



# POWERING B.C. WITH CLEAN, RELIABLE ELECTRICITY FOR GENERATIONS

SPRING 2011

SITE  CLEAN  
ENERGY PROJECT

BChydro |   
REGENERATION

# SITE C AT-A-GLANCE

## DAM

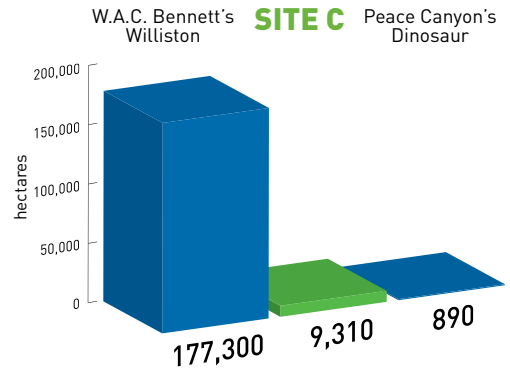
Type: Earthfill dam  
Height: 60 metres above riverbed  
Length: 1,050 metres  
Energy: 5,100 GWh/yr.  
Capacity: Up to 1,100 MW

## RESERVOIR

Total Reservoir Surface Area: 9,310 hectares  
Total Flooded Land Area: 5,340 hectares  
Crown land: 4,318 hectares (81%)  
BC Hydro-owned land: 666 hectares (12%)  
Private land: 356 hectares (7%)

Maximum Reservoir Fluctuation: 1.8 metres  
Length: 83 kilometres  
Width: 2-3 times the current river (on average)

## RESERVOIR FOOTPRINTS



# ABOUT SITE C

SITE C IS A PROPOSED THIRD DAM AND HYDROELECTRIC GENERATING STATION ON THE PEACE RIVER IN NORTHEAST B.C.

Site C is being proposed as part of BC Hydro's overall program to invest in and renew the province's electricity system.

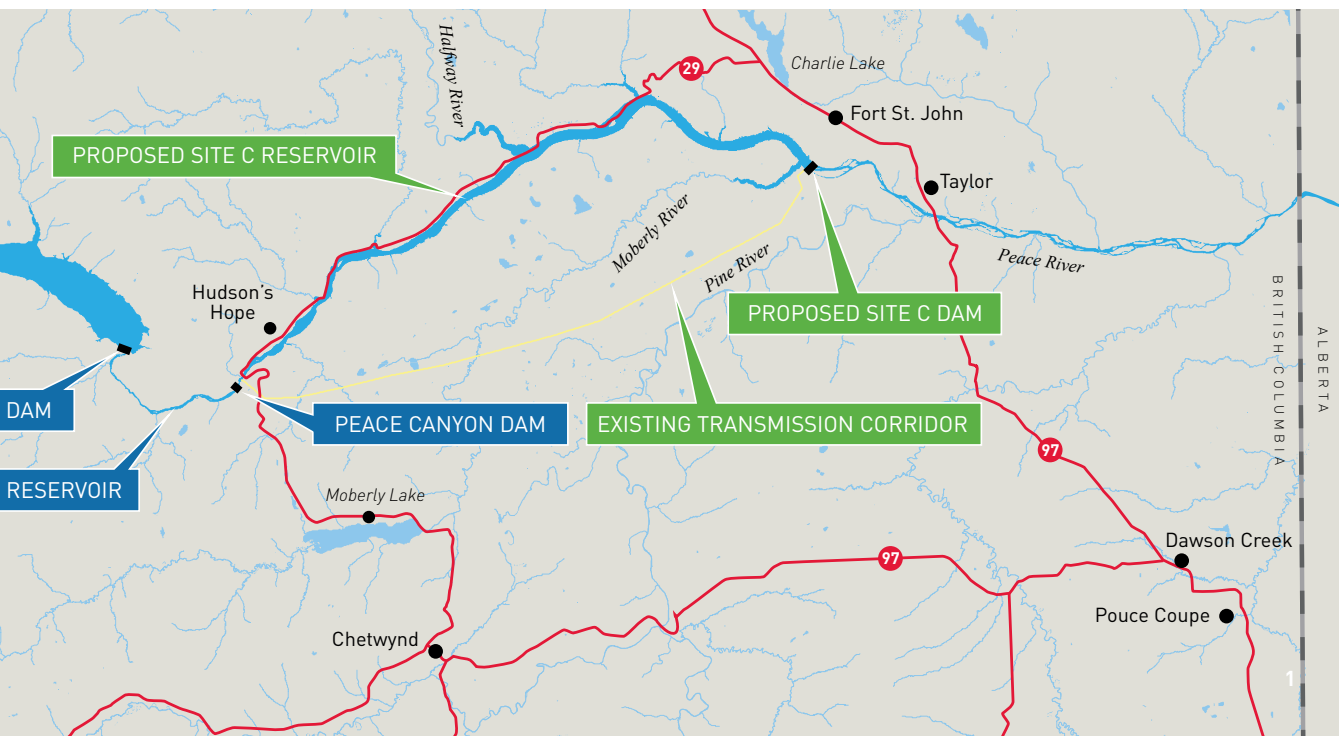
Site C would provide up to 1,100 megawatts (MW) of capacity, and produce about 5,100 gigawatt hours (GWh) of electricity each year — enough energy to power more than 450,000 homes per year in B.C.

As the third project on one river system, Site C would gain significant efficiencies by taking advantage of water already stored in the Williston Reservoir. This means that Site C

would generate approximately 35 per cent of the energy produced at W.A.C. Bennett Dam, with only five per cent of the reservoir area.

The Site C reservoir would be approximately 83 kilometres long and would be, on average, two to three times the width of the current river. This reservoir would be one of the most stable in the BC Hydro system with relatively little fluctuation in water levels during normal operations.

Site C would be a publicly owned heritage asset. It would be a source of clean, reliable and cost-effective electricity for more than 100 years.



# B.C.'S FUTURE ELECTRICITY NEEDS

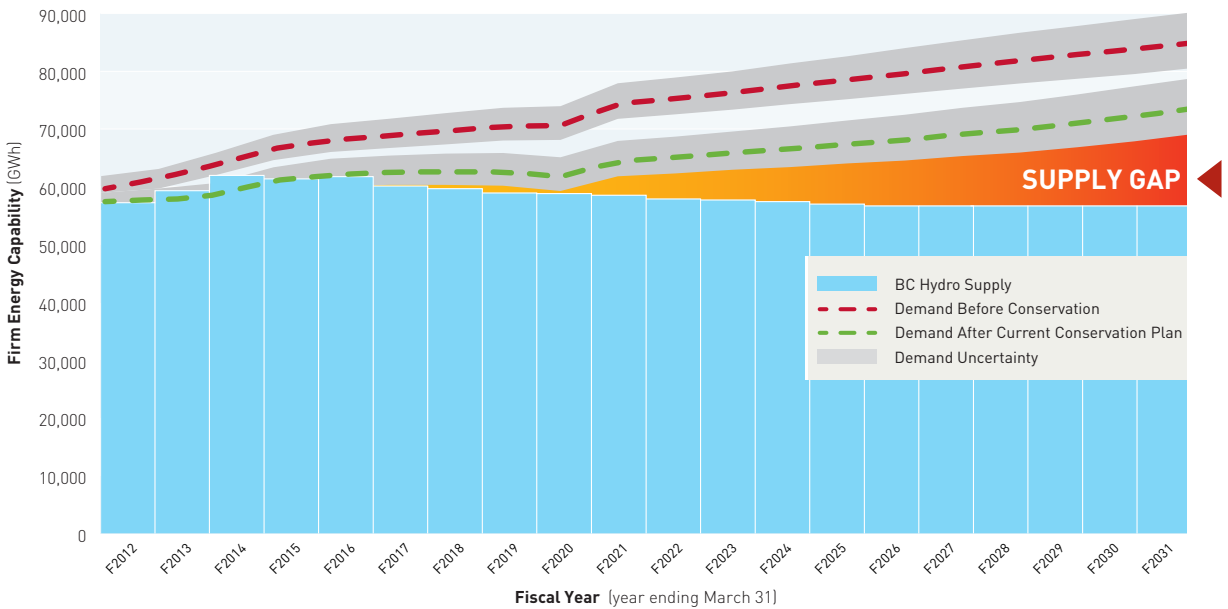
B.C. IS GROWING AND SO IS OUR DEMAND FOR ELECTRICITY.

BC Hydro forecasts that the province's electricity needs will grow by approximately 40 per cent over the next 20 years, as B.C.'s population grows by a projected 1.2 million people.

As extensive as BC Hydro's hydroelectric assets are, they will not be enough to meet B.C.'s future electricity needs if demand continues to grow as projected.

To meet B.C.'s future electricity needs, BC Hydro is encouraging conservation, upgrading its existing facilities, building new transmission and distribution infrastructure, and investing in new supplies of clean energy.

With Site C, BC Hydro is planning now so that British Columbians will continue to benefit from clean, reliable and cost-effective electricity in the future.



# ENVIRONMENTAL AND REGULATORY REVIEW

THE ENVIRONMENTAL ASSESSMENT PROCESS FOR SITE C WILL BE THOROUGH AND INDEPENDENT.

BC Hydro is committed to producing and delivering electricity in an environmentally responsible manner — minding our footprint by carefully managing our impacts on the environment. This includes meeting the regulatory requirements set out by federal and provincial environmental assessment processes.

The environmental assessment process for Site C will be thorough and independent. It will include opportunities for consultation and input by the public, Aboriginal groups, communities, property owners and stakeholders.

As part of an environmental assessment, BC Hydro will identify and assess potential project effects — environmental, economic, social, heritage and health — and opportunities to provide lasting benefits for the region and Aboriginal groups. Where effects cannot be avoided, BC Hydro will identify and evaluate options for mitigation.

Site C requires environmental certification and other regulatory permits and approvals before it can proceed to construction. In addition, the Crown has a duty to consult and, where appropriate, accommodate Aboriginal groups.



## SUPPORTING RENEWABLES

To facilitate the development and use of clean and renewable electricity sources, there is a need to back up intermittent sources — such as wind and run-of-river hydro — with reliable capacity.

As a dependable and flexible resource, Site C would be able to quickly increase or decrease generation to match the availability of intermittent resources.

# STAGE 3 STUDY TOPICS

BC HYDRO IS UNDERTAKING OR PLANNING A NUMBER OF PRELIMINARY STUDIES IN PREPARATION FOR THE ENVIRONMENTAL ASSESSMENT PROCESS.

A summary of preliminary Site C study topics is listed below.

## BIOLOGICAL ENVIRONMENT

### Fish and Aquatic Habitat

- Aquatic productivity
- Fish and fish habitat
- Mercury assessment
- Mercury modeling

### Wildlife and Vegetation

- Bats
- Birds
- Furbearers
- Garter Snakes
- Habitat mapping
- Rare plants
- Small mammals
- Ungulates

## ENGINEERING

- Clearing plan
- Construction access roads
- Construction materials
- Dam site investigations
- Highway 29

## PHYSICAL ENVIRONMENT

### Land and Water

- Contaminated site assessments (reservoir area)
- Geomorphology and sediment transport
- Geotechnical conditions
- Groundwater conditions
- Ice and water temperature
- Reservoir impact lines
- River hydrology
- Surface water quality

### Climate and GHGs

- Electromagnetic Field (EMF)
- Greenhouse gas emissions
- Local air quality
- Local and micro climate
- Noise

## SOCIAL AND ECONOMIC

### Land and Water Use

- Agriculture
- Fishing
- Forestry
- Hunting & guide outfitting
- Land use
- Mining & minerals
- Oil and gas/energy
- Other renewable energy
- Outdoor recreation

- Tourism
- Trapping
- Water use

### Social and Economic

- Aesthetics
- Community services
- Education services
- Emergency services
- Government finances
- Health services
- Housing
- Labour market and incomes
- Population
- Regional economic development
- Transportation

### Aboriginal Community

- Socio-economic/socio-community conditions
- Traditional land use

## HERITAGE

- Archaeological inventory assessment
- Palaeontological assessment

## HUMAN HEALTH

- Human health assessment

# STAGE 3 CONSULTATION

THROUGHOUT STAGE 3 THERE WILL BE OPPORTUNITIES FOR CONSULTATION AND INPUT BY THE PUBLIC, COMMUNITIES, ABORIGINAL GROUPS, PROPERTY OWNERS AND STAKEHOLDERS.

BC Hydro will lead several streams of public and stakeholder consultation during Stage 3. These BC Hydro-led consultations are over and above the consultation opportunities provided by the environmental assessment process. These include:

**Regional and Local Government Liaison:**

BC Hydro is engaging key municipal, regional and provincial government stakeholders.

**Property Owner Consultation:** BC Hydro is providing information and gathering input from property owners and leaseholders in the Site C project area.

**Local Area Consultations:** BC Hydro will be conducting area-specific consultations where local issues arise. For example, a consultation to gather local input about proposed shoreline protection measures will be held specifically with the community of Hudson's Hope.

**Preliminary Design Consultation:** BC Hydro will be conducting broad consultations with the public and stakeholders on a range of topics important to project planning and the environmental assessment process.

In addition, BC Hydro and Aboriginal groups are engaged in a thorough consultation process that will continue through all stages of the project.



## ENVIRONMENTAL ASSESSMENT PROCESS CONSULTATION

Consultation is a key part of the environmental assessment process.

At a minimum, two public comment periods are anticipated as part of the environmental

assessment process. This includes a public comment period early in the process on the nature and scope of environmental studies. In addition, there will be comprehensive consultation on BC Hydro's Application for an Environmental Assessment Certificate, which is expected to be submitted in 2012.

# PROJECT DESIGN UPGRADES

UPDATING THE 30-YEAR-OLD HISTORIC DESIGN HAS BEEN A PRIORITY OF BC HYDRO'S EARLY STAGE 3 WORK.

Site C design upgrades have resulted in improved foundation stability, greater seismic protection, enhanced spillway safety, and additional generating capacity.

**Improved Foundation Stability:** In the upgraded design, the generating station and spillway have been rotated and are now at right angles to the dam, parallel to the valley wall on the south bank.

This design minimizes the depth of the excavation required under the generating station and spillway, reducing concerns about foundation conditions. In addition, the south

valley wall under the dam, the generating station and the spillway are reinforced with a long concrete buttress to improve foundation stability.

**Greater Seismic Protection:** There is a greater understanding of the seismicity of the region today than in the past and the 30-year-old historic Site C design required changes to withstand a larger potential earthquake. As a result of upgrades to the project design, the dam can withstand a significantly larger earthquake than the historic design.



- Design: 1981
- Type: Earthfill dam
- Capacity: 900 MW
- Energy: 4,600 GWh/yr.
- Key project components:
  - Spillway
  - Generating Station (six 150 MW units)
  - Power Intakes
  - Switchgear Building
  - Access Road
  - Maintenance Access Bridge (approximately 4 km downstream)

HISTORIC SITE C DESIGN (1981)

**Enhanced Spillway Safety:** Spillways are key hydroelectric facility safety features, as they allow for the safe discharge of excess water from the reservoir — generally in times of flood. Several design upgrades have been made to the spillway for Site C to improve safety:

- An overflow auxiliary spillway has been added, which provides capacity to discharge water in the unlikely event that the spillway gates become inoperable.
- A centre wall has been added that divides the gated spillway into two sections. This wall allows either section of the spillway to be maintained or repaired, while retaining spill capacity in the other section.

### **Additional Generating Capacity and Energy:**

The generating capacity for Site C has increased by 22 per cent, from approximately 900 MW in the historic design to up to 1,100 MW in the updated design.

This additional capacity, achieved through larger generating units, is similar to having more horsepower in a car. It provides improved capability for BC Hydro to meet winter peak loads, and allows for greater integration of intermittent renewable sources, such as wind.

In addition, the amount of energy from Site C has been updated. Site C would produce 5,100 GWh/yr., which is an increase of 11 per cent from the historical estimate of 4,600 GWh/yr.

The increase in energy and capacity is achieved with no change to the maximum normal operating range for the Site C reservoir.



UPGRADED SITE C DESIGN (2011)

- Design: 2011
- Type: Earthfill dam
- Capacity: 1,100 MW
- Energy: 5,100 GWh/yr.
- Key project components:
  - Wider Divided Spillway
  - Auxiliary Spillway
  - Generating Station (six 183 MW units)
  - Power Intakes
  - Open Air Switchyard
  - Access Road
  - Maintenance Access Across Dam
  - Concrete Buttress

# A COST-EFFECTIVE RESOURCE OPTION

LARGE HYDRO PROJECTS LIKE SITE C HAVE A SIGNIFICANT UPFRONT CAPITAL COST, LOW OPERATING COSTS, AND A LONG LIFE OF MORE THAN 100 YEARS.

The project cost for Site C has been updated to reflect the upgraded design, and current market prices for labour, equipment and materials. Site C would have an estimated capital cost of \$7.9 billion, and it would produce electricity at a cost between \$87 and \$95 per megawatt hour.

Based on this updated cost estimate, Site C would be among the most cost-effective resource options to help meet B.C.'s future electricity needs, as well as providing significant additional benefits such as reliable capacity and flexibility.

BC Hydro rates are not affected by projects in the development phase, as these costs

are deferred until the project begins producing electricity. In the case of Site C, this means that project costs would start being recovered in rates beginning in fiscal 2021, assuming that the project is in service following environmental certification and other regulatory permits and approvals.

BC Hydro is committed to keeping rates as low as possible. To reduce the rate impact on customers, BC Hydro anticipates that the costs for Site C would be amortized over many decades. The amortization period and rate impact would be determined through a future regulatory process with the British Columbia Utilities Commission.



## CONSERVING FIRST

BC Hydro is dedicated to meeting at least 66 per cent of the province's future electricity needs through conservation by 2020. But in order to meet the remaining demand, BC Hydro

is investing in clean energy projects — and proposing the Site C Clean Energy Project — to ensure we can safely keep the lights on in our province for future generations.

# OPPORTUNITIES TO BENEFIT NORTHERN COMMUNITIES AND ABORIGINAL GROUPS

BC HYDRO AND THE PROVINCE ARE COMMITTED TO PROVIDING LASTING BENEFITS FROM THE CONSTRUCTION AND OPERATION OF SITE C.

Site C would benefit British Columbia by generating clean and renewable electricity for generations.

In addition, the project would foster economic development through construction-related jobs and business opportunities.

Site C is estimated to create approximately 7,000 person-years of direct employment during the seven-year construction period. It is estimated to create up to 35,000 direct and indirect jobs through all stages of development and construction.

Legacy benefits associated with the Site C project will be determined in Stage 3 in consultation with the public, local governments, Aboriginal groups and the Province.

BC Hydro is also working with Aboriginal communities to identify opportunities, such as skills training, jobs and economic development.



## REDUCING GHGs

BC Hydro's greenhouse gas (GHG) emission modelling found that Site C would produce among the lowest levels of GHG emissions, per gigawatt hour, compared to other forms of electricity generation.

Site C emissions per GWh would be as low as other renewable generation options, such as wind, geothermal and solar.

As expected, Site C would significantly outperform fossil fuel sources such as coal, diesel and natural gas.

# LEARN MORE ABOUT SITE C

For more information on Site C,  
visit us on the web at [bchydro.com/sitec](http://bchydro.com/sitec).

You can sign up to receive **email updates** on the project.

Companies and individuals can also sign up online  
to a **business directory** to receive notification of  
business opportunities associated with the project.

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