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November 10, 2015

### MEMORANDUM

**TO: Council members**

**FROM: Tom Eckman, Ben Kujala, John Ollis, Gillian Charles and Massoud Jourabchi**

**SUBJECT: Potential Impact of California 50% Renewable Portfolio Standards and Related Developments on the Seventh Plan**

### BACKGROUND:

Presenter: Tom Eckman and Ben Kujala

Summary: The increase in California's RPS and the expansion of the CAISO beyond that state's borders could potentially affect the Northwest power system and power market in several ways. These include:

- Need for In-Region Resource Development
- PNW and WECC-wide Resource Mix and Location
- System Operation (e.g., flexibility and oversupply)
- Wholesale Market Prices

Staff will present its assessment of whether any of the possible impacts would alter the draft Seventh Plan's resource strategy or Action Plan in the near-term. However, in the staffs judgment many significant factors that will determine the eventual impact of the California 50% RPS, especially when coupled with an expanded CAISO are still "in play." Hence, a definitive statement of the potential long-term impact on any of the areas listed above is viewed as premature, and therefore, should be considered in future Council Plans.

Relevance: The Northwest and California power systems and markets are interconnected. Therefore, policies and resource development in California impact the Northwest.

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

- Complete draft plan resource strategy and draft action plan

Background: In October of 2015 California enacted legislation that increased in Renewable Portfolio Standard (RPS) from 30% by the end of 2020 to 50% by the end of 2030. This legislation also authorized the California Independent System Operator (CAISO) to its governance structure so that parties outside the state could fully participate in that states electricity market. Several Northwest Investor-Owned Utilities have announced that they intend to participate in the CAISO's Energy Imbalance Market (EIM) and PacifiCorp has indicated that it is considering full participation in the CAISO.

More Info: N/A

# Potential Impacts on 7<sup>th</sup> Plan of California 50% RPS

**Power Committee**  
**November 17, 2015**



## Outline

- **Scope and Timing of Revised California RPS**
- **Status of compliance with prior RPS**
- **Potential Impacts on PNW**
  - **In-Region Resource Development**
  - **Resource Mix & Location**
  - **Market Price Issues**
  - **Operational Issues**



## California RPS: 50% by 2030

- **SB 350** signed by Governor Brown in October 7, 2015
- Doubles Energy Efficiency “targets” by 2030
- Extends timeline and increases target of California’s RPS, from 33% in 2020 to 50% in 2030

RPS as % of Retail Sales (IOUs & Municipals)	By End of Year
33%	2020
40%	2024
45%	2027
50%	2030

**\*Existing RPS also set storage target of 1,325 MW to be procured by 2020 (in service by 2024). This was not changed.**

## California IOUs Are Already Well Positioned to Meet Higher RPS

- RPS targets did not change in the near-term
- Data from CPUC show the three large IOUs in CA are on track to meet/exceed 2020 target (33%)
  - Percentage of RPS procurement currently under contract for 2020 (as of Sept 2015)
    - Pacific Gas & Electric → 31.3%
    - Southern Cal Edison → 23.5%
    - San Diego Gas & Electric → 38.8%
- SB 2, passed in 2011 – codified multi-year compliance periods (linear ramp up between target years)
  - 2016: 25%, 2017: 27%, 2018: 29%, 2019: 31%

## Potential Impact on PNW Renewable Resource Development

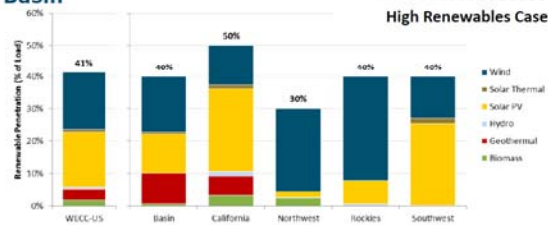
- About **3,000 MW** installed wind capacity in the PNW is currently under contract to California
- In 2011, CA placed restrictions on out-of-state resources used for RPS compliance
  - Three portfolio procurement categories; establish limits to out-Of-state unbundled RECs
- **If** PacifiCorp joins the CAISO, renewable projects in PAC territory would be eligible for California RPS requirements

## Solar PV Resources Are Generally Forecast to Meet CA Increased RPS

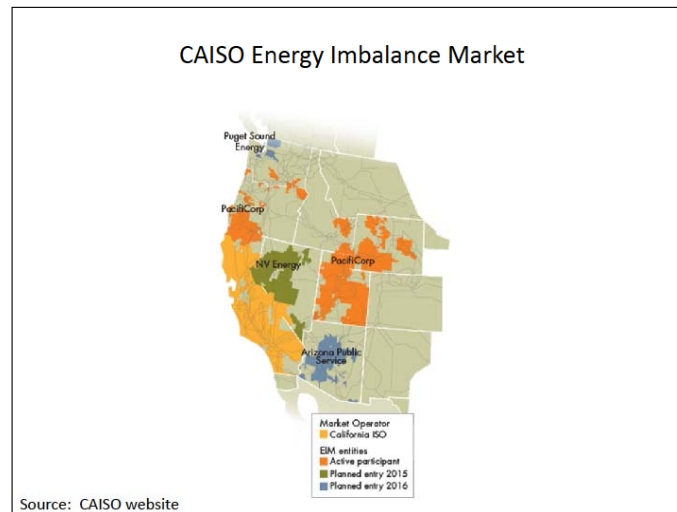


### Case 2: High Renewables Case

- + Renewable penetration is approximately **41%** of supply (**43%** of sales)
  - Wind and solar provide approximately **34%** of supply
- + Incremental resource mix varies by region: mostly solar in CA & SW, wind in NW, mixed in Rockies & Basin



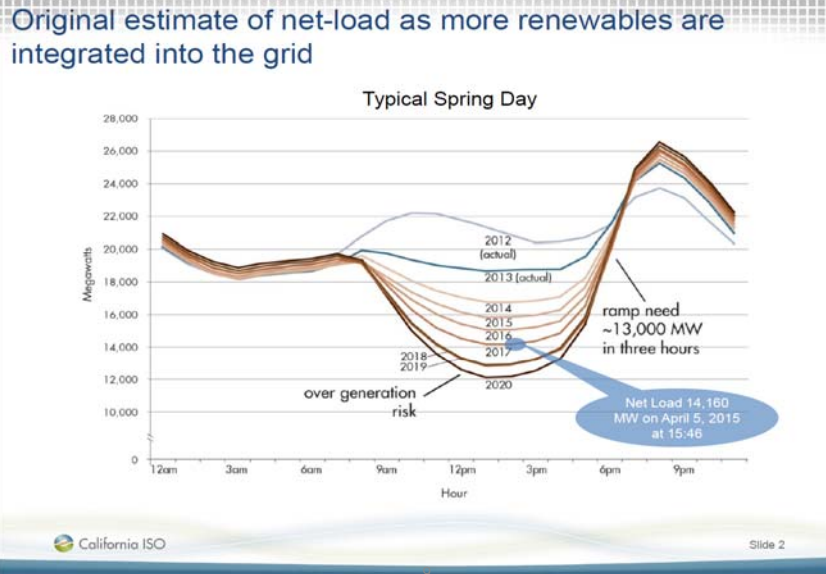
## However, PacifiCorp Renewable Resource Development Outside of CA May Rely More On Wind from the "Rockies"



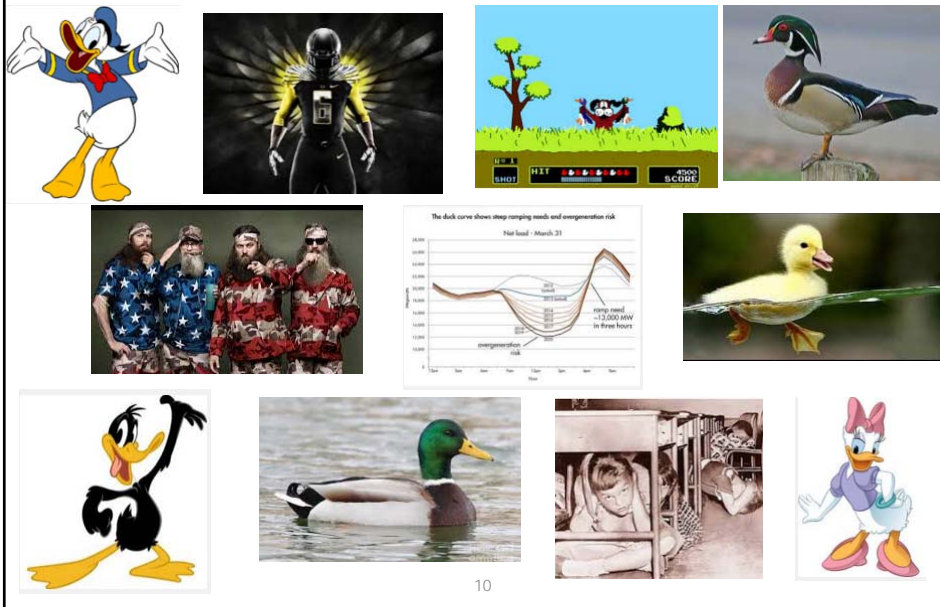
## Potential Market Impacts

- **Added generation for RPS could be located in the PNW**
  - Proportionally, this could allow around 1500 MW additional renewable PPAs
  - Transmission constraints could limit additional development
- **Market prices could be depressed in PNW markets from both added regional and out-of-region resources**

# How Might This Impact the "Duck Curve"



# Every Duck (curve) is Different!



## What is a Duck Curve?

- Duck curve label was first used in reference to increased generation from solar. This leads to two primary impacts
  - Potential over generation during the day
  - Rapid net load ramps as solar generation declines
- California RPS requirements is the driving force behind the expansion of solar.
- ISO raised the duck curve issue to raise an alarm on system reliability.

## Main Duck parts of Interest to NW

- **Belly** : over generation, possible lower market prices, lower opportunity for secondary sales.
- **Neck**: Fast ramp rate. Higher market prices, higher opportunity for secondary sales.

How the neck and belly issues are dealt with depends on operational issues CA ISO will be dealing with, as the future unfolds.



## Duck Curve Mitigation Options

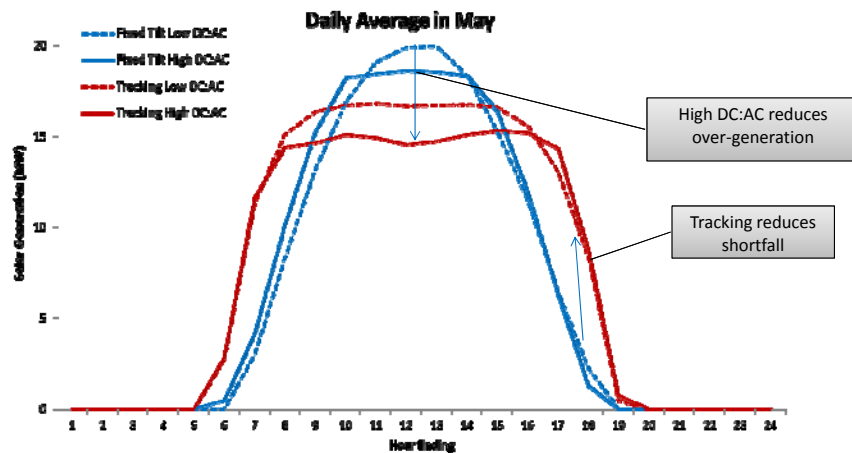
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### SCE analysis of Solar Shapes

– March 12, 2015 presentation shows assumptions on LTPP 2014 were too constraining.

### Annual Over generation can be reduced by 50%



## Over-generation Studies

- **Of concern to NW is California over-generation**
- **How much, and when would California export to NW.**
- **Do we have market price differential due to large renewables.**
- **Opportunity for power sales from NW to CA would be during the rapid ramp period (neck)**

## Upcoming studies

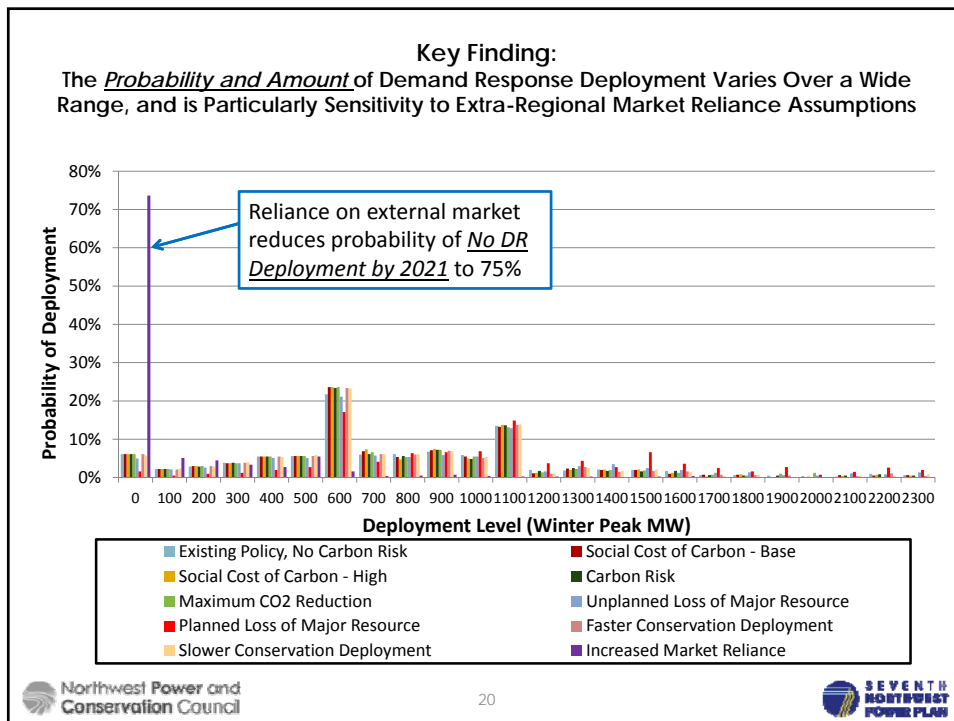
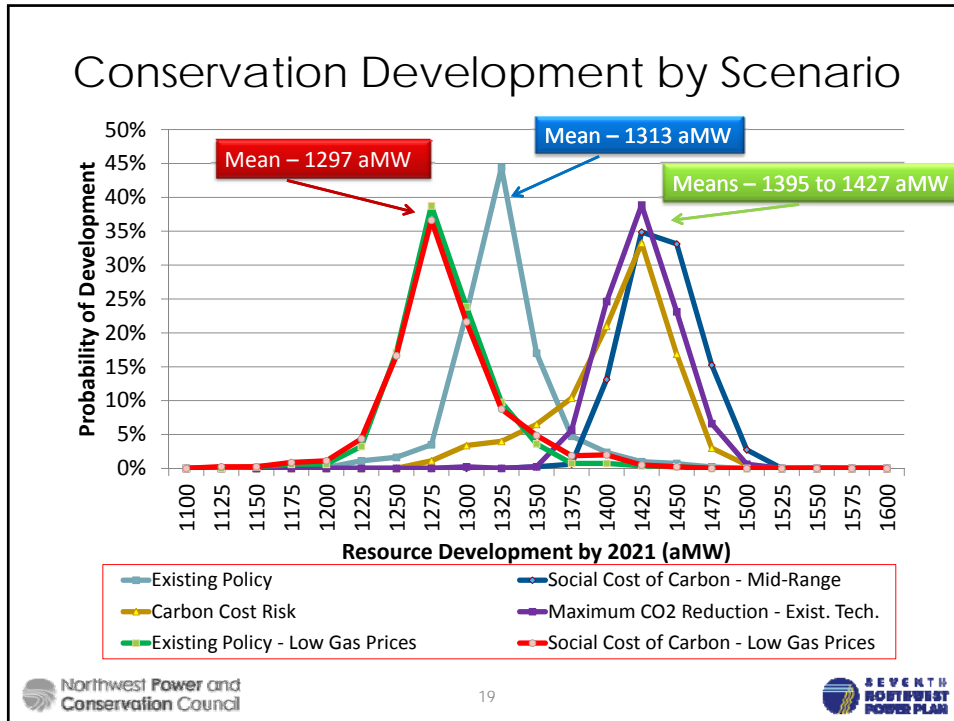
- **Current and planned CAISO, CEC, CPUC analysis for 2016 would shed more light on the potential impact in the NW.**
- **These studies will try to present a more accurate picture of impact of fulfilling the 50% RPS by resources in California only, or WECC wide.**

## Conclusions Regarding Impact of the CA RPS

- Size of the Duck is highly assumption driven.
- Size of duck curve can be much smaller than initially estimated.
- Planned mitigation actions could further reduce over generation period and reduce ramp rate for the neck.
- More will be know by next year.

## Impact on Council Analytics

- AURORAxmp price forecast would likely be reduced
  - RPM would likely import more out-of-region power based on the price change
- May impact RAAC recommendations on reliable out-of-region imports
  - Reduce need for and value of DR and EE
  - Low Gas Price Scenario “illustrative” of potential impact



## Potential Impact on Draft Plan

- **No significant change in resource strategy through 2021**
- **Track evolution of CA ISO EIM and full market participation by NW utilities**
- **Review conditions in mid-term assessment**