



Western energy imbalance market update

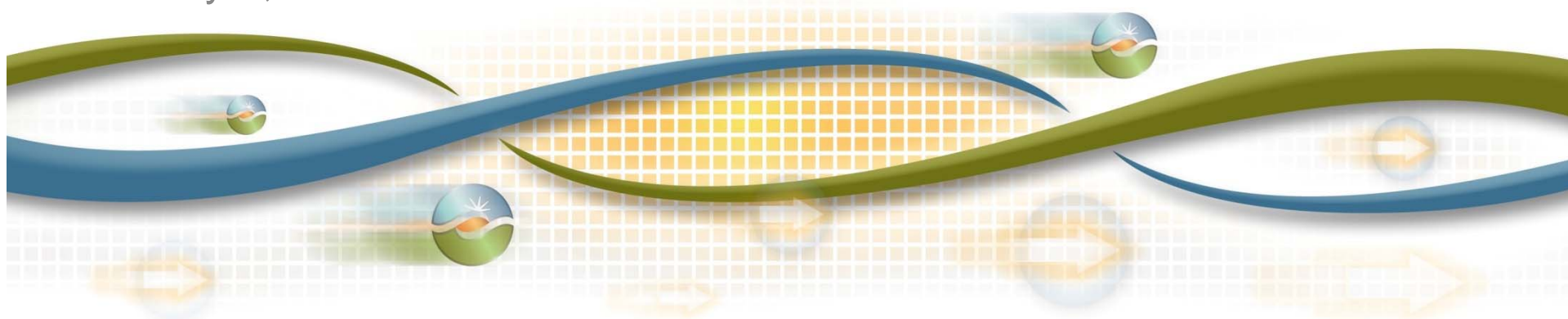
Mark Rothleder

Vice President, Market Quality & Renewable Integration

Board of Governors Meeting

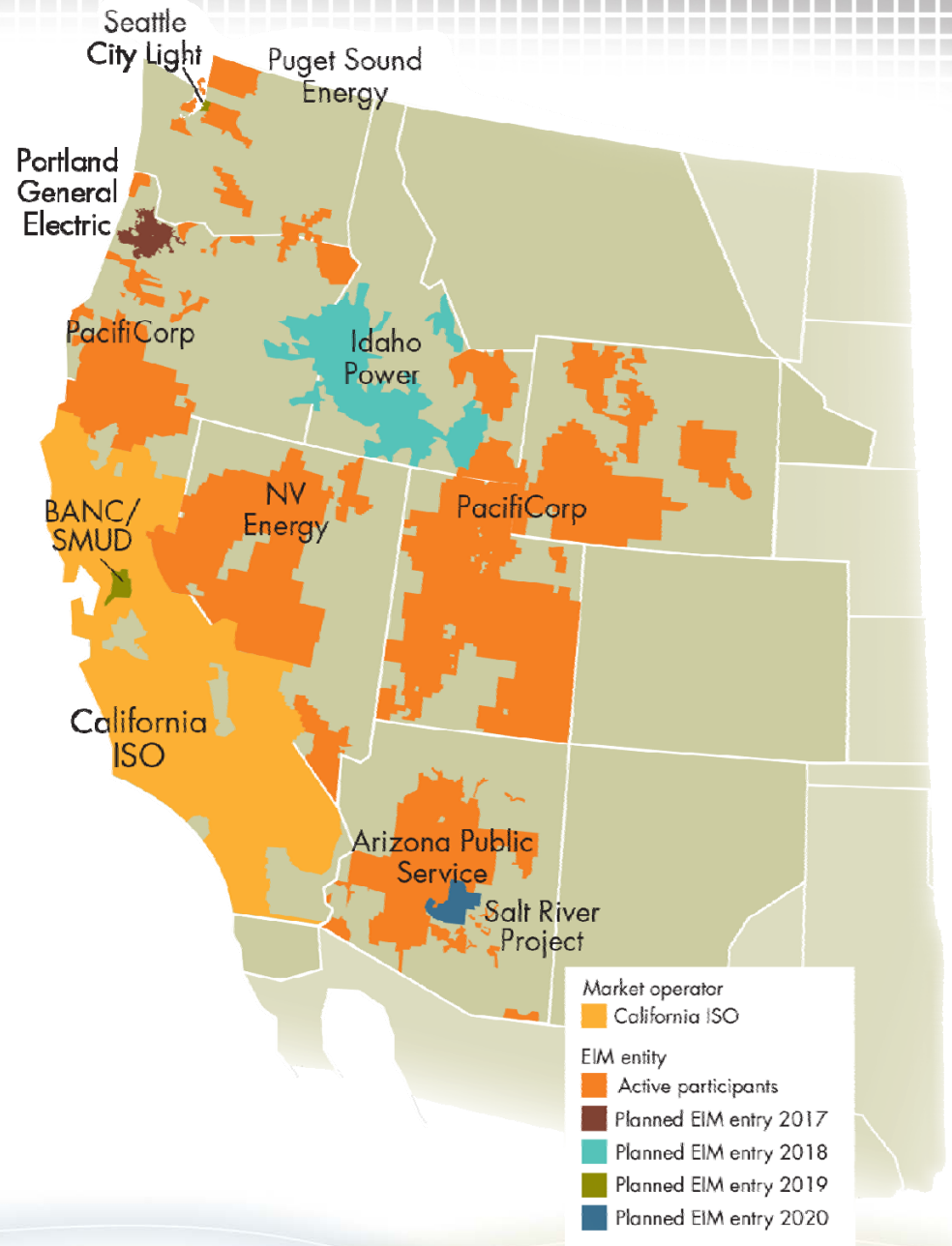
General Session

May 1, 2017



Implementation update

- Entities now in the implementation phase
 - ~ Portland General – Fall 2017
 - ~ Idaho Power – Spring 2018
 - ~ BANC/SMUD & Seattle City Light – Spring 2019
 - ~ Salt River Project – Spring 2020
- Entities exploring future entry
 - ~ CENACE, Baja California, Mexico
 - ~ Los Angeles Department of Water & Power (LADWP)
 - ~ Northwestern Energy

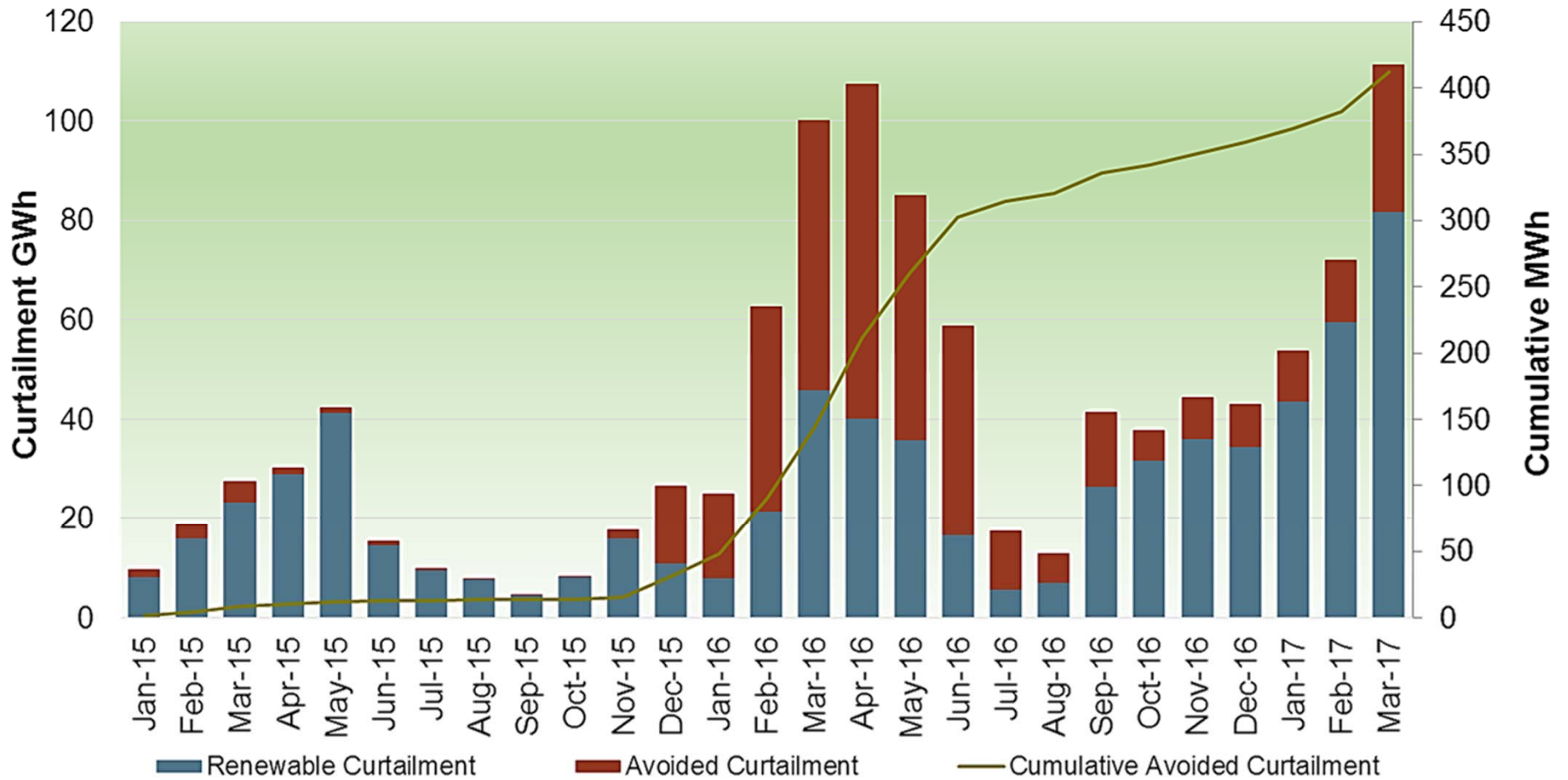


Gross economic benefits since start of EIM = \$173.72M

BAA	4 th Qtr 2014	1 st Qtr 2015	2 nd Qtr 2015	3 rd Qtr 2015	4 th Qtr 2015	1 st Qtr 2016	2 nd Qtr 2016	3 rd Qtr 2016	4 th Qtr 2016	1 st Qtr 2017	Total
APS									5.98	5.23	11.21
CAISO	1.23	1.44	2.46	3.48	5.28	6.35	7.89	5.44	8.67	9.50	51.74
NVE	-	-	-	-	0.84	1.70	5.20	5.60	3.07	3.50	19.91
PAC	4.73	3.82	7.72	8.52	6.17	10.85	10.51	15.12	8.99	11.47	87.90
PSE									1.56	1.40	2.96
Total	5.96	5.26	10.18	12.00	12.29	18.90	23.60	26.16	28.27	31.10	173.72

BAA	January	February	March	Q1 – 2017 Total
APS	1.71	1.71	1.81	5.23
CAISO	2.15	3.17	4.18	9.5
NVE	1.07	1.31	1.12	3.5
PAC	2.74	3.84	4.89	11.47
PSE	0.41	0.41	0.58	1.4
Total	8.08	10.44	12.58	31.1

Energy imbalance market helps avoid curtailment



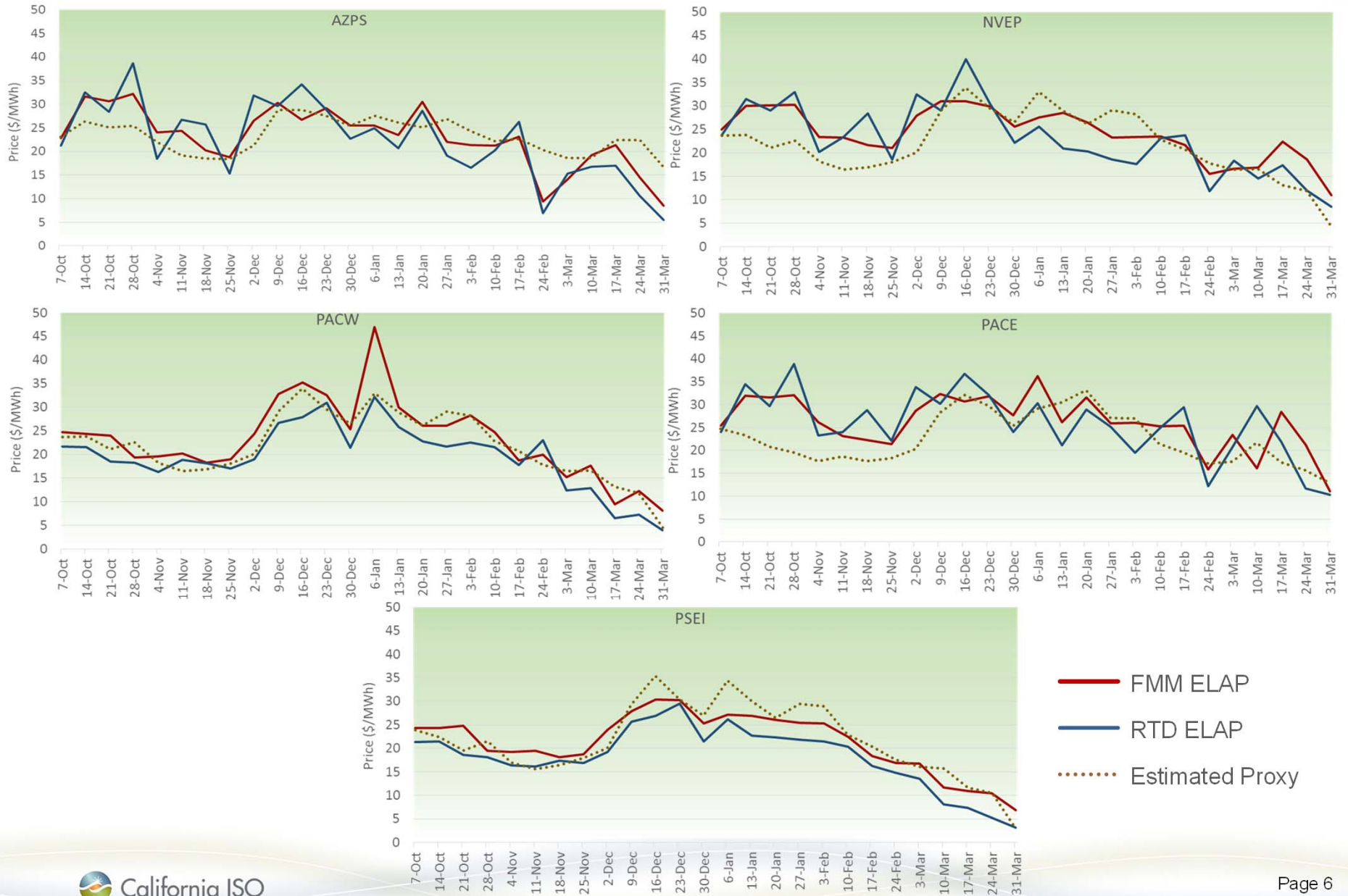
Year-to-date estimated metric tons of CO2 displaced = 176,241

Flexible ramping procurement diversity savings for 1st quarter, 2017

	January		February		March	
Direction	Up	Down	Up	Down	Up	Down
Average MW saving	377	474	379	486	399	488
Sum of BAA requirements	1,205	1,165	1,191	1,192	1,181	1,245
Diversity Benefit	31%	41%	32%	41%	34%	39%

The percentage of savings is the average MW savings divided by the sum of the four individual BAA requirements.

Daily average prices in EIM areas



* Prices still under price validation and subject to change.

Energy transfer capability in 1st Quarter, 2017

