PNWER - 29th Annual Summit

Energy Resilience, Regional Reliability and the Importance of Infrastructure

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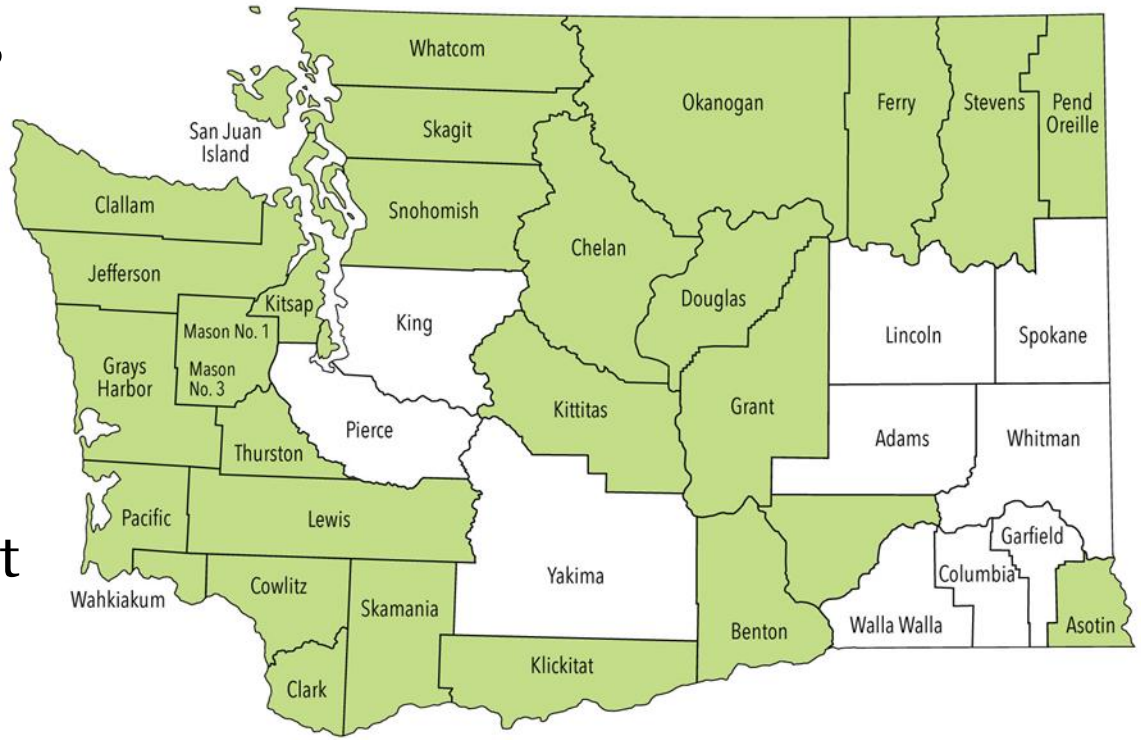
Washington Public Utility Districts Association

Washington's Public Utility Districts

- WPUDA represents 27 Public Utility Districts and 1 joint operating agency, Energy Northwest
- Public Utility Districts
  - Retail electric, water and wastewater service to about 2.5 million people
  - Wholesale telecommunications
  - Community-owned and not-for-profit
  - Governed by elected commissioners, and run by a general manager

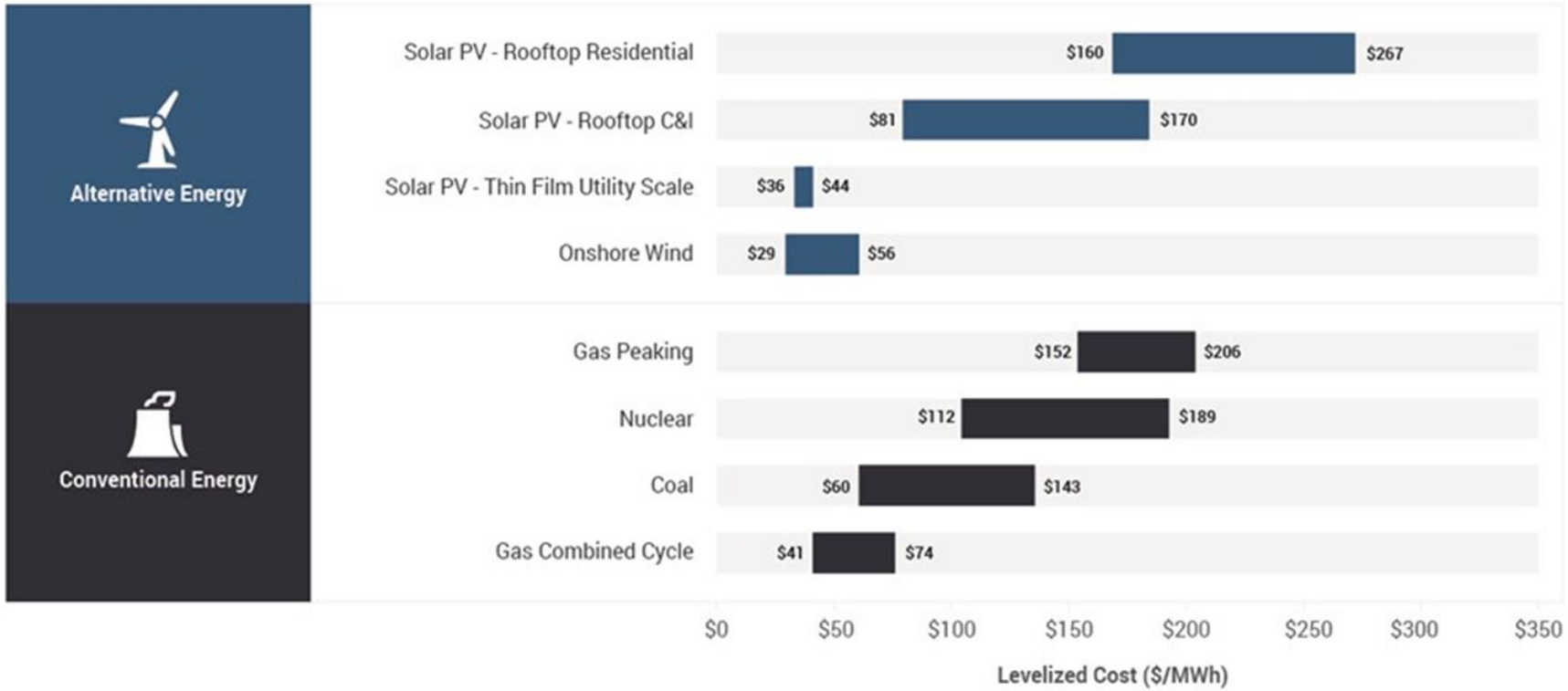


2023 LOLP Heat Map (%)[1]

SW Import (MW)	1500	2000	2500	3000	3500
High Load (+2%)	14.3	12.1	10.1	7.8	6.0
Med Load	11.0	8.6	6.9	5.1	3.9
Low Load (-2%)	8.0	6.4	4.9	3.5	2.3

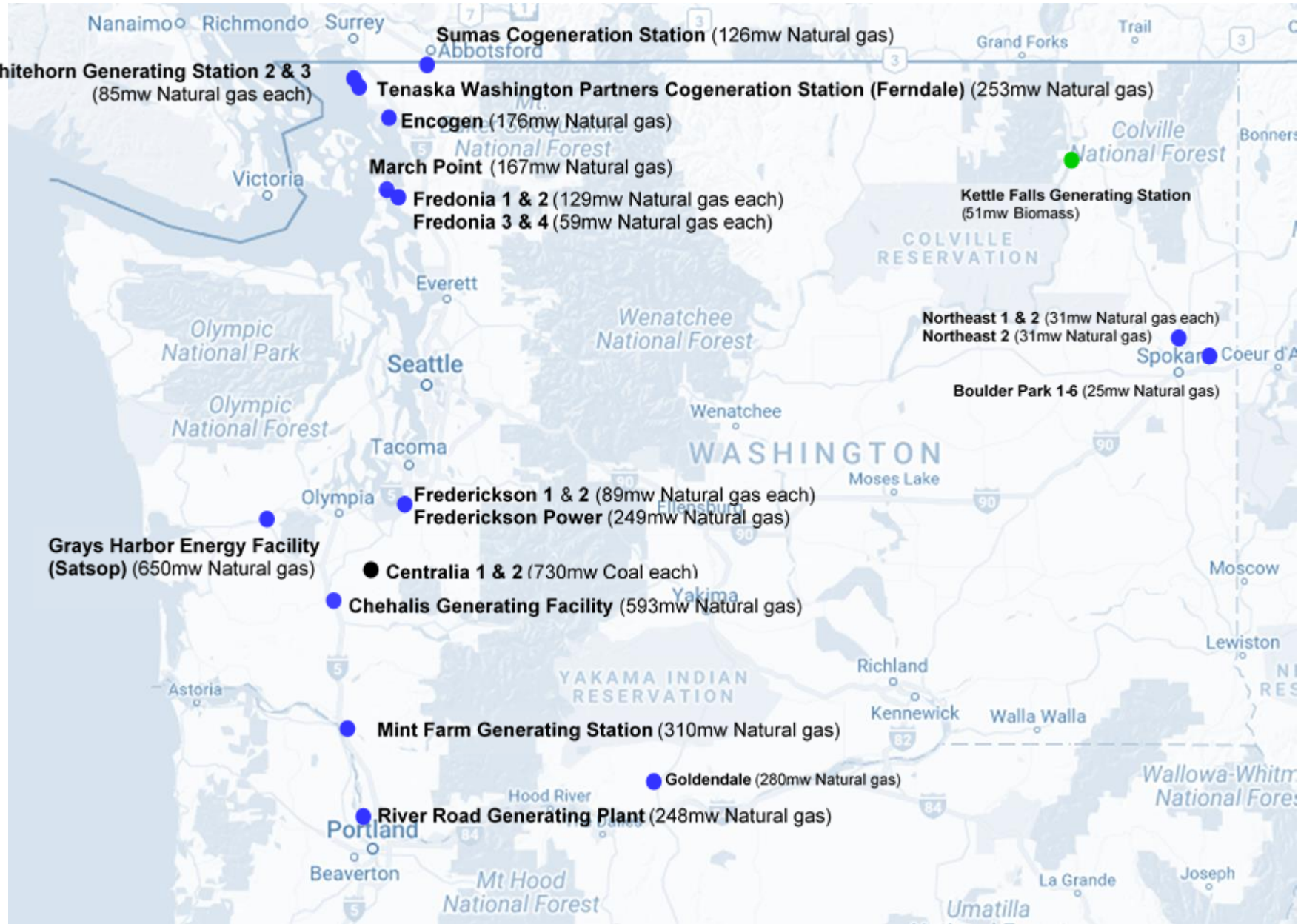
[1] Preliminary Resource Adequacy Assessment, RAAC Steering Committee Meeting, March 26, 2019

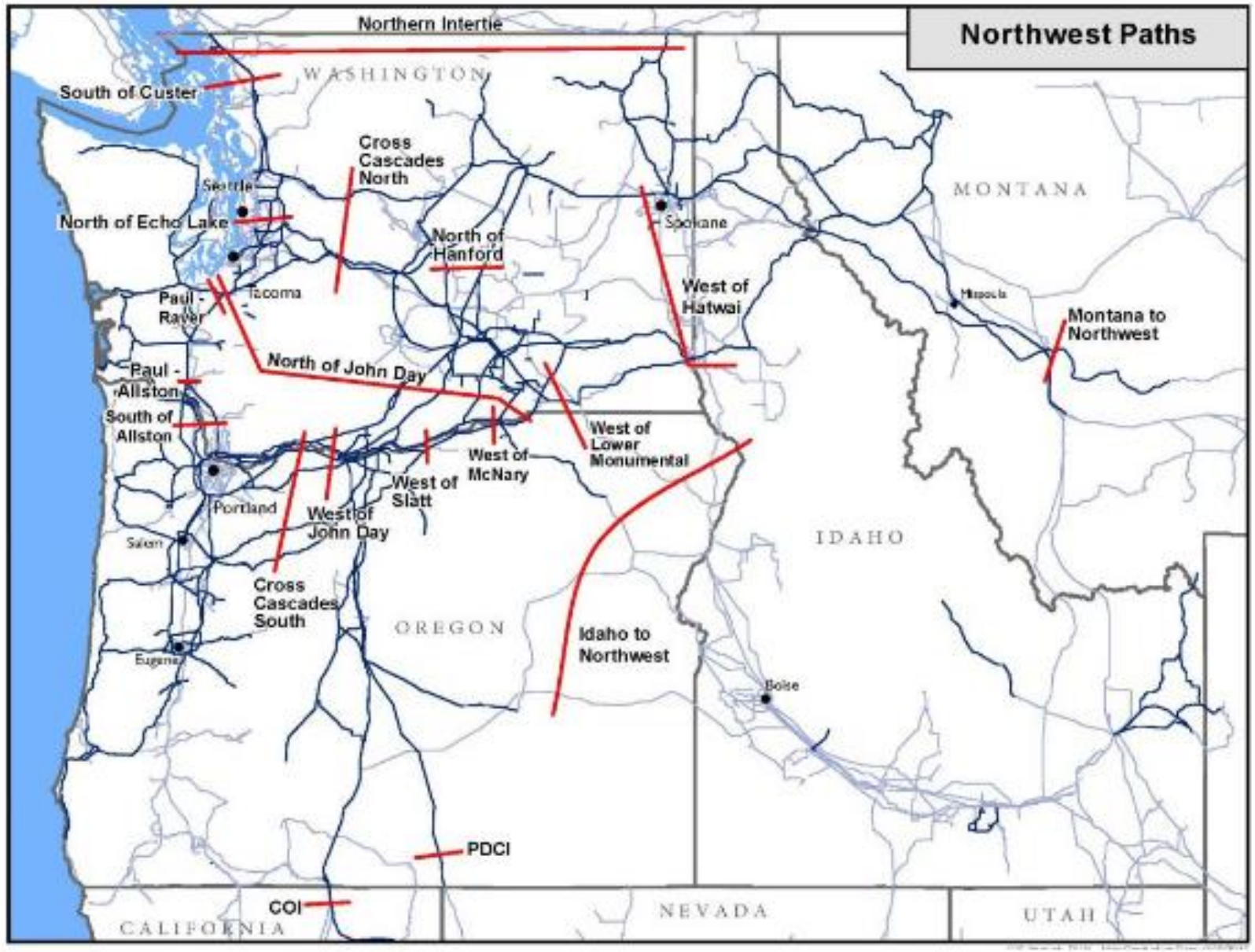
Renewable Generation is Cost Competitive



…in some scenarios the full-lifecycle costs of building and operating renewables-based projects have dropped below the operating costs alone of conventional generation technologies such as coal or nuclear...

-Lazard, 2017


Nanaimo
Richmond
Surrey
Abbotsford
Sumas Cogeneration Station (126mw Natural gas)
Whitehorn Generating Station 2 & 3
(85mw Natural gas each)
Tenaska Washington Partners Cogeneration Station (Ferndale) (253mw Natural gas)
Encogen (176mw Natural gas)
Victoria
March Point (167mw Natural gas)
Fredonia 1 & 2 (129mw Natural gas each)
Fredonia 3 & 4 (59mw Natural gas each)
Mt. Baker-Snoqualmie National Forest
Grand Forks
Trail
Colville National Forest
Kettle Falls Generating Station
(51mw Biomass)
COLVILLE RESERVATION
Everett
Olympic National Park
Wenatchee National Forest
Northeast 1 & 2 (31mw Natural gas each)
Northeast 2 (31mw Natural gas)
Spokane
Coeur d'A
Seattle
Boulder Park 1-6 (25mw Natural gas)
Olympic National Forest
Wenatchee
Tacoma
WASHINGTON
Moses Lake
Olympia
Ellensburg
Frederickson 1 & 2 (89mw Natural gas each)
Frederickson Power (249mw Natural gas)
Grays Harbor Energy Facility
(Satsop) (650mw Natural gas)
Centralia 1 & 2 (730mw Coal each)
Moscow
Yakima
Chehalis Generating Facility (593mw Natural gas)
Lewiston
Richland
YAKAMA INDIAN RESERVATION
Astoria
Kennewick
Walla Walla
Mint Farm Generating Station (310mw Natural gas)
Goldendale (280mw Natural gas)
Wallowa-Whitm
National Fores
Hood River
River Road Generating Plant (248mw Natural gas)
Portland
Beaverton
Mt Hood National Forest
La Grande
Joseph
Umatilla

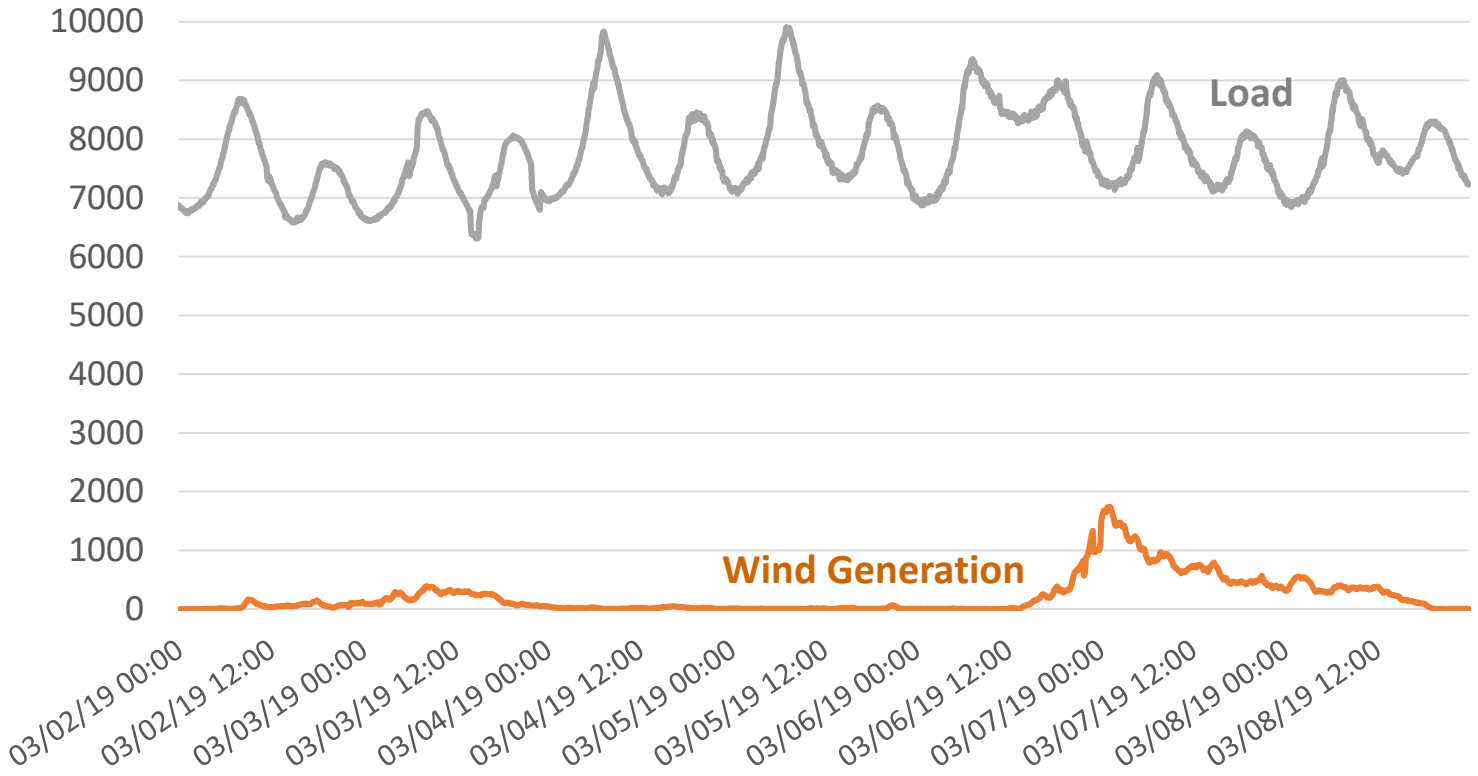


Source: BPA 2018 Transmission Plan

BPA Press Release March 1, 2019:

Northwest energy supplies tight, consumers asked to conserve electricity

- High loads due to unusually cold temperatures
- low stream flows
- Transmission and gas pipeline constraints



Source: BPA Load & Generation Data

Average Solar Generation as a Percent of Capacity

By Month and Time of Day

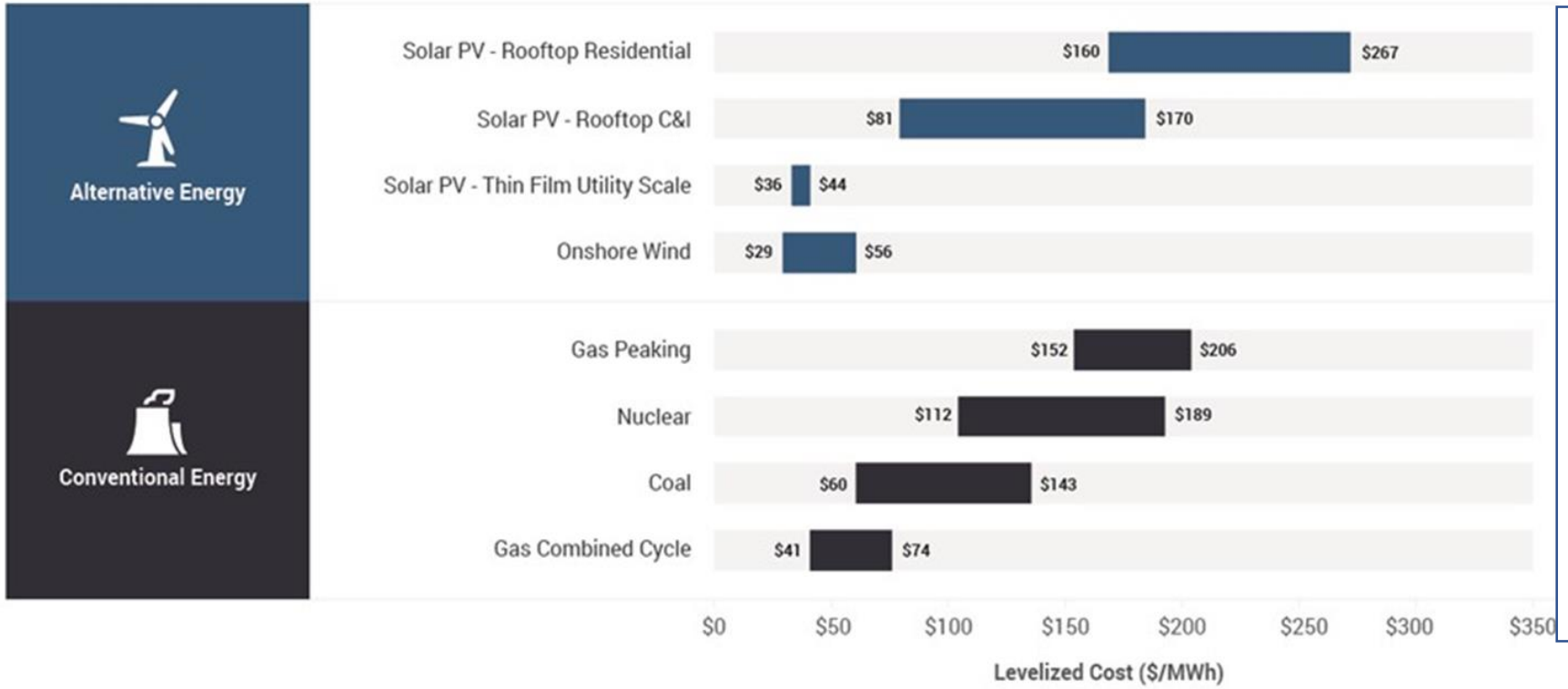
	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM	12 AM
Oct	0%	0%	0%	0%	0%	0%	0%	3%	26%	43%	49%	49%	46%	47%	47%	47%	38%	14%	0%	0%	0%	0%	0%	0%
Nov	0%	0%	0%	0%	0%	0%	0%	4%	17%	25%	29%	32%	34%	31%	27%	14%	2%	0%	0%	0%	0%	0%	0%	0%
Dec	0%	0%	0%	0%	0%	0%	0%	0%	9%	19%	22%	22%	23%	23%	20%	8%	0%	0%	0%	0%	0%	0%	0%	0%
Jan	0%	0%	0%	0%	0%	0%	0%	1%	12%	27%	29%	29%	29%	31%	30%	20%	3%	0%	0%	0%	0%	0%	0%	0%
Feb	0%	0%	0%	0%	0%	0%	0%	5%	26%	36%	39%	39%	38%	37%	37%	29%	13%	1%	0%	0%	0%	0%	0%	0%
Mar	0%	0%	0%	0%	0%	0%	0%	7%	31%	47%	51%	53%	54%	53%	50%	48%	41%	24%	6%	0%	0%	0%	0%	0%
Apr	0%	0%	0%	0%	0%	0%	2%	22%	47%	55%	61%	63%	64%	64%	60%	56%	52%	42%	20%	2%	0%	0%	0%	0%
May	0%	0%	0%	0%	0%	0%	11%	37%	51%	56%	59%	62%	63%	61%	58%	55%	50%	43%	28%	8%	0%	0%	0%	0%
Jun	0%	0%	0%	0%	0%	1%	20%	47%	60%	64%	67%	68%	69%	69%	67%	64%	60%	55%	42%	19%	1%	0%	0%	0%
Jul	0%	0%	0%	0%	0%	0%	12%	43%	60%	66%	68%	70%	70%	67%	64%	63%	59%	51%	37%	15%	1%	0%	0%	0%
Aug	0%	0%	0%	0%	0%	0%	3%	26%	50%	59%	63%	65%	64%	62%	59%	57%	52%	45%	26%	4%	0%	0%	0%	0%
Sep	0%	0%	0%	0%	0%	0%	0%	14%	41%	53%	54%	55%	54%	54%	54%	53%	51%	47%	34%	11%	0%	0%	0%	0%

Source: BPA Fact Sheet, March 2016

A NW Energy Solution:

Regional power benefits of the lower Snake River dams

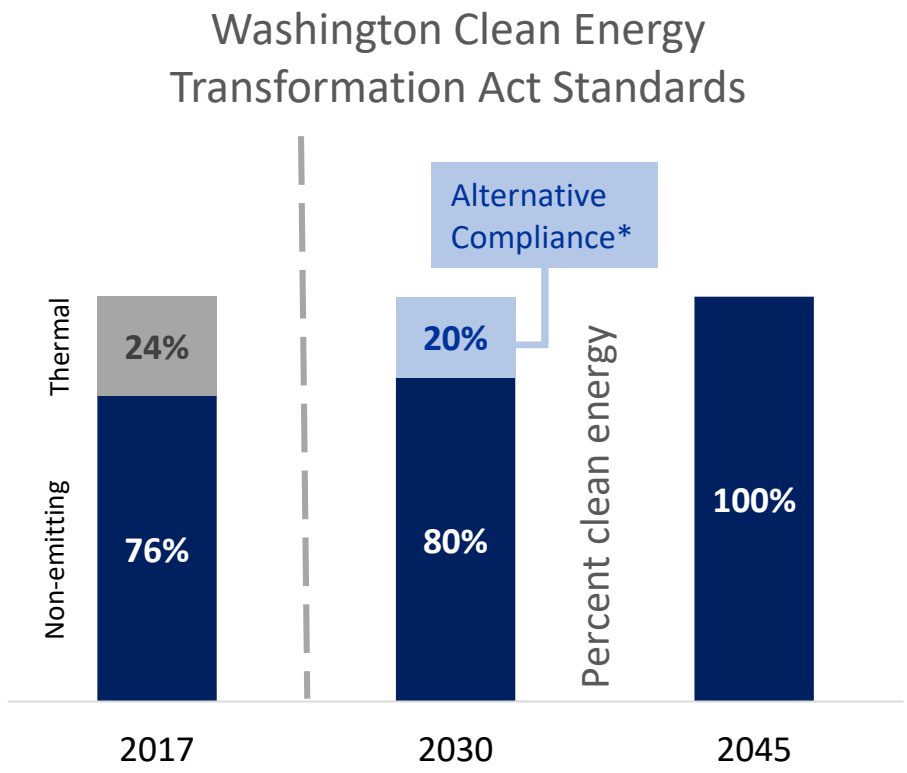
“Optimal solution is complementary conventional and alternative energy resources”



…alternative energy systems alone will not be capable of meeting the base-load generation needs of a developed economy for the foreseeable future. The optimal solution is to use in a diversified generation fleet. ***-Lazard, 2017***

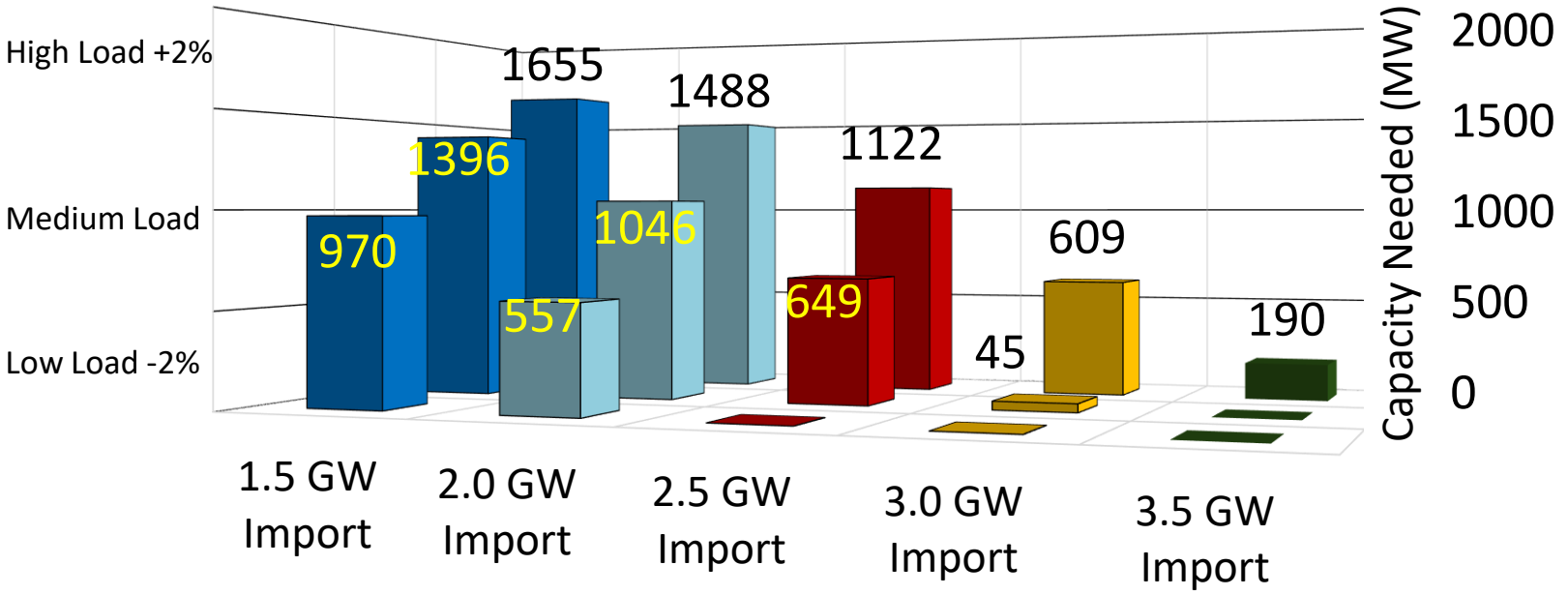
Washington Clean Energy Transformation Act

"Putting Washington on a path to entirely eliminate fossil fuels from electricity generation by 2045"



*Alternative compliance options include purchasing renewable energy certificates, investing in energy transformation project, paying a fee, etc.

2023 CCCT[1] Capacity Need (MW)



[1]CT capacity needs for the reference case (649 MW) and high-load-low-import case (1655 MW) estimated using GENESYS studies, all others estimated by using linear interpolation methods.