



/RUN-OF-RIVER HYDRO POWER



What is It?

- > Run-of-River hydro power is one of the renewable electricity generating options available to British Columbians, along with wind, solar, geothermal and biomass energy.
- > Together with energy conservation and awareness, the renewable energy options are expected to provide a large portion of BC's energy needs for the future. By developing renewable electricity projects in a responsible manner, British Columbia's electricity industry can achieve its sustainability goals at the same time as meeting important objectives to reduce the impacts of climate change.
- > Run-of-River hydro encompasses hydroelectric projects that use the natural elevation and part of the natural flow of a stream to create power. It is different from conventional storage hydro in several ways.
- > A portion of the water from the stream is diverted into a submerged penstock or pipe that channels it downstream to a turbine. There is short distance in the stream where there is less water in the streambed than normal – within carefully determined limits determined by modeling and detailed impact assessments – at the end of which all the water is returned to the stream.
- > Run-of-River projects have a much smaller environmental footprint compared to traditional reservoir storage hydro projects. By using existing forestry roadways and burying much of the penstock, the land impact per unit of energy produced is usually orders of magnitude smaller than traditional reservoir projects.
- > Run-of-River projects require over 50 permits, licenses, approvals and reviews from over a dozen government agencies, involving extensive public and First Nations consultation, before they can be built and operated, a recent project had over 1,500 permit conditions to comply with.

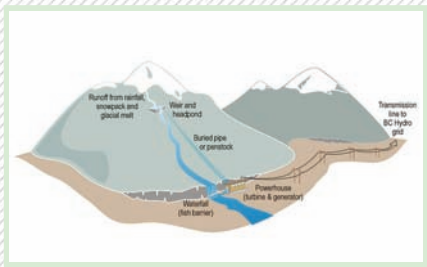
Why Run-of-River?

- > As a readily available source of green electricity in carefully selected watersheds, Run-of-River hydro can play a prominent role in helping BC achieve energy self-sufficiency by 2016. The BC government is encouraging the development of renewable power generation sources in British Columbia for several reasons:
 - » Helps meet greenhouse gas emissions reduction targets – part of a worldwide effort to reduce the impacts of climate change
 - » Meet the province's growing energy needs in a sustainable manner
 - » Reduce its reliance on imported, carbon-intensive, non-renewable energy.
 - » Zero greenhouse gas emission electricity projects that fully mitigate their environmental impacts are highly desirable both at home and in the electricity marketplace.
- > All forms of energy production have impacts. However, among the choices for electricity development, renewables including run of river energy – if adequately designed and developed, have several advantages:
 - » Have zero greenhouse gas or other air emissions in operations over a very long project life.
 - » Displace energy produced by polluting (oil, coal) sources.
 - » Have low potential for risk to water quality.
 - » Displace energy produced by polluting (oil, coal, gas) sources.
 - » Typically located at high elevations, usually above waterfalls, which act as a natural fish barrier.
 - » Have minimal impact on vegetation, bird or wildlife habitat due to the limited footprint of the project, especially after reclamation is completed.
 - » Have low visual impact after the 1–2 year construction and subsequent required reclamation is complete.
 - » Typically use existing logging roads for access and transmission rights-of-way minimizing environmental impacts.

Like any industry, effective ongoing environmental management includes the implementation of operating environmental management plans.

The Technology

- > Run-of-River projects do not require unlike traditional hydroelectric facilities, which flood large areas of land large storage reservoirs.
- > Instead, some of the water is diverted from a river into a pipe called a penstock. The penstock feeds the water downhill to a generating station.



The main principle of Run-of-River.

//FACT SHEET

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Images by Canoe Creek

- > The natural force of gravity creates the energy required to spin the turbines that generate electricity.
- > The water leaves the generating station and is returned, unaltered, to the river.

BC's Run-of-River Potential

- > Small hydro projects have long been used throughout British Columbia to power mines, mills and towns.
- > Today there are 35 independent Run-of-River projects operating in British Columbia.
- > Although there are countless rivers in the province not all are suitable for Run-of-River projects. Potential sites must have cost effective transmission access, undergo a comprehensive environmental assessment at the developers cost, meet government guidelines and regulations and be commercially viable.
- > Of the Water License Applications for Power-General; over 50% are for projects under 10 MW and less than 5% are for projects over 50 MW.

Environmental & Regulatory Considerations

- > A typical 26 megawatt (MW) Run-of-River power plant producing 80 gigawatt hours (GWh) of green energy annually would displace approximately 47,000 tonnes of carbon dioxide, the equivalent of taking 9,000 cars off the road.
- > Most Run-of-River projects have a small environmental footprint and tend to use pre-existing infrastructure like logging roads for site access, produce no greenhouse gas emissions, and do not require dams, reservoirs or flooding of large tracts of land.
- > Every proposed Run-of-River project must obtain land tenure and apply for a water license.
- > Run-of-River projects must adhere to an extensive regulatory and review process before construction can begin.
- > Water licenses issued by the provincial government are for a maximum of 40 years. Over this period, the developer pays a water rental levy as well as land lease payments to the government.
- > When a water license expires, all infrastructure improvements along with the right to use the land and water revert back to the provincial government.
- > Every Run-of-River project goes through a stringent environmental review process that can take two or more years and involves more than 12 federal, provincial, local and First Nations authorities.
- > Run-of-River proponents are required to consult with government and First Nation interested parties and stakeholders throughout the planning process. There are ample opportunities to provide input and feedback on a proposed project before it is approved.
- > If a project receives an Environmental Certificate, the proponent must comply with dozens of commitments and/or conditions, which are monitored by independent, third-party engineers and compliance officers to ensure a high standard of environmental protection and mitigation.

Public vs. Private

- > Allowing private industry to develop Run-of-River projects eliminates the need to spend taxpayer dollars on high risk, early stage project assessment and development of dozens of projects that ultimately may reveal some shortcomings.
- > Any construction cost over-runs are covered by the project's shareholders, not BC Hydro ratepayers or taxpayers.
- > Tax dollars can be dedicated to public healthcare and education; instead of the risky business of resource prospecting.
- > The land on which the Run-of-River projects are built remains in public hands, with land lease and water rental payments being made to the BC government.
- > Provides new sources of green, made-in-BC energy for the benefit of all British Columbians throughout the province.
- > Typically one-quarter of electricity revenues received by Run-of-River plants are paid back as taxes, water rentals and other levies to local, provincial and federal authorities.
- > By encouraging competition and ingenuity in the marketplace, renewable energy development will stimulate economic activity, creating jobs and opportunities for British Columbians.
- > Run-of-river hydropower is one of the most plentiful, environmentally sound renewable energy sources available in BC.

Socio-Economic Benefits

- > Ensures environmentally sustainable development of local resources.
- > Diversifies economic activity in remote areas.
- > Provides training and employment opportunities for First Nations and communities.
- > Provides a continuous source of clean, green renewable energy with minimal environmental impact.

/KEY LINKS

Environmental Assessment Office
www.eao.gov.bc.ca

BC Hydro
www.bchydro.com/info

BC Utilities Commission
www.bcuc.com

**BC Ministry of Energy, Mines and
Petroleum Resources**
www.gov.bc.ca/empr