DOCKETED

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Storage Follow Up

Additional submitted attachment is included below.

Columbia Gorge Renewable Energy Balancing Project

(FERC No. P-14729)

Clean Power Development LLC

Clean Power Development LLC

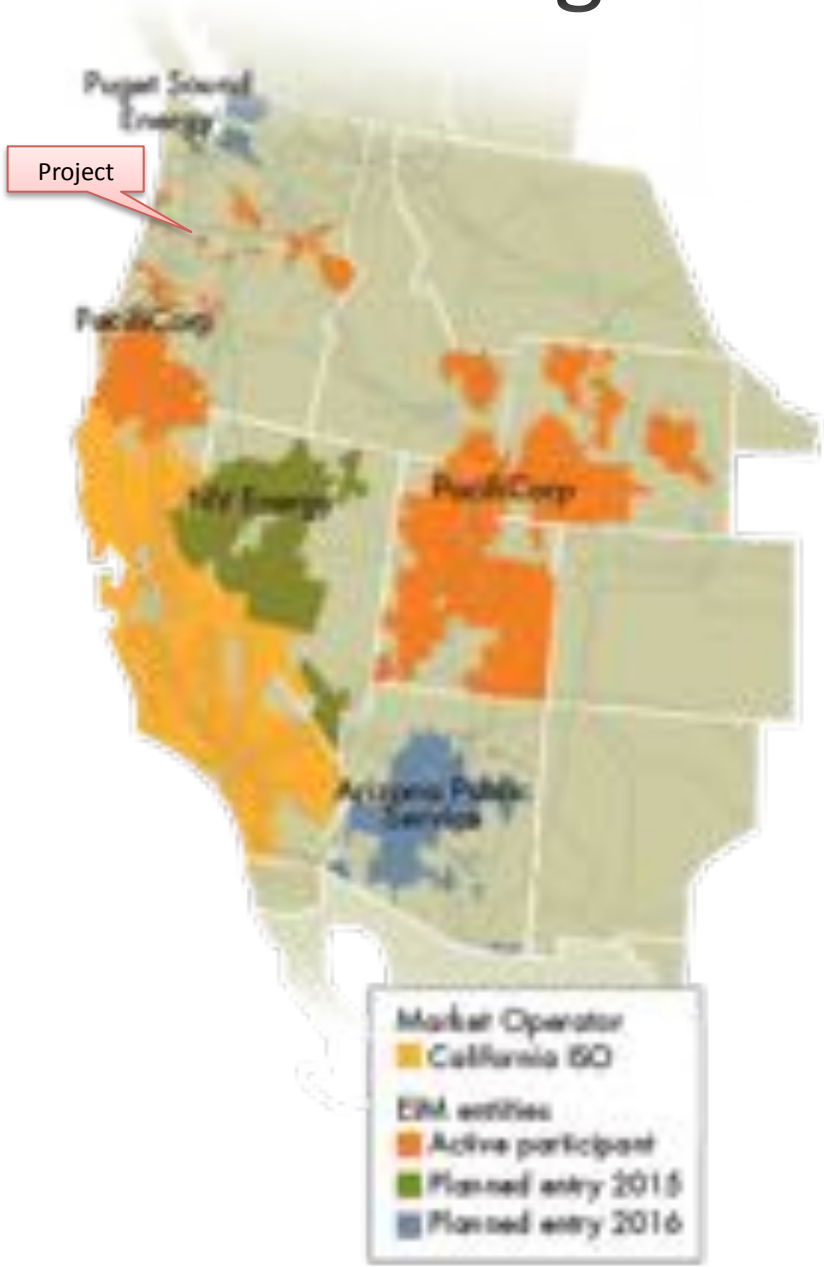
- Clean Power Development (CPD) LLC is a project development company dedicated to the need for reliability of an affordable clean power supply in decarbonizing the power system

- CPD LLC will develop a new, bulk energy storage project to meet the challenge of integrating intermittent renewable energy such as wind and solar

- CPD LLC principals, partners and backers bring unique perspective, experience and focus to hydropower development along with a track record of success in energy project development

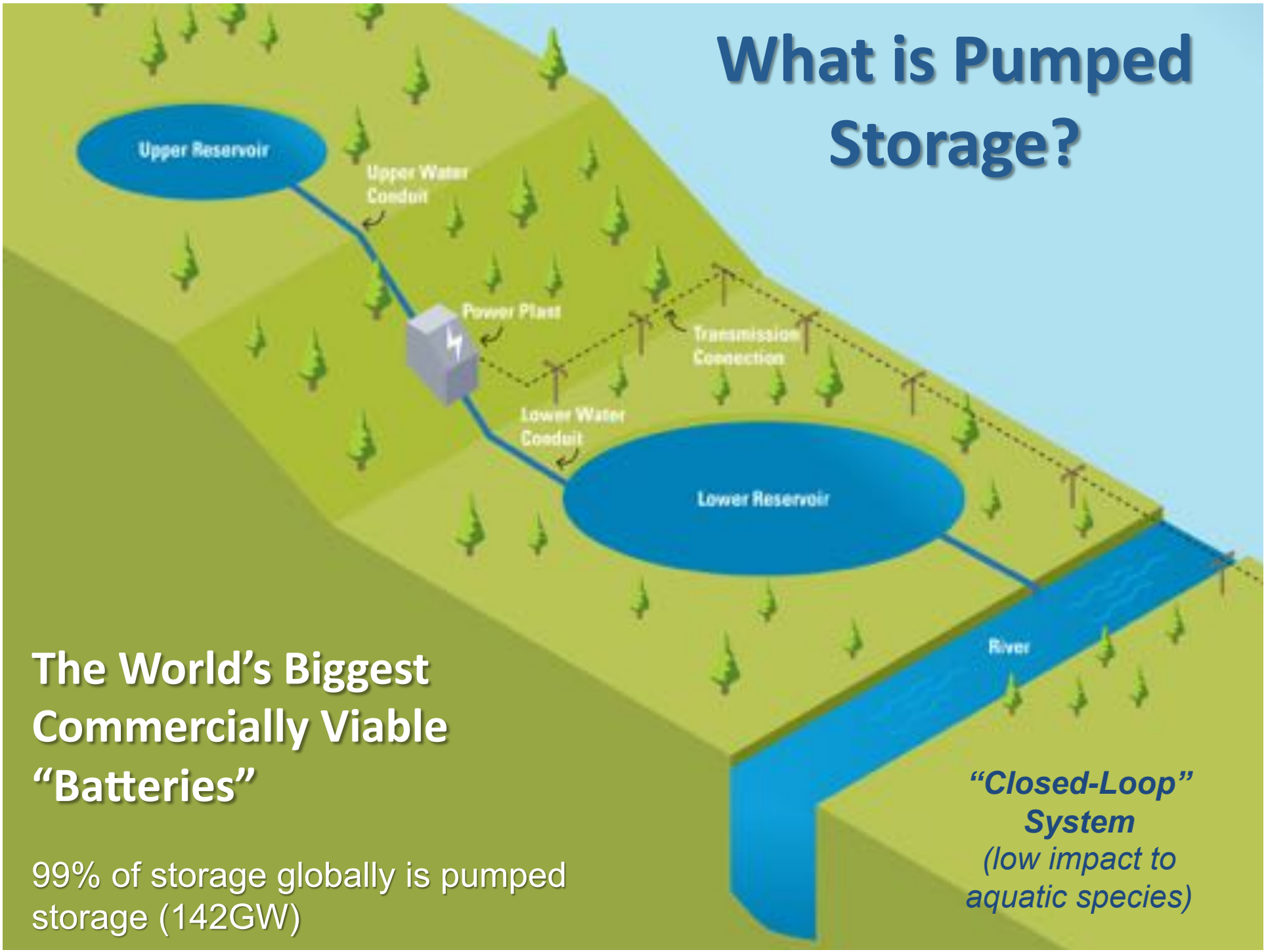
- CPD LLC is a 100% independent with no ownership ties to power generation companies or incumbent utilities

Storage Need/Market Drivers



- **Incredible need for carbon-free, flexible capacity/storage to balance renewable energy**
- West-wide Energy Imbalance Market (EIM)
- PacifiCorp joining California ISO
- EPA's Clean Power Plan (i.e. coal plant retirements)
- California 50% renewable energy mandate
- Regional increasing state renewable energy mandates
- Massive solar/wind oversupply
- Optimizing over 4700 MW of wind interconnected to Bonneville Power Administration's (BPA) system
- Over 7500 MW of wind generation in BPA's Interconnection Request Queue
- BPA's Focus 2028
- Columbia River Treaty

What is Pumped Storage?



The World's Biggest Commercially Viable "Batteries"

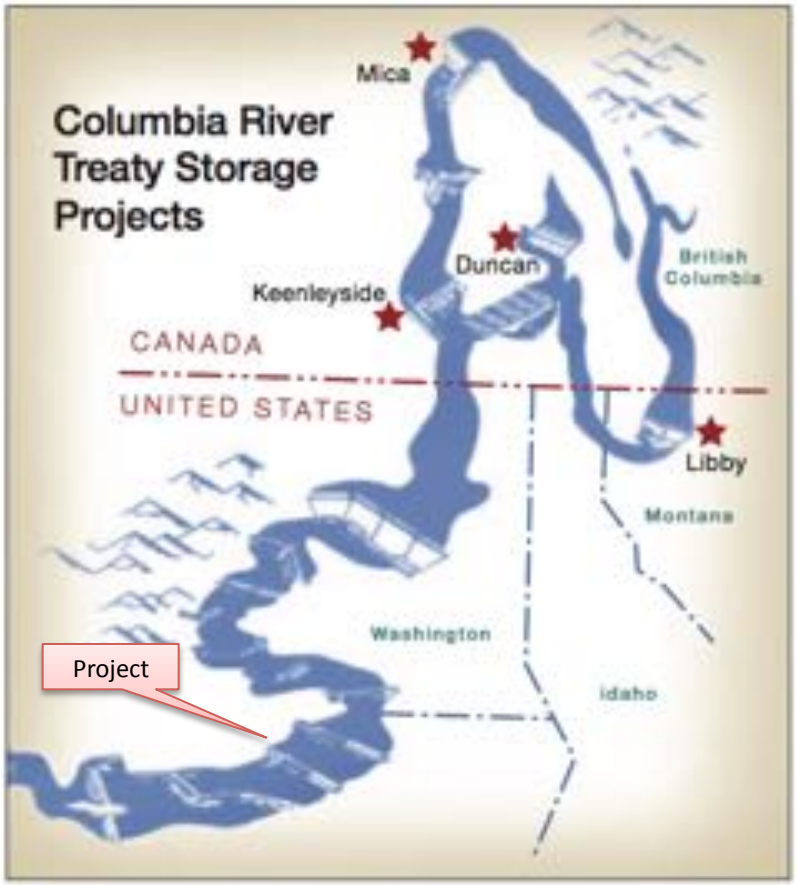
99% of storage globally is pumped storage (142GW)

"Closed-Loop" System
(low impact to aquatic species)

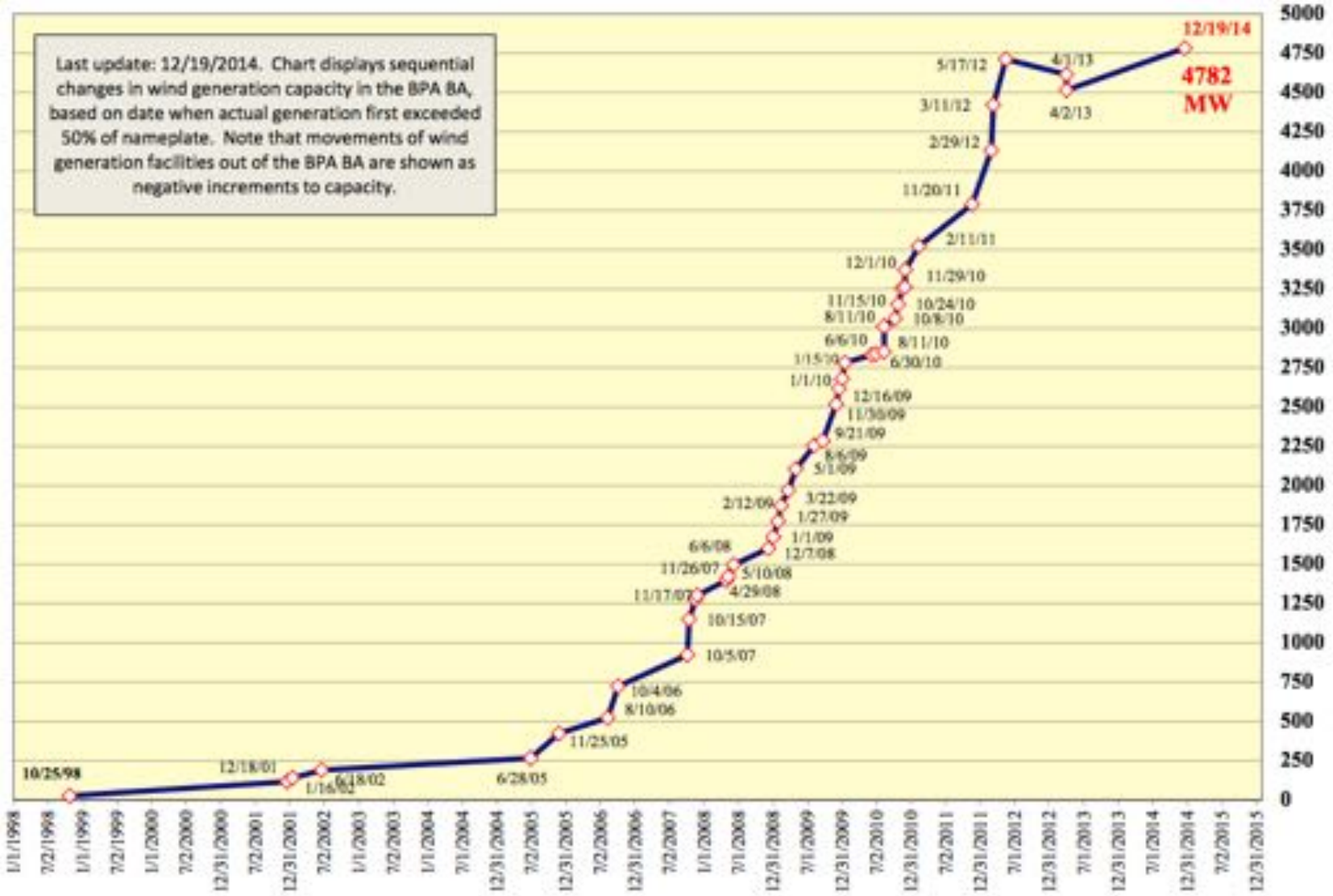
Location, Location, Location!

The Project is the premier site strategically located in the West

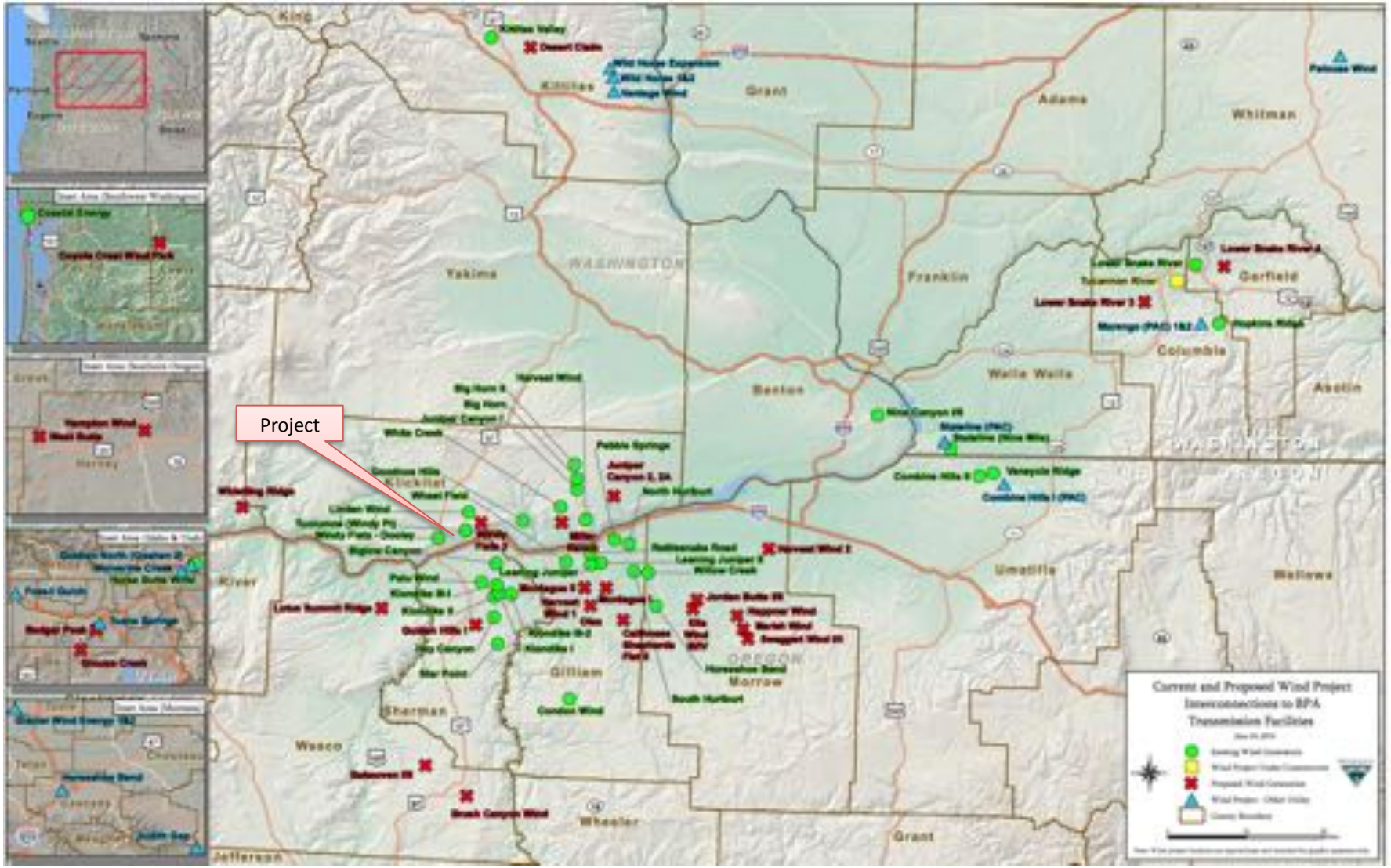
Columbia River dams showing signs of age and in need of extensive investment



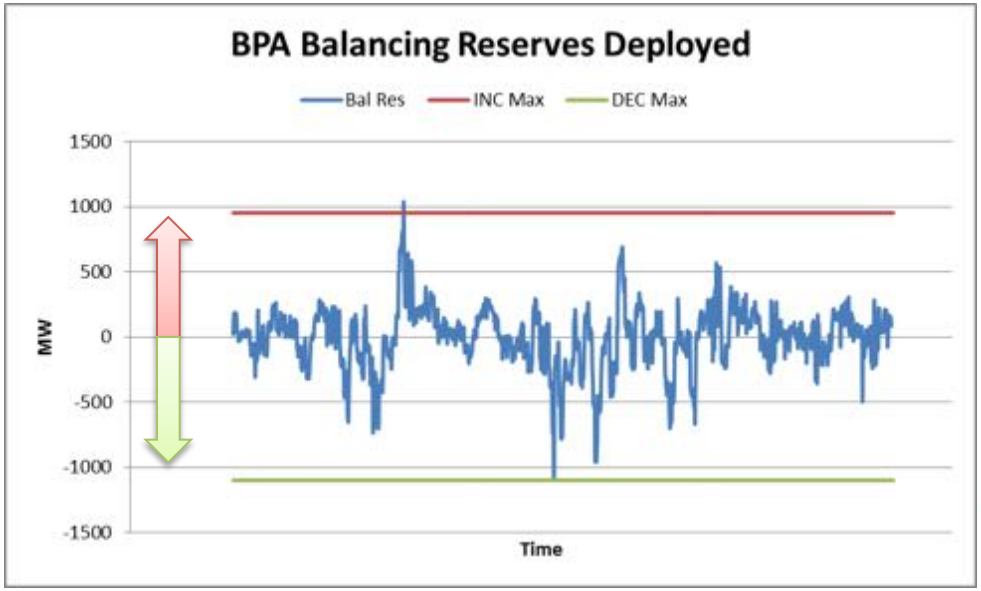
Wind Generation Capacity in BPA Balancing Authority Area

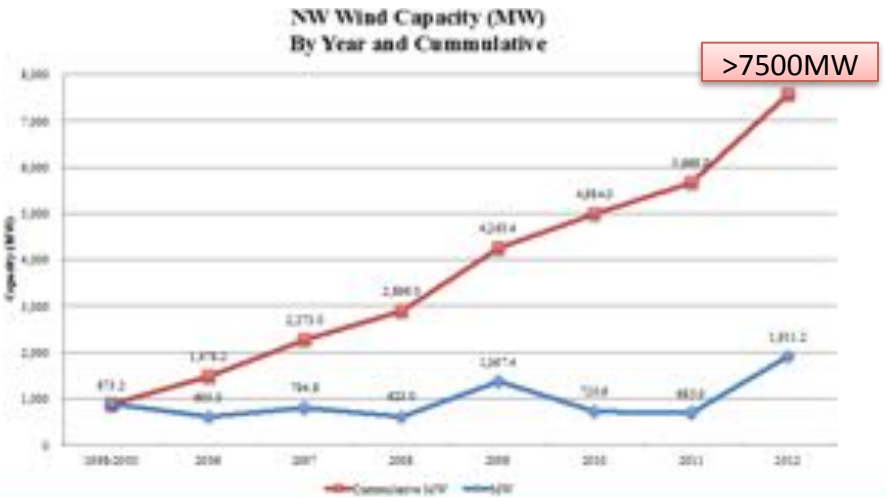


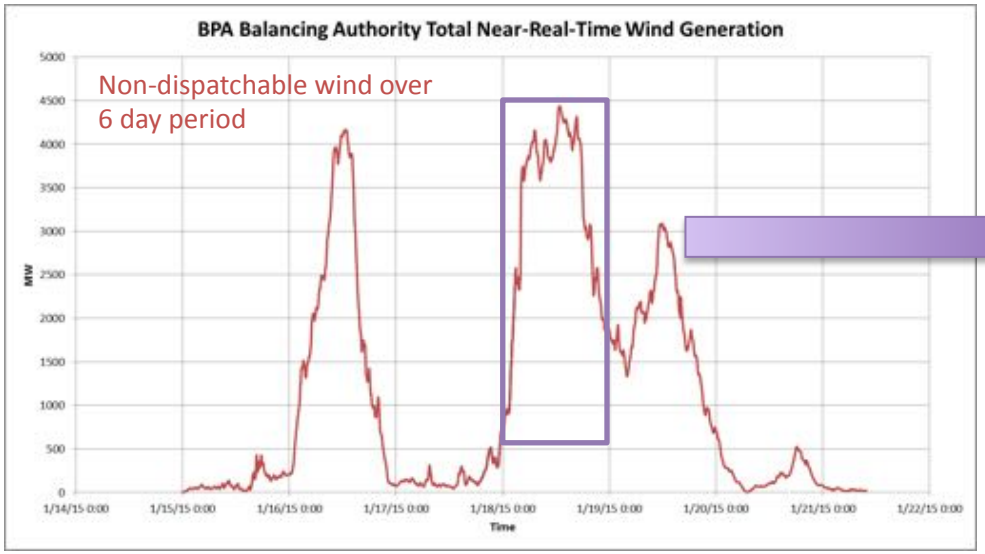
Current & Proposed Wind Projects Interconnections to BPA

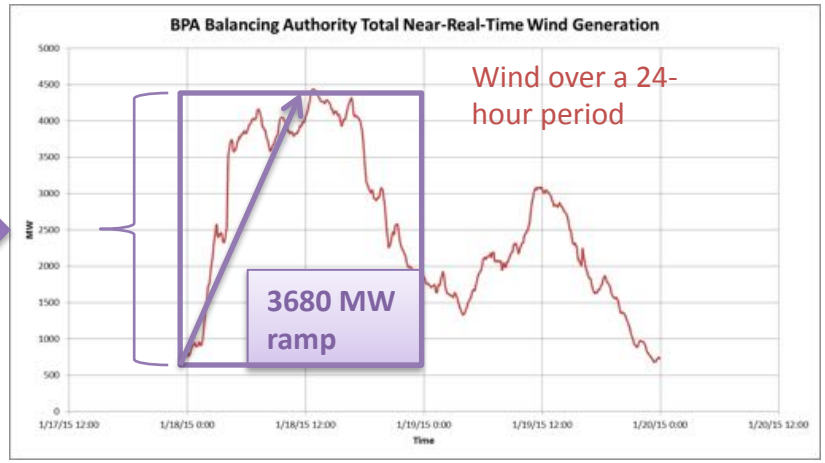


Wind Energy in the Northwest









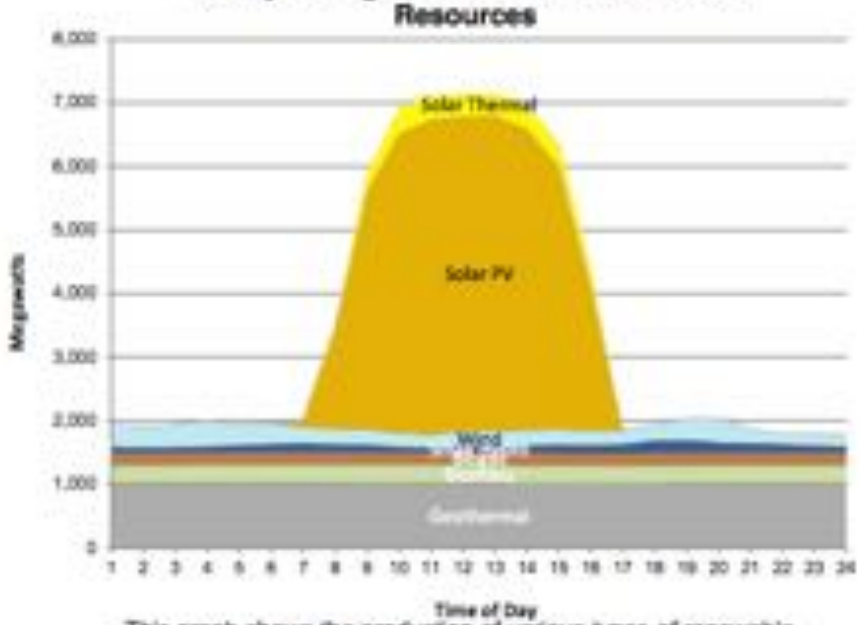
California Renewables Production

24-Hour Renewables Production

Renewable Resources	Peak Production Time	Peak Production (MW)	Daily Production (MWh)
Solar Thermal	9:28	391	2,688
Solar	10:44	4,980	36,124
Wind	3:06	465	6,143
Small Hydro	18:24	205	3,077
Biogas	22:58	204	4,804
Biomass	10:13	281	6,567
Geothermal	5:05	1,028	24,544
Total Renewables			**83,947**
Total 24-Hour System Demand (MWh):			*557,277*

This table gives numeric values related to the production from the various types of renewable resources for the reporting day. All values are hourly average unless otherwise stated. Peak Production is an average over one minute. The total renewable production in megawatt-hours is compared to the total energy demand for the ISO system for the day.

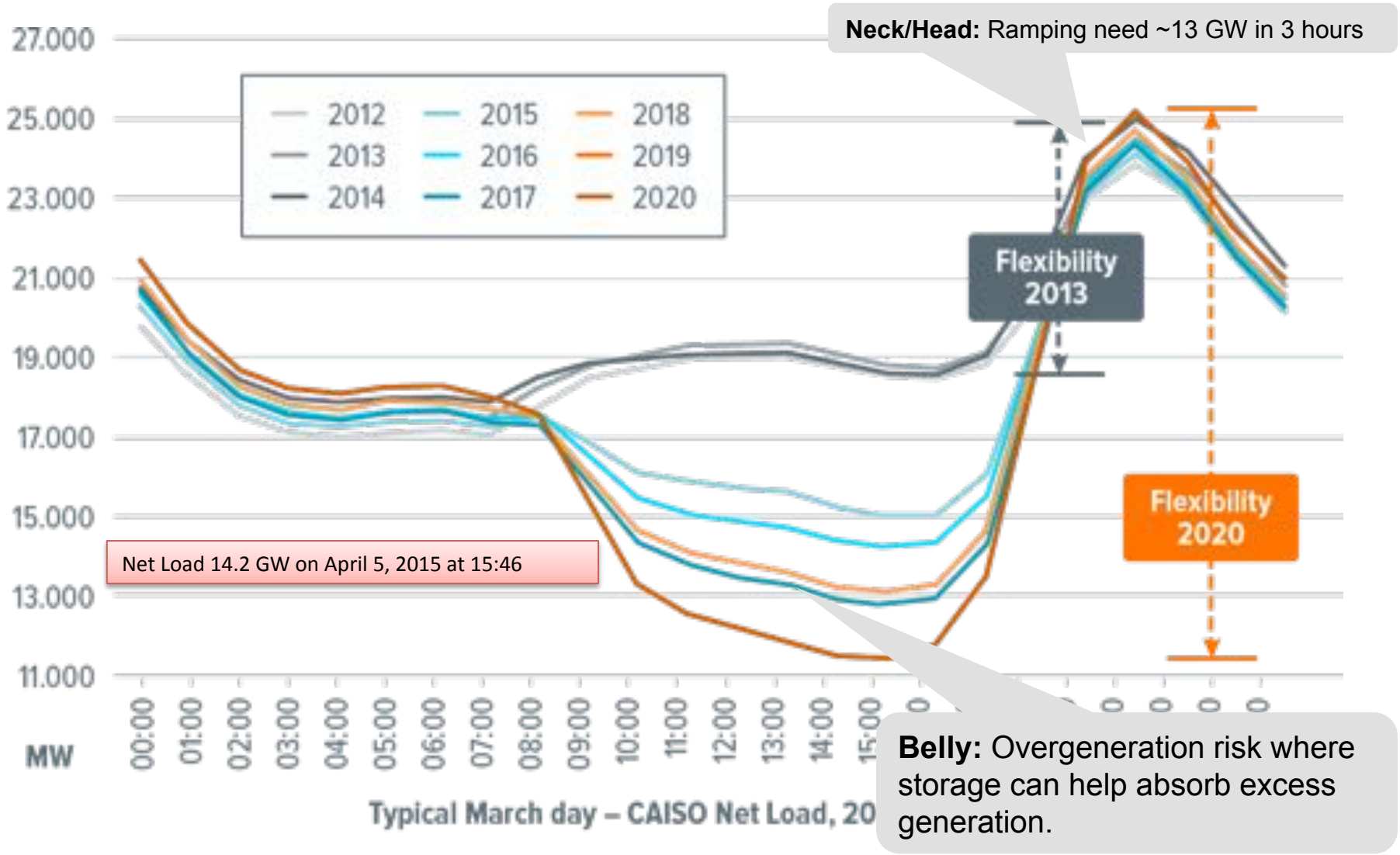
Hourly Average Breakdown of Renewable Resources



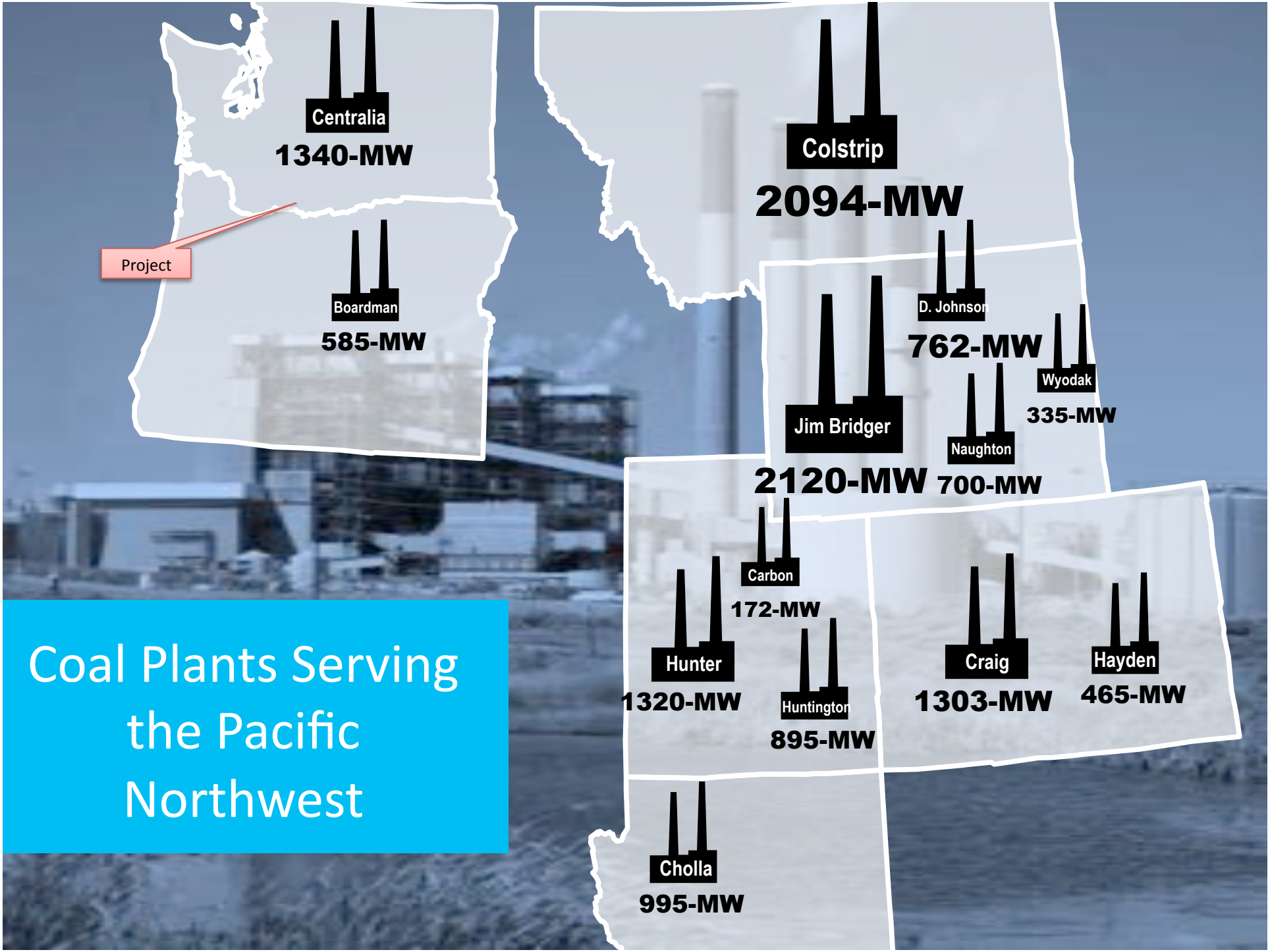
This graph shows the production of various types of renewable generation across the day.

System Peak Demand (MW) *one minute average	**27,274**
Time:	**17:43**

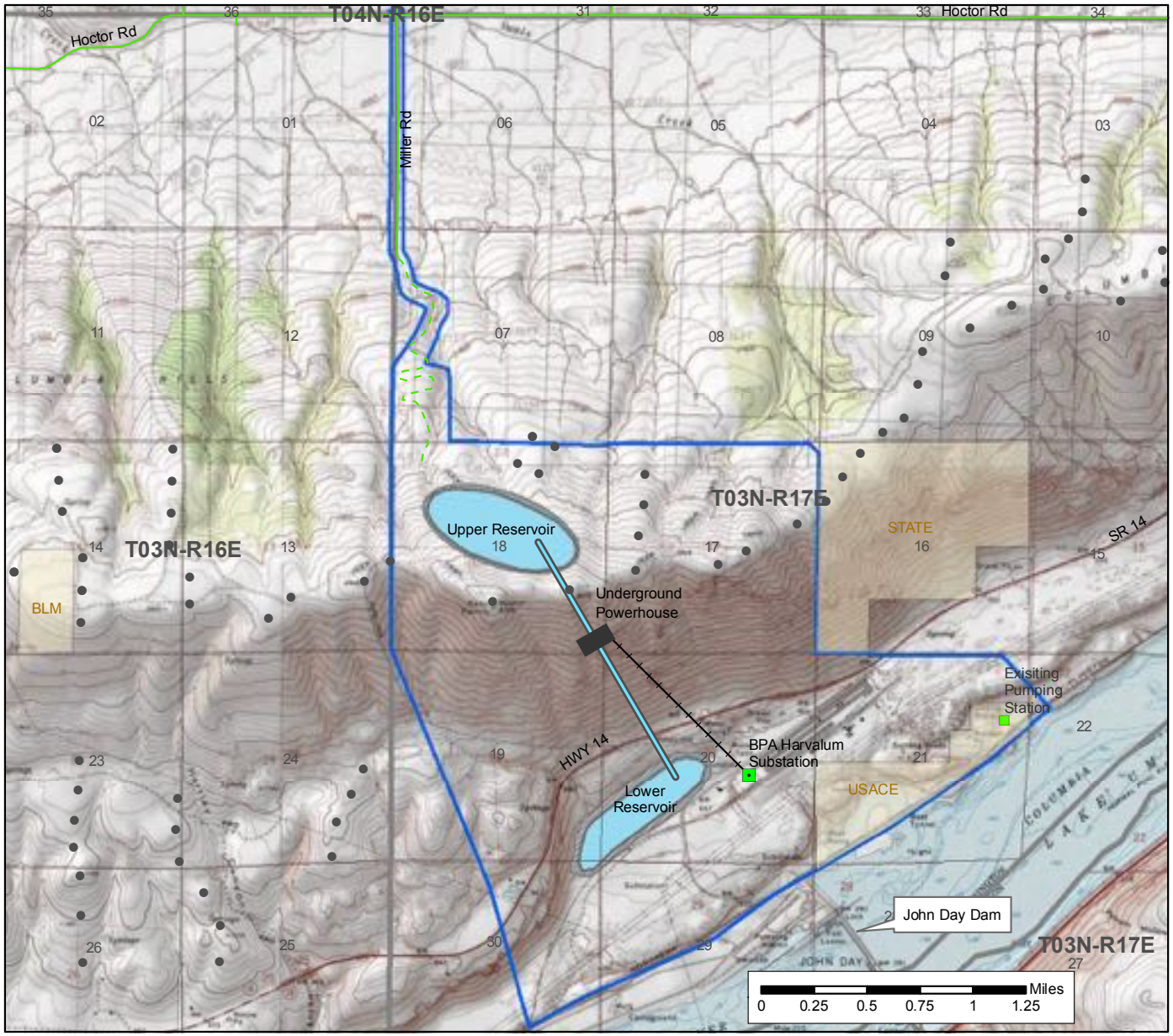
California's Growing Flexibility Need Due to Solar ("Duck Curve")



Net Load (i.e. forecast variability) = forecasted load - forecasted intermittent wind/solar production


Centralia
1340-MW
Project
Boardman
585-MW
Colstrip
2094-MW
D. Johnson
762-MW
Wyodak
335-MW
Jim Bridger
2120-MW
Naughton
700-MW
Carbon
172-MW
Hunter
1320-MW
Huntington
895-MW
Craig
1303-MW
Hayden
465-MW
Cholla
995-MW
Coal Plants Serving the Pacific Northwest

Columbia Gorge Renewable Energy Balancing Project (CGREBP)



Project Overview

Legend

- Project Boundary
- Proposed Reservoir
- Proposed Underground Water Conveyance Tunnel
- Proposed Underground Powerhouse
- Proposed Project Transmission 230-kV
- BPA Harvalum Substation
- Existing Wind Turbine
- Area Roads
- Public Land
- Township
- Section

1:40,000

Project Characteristics

Underground Powerhouse:	
Rated Head (Gross) Hydraulic	2,000 feet
Discharge Capacity	7,000 cfs
Generating Capacity	*Up to* 1200 MW
Number of Units	*Up to* 4 × 300 MW

Underground Water Conductors/Penstock:	
Total Length	7000 feet
Composition Tunnel	Shotcrete/steel
Tunnel/Shaft Diameter	24 feet
Length/Head Ratio	3.5

Lower Reservoir Dam:	
Type	Rockfill embankment ring dike
Height	295 feet
Length	5,870 feet

Upper Reservoir Dam:	
Type	Rockfill embankment ring dike
Height	295 feet
Length	5,870 feet

Surface Area at Maximum Pool	100 acres
Active Storage Capacity	11,000 ac-ft
Hours of Storage	8-10 hours/day

ROM Cost Estimate
400MW Variable Speed PSH Project

(Millions $USD)

Pre-construction Geotechnical / Design Work	$30
General Conditions	$40
Access Roads & Staging	$20
Upper Reservoir	$110
Access Tunnels	$15
Ventilation Shafts and Tunnels	$25
Water Conductors	$110
Powerhouse Cavern	$50
Re-conductor Existing BPA Transmission Lines	$45
Electrical Mechanical Equipment	$240
Total Construction Cost	**$685**

KPUD has existing water right

	KPUD Water Right	As % of Min. Columbia River Flow	As % of Max. Columbia River Flow	As % of Avg. Columbia River Flow
Max Instantaneous Rate	34.63 cfs	0.05%	0.02%	0.03%
Max Cumulative Annual Volume	15,479 AFY			