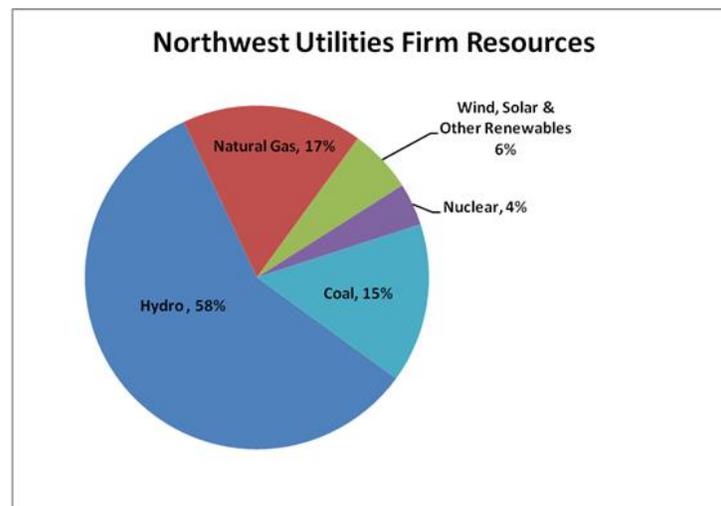


Hydro: Renewable, Clean Power for the Northwest

Hydropower is the original renewable resource. It converts energy from the movement of water into electricity. Hydropower is largely dependent upon rainfall, snow pack and changes in elevation as water flows downstream through turbines. That makes conditions in the Columbia River Basin and elsewhere in the wet and mountainous Northwest ideal for the production of hydroelectricity. In fact, the Northwest is home to the largest hydroelectric project in the country, Grand Coulee Dam.

Hydropower is the single most important resource for producing electricity in the Northwest. About 58 percent (approximately 33,000 megawatts) of the region's generating capacity comes from hydroelectric dams. Under normal precipitation, dams supply about three-quarters of the electricity that lights homes and powers commerce and industry in the Northwest. Because hydroelectricity is clean and renewable and has no carbon emissions, the region's carbon footprint is half that of other regions of the country.



Source: 2015 PNUCC Northwest Regional Forecast (Average water conditions)

Modern-day hydropower has its origins in ancient history. Water power was used by the Greeks 2,000 years ago to turn wheels for grinding wheat. Mechanical developments in the mid-1770s set the stage for hydropower generation, and plants were built in the United States as early as the 1880s. In 1889, the first long-distance transmission of electricity in the country took place between a plant at Willamette Falls near Oregon City and Portland, Oregon.

Hydroelectric development began in the 1880s in the Northwest.

- Willamette Falls Electric, the predecessor to Portland General Electric, built a hydroelectric dam at Willamette Falls on the Willamette River in 1888.

- Washington Water Power Company constructed a hydroelectric dam on the Spokane River in downtown Spokane in 1896.
- The city of Idaho Falls built the first dam on the Snake River in 1904.
- Chelan County PUD built the first dam on the mainstem of the Columbia in 1933.

The pace of dam construction was slow during the early 1900s, but picked up in the 1930s. Today, there are 58 dams built exclusively for hydropower in the Columbia River Basin. In addition, there are 78 multipurpose projects that include hydropower production.

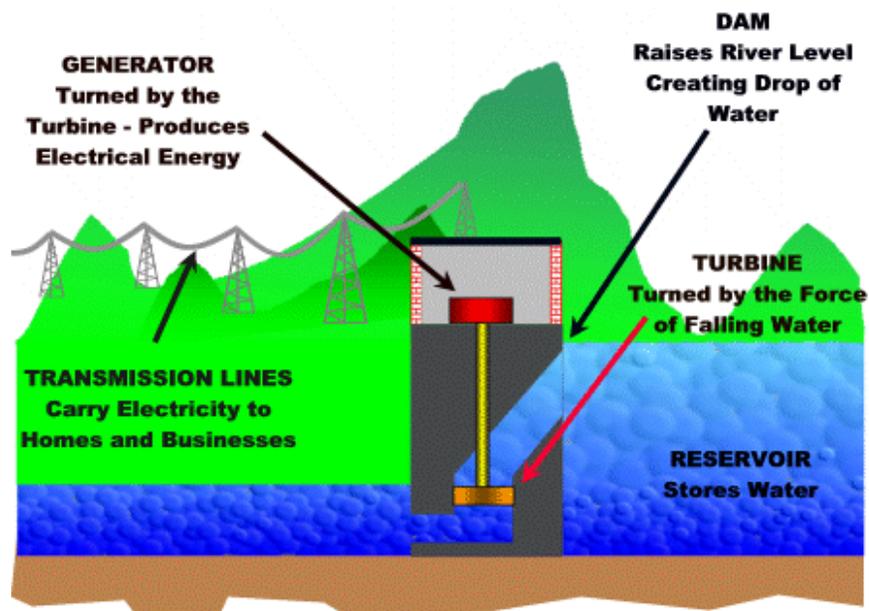
Most, but not all, of the region's largest dams are part of the Federal Columbia River Power System. The FCRPS consists of 31 projects owned and operated by two federal agencies: the Bureau of Reclamation (10 dams) and the Corps of Engineers (21 dams). About 20,600 megawatts of the hydroelectric capacity in the Northwest come from this system. This includes the giant Grand Coulee, with a capacity of 6,494 megawatts. Other major hydroelectric dams in the Northwest are owned and operated by publicly owned and privately owned utilities.

How Hydropower Works

Generating hydroelectricity starts with the annual hydrologic cycle, which provides seasonal rain and runoff from snow pack. The runoff from rain and snow collects in lakes, streams, and rivers and flows to dams downstream.

- The Columbia and Snake rivers are primarily fed by snowmelt, and the volume of water in the system fluctuates seasonally.
- The highest volumes flow between April and September; the lowest volumes flow from December to February.

Hydropower projects intercept the water on its downward path and convert mechanical energy into electricity. Water entering a powerhouse strikes a turbine, which turns a shaft to generate electricity. The water then returns to the river to be used again downstream. From the powerhouse, transmission lines carry current to where it can be used by electricity consumers.



The hydropower projects in the Columbia River Basin fall primarily into two major categories: storage and run-of-river.

- Storage projects impound water behind the dam and store it in a reservoir for later use. Water is released from the reservoir for power production and other purposes. Storage projects are vital for flood control.
- Run-of-river projects have limited storage and were developed primarily for navigation and power production. With little storage, run-of-river dams pass water at nearly the same rate as it enters the project.

Benefits of Hydropower

The Northwest is the beneficiary of a bountiful supply of hydroelectricity. It accounts in large part for our blue skies, with less natural gas and coal needed for energy needs, and small carbon footprint.

- Hydropower is a clean, renewable source of electricity. It produces no emissions and its fuel (water) can be reused at each downstream dam.
- Hydropower is domestic. The supply of water in the Pacific Northwest is continually replenished by rain and snowmelt. The fuel and the power plants exist within our borders and are not subject to interruption.
- Hydropower is affordable. It is cheaper to produce megawatts at dams than at nuclear, coal, or natural gas-fired plants. The Northwest has some of the lowest power rates in the country, due to the abundance of hydropower.
- Hydropower is flexible. Generation at a hydroelectric plant can be ramped up and down quickly. This flexibility makes it a good partner for variable sources of generation, like wind.

Hydroelectricity is not without controversy, and dam owners, including the federal government, must operate their projects to protect the environment and the fish and wildlife that inhabit the rivers and surrounding areas. Dams in the Northwest have been outfitted with a number of features that help to protect salmon and other fish that live and migrate in the river system. For details on the upgrades to dams for safer fish passage, see “Salmon and Hydropower: A System to Keep Salmon Safe” located under “Salmon Plans and Protection” on the Facts page.

Northwest RiverPartners is a partnership of farmers, electric utilities, ports, and large and small businesses in the Pacific Northwest. We are dedicated to ensuring the Columbia and Snake remain living, working rivers to benefit families and businesses in the region.

www.nwriverpartners.org

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