



Islands Trust

FACT SHEET

MICRO-HYDRO ENERGY SYSTEMS

The rural nature of the Islands Trust Area is one of the characteristics that makes it unique and valued by residents and visitors alike. Yet such remote locations can pose unique challenges for service provision, including electricity. Recognizing the importance of using low-impact and renewable energy sources, island residents are increasingly turning to innovative technologies that are sensitive to the environment and the rural character of the landscape. Micro-hydro energy systems can fulfil these criteria for electricity generation, and can provide a complement to existing technologies like solar photovoltaics.

What are micro hydro energy systems?

Although definitions may vary among different agencies, BC Hydro defines micro hydro developments as those with an installed capacity of less than 2 MW (2,000 kW). (The Province of British Columbia refers to run-of-river and micro hydro projects as “small hydro”.) Micro hydro projects are located where there is sufficient annual precipitation and landscape gradient to ensure that a stream has a consistent and steady natural flow. Electricity is produced by directing some of the water to a generator via small dams or diversion channels. Diverted water is returned to the stream below the powerhouse or generator.

How are they used?

Micro hydro installations can provide power to an isolated home or small community, or are sometimes connected to electric power networks. Their most likely application in the Islands Trust area would be very small systems – called *pico* or *nano* hydro systems – which supply only a few kilowatts of capacity, and which may operate only seasonally depending on water flow. These systems are common in rural BC for independent supply where there is no access to the electric power grid. Very small systems are typically run-of-stream, meaning that pipes are used to divert stream flow, rather than storing the water behind a dam. Micro hydro systems can also complement photovoltaic solar energy systems because in many areas water flow, and thus available hydropower, is highest in the winter when solar energy is at a minimum.

How much electricity can micro hydro energy systems produce?

In general, the site determines the capacity of the system to produce electricity. Power potential is a function of head (the change in elevation of the water) and the available flow. Although hilly or mountainous sites are best suited to micro hydro, systems can be constructed to take advantage of heads as low as 2 feet. Operating efficiency depends on factors such as turbine efficiency and pipe friction, which usually results in systems between 55 and 65 percent efficient. A 10-kilowatt micro hydro system can typically provide enough power for a large home or a hobby farm. However, power generation can be limited during periods of low stream flow due to low precipitation or temperatures low enough to freeze the stream.

What are the benefits of micro hydro?

Where an appropriate site exists, micro hydro can provide a reliable, renewable and cost-effective energy source for rural communities. Hydroelectric power generation is emission-free: no greenhouse gases or waste heat is released during operation. Disturbance to fish habitat is limited by maintaining natural water temperatures and downstream flows. Well-designed projects can blend in with the landscape and minimize environmental impacts. Micro hydro has the potential to supplement the energy mix in British Columbia while providing an alternative to major energy infrastructure investments.

How are micro hydro installations regulated?

Installation of micro hydro energy systems on private land is subject to a number of regulations. The Riparian Area Regulation (RAR) may limit development around streams and other water bodies for the purpose of protecting fish habitat. Applicable streams within the Islands Trust area have been mapped, and in most cases Development Permit Areas (DPAs) have been established to implement the Regulation. Micro hydro installations within the DPA surrounding a RAR stream would require an application for a Development Permit from the Local Trust Committee. Local Trust Areas may also have bylaws regulating the construction of utilities on the property.

The provincial Crown owns all water present in streams, rivers and lakes in BC. Individuals or companies who wish to divert and use this “surface” water are required by law to first obtain a water license from the Ministry of Forests, Lands and Natural Resource Operations under the BC *Water Act* (soon to be replaced by the *Water Sustainability Act*). Additional agreements with BC Hydro are required to connect the micro hydro system with the power grid or to sell any of the generated energy. Any development that crosses or floods Crown land would also require application for a Crown Land Lease.

If you are considering installing a micro hydro energy system on your property, **contact your local Island Planner early in the planning process** to determine which regulations and procedures apply.

How do I find out more about micro hydro energy systems?

For more information about micro hydro energy systems, consult the websites below:

- BC Hydro. “Small & Micro Hydro Energy” www.bchydro.com/energy-in-bc/meeting_demand_growth/energy_technologies/micro_hydro.html
- BC Hydro, 2004. *Handbook for developing micro hydro in British Columbia*. www.bchydro.com/content/dam/hydro/medialib/internet/documents/environment/pdf/environment_handbook_for_developing_micro_hydro_in_bc.pdf
- Province of British Columbia. “Water Act, Section 9” http://www.env.gov.bc.ca/wsd/water_rights/licence_application/section9/
- Province of British Columbia. “Water Sustainability Act” <http://engage.gov.bc.ca/watersustainabilityact/>
- Province of British Columbia. “What is Small Hydro?” <http://www.empr.gov.bc.ca/RET/RENEWABLEENERGYTECHNOLOGIES/SMALLHYDRO/>
- Energy BC. “Run-of-River Power” <http://www.energybc.ca/profiles/runofriver.html>
- U.S. Department of Energy. “Microhydropower Systems” <http://energy.gov/energysaver/articles/microhydropower-systems>