



IEA Electricity Security Advisory Panel (ESAP) & Council of
European Energy Regulators (CEER)

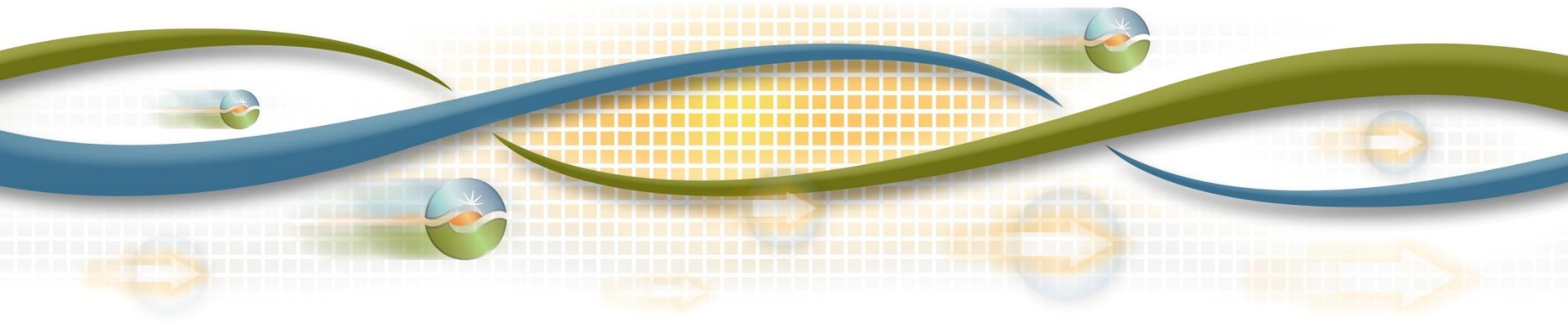
Workshop V - Regional Resource Adequacy

CAISO Energy Imbalance Market

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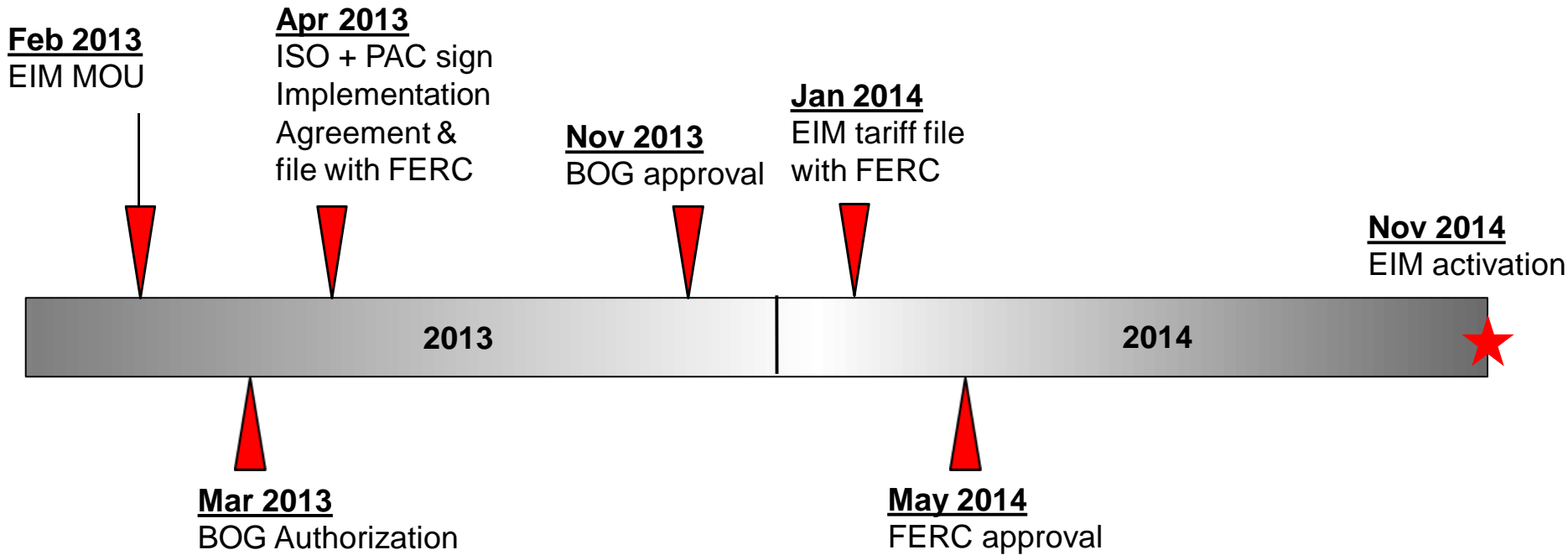
January 15, 2015



Outline

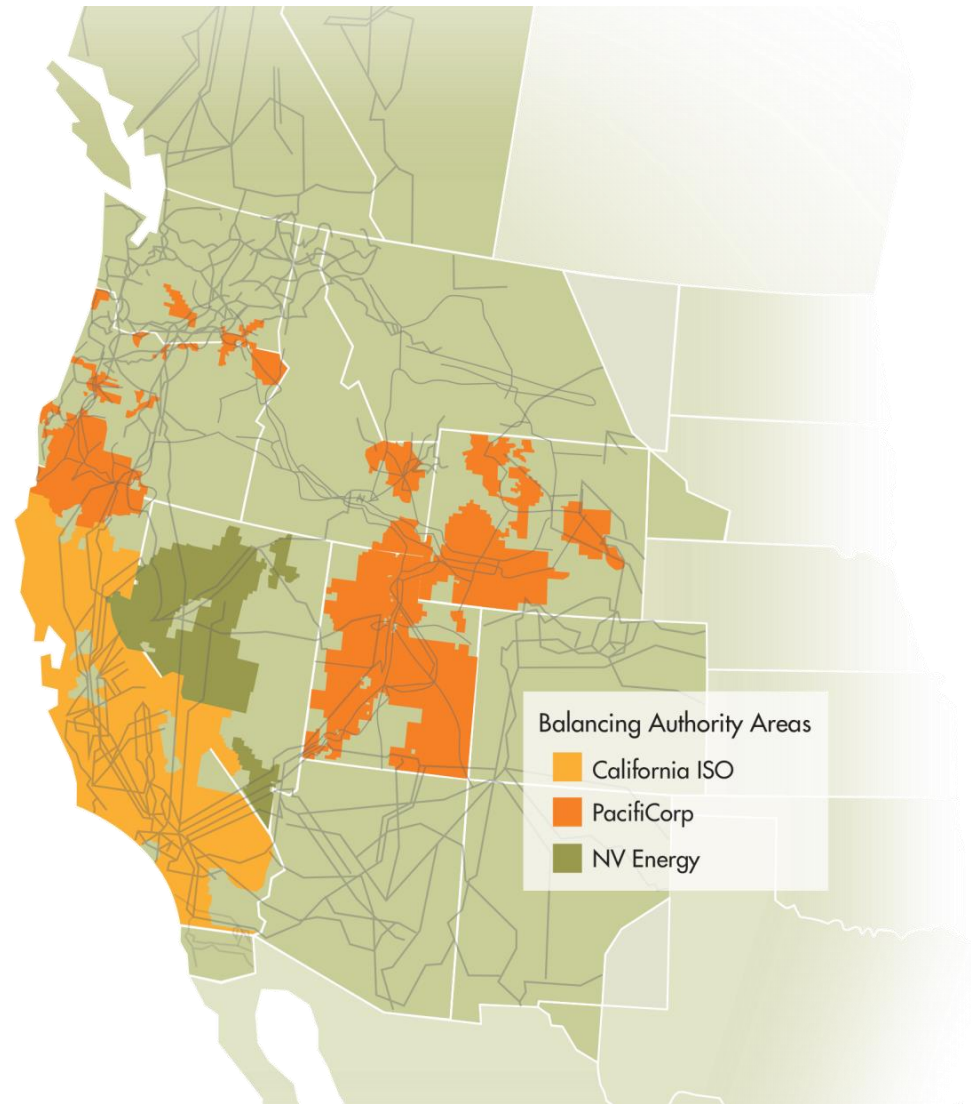
- Energy Imbalance Market (EIM)
- Renewable Integration

EIM Major Milestones



Energy Imbalance Market

- Builds on existing market platform
- No critical mass required
- Easily scalable, offering low-cost, low risk option to new entities
- No exit fees
- Preserves BAA autonomy, including compliance, balancing, and reserve obligations



EIM uses existing structure to provide gradual participation

- EIM participation can develop gradually
- EIM participants will have transmission rights to reach other participants
- Assumes 10% of participating areas' energy is in EIM, but this can vary
- ISO can leverage existing market and energy management systems to enable ready implementation
- Existing structure also satisfies regulatory requirements
 - Independent non-profit corporation
 - Credit policy and financial reporting
 - Market monitoring

A participant incurs a one-time cost to join and ongoing fees based on usage

One time

3¢ x

Total annual energy usage

Example: licensing fees, servers and set up

On-going

Usage rate
19¢ x

MWh of EIM energy

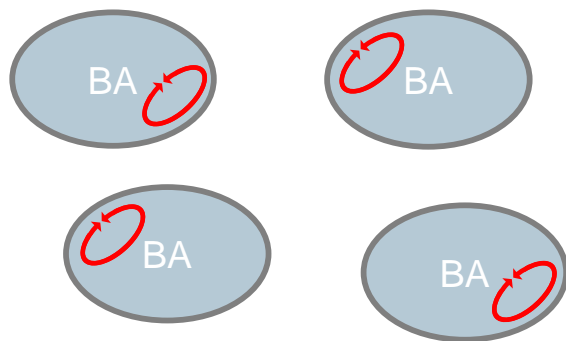
Example: staff and portions of ISO systems used to support EIM functionality

The California ISO proposal recognizes the need for a governance solution.

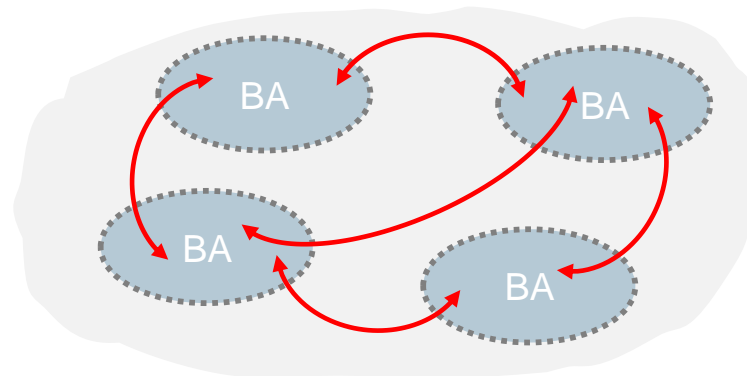
- Enable participants to govern the EIM
- Acknowledge that EIM rules will evolve over time with consideration of the costs and feasibility
- Allow participants to enter and exit the EIM on terms that are clear and agreed-upon
- Recognize FERC jurisdiction over EIM while avoiding direct FERC regulation of EIM participants

EIM provides multiple benefits

Today:
Each BA must balance loads and resources within its borders.



In an EIM:
The market dispatches resources across BAs to balance energy



EIM Benefits

- Reduce costs by serving imbalance from most economic resources
- Enhances reliability by improving system visibility and responsiveness
- Results in more efficient dispatch of resources within/between BAAs
- Leverages geographical diversity of loads and resources in the market footprint

EIM expected to provide significant net benefits

	ISO/ PacifiCorp study (in millions)	ISO/NV Energy study on incremental benefits (in millions)	APS study (in millions)
annual benefits	\$21.4 - \$129.0	\$9.0 - \$18.0 (2017)	TBD
		\$15.0 - \$29.0 (2022)	
start-up costs	approx. \$20.0 (\$2.5 to ISO)	approx. \$11.20 (\$1.10 to ISO)	TBD (\$1.0 to ISO)
annual on- going costs	approx. \$3.00 (\$1.35 to ISO)	approx. \$2.60 (\$0.75 to ISO)	TBD (\$0.65 to ISO)

Benefits primarily derived from:

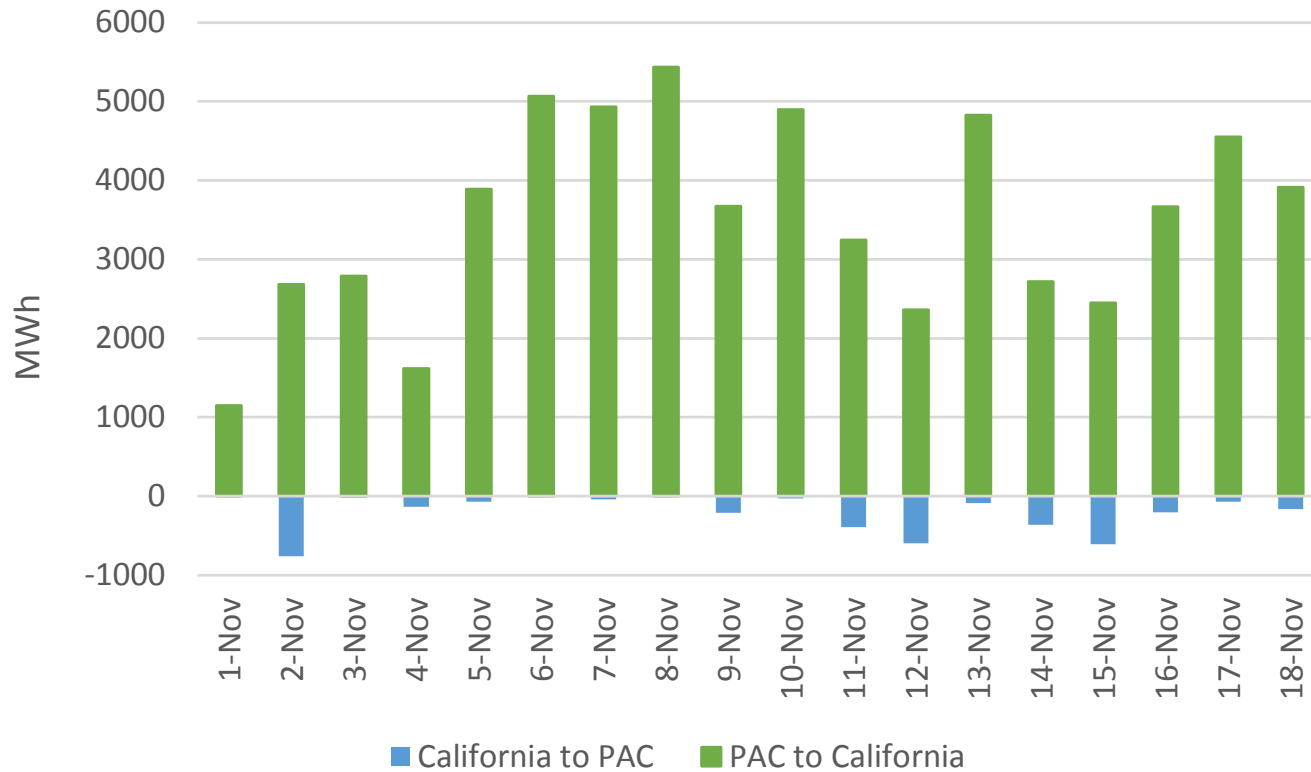
- Reduced flexibility reserves
- More efficient dispatch, within and across BAs
- Reduced renewable energy curtailment

EIM deployment update

- Smooth transition on November 1 with PacifiCorp relative to scope of implementation.
- EIM dispatching participating resources as designed to balance real-time supply/demand across the EIM areas.
- Optimized transfers benefiting both supply and demand.
- Experienced some transitional data transfer, software issues and process learning.
- Tuning new business practices to enhance information flow between operations and market inputs.
- ISO will track EIM regional benefits and provide quarterly reports to stakeholders

15-minute EIM transfers between PacifiCorp and ISO

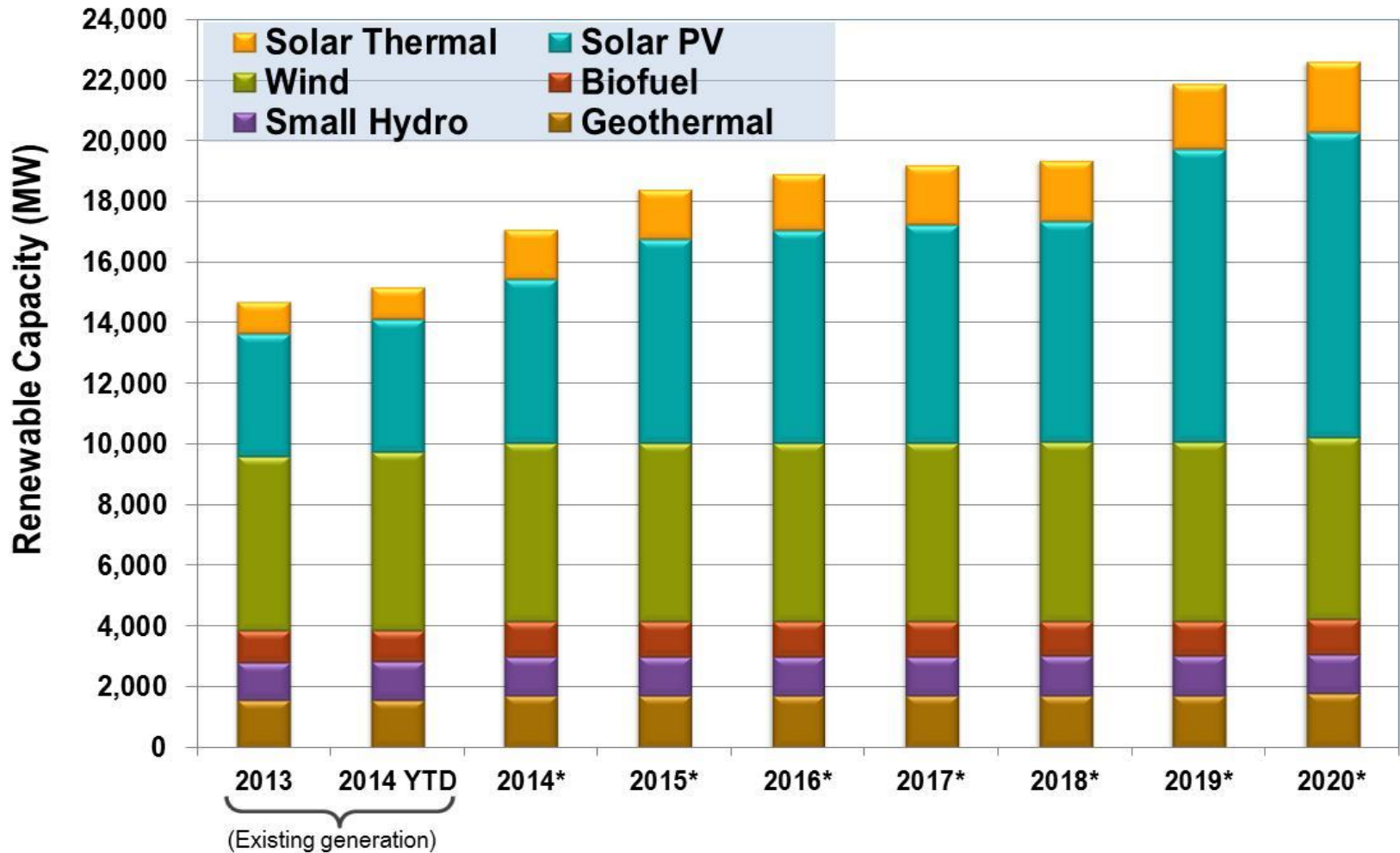
(+) PacifiCorp to ISO / (-) ISO to PacifiCorp



The ISO is committed to working cooperatively with the rest of the West to improve reliability and efficiency to benefit the entire region

EIM & Renewable Integration

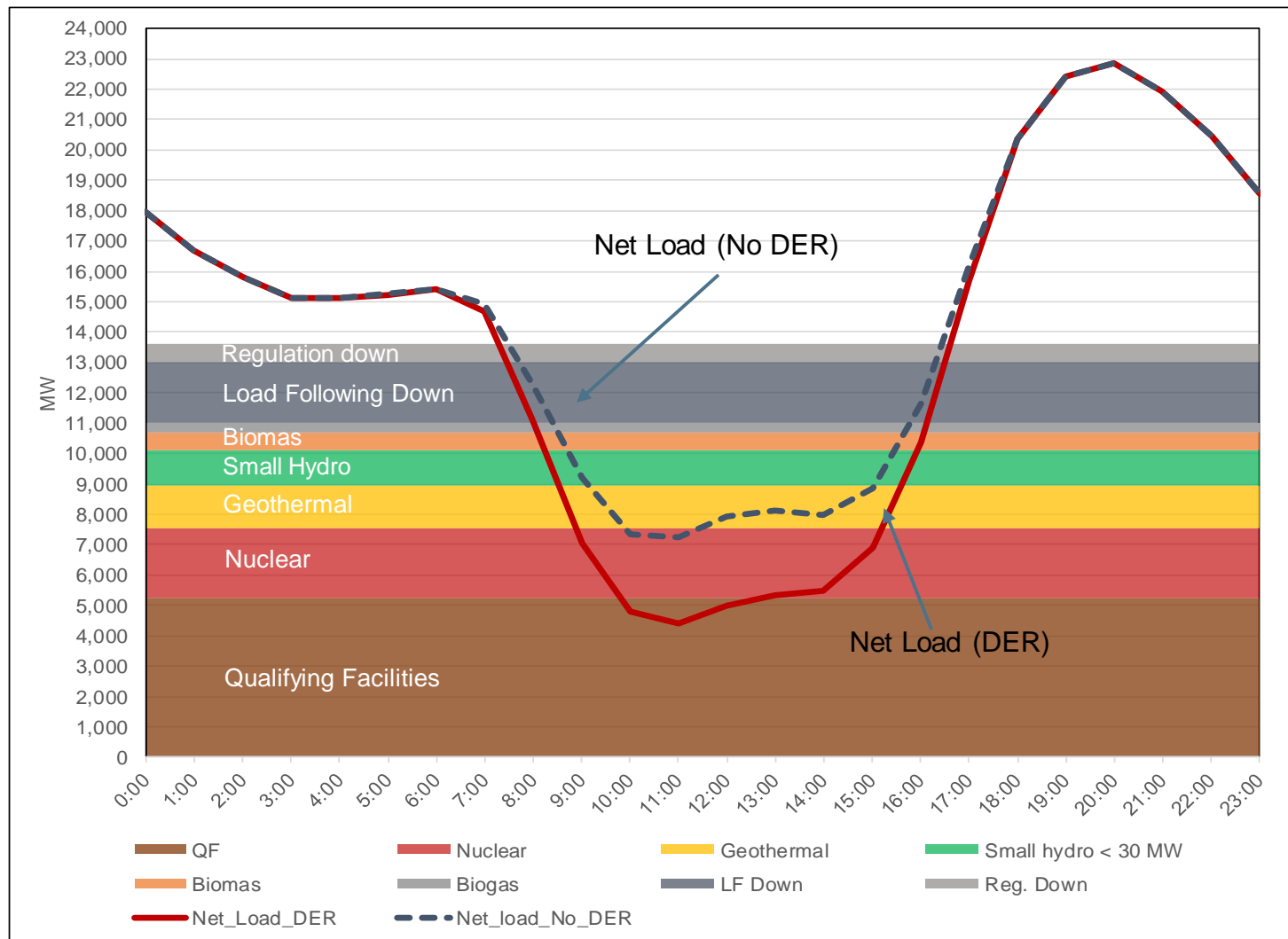
Current and projected renewable generation capacity in operation within the ISO



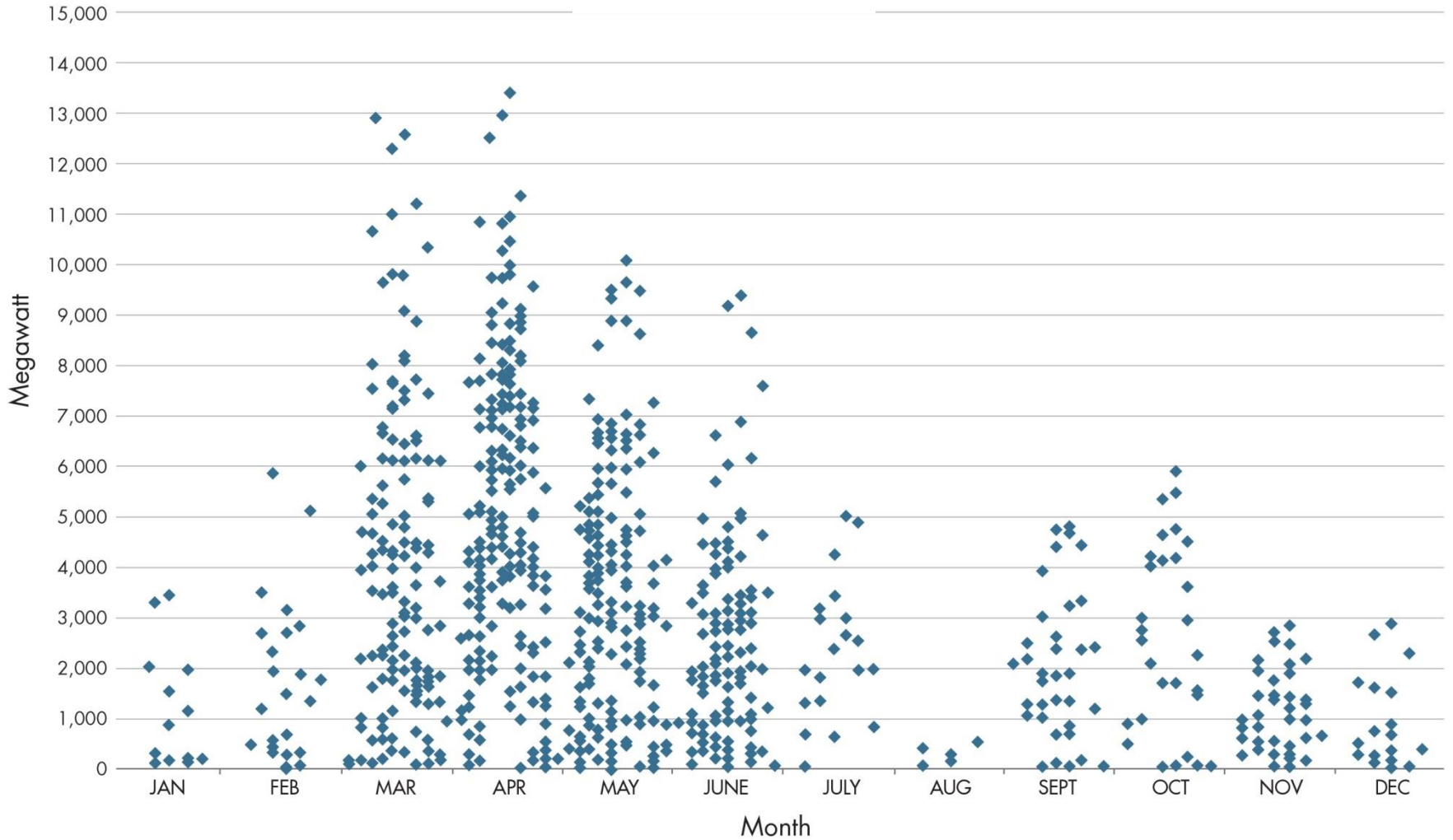
* Based on information obtained in March 2014 from LSEs within the ISO and the March 2014 CPUC RPS Calculator.

Potential over-generation (LTPP Scenario March, 24, 2024)

	Installed Capacity (MW)
Nuclear	2,300
Biomass	583
Biogas	320
Geothermal	1,404
QF	5,243
Small hydro < 30 MW	1,163
Imports	3,500
LF Down	2,000
Reg. Down	600



RPS Curtailment in 2024 – 40% RPS Scenario



A range of options are available for addressing the identified flexibility and curtailment issues.

- Modify curtailment provisions in power purchase agreements to reconcile with RPS priorities
- Increase energy storage and demand response
- Achieve time-of-use rates aligned with regional and seasonal system conditions
- Electrification of transportation and related managed charging
- Reduce fleet minimum load burden by increasing fleet flexibility
- Deeper regional coordination with other balancing authorities

Questions / Discussions?

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