

BC Hydro 2004 Integrated Electricity Plan

Resource Options

After forecasting the need for electricity and the amount that can be supplied from current resources, planners look at possible new sources of electricity and ways of reducing demand for electricity that might meet BC Hydro's customers' needs (see "Electricity Resources" below).

Options are developed based on these new resources in three major steps:

- 1) **Identify possible resources** that could meet future demand. Resources can be:
 - Generation resources, such as hydroelectric; gas or coal-fired; alternative technologies, such as wind energy; and improvements at existing generating facilities ("Resource Smart" programs);
 - Demand-side management, such as BC Hydro's Power Smart programs; and
 - Transmission options, such as building additional lines and increasing the capability of existing lines, to carry electricity from areas where it is created to where it is needed.
- 2) **Identify attributes** (or criteria) used to describe resources in order to choose the best ones. Attributes include, but are not limited to:
 - Cost to construct (capital cost)
 - Amount of energy generated per year (GWh)
 - Dependable capacity (MW)
 - Employment (short-term and long-term jobs created)
 - Greenhouse gases and other air emissions

This process produces a list of feasible electricity supply options with a description of their performance on several key attributes.

Electricity Resources

B.C. has a wide variety of natural resources to create electricity. The list below describes the resource options, along with some advantages and disadvantages of each.

- **Power Smart** – demand-side management (DSM) programs to encourage residential, commercial and industrial customers to use less electricity by improving the efficiency of their energy use (e.g. by adopting more-efficient technologies such as installing new types of light bulbs). The potential is significant, although it depends on economic and community considerations. Programs may have associated costs to educate users or provide incentives.
- **Run-of-River Small Hydro** – hydro dam and generator without significant water storage. High precipitation and steep mountain terrain result in good potential with relatively low costs and environmental impacts. Little dependable capacity is provided by small hydro due to the lack of water storage and potential for low water flow in winter months.
- **Wind** – wind energy can be created by wind farms using large wind-powered turbine generators. B.C. has potential for wind energy resources, although suitable locations are often remote. Costs could be relatively high, but environmental impacts are relatively low.
- **Geothermal** – geothermal energy can be created by using heat to power a steam-powered generator. B.C. has potential for geothermal resources. Costs could be relatively high in part due to the needs for extensive exploration, but environmental impacts are relatively low.

BC Hydro 2004 Integrated Electricity Plan

- **Biomass** – The use of biomass would involve burning wood residues from the forest industry or municipal solid waste as a fuel for steam generators. Certainty of fuel supply is a significant issue. Costs are relatively low. With good emission controls, environmental impacts are positive as existing local emissions from beehive burners is reduced.
- **Customer Cogeneration** – BC Hydro customers that produce steam for manufacturing processes can use the steam to power electric generators. Typically, natural gas and wood residue are used as fuels. Costs and environmental impacts are relatively low.
- **Natural Gas** – High-efficiency gas-fired turbines generate electricity in large generating stations. Although there is plenty of natural gas available to B.C., it is a depleting fossil fuel. Construction costs are lower than costs for large Hydro systems, but operation and maintenance costs are higher due to the cost of fuel. Environmental impacts include greenhouse gases and local emissions.
- **Coal** – Coal-fired steam turbines generate electricity in large generating stations. Large amounts of coal are available, although transportation costs limit generating sites to areas where the coal mine is located. Construction costs are lower than costs for large hydro systems. Fuel costs are lower than those for a gas-fired plant, but total operating costs are uncertain, as the requirements for emission controls may change. Lower emissions coal generation technologies are still in the development stages.
- **Large Hydro** – hydro dam and generator with a reservoir. The potential of this resource to supply electricity is high, as a potential location exists on an existing reservoir/river system (Site C on the Peace River). Large hydro projects have the advantage of providing dependable capacity that can be counted on for electricity when needed. A large capital investment is needed, but operating and maintenance costs are relatively low. Construction and operation result in environmental impacts, primarily in the river valley.