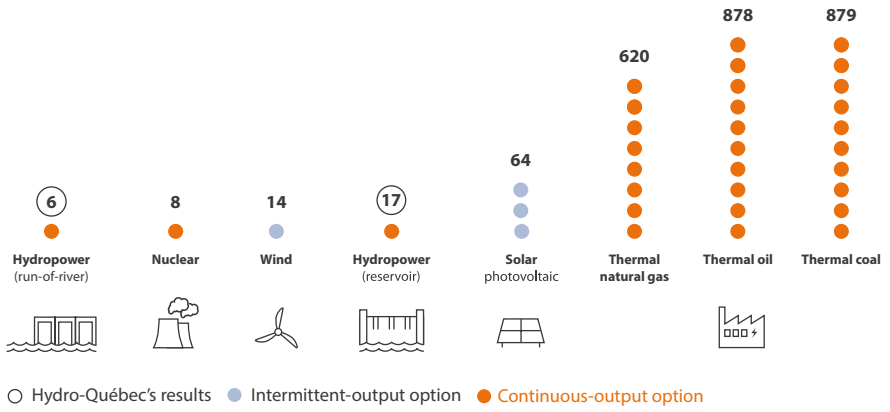
UNDERSTANDING QUÉBEC HYDROPOWER

AMONG THE LOWEST GREENHOUSE GAS EMISSIONS OF ALL ELECTRICITY GENERATION OPTIONS

All forms of electricity generation emit greenhouse gases (GHG) over the course of their lifespan (construction, operation and decommissioning). For hydropower, GHG emissions are mainly carbon dioxide, and to a lesser extent, methane, resulting from decaying vegetation in flooded land. Based on a life cycle analysis, net GHG emissions from Québec hydropower are significantly lower than electricity generation from natural gas and coal, and on par with wind.[1]

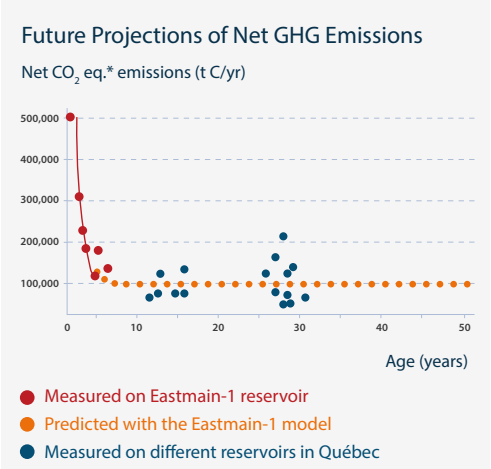
GHG EMISSIONS

Power generation options (g CO_2 eq.*/kWh)



Temporary emissions

Hydro-Québec has been a pioneer in the study of greenhouse gas emissions from hydroelectric reservoirs. Our studies show that emissions peak immediately after reservoir creation, and **decline to natural lake levels within five to ten years.**[2]



METHANE IS NOT AN ISSUE IN QUÉBEC RESERVOIRS

Northern reservoirs emit little methane for two main reasons:

Location

Vegetation is very sparse in the **northern environments** where Hydro-Québec's reservoirs are located. Additionally, they are **far from agricultural or urban areas,** so run-off that reaches them is very low in organic matter and in nutrients. Less organic matter means that Québec reservoirs and lakes are less productive ecosystems than those in other regions.

Cold temperatures

Cold water contains **more dissolved oxygen** than warm water, leading to the formation of more carbon dioxide and less methane when organic matter decomposes. Some carbon in sediments decomposes to form methane due to low oxygen levels, but this will turn into carbon dioxide in the presence of oxygen in the water as it migrates to the surface. There is enough oxygen in one metre of the water column to oxidize the methane produced.

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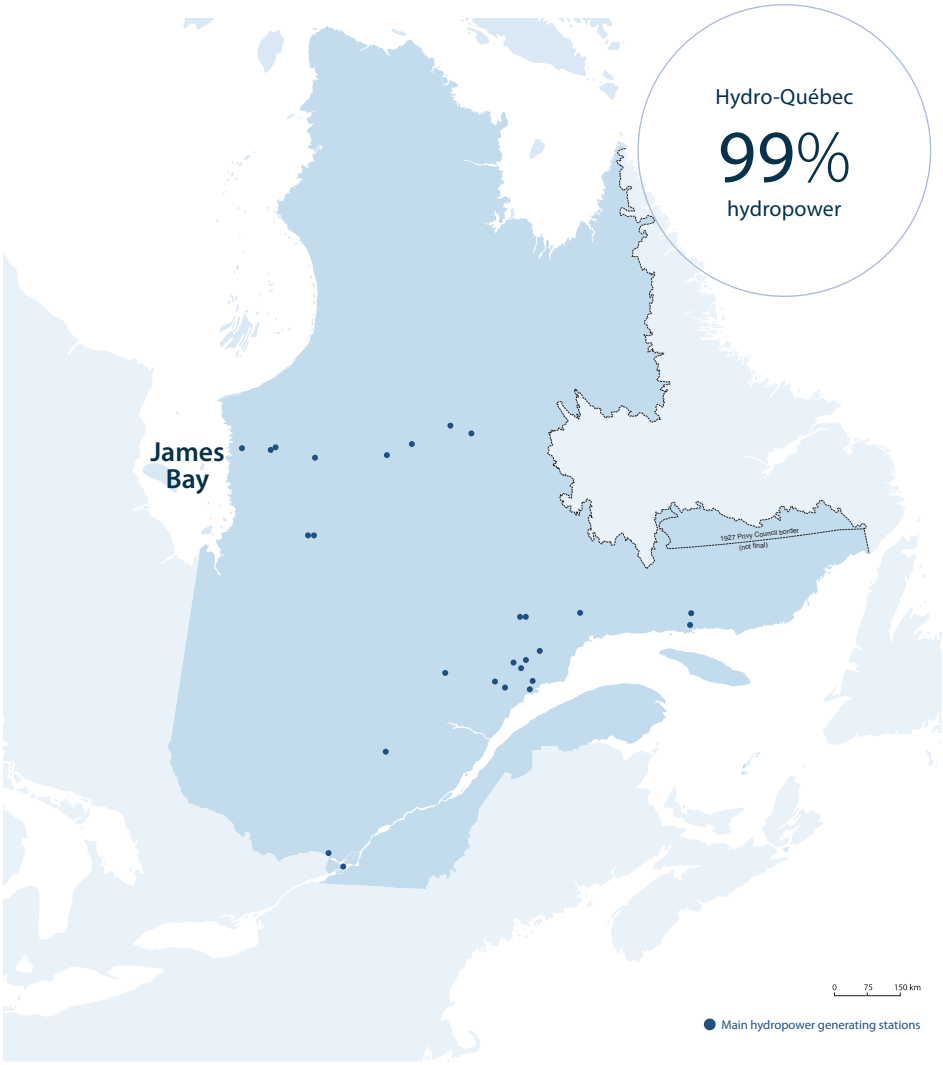
1 CIRAIG (2014). These results are similar to those published by the IPCC (2011); 2 Tremblay et al. (2005)

* CO_2 = Carbon dioxide; CO_2 eq. = CO_2 equivalent



<1%

Methane's share of total emissions from Québec hydropower

Hydropower emissions are on a par with wind,

50 times lower

than natural gas, 70 times lower than coal, 5 times lower than solar

1993

Year Hydro-Québec's GHG research started

10

Years of study on the Eastmain reservoir in James Bay (before, during and after impoundment)

80

Number of experts involved in the Eastmain-1 GHG study

>120,000

Number of measurements taken

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For more information on hydropower generation and greenhouse gas emissions, please consult our Web site:

www.hydroquebec.com/sustainable-development/documentation-center/ghg-reservoir.html

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