

WELCOME TO TRACK 2

ENERGIZING THE TRI-CITIES

ROOM C



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#TCOutlook20

ECONOMIC OUTLOOK 2020

PATHWAY TO WA CLEAN ENERGY



VP for Corporate Services/CFO, Energy Northwest





Pathway to Washington's Clean Energy Future

Energy Northwest

February 2020

2020



Nine Canyon Wind Project (96 MWe)



Columbia Generating Station (1,207 MWe)



White Bluffs Solar Station (38 KWe)



Portland Hydroelectric Project (37.5 MWe)



Tieton Hydroelectric Project (15 MWe)



Packwood Lake Hydroelectric Project (27 MWe)



Horn Rapids Solar, Storage & Training Project

The Need for Transformation





Clean Energy Transformation Act

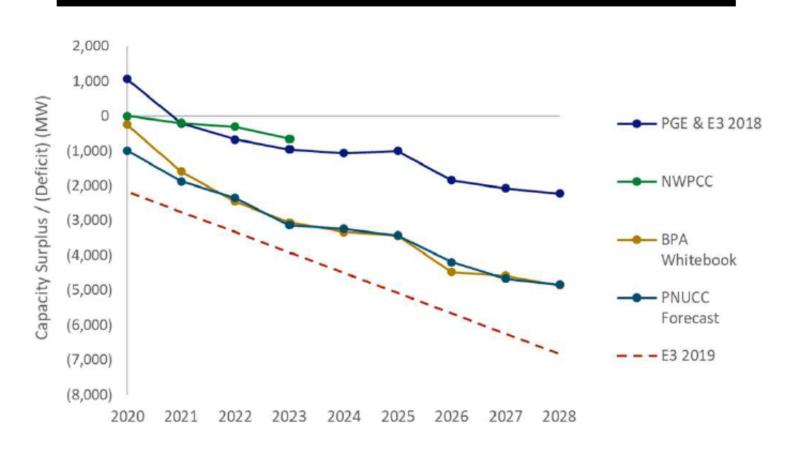
2025: Phase out coal

2030: Greenhouse gas neutral

2045: 100% clean electricity

The Importance of Capacity

NW Capacity Surplus / Deficit in Recent Studies



Energy Northwest Uniquely Positioned

- Joint Operating Agency of Washington – Public Power (Not-for-Profit and provider of atcost power to region)
- 100% Carbon-free generation portfolio
- Experience successfully implementing participantbased projects and public private partnerships

- Expertise in wind, solar, hydro, storage & nuclear generation
- Expertise in electric vehicle charging infrastructure and demand response programs and projects
- Long-term vision

Our Guiding Values



Environmental Responsibility

- Carbon-free emissions
- Efficient use of natural resources



Economic Responsibility

- Customer affordability
- Job transfer



Reliability

- Sufficient capacity to meet peak loads
- Generation diversity
- Resource integration

Optimal Resource Mix under CETA











Wind & Solar (w/ storage)

Hydro

Existing Nuclear (Columbia)

New Nuclear (SMRs)

Next Steps

- Continued evaluation of all clean resource options and extensive analysis of potential for SMRs to meet CETA goals
- Outreach to utilities to identify potential partners in Pacific Northwest
- Continued collaboration and consultation with policymakers, NGOs, labor, community organizations and key stakeholders
- Commitment to public engagement & transparency

ECONOMIC OUTLOOK 2020

ENERGY TECHNOLOGY



Director of Technology Deployment & Outreach, PNNL







Technologies for Our Energy Economy

February 20, 2020

Lee Cheatham

Director, Technology Deployment and Outreach

PNNL-SA-150910



PNNL is operated by Battelle for the U.S. Department of Energy





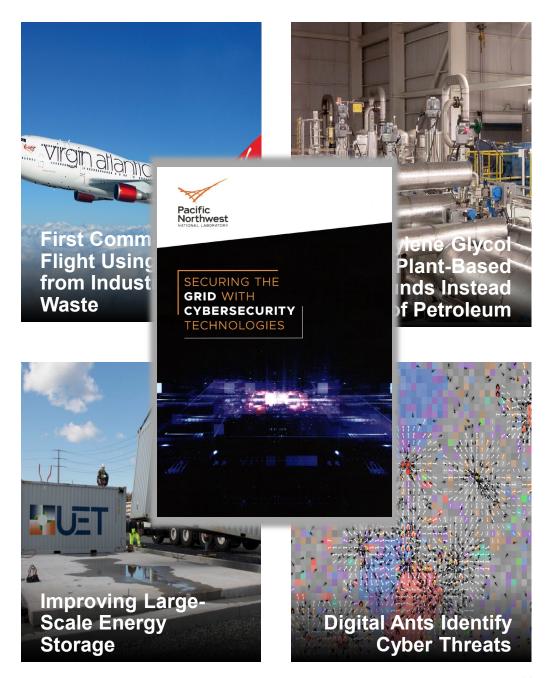
DOE's 17 **national laboratories** tackle critical scientific challenges





INNOVATIONS from DOE Labs:

Impacting Markets to Spur Economic Growth





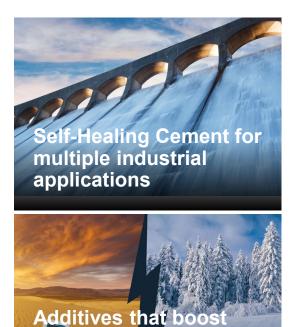
Energy-related TECHNOLOGIES Ready to address MARKET Challenges











battery performance in hot or cold weather



Expanding our local and state leadership in energy sciences ...

Encourages

economic growth

through partnerships



Energy Sciences Building



Grid Storage Launchpad



Thank you

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ECONOMIC OUTLOOK 2020

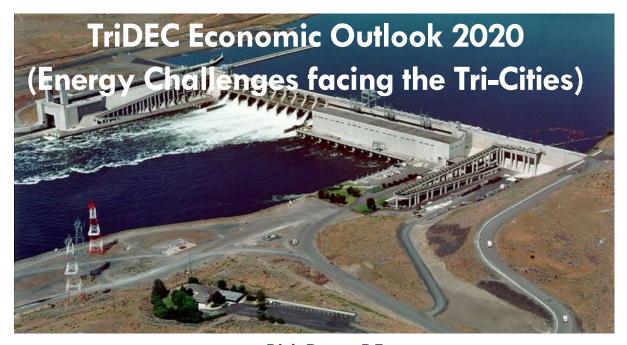
ENERGY TECHNOLOGY



General Manager, Benton PUD





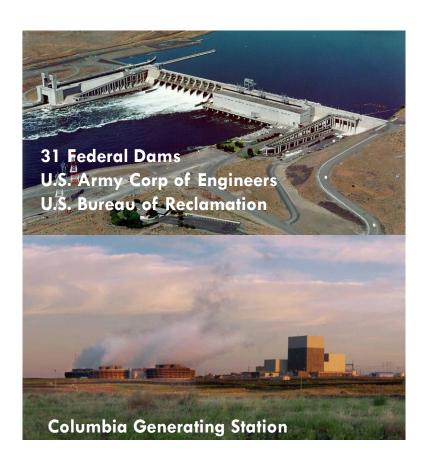


Rick Dunn, P.E.
Senior Director of Engineering and Power Management

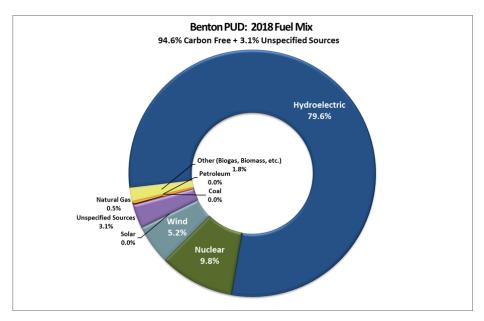
February 20, 2020



First The Good News



Clean, Reliable & Low Cost Hydro & Nuclear Energy



Bonneville

Hydro and Nuclear Energy: Brought to you by BPA

Nonprofit federal power marketing administration Part of the U.S. Department of Energy but <u>Self</u> Funding



143 BPA Power Customers

Public Utility Districts (28) 135 **Preference** Cooperatives (54) Customers **Municipalities (42)** with Tribal (3) priority Federal Agencies (7) access to Port Districts (1) federal Investor-Owned Utilities(6) power **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



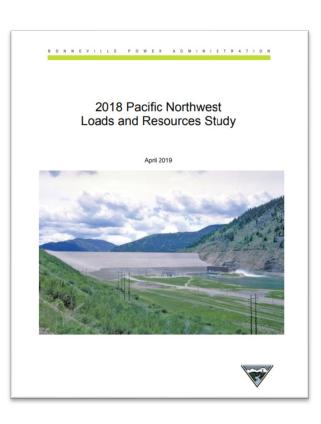






- Tri-Cities Area Utilities (654 aMW)
 - Benton PUD
 - Benton REA
 - Big Bend Electric Cooperative
 - Columbia REA
 - Franklin PUD
 - Richland Energy Services
- Loads exceed <u>firm</u> hydro/nuclear energy contract rights (+40 aMW)
 - Benton PUD & Franklin PUD contract rights to % (Slice)
 - BPA contracts 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

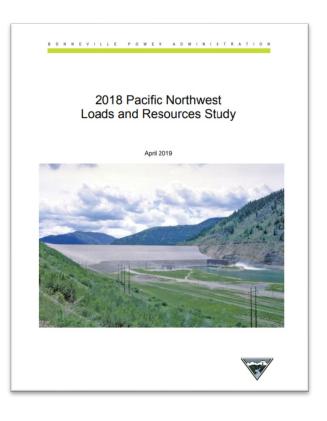
BPA <u>Firm</u> Energy & Capacity Fully Allocated

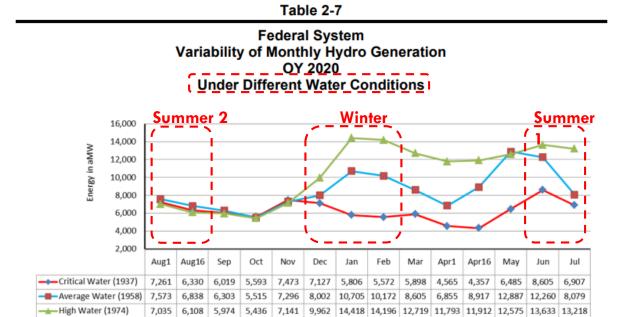


Federal System Annual Energy and January 120-Hour Capacity Surplus/Deficit OY 2020 through 2029 1937-Critical Water Conditions 250 Surplus/Deficit -250 **Annual Energy** -500 -750 Capacity -1,000 **Deficits** -1,250 -1,500 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 Energy (aMW) -123 -256 -414 -300 -438 -224 -275 -190 -308 January 120Hour Cap (MW) -994 -1,312 -1,406-1,367-1,371 -1,209-1,289 -1,340 -1,258

Table 2-13

Hydro Energy Highly Variable





Eroding Support for Hydro & Nuclear Energy

Tri-City Herald

Oregon governor calls for tearing out Snake River dams. Washington reps are outraged

BY ANNETTE CARY
FEBRUARY 14, 2020 06:33 PM

BY ANNETTE CARY

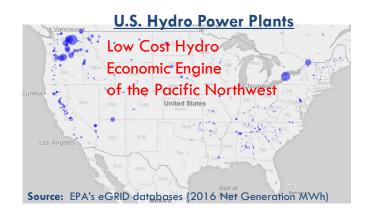
DECEMBER 20, 2019 12:54 PM

Wash. state deeply divided over tearing down Snake River dams, says Inslee's \$750,000 study

Eureka

Nev. Utah Colo. United States Koman Man. Ala. Colo. Colo.

Source: EPA's eGRID databases (2016 Net Generation MWh)



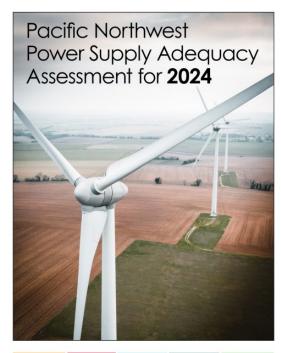
The Scattle Times Seattle council measure seeks alternatives to nuclear power

Originally published May 31, 2016 at 7:17 pm

Los Angeles Times

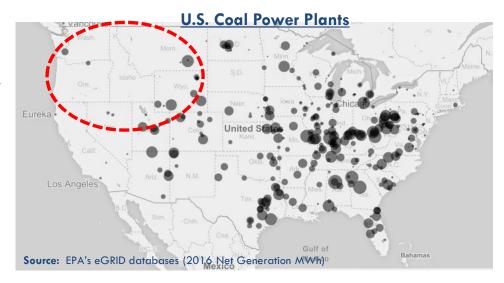
Regulators vote to shut down Diablo Canyon, California's last nuclear power plant

Power Grid Reliability Concerns



- October 31, 2019 Document 2019-11
- Northwest Power and Conservation Council

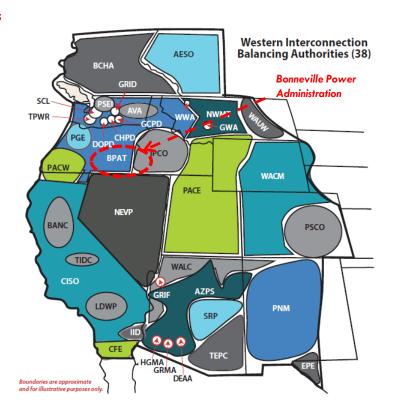
- +6,000 MW of Coal Plants could be retired by 2028
 - No firm plans for equivalent capacity additions



- 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)

Electric Load & Resource Balance

Electrical Load and Generation Must Be Equal at All Times balance



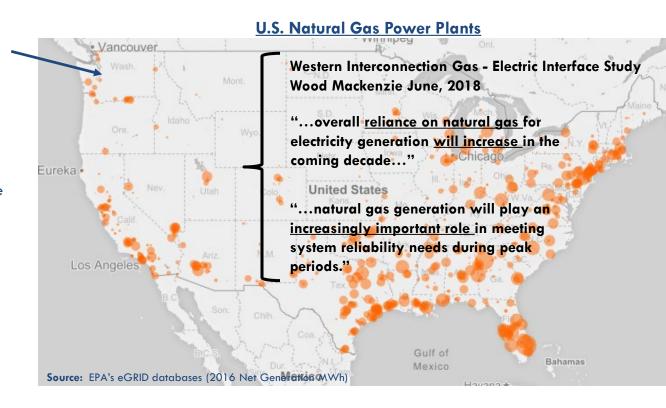
Intermittent & Variable Wind & Solar

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

Natural Gas Power & CETA Impacts

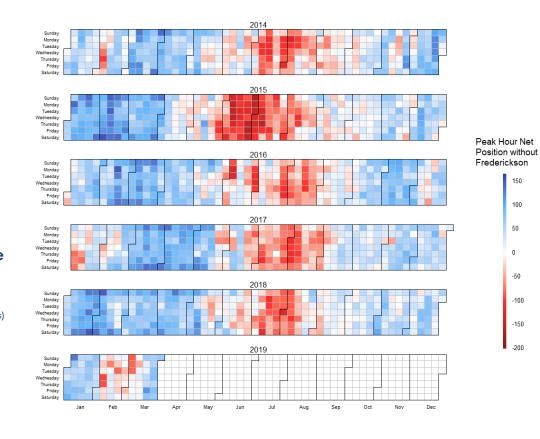
CLEAN ENERGY TRANSFORMATION ACT

- 100% Non-Emitting by 2045
- Chilling Effect on Investments in Needed Capacity (This Decade)
- Wind and solar power does not provide replacement capacity needed during poor water years and extreme temperatures
- Overly optimistic belief in rapid energy technology advances; particularly gridscale battery storage



Summer 100 MW **Shortage Heavy Load** Hours

Winter 45 MW Shortage Heavy Load Hours (Worse in Low Water Years)



Resources Surplus Hydro?



Natural Gas CCCT Plant

150

100 50

-50

-100

-150

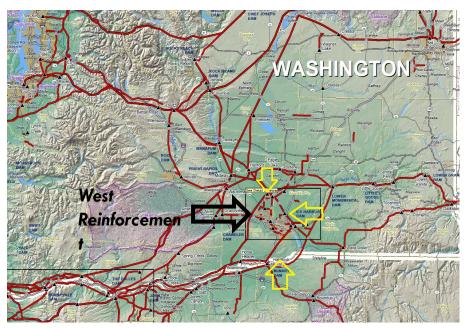


Natural Gas Peaking Plant



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