Project description

Hydro-Québec TransÉnergie has asked Hydro-Québec Équipement et services partagés to carry out a draft-design study for the construction of an approximately 50-km long, 320-kV underground direct-current (DC) line between Hertel substation (in La Prairie) and the U.S. border (near Lac Champlain).

The project also includes a converter at Hertel substation, which will convert alternating current to direct current to supply the new interconnection.

On the U.S. side, the Champlain Hudson Power Express (CHPE) project will supply New York City with energy coming from Canada. The project includes plans to build an underground and underwater DC line between the Canada–U.S. border and New York City, spanning some 530 km.
What is direct current?

Direct current is unidirectional, which means the electrons always move in the same direction. A good example is a battery, where a chemical reaction triggers a movement of electrons in one direction inside the conductor: from the negative to the positive terminal of the battery. In alternating current, by comparison, the electrons move back and forth.

Why a direct-current line?

The technology used to transmit direct current is not the most common. However, in projects such as this one, it can be advantageous for transmitting power over long distances and for connecting systems that aren’t synchronized, for example connecting the Québec power system with grids in the U.S.

Why an underground line?

At Hydro-Québec, environmental, social, technical and economic criteria are taken into consideration in all studies for generation and transmission projects. In the case of transmission projects, once all these aspects are factored in, the decision is usually in favor of the construction of overhead lines.

In the case of the Hertel–New York interconnection, however, the geological conditions of the study area, combined with the technology chosen and its reasonable cost, allow the simple undergrounding of the line over a long distance, without the addition of other electrical equipment on the surface.

Hertel substation converter

The project includes the installation of a converter at Hertel substation, on Hydro-Québec property.

It will convert alternating current to direct current, which will flow directly to New York through the underground line.

The conversion equipment will be installed in a new 6,000 m² building located in the planned expansion area (see substation map below).

The conventional switchgear needed to connect the converter to the 735-kV system will be erected within the existing substation and planned expansion area.

Project Web site:
www.hydroquebec.com/hertel-new-york/en
Technical characteristics

The line will consist of two cables, each 115 mm (4.5 in.) in diameter, buried directly in a trench about 1 m wide and 1.5 m deep.

The trench will be covered with a concrete slab, and above that, two warning tapes will be laid all along the trench (see figure below).

To ensure communication between Hertel substation and the New York facilities, a fibre-optic cable will run alongside the power cables.

A 4-m wide right-of-way is needed to operate the line. Once the line is commissioned, traffic can resume in the right-of-way and farmland can be cultivated again.

Typical excavation

[Diagram of typical excavation with labels for Backfill in accordance with environment, 0.9 m, Slope depending on type of soil, Warning tape, Concrete slab, Optical fibre, Stone bed, Fine sand, Power cable, 0.9 m, 1.5 m]
Study area

Hydro-Québec has delineated a study area in which to develop potential line routes, and has conducted general analyses and inventories within that area.

With a surface area of 793 km², the study area stretches north to Hertel substation, west to just past Highway 15, south to the U.S. border and east to the Rivière Richelieu (which is excluded). It crosses the territories of three regional county municipalities (MRCs): Roussillon, Le Haut-Richelieu and Les Jardins-de-Napierville.

Most of the study area is on private property. Because of the exceptional climatic conditions and highly arable soil, over 75% of the study area is farmland.

Except for the urban perimeters, the entire study area is on protected agricultural lands.

Line route development

In an underground line project, although environmental considerations are always taken into account, the line routing criteria have mainly to do with technical factors (underground space, presence of other infrastructure, clearance, etc.). The environmental impacts are mostly related to the construction work.

In developing the potential routes, Hydro-Québec applied the following criteria:

- Run the line along an existing linear axis (road, railway, etc.) to limit impacts on property
- Ensure easy access to the jobsite to reduce inconvenience
- Preserve woodlands wherever possible
- Limit the impacts of construction on local residents

Using the technical and economic criteria and taking into account the preliminary results of the environmental inventories, Hydro-Québec studied several potential line routes. One route stands out among all those considered. From Hertel substation, the route runs south along an existing 735-kV line right-of-way until it meets Highway 15.

Two options are then possible:

- In Variant 1, the line continues south alongside Highway 15 for 31 km, up to Exit 6. Then it runs along the Highway 202 right-of-way up to the junction with Highway 221, where it turns south again and runs along that highway down to the U.S. border.
- In Route Variant 2, the line continues south alongside Highway 15 for 36 km, up to Exit 1. There it turns east and runs along Montée Guay in Saint-Bernard-de-Lacolle and Lacolle, ending at the U.S. border.

The exact crossover point remains to be determined (see map opposite).

In addition to avoiding all urban cores, this route offers easy access for construction work and would have only a low impact on agricultural operations.

More detailed environmental inventories and engineering work will make it possible to round out the evaluation of this route and to determine which of the variants to select.
Next stages

Hydro-Québec is conducting detailed inventories (wetland characterization, archaeological potential, etc.) along the line route and options under study, in order to gain a thorough knowledge of all the elements making up the biophysical and human environments.

Using these inventories, Hydro-Québec will be able to optimize the route as needed and develop specific mitigation measures adapted to the project context.

Mitigation measures

Depending on the route selected, Hydro-Québec will implement all the mitigation measures needed to reduce the negative impacts to a minimum.

For example, during construction, Hydro-Québec will apply measures to ensure the smooth flow of traffic while protecting workers and the public. In addition, the construction methods used to bury the cables will be adapted for stream crossings.

For the planned work at Hertel substation, exhaustive inventories—along with specific studies such as noise studies—will be used to measure the project impacts and to apply effective mitigation measures wherever necessary.
Public participation

Hydro-Québec is implementing a public participation program designed to maintain a dialog with the affected communities for the duration of the draft-design studies. Through this program, the company hopes to inform people about the project, respond to questions and note all concerns.

This will enable the company to take into account the concerns expressed by the community and thus ensure the best possible integration of the project into the host environment.

Once the public consultation is over and the potential route has been improved, Hydro-Québec will announce the solution selected.

The company will then file an environmental impact statement with the Ministère du Développement durable, de l’Environnement, de la Faune et des Parcs in order to obtain the necessary permits.
Calendrier

DRAFT DESIGN

Public information and consultation  Spring 2013

Information on the route selected  Fall 2013

PROJECT

Permitting  Spring 2014–summer 2015

Construction  Fall 2015–fall 2017

Commissioning  Fall 2017

For more information

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