Renewable Hydropower Program

Division of Geological & Geophysical Surveys

What is the Hydropower Program?

The State of Alaska Division of Geological & Geophysical Surveys' Hydropower Program collects, compiles, and disseminates data and information related to the State's hydropower energy resources.

We collaborate with public and private stakeholders including the University of Alaska Fairbanks' Center for Energy and Power (ACEP), the U.S. Geological Survey (USGS), utility providers, and others to understand data needs prioritize data collection efforts that benefit Alaskans.

Hydropower in Alaska

Hydropower is a significant contributor to Alaska's energy profile, with nearly **50 utility-scale hydroelectric projects** supplying more than **20% of the State's electricity** in an average water year (AEA, 2025). Hydropower infrastructure is reflected in the State's industrial, residential, and economic development. Large-scale hydroelectric projects such as Bradley Lake prompted development of the Alaska Intertie (the 'Railbelt'), bridging electricity transmission between Southcentral and the Interior. Small-scale projects (1-5 MW) keep the lights on and support critical industries from the Aleutians to Southeast. As the State's population and economy continue to grow, **hydropower remains a critical resource for meeting increasing energy demand, both in the Railbelt and Rural Alaska.**

Storage

Bradley Lake- Ian Dickson/KTOO

Traditional storage projects use a dam and reservoir to store water and control outflow used to generate electricity on demand.

Alaska's three largest hydroelectric facilities are all storage projects: Bradley Lake – 126 MW (Homer), Snettisham – 78 MW (Juneau), and Eklutna Lake – 44 MW (Anchorage). While traditional storage projects provide the most electricity per initial investment cost, large-scale projects are not viable in small communities, where electricity demand is low and large infrastructure project cost is high.

Run-of-River

Power Creek – Cordova Electric Co-op

Run-of-river (ROR) projects differ in that they do not impound large amounts of water.

In ROR systems, flow is diverted and routed through a penstock to a turbine downstream. ROR systems can be optimized based on local terrain; however, without large-scale storage, ROR projects are highly subject to short-term and seasonal fluctuations in flow. ROR projects typically produce smaller impacts on local hydrology and ecological function than traditional large-scale storage projects.

Hydrokinetic

Kvichak River, Igiugig - ORPC RivGen

Hydrokinetic turbines produce electricity directly from the current without the need for dams or large infrastructure.

Alaska's vast abundance of free-flowing rivers presents a unique opportunity - with thousands of miles of rivers and coastlines, and abundant precipitation, Alaska is perfectly situated to take advantage of hydrokinetic energy. Without a dam, hydrokinetic turbines offer minimal disruption to natural flow, aquatic habitats, and fish migration.

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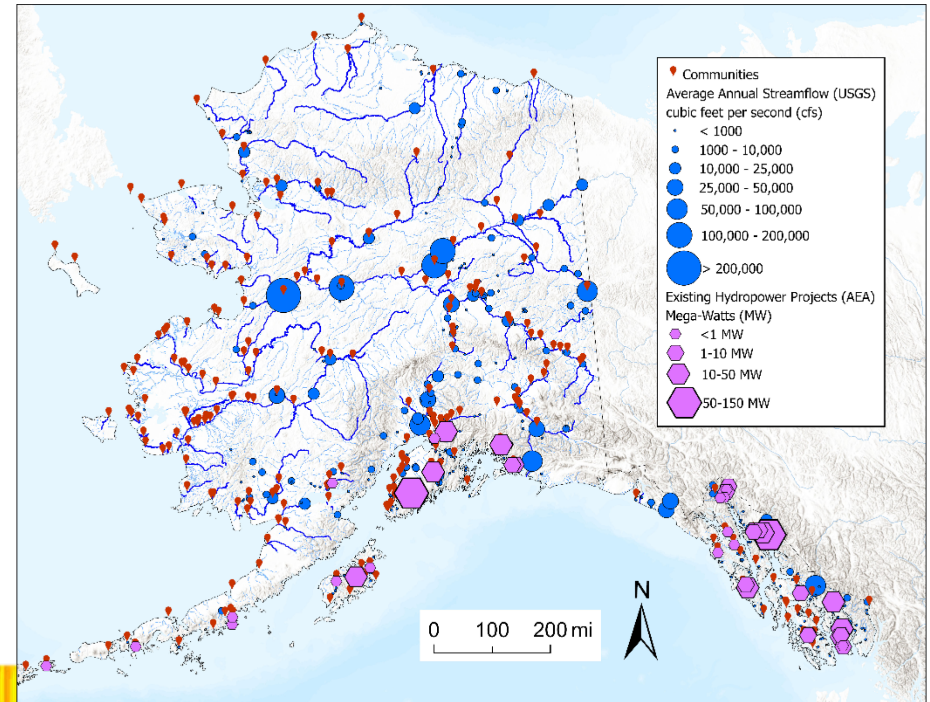
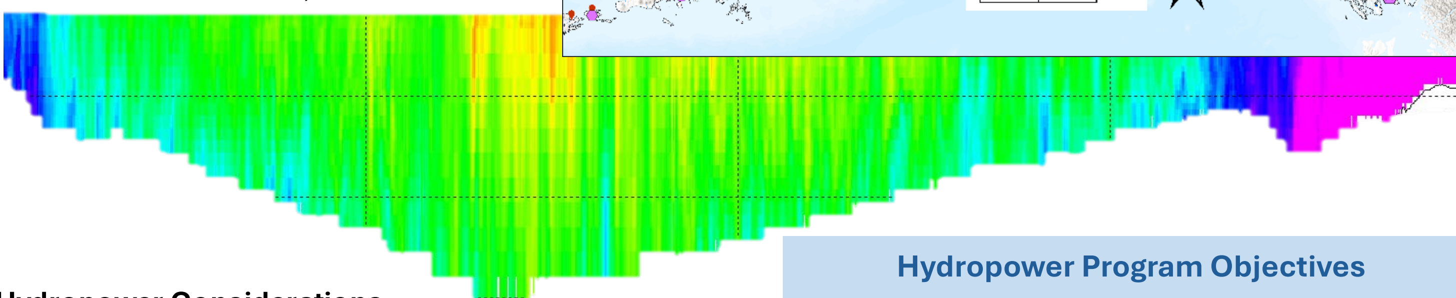
Benefits for Alaska

Many remote villages rely on expensive diesel fuel for power and heat. For those near rivers and coastlines, hydropower may be an economic and reliable alternative, reducing community dependence on expensive imported fuels.

Hydropower facility design depends on natural terrain, local climate, water availably, and electricity demand. Balancing these factors with other cultural and ecological values is key to project development and success.



Acoustic Doppler Flow Velocity Profile, Yukon River at Eagle, AK (USGS)



Hydropower Considerations

Hydrologic Resource	How much water is available to produce power?
Geographic & Climatic	Natural terrain (storage volume, head, channel properties), temperature, precipitation, ice dynamics, permafrost
Economics & Infrastructure	Construction, operation, and maintenence costs; power output and cost per kilowatt-hour
Ecological and Fisheries Impacts	Anadromous (salmon) fish habit, other ecological values
Social & Cultural	Indigenous/local stewardship, subsistence and cultural values
Policy & Regulatory	Federal Energy Regulatory Commission (FERC) versus state-level oversight
Climate Adaptation	Adaptive design for shifting hydrology; opportunities to integrate hybrid microgrids

For more information about the Renewable Hydropower Program, contact Matthew Scragg matthew.scragg@alaska.gov
Learn more online at:
https://dggs.alaska.gov/hsg/renewable-hydropower.html

Hydropower Program Objectives

- DGGS is coordinating a **Channel Mapping Project** (CMP) to systematically and efficiently map river bathymetry (depth) and velocity, using sonar, lidar, and ground-penetrating radar. From this, we will identify areas where hydropower may be a viable alternative.
- DGGS is conducting a **Statewide Assessment of Hydrokinetic Energy Resources in Alaskan Rivers** (SHEAR) project, aimed at sparking long-term investment in emerging hydrokinetic turbine technology and project implementation.
- DGGS maintains an Alaska Hydropower Database which shares existing and new geospatial and temporal data related to hydropower.
- DGGS collects data and uses instrumentation to monitor and characterize hydrology of potential hydropower projects.
- DGGS continually works with other agencies, organizations, and the private sector to provide guidance and technical expertise related to hydrology and hydropower resources throughout Alaska.

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