

The Growing Cost of Electricity Production in Quebec

by Youri Chassin with the collaboration of Guillaume Tremblay



The Quebec government announced a few weeks ago that it will award contracts for 800 megawatts (MW) of electricity production using wind turbines.¹ A few months earlier, however, under the pretext that Quebec was faced with the prospect of an energy surplus, the government put an end to six community hydroelectric projects.² According to the government's press release, the decision to cancel these projects was made for "obvious economic reasons" among others, and could mean savings of \$24 million a year. The production of electricity using biomass, for its part, is apparently not being questioned.

These decisions were made in a context in which more recent projects have high production costs. The latest rate hike request that Hydro-Québec submitted to the Régie de l'énergie is, according to the Crown corporation, "basically attributable to new electricity purchases [...]. The growth of costs related to electricity purchases explains almost the entirety of the rate increase of 2.8%."³

Does the economic argument justify the government's decisions with regard to the wind power sector, hydroelectric projects and biomass? To answer this question, this *Economic Note* compares the costs of the different energy sectors.

The energy surplus

To produce electricity, Quebec can rely on power projects totalling 42,551 MW of installed capacity,⁴ which is the electrical production capacity at any given moment. A large portion of this electricity comes from what is called patrimonial energy, which is a certain quantity of electricity that Hydro-Québec Production must supply to Hydro-Québec Distribution at a price fixed by the government. This electrical production comes mostly from large projects like the La Grande and the Manic complexes, where production costs are low.

Hydro-Québec Production also sells what is called post-patrimonial energy, produced in addition to patrimonial energy using more recently constructed large dams.

For the past few years, decisions related to the development of electricity production have been made in the context of an "energy surplus."⁵ This expression can be misleading since it does not refer to electricity produced but not used. It is instead a description of the situation in which Hydro-Québec Distribution finds itself when it is obligated to accept delivery of a certain amount of electricity production that it must then resell at a loss.

If the electricity could be resold profitably, on the domestic market or by exporting it, there would be no talk of a surplus. This notion therefore reflects the financial losses caused by electricity provision whose cost is above selling prices.

The example of TransCanada Energy's gas-fired power plant located in Bécancour provides a good illustration of the financial consequences associated with an energy surplus. Hydro-Québec Distribution, which has a supply contract with this company, opted to pay out compensation in order for the power plant not to produce electricity, given the current state of the market. The amount of this compensation is confidential, but is estimated



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to be between 200 and 250 million dollars a year.⁶ In its Supply Plan, Hydro-Québec does not expect to make use of this power plant before 2017-2018.⁷

Three main sectors

Despite the existence of these surpluses, or of electricity produced at a loss, the Distribution division of Hydro-Québec is currently tied in to 58 long-term supply contracts.⁸ These contracts commit Hydro-Québec to purchase a certain amount of electricity even if doing so is not cost-effective. They consist of three main kinds of projects, or sectors, that are relatively recent.

Community hydroelectric power plants (147 MW⁹)

This program, established in 2009, initially had thirteen projects. There were eleven left before the recent announcement by the Department of Natural Resources that it did not wish to carry on with six of them. They are developed by municipalities or native communities that remain in control of the projects. The scale of each power plant is modest, which is to say less than 50MW of installed capacity. Private developers are hired to build the power plants and to manage them. These supply contracts are generally good for 20 years, renewable for an additional 20-year period. If they are renewed, Hydro-Québec can set a different purchase price. Once the supply contract is over, ownership of the power plants is transferred to the Department of Natural Resources.

Wind farms (3119 MW¹⁰)

Since 2003, the government has committed Hydro-Québec to a supply program of electricity produced by wind turbines. The projects are generally accepted after a request for bids stipulating certain elements, for example a requirement that 60% of the parts used to construct the windmills be made in Quebec and 30% in the Gaspé region. The supply contracts are for 20 years. The wind farms have differing useful lifespans depending on the quality of their components, maintenance and weather conditions, among other things. Nevertheless, after 20 to 25 years, they must be dismantled and retain no residual value.

Biomass cogeneration power plants (248 MW¹¹)

These electrical power plants use forest residues to produce electricity. Since 2011, Hydro-Québec has had in place a program to purchase electricity produced by small scale projects—50 MW or less. The six contracts finalized in 2012 are for durations of 15 to 25 years and bind Hydro-Québec and the owners of these power plants, which are mainly forestry product companies like Tembec, Resolute Forest Products and Fortress.¹²

A comparison of the sectors

The data made available by the government and by Hydro-Québec do not reveal the financial impact of these new electricity production projects in these three sectors. Despite this lack of transparency, a thorough search of the data has allowed us to obtain some ballpark figures.

In order to be able to compare the different sectors, we must establish the difference between the average cost for each of them and the average price at which Hydro-Québec sells its electricity. If the cost is higher than the sale price, then the electricity produced by this sector is de facto subsidized. If the government did not require it to do so, Hydro-Québec Distribution would not procure this electricity, except as insurance.¹³ It amounts to an implicit subsidy to the particular sector and to the specific power plant owners.

We obtain an estimate of the average cost of electricity for each sector by adding up the following costs:

- The supply cost, which corresponds to the price at which Hydro-Québec Distribution buys the electricity from the source. This cost per kilowatt hour varies substantially from one project to another.
- The costs of integrating wind power projects to the Hydro-Québec network. These costs are essentially zero for the other sectors. Wind being irregular by nature, the network must therefore be balanced and complementary energy from another source must be guaranteed if the electricity produced is less than anticipated.¹⁴
- The average transportation and distribution costs, including losses on the networks, to deliver the electricity from the production site to customers.

Despite the existence of these surpluses, the Distribution division of Hydro-Québec is currently tied in to 58 long-term supply contracts which commit it to purchase a certain amount of electricity even if doing so is not cost-effective.

Among the different sectors, only patrimonial energy is currently cost-effective for Hydro-Québec.¹⁵ Wind turbines, on the contrary, are the most expensive, followed by biomass power plants and small power plants, as shown in Figure 1.

While they are all subsidized insofar as the cost of each kWh is greater than its sale price, the sectors do not all have the same

production levels or the same installed capacity. By taking into account the actual production of each sector, we find that Hydro-Québec indirectly subsidizes the wind power sector to the tune of \$695 million a year. Biomass and small power plants are far behind, as shown in Figure 2.

In the case of the Bécancour power plant, as we saw above, the annual loss is estimated at between \$200 and \$250 million a year. This amount of compensation was agreed to in advance, but it corresponds exactly to the cost of the contract binding Hydro-Québec Distribution and TransCanada Energy.

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In the case of small power plants, the value of the implicit subsidy is overestimated since, unlike wind power, community power plants pay water rentals, which are transferred to the Generations Fund. Also, ownership of community power plants is transferred to the government when the supply

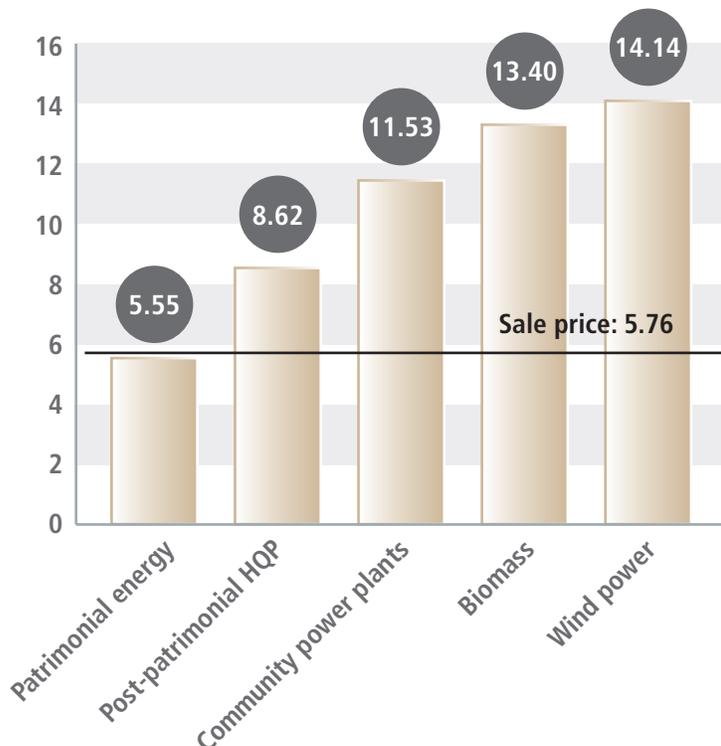
contracts are up, a non-negligible value, whereas wind farms have little or no residual value and are not transferred to the government.

An urgent need for rational decisions

The above analysis shows that in the end, the approval of new electrical production projects is not based on a rational economic analysis. Hydro-Québec being a Crown corporation whose sole shareholder is the Quebec government, the government determines in part the development of new projects, sometimes based on political objectives like supporting certain industries or regions. The CEO of Hydro-Québec himself recognizes this and states that new projects stemming from ministerial decrees “had nothing to do with planning for Hydro-Québec’s needs.”¹⁶

The current decision-making process explains for the most part the growing cost of electricity production in Quebec, and the resulting rate increases for consumers. Obtaining the best possible electricity rates would require that Hydro-Québec’s investment

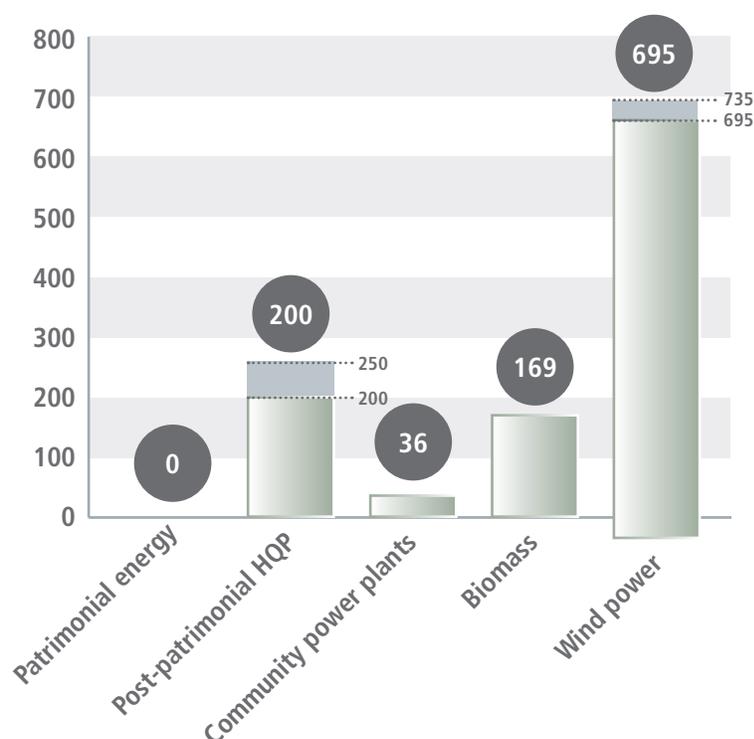
Figure 1 Total cost of a kilowatt hour by sector (¢/kWh), and sale price



Note : The prices indicated here are projections for 2013, except for patrimonial and post-patrimonial energy from Hydro-Québec Production (HQP), whose prices are those of 2012.

Sources for figures: See annex on the MEI’s website.

Figure 2 Implicit annual subsidy by sector (in millions of dollars)



Note : The implicit \$36-million subsidy for small power plants does not take into account the cancellation of 6 small power plant projects, which reduced the implicit subsidy to \$16 million for the 5 remaining projects. This saving of \$20 million, according to our calculations, is estimated at \$24 million by the Quebec Department of Natural Resources.

The ranges presented here reflect the fact that certain documents provided different estimates of integration costs for wind power and of the compensation paid out to TransCanada Energy.

decisions be depoliticized by resorting to calls for bids that are general instead of specific to certain energy sectors, which would let the best price win regardless of the technology used to produce the electricity.

As for subsidies granted to regions or industries, they must at the very least be transparent so that Quebecers can debate them, instead of being buried in the general costs of the Crown corporation. This need was already mentioned in an earlier *Economic Note*.¹⁷ The goal of this current text has been to shine a light on the subject.

The implicit \$695-million subsidy to the wind power industry increases costs for all Quebecers, and this has a negative impact on the economy since this sum could have served other purposes.¹⁸ The alleged positive economic impact of this industry is in fact just an inefficient displacement of money.

Obtaining the best possible electricity rates would require that Hydro-Québec's investment decisions be depoliticized by resorting to calls for bids that are general instead of specific to certain energy sectors.

In a context of surplus energy and financial rigour, wanting to save money makes a lot of sense. By the government's own logic, "obvious economic reasons" should lead it to reconsider the most expensive projects, which are the wind farms.

10. This figure, as well as the calculations carried out for this *Economic Note*, do not include the new 800 MW announced on May 10, 2013.
11. This figure includes 20 MW of biogas power plants.
12. Hydro-Québec, *Programme d'achat d'électricité provenant de centrales de cogénération à base de biomasse forestière résiduelle*, PAE 2011-01.
13. It is indeed possible that Hydro-Québec might accept to pay a higher price to ensure the availability of a certain block of energy or power during a given time period. In a context in which Hydro-Québec has an obligation to buy the power, and given the difficulty of estimating the amount such an insurance represents, this case will not be considered. It can however explain why Hydro-Québec Production's post-patrimonial production is considered worthwhile despite its cost being higher than the current price of electricity.
14. Hydro-Québec Distribution, *Suivi de l'entente d'intégration éolienne pour la période du 1^{er} janvier au 31 décembre 2012*, February 2013. What are called connection costs have not been taken into account in order to avoid having to posit extra hypotheses on the amortization of these initial costs.
15. Other methodological warnings must be stated. A comparison of the costs associated with each sector does not mean that all projects are equal. Some will be more cost-effective and others more expensive. For community power plants, a portion of the implicit subsidy comes from the generous indexation applied to the supply price. In addition, certain aspects were not taken into consideration, for instance transportation costs and costs for higher than average losses for Hydro-Québec Production's patrimonial and post-patrimonial energy from power plants that are often located far from urban centres, which underestimates their costs somewhat. Criteria other than the average cost of production can also be included in evaluating the benefits of projects.
16. Charles Lecavalier, "Hydro-Québec : 21 milliards de kWh de surplus énergétiques," *Argent*, February 13, 2013.
17. Youri Chassin, "Quebec's Energy Reality," Montreal Economic Institute, *Economic Note*, April 2013.
18. Wind energy elicits real interest from certain consumers. If the government wants to respond to this demand, it would be possible to offer electricity produced by wind turbines to consumers who want to buy it at the cost price of 14.14¢/kWh. If the industry manages to lower its production costs, it could then offer a better price and attract more clients. Instead of imposing general rate hikes on all Hydro-Québec clients, it is therefore the consumers who are willing to pay more to consume this energy who would take on the ensuing costs.

References

1. This consists of 350 MW of private contracts, a request for proposals for 300 MW of projects in the Gaspé and Lower-Saint-Lawrence regions, and a request for proposals for 150 MW of projects throughout Quebec. Department of Natural Resources, *Québec s'engage à long terme dans la filière éolienne : attribution de 800 MW pour de nouveaux projets et maintien d'environ 800 emplois manufacturiers*, press release, May 10, 2013.
2. Quebec Department of Natural Resources, *Le gouvernement du Québec met fin au programme de petites centrales hydroélectriques*, press release, February 5, 2013.
3. Hydro-Québec, *Présentation de la demande tarifaire 2013-2014 du distributeur*, document R-3814-2012 submitted to the Régie de l'énergie, July 2012, p. 4.
4. Not including the 5,128 MW of power from Churchill Falls in Labrador, whose production is included in patrimonial energy. Quebec Department of Natural Resources, *Puissance des centrales électriques*, figures for December 31, 2011.
5. Since at least 2009, Hydro-Québec has a production capacity that exceeds the amount it can sell at a reasonable price. See for example Fabien Deglise, "Un milliard de coûts inutiles pour Hydro-Québec," *Le Devoir*, July 30, 2009.
6. The daily paper *Le Soleil* has produced an estimate of \$250 million, based on the fact that "Hydro-Québec has made a commitment to give TCE a compensation of \$157 million (\$13.1 million per month). A 'fixed allowance' for power of about \$93 million is also part of the contract." Pierre Couture, "Hydro-Québec versera 250 millions \$ à TransCanada Energy," *Le Soleil*, July 10, 2009. In 2012, the Parti québécois instead estimated this amount at \$200 million. Jean-Marc Salvat, "TransCanada Energy dédommagée 200 millions \$ par an, selon le PQ," *Le Soleil*, March 27, 2012.
7. Hydro-Québec Distribution, *État d'avancement 2012 du plan d'approvisionnement 2011-2020*, November 2012, p. 24.
8. *Ibid.*, p. 15.
9. This figure includes the six projects that were cancelled by the government in February, in order to establish a complete comparison of the sectors before this decision.

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