

Hydro Quebec's Electricity Prices: Two Questions

How are They Determined?
Why So Cheap?

(VIDEO #2):

Doug May



(VIDEO #2-A):
Quebec's Contribution to the Answers.

Doug May

Our Question for Households Is?

What is the current price per kilowatt hour to the average household in Montreal?

Montreal: 6.678 cents per kWh up to 1200 kWh per month.
10.153 ¢ above that, using the DP rate

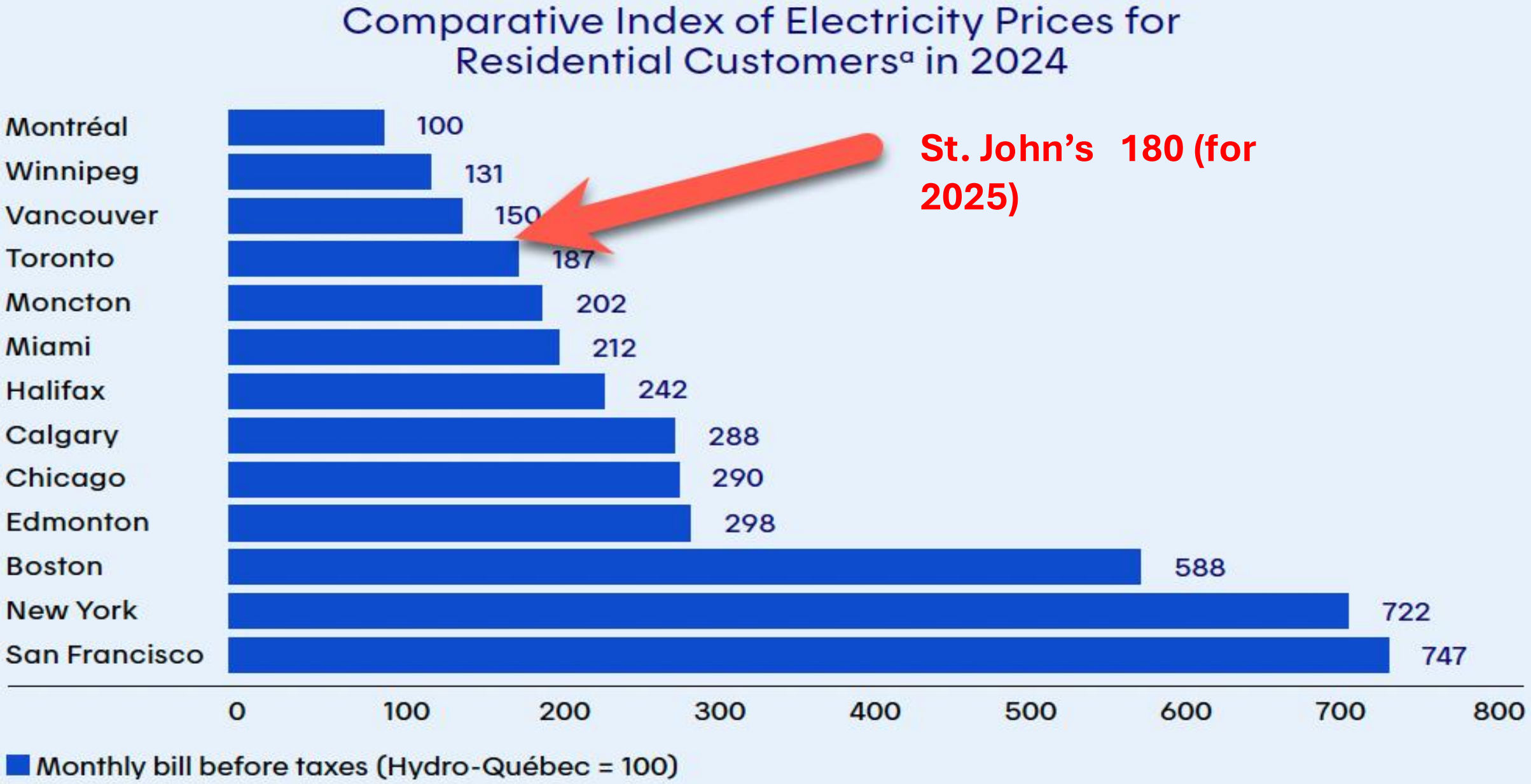
Plus, a monthly charge, which changes from summer ($5.213) to winter ($7.054)

or about 8.30¢ per kWh if you used 1550 kWh that month.

S. John's: 15.022¢/kWh

Note: Prices can increase up to 3% annually over the next five years.

HQ is promoting "dynamic" pricing in which the rate varies during the day.



Source: Hydro Quebec, "An Ambitious Transition: Annual Report 2024," p. 22

Hydro-Québec is a government-owned corporation that generates, transmits, and distributes an essential good, electricity, in Quebec. It has a responsibility to provide power to its residents at the lowest possible cost when households need it.

It is a regulated monopolist. The prices it can charge industrial customers fit into Quebec's industrial strategy; these prices can vary.

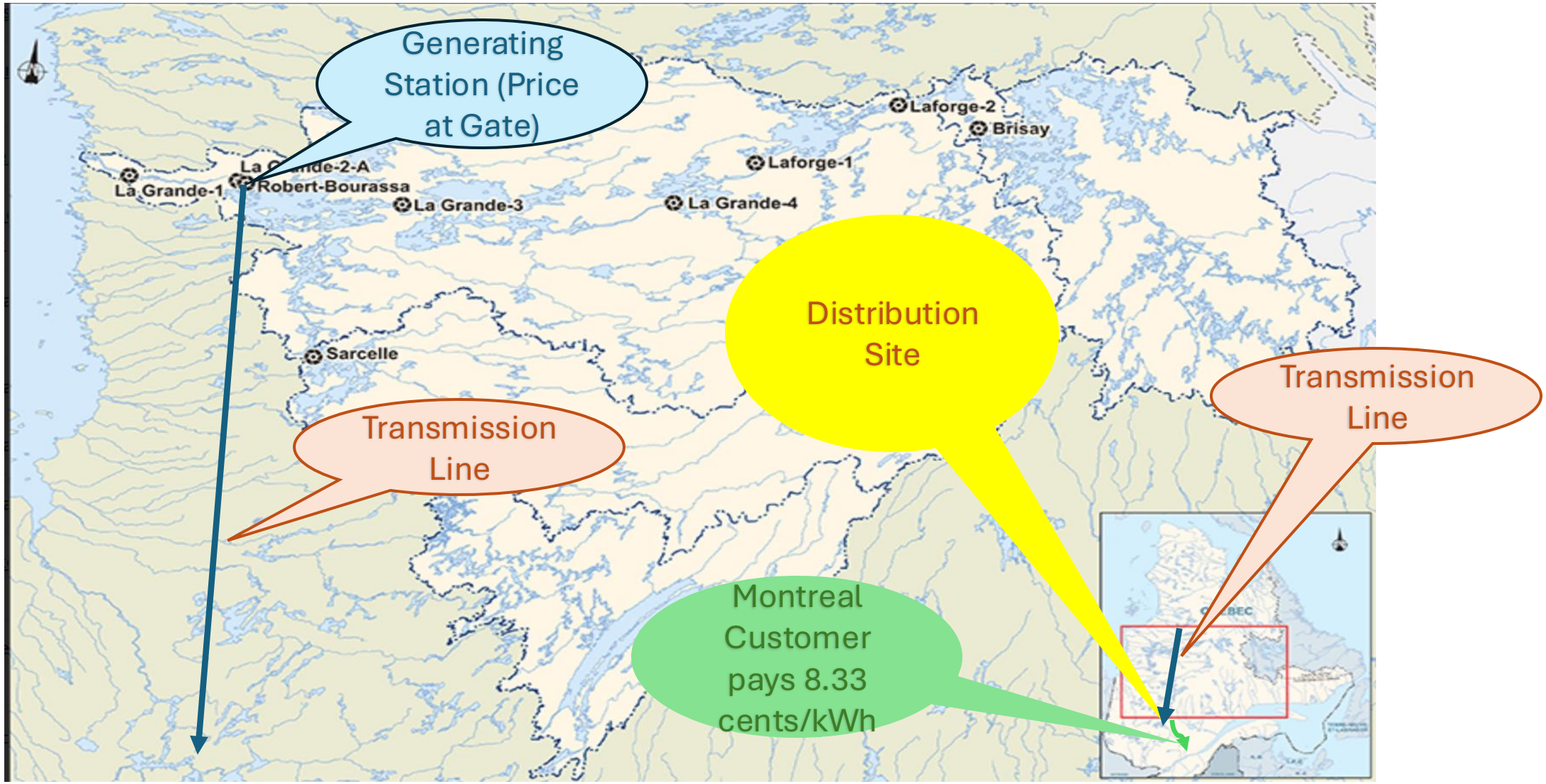
Residents are often voters.

Any "profit" earned is considered to increase a province's revenue-generating capacity and therefore would affect equalization entitlements under the Federal-Provincial Fiscal Arrangements Act.

Electricity Generation in Quebec and The Availability of Electricity to Quebec

- There are 61 hydroelectric generating stations and 44 wind farms with an installed capacity of about 4,000 MWh. Over 90% of the power generated within the province comes from hydro stations.
- The "installed capacity" of the hydro stations varies. Robert Bourassa capacity is 5,616 MWh.
- Hydro plants do not usually run at full capacity. Over the years, CF typically runs annually at about 72% of capacity. The utilization rate varies over the year, as we have seen, with the rate increasing during the coldest months.
- Thus, the average cost (AC) of electricity ranges from station to station. In addition to the AC at the plant, there are also transmission costs.
- As discussed in our previous videos, HQ Quebec generates most of its electricity in Quebec, BUT it also imports electricity from Churchill Falls. This is by far its most important source for these imports. HQ owns 34.2% of CFL(Co) and may be the most important single source of electricity for HQ.

Hydro Quebec's Supply Use Chain for Hydro



Source: https://www.hydroquebec.com/generation/generating-stations.html

Why is there a difference in electricity prices to households?

How is HQ able to say that the prices to households are the lowest in Canada and in the G7?

HQ answers that the cheaper power comes from hydroelectric generators. It’s cheap green energy

Price at the Hydro Generating Station Gate: How is it Determined?

Must think like an economist!

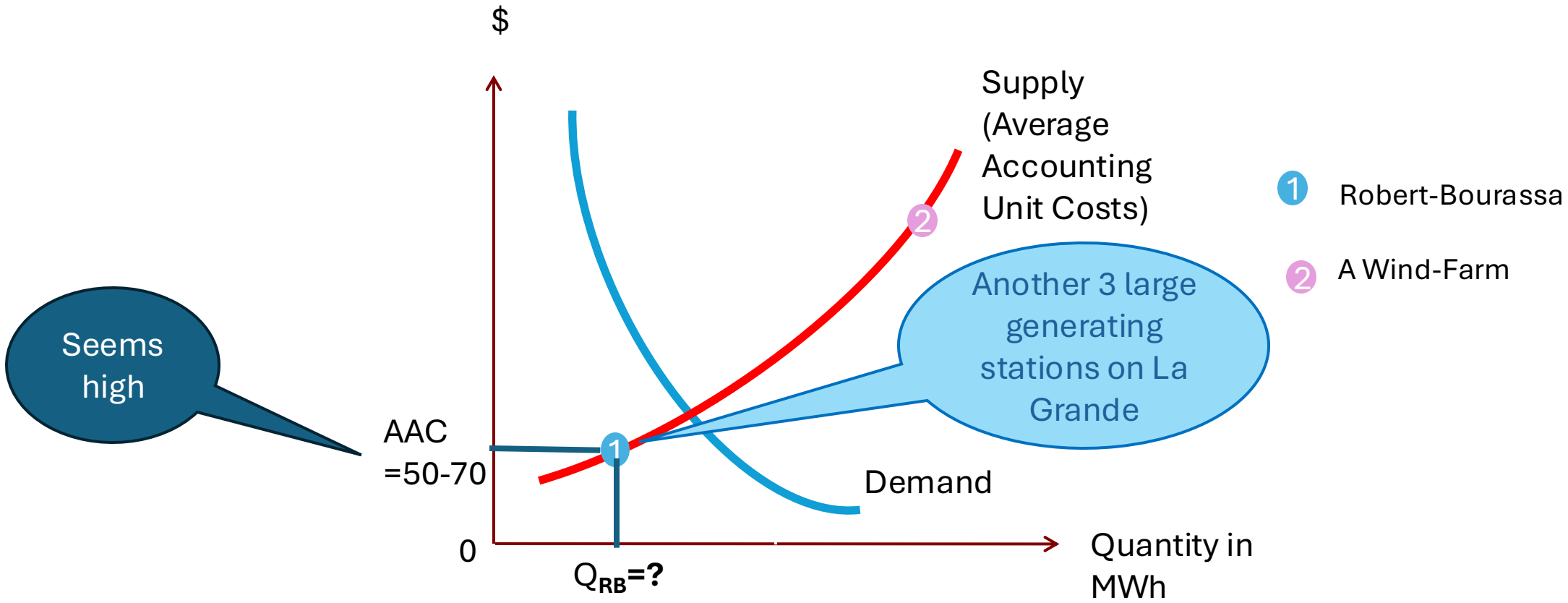
- Minimize economic costs: Hydro generation is very capital-intensive. Production function: Q=f(**K**,L,E,M,S, "**W**")
- For each of these inputs, we can imagine a **flow of services** coming from their use. Water flows into the generation station and through the turbines to create electricity. However, after the water passes through both turbines, both still exist.
- Each of these inputs has a unit price associated with it.

  $TC = p_K K + p_L L + p_E E + p_M M + p_S S\ p_W W$
- AC (average costs) = TC/Q
- Determining the price of capital services (p_K) is somewhat complicated, as some allowance must be made for "depreciation," since capital will not exist forever, and investors incur costs and **a rate of return on capital**.
- Before 2015, there was typically no established market for the water used. The current rate is 0.75% of the total revenue generated from the sale of hydro-generated electricity.

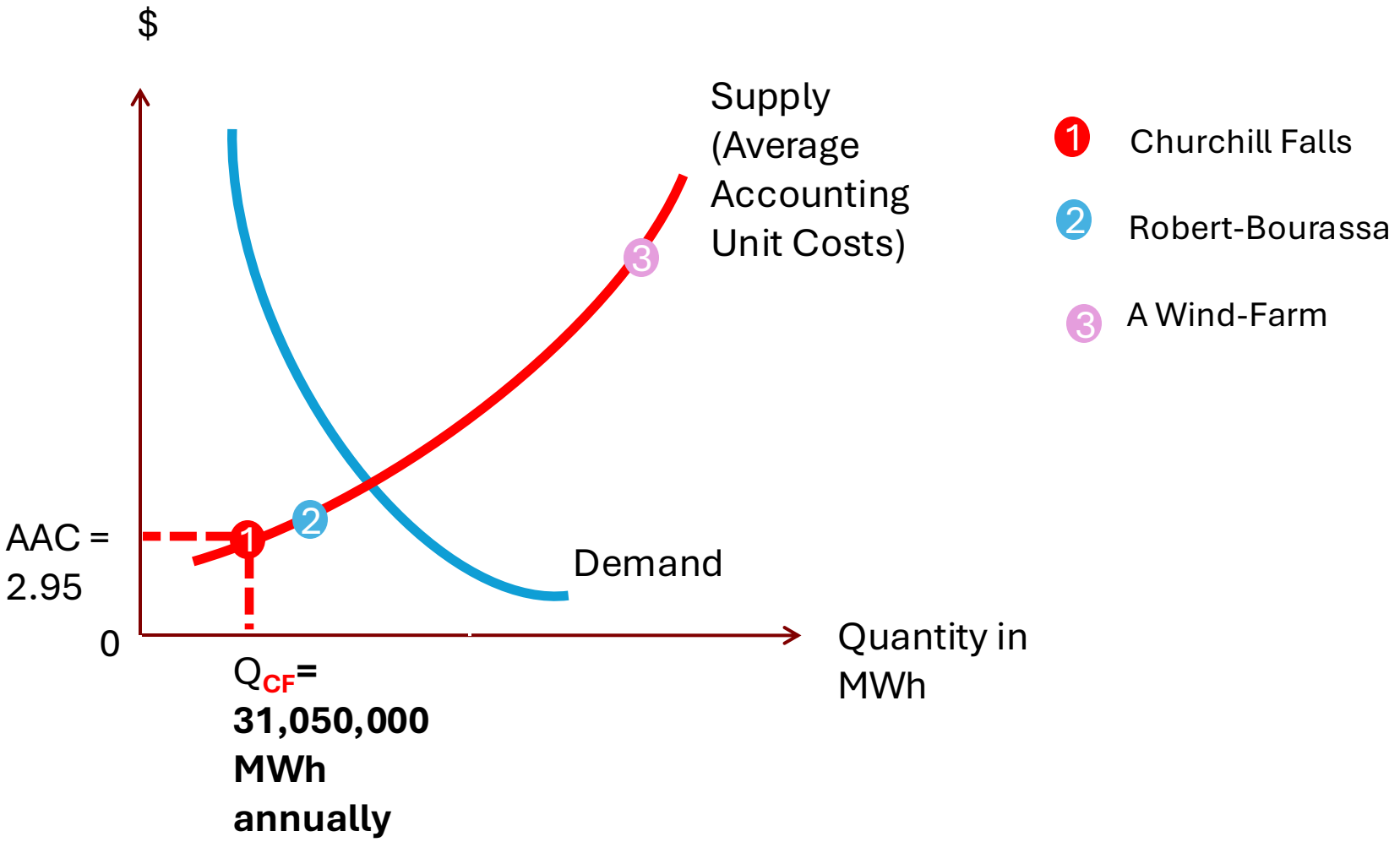
Determining Costs for a Generating Station

- The **cost** of an input is equal to the unit price (p_j) of the input times the quantity of the input (Xj) used. Same as your monthly electricity bill.
- The "**total costs**" are equal to the sum of the costs of each of the inputs. Same as your grocery bill.
- The "**average cost**" per unit is the total cost divided by the number of output units (Q) produced. In our case, these are units of electricity such as kilowatt-hours or megawatt-hours. MWh =1,000 kWh.

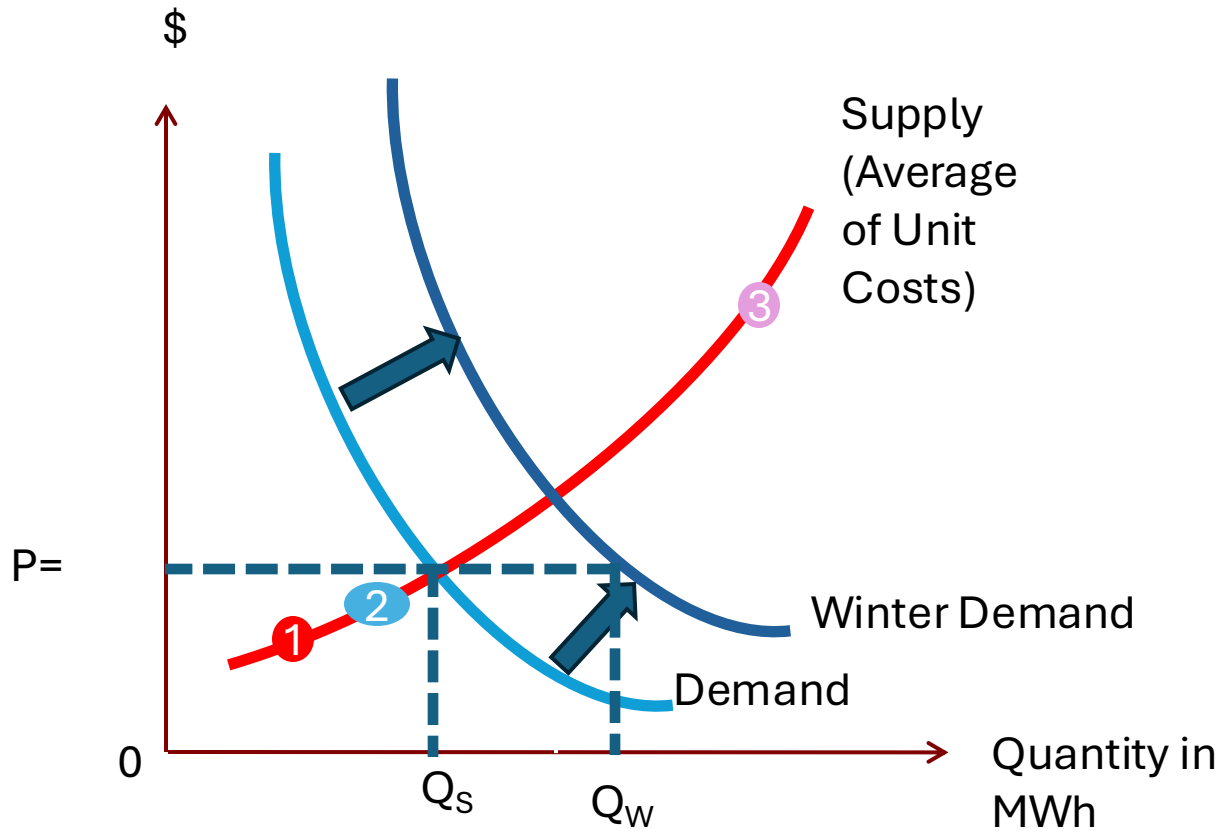
The Simple Domestic Market Model



The Simple Domestic Market Model



The Simple Domestic Market Model
Seasonal Variation



1 Churchill Falls

2 Robert-Bourassa

3 Wind-Farm Operation

Actual Average Cost Calculation by HQ

- Add up all the costs from all the generating stations to get a grand TC. Then divide that number by Q, the amount of electricity generated, to get the average costs.
- If the Total Costs (TC) are relatively fixed because of capital and labour costs, then when the drought lowers Q, the average costs increase. The productivity of the hydro station has fallen.

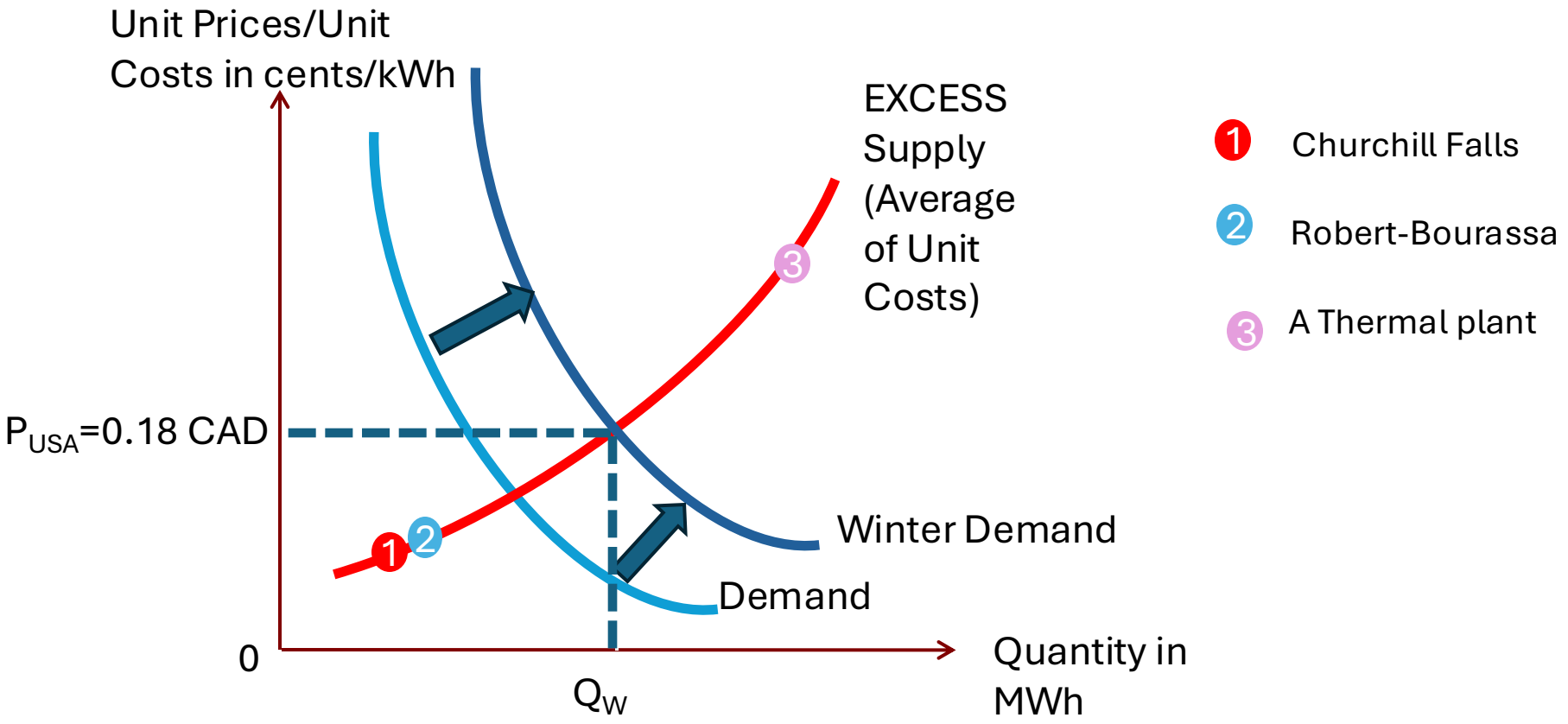


End of Part 1

Hydro Quebec's Import/Export Prices

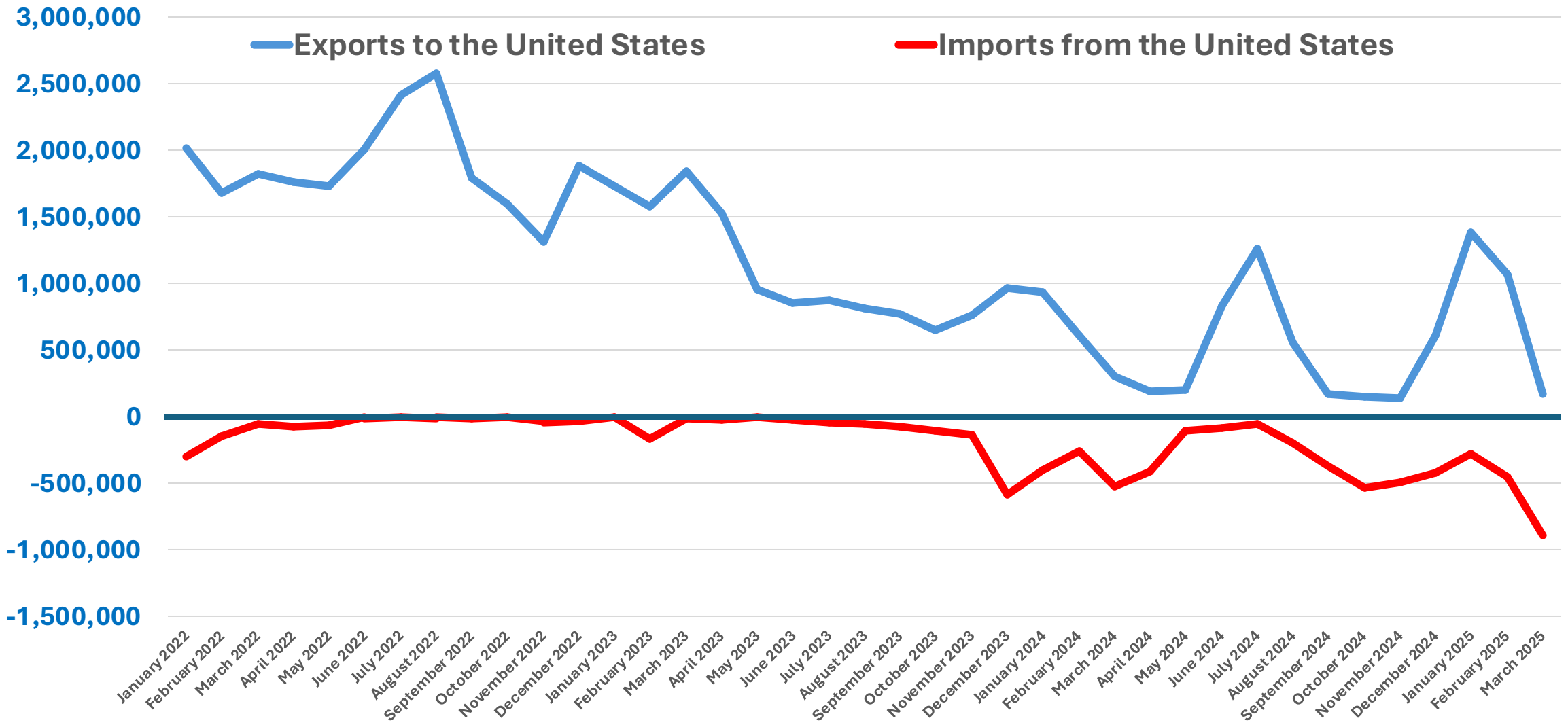
- Provincially HQ has agreements to export power to NB and is examining new ways with NB to increase transmission to the Maritimes and New England.
- HQ is a major shareholder with NLH of CFL(Co) and has an MOU with NLH. **HQ is a cost minimizer.**
- Export and Import prices into New England (NE) and New York (NY) are set by market forces through private contractors. HQ owns transmission lines into the USA and 13 hydroelectric stations in NE. **HQ is a cost minimizer AND a profit maximizer!**

The Simple Export (USA) Market Model Seasonal Variation

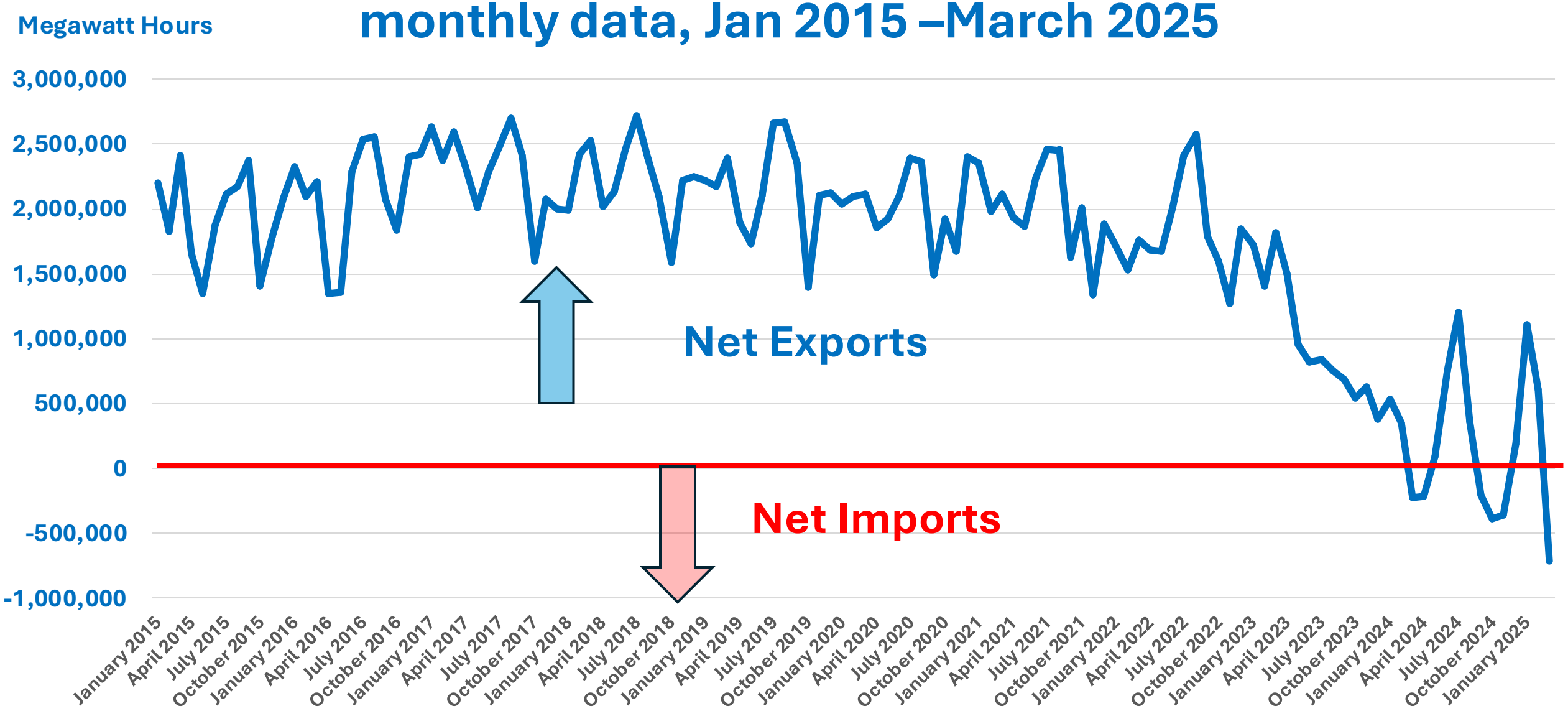


Why Are Electricity Prices in NE and NY so high?

- Not the same availability of cheap hydro power.
- Profit-maximizing firms provide electricity generation.


Exports to the United States
Imports from the United States
3,000,000
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
-500,000
-1,000,000
-1,500,000
January 2022
February 2022
March 2022
April 2022
May 2022
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Hydro Quebec's Net Exports to USA, monthly data, Jan 2015 –March 2025



Source: Stats Can Table 16-10-0016-01

A Profit-Maximizing Export Strategy?

Obtain electricity from the cheapest source possible, i.e. hydro, and use your reservoir as a vast storage battery. Release water when export market prices are high, while reaching generating capacity, depending on market conditions.