

WESTERN ENERGY IMBALANCE MARKET

Western Energy Imbalance Market – Current Status; Future Direction

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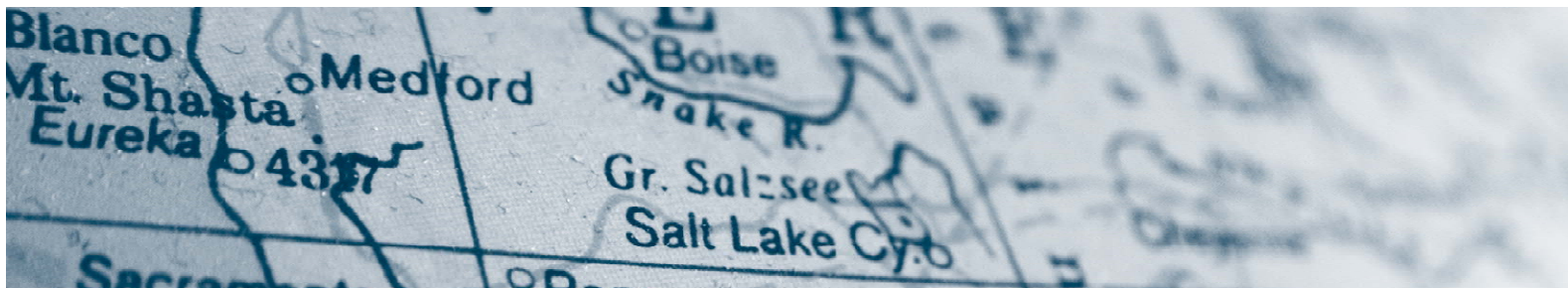
Chair, EIM Governing Body

Annual Seminar

Power Association of Northern California

May 8, 2019

ISO Public

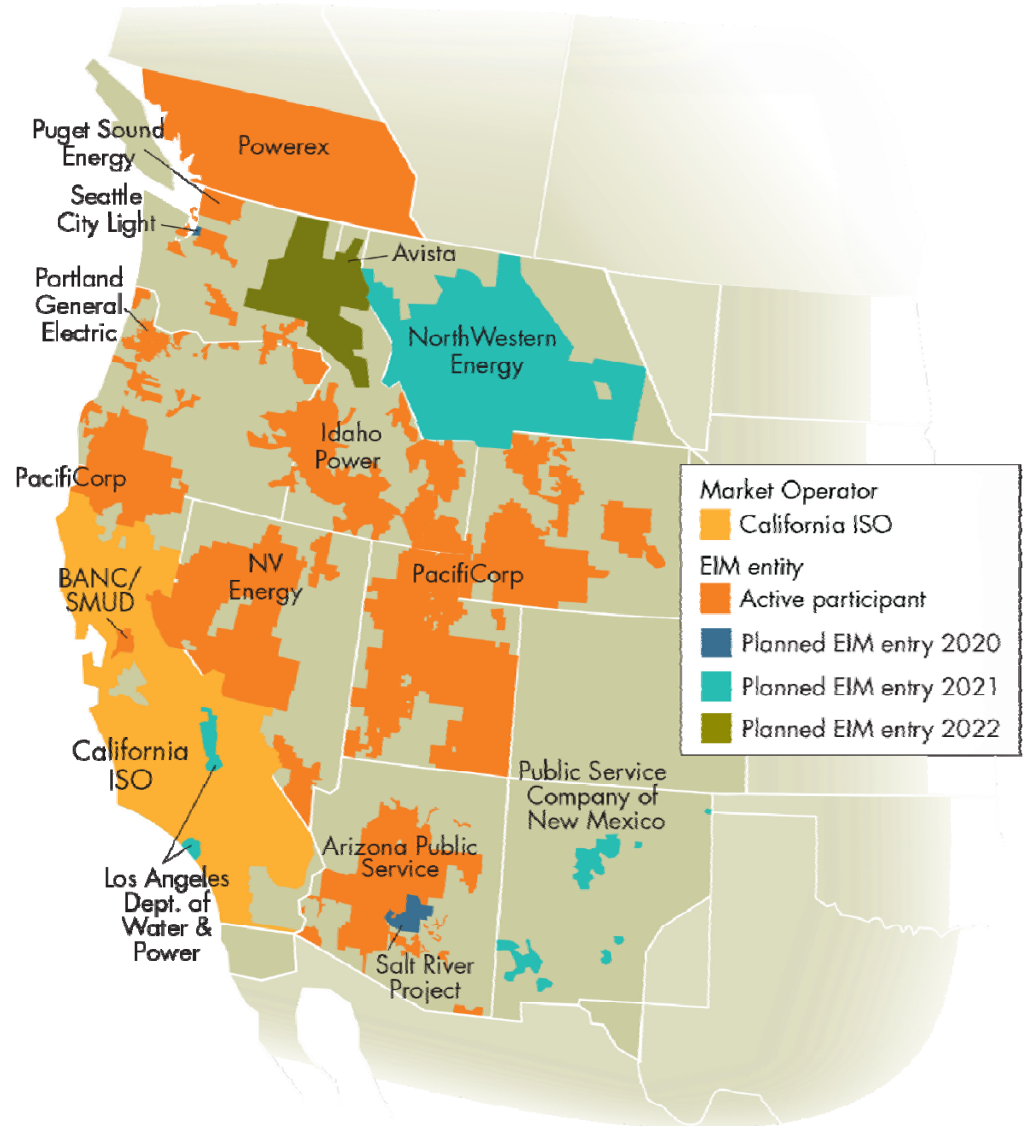


Agenda

- Market overview
- EIM participation and governance
- Stakeholder process
- Decisional authority with respect to the CAISO Board
- Market improvements
- Benefits of the EIM for California and the region
- Greenhouse gas accounting in the EIM
- Updates

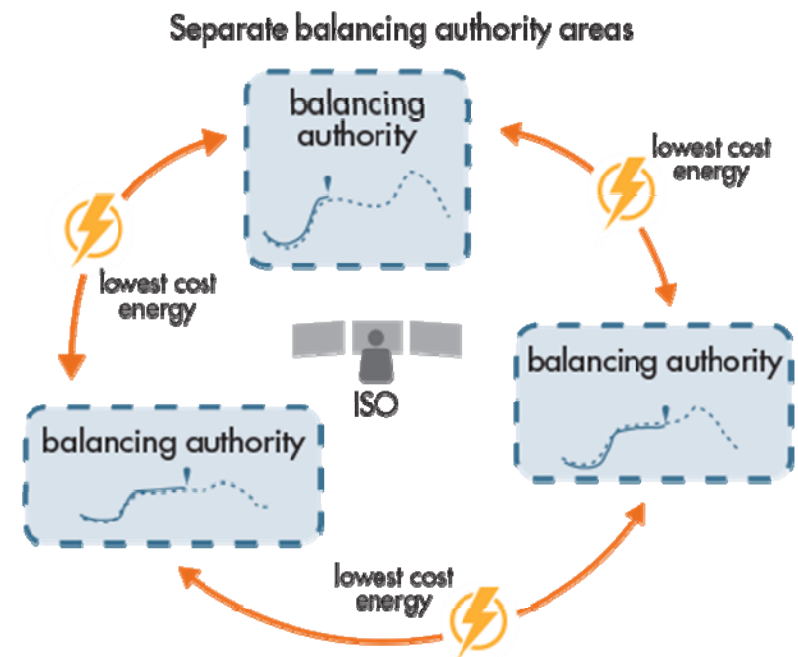
Overview of the Western Energy Imbalance Market

- Leverages geographical diversity of loads and resources in larger market footprint
- BANC/SMUD successfully began participation in April 2019
- Six more entities plan to join by 2021



EIM provides an easily-scalable extension of real-time market to the broader region

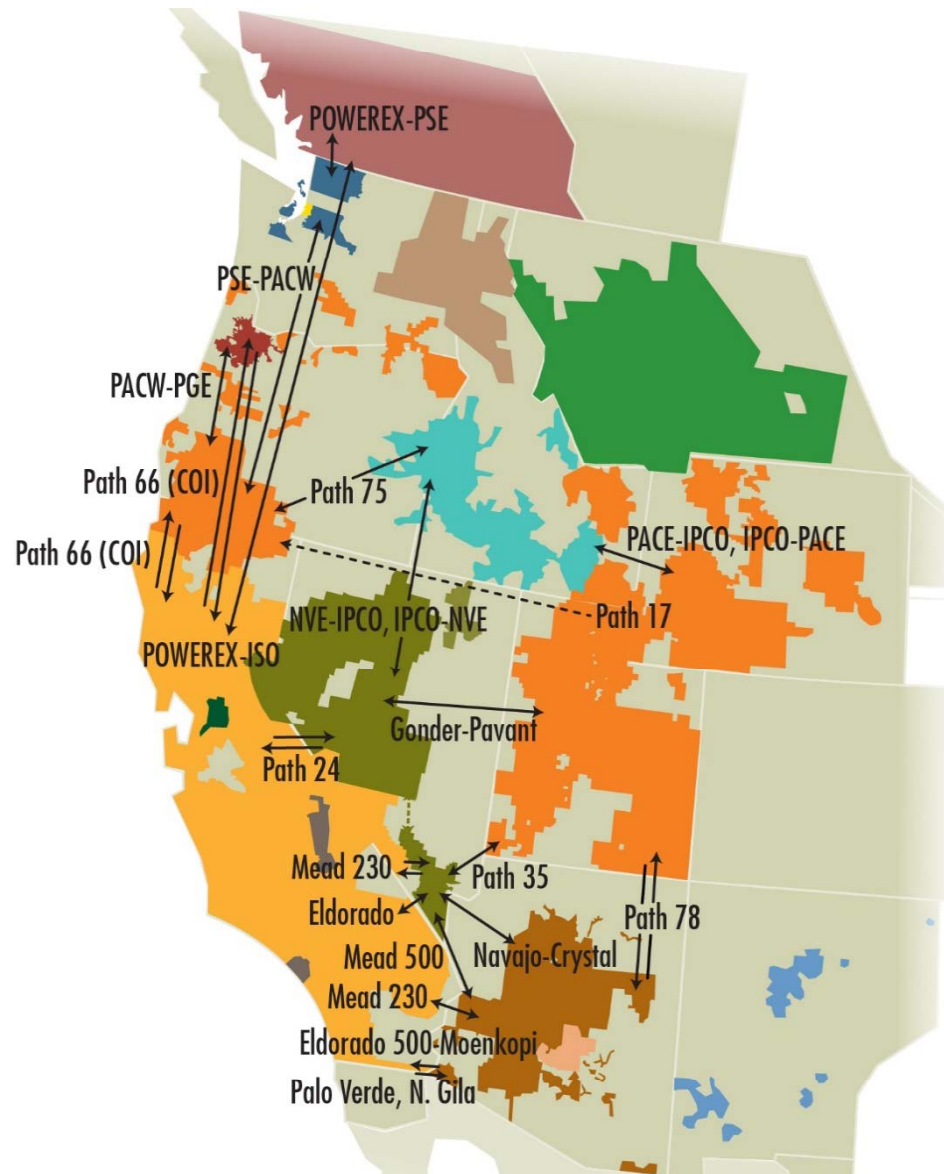
- Builds on existing market
- Automated dispatch minimizes cost, facilitates renewables, resolves imbalance and avoids congestion
- Situational awareness enhances reliability
- Easily scalable, low-cost, low risk, no exit fees and voluntary option for new participants
- Preserves BAA autonomy



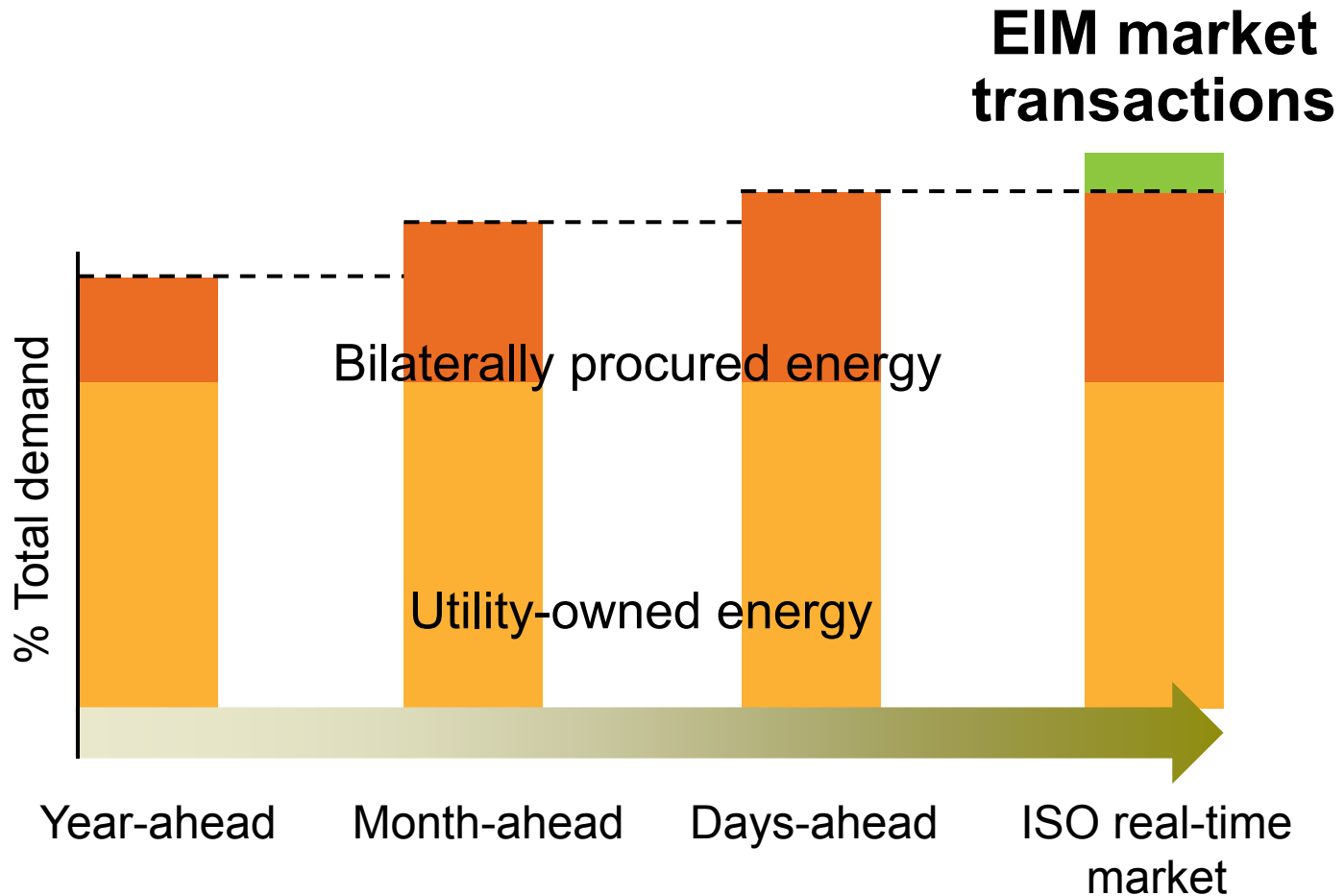
The Western EIM utilizes robust existing transmission capacity

← one direction ↔ bi-directional

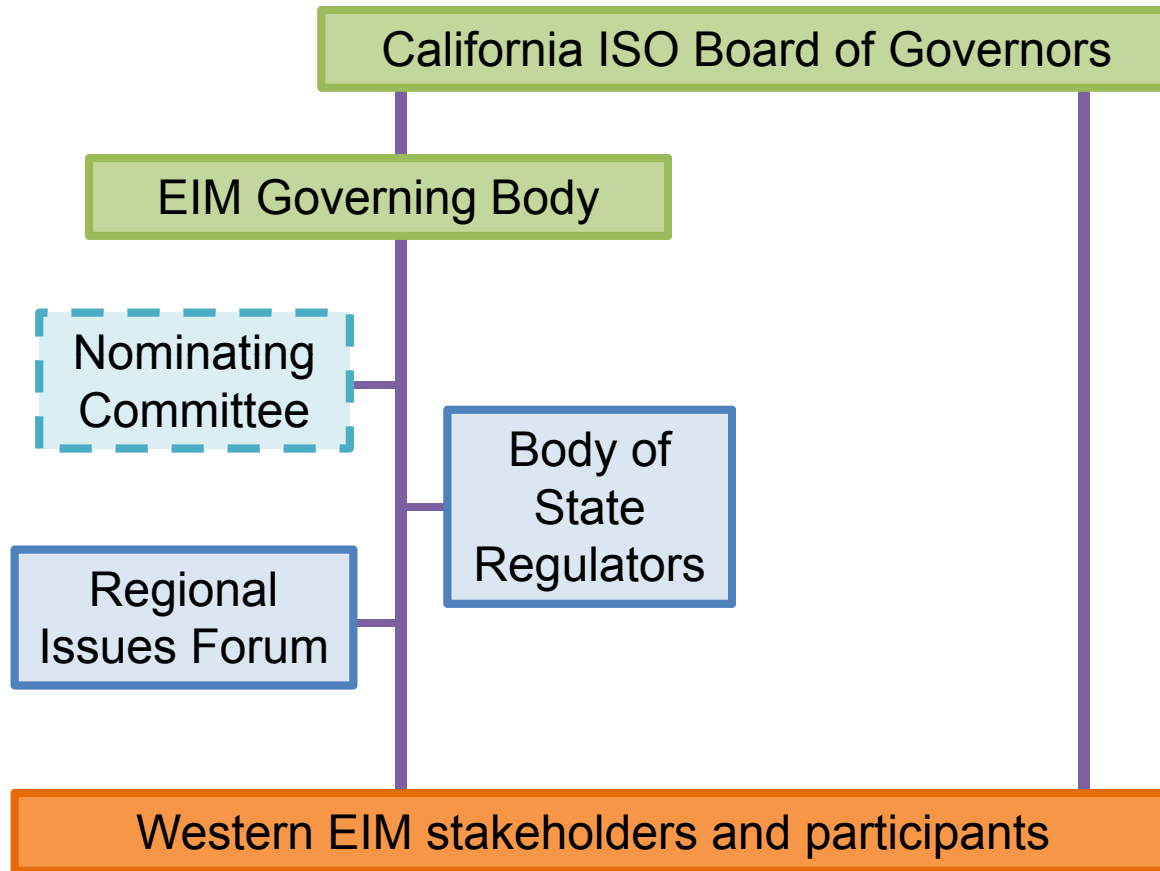
- California ISO
- PacifiCorp
- NV Energy
- Arizona Public Service
- Portland General Electric
- Puget Sound Energy
- Idaho Power Company
- Powerex
- BANC/SMUD
- Seattle City Light *(planned entry 2020)*
- Salt River Project *(planned entry 2020)*
- LADWP *(planned entry 2021)*
- Public Service Company of New Mexico *(planned entry 2021)*
- NorthWestern Energy *(planned entry 2021)*
- Avista *(planned entry 2022)*



Most demand is met in advance of the market through utility-owned or bilaterally procured resources



EIM Participation and Governance Structure



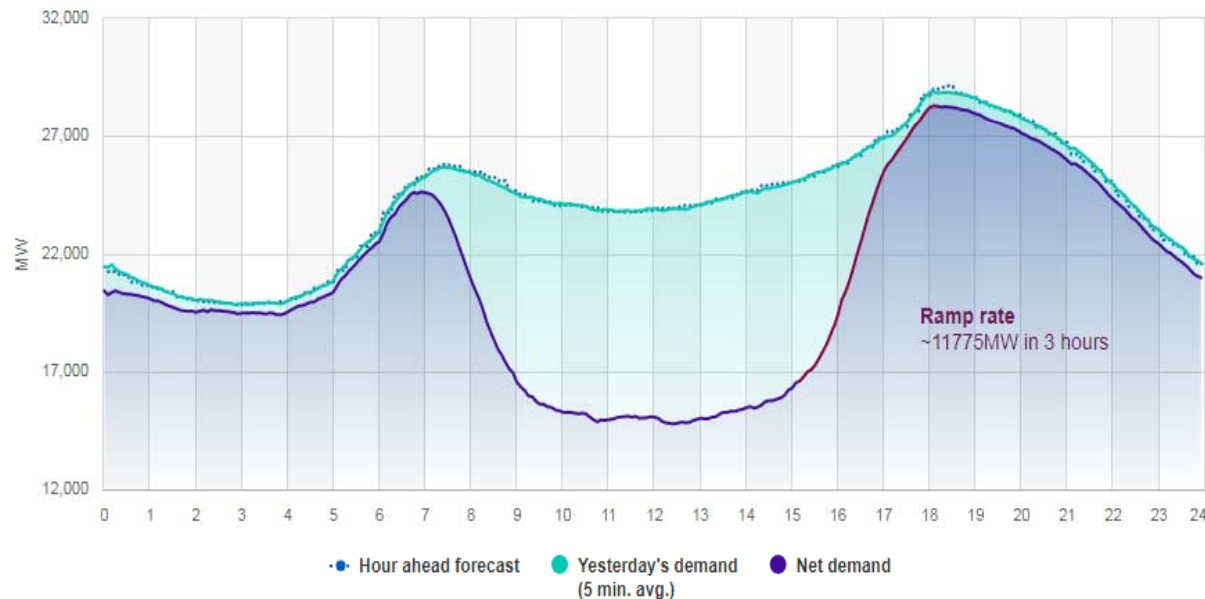
■ California ISO stakeholder process

Stakeholder process encourages robust participation



- Three ongoing initiatives in the policy and plan development stage fall within the EIM Governing Body’s decisional authority
- Several additional initiatives planned for 2019 will fall under the EIM Governing Body’s primary and advisory decisional authority

Day-ahead market enhancements address net load curve and uncertainty previously left to real-time market



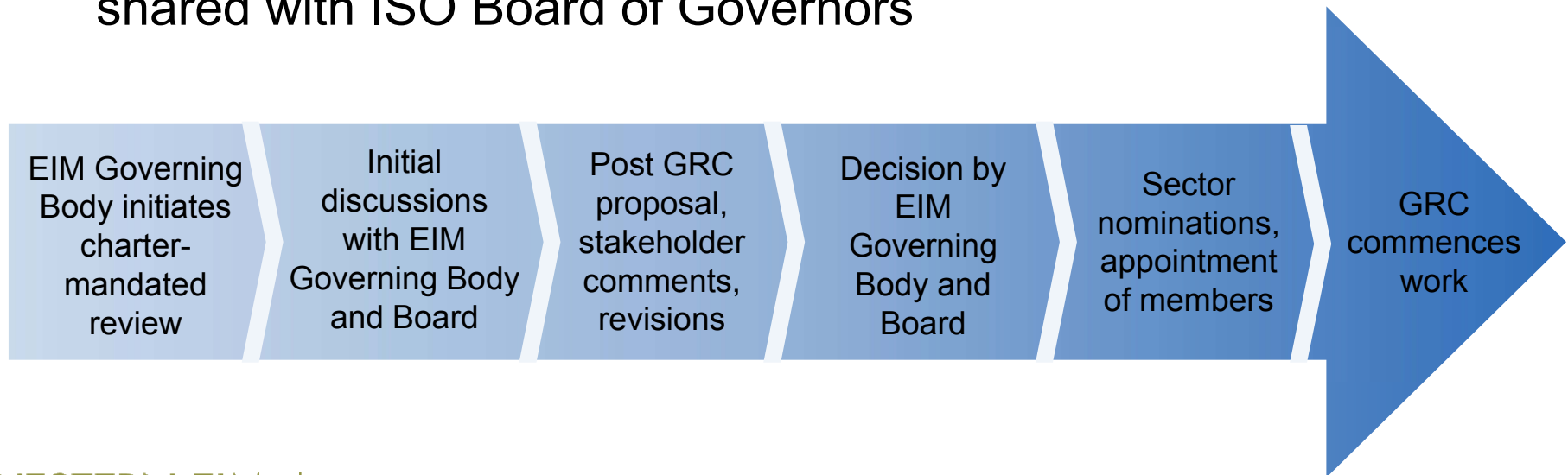
- Flexible ramping product will address uncertainty that materializes between day-ahead and real-time markets

Extended Day-Ahead Market would allow EIM participants to take advantage of broader market

- Same principles as EIM:
 - Voluntary participation
 - Easy entry
 - No exit fee
- Day-ahead unit commitment and scheduling across larger footprint improves market efficiency
- Balancing authority areas retain reliability responsibilities
- States maintain control over integrated resource planning

EIM Governance Review

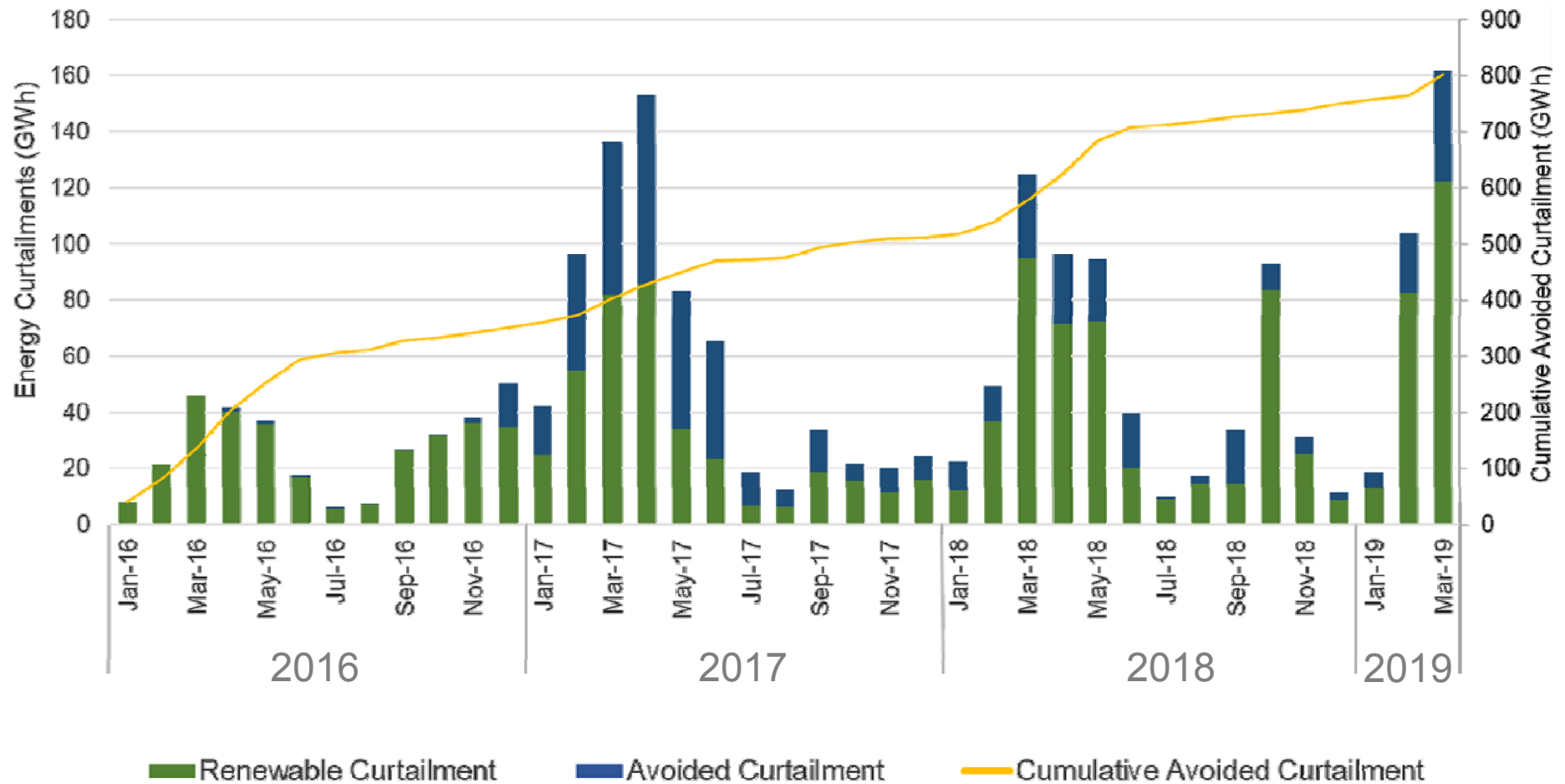
- Phase 1 – Primary authority of EIM Governing Body expanded to include changes to generally applicable rules of real-time market when the initiative’s primary driver is EIM
- Phase 2 – Establish a Governance Review Committee to review broader governance structure
- Role of the EIM Governing Body – *E2, Advisory Authority*, shared with ISO Board of Governors



How does the Western EIM help California?

- California has seen a rapid increase in installed intermittent generation resources
- Daily and seasonal oversupply situations
 - Two obvious solutions:
 - Curtail generation
 - Find a market for the excess generation
- With the EIM:
 - California and the region realize reduced curtailment of clean renewable resources
 - Excess generation is sold and bought across a wide geographic area

Energy imbalance market helps avoid curtailment



Gross economic benefits since start of EIM have reached \$650.26M

(millions \$)

EIM PARTICIPANTS	2014	2015	2016	2017	2018	2019	TOTAL
Arizona Public Service Entered 10/2016			\$5.98	\$34.56	\$45.30	\$8.20	\$94.04
California ISO Entered 11/2014	\$1.24	\$12.66	\$28.34	\$36.96	\$67.94	\$13.08	\$160.22
Idaho Power Company Entered 04/2018					\$26.88	\$8.45	\$35.33
NV Energy Entered 12/2015		\$0.84	\$15.57	\$24.20	\$25.55	\$5.71	\$71.87
PacifiCorp Entered 11/2014	\$4.73	\$26.23	\$45.47	\$37.41	\$61.68	\$23.76	\$199.28
Portland General Electric Entered 10/2017				\$2.83	\$27.57	\$11.74	\$42.14
Powerex Entered 04/2018					\$7.84	\$7.23	\$15.07
Puget Sound Energy Entered 10/2016			\$1.56	\$9.86	\$13.68	\$7.21	\$32.31
TOTAL	\$5.97	\$39.73	\$96.92	\$145.82	\$276.44	\$85.38	\$650.26

How are Greenhouse Gases handled in the EIM?

- California rules for GHG compliance
 - Generation inside CA has a compliance obligation
 - Generation outside CA has a compliance obligation when serving ISO load
 - Generation outside CA does not have a compliance obligation when serving non-ISO load
- EIM participating resources submit a separate GHG bid MW quantity and price which expresses willingness to support EIM transfer to ISO

How are Greenhouse Gases handled in the EIM? (continued)

- When energy is transferred into CA, secondary dispatch outside of CA may occur
 - Other resources backfill to serve external demand
 - Emissions associated with backfilling may or may not have higher emissions
- Adopted solution:
 - Maximum attribution quantity = Top of Energy Bid Curve – Base Schedule
 - Base schedule is amount of resource planned to serve load outside of ISO

Updates on Western EIM

- Energy Imbalance Market
 - More than 2/3 of WECC load will participate by 2021
- EIM Governance Review
 - Draft Charter and Straw Proposal for formation of a Governance Review Committee posted April 1st
 - Stakeholder comments submitted April 29th
- Extended Day Ahead Market
 - Feasibility assessment currently underway
 - Anticipated implementation date in 2022

Resources



- EIM Computer-based training at:
<https://www.westerneim.com/Pages/Resources.aspx>
- EIM Quarterly benefits reports at:
<https://www.westerneim.com/Pages/About/QuarterlyBenefits.aspx>