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First The Good News



Clean, Reliable & Low Cost Hydro & Nuclear Energy



Hydro and Nuclear Energy: Brought to you by BPA

Bonneville Nonprofit federal power marketing administration Part of the U.S. Department of Energy but Self Funding BRITISH COLUMBIA ALBERTA Vancouver CANADA UNITED STATES Grand Victoria **Coulee Dam** Seattle Coeur Spokane d'Alene Yakima MONTANA River Missoula WASHINGTON Richland Clearwater River Billings •Butte Vancouver Columbia River Bozeman Portland Willamette -North Fork Santiam River Yellowstone River IDAHO National Santiam River **Pavette River** Park Eugene McKenzie River Idaho Boise Middle Fork McKenzie River Falls Grand Teton • Boise River National Roque Park OREGON River WYOMING Medford Alturas Winnemucca

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143 BPA Power Customers

Public Utility Districts (28) Cooperatives (54) Municipalities (42) Tribal (3) Federal Agencies (7) Port Districts (1) Investor-Owned Utilities(6) Direct-Service Customers (2)

[Average Water Year]

Generation \approx 10,000 aMW annually Peak Hourly Generation \approx 15,600 MW

[Critical/Low Water Year] Firm Obligations & Net Resources ≈ 7,500 aMW

Energy Challenges: Tri-Cities Area









Tri-Cities Area Utilities (654 aMW)

- Benton PUD
- Benton REA
- Big Bend Electric Cooperative
- Columbia REA
- Franklin PUD
- Richland Energy Services

Loads exceed <u>firm</u> hydro/nuclear energy contract rights (+40 aMW)

- Benton PUD & Franklin PUD contract rights to % (Slice)
- BPA contracts expire in 2028 (new contracts T&C's by 2025)
- Eroding support for hydro-electric generation (Snake River Dam removal)
- Anti-nuclear sentiment (particular west coast)
- Anti fossil-fuel sentiment & preferences for wind/solar (risking grid reliability)
- Tri-Cities Summer Peak Loading Concerns
 - Reaching critical levels under outage conditions

BPA Firm Energy & Capacity Fully Allocated



Hydro Energy Highly Variable







Eroding Support for Hydro & Nuclear Energy





The Seattle Times Seattle council measure seeks alternatives to nuclear power

Originally published May 31, 2016 at 7:17 pm

Los Angeles Times

Regulators vote to shut down Diablo Canyon, California's last nuclear power plant

Power Grid Reliability Concerns



- +6,000 MW
 of Coal
 Plants could
 be retired by
 2028
- No firm plans for equivalent capacity additions



- No coal power in Washington state after 2025 (Clean Energy Transformation Act)
- Standard for Adequacy is Loss-of-Load Probability (LOLP) < 5%</p>
- 2024 LOLP = 8.2% to 12.8%
- 2026 LOLP > 26% (If 3,080 MW of Coal Retirements & No Replacement)

October 31, 2019 Document 2019-11



Electric Load & Resource Balance

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Electrical Load and Generation Must Be Equal at All Times





Intermittent & Variable Wind & Solar

Increases
 Balancing
 Complexity

- Devalues Capacity Resources in Energy Only Markets
- Could erode reliability without investments in dispatchable capacity

Natural Gas Power & CETA Impacts

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Benton PUD: Hourly Load/Resource Balance

Possible Capacity Resources Surplus Hydro?

<u>Summer</u> 100 MW Shortage Heavy Load Hours















Natural Gas CCCT Plant

Peak Hour Net Position without

Frederickson

150

100

50

0

-50

-100

-150

-200



Natural Gas Peaking Plant



Solar Plus Energy Storage

BPA Transmission: Tri-Cities Area Reinforcement



Bonneville Power Administration Transmission Lines (Eastern Washington)

- Tri-Cities Summer Peak Loading Concerns
 - Reaching critical levels under outage conditions
- BPA has over 20 projects planned for Tri-Cities

West Reinforcement Project

- Possible interconnection to CGS 500-kV line
- Project development cycle can be 3 to 5 years or more
 - Can hamper economic development
 - BPA working closely with Tri-Cities Utilities
 - Quantify available capacity
 - Minimize process times and delays

Take-A-Ways: Economic Development & Electricity

Low Cost and Reliable Hydro and Nuclear Energy should be celebrated

- Understand <u>firm</u> hydro energy is spoken for
 - Unless BPA reallocates post 2028 contracts
- Some utility BPA contracts include access to surplus hydro energy (occurs most years)
 - Even with surplus, time of year is critical (summer challenges)

Preferences for "clean, renewable & sustainable" energy

- Significant wind and solar power being developed in the northwest
- Tri-Cities utilities have market presence and can bring new resources into power supply portfolios
- Not everyone supports wind and solar power development; particularly in their "backyard"

> Manufacturing and other Electricity Intensive Businesses

- Increased collaboration between economic development entities and Tri-Cities electric utilities
- Determine what we can do and how fast
- Anticipate and understand project development cycle time