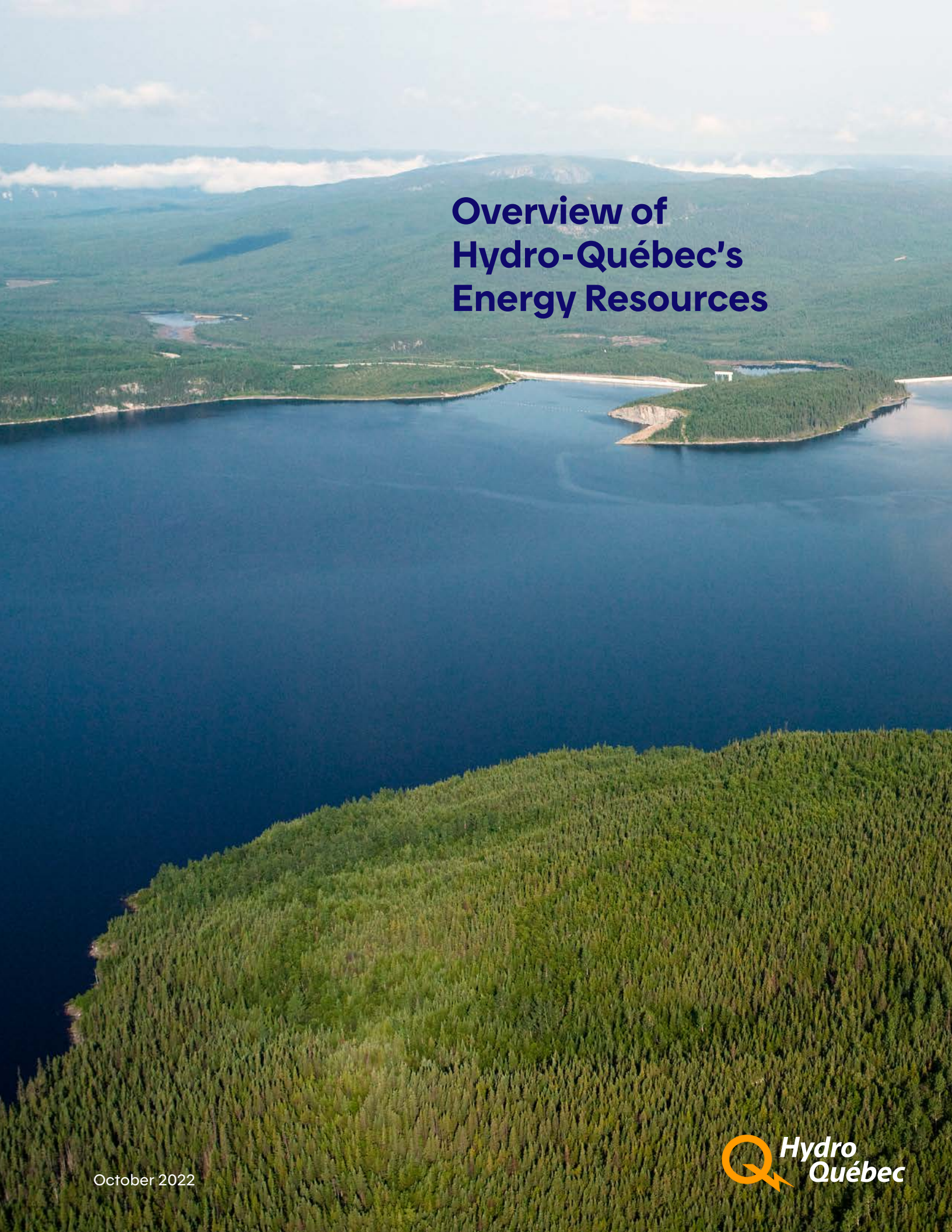


# Overview of Hydro-Québec's Energy Resources

October 2022

Hydro Québec

# Highlights

Hydro-Québec's Electricity Supply Plan 2023–2032 sets out Québec's anticipated energy and capacity needs for the next 10 years and explains how these needs will be met. The plan presents the strategies that have been developed to maximize use of current and planned resources and meet additional supply requirements. Hydro-Québec submits an electricity supply plan to the Régie de l'énergie [Québec energy board] every three years and updates it in each of the two intervening years.

Québec's electricity demand will continue to grow over the 2022–2032 period. **We anticipate an increase of 25 terawatthours (TWh) in energy needs and 4,000 megawatts (MW) in capacity requirements by 2032.** This growth is primarily driven by the following factors:

- Transportation electrification
- Other initiatives to decarbonize the economy
- The emergence of new sectors of economic development, many of which stem from the energy transition, e.g., battery components for electric vehicles and the production of green hydrogen

The anticipated growth takes into account significant energy efficiency efforts that will make it possible to curtail 8.9 TWh by 2032.

In addition, demand response tools will help us manage winter peaks, i.e., the coldest hours during the winter when electricity use rises sharply.

To meet the growing demand, we will have to add energy and capacity to our supply portfolio. Two new calls for tenders—one for 300 MW of wind power and the other for 480 MW of renewable energy—are already underway, and two more will be launched in the next few months.

Other tender calls will follow in the coming years to meet the balance of the needs presented in the Electricity Supply Plan 2023–2032.

In recent years, we have taken steps to increase the capacity of our generating fleet and enhance other available sources of supply. These include commissioning Romaine-4 generating station, increasing the capacity of some of our existing hydroelectric facilities, creating a 3,000-MW portfolio of wind power projects and purchasing the output of generating stations owned and operated by Evolugen.

**Cover**
Aerial view of the Toulnustouc development

# Forecast of electricity demand in Québec

## Growth in Québec's electricity demand over the 2022–2032 period

**25 TWh* (+14%)**

| ORGANIC GROWTH | CONVERSION OF BUILDINGS AND INDUSTRIAL PROCESSES | EMERGING MARKET SECTORS** | NEW TECHNOLOGIES | |
|---|---|---|---|---|
| | | | Photovoltaic solar | Transportation electrification |
| +4.3 TWh | +4.5 TWh | +8.9 TWh | −0.7 TWh | +7.8 TWh |

The sum of the values may differ from the total due to rounding.

* *TWh: terawatthour (one billion kilowatthours).*
** *Emerging market sectors include data centers (4.1 TWh), green hydrogen production (2.3 TWh), battery components for electric vehicles (1.2 TWh) and greenhouse farming (0.7 TWh).*

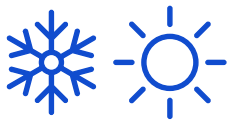
**In 2029, the anticipated growth represents a 6-TWh increase over the forecast presented in the 2021 Progress Report on the Electricity Supply Plan 2020–2029.**

**This increase is due to several factors, many of which stem from the energy transition:**

- Electrification of industrial processes
- Conversion of space and water heating systems to electricity, including through dual energy (electricity/natural gas)
- Additional electricity sales, in particular to data centers and green hydrogen producers
- Evolution of the battery industry value chain
- Growth of electric transportation (individual and public)

# Balancing supply and demand

Hydro-Québec requires an adequate supply of electricity to meet the electricity demand of Québec customers at all times, while also respecting our export commitments. We must also maintain a sufficient margin to deal with unforeseen circumstances, such as extreme winter temperatures or higher-than-expected economic growth. Meeting Québec's increasing needs over the next 10 years will involve expanding our supply portfolio.



**+4,000 MW**

Additional capacity requirements
in the event of extreme winter temperatures

The Electricity Supply Plan presents the balance between the projected supply and demand in Québec for two measures of electricity: power and energy.

### What is power?

**Power is the amount of energy required at a specific point in time. It is calculated in watts (W or MW in this document).**

Example: Québec's peak power demand in winter 2021–2022 totaled 40,537 MW* and was recorded at 6 p.m. on January 11, 2022.

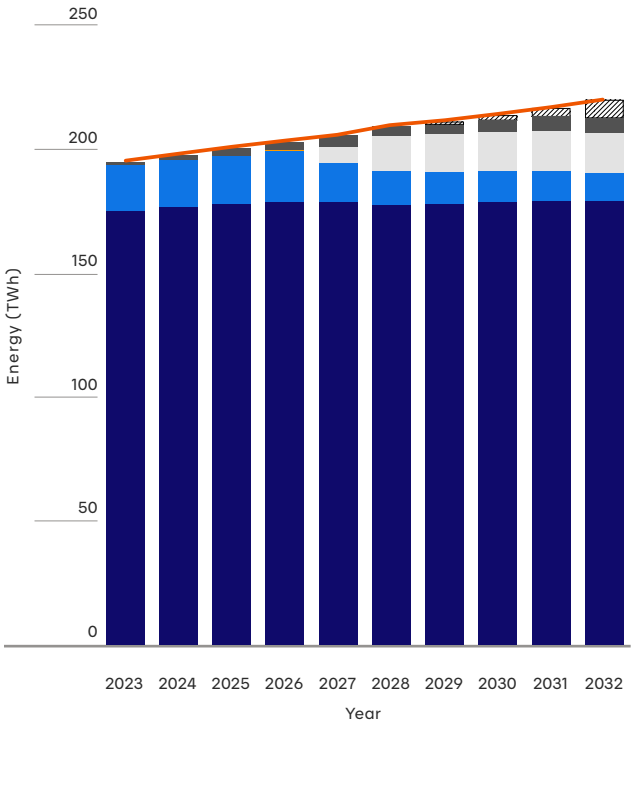
### What is energy?

**Energy is power multiplied by time, measured in watthours (Wh or TWh in this document). For example, using 1 W during a 3-hour period corresponds to 3 Wh.**

* *These data represent Québec's total requirements. They differ from the figures submitted to the Régie de l'énergie in the Electricity Supply Plan 2023–2032, which are specific to the native load and heritage generating stations.*

## Energy balance

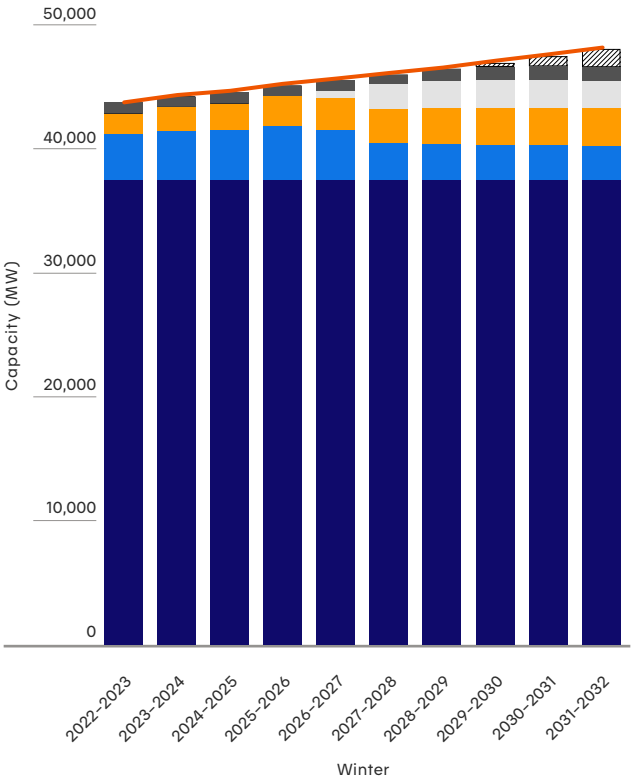
The energy balance presents the current and planned means that Hydro-Québec will use to meet Québec's anticipated energy needs, including supplies resulting from calls for tenders that have already been launched or announced (new planned contracts). It shows that additional tender calls will have to be issued in the coming years.




- Needs
- Heritage pool*
- Supply contracts and management measures
- New planned contracts
- Purchases on short-term markets
- Additional supplies required

## Capacity balance

The capacity balance compares Hydro-Québec's current and planned means with Québec's anticipated capacity needs at the annual peak, i.e., when power demand is at its highest. It shows that in addition to the new planned contracts, other long-term supplies will be required as of winter 2029–2030.




- Needs
- Heritage pool*
- Supply contracts and management measures
- Demand response
- New planned contracts
- Purchases on short-term markets
- Additional supplies required

** Including transmission and distribution losses*

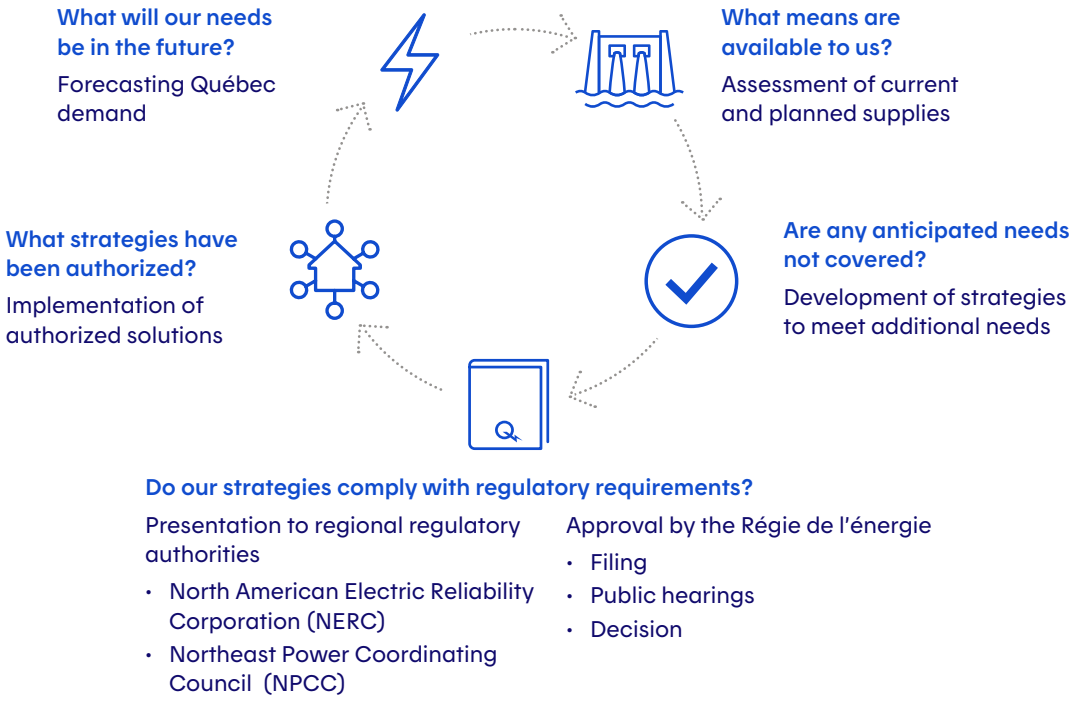
# Our priority: Meeting Québec's electricity demand

To ensure an adequate and reliable supply of electricity—an essential service—to the Québec market, Hydro-Québec's distribution segment must:

- forecast the electricity needs of Québec customers;
- determine whether the current and planned supplies are sufficient; and
- develop strategies to increase supplies as needed, while complying with the requirements of regulatory authorities in the energy sector.

The results of this exercise are presented every three years in an electricity supply plan covering the next 10 years. This document is filed with the Régie de l'énergie and updated in each of the intervening years.

## Process for supplying the Québec market



## Heritage pool

In 2000, the government of Québec passed *An Act to amend the Act respecting the Régie de l'énergie*, providing for the establishment of a heritage pool to guarantee affordable electricity rates to Québec customers. The heritage pool, which consists of a maximum annual reference volume of 165 TWh of electricity that Hydro-Québec's generation segment is required to supply to its distribution segment, is roughly equal to the output of Hydro-Québec's "heritage" facilities, in particular those in the La Grande complex and generating stations on the Rivière Manicouagan, the Rivière des Outaouais (Ottawa River) and the Fleuve Saint-Laurent (Saint-Lawrence River). It constitutes the main source of supply for the Québec market and currently meets about 90% of native load needs. The price of heritage pool electricity was initially set at 2.79¢/kilowatthour (kWh) and has been indexed annually to inflation since 2014. In 2021, it stood at 3.08¢/kWh.

## Long-term supply contracts

To meet Québec needs that cannot be met by the heritage pool, the distribution segment concludes supply contracts with various electricity suppliers through calls for tenders and purchase programs. Currently, 78 contracts with independent power producers and Hydro-Québec's generation segment are in effect, and two calls for tenders are underway.

## Strategies and initiatives to meet Québec's needs

Hydro-Québec's *Strategic Plan 2022–2026* sets out our strategies and initiatives for optimizing the use of energy resources and meeting the increased electricity demand of the Québec market while continuing to contribute to the decarbonization of neighboring markets.

### Energy efficiency

- Make it easier for our customers to become more energy-wise.
- Test innovative energy management models and promote the most promising solutions.

The anticipated growth in Québec's electricity demand presented in the Electricity Supply Plan 2023–2032 takes into account significant energy efficiency efforts that will make it possible to curtail 8.9 TWh by 2032. Hydro-Québec programs such as the Efficient Heat Pump Program for residential customers and the Efficient Solutions Program for business customers will help optimize electricity use.

### Accelerated rollout of demand response measures

- Introduce new incentives to encourage our customers to reduce their electricity use during peak periods.
- Step up the rollout of behind-the-meter technologies and equipment.

Demand response tools will help us manage winter peaks, i.e., the coldest hours during the winter when electricity use rises sharply. In total, the tools available to our various customer segments will help curtail more than 3,000 MW in winter 2031–2032, which is equal to the capacity of La Grande-4 generating station, the second largest among our 62 hydroelectric facilities in terms of installed capacity. Demand response tools include the products and services marketed by Hilo and dynamic pricing, as well as the Demand Response (DR) Option offered to business customers.

### New calls for tenders

As we pursue our optimization efforts, we must also integrate additional energy and capacity into our supply portfolio. Two calls for tenders—one for 300 MW of wind power and the other for 480 MW of renewable energy—are already underway. Two more will be launched by the end of 2022 for new long-term supplies as of December 2027, and others will follow in the coming years to meet the balance of the needs presented in the Electricity Supply Plan 2023–2032.

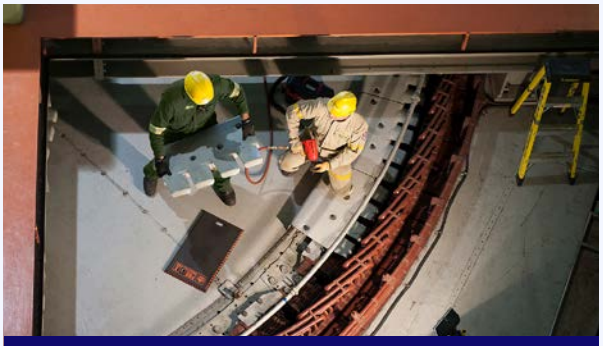
### Proactive management of our generation resources

- Launch projects designed to add 2,000 MW of capacity to our existing hydropower generating stations by 2035.
- Develop with local partners, by 2026, a portfolio of wind energy projects totaling 3,000 MW that could be launched as soon as needs are confirmed.
- Evaluate the potential contribution of other renewables and update the assessment of Québec's residual hydropower potential.

In recent years, we have also taken steps to increase the capacity of our generating fleet and enhance other available sources of supply. These include commissioning Romaine-4 generating station, increasing the capacity of some of our existing hydroelectric facilities, creating a 3,000-MW portfolio of wind power projects and purchasing the output of generating stations owned and operated by Evolugen.

To learn more about our objectives, strategies and initiatives, please refer to our *Strategic Plan 2022–2026*.

Baie-des-Sables wind farm



Refurbishing underway at Trenche generating station

# Supplying off-grid systems

We supply electricity that is more than 99% clean and renewable to our customers connected to the main grid, who represent the vast majority of Quebecers. However, a few remote communities are not connected to the main grid. These are supplied by 22 off-grid systems, which must produce their own power, often by means of diesel generation.

We are deploying significant efforts to meet the needs of our customers served by off-grid systems in a manner that is consistent with our commitment to the energy transition. These include integrating more renewables into their energy supply and offering them adapted energy-efficiency programs.

All decisions in this regard are based on four guiding principles:

- Reliable electricity supply
- Lower procurement costs
- Reduction in greenhouse gas (GHG) emissions
- Social and environmental acceptability

Overall, we aim to supply our off-grid systems with 80% clean energy by 2030. Doing so will involve working with the local and Indigenous communities.

## Maintaining service reliability

Integrating variable renewables into an off-grid system involves more than simply adding storage batteries to ensure service reliability. A second generating source that is available at all times is also required. For this reason, a diesel-powered supply must be maintained. We will therefore be replacing some permanent diesel generating units and adding new ones during the period covered by the Electricity Supply Plan 2023–2032.

## The energy transition in our off-grid systems

### QUAQTAQ

We have installed solar panels and energy storage batteries.

### TASIUJAQ

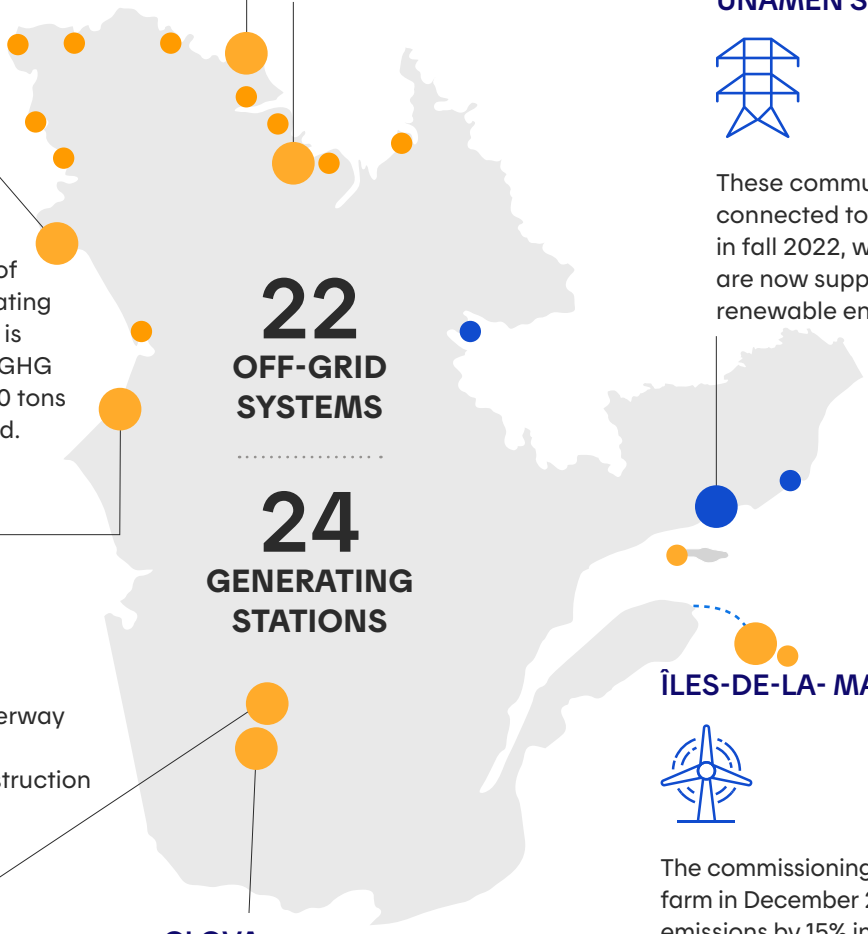
The commissioning of a hybrid generating station integrating renewable energy is planned for 2023.

### INUKJUAK

The commissioning of a run-of-river generating station in early 2023 is expected to reduce GHG emissions by 700,000 tons over a 40-year period.

### VILLAGE OF LA ROMAINE AND COMMUNITY OF UNAMEN SHIPU

These communities were connected to the main grid in fall 2022, which means they are now supplied with clean, renewable energy.



**22**
**OFF-GRID SYSTEMS**

**24**
**GENERATING STATIONS**

### KUUJJUARAPIK

Discussions are underway with the community concerning the construction of a wind farm.

### ÎLES-DE-LA- MADELEINE

The commissioning of Dune-du-Nord wind farm in December 2020 reduced GHG emissions by 15% in the Îles-de-la-Madeleine, and discussions are underway with the community and the proponent for the addition of a second wind farm. As for the project to connect the Îles-de-la-Madeleine to the main grid, the Régie de l'énergie has asked Hydro-Québec to provide greater detail regarding three scenarios before granting its approval.

### OBEDJIWAN

Discussions are underway with the community concerning the construction of a biomass generating station.

### CLOVA

Discussions are underway with the community about the possibility of connecting the village to the main grid.

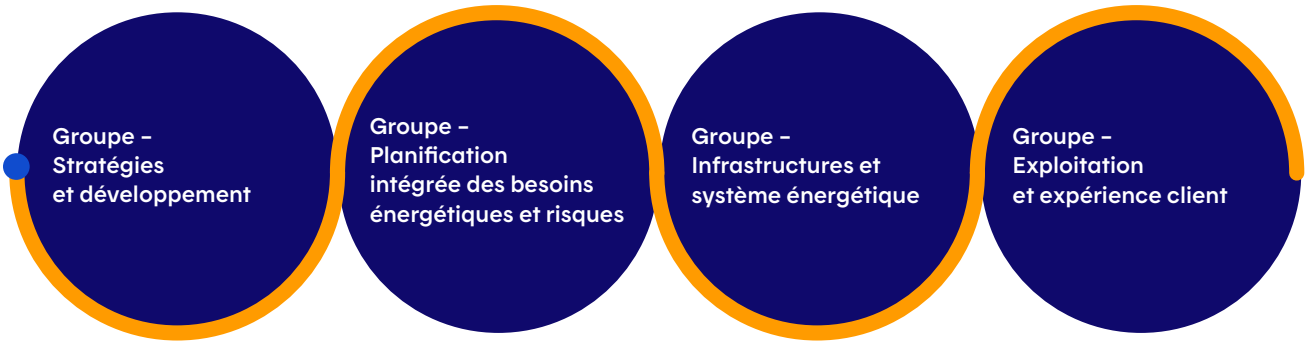
- Two off-grid systems, Schefferville and Lac-Robertson, are already supplied by hydroelectric generating stations.
- To prepare for the integration of renewables, we're modernizing the protections and controls in diesel-fired power plants and will be adding storage systems in six off-grid systems.

Further initiatives will be launched in other off-grid systems in the coming years, in particular under our partnership with Tarquti Energy to accelerate the energy transition in Nunavik.

# A single, unified Hydro, from the drop of water entering our turbines to new, behind-the-meter technologies

In 2022, Hydro-Québec implemented a new corporate structure designed to maximize cooperation and agility, with a view to bringing about the energy transition efficiently while also supporting the realization of Quebecers' collective aspirations.

## A single, unified Hydro – Our value chain




This group is responsible for Hydro-Québec's overall strategies, corporate evolution and business development, as well as acquisitions, investment management, export markets, innovation and R&D.

This group assesses all of our energy needs and carries out detailed analyses so that we can allocate financial resources optimally among our various projects, taking into account the business opportunities and risks associated with each one.

This group oversees power system design and development, asset management, technical expertise and support, construction and refurbishment projects, and strategic procurement. It is also responsible for jobsite occupational health and safety and environmental activities.

This group is responsible for electricity supply, technical services, operating and maintaining generation, transmission and distribution assets, and all customer interactions.

These four groups are supported by six others, which are responsible for: corporate, legal and regulatory affairs and governance; finance; internal audit; digital technologies; talent and culture management; sustainable development, community relations and communications.

### Separation of certain functions

Our frameworks and guidelines ensure that the units responsible for supplying energy to the Québec market, transmission service marketing, and energy transactions on markets open to competition maintain an arm's length relationship with one another.

In addition, given that Hydro-Québec's generation segment can take part in calls for tenders issued by the distribution segment as an electricity supplier, the *Act respecting the Régie de l'énergie* requires that the team responsible for electricity supplies take the necessary steps to treat all bidders fairly and impartially.

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