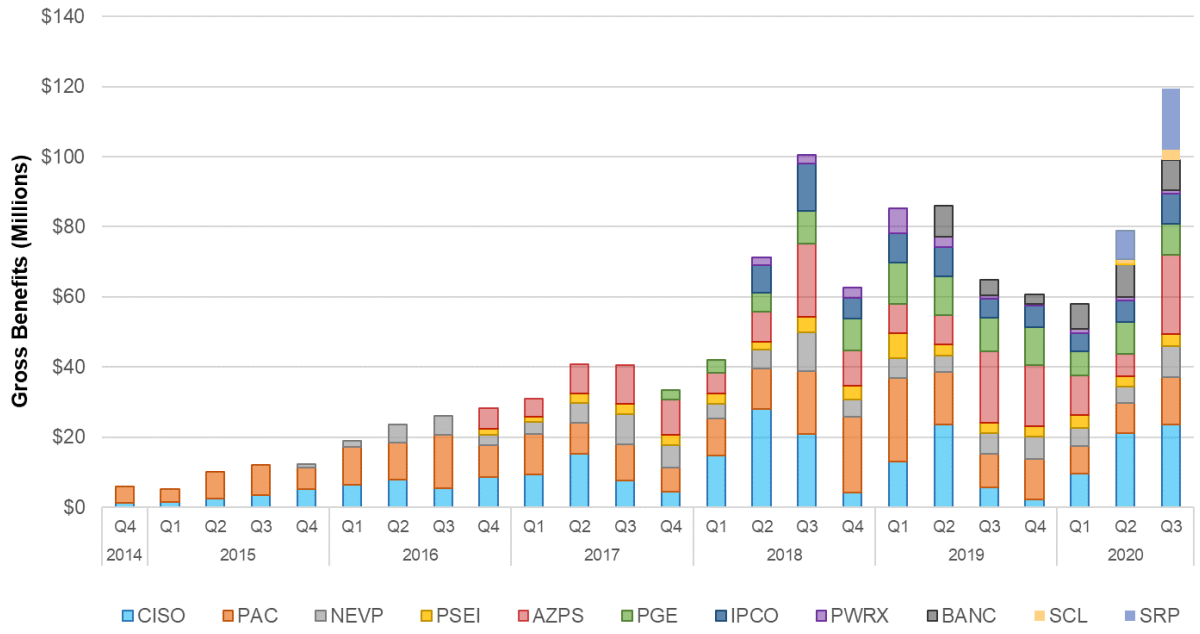
Region	July	August	September	Total
APS	$4.30	$12.85	$5.45	$22.60
BANC	$1.75	$4.92	$2.03	$8.70
CISO	$3.77	$17.88	$2.03	$23.68
IPCO	$2.05	$4.13	$2.33	$8.51
NVE	$1.89	$4.18	$2.74	$8.81
PAC	$2.43	$6.65	$4.39	$13.47
PGE	$2.64	$4.00	$2.31	$8.95
PSE	$0.99	$1.28	$1.17	$3.44
PWRX	$0.39	$0.29	$0.20	$0.88
SCL	$1.10	$1.13	$0.64	$2.87
SRP	$3.69	$8.78	$4.94	$17.41
Total	$25.00	$66.09	$28.23	$119.32

TABLE 1: Third Quarter 2020 benefits in millions USD

[1] The benefits reflect the Sacramento Municipal Utility District as the participating resource within BANC.
[2] Prior reports are available at https://www.westerneim.com/Pages/About/QuarterlyBenefits.aspx
[3] The EIM 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 of the total intervals.

CUMULATIVE EIM BENEFITS SINCE INCEPTION

Since the start of the EIM in November 2014, the cumulative economic benefits have totaled $1.11 billion. The quarterly benefits have grown over time as a result of the participation of new Balancing Authority Areas in the market, which results in additional benefits for both the individual BAAs but also compounds the benefits to adjacent BAAs by enabling further transfers. Graph 1 illustrates the gross economic benefits of the EIM by quarter for each participating BAA.



GRAPH 1: Gross economic benefits for each quarter by BAA

INTER-REGIONAL TRANSFERS

A significant contributor to EIM 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 EIM. 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 EIM, 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 EIM.

Table 2 provides the 15-minute and 5-minute EIM transfer volumes with base schedule transfers excluded. The EIM 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

EIM. The benefits do not include any transfers attributed to transfers submitted in the base schedules that are scheduled prior to the start of the EIM.

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 EIM. The 5-minute transfer volume is the result of optimization using all bids and base schedules submitted into EIM, based on unit commitments determined in the 15-minute market optimization. The maximum transfer capacities between EIM entities are shown in Graph 2 below.

Month	From BAA	To BAA	15min EIM transfer (15m - base)	5min EIM transfer (5m - base)
	AZPS	CISO	88,736	55,882
	AZPS	NEVP	10,534	13,042
	AZPS	PACE	89,588	102,754
	AZPS	SRP	36,722	31,167
	BANC	CISO	10,468	8,608
	CISO	AZPS	48,897	64,527
	CISO	BANC	124,023	134,437
	CISO	NEVP	83,989	91,413
	CISO	PACW	0	10,107
	CISO	PGE	2,092	11,058
	CISO	PWRX	6,239	8,156
	CISO	SRP	142,589	151,499
	IPCO	NEVP	20,287	14,472
	IPCO	PACE	54,808	57,336
	IPCO	PACW	42,221	38,946
	IPCO	PSEI	734	700
	IPCO	SCL	3,785	3,300
July	NEVP	AZPS	5,920	5,819
	NEVP	CISO	93,521	61,928
	NEVP	IPCO	33,034	32,428
	NEVP	PACE	93,845	105,550
	PACE	AZPS	49,359	32,089
	PACE	IPCO	7,173	5,512

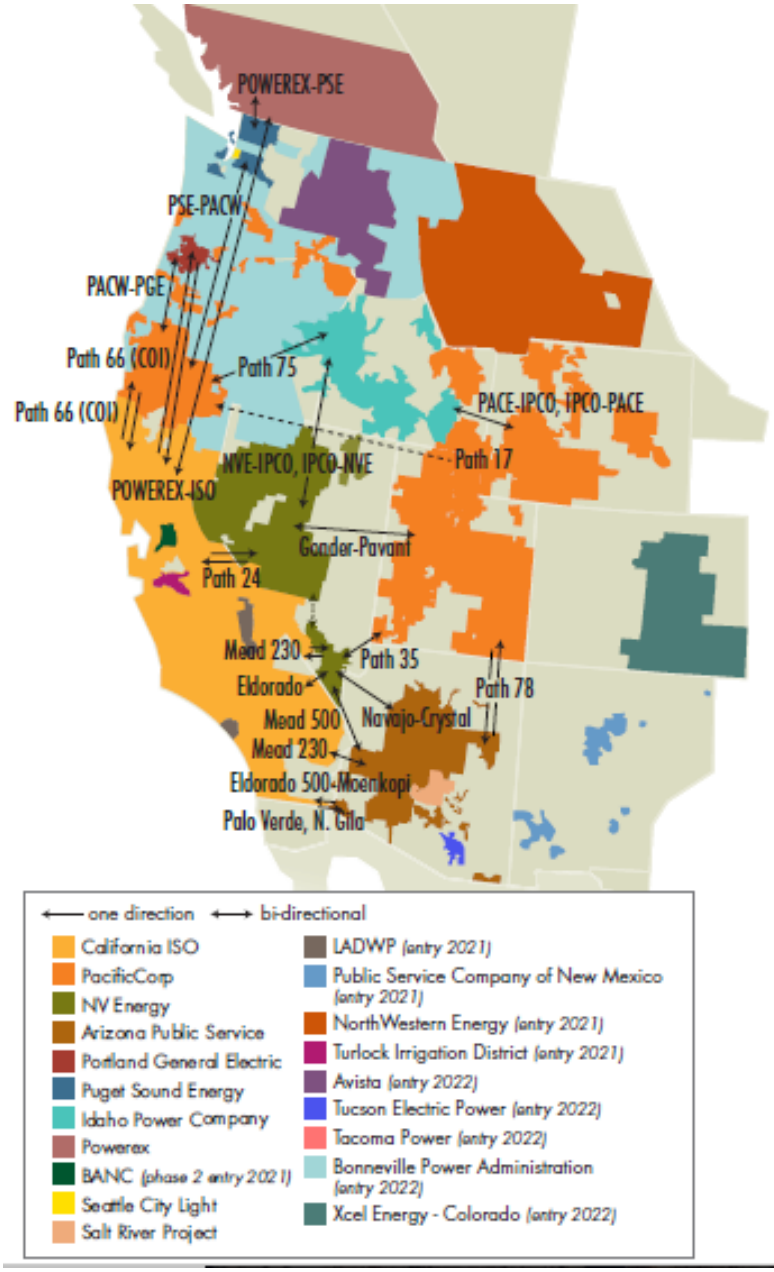
	PACE	NEVP	33,950	16,802
	PACE	PACW	21,829	19,920
	PACE	SRP	0	0
	PACW	CISO	66,562	83,959
	PACW	IPCO	14,115	12,913
	PACW	PGE	16,374	14,739
	PACW	PSEI	8,805	7,237
	PACW	SCL	808	637
	PGE	CISO	8,499	8,353
	PGE	PACW	105,950	108,798
	PGE	PSEI	0	0
	PGE	SCL	6,202	5,254
	PSEI	IPCO	0	0
	PSEI	PACW	101,045	109,131
	PSEI	PGE	0	0
	PSEI	PWRX	4,286	5,820
	PSEI	SCL	11,200	10,894
	PWRX	CISO	0	0
	PWRX	PSEI	36,976	39,443
	SCL	IPCO	11,981	12,116
	SCL	PACW	7,044	8,806
	SCL	PGE	5,108	5,638
	SCL	PSEI	18,097	20,755
	SRP	AZPS	47,893	57,796
	SRP	CISO	123,961	110,191
	SRP	PACE	0	0
	AZPS	CISO	202,206	139,421
	AZPS	NEVP	15,477	20,981
	AZPS	PACE	32,144	40,613
	AZPS	SRP	21,425	17,256
	BANC	CISO	28,111	21,080
	CISO	AZPS	27,538	42,128
	CISO	BANC	117,770	138,589
	CISO	NEVP	62,994	79,345

	CISO	PACW	0	3,931
	CISO	PGE	2,566	7,688
	CISO	PWRX	8,464	13,932
	CISO	SRP	71,449	71,696
August	IPCO	NEVP	50,086	38,062
	IPCO	PACE	29,909	24,036
	IPCO	PACW	37,098	41,475
	IPCO	PSEI	6,408	6,017
	IPCO	SCL	4,377	4,565
	NEVP	AZPS	7,901	8,028
	NEVP	CISO	132,173	88,218
	NEVP	IPCO	25,853	31,123
	NEVP	PACE	31,088	37,571
	PACE	AZPS	109,751	90,050
	PACE	IPCO	23,004	23,881
	PACE	NEVP	105,347	79,528
	PACE	PACW	37,945	44,810
	PACE	SRP	0	0
	PACW	CISO	51,123	91,404
	PACW	IPCO	17,668	12,129
	PACW	PGE	27,685	27,960
	PACW	PSEI	23,372	16,914
	PACW	SCL	2,355	1,587
	PGE	CISO	8,526	8,306
	PGE	PACW	96,754	94,806
	PGE	PSEI	0	0
	PGE	SCL	7,141	5,627
	PSEI	IPCO	0	0
	PSEI	PACW	58,072	77,375
	PSEI	PGE	0	0
	PSEI	PWRX	10,148	11,175
	PSEI	SCL	11,909	11,699
	PWRX	CISO	0	0
	PWRX	PSEI	23,698	32,297

	SCL	IPCO	11,207	9,556
	SCL	PACW	4,474	6,517
	SCL	PGE	3,756	4,996
	SCL	PSEI	10,996	12,630
	SRP	AZPS	38,101	48,602
	SRP	CISO	207,614	201,693
	SRP	PACE	0	0
September	AZPS	CISO	187,364	150,732
	AZPS	NEVP	12,241	12,610
	AZPS	PACE	24,892	25,859
	AZPS	SRP	55,858	46,699
	BANC	CISO	11,064	9,838
	CISO	AZPS	15,171	19,608
	CISO	BANC	133,480	149,762
	CISO	NEVP	26,659	31,590
	CISO	PACW	0	15,682
	CISO	PGE	6,137	24,735
	CISO	PWRX	25,060	38,360
	CISO	SRP	57,527	62,679
	IPCO	NEVP	43,568	28,414
	IPCO	PACE	12,726	8,553
	IPCO	PACW	111,536	113,293
	IPCO	PSEI	0	0
	IPCO	SCL	9,538	9,670
	NEVP	AZPS	7,230	8,705
	NEVP	CISO	157,721	114,637
	NEVP	IPCO	22,049	19,945
	NEVP	PACE	3,280	5,330
	PACE	AZPS	107,020	95,316
	PACE	IPCO	83,616	81,282
	PACE	NEVP	87,762	69,056
	PACE	PACW	20,589	23,818
	PACE	SRP	0	0
	PACW	CISO	21,595	57,409

	PACW	IPCO	20,181	10,333
	PACW	PGE	43,428	40,417
	PACW	PSEI	61,539	52,184
	PACW	SCL	2,087	1,516
	PGE	CISO	11,655	11,092
	PGE	PACW	33,289	35,691
	PGE	PSEI	0	0
	PGE	SCL	2,442	2,102
	PSEI	IPCO	0	0
	PSEI	PACW	20,909	29,667
	PSEI	PGE	0	0
	PSEI	PWRX	25,100	25,029
	PSEI	SCL	18,422	17,116
	PWRX	CISO	0	0
	PWRX	PSEI	22,480	28,373
	SCL	IPCO	5,040	3,312
	SCL	PACW	1,507	2,402
	SCL	PGE	5,134	5,665
	SCL	PSEI	9,481	10,294
	SRP	AZPS	37,352	40,059
	SRP	CISO	183,759	190,798
	SRP	PACE	0	0

TABLE 2: Energy transfers (MWh) in the FMM and RTD markets for Q3 2020



Path	Estimated Max Capacity (MW)
Path 24 *(west to east)*	100
Path 24 *(east to west)*	35-90
Eldorado	797
Path 35 *(west to east)*	580
Path 35 *(east to west)*	538
Gonder-Pavant	130
PACW to PGE	320
Path 66 *(ISO to PGE)*	627
Path 66 *(PGE to ISO)*	296
Path 66 *(ISO to PACW)*	331
Path 66 *(PACW to ISO)*	432
Path 17	0-400[1] [2]
PSE to PACW	300
Eldorado 500-Moenkopi	732
Palo Verde, N. Gila	3,151
Path 78 *(PACE to APS)*	625
Path 78 *(APS to PACE)*	660
Navajo-Crystal	522
Mead 500	349
Mead 230 *(APS <–> ISO)*	236
Mead 230 *(ISO to NVE)*	3,443
Mead 230 *(NVE to ISO)*	3,476
IPCO to PACW (Path 75)	1,500
PACW to IPCO (Path 75)	400-510
PACE to IPCO	2,557
IPCO to PACE	1,550
NVE to IPCO	262
IPCO to NVE	390-478
Powerex <–> PSE	150
Powerex <–> ISO	150

[1] *Is an optional path available for PACE-PACW EIM transfers and the capacity is a subset of PACE-IPCO/IPCO-PACE and Path 75 capacity.*

[2] *When in use, the available capacity on PACE-IPCO/IPCO-PACE and Path 75 will be subsequently reduced by the used amount on Path 17, and not double counted.*

Current as of July 2020

GRAPH 2: Estimated maximum transfer capacity (EIM entities operating in Q3 2020)

WHEEL THROUGH TRANSFERS

As the footprint of the Western EIM grows and continues to change, wheel-through transfers may become more common. Currently, an EIM 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 Western EIM Consolidated Initiatives stakeholder process, the ISO committed to monitoring the wheel through volumes to assess whether, after the addition of new EIM 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 EIM market in the quarterly reports. In order to derive the wheel-through transfers for each EIM BAA, the ISO uses the following calculation for every real-time interval dispatch:

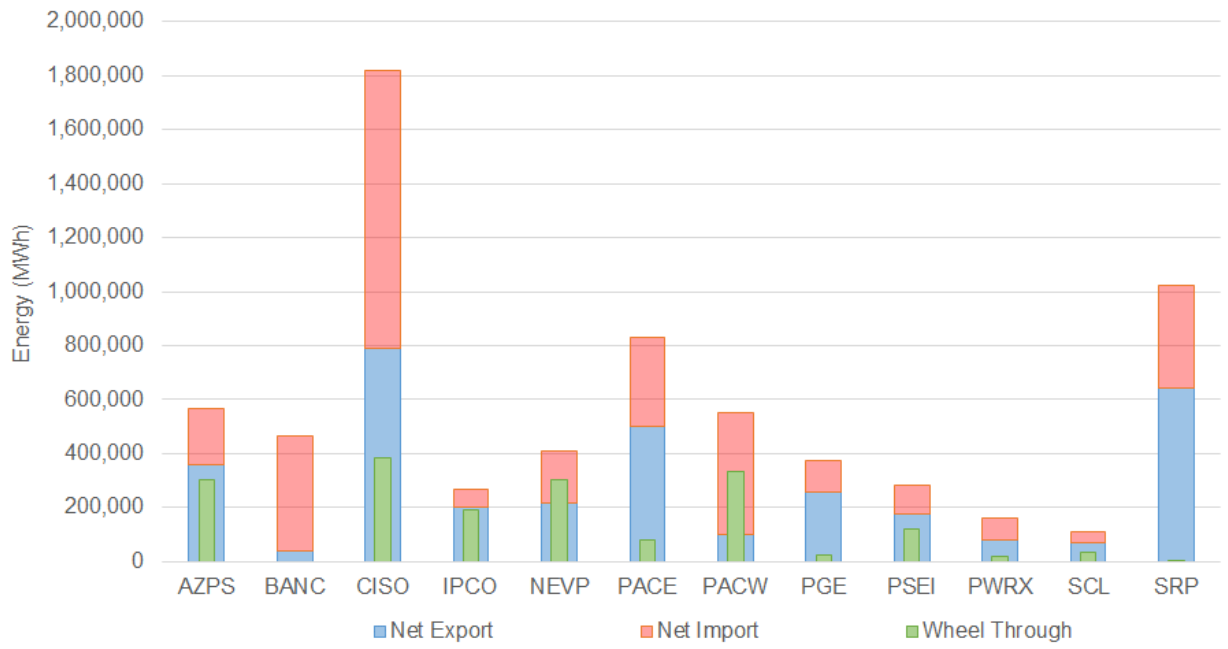
- *Total import*: summation of transfers above base transfers coming into the EIM BAA under analysis
- *Total export*: summation of all transfers above base transfers going out of the EIM BAA under analysis
- *Net import*: the maximum of zero or the difference between total imports and total exports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

All wheel-through transfers are summed over both the month and the quarter. This volume reflects the total wheel-through transfers for each EIM 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 EIM 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
AZPS	356,611	211,311	302,356
BANC	39,613	424,214	-
CISO	788,893	1,031,726	385,007
IPCO	200,185	65,625	189,458
NEVP	216,782	192,722	303,317
PACE	502,178	326,732	81,218
PACW	100,031	454,105	332,622
PGE	255,860	118,690	24,695
PSEI	176,025	104,985	122,486
PWRX	79,328	81,773	20,999
SCL	69,817	40,979	33,130
SRP	644,115	376,576	5,696

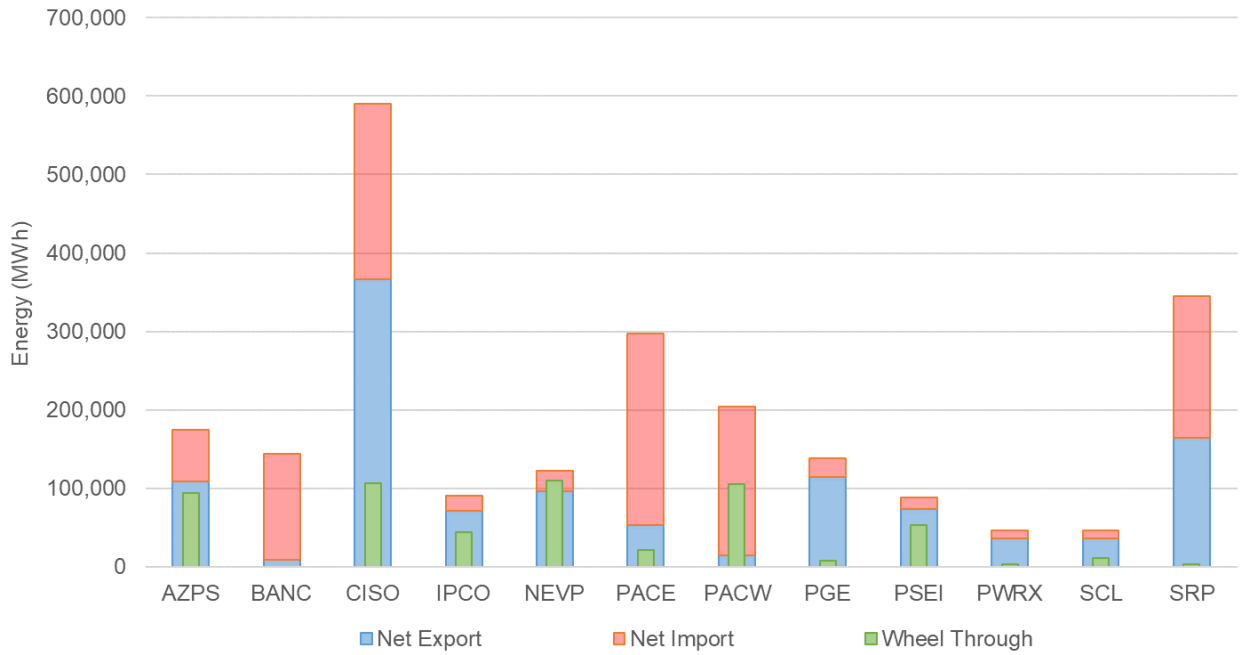
TABLE 3: Estimated wheel-through transfers in Q3 2020



GRAPH 3: Estimated wheel-through transfers in Q3 2020

BAA	Net Export	Net Import	Wheel-Through
AZPS	108,704	66,240	94,490
BANC	8,608	134,944	-
CISO	366,663	223,101	106,216
IPCO	70,971	19,133	43,948
NEVP	96,378	26,226	109,733
PACE	52,632	244,141	21,821
PACW	14,141	190,519	105,661
PGE	114,617	23,455	8,006
PSEI	73,059	15,257	53,050
PWRX	35,876	10,350	3,627
SCL	36,555	9,249	10,886
SRP	164,470	180,059	3,580

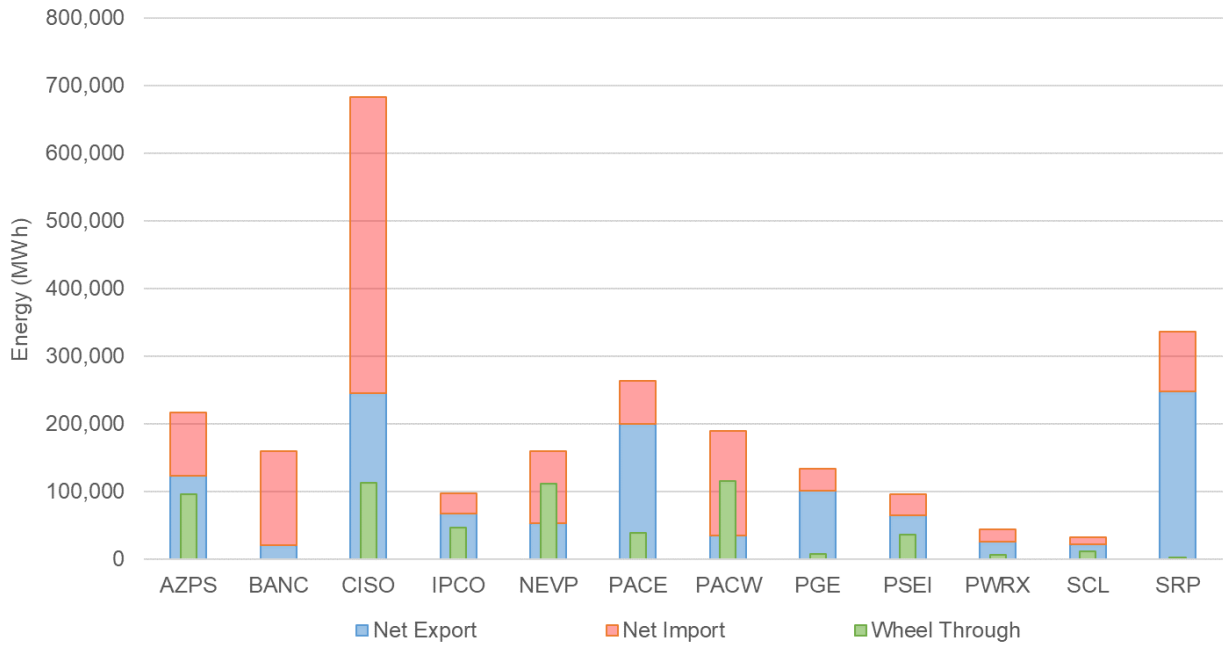
TABLE 4: Estimated wheel-through transfers in July 2020



GRAPH 4: Estimated wheel-through transfers in July 2020

BAA	Net Export	Net Import	Wheel- Through
AZPS	123,156	93,296	95,593
BANC	21,162	138,862	-
CISO	245,005	438,302	112,587
IPCO	67,155	29,752	47,039
NEVP	53,300	106,214	111,763
PACE	199,945	63,736	38,508
PACW	35,032	153,885	115,205
PGE	101,040	32,990	7,778
PSEI	64,327	31,938	35,983
PWRX	26,002	18,752	6,356
SCL	21,598	11,378	12,126
SRP	248,452	87,070	1,997

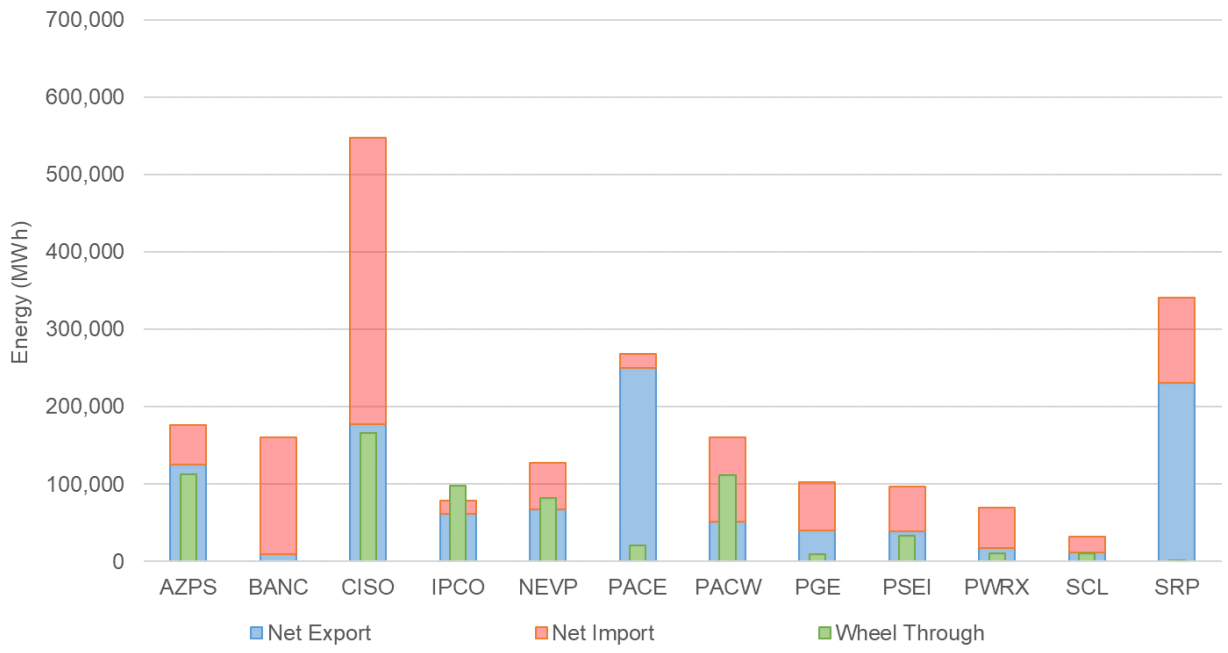
TABLE 5: Estimated wheel-through transfers in August 2020



GRAPH 5: Estimated wheel-through transfers in August 2020

BAA	Net Export	Net Import	Wheel Through
AZPS	124,751	51,775	112,273
BANC	9,843	150,408	-
CISO	177,225	370,323	166,205
IPCO	62,059	16,739	98,471
NEVP	67,104	60,282	81,821
PACE	249,600	18,854	20,889
PACW	50,858	109,701	111,756
PGE	40,203	62,245	8,910
PSEI	38,639	57,790	33,453
PWRX	17,449	52,672	11,016
SCL	11,664	20,352	10,118
SRP	231,193	109,448	119

TABLE 6: Estimated wheel-through transfers in September 2020



GRAPH 6: Estimated wheel-through transfers in September 2020

REDUCED RENEWABLE CURTAILMENT AND GHG REDUCTIONS

The Western EIM 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 EIM, 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 2020 was calculated to be 16,014 MWh (July) + 11,158 MWh (August) + 10,376 MWh (September) = 37,548 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 16,071 metric tons of CO_2 for Q3 2020. 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 along with the associated reductions in CO_2 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
	Total	1,283,952	549,452

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

FLEXIBLE RAMPING PROCUREMENT DIVERSITY SAVINGS

The Western EIM 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 EIM 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 Table 8.

Month	**BAA**	**Direction**	**Minimum requirement**	**Maximum requirement**
July	*AZPS*	up	14	308
	BANC	up	5	71
	CISO	up	442	1686
	IPCO	up	40	217
	NEVP	up	35	236
	PACE	up	68	318
	PACW	up	38	171
	PGE	up	57	215
	PSEI	up	30	157
	PWRX	up	45	199
	SCL	up	3	26
	SRP	up	28	151
	ALL EIM	**up**	**459**	**1,904**
	AZPS	down	24	272
	BANC	down	0	74
	CISO	down	36	1,177
	IPCO	down	65	224
	NEVP	down	19	233
	PACE	down	79	345
	PACW	down	6	148

	PGE	down	34	277
	PSEI	down	37	244
	PWRX	down	62	297
	SCL	down	4	63
	SRP	down	26	132
	ALL EIM	**down**	**0**	**1,439**
	AZPS	up	21	270
	BANC	up	7	80
	CISO	up	420	1,776
	IPCO	up	35	217
	NEVP	up	25	298
	PACE	up	89	318
	PACW	up	23	171
	PGE	up	34	215
	PSEI	up	30	157
	PWRX	up	54	216
	SCL	up	3	40
	SRP	up	45	151
August	**ALL EIM**	**up**	**480**	**2,080**
	AZPS	down	34	272
	BANC	down	0	98
	CISO	down	36	1,121
	IPCO	down	34	224
	NEVP	down	35	214
	PACE	down	77	345
	PACW	down	3	148
	PGE	down	36	248
	PSEI	down	37	244
	PWRX	down	64	209
	SCL	down	5	63
	SRP	down	44	132
	ALL EIM	**down**	**0**	**1,354**
	AZPS	up	24	285
	BANC	up	9	80
	CISO	up	393	1,776
	IPCO	up	31	170

	NEVP	up	23	298
	PACE	up	64	318
	PACW	up	25	171
	PGE	up	56	215
	PSEI	up	34	156
	PWRX	up	74	224
	SCL	up	2	40
	SRP	up	48	151
September	**ALL EIM**	**up**	**491**	**2,080**
	AZPS	down	34	272
	BANC	down	6	224
	CISO	down	70	1,288
	IPCO	down	20	224
	NEVP	down	34	214
	PACE	down	81	345
	PACW	down	20	148
	PGE	down	27	213
	PSEI	down	29	232
	PWRX	down	69	232
	SCL	down	3	63
	SRP	down	34	132
	ALL EIM	**down**	**40**	**1,731**

Table 8: Flexible ramping requirements

The flexible ramping procurement diversity savings for all the intervals averaged over the month are shown in Table 9. The percentage savings is the average MW savings divided by the sum of the four individual BAA requirements.

	July		**August**		**September**	
Direction	Up	Down	Up	Down	Up	Down
Average MW saving	925	969	906	956	924	957
Sum of BAA requirements	2,057	1,757	2,041	1,698	2,246	1,702
Percentage savings	45%	55%	44%	56%	41%	56%

Table 9: Flexible ramping procurement diversity savings in Q3 2020

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 EIM-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 EIM 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 EIM 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 Western EIM demonstrates that utilities can realize financial and operational benefits and reduce carbon emissions through increased coordination and optimization. Since its inception in November 2014, the cumulative gross economic benefits have reached $1.11 billion.

The Western EIM 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 549,452 metric tons of CO2, roughly the equivalent of avoiding the emissions from 115,520 passenger cars driven for one year.