# Hydropower Communications Toolkit

*The resource to respond to messages about hydropower*
2026-2027

A Coordination between:

NWHA
NORTHWEST HYDROELECTRIC ASSOCIATION

Northwest RIVERPARTNERS
Hydropower for a better Northwest

PPC
PUBLIC POWER COUNCIL

With support from:
Bonneville Power Administration, Canyon Hydro, Chelan County PUD, Energy Trust of Oregon, Idaho Power, Mason County PUD 3, Mesa & Associates, and Bonneville Environmental Foundation

## Contents

# The Goal of the Hydropower Communications Toolkit

The Northwest Hydroelectric Association (NWHA), Northwest RiverPartners (NWRP), Public Power Council (PPC), Northwest utilities, suppliers, and consultants created the Hydropower Communications Toolkit to provide a one-stop resource for factually accurate information and messages on the benefits of hydropower. We encourage you to use the resources contained in this toolkit to educate your communities on hydropower technology, the human elements of hydropower, and hydropower as a climate solution. The content contained in the toolkit can be used to address myths and misconceptions, inform press releases, be shared on social media, and engage the public at events. The toolkit was made available originally in 2020 and has now been reviewed and updated for the 2026-2027 edition.

**Why:** The population of the Northwest has grown rapidly in recent years with transplants from other parts of the country. Many of the new arrivals moved to the region for its clean air, outdoor recreation, and employment opportunities, yet they are sometimes unaware of the roles that the region's number one energy source – hydropower – plays in those positive attributes. In addition to the lack of awareness, there is widespread misinformation about hydropower. This is especially prevalent in younger generations like Generation Z and Millennials.

**What**: The toolkit offers topical sections for different hydropower subjects, beginning with general hydropower fast facts. Each additional section includes key messages, short summaries, which we call elevator speeches, myth-busting answers to misconceptions, stories offering examples to share, and additional resources for more information targeted to that topic. You can also find over 30 supporting visuals and graphic resources at www.nwhydro.org/hct.

**Who:** This material is designed for anyone who uses social media, has seen hydropower misinformation or disinformation, talks to elected officials, visits classrooms, or attends public events to talk about energy, or even those wanting to share information with neighbors. The more we can provide a shared and common message about the benefits of hydropower, the more support we will have to build our clean energy future. So, let's get started.

# Toolkit Tips

- When possible, **tell a story** that puts the audience at the center of the issue – describe how these issues affect the people or person you are communicating with, whether it be their livelihood, quality of life, personal beliefs, or passions. Impactful stories help create an emotional connection and inspire action.
- Let's agree to use a **common language around hydropower**. Our communities repeatedly hear the terms wind and solar associated with renewable energy, but are likely confused by the many terms used to refer to hydropower (e.g., waterpower, hydroelectric generation, pumped storage, pump storage, water batteries, micro-hydro, conduit, small hydro, large hydro, etc.). Let's all start consistently using the term hydropower to make sure our communities associate hydropower with renewable energy.
- **Use visuals** that remind our communities of how they benefit from and can relate to hydropower. Consider showing recreation, boat docks, reservoir scenery, and all the benefits hydropower gives our communities, like clean air and power to charge devices. We all love seeing an impressive dam, but keep the focus on the environment we work to enhance and maintain, and use images that most people can relate to. Images for you to use are available at www.nwhydro.org/hct.
- Electricity is complicated, but try to **keep it simple**. Use plain language, short sentences, and helpful analogies.
- **Repeat, repeat, repeat**. Communication experts agree that repetition is key. On average, it takes seven impressions for someone to recall a fact quickly. Keep repeating these key facts!
- It can be helpful to know what your audience knows about hydro power before communicating with them. This is called **assessing prior knowledge** and can be done in a variety of different ways. One simple strategy is to poll your audience ahead of time or as you begin talking by asking them, "How much do you know about hydropower?" By asking what your audience already knows, you provide an opportunity for feedback on the content you are presenting. Assessing prior knowledge also helps build trust more quickly.
- If you are looking to go the extra mile in communicating about hydropower, be sure to utilize the Hydropower Ambassadors' tools available.

# General Hydropower Fast Facts

**Key Messages**

1. As the demand for carbon-free energy and climate-friendly policies grows, hydropower remains the backbone of the Northwest's energy supply.
2. The Washington Climate Impacts Group predicts the Northwest will continue to see an increase in precipitation under climate change scenarios during the spring, winter, and fall with decreased precipitation in the summer, so hydropower will continue to be a reliable source of renewable energy for our region.
3. According to www.EIA.gov, hydropower provides 60% of the Northwest's renewable electricity and provides about 30% of our total electricity. It's critical to our fight against climate change.
4. Hydropower fills in the gaps when wind and solar power are not available.
5. Advanced fish passage technologies at hydropower dams have greatly improved salmon survival.
6. As we move away from fossil-fuel energy sources, hydropower will be key to avoiding regional blackouts.
7. Most of the Northwest's hydropower benefits communities through not-for-profit community-owned utilities.
8. The loss of clean and affordable hydropower would unfairly burden vulnerable communities.

**By the Numbers**

- In the Northwest, 454 hydropower dams are generating clean energy. https://hydrosource.ornl.gov/data/datasets/eha-net-generation-plant-database-2003-2024/
- These plants generate roughly 119,201 gigawatts of power annually. https://hydrosource.ornl.gov/dataset/EHA2022
- Northwest hydropower produces enough energy to power the equivalent of 16 Seattle-sized cities all year round. https://www.seattle.gov/city-light/energy/power-supply-and-delivery https://www.nrc.gov/docs/ML1209/ML120960701.pdf
- 31% of all energy used in the Northwest comes from hydropower. www.EIA.gov
- Of the 22,910 MW of renewable generating capability in the Northwest, hydropower makes up over 60% of the renewable energy used to power our communities. (www.eia.gov)
- Hydropower employs 7,400 people in the Northwest. With every new megawatt of hydropower installed, an additional 161 jobs are created. A loss in hydropower could devastate communities in our region. (https://www.nrel.gov/docs/fy19osti/74313.pdf)
- Each year, 50 million tons of cargo are transported on the Columbia and Snake River System, keeping more than 180,807 trucks off the road.

https://www.pnwa.net/wp-content/uploads/2025/10/Columbia-River-Facts-250827.pdf

- Water from the Columbia River system irrigates about 5.1 million acres of land to harvest crops like grains, alfalfa, fruits and vegetables, and provides the foundation for the Northwest wine industry. https://www.nwcouncil.org/reports/columbia-river-history/irrigation/
- It would take 46 natural gas plants (500 MW each) to replace the Northwest's hydropower.

# Adding More Renewables

**Key Messages**

- Hydropower is the original renewable energy source. It is reliable, carbon-free, and allows us to safely add more wind and solar power to the electric grid.
    - Solar and wind are both variable resources, completely dependent on the weather. Hydropower fills in the gaps when wind and solar power are not available, at any time of the day or night.
- Hydropower is the backbone of a clean electrical system, and the Northwest can't achieve carbon zero without it.

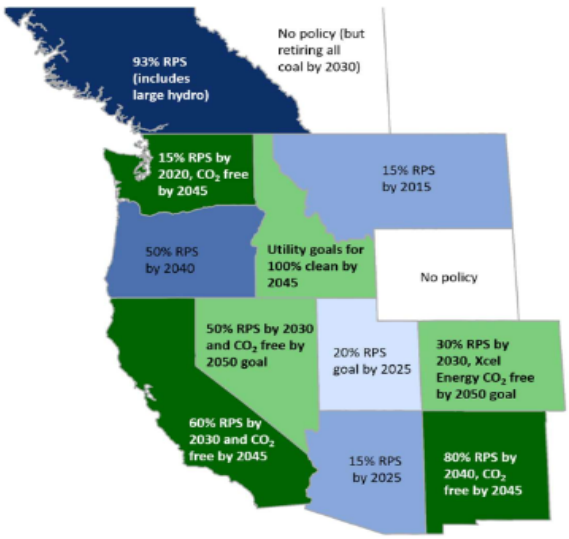
**Elevator Speech**

Renewable, carbon-free hydropower partners with other sources of power – it is the reason that variable renewable energy sources such as wind and solar can be integrated into the grid. Hydropower provides a continual supply of power when the wind isn't blowing and the sun isn't shining due to local weather patterns or the time of day. For example, hydropower steps up in the evening to meet increased energy demands as solar tapers off with the setting sun.

**Myths & Misconceptions**

*Myth: You have to choose a side in the renewables/energy debate.*
Fact: It is projected that before 2050, renewable generation in the U.S. will make up 44% of all generation, with solar being the most significant contributor.
However, some states have established aggressive greenhouse gas reduction objectives, and natural gas will be reduced, placing significantly more reliance on other reliable, carbon-free energy sources such as hydropower. See the map above for current clean energy legislative proposals across the Western U.S.

**Renewable Portfolio Standards (RPS) by State**



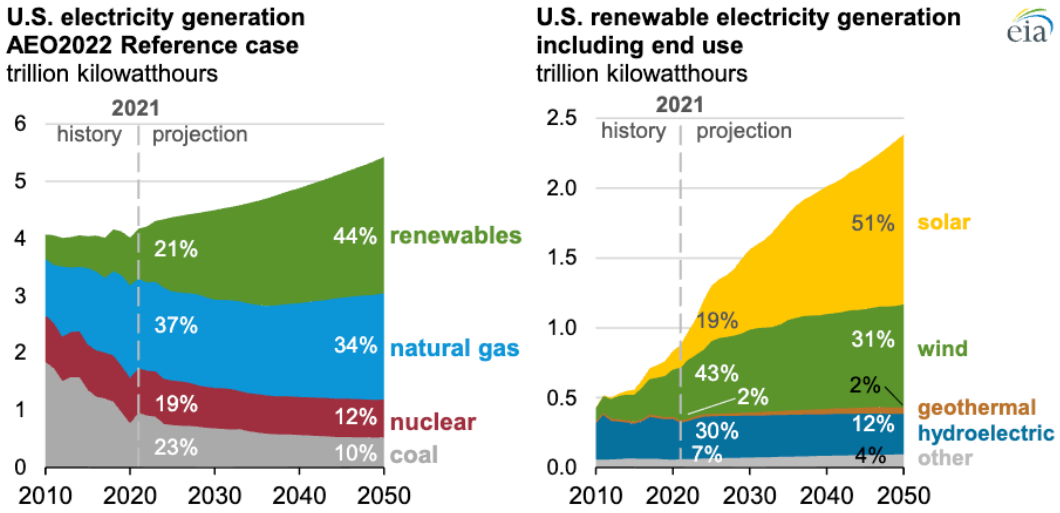
https://www.eia.gov/todayinenergy/detail.php?id=51698
https://www.dsireinsight.com/blog/2020/9/25/states-expanding-renewable-and-clean-energy-standards

*Myth: Hydropower isn't a player in our current energy mix and/or our future mix.*
Fact: This table shows the current energy mix and the Northwest's reliance on hydropower.

**U.S. Department of Energy, The Energy Information Administration (EIA) month of July 2025**

| Energy Mix in the Northwest – July 2025 | | | |
|---|---|---|---|
| | Oregon | Washington | California |
| Hydropower | 32% | 57% | 14% |
| Other Renewables | 26% | 8% | 46% |
| Natural Gas | 42% | 20% | 32% |
| Coal | - | 4% | >1% |
| Nuclear | - | 9% | 8% |
| Other | - | 2% | - |

## National Statistics




**Source:** U.S. Energy Information Administration, *Annual Energy Outlook 2022* (AEO2022)
**Note:** Biofuels are both shown separately and are included in petroleum and other liquids.

*Myth: Wind and solar alone can power our entire economy.*
Fact: Hydropower is necessary for providing both baseload power and ramping up to meet peak power demands during times when wind or solar are not available, such as

when the sun sets each evening or when the wind dies due to local weather patterns. Hydropower has provided about 300 billion kilowatt-hours of electricity across the U.S. each year since 2010 and is forecast to remain at that level for the next 30 years:

*Myth: It would be easy and inexpensive to replace hydropower with wind and solar.*
Fact: Not only would breaching or removing federally-owned dams require congressional authorization, but a three-agency government study also showed that it would cost $1.2 billion alone to physically remove the four lower Snake River dams, and would take roughly $800 million *every* year to replace with wind, solar, and battery-powered resources until other energy resources were developed. Dam removal is often a lengthy, expensive process – it is not as simple or cheap as some would like the public to believe.

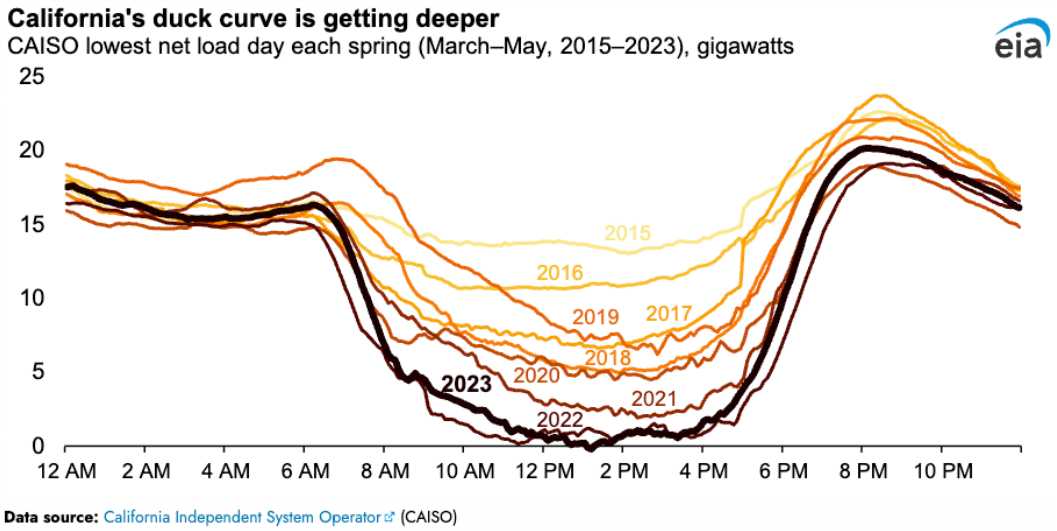
The dams are for more than just energy - they also provide navigation, irrigation, and recreation that cannot be easily replaced. (USACE Environmental Impact Statement on Columbia River System Operations Executive Summary p 32 and Appendix Q, Section 3.4.2 https://usace.contentdm.oclc.org/utils/getfile/collection/p16021coll7/id/14957 ) https://www.nwriverpartners.org/wp-content/uploads/LSR-Dam-Removal-White-Paper-FCS-08.13.23.pdf

Additionally, comparing wind and hydropower is like comparing apples to oranges. Hydropower is a capacity resource – meaning it has a constant fuel supply and can be easily ramped up or down. Wind power, on the other hand, is highly variable. Wind generation follows the availability of wind regardless of consumer need or utility obligations – when it's windy, the turbines produce power even if it isn't needed. For reliability purposes, power planners must ensure the region has sufficient capacity resources, like hydropower, to meet peak energy demands. Because of the variable generation pattern of wind, it cannot be consistently relied upon.
Also, wind and solar resources are not as plentiful or reliable in Oregon and Washington – the latitudes of the Northwest are at a low solar angle, meaning the sun's rays are not captured by solar panels as optimally compared to places further south in the country.

*Myth: Elimination of dams will not impact grid reliability.*
Fact: Elimination of hydropower resources would seriously compromise the stability of the grid, as the region replaces fossil fuels with intermittent power sources such as wind and solar. Wind patterns are hard to forecast and can quickly increase or die down completely, making power planning difficult without the steady availability of hydropower. And solar isn't always available or optimal, depending on the time of day and solar angle. The grid needs resources that can quickly (within seconds) ramp up to fill behind wind generators when the wind doesn't blow as expected, or to accommodate power demands when the sun sets. That's where hydropower comes in. It not only can meet sudden shifts in load demands, but it provides baseline energy when wind or solar power isn't available.

## Stories

*Morning in California* – Hydropower plays a significant role in the integration of renewables, as highlighted by our neighbor to the south. Each morning in California, close to 10 GW of solar starts up while utilities shut off approximately 1 GW of in-state hydropower, 6 GW of imported energy (mostly hydropower from Oregon and Washington), and 3 GW of gas turbines to make room for the solar generation. Then, as the sun sets, these resources are turned back on to meet the energy demand. In the future, as these cycles become more and more prominent and are coupled with the elimination of fossil fuels, more reliance will be placed on hydropower and other carbon-free energy resources to keep the lights on.




https://www.eia.gov/todayinenergy/detail.php?id=56880

## Resources

*Integrating renewables article*: https://www.pnnl.gov/explainer-articles/renewable-integration

*Integrating Other Renewables: The Perfect Partner*
https://www.bpa.gov/learn-and-participate/community-education/hydropower-101/integrating-renewables

*Adding hydropower in a changing energy landscape:*
https://sitecproject.com/

*Hydropower and wind work together for a clean grid:*
https://www.e-mc2.gr/el/news/naeras-pumped-storage-clean-energy-plant-island-ikaria-greece.

*A Northwest energy solution: Regional power benefits of the lower Snake River dams:* https://www.bpa.gov/-/media/Aep/about/publications/fact-sheets/fs-201603-A-Northwest-energy-solution-Regional-power-benefits-of-the-lower-Snake-River-dams.pdf

# Large Hydropower

**Key Messages**

- Hydropower is the cornerstone of renewable energy:
    - Here in the Northwest over 60% of renewable energy comes from hydropower (www.eia.gov).
    - Hydropower is the backbone of the clean energy system in the Northwest and we can't achieve decarbonization without it.
    - Northwest hydropower provides critical energy when demand is highest in the winter and when wind and solar are not abundant.
    - Hydropower is carbon-free which is why the Northwest has the cleanest energy in the nation.
- Hydropower has numerous other benefits:
    - Hydropower flows 24/7.
    - Hydropower acts like a giant, clean battery that allows us to add wind and solar to the grid.
    - Low-cost hydropower in the Northwest attracts businesses that require large amounts of power like AI data centers or industrial manufacturing. Thanks to hydropower, we can keep the regional economy thriving.
- Hydropower in the Northwest is important for many reasons:
    - Idaho, Montana, Oregon, and Washington all have electricity prices below the national average for electricity prices because hydropower has no fuel cost (like gas and coal). https://www.eia.gov/electricity/sales_revenue_price/
    - If we want to decarbonize our economy, we need to make the most of our existing clean and affordable hydropower resources.
    - Without hydropower, the Northwest would have to build more carbon-emitting, natural gas power plants to fill in the gaps from intermittent wind and solar power.

**Elevator Speech**

Hydropower provides over 60% of our renewable energy in the Northwest. We are lucky to have such a strong backbone of renewable energy to churn out thousands of megawatts of carbon-free power. Hydropower is the perfect partner to wind and solar energy and is critical to the region's quest to go greener.

**Myths & Misconceptions**

*Misconception: Hydropower is a big player in our current energy mix but probably not in our future mix.*
Fact: In the Northwest, hydropower plays a huge role in renewable energy and will continue to do so for the coming decades (see graphs on page 6-7). Hydropower represents 30% of the energy generated in the Northwest. There is also huge potential to generate more than 50 GW of additional power by 2050 across the U.S. (www.hydro.org/map) from powering dams that currently don't have powerhouses installed. Forty-two of those potential clean energy projects are right here in the Northwest (https://www.hydro.org/map/hydro/non-powered-dams/)

*Myth: Hydropower, federal hydropower, in particular, is an old-school renewable and is outdated infrastructure.*
Fact: While some hydropower projects are many decades old, federal agencies have been regularly maintaining, upgrading, and enhancing these projects. New technologies installed at the hydropower dams allow for better harnessing of energy, by capturing more energy using less water. The modern infrastructure is often the unsung hero behind the scenes.

*Myth: Fish Myths- See page 14 for more information.*

**Stories**

*Hydropower saves the day* – During the January 2024 cold snap, where temperatures in the NW region plunged below freezing for 4 straight days, it was hydropower generation to the rescue again. The federal fleet and other generators' hydro plants in the region kept operating, providing firm, reliable power.
20240131-federal-hydro-system-powers-region-through-arctic-blast - Bonneville Power Administration

Also, during the late June 2021 heatwave, the four dams on the lower Snake River provided much-needed energy, balancing and contingency reserves, and Ice Harbor dam on the lower Snake River played a key role in keeping the lights on in the Tri-Cities area in eastern Washington. Without these four dams, powering through the heatwave could have been much more expensive and operationally challenging.
(https://www.bpa.gov/-/media/Aep/about/publications/news-releases/20210722-pr-10-21-lower-snake-river-dams-help-region-power-through-recent-heatwave.pdf)

*Hydro powers local communities* – Snohomish PUD employees share why they love their jobs and describe technological advancements to help enhance fish and wildlife habitat:
https://player.vimeo.com/video/311923530

https://player.vimeo.com/video/291009677

**Resources**

*Educational Hydropower System Poster*
https://www.bpa.gov/-/media/Aep/education/educational-activities/edu-hfh-hydro-system-poster.pdf

*Carbon footprint comparison*
https://www.bpa.gov/-/media/Aep/about/publications/fact-sheets/fs-201901-The-carbon-free-footprint-of-BPA-hydropower-supply.PDF

# Small Run-of-River Hydropower

**Key Messages**

- Small hydropower often does not use dams. It uses the natural elevation drops along rivers to generate clean, renewable energy from Mother Nature.
- Small hydropower plants are built to enable sustainable, carbon-free, climate-resilient, low-cost energy.
- Today's small hydropower units often go unnoticed on riverways and canals because they are low-impact.

**Elevator Speech**

Run of river hydropower sites can be selected and projects designed with low or no impact to fish and the environment. These projects are designed to divert only a small portion of the river flow and be dynamic over the course of the year, and sites can be selected above natural fish barriers.

**Myths & Misconceptions**

*Myth: All hydropower is bad.*
Fact: Hydropower is an essential carbon-free resource that is part of the climate change solution, which is very important for healthy fish and wildlife populations. Also, many Northwest dams have been updated with the latest technologies to support fish passage and protect and enhance the environment. Lastly, small hydropower is specifically designed to have very low to zero environmental impacts.

*Myth: Small hydropower is too small to make a difference in climate change*
Fact: In today's advanced technology landscape, we have arrays of small hydropower projects much like arrays of solar panels. Combined, these small but mighty hydropower projects have BIG generation potential. Also, having local energy projects

is a way to keep economic development in communities while ensuring a sturdy electric grid.

*Myth: Small hydropower is too small to matter in my community*
Fact: small hydro can provide important ancillary benefits (i.e., frequency regulation) to the far reaches of the grid. This means small communities have more reliable energy locally to keep their lights on.

**Stories**

*See what a Restoration Hydro Turbine looks like:*
https://www.natelenergy.com/restoration-hydro
*See what an array of small hydropower looks like:*
https://emrgy.com/
*See what family-owned hydropower looks like:*
https://www.youtube.com/watch?v=cL08sznAXtE&feature=youtu.be.
*See hydropower with no dam or reservoir:*
http://www.whyhydropower.com/HydroTour2c.html.
*Visit a fish-friendly small hydropower project in Youngs Creek, Washington:*
https://www.snopud.com/?p=1199.

*Where to find small hydro:* Snohomish County PUD in Washington has three projects high up in a stream-reach that do not have impacts on fish because the hydropower project is above natural barriers with native fish mitigation in place and no anadromous fish that need to migrate out to the ocean and back.

*A field of empty oil barrels:* Cordova Electric is a rural electric company that uses two hydropower plants to electrify its community. When these plants were commissioned, there was a field full of empty oil barrels from previously used diesel generation. Small hydropower changed this community's energy supply completely.

*Hydropower keeps carbon out of the air:* Copper Valley Electric is a local electric company that has two hydropower plants, called Valdez and Glen Allen. Using modern technology to control their projects, they now handle swings in energy demands with hydropower instead of diesel generators.

# Conduit Hydropower

**Key Messages**

- Conduit Hydropower generates electricity by harnessing the flow of water in existing man-made structures like pipelines, irrigation canals, and cooling water conduits, rather than building new dams. This method has a lower

environmental impact and can generate revenue for water system operators by using existing infrastructure to produce clean energy.

- In-Conduit turbines can be utilized on raw water pipelines as well as on treated water sources.
- Municipalities that operate water delivery systems often use pressure reduction valves (PRVs) or sleeve valves to control operating pressures. In-conduit hydropower turbines may be used to replace these valves, providing the same operational benefits while producing renewable electricity that is net-metered or sold to the utility.
- By piping open canal systems and letting gravity pressurize water supplies, irrigation districts and the farmers they serve can create conduit hydropower projects to harness renewable energy from the water on its way to crops. These projects can help save water, creating environmental benefits for fish, wildlife, and our communities while supporting farmers. Keeping energy production local helps local economies.
- Wastewater discharge from water treatment plants or other facilities with adequate head and flow can be used to generate power and offset operational costs.
- Conduit hydropower projects can provide a reliable revenue stream for local governments and special districts to help pay for infrastructure maintenance, keeping costs lower for our communities.
- Conduit hydropower projects can be installed while modernizing irrigation water delivery systems. Done together, these projects can also enable water conservation, energy savings from reduced pumping, and environmental restoration.
- Conduit hydropower projects can be grid tied or isolated, allowing power generation in local and remote locations
- When located near population centers, conduit hydropower projects can provide energy to critical facilities during power outages, improving community resilience.

**Myths & Misconceptions**

*Myth: All hydropower is bad.*
Fact: Conduit hydropower uses energy from water already on the way to a farm or municipal treatment station, creating a winning situation all-around by generating clean energy while still supporting local agriculture and municipalities with no environmental impacts. (See page 13 for more facts.)

*Myth: Conduit hydropower is hydropower, and hydropower is bad for the environment.*
Fact: Conduit hydropower projects make additional use of water that has already been diverted for other purposes. Hydropower projects in agriculture can help pay for projects that enable water conservation and other environmental benefits, in addition

to producing renewable energy.

**Stories**

*What Micro-hydropower Looks Like*
https://www.hillsboro-oregon.gov/our-city/departments/water/conservation-sustainability/in-pipe-hydroelectric

*Story of Swalley:*
https://vimeo.com/205059484

*Welcome back to the party that has been 130 years in the making:*
https://fcasolutions.org/stories/welcome-back-party-130-years-making/

# Fish

**Key Messages**

- The eight dams on the lower Columbia and Snake rivers were originally built with fish passage in place and have been largely successful in facilitating fish movement both up and downstream.
- Continued investments in fish passage and monitoring technology have allowed fish to navigate each hydropower project more efficiently and be tracked during their journey up and down the rivers.
- Changes in flow requirements over the last decade have provided more spill over large dams during smolt migration, which helps fish avoid turbines and other dangerous areas.
- Salmon and steelhead are now returning to streams where they haven't been in decades thanks to extensive regional efforts to restore habitat in rivers and streams.
- A portion of everyone's electric bills in the Northwest goes toward salmon habitat conservation or enhancement.
- Each stage of the complex life cycle of salmon comes with its survival challenges, and as such, there isn't a silver bullet to recovering the species. Salmon health is affected by a variety of factors, including conditions in the ocean where they spend the majority of their lives. Warm ocean waters affect the food chain for salmon and can have big impact on their populations.
- There are hydropower projects built upstream of natural impassable barriers that therefore do not impact the migratory nature of anadromous fish like salmon that are born in freshwater and migrate to saltwater to mature.
- Most FERC licensed projects account for fish impacts in their license conditions through balancing of instream flow needs of various species and life stages which in turn mimics natural events. Each project has ongoing monitoring and

adaptive management which builds resiliency in fish populations by providing cool water to the fish during hot summers and as fish migrate.

- Columbia and Snake River hydropower dams use some of the most advanced fish-passage technology in the world to help salmon and steelhead travel up and downriver more quickly and safely. They also produce the most carbon-free hydropower in the nation, which helps fight the impacts of climate change on fish populations.

**Elevator Speech**

While hydropower has effects on fish, mitigation efforts, technological advancements, and adaptive management have helped conserve fish species and either maintain or increase sustainable adult returns for state and tribal fisheries. There are many factors affecting salmon and steelhead survival at each stage of their complex life cycle. While hydropower may affect their migration to and from their natural streams, conditions in the Pacific Ocean can drive their overall survival rate to adulthood. With the consistent availability of water as hydropower's fuel source, hydropower continues to be the primary source of clean, renewable energy for residents of the Northwest.

**Frequently Asked Questions**

*Does hydropower kill or harm fish?*
Answer: Salmon and steelhead are now returning to streams where they haven't been in decades, thanks to extensive regional efforts to restore habitat in rivers and streams.

*Are dams the reason fish are endangered?*
Fact: According to scientists, salmon and steelhead populations worldwide, in both free-flowing rivers and those with dams, have most likely experienced recent declines due to climate change. Salmon and steelhead populations are also impacted by habitat loss, being eaten by marine mammals, changing ocean conditions, pollution, and the history of overfishing.

*Do hydropower dams block rivers?*
Answer: Large hydropower dams in the Northwest use some of the world's most advanced technology to help young and adult fish travel up and down the river.

*Without dams, would salmon and orcas would be thriving?*
Answer: Scientists have shown that salmon and steelhead – which spend the majority of their lives in the ocean – are especially vulnerable to the effects of warming ocean temperatures caused by climate change. Carbon-free hydropower is critical in our fight against climate change.

*Dams have no way for fish to pass – do salmon go through turbines and get chopped up?*
Answer: The majority of young salmon migrating to the ocean do not go through turbines at federal dams. Most fish successfully pass dams using surface passage routes. New technology also allows fish to pass through turbines safely.

*Myth: Do dams cause the rivers to heat up to unsafe levels for salmon and result in massive salmon die-offs?*
Answer: Salmon face numerous threats and stressors – from habitat loss, being eaten by marine mammals, changing ocean conditions, pollution, and a history of overfishing – which is why we all have a role to play in protecting them for the future.

*Do dams cause "delayed mortality," which means fewer juvenile fish return as adults?*
Answer: The number of adult salmon and steelhead returning to the Columbia River can vary greatly year to year due to a variety of factors, including ocean conditions. Scientists note that long-term trends tell more about salmon health than any single year.

*Do hydropower projects impact salmon?*
Answer: Many hydropower projects are built upstream of natural impassable barriers; therefore, they do not impact the migratory nature of anadromous fish like salmon that are born in fresh water and migrate to saltwater to mature. Many FERC licensed projects account for fish impacts in their license conditions through the balancing of instream flow needs of various species and life stages, providing special process flow releases to mimic natural events, and requiring ongoing monitoring and adaptive management. With adaptive management, projects can build climate resilience in fish populations by providing necessary water during hot summers and during changed migration timing.

**Resources**

*Southern Resident Killer Whales and West Coast Chinook Salmon:*
https://media.fisheries.noaa.gov/dam-migration/srkw-salmon-sources-factsheet.pdf

*Historic Columbia Basin Fish Accords: 10 years of accomplishments for fish and wildlife:*
https://www.bpa.gov/environmental-initiatives/efw/columbia-basin-fish-accords

*See the Fish Returns on the Columbia River:*
https://myodfw.com/fish-counts-major-dams-and-fish-traps

*How Much Money Flows into Fish and Wildlife Expenditures:*
https://www.nwcouncil.org/fs/18978/2024-6.pdf

*Fish friendly turbines – the U.S. Army Corps of Engineers installed new turbines to increase fish survival to 98% which is the same as if they were going over a spillway:* https://www.union-bulletin.com/news/u-s-army-corps-officials-new-dam-turbines-improve-fish/article_474c3905-2ad2-5abf-8941-64323fff8a67.html.

*Check out a fish ladder:* https://www.oceanservice.noaa.gov/facts/fish-ladder.html.

*Innovative Technologies Helping Support Fish: The Salmon Cannon:* https://www.youtube.com/watch?v=2z3ZyGlqUkA.

*To learn more about the fishing history of the Columbia River, visit the NW Power and Conservation Council's history of commercial fishing:* https://www.nwcouncil.org/reports/columbia-river-history/commercialfishing.

# Environment

**Key Messages**

Hydropower is the Northwest's largest carbon-free resource and accounts for nearly 60% of all renewable energy in the Northwest, more than in other regions in the nation. Renewable hydropower plays a key role in reducing the world's dependence on fossil fuels and avoiding harmful air pollutants, including greenhouse gases. Unlike other renewable power generation options, hydropower is available year-round, day and night, and during variable weather conditions.

**Supporting Facts**

- Reservoirs act as a sort of battery, holding energy in the form of water until it's needed by customers. Hydropower output does fluctuate with river flows, but dams are designed to store and release water strategically, helping stretch resources through dry months and extreme weather conditions.
- Hydropower works by using falling water to turn a turbine and produce electricity. It relies on the natural water cycle of rain and snowmelt feeding rivers and flowing downstream to rejoin the ocean, where it is turned into rain or snow again. It does not require burning fuel and can be used to restart the grid when other power sources fail.
- Both the U.S. Army Corps of Engineers and the Northwest Power and Conservation Council concluded that the reservoirs in the Columbia and Snake Rivers do not emit a measurable level of methane.
- Water temperatures above and below dams are continually measured and, in most cases, managed at hydropower dams through spill operations. This water release provides cooler water for fish and wildlife.

- Hydropower developments fund habitat projects that protect and improve river and stream conditions across the Northwest.

**Elevator Speech**

- The Columbia River Basin produces more hydropower than any other North American river. Hydropower dams provide 60% of the Northwest's renewable energy. With zero carbon emissions, the hydropower dams in the region help preserve our quality of life and are the main reason why the Northwest has the cleanest energy in the nation. Renewable hydropower is always available and able to serve when needed by consumers and businesses year-round, day and night during cold snaps and heatwaves.
- The Northwest cannot meet its decarbonization, clean energy goals, and growing energy needs without hydropower. Not only does hydropower provide enough clean, reliable, and low-cost power to meet the region's demand, it's a perfect partner for other renewables because it can respond quickly to shifts in wind and solar power generation. Bottom line: The Northwest can count on carbon-free, renewable hydropower for a better, cleaner energy future.

**Myths & Misconceptions**

*Myth: Hydropower doesn't work during droughts.*
Fact: Reservoirs act as a sort of battery, holding energy in the form of water until it's needed by customers. Hydropower output does fluctuate with river flows, but dams are designed to store and release water strategically, helping stretch resources through dry months. Hydropower units can now operate with lower reservoir levels, enabling generation even during low water seasons. As climate change impacts continue to be understood more fully by scientists, hydropower is working to support water supply by timing the availability of water as we face more extreme weather conditions. The University of Washington Climate Impacts Group predicts the Northwest will see increases in precipitation for winter, spring, and fall precipitation and decreases in summer precipitation.
https://cig.uw.edu/resources/analysis-tools/pacific-northwest-climate-projection-tool/

*Myth: Hydropower isn't renewable.*
Fact: Hydropower works by using falling water to turn a turbine and produce electricity. It relies on the natural water cycle of rain and snowmelt feeding rivers and flowing downstream to rejoin the ocean where it is turned into rain or snow again. This continuous cycle allows the water to be re-used again and again unlike coal or natural gas that is consumed and can't be used for fuel again.

*Myth: Hydropower dams create reservoirs that add to our greenhouse gas problems.*
Fact: Some research has shown that under certain conditions, particularly in tropical climates where there is a lot of plant and algae growth, reservoirs behind hydropower

dams can emit methane. The Columbia River system doesn't have a tropical climate and nutrient-rich environment that would support substantial methane production in reservoirs. Both the U.S. Army Corps of Engineers and the Northwest Power and Conservation Council concluded that the reservoirs in the Columbia and Snake rivers do not emit a measurable level of methane.

*Myth: Dams are creating dangerous river temperatures.*
Fact: Water temperatures are continually measured and, in most cases, managed at hydropower dams through spill operations. This is a result of continued learning and applying operational modifications to help ensure a safe environment for fish and wildlife. (See page 17 for additional information.)

For example, on the Snake River, hydropower system operators conduct cold water releases from Dworshak Dam to provide cool water to the river for fish and wildlife. Pumps have also been installed to provide cool water to fish ladders at Lower Granite and Little Goose dams.

Additionally, on-the-ground habitat work in the Columbia and Snake rivers is designed to address changing climate conditions and to anticipate what fish and wildlife populations would need to survive under those conditions.

*Myth: Wind and solar can power our entire region.*
Fact: Wind and solar are great when the sun is shining and the wind is blowing, but that depends on the time of day and angle of the sun for solar and on local weather conditions and seasonable patterns for wind. Wind and solar are variable and must be supported by baseline power generators, like hydropower, to provide consistent energy to the region, day or night, rain or shine, and when it's windy or calm.

Hydropower is essential for providing a steady stream of reliable power again so there aren't brownouts or blackouts every time the weather changes. (See page 7 for more facts.)

*Myth: We can easily and affordably replace hydropower dams with wind plants/the dams are not needed/the dams have outlived their useful lives.*
Fact: See the resources below or page 7 to learn more about the role hydropower plays in supporting the growth of renewable energy on the grid.

**Stories**

*What a perfect partner looks like:*
https://www.bpa.gov/learn-and-participate/community-education/hydropower-101/integrating-renewables

*Facts on Methane:*
*www.hydro.org/wp-content/uploads/2023/05/Methane-Emission-Joint-Fact-Sheet-Doc.pdf*

**Resources**

Carbon-free hydropower fact sheet:
https://www.bpa.gov/-/media/Aep/about/publications/fact-sheets/fs-201901-The-carbon-free-footprint-of-BPA-hydropower-supply.PDF

Snake River dams fact sheet:
https://www.bpa.gov/-/media/Aep/about/publications/fact-sheets/fs-201603-A-Northwest-energy-solution-Regional-power-benefits-of-the-lower-Snake-River-dams.pdf

**Hydro Companies' Environmental Programs**

| | |
|---|---|
| Avista | Celebrate Our Rivers |
| Bonneville Power Administration | CBFish.org |
| Chelan County PUD | Habitat Conservation Plans |
| Columbia Power Corporation | Environmental Programs – Columbia Power |
| Grant County PUD | Grant PUD: Environment |
| Idaho Power Company | Environment - Idaho Power |
| PacifiCorp | Habitat Protection |
| Portland General Electric | Recreation, Fish & Wildlife \| PGE |
| Puget Sound Energy | PSE \| Protecting Wildlife and Their Habitat<br>PSE \| Protecting Our Region's Fish |
| Seattle City Light | Environmental Stewardship - City Light \| seattle.gov |
| USACE | Civil Works - Northwestern Division |

# Pumped Storage Hydropower and Batteries

**Key Messages**

- Pumped storage hydropower is like a battery, but instead of harsh chemicals, it uses water and gravity to provide energy. At night or when energy demand is low, water is pumped uphill to an upper reservoir (the battery) where it is stored until energy is needed, then it is released to flow back downstream through turbines to create carbon-free energy.
- Hydropower is the oldest, most proven renewable energy that continues to provide carbon-free electricity 24/7. Today's advanced pumped storage hydropower enables a carbon-free grid.

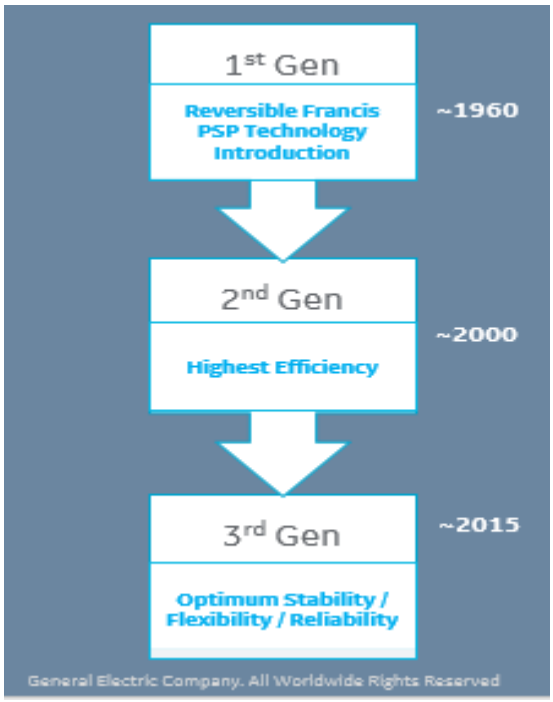
**Elevator Speech**

As we move to a clean energy future free of fossil fuels, we will need reliable energy batteries that store renewables (like wind and solar) and release the energy when it's needed. Pumped storage hydropower, solar, wind, and large-scale batteries can jointly play a significant role in providing grid resiliency and will be relied on more and more in our clean energy future. Today pumped storage hydropower provides one of the best carbon-free renewable solutions for the following reasons:

1. Pumped storage hydropower is a proven technology with a design life greater than 50 years with 10 or more cycles per day (which traditional batteries can't do);
2. It provides long-term bulk energy storage (so when there is an extended period without sun or wind power can still flow to hospitals and other critical facilities);
3. Pumped storage hydropower can quickly come online at the correct electrical frequency to prevent disruptions to the grid when additional power is needed throughout the day;
4. Grid ancillary services like black start*, inertia, regulation control, frequency support, flexible capacity, and reactive power, which are necessary for an agile, responsive power grid that provides power safely and reliably across the region.

*Glossary of terms:
*Black start* - When there is a blackout, hydropower can open gates and start up the grid again which other sources cannot do. Black start is like trying to start your engine in your car without a battery to start the ignition.
*Inertia* -The ability to absorb big energy loads like when a manufacturing plant turns on/off a large piece of equipment; this can cause a brownout without hydropower.
*Regulation control* - Hydropower can produce just the right amount of power to ensure that there isn't too much or too little power flowing onto the grid so your lights don't flicker.
*Frequency support* - Each outlet in your home needs an exact frequency of energy flowing into the plug. Hydropower can change the energy frequency to stabilize the grid.

*Flexible capacity* - As wind and solar picks up or dies off, hydropower can speed up or slow down production to complement these variable renewables.
*Reactive power* - If another power plant shuts off unexpectedly, hydropower can almost immediately turn on as opposed to a coal or nuclear plant which take days to turn on or off.



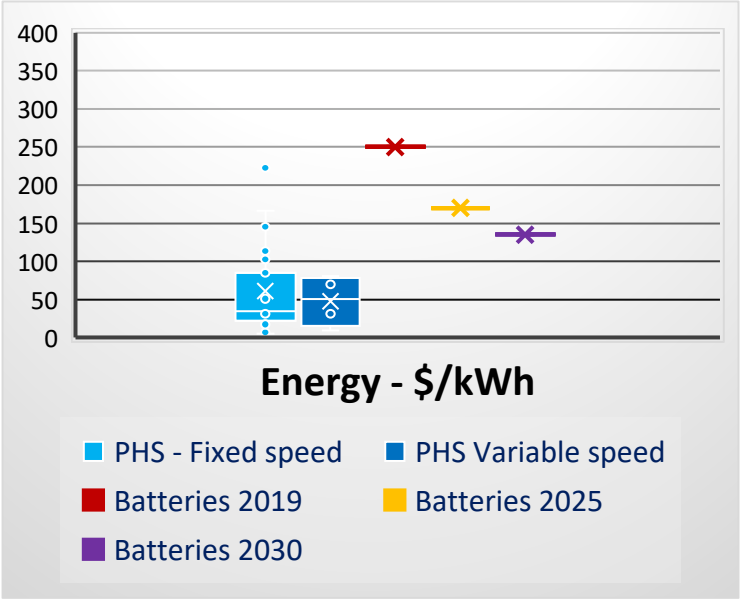

**Myths & Misconceptions**

*Myth: Hydropower takes too long to license and build, especially pumped storage hydropower.* Fact: For closed-looped pumped storage hydropower (where the water is used to create energy does not connect to a river but only flows between two reservoirs), FERC licenses now take only two years and commissioning can be achieved less than 4 years after.

*Myth: Hydropower, especially pumped storage hydropower, is an obsolete technology.*
Fact: Pumped storage hydropower is in its 3rd design generation, offering the most flexible designs we've seen (see graphic at right). Plants are designed today to last over 50 years and can cycle 10 times per day.

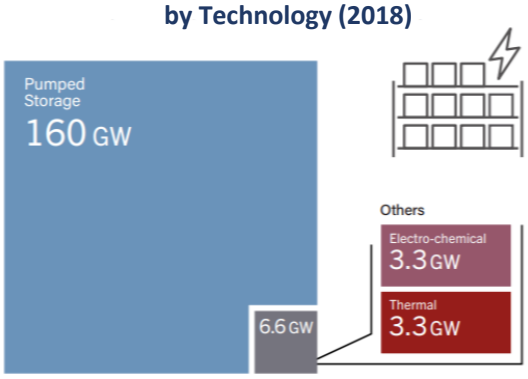
*Myth: Pumped storage hydropower is bulky and slow to react to today's grid demands.*
Fact: Pumped storage hydropower control systems provide the latest technological advances and can respond as quickly as batteries.

*Myth: Pumped storage hydropower is too expensive to build.*
Fact: When evaluating energy storage systems, one needs to look at the $/kWh – the cost of the technology, lifetime, and amount of energy storage. As the chart to the right shows, pumped storage hydropower has a much lower $/kWh than batteries – it is nearly two to three times less expensive. Also, pumped storage hydropower's annual operations and maintenance, at $20/kWh per year, are three times less than the costs for batteries. (DOE's Energy Storage Benchmark.)



*Myth: Battery storage can solve the typical afternoon ramp problem California experiences most days – 13GW in three hours (or 19.5 GWh).*
Fact: The largest battery project in Australia (100 MW) is capable of 120 MWh. The largest advanced pumped-storage hydropower plant in Switzerland (1,000 MW) is capable of 34 GWh.

**Global Utility Scale Storage Capacity by Technology (2018)**




**Stories**

*1GW Pumped Storage Hydropower Proposed:*
https://www.canarymedia.com/articles/hydropower/giant-1gw-pumped-hydro-energy-storage-project-enters-final-review

*Pumped Storage Hydropower Saves the Day - the New England electrical blackout that never happened:* https://www.hydro.org/path-to-clean-energy-vol-1-s1/.

*Projects Under Development*
https://www.ryedevelopment.com/projects.html

# Energy Costs in the Northwest

**Key Messages**

Hydropower is like a reliable car that lasts a long time. The average life span of a hydropower generating unit is about 65-85 years. That means hydropower has low operations and maintenance costs over its lifespan compared to other sources of energy.
https://www.energy.gov/eere/water/hydropower-basics

**Elevator Speech**

Hydropower is like a reliable car that just keeps running—its generating units last an average of 65 to 85 years, which means lower maintenance costs and steady, affordable power over time. In fact, states that rely on hydropower have some of the lowest residential energy bills in the country—often 20 to 50 percent below the national average. Here in the Pacific Northwest, where most of our energy comes from water, we pay about 10 to 11 cents per kilowatt hour compared to 15 to 16 cents in fossil-fuel regions. That adds up to about $2–3 billion in annual savings for consumers. Hydropower also helps avoid up to $2 billion a year in fossil fuel imports, cutting rates even further. These dams not only powered rural communities but also laid the foundation for today's cooperative, not-for-profit utilities—keeping clean, affordable energy flowing for generations.

*Myth: My Energy Bill is high!*
Fact: States that rely heavily on hydropower tend to have the lowest residential energy bills in the U.S., often 20-50% below the national average. (source: Dept. of Energy hydropower basics). The Northwest has an average retail price of 10 to 11 cents per kilowatt hour compared to 15 to 16 cents per kilowatt hour in gas/coal-dominant areas like the Northeast. In 2023, that saved Northwest consumers about $2-3 billion annually in rates. (Source: DOE: https://www.energy.gov/eere/water/hydropower-market-reports

Hydropower avoids $1–2 billion/year in fossil fuel imports, which directly reduces rates by 10–20% at utilities that rely on hydropower.

Many dams, originally constructed as part of President Franklin D. Roosevelt's New Deal in the Northwest, brought fair access to electricity to rural areas, paving the way for cooperatives and not-for-profit utilities.

# Hydropower Ambassadors

**Key Messages**

NWHA launched the Hydropower Ambassadors program to help NWHA Members take a more active role in educating the next generation – our children and grandchildren - on the value, benefits, and importance of hydropower in the region.

**What are Hydropower Ambassadors?**

They are industry volunteers who give in-person (or virtual) presentations to students, advise educators on industry realities and real-world applications, and support career-connected STEM education activities like engineering challenges, career fairs, or other STEM activities. Ambassadors will collaborate with members of the NWHA to access many existing resources available in the region and nationally, as well as find support and connections to facilitate getting real folks working in hydropower, engaging with educators and students.

**What do they do?**

There are a large variety of ways Hydro Ambassadors connect and engage with local schools beyond the traditional classroom visits and lectures:

- Give in-person (or virtual) presentations to students and teachers.
- Advise educators on industry realities and real-world applications to support curriculum planning or program design.

- Support career-connected STEM education activities like engineering challenges or career fairs.
- Provide feedback on hydropower curriculum teachers use in their classrooms.
- Invite and host school groups for field trips to hydro facilities or other industry sites.

Ambassadors can collaborate with members of the NWHA to access many existing resources available in the region and nationally, as well as find support and connections to facilitate getting real folks working in hydropower, engaging with educators and students.

**What support, tools, and resources are available?**

Featured on https://www.nwhydro.org/hydropower-ambassadors is a toolkit of resources to help and support Hydro Ambassadors decide on how they would like to engage with schools, prepare materials to support a school visit or field trip, and learn about best practices in STEM education. Included in the toolkit are:

- A tips and tricks list
- Links to classroom activities
- A virtual training workshop
- PowerPoint template to help prepare presentations
- A pre-classroom visit checklist
- And more!

**Resources**

*Learn more about the Hydro Ambassadors Program:*
https://www.nwhydro.org/hydropower-ambassadors