HYDROPOWER: REGULATORY STRATEGIES TO ENHANCE HYDRO'S CONTRIBUTION TO RESILIENCE AND RELIABILITY

INNOVATION WEBINAR

June 20, 2024

3:00 - 4:00 p.m. ET

NARUC CPI Innovation Webinar

***Moderator*, Tom Plant**
Colorado Public Utilities Commission

Malcolm Woolf
National Hydropower Association

Corey Vezina
DOE Water Power Technologies Office

Clark Mather
Northwest RiverPartners

About NARUC

- Founded in 1889, the National Association of Regulatory Utility Commissioners (NARUC) is a non-profit organization dedicated to representing the state public service commissions who regulate the utilities that provide essential services such as energy, telecommunications, power, water, and transportation.

- NARUC's members include all 50 states, the District of Columbia, Puerto Rico, and the Virgin Islands.

- Our mission is to serve the public interest by improving the quality and effectiveness of public utility regulation.

About CPI

- The NARUC Center for Partnerships & Innovation (CPI) builds relationships, develops resources, and delivers training to assist state commissions contending with complex current and emerging issues.
- CPI is funded by cooperative agreements with the U.S. Department of Energy (DOE) and the U.S. Department of Commerce's National Institute of Standards and Technology (NIST).
- NARUC CPI conducts work across five key energy areas and many topics within each: generation; transmission; distribution; customers; and critical infrastructure preparedness, response, and resilience.
- For more information, visit: https://www.naruc.org/cpi/cpi-home/

Upcoming Events

Virtual Events:

- **Regulators' Roundtable Series: Wildfires and Affordability: Financial, Regulatory, and Policy Issues for Regulator Part One of Three** – June 24
- **Collaborative Enhancements to Unlock Interregional Transmission** – June 27
- **Virtual Power Plant (VPP) Virtual Site Visit** – July 8, 2024

In-Person Events:

- **Coal & carbon management site visit** – June 26 – 28, Gillette, WY
- **NARUC Summer Policy Summit** – July 14 – 17, West Palm Beach, FL
- **Grid Resilience Metrics, Resilience Valuation and Regulatory Mechanisms Cohorts Workshop** – July 31 – August 1, Detroit, MI

Hydropower: Regulatory strategies to enhance hydro's contribution to resilience and reliability

Moderated by:

Commissioner Tom Plant, Colorado Public Utilities Commission

NARUC Innovation Webinar: Q&A

Hydropower: Regulatory strategies to enhance hydro's contribution to resilience and reliability

Speakers:

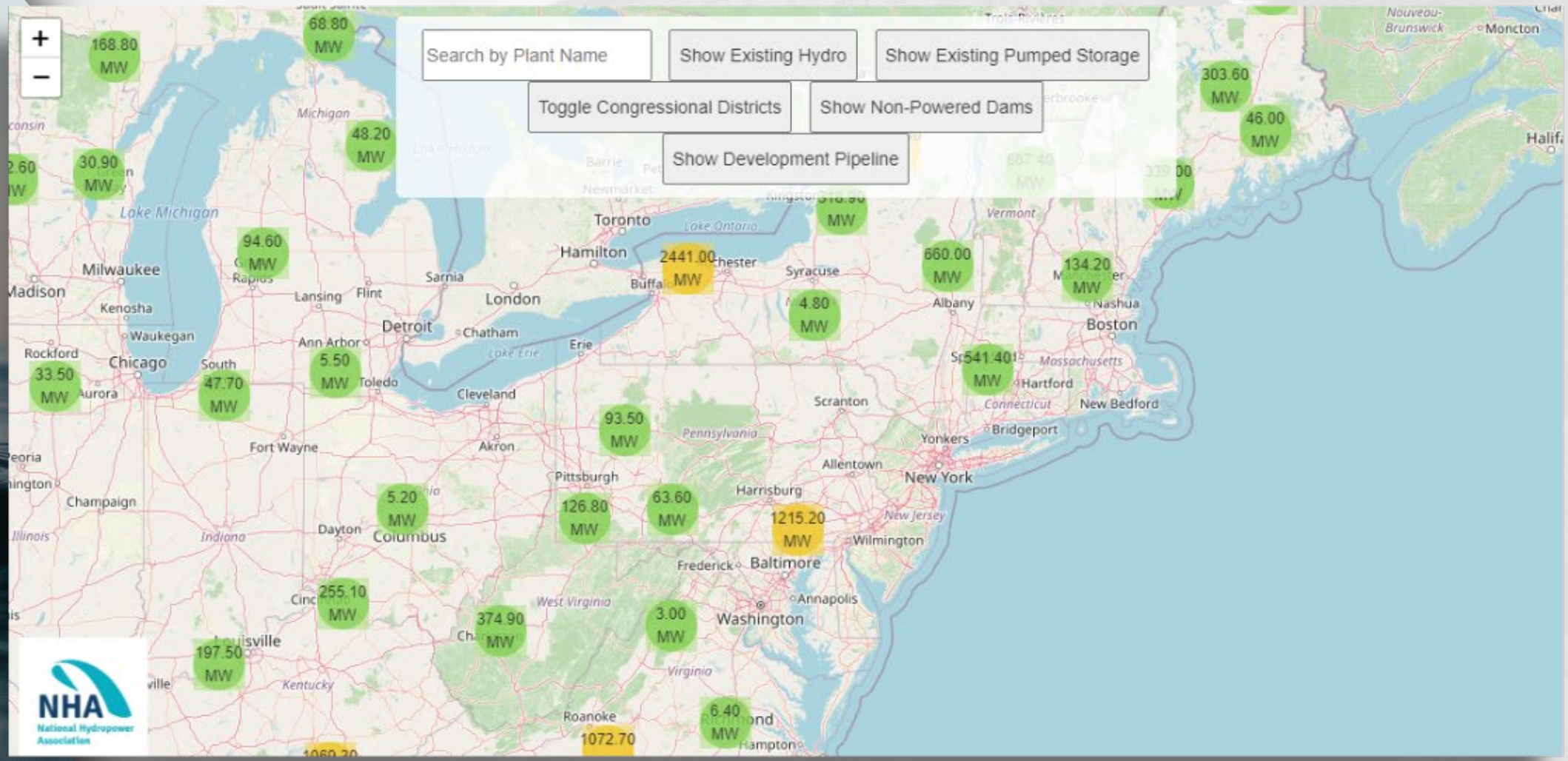
Malcolm Woolf, National Hydropower Association
Clark Mather, Northwest RiverPartners
Corey Vezina, Water Power Technologies Office, U.S. DOE

What state regulators need to know about current threats to hydro and impact on reliability

Malcolm Woolf
President and CEO

NHA
National Hydropower Association

Hydropower is in 49 states

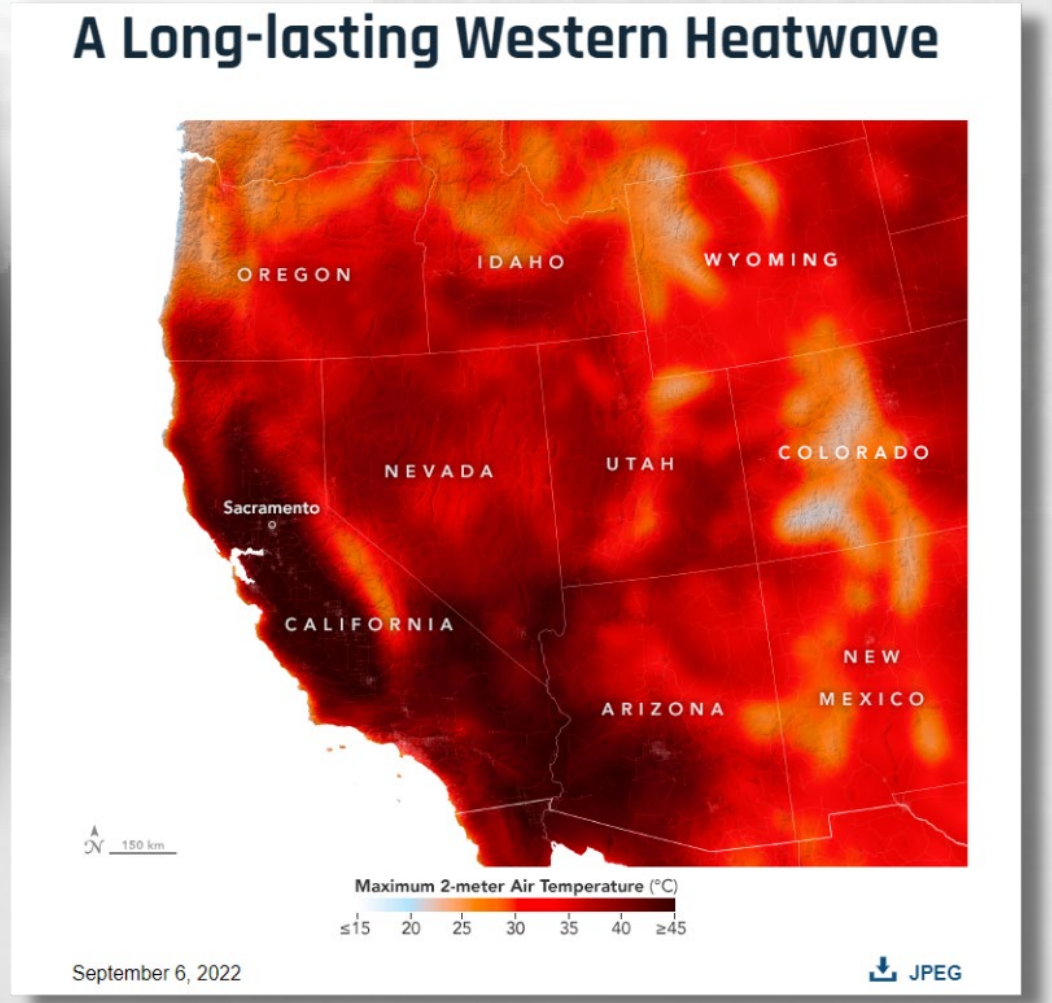


hydro.org/map

Water Power at a Glance: Over 100 GWs of Dispatchable, Carbon-free Electricity

- About 30% of U.S. renewable energy
- 80 GW of hydropower capacity
- 22 GW of pumped storage hydropower capacity
- 96% of current U.S. electricity storage capacity
- Globally produces more electricity than all other forms of renewables combined
- Emerging marine energy technologies (wave, tidal, current)

Critical to 24/7 Reliability on a Clean Energy Grid



HYDRO REVIEW

Environmental

Natural gas, hydro provided electricity during California heat wave high demand hours

Pacific Northwest NATIONAL LABORATORY

In the Face of Drought, Hydropower Still Delivers Electricity

Drought-strained hydropower sustains 80 percent average power generation capacity

Hydropower's Secret Superpower:

Essential Grid Services

Product	Nuclear	Run-of-River Hydro	Pondage Hydro	Pumped Storage	Coal	Combined Cycle	Combustion Turbine	Wind	Solar	Battery Storage	Demand Response	Energy Efficiency
Day-Ahead Energy	✓	✓	✓	✓	✓	✓	O	✓	✓	O	O	O
Real-Time Energy	O	✓	✓	✓	✓	✓	O	✓	✓	O	O	O
Clean Energy	✓	✓	✓	O	X	O	O	✓	✓	O	O	✓
Regulation	X	O	✓	✓	✓	✓	O	O	O	✓	O	X
Spinning Reserves	X	O	✓	✓	✓	✓	✓	X	X	✓	O	X
Non-Spinning Reserves	X	X	✓	✓	X	✓	✓	X	X	✓	O	X
Load-following	O	O	✓	✓	O	✓	✓	O	O	✓	O	X
Reactive Power	✓	✓	✓	✓	✓	✓	✓	O	O	✓	X	X
Black Start	X	✓	✓	✓	O	✓	✓	X	X	O	X	X
Resource Adequacy	✓	✓	✓	✓	✓	✓	✓	O	O	O	✓	✓

Technical Capability to Provide Product

✓ Well-Suited

O Neutral

X Poorly-Suited

Risk to Grid:

Potential Wave of Retirements

- Licenses for 459 hydropower facilities, representing 17GWs, are set to expire by 2035.
- Relicensing takes, on average, 7.6 years to complete, but often much longer.
- Projects of greater than 10MW report licensing costs exceeding $1 million, and projects more than 100MW report costs around $10 million or more.
- Survey: 36.4% of hydropower industry asset owners said that they were “actively considering” decommissioning a facility.

Current Challenges

- Lack of Parity in Tax Code
  - Supports new (over existing) generation
  - Exception - $30 billion to preserve existing carbon-free nuclear, but $0 for existing carbon -free water power
- Antiquated licensing process
- Market design failures
  - Not appropriately paid for flexibility or essential grid services


NORTHWEST PUBLIC BROADCASTING
PBS npr
Environmental And Energy Industry Groups Commit To Working Together On (Some) Hydro Projects
By Courtney Flatt
UNCOMMON DIALOGUE
"U.S. Hydropower: Climate Solution and Conservation Challenge"
The New York Times
Environmentalists and Dam Operators, at War for Years, Start Making Peace
Facing a climate crisis, environmental groups and industry agree to work together to bolster hydropower while reducing harm from dams.
CLIMATE & ENVIRONMENT
Los Angeles Times
Can hydropower help solve the climate crisis? This $63-billion plan is banking on it
ENERGYWIRE
RENEWABLE ENERGY
DOE-backed hydro group launches to cut CO2
David Iaconangelo, E&E News reporter
Published: Wednesday, October 14, 2020
HYDROPOWER + RIVER + CLIMATE

Thank you!

mwoolf@hydro.org

NHA
National Hydropower Association

An update from Northwest RiverPartners

Clark Mather, Executive Director

NARUC | June 20, 2024 | clark@nwriverpartners.org

Northwest RIVERPARTNERS

Who we are

"Lead the charge for the Northwest to realize its clean energy potential using hydroelectricity as the cornerstone."

Our mission: Lead the charge for the Northwest to realize it's clean energy potential using **hydroelectricity** as the cornerstone

We **educate** the public and policymakers about the important role of hydroelectricity

We **partner** with our members, Native American tribes, communities, agencies and businesses to achieve common goals

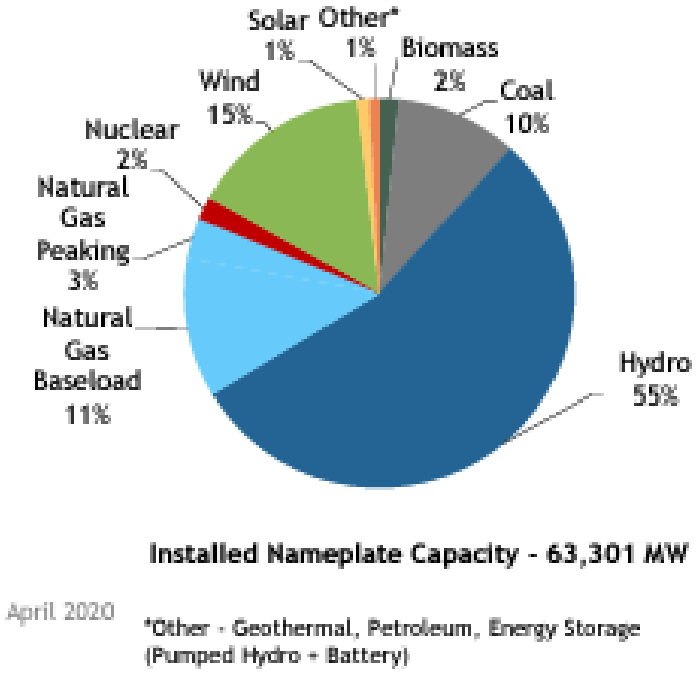
We **support** research and analytics so the region can reach informed decisions

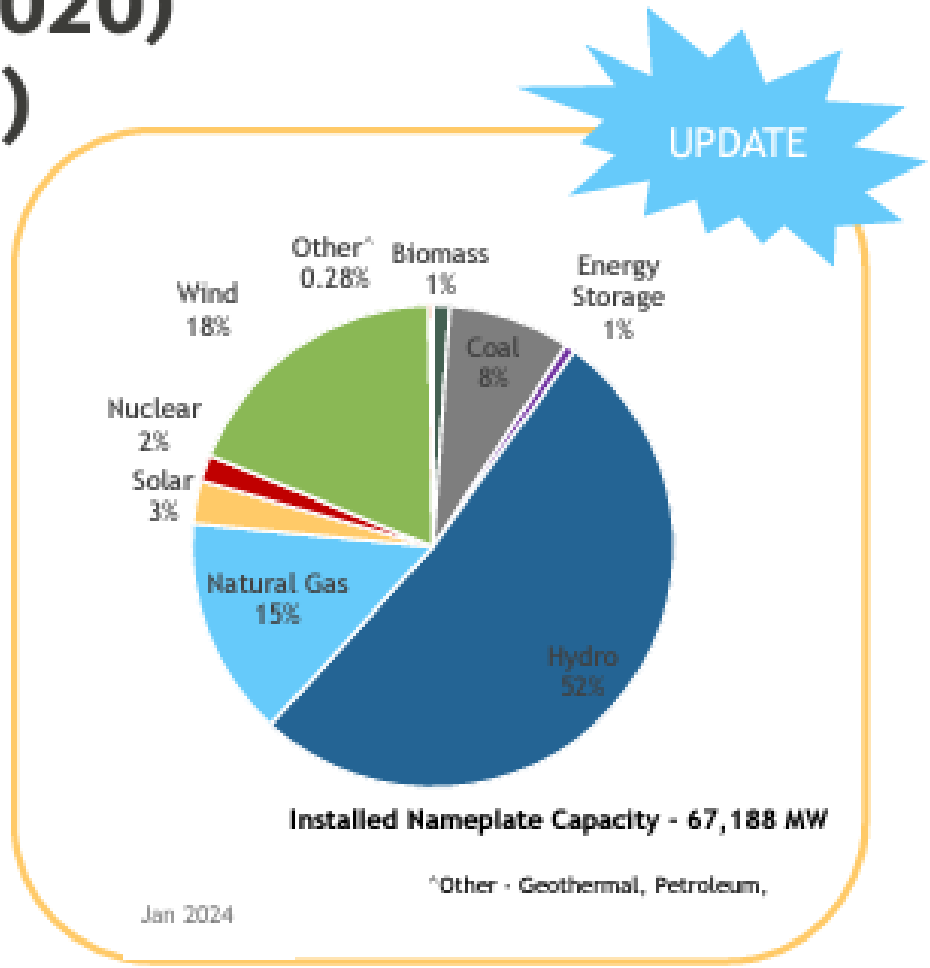
We **engage** in public processes to provide balanced insights and suggestions

"Lead the charge for the Northwest to realize its clean energy potential using hydroelectricity as the cornerstone."

Hydropower = PNW backbone

2021 Power Plan (April 2020) vs. Today (February 2024)





Courtesy: Northwest Power and Conservation Council

"Lead the charge for the Northwest to realize its clean energy potential using hydroelectricity as the cornerstone."

Growing reliability and affordability challenges

The Seattle Times **Surge in electricity demand poses tricky path ahead for PNW**

U.S. Government Sets a Path to Breach the Four Lower Snake River Dams

The Biden administration commits considerable federal resources to support the restoration of native fish populations and prepare for dam breaching

"Lead the charge for the Northwest to realize its clean energy potential using hydroelectricity as the cornerstone."

Hydropower Resilience & January 2024 Storm

"Lead the charge for the Northwest to realize its clean energy potential using hydroelectricity as the cornerstone."

What happened

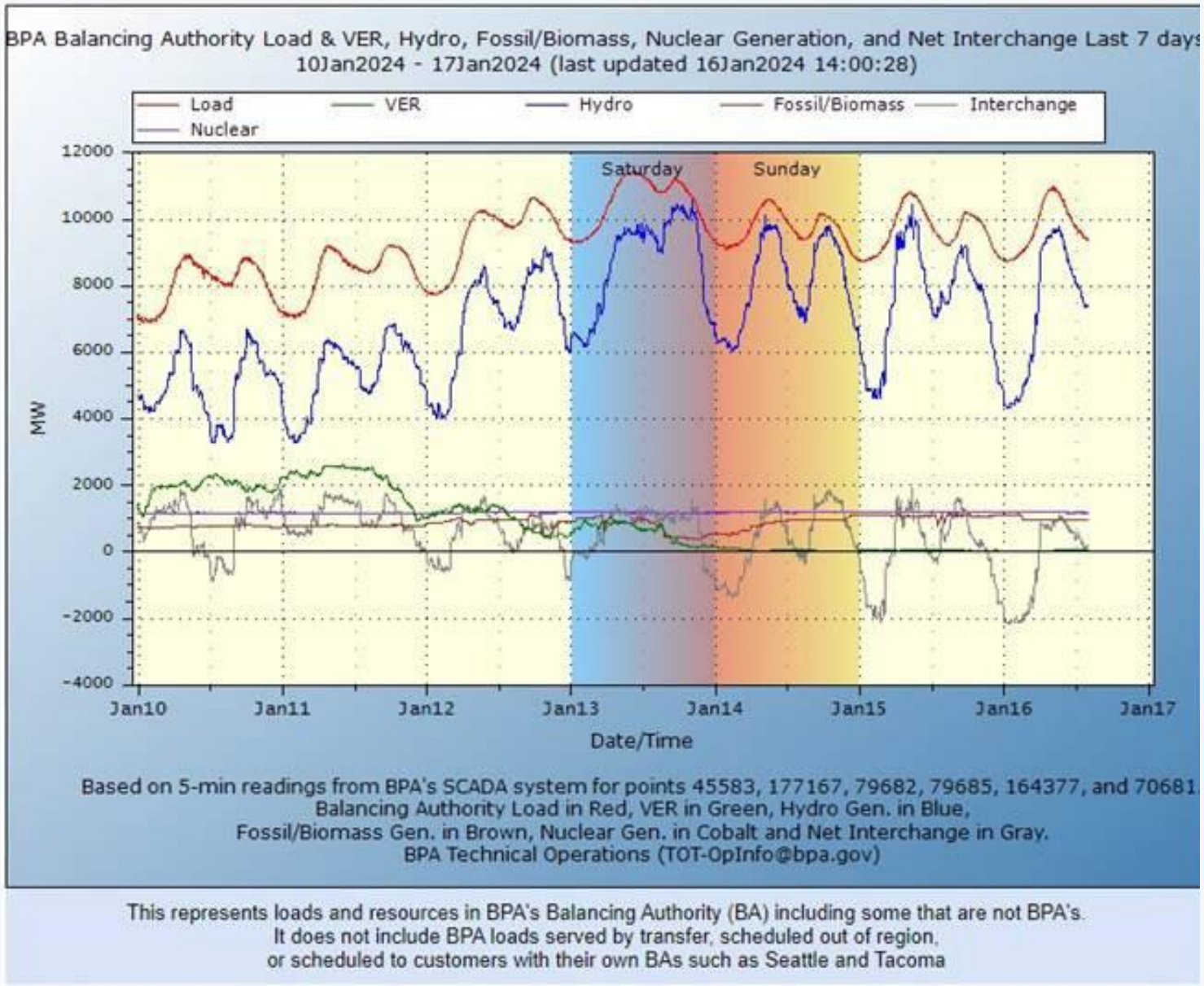
The Northwest faced record-breaking low temperatures, high winds, snow and freezing rain.

More than 100,000 lost power due to damaged lines. In total, an estimated 17 people died from falling trees, electrocution, and hypothermia.

Natural gas experienced equipment failures, and wind generation dropped to **near-zero**.

"Lead the charge for the Northwest to realize its clean energy potential using hydroelectricity as the cornerstone."

Wind, Solar ⬇



This represents loads and resources in BPA's Balancing Authority (BA) including some that are not BPA's.
It does not include BPA loads served by transfer, scheduled out of region,
or scheduled to customers with their own BAs such as Seattle and Tacoma

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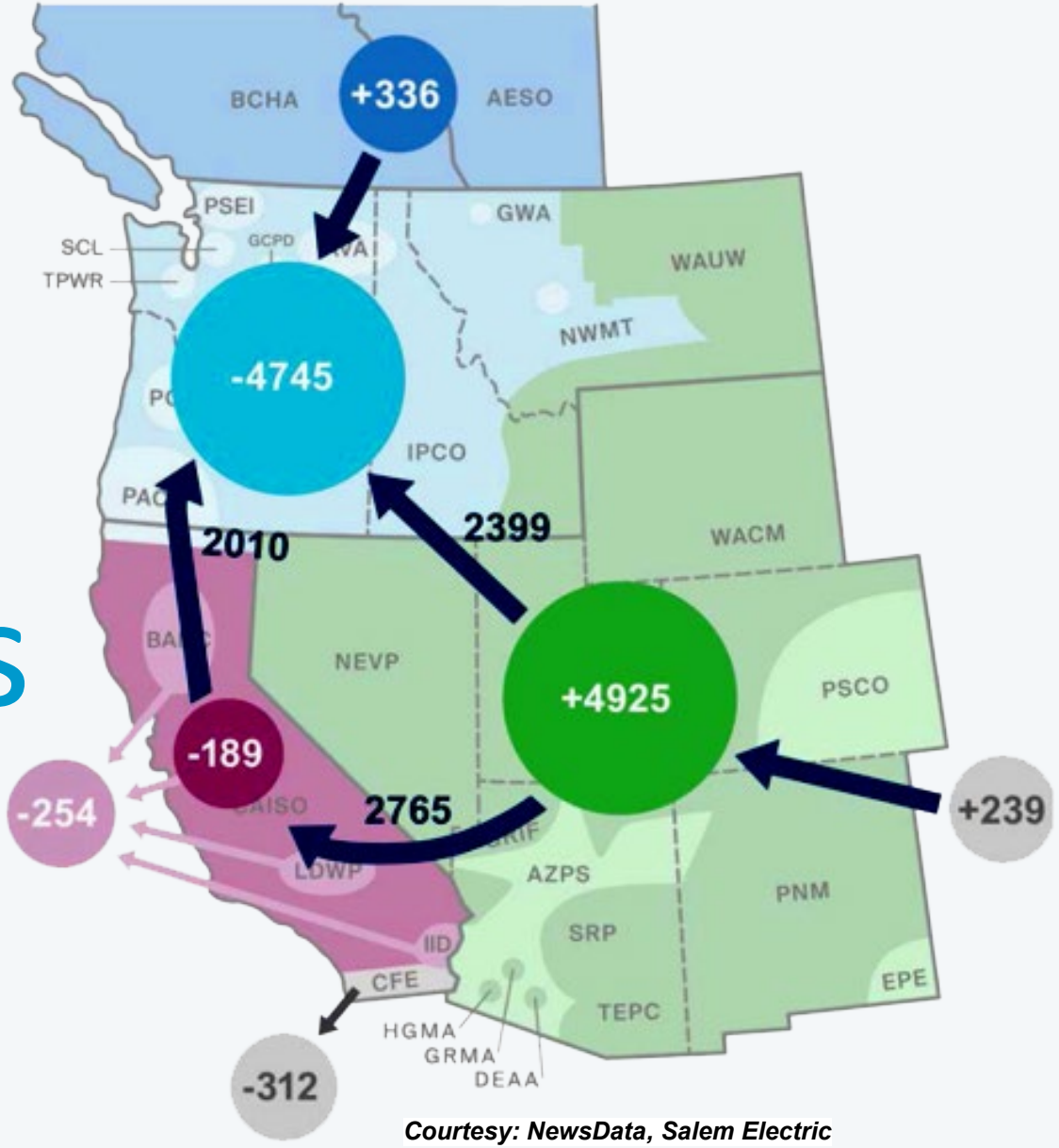
Hydro, Imports Prevent Blackouts



Courtesy: NewsData, Salem Electric

"Lead the charge for the Northwest to realize its clean energy potential using hydroelectricity as the cornerstone."

Hydro supports regional resilience

Los Angeles Times

Editorial: The 2022 heat wave killed 395 Californians. It shouldn't have taken so long to find out

NewsData
Inform. Enlighten. Empower.

NW Imports During Heat Wave 'Major Factor' Kept California's Lights On

"Lead the charge for the Northwest to realize its clean energy potential using hydroelectricity as the cornerstone."

The bottom line

Hydropower is an **affordable, reliable and clean** base load generating resource

We need **policies** that recognize these important attributes to meet current electricity demands and **dramatic anticipated future growth**

"Lead the charge for the Northwest to realize its clean energy potential using hydroelectricity as the cornerstone."

An update from Northwest RiverPartners

Clark Mather, Executive Director

NARUC | June 20, 2024 | clark@nwriverpartners.org

Northwest RIVERPARTNERS

U.S. DEPARTMENT OF ENERGY | Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

WATER POWER TECHNOLOGIES OFFICE

Hydropower - NARUC 2024

Corey Vezina
Water Power Technologies Office, U.S. Department of Energy
Hydropower Program Manager
Corey.Vezina@ee.doe.gov

Agenda

- Introduction to the Hydropower Program at the U.S. Department of Energy's Water Power Technologies Office (WPTO)
- WPTO Research Priorities
- How WPTO Supports the Hydropower Industry

Research Priorities in the Water Power Technologies Office (WPTO)

WPTO enables research, development, and testing of emerging technologies to advance marine energy and next-generation hydropower and pumped storage systems for a flexible, reliable grid.

Hydropower Program FY2024: $59M

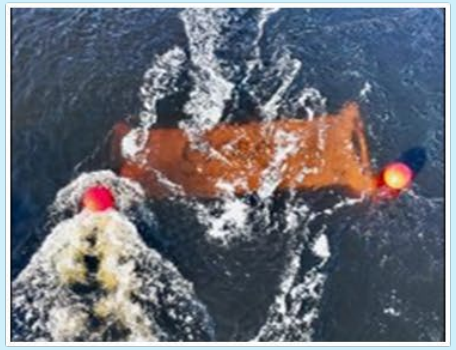
Modernizing the Existing Fleet

Pumped Storage Hydropower

New Low-Impact Projects

Marine Energy Program FY2024: $141M

Wave



Tidal, River and Ocean Current

Ocean Thermal

Hydropower Program

Vision and Mission

Vision: A U.S. hydropower and pumped storage industry that modernizes and safely maintains existing assets; responsibly develops new low-impact hydropower; promotes environmental sustainability; and supports grid reliability, integration of other energy resources, and energy-water systems resilience.

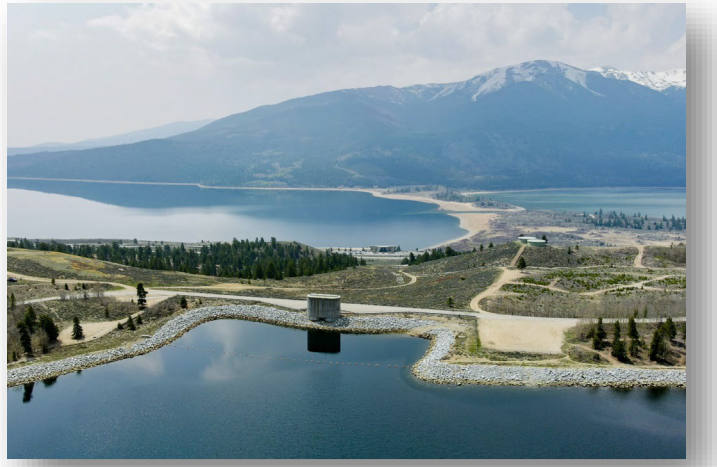
Mission: Conduct research, development, demonstration, and commercial activities to advance transformative, cost-effective, reliable, and environmentally sustainable hydropower and pumped storage technologies; better understand and capitalize upon opportunities for these technologies to support the nation's rapidly evolving grid; and improve energy-water infrastructure and security.

Hydropower: Many Different Opportunities

Upgrades for Existing Hydropower

Non-Powered Dams and Conduits

New Low-Impact Projects



Pumped Storage Hydropower

Case Study – Decision Making on NPDs in Pennsylvania

- WPTO working with the commonwealth of Pennsylvania to use an Oak Ridge National Laboratory developed dataset in combination with other cost and generation modeling tools from the national labs to identify high priority NPD retrofits.
- Have identified 5 potential sites.

U.S. Non-Powered Dam Characteristic Inventory describes US NPDs and their surroundings including physical attributes, environmental and safety conditions, socioeconomic aspects, and hydropower development potential.

For more information on the dataset:
U.S. NPD Dataset

National Conduit Resource Assessment

Oak Ridge National Laboratory study found opportunities to develop hydropower on conduits in every state in the United States, which could add 1.41 gigawatts of new generating capacity.

374 MW municipal conduits

662 MW agricultural conduits

378 MW industrial conduits

For more information on the report:
National Conduit Resource Assessment

Small Hydropower Facilities to Connect to the Electric Grid

Innovations for Low-Impact Hydropower Growth

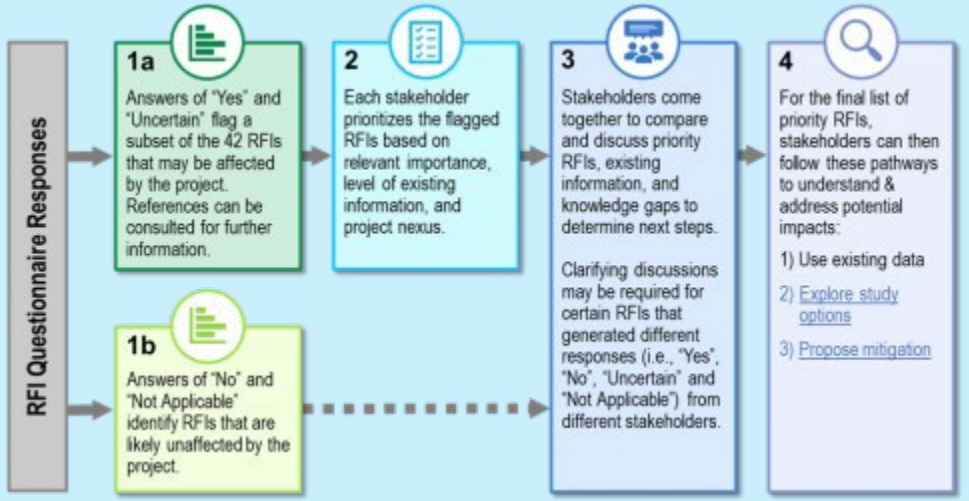
- This study compiled data on costs and timelines for small hydropower interconnection projects to create a one-stop shop for facility owners and operators as they look to connect new and existing facilities to the electricity grid.
- Will help facility owners and operators obtain a better up-front understanding of the costs, timelines, and potential challenges of their grid interconnection projects.
- Information can help owners and operators of small hydropower facilities—those that generate less than 20 megawatts of power—evaluate whether interconnection to a utility's power grid is something that makes sense for them to undertake.

For more information view the study:
Small Hydro Connect to the Grid

Environmental Decision Toolkit (ORNL)

The EDS Toolkit is designed to:

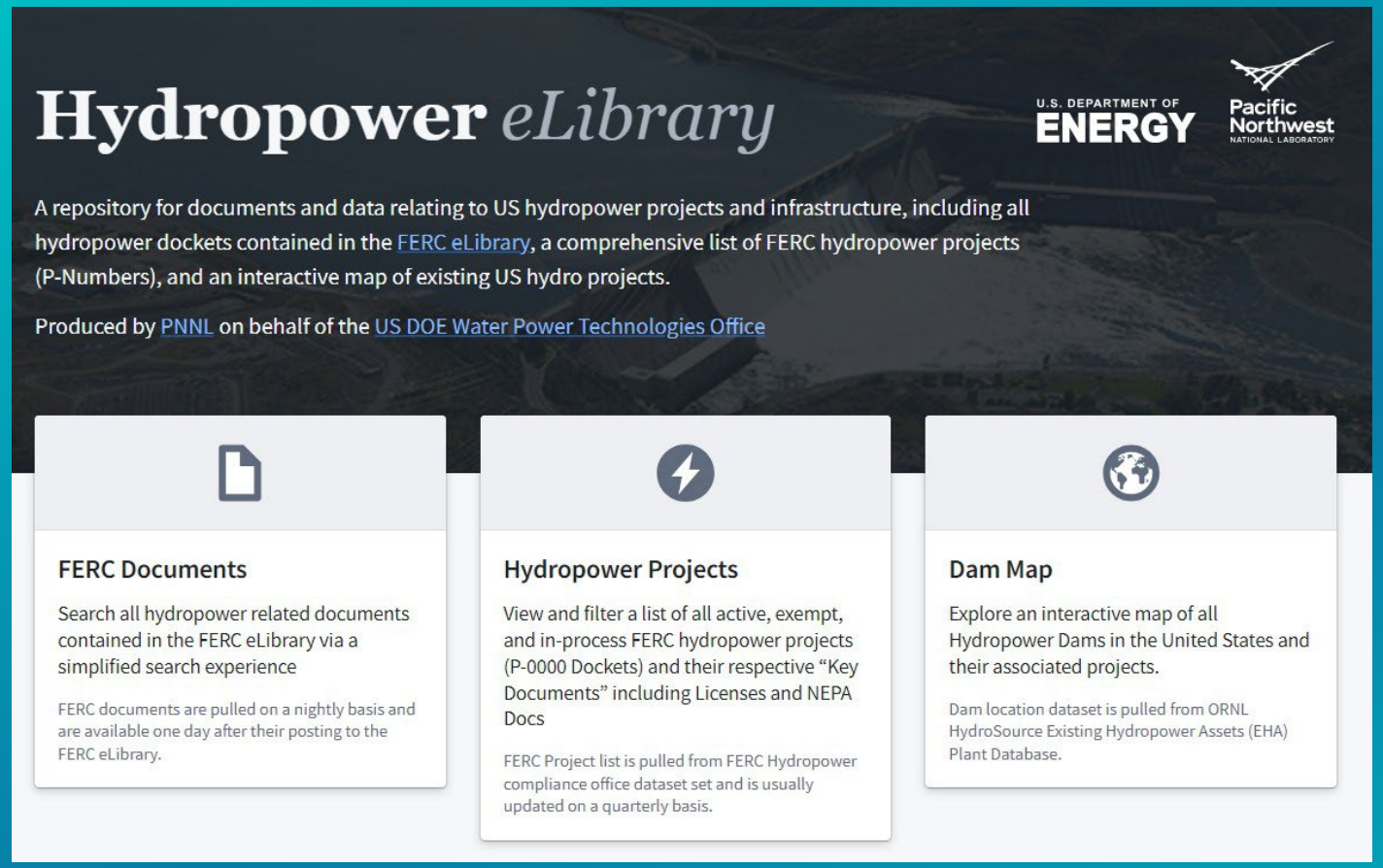
- Characterize and summarize the best-available science for use by diverse hydropower stakeholders seeking to better understand potential hydropower project impacts on the riverine ecosystem.
- Provide transparent and consistent methodology for identifying and discussing potential environmental impacts during hydropower licensing negotiations.
- Point users toward key river function indicators of concern to reduce the time and cost of hydropower licensing negotiations and promote greater certainty in federal authorization processes for hydropower development and relicensing.



The centerpiece of the EDS Toolkit is an online, interactive, and science-based River Function Indicator (RFI) Questionnaire that provides stakeholders with a systematic and transparent method for identifying the potential environmental impacts of a hydropower project.

For more information on the toolkit:
Environmental Decision Toolkit

Hydropower eLibrary



Pacific Northwest National Laboratory software tool as a complement to FERC's eLibrary – allows stakeholders to search for the information they need while filtering out information on other energy projects

For more information on the tool:
Hydropower eLibrary

RAPID Toolkit (NREL)

- Features links to permit applications, processes, manuals, and related information.
- Presents information on federal and state permits and regulatory approvals required for the development of hydropower projects.
- Provides best practices to help navigate the regulatory process.
- Helps potentially reduce the permitting timeline by facilitating communication among all project stakeholders—project developers, permitting agency personnel at all jurisdiction levels, and the public.
- Helps potentially lower total project costs and investor risk by clarifying the permitting process, which encourages future hydropower development.

For more information view the Hydropower RAPID Toolkit

energy.gov/water

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