



Applying knowledge to improve water quality

Pacific Northwest

Regional Water Program

A Partnership of USDA CSREES
& Land Grant Colleges and Universities

Fall 2008
PNWWATER 146

Powering Small Communities:

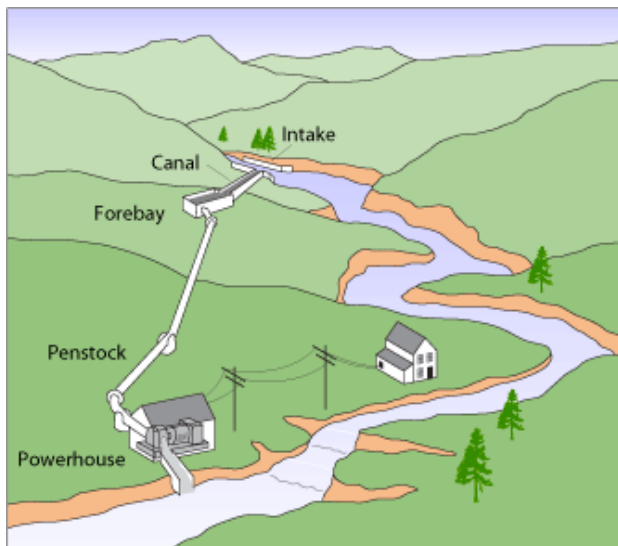
Micro Hydro Projects



With increasing fuel cost in isolated rural communities in Alaska alternative energy sources are being considered. One of the alternatives is Micro Hydro. Micro Hydro systems are small (100 kW or smaller) water powered sources that are used for individual users or small groups of users such as small communities or developments. There are two basic types of Micro Hydro systems that are based on two different environmental conditions. Run of the River systems are situated on fast flowing streams with steeper topographic gradient. In-Stream systems are situated on larger flowing rivers with large volume.

Run of the River

Run of the river systems require an up stream intake or weir to redirect some of the stream flow through a forebay tank to separate out any gravel and detritus. The water then flows down a penstock pipe down hill to a powerhouse and then out a tailrace to return to the stream. The height or head between the top of the penstock and the powerhouse provides most of the gravitational potential for the production of energy. The water flow across a Pelton wheel or other type of turbine provides the energy conversion to a generator. Transmission lines then connect to the individual users.



Run of the River System.

In-Stream

In-Stream or Hydrokinetic systems depend on large volume flows rather than high head as the major component of energy production. Large rotor blades either positioned vertically or horizontally are placed into the river flow for energy conversion. The generators are usually fixed to the gearbox and transmission lines run out of the unit to the users. These system designs are basically the same for tidal energy systems.



Pacific Northwest Regional Water Quality Coordination Project Partners

Land Grant Universities

Alaska

Cooperative Extension Service
Contact Fred Sorensen:
907-786-6311

<http://www.uaf.edu/ces/water/index.html>

University Publications:

<http://www.alaska.edu/uaf/ces/publications/>

Idaho

University of Idaho
Cooperative Extension System
Contact Bob Mahler: 208-885-7025

<http://www.uidaho.edu/wq/wqhome.html>

University Publications:

<http://info.ag.uidaho.edu/Catalog/catalog.html>

Oregon

Oregon State University
Extension Service
Contact Mike Gamroth: 541-737-3316

<http://extension.oregonstate.edu/>

University Publications:

<http://extension.oregonstate.edu/catalog/>

Washington

Washington State University
WSU Extension
Contact Bob Simmons:
360-427-9670 ext. 690

<http://wawater.wsu.edu/>

University Publications:

<http://pubs.wsu.edu/>

Northwest Indian College
Contact: Michael Cochrane:
360-392-4299

mcochrane@nwic.edu or

<http://www.nwic.edu/>

Water Resource Research Institutes

Water and Environmental Research
Center (Alaska)

<http://www.uaf.edu/water/>

Idaho Water Resources
Research Institute
<http://www.boise.uidaho.edu/>

Institute for Water and
Watersheds (Oregon)
<http://water.oregonstate.edu/>

State of Washington
Water Research Center
<http://www.swwrc.wsu.edu/>

Environmental Protection Agency

EPA, Region 10
The Pacific Northwest
<http://www.epa.gov/r10earth/>

Office of Research and Development,
Corvallis Laboratory
<http://www.epa.gov/wed/>

For more information contact
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The Project

Land Grant Universities, Water Research Institutes, and EPA Region 10 have formed a partnership to provide research and education to communities about protecting or restoring the quality of water resources. This partnership is being supported in part by the USDA's Cooperative State Research, Education, and Extension System (CSREES).

Our Goal and Approach

The goal of this Project is to provide leadership for water resources research, education, and outreach to help people, industry, and governments to prevent and solve current and emerging water quality and quantity problems. The approach to achieving this goal is for the Partners to develop a coordinated water quality effort based on, and strengthening, individual state programs.

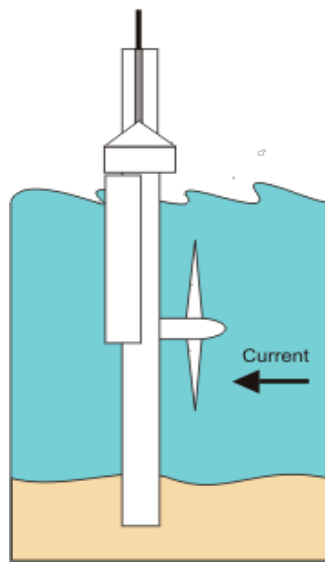
Our Strengths

The Project promotes regional collaboration by acknowledging existing programs and successful efforts; assisting program gaps; identifying potential issues for cross-agency and private sector collaboration; and developing a clearinghouse of expertise and programs. In addition, the Project establishes or enhances partnerships with federal, state, and local environmental and water resource management agencies, such as by placing a University Liaison within the offices of EPA Region 10.

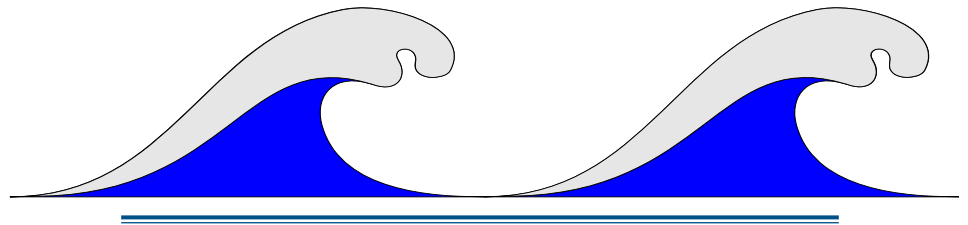
In Alaska

In Alaska, examples of both of these systems already exist or pilot systems are being installed. As expected the colder climates and inherent freezing winter conditions bring system problems. In some designs the system is not in use in the middle of winter. Run of the River systems will work in mountainous regions such as South Eastern and South Central Alaska. In-Stream systems are more likely in interior and western Alaska where large river systems exist.

Siting of these systems is important and often requires a Federal Energy Regulatory Commission (FERC) permit. At this time in Alaska energy companies outside of Alaska are seeking permits for prime sites, especially near communities on large rivers such as the Yukon, as speculation possibilities.



In-Stream System.



National Water Quality Program Areas

The four land grant universities in the Pacific Northwest have aligned our water resource extension and research efforts with eight themes of the USDA's Cooperative State Research, Education, and Extension System.

1. Animal Waste Management
2. Drinking Water and Human Health
3. Environmental Restoration
4. Nutrient and Pesticide Management
5. Pollution Assessment and Prevention
6. Watershed Management
7. Water Conservation and Management
8. Water Policy and Economics

CSREES is the Cooperative States Research, Education, and Extension Service, a sub-agency of the United States Department of Agriculture, and is the federal partner in this water quality program.