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March 1, 2016

### MEMORANDUM

**TO: Council members**

**FROM: Tom Eckman**

**SUBJECT: Pat Reiten Presentation on the Changing Western Electricity Market and Transmission**

### BACKGROUND:

Presenter: Pat Reiten

**Summary:** Pat Reiten is president and chief executive officer of PacifiCorp Transmission. He was appointed to this position in March 2015 and is responsible for managing the West's largest single owned- and-operated transmission system. He oversees transmission services, transmission planning and system operations as well as the company's transmission expansion projects. Prior to his current position, Reiten served as president and CEO of Pacific Power, responsible for delivering electricity safely and reliably to 733,000 customers in Oregon, Washington and California

Mr. Reiten will provide his views on the evolving western electricity market, including PacifiCorp's decision to join the California Independent System Operator's (CAISO) Energy Imbalance Market and the role of transmission expansion across the WECC.

**Relevance:** The Council's analysis of the need for new resources to meet future energy and capacity demands must account for the reserves held to provide balancing and flexibility across the system, since these resources cannot be used to provide peaking capacity or other ancillary services. As

the Seventh Power Plan was being developed regional discussions regarding the benefits and cost of establishing an Energy Imbalance Market (EIM) across the Northwest Power Pool (NWPP) were underway. The principal benefit of an EIM is to reduce the cost of providing within-hour balancing of loads and resources by sharing those across balancing authorities. The NWPP process appears to have stalled, partially because several northwest utilities, lead by PacifiCorp have already decided to join or are considering joining the CAISO's EIM. These actions are likely to have significant consequences for future Council plans.

Workplan: 1.B. Develop Seventh Power Plan and maintain analytical capability

Background: See below

More Info: The following article from BloombergBusiness provides an overview of some of the forces driving changes across the western electricity market and some of PacifiCorp's activities.

## Why Buffett Needs West to Get Over Enron and Link Power Grids

Source: Bloomberg Business

Naureen Malik and Harry Weber

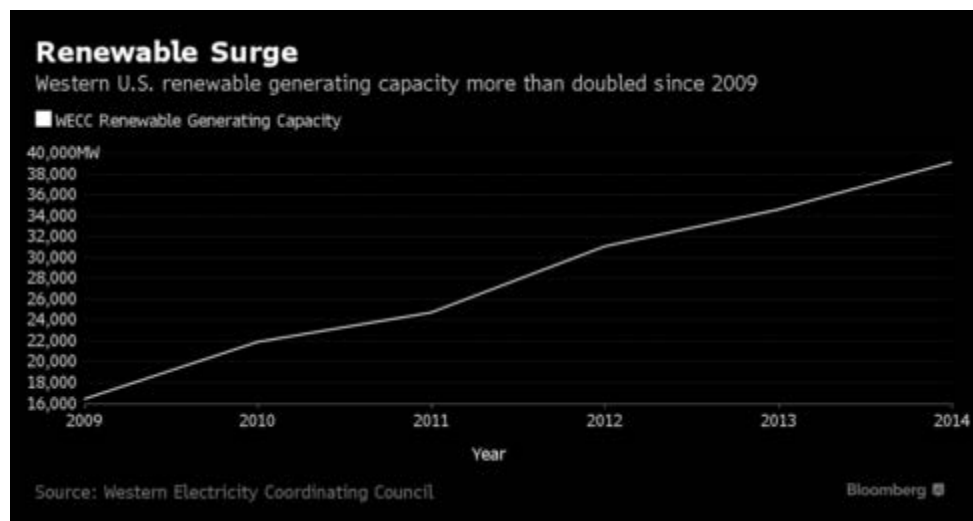
February 24, 2016 — 4:01 PM PST

Updated on February 25, 2016 — 9:35 AM PST

- Grids a patchwork with little cooperation as legacy of crisis
- Solar and wind farms shut down when power has nowhere to flow
- California has more renewable energy than it can handle

Elsewhere in the U.S., states with extra power hand it off to neighbors when they need it. That's not happening in the West, where cooperation among electrical grids has historically been an issue. The result: Individual providers can find themselves shutting down their extra power rather than sending it elsewhere.

"It makes my heart ache to be in our control room and see us turn off renewables that would provide green, zero-marginal-cost power for somebody else's advantage," said Steve Berberich, chief executive officer of the California Independent System Operator Corp., which runs the state's power grid. "How long do you want to let that go on?"



California and utilities owned by Warren Buffett's Berkshire Hathaway Inc., including PacifiCorp and NV Energy Inc., are now on a mission to end that thinking as quickly as possible.

In their view, the situation is urgent. Berkshire Hathaway turned on the country's two largest solar farms in California last year and Apple Inc. invested in another that will supply it for 25 years. Governor Jerry Brown has ordered the state's utilities to get half their power from renewable sources by 2030. The logjams need to be removed if renewable power is to flow smoothly.

## Grid Patchwork

Electric companies around the world have been improving connections for years, while the western U.S. remains a patchwork of systems that don't have the ability to trade excess supplies quickly across their borders. It's a legacy of a regional crisis 15 years ago when traders including Enron Corp. shut natural gas pipelines and generating capacity to cut supply, which drove power prices to records and caused blackouts. As a result, utilities are still hesitant about doing business with the Golden State.

The U.S. West, with plentiful renewable resources, is arguably the region of the country most in need of collaboration. Europe, Japan, Mexico and most of the U.S. are stepping up cooperation to balance fluctuations across wider expanses. Meanwhile, the West has 38 entities controlling power lines in an area larger than India. Past efforts to organize have had marginal success.

"Watch what's going in California because it's a precursor of what's going to happen" elsewhere, said Michael Blaha, Americas power and renewables research director at Wood Mackenzie Ltd. "In the West, they will ultimately

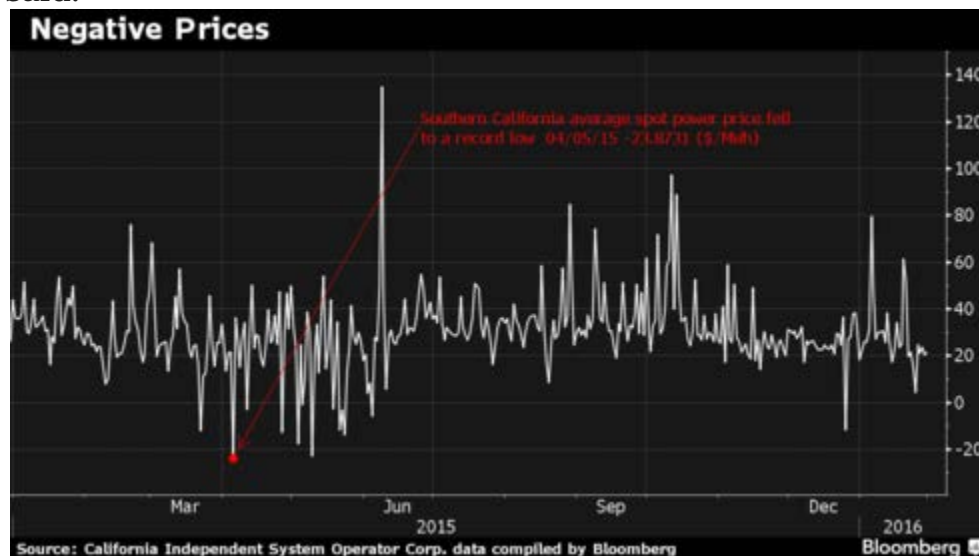
need to cooperate over a bigger and bigger issue. How are they going to get the renewables in and meet policy goals demanded by the states?”

## Dispatching Power

Electric companies including ITC Holdings Corp. and U.S. Grid Co. will discuss managing the onslaught of renewables at the IHS CERAWeek energy conference in Houston on Thursday. In the West, Berkshire's PacifiCorp utility and the California grid started a market 15 months ago that allows them to electronically dispatch power across their systems every five minutes, quick enough to move a sudden burst in wind power across states to a place that can use it. Berkshire's NV Energy joined in December.

That reinvigorated efforts by a group of Northwest utilities to create their own market, though California and PacifiCorp are trying to lure them to theirs, arguing that they will save money. Puget Sound Energy Inc. and Arizona Public Service were convinced and will join that market this fall, Portland General Electric Co. next year. Idaho Power is thinking about it.

Past efforts have failed because they attempted to pull together everyone at once, said Stefan Bird, chief executive officer of PacifiCorp's Pacific power utility. This time around, they are trying to win over utilities one at a time, he said.



To understand what's at stake, take a look at California's power market on April 5, 2015. Sunny skies boosted solar power way above forecasts, while slack demand and constrained transmission capacity stranded the energy. Wholesale power near Los Angeles averaged minus \$24 a megawatt-hour, a point so low not even tax incentives made it economic to keep solar and wind farms running.

Southern California spot on-peak power was down 12 percent at about 8 a.m. local time Thursday at \$16.02 a megawatt-hour. Renewable generation accounted for 29 percent of demand at 8:50 a.m. on the California grid.

## Power Backup

At times, the renewable power pooling up is so voluminous that generators have to pay utilities to take it. By 2020, California may be forcing 10,000 megawatts -- the equivalent of 10 nuclear reactors -- out of service at times, said Berberich, the chief of California's grid.

While the Supreme Court this month put on hold President Barack Obama's plan to cut greenhouse-gas emissions from power plants, most western states have their own renewable power targets. The grids will have to accommodate that power.

Berberich has been visiting other states in an effort to convince them that it's "not as dangerous to work with us," he said. "There are still some people sore about the energy crisis and a lot of folks don't like California because it's the big boy on the block," he said.

# PacifiCorp Transmission and Regional Updates

Pat Reiten

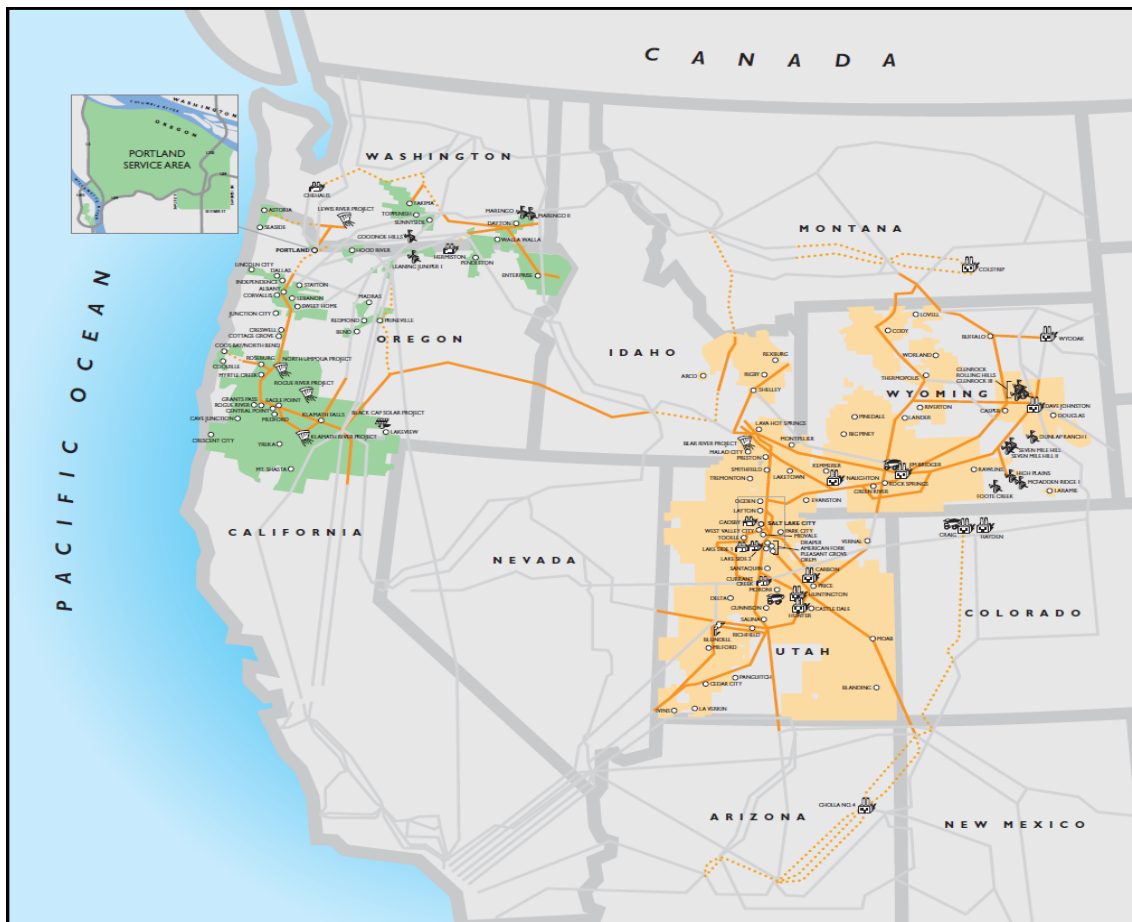
President and CEO, PacifiCorp Transmission



*Let's turn the answers on.*

# PacifiCorp Transmission Overview

- 16,400 circuit-miles of transmission lines
- 12,685 MW record peak demand (June 29, 2015)
- Net plant value of \$4.4b
- Annual adjusted gross revenue requirement of \$523m



# New PacifiCorp Transmission Business Unit



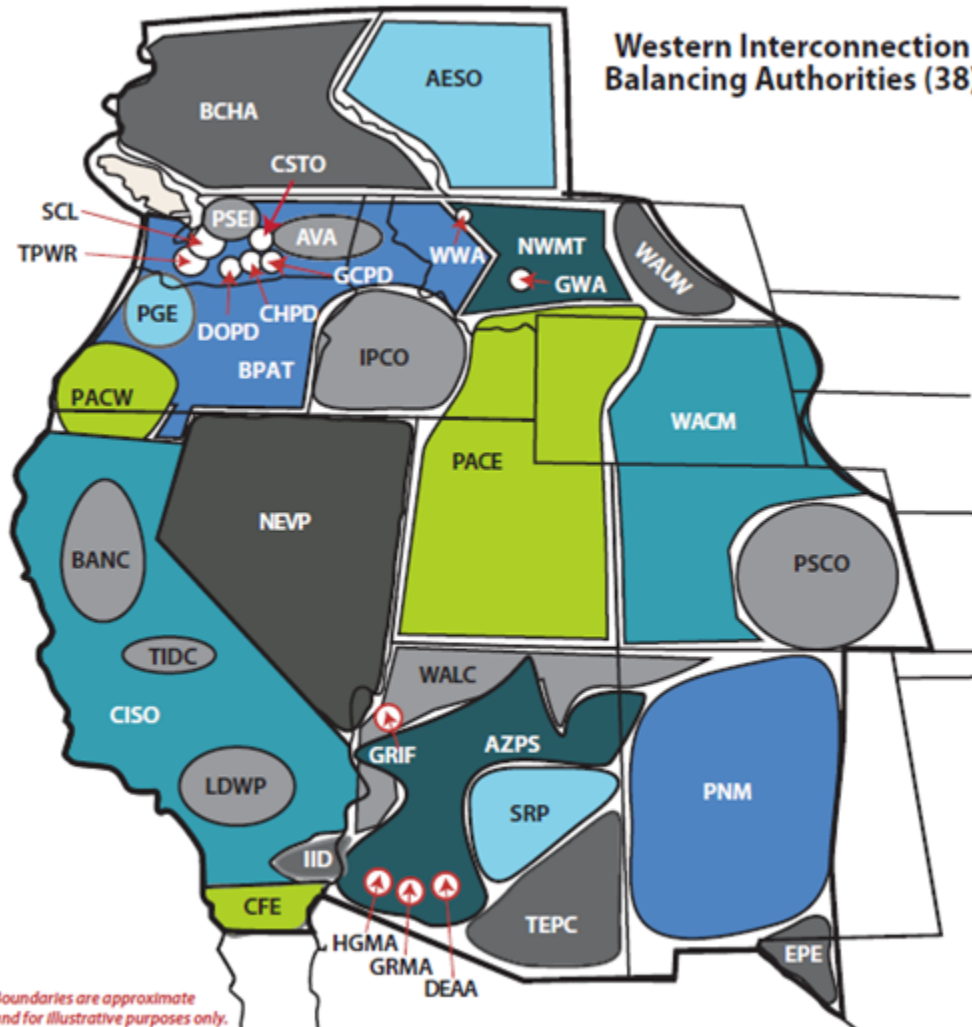
- Focus on permitting / capital investment
  - Energy Gateway projects
  - Vantage to Pomona Heights
  - Snow Goose substation
  - Wallula to McNary
- Pursue strategic aims
  - Energy Imbalance Market optimize / expand
  - Regional ISO Market Integration



# Why Regional Collaboration?

- Economic savings for end-use customers through automated efficient unit dispatch
- Reliability improvements through increased visibility
- Opportunity for further savings through reserve sharing or flexibility reserve sharing
- Take advantage of geographical and resource diversity
- Renewable integration

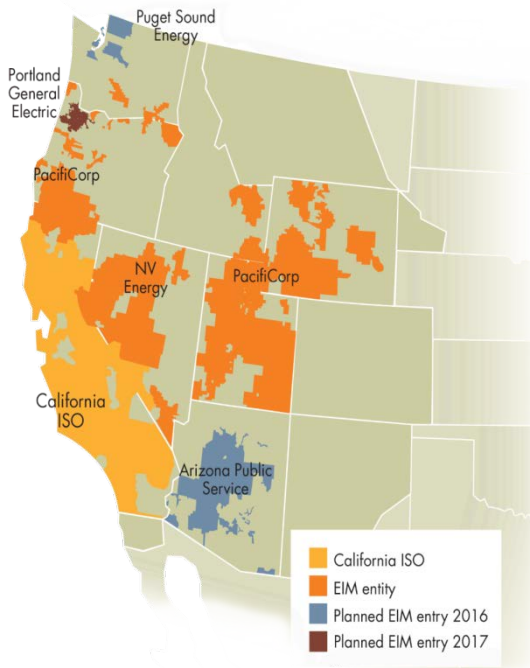
# Balancing Authority Areas in the West



Source: Western Electricity Coordinating Council

# EIM Provides Significant Net Benefits and Will Operate in Eight Western States

## EIM Entities



	PacifiCorp	NV Energy	Puget Sound Energy	Arizona Public Service
Go Live	November 2014	December 2015	Fall 2016	Fall 2016
Peak Demand (MW)	9,500	8,148	4,912	7,000
~ Annual benefits (in millions)	\$21-\$129	\$9-\$18 (2017)	\$18-\$30	\$7-\$18
		\$15-\$29 (2022)		
~ Start-up costs (in millions)	\$20	\$11.2	\$14.2	\$13.5
~ Annual on-going costs (in millions)	\$3	\$2.6	\$3.5	\$4

# Energy Imbalance Market Progress and Success

- Total estimated EIM benefits since November 2014 = \$45.7m

## 2015 Results

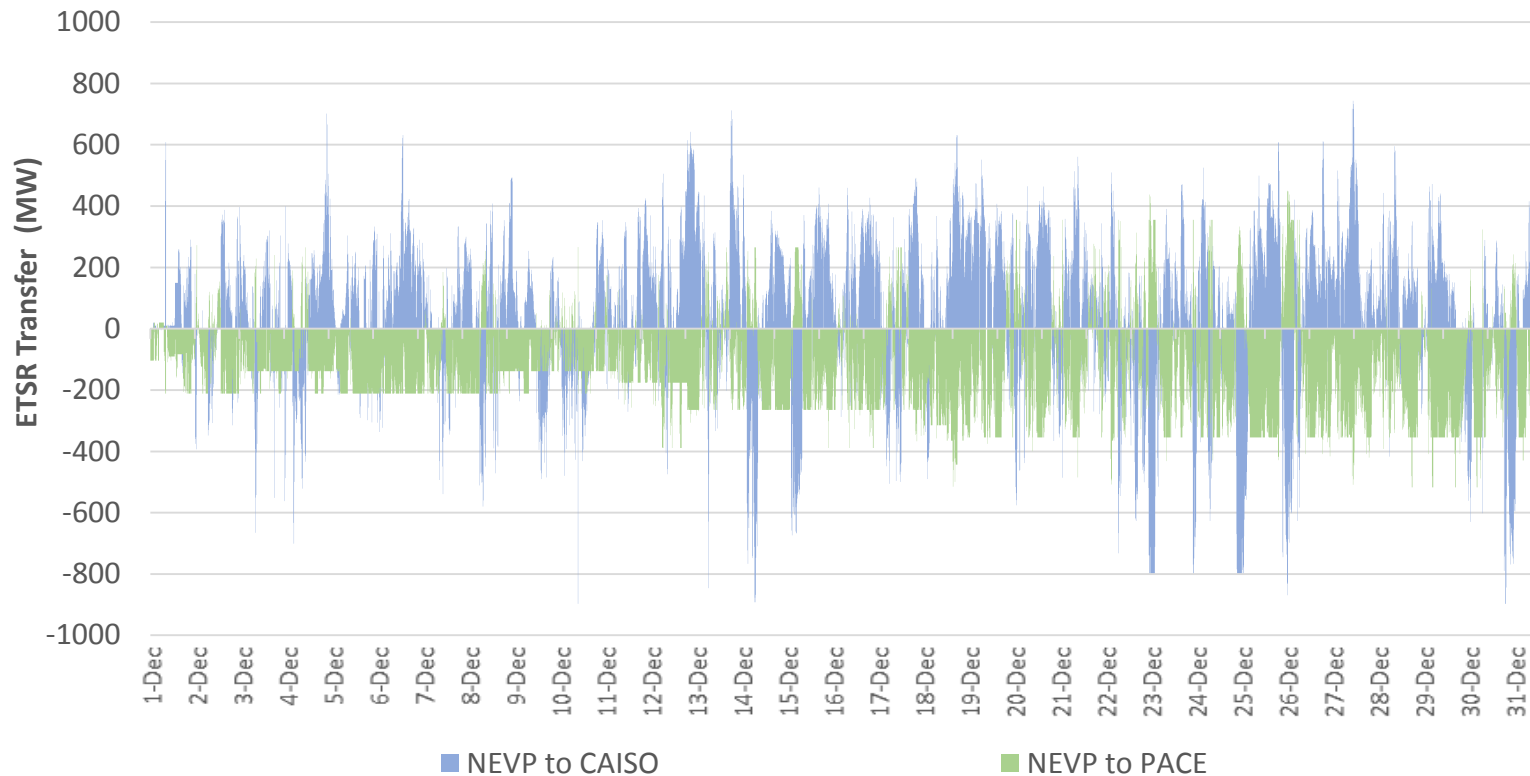
BAA	Jan-Mar 2015	Apr-Jun 2015	Jul-Sep 2015	Oct-Dec 2015	2015 Total
ISO	\$1.44m	\$2.46m	\$3.48m	\$5.28m	\$12.66m
PacifiCorp	\$3.82m	\$7.72m	\$8.52m	\$6.17m	\$26.23m
NV Energy				\$0.84m	\$0.84m
<b>Total</b>	<b>\$5.26m</b>	<b>\$10.18m</b>	<b>\$12.00m</b>	<b>\$12.29m</b>	<b>\$39.73m</b>

## 2015 4<sup>th</sup> Quarter Results

BAA	October	November	December	Total
ISO	\$1.27m	\$1.30m	\$2.70m	\$5.28m
PacifiCorp	\$1.24m	\$2.19m	\$2.75m	\$6.17m
NV Energy			\$0.84m	\$0.84m
<b>Total</b>	<b>\$2.51m</b>	<b>\$3.49m</b>	<b>\$6.29m</b>	<b>\$12.29m</b>

# Five-Minute EIM Transfer for NEVP Area

Five-Minute EIM Transfer from NEVP to CAISO and PACE



# EIM Transitional Committee Governance Proposal Approved and Implementation Underway

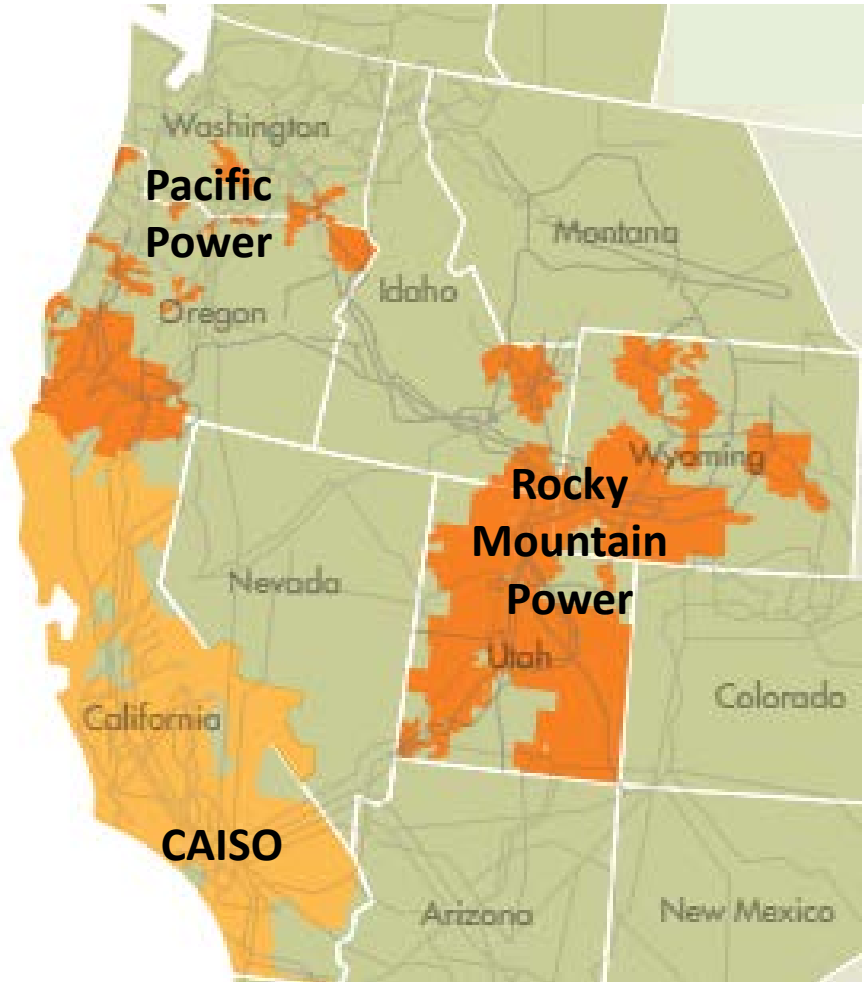
- 5 independent (non-stakeholder) members
- Delegated authority over EIM-related market rules
- Charter development complete, bylaw revisions approved
- Candidates selected by stakeholder nominating committee, approved by ISO Board
- Sectors have formed and selected their reps to the nominating committee
- Committee of state regulators already formed, led by WA Commissioner Ann Rendahl
- Regional Issues Forum sectors selecting liaisons – first Forum expected Q1 2016

EIM governance initiative page

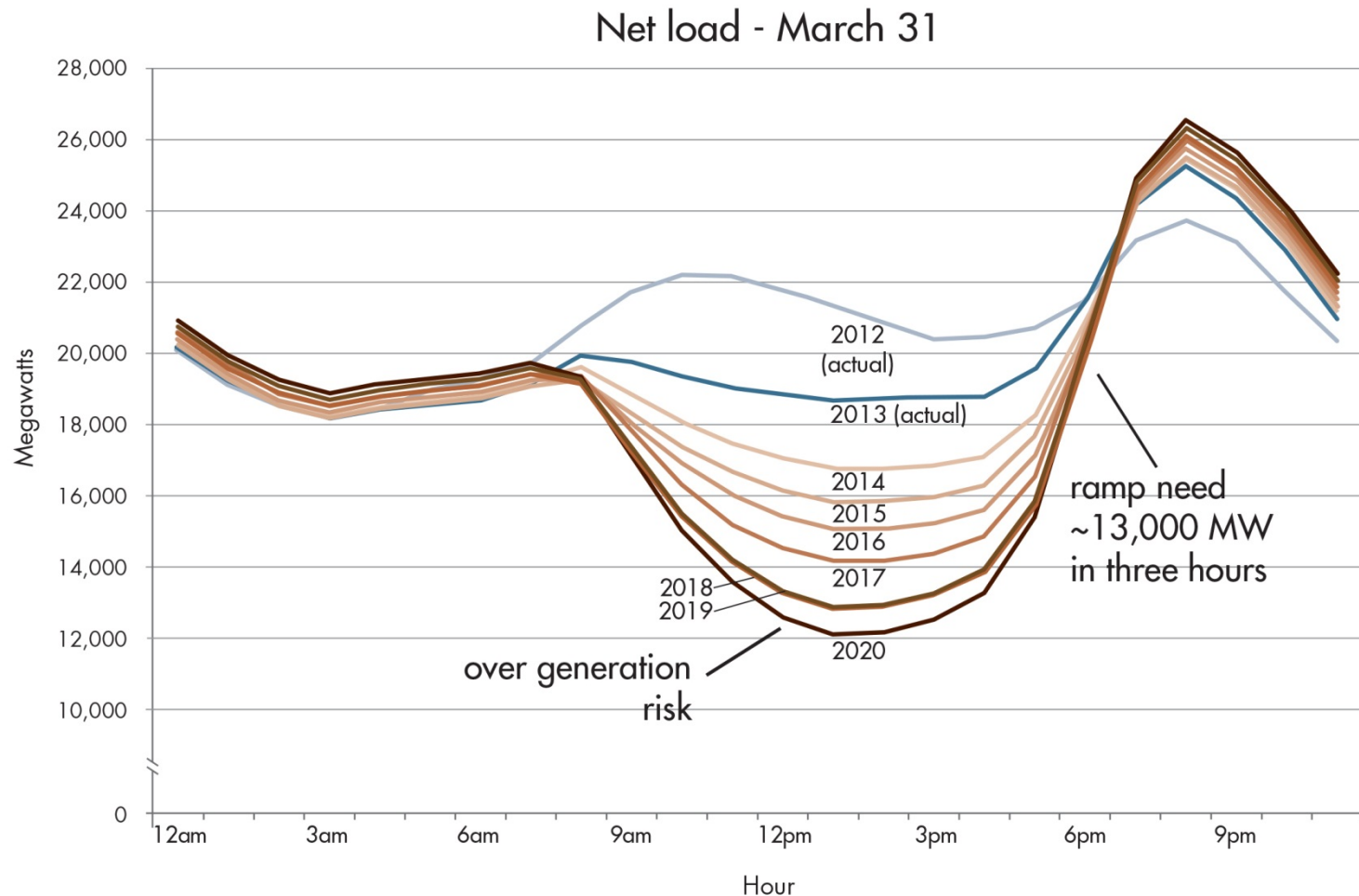
<http://www.caiso.com/informed/Pages/StakeholderProcesses/EnergyImbalanceMarketGovernanceDevelopment.aspx>

# What Regional ISO Market Integration Means to PacifiCorp

- Combine balancing authority areas into one
- Allow resources to be centrally-dispatched on an automated basis
- Facilitate participation in hour-ahead and day-ahead markets
- Make renewables across footprint eligible for California Renewable Portfolio Standard

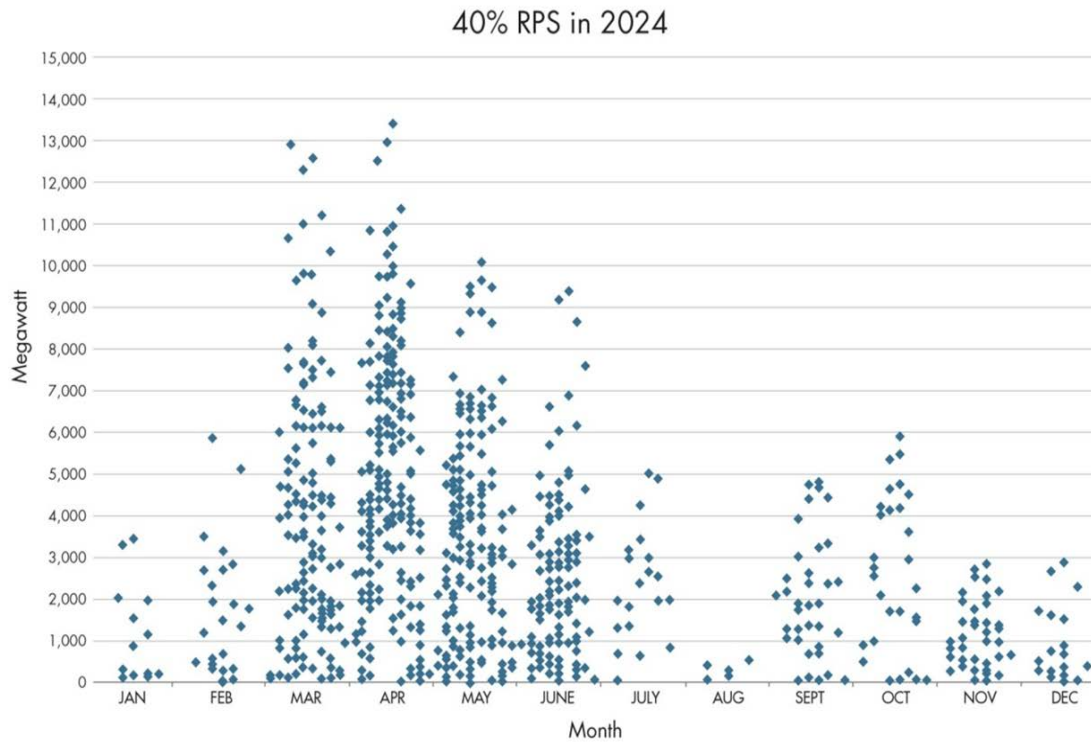


# Non-summer Months – CA Net Load Pattern Changes Significantly Starting in 2014





# CA Renewable Curtailment in 2024 at 40% RPS



Solutions
Targeted Energy Efficiency
Retrofit existing power plants
Enable economic dispatch of renewables
Decarbonize transportation fuels
Increase storage and demand response
Align time-of-use rates with system conditions
Deeper Regional Coordination & EIM

# Market Integration 2015

- Benefits study rollout and results
  - Gross benefits study results were released October 13, 2015
  - Present value savings over the 20-year period 2020-2039 (2015 \$ billions):

Area	Low	High
PacifiCorp	\$1.6	\$2.3
ISO	\$1.8	\$6.8
<b>Combined Benefit</b>	<b>\$3.4</b>	<b>\$9.1</b>

- Memorandum of Understanding extension to July 1, 2016, in order to determine costs to establish net benefits

# PacifiCorp Next Steps

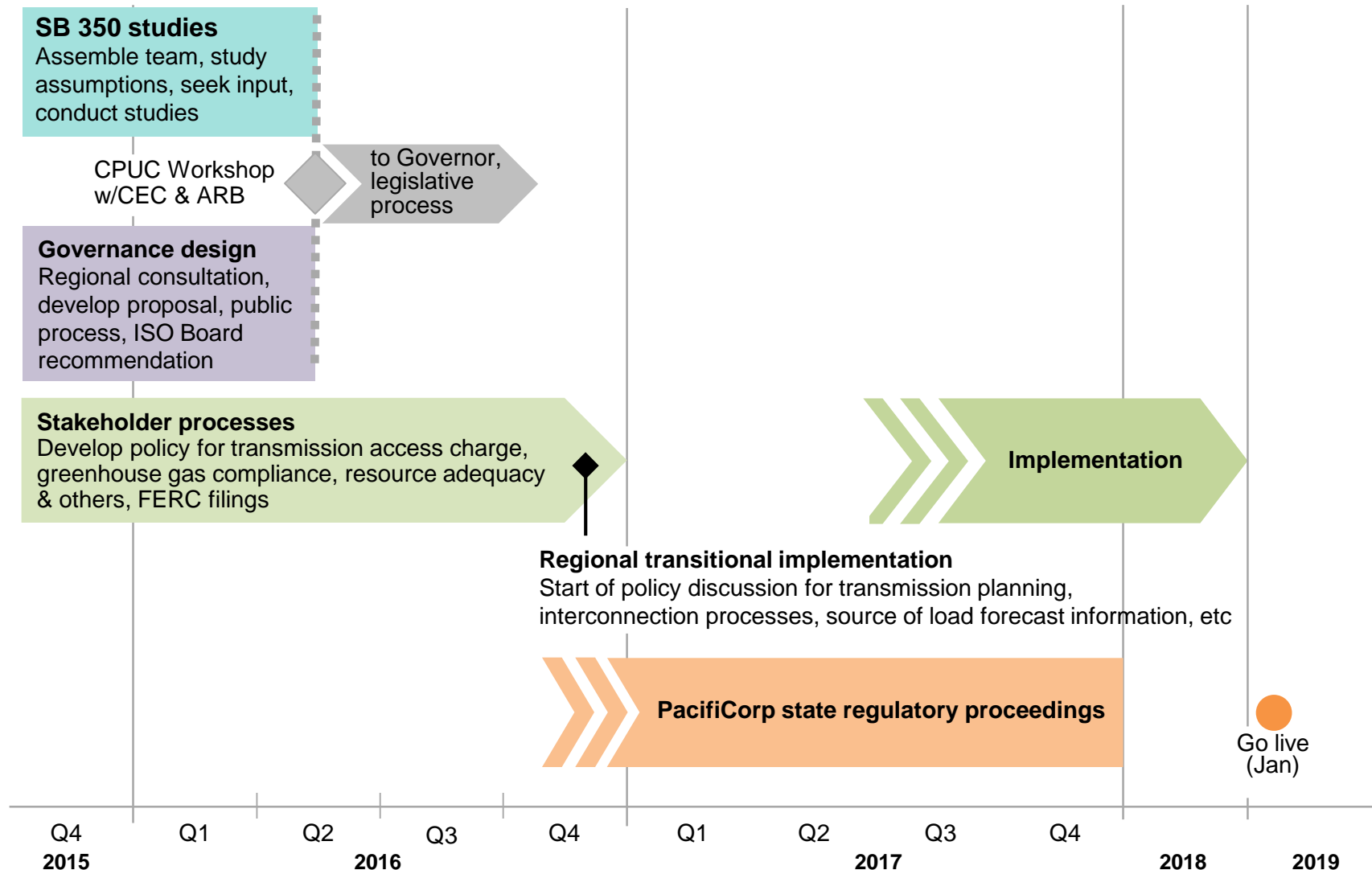
- Participate in market design changes underway
  - Stakeholder workstreams resulting in FERC tariff filings

Initiative	Planned Start to Process
Regional Transmission Access Charge Structure	Q4 2015
Resource Adequacy Rules	Q4 2015
Regional Integration – CA GHG Compliance	Q1 2016
Metering Rules Update	Q1 2016
Full Network Model Enhancements	Q2 2016

- PacifiCorp state filings: Fourth Quarter 2016

# Current Timeline for Regional Integration Activities

*Note: Timeline designed to allow PacifiCorp to seek state regulatory approvals before the end of 2017*



# ISO Governance

- California Senate Bill 350 signed into law
  - Supports regional ISO and directs the California ISO to take various actions
    - Develop specific governance / bylaw modifications
    - Study impacts of a regional market
    - Hold a joint workshop with California Public Utilities Commission, California Energy Commission and California Air Resources Board
    - Submit proposed governance modifications no later than December 31, 2017; currently targeting midyear 2016

# Questions?

