

## In the context of developing a new energy policy, it would be desirable to factor in costs related to each form of energy, including granted subsidies.

The same question can be asked regarding natural gas. The hydrocarbon law and the energy policy, promised by the government, should hopefully provide some answers. One thing is sure: debates over Quebec's energy future are not about to become any less intense in the coming years.

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# Quebec's Energy Reality

by Youri Chassin



Questions about energy are currently in the news on an almost daily basis in the province of Quebec. Numerous articles address the closing of the Gently-2 nuclear power plant, small dam projects, wind energy production, oil production in the Gaspé region, shale gas potential, etc. In addition, the Quebec government intends to adopt a new law on hydrocarbons in the near future, and next year, a new energy policy. In order to be able to discuss these topics seriously, it is useful to have a global picture of Quebec's energy reality. This *Economic Note* therefore provides a general overview of Quebec's energy consumption and production. It also highlights some of the energy challenges that the province will face in the years to come.

## Quebec's energy production

The topic of energy is all the more relevant given that Quebec distinguishes itself when it comes to energy production. Globally speaking, Quebec is the fourth largest producer of hydroelectricity after China, Brazil, and the United States. All by itself, this renewable source of energy accounts for 96% of all electricity production in Quebec.<sup>1</sup>

After hydroelectricity, nuclear energy was the second largest source of electricity in 2010, nevertheless making up just 2% of production. Since then, the government decided to shut down Quebec's only nuclear power plant, a decision that was carried out on December 28, 2012.<sup>2</sup> As 97.3% of Quebec electricity was produced from renewable energy sources in 2010, this figure may very well now be over 99%. Only Iceland surpasses us in this regard.<sup>3</sup>

The other methods of producing electricity are all marginal. Wind power accounts for just 0.8% of electricity in the province, as does biomass. Electricity is also produced from oil and natural gas, which account for 0.7%.

The hydroelectric development of waterways is mostly carried out by Hydro-Québec. Nonetheless, other producers, including

some municipalities and private businesses, play a significant role, producing 16% of Quebec's total kilowatt-hours. For example, Hydro-Sherbrooke has nine hydroelectric plants and 81,500 clients.<sup>4</sup> Finally, Quebec is also supplied by Newfoundland and Labrador thanks to an agreement regarding electricity production at Churchill Falls.<sup>5</sup>

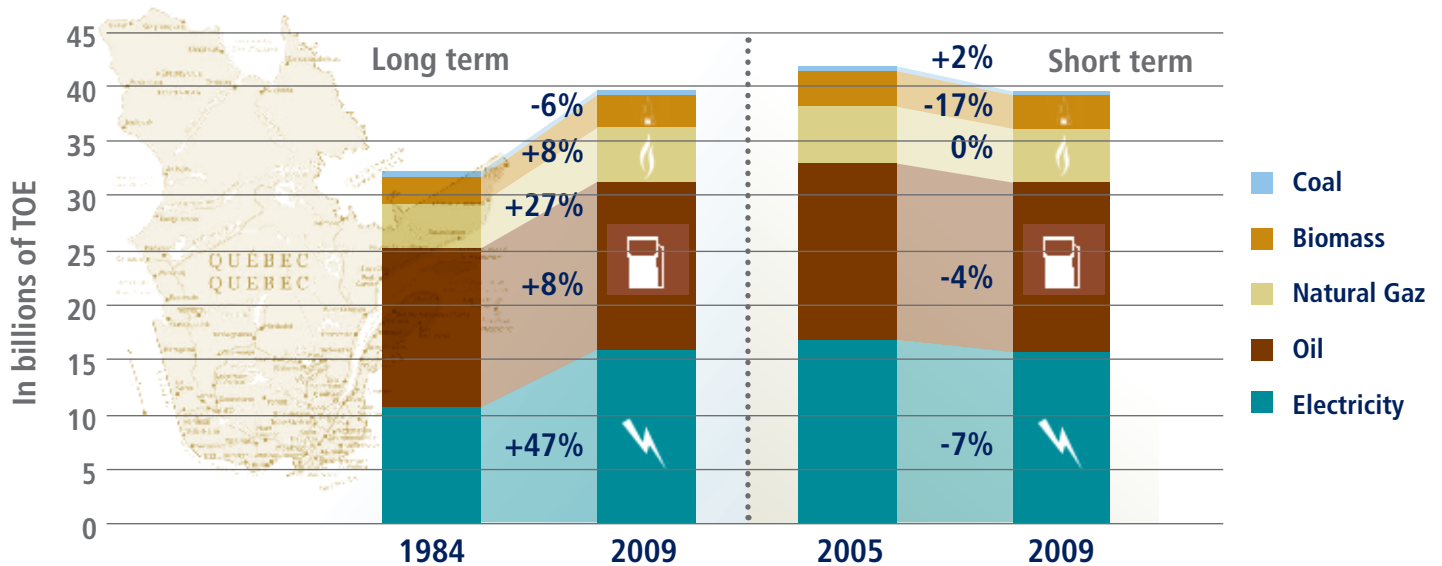
The geography of Quebec features a terrain that is well-suited to the production of hydroelectricity at low costs. However, the cost of electricity produced from windmills, from biomass or from new dams is much higher. For example, Hydro-Québec buys electricity supplied by wind farms at 9.30¢ per kilowatt-hour produced, on average, while it sells each kilowatt-hour just 5.76¢.<sup>6</sup> These new money-losing purchases of electricity are taking place despite the fact that Hydro-Québec is currently in a position of surplus energy, which may signal future controversies over whether to go ahead with or abandon planned or anticipated projects.<sup>7</sup>

Quebec's abundant forests are also a source of fuel wood for heating homes. The forestry industry uses its residues to produce energy, especially heat. These products fall under the heading of biomass since they are combustible. A small proportion of this energy source is transformed into electricity.<sup>8</sup>



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Figure 1 Quebec trend in energy consumption



Note: Proportions are function of consumed energy, converted in TOE, meaning tonnes of oil equivalent.

Source: Quebec Department of Natural Resources, *Consommation finale par forme d'énergie (1984-2009)*, data available online at <http://mrn.gouv.qc.ca/energie/statistiques/statistiques-consommation-forme.jsp>.

Quebec energy production is basically limited to electricity and biomass. Fossil fuels are not produced and are therefore imported. Crude oil is actually Quebec's top imported product at \$13.7 billion in 2012. In comparison, natural gas imports only amounted to \$80.8 million.<sup>9</sup>

Imported oil comes mostly from Algeria (28.1%), the United Kingdom (16.1%) and the Atlantic provinces (11.9%). Up until the early 1990s, a portion of the oil used here also came from Alberta. Since then, there is no more oil shipped here from that province, which produces three quarters of Canadian oil.<sup>10</sup> With the potential reversing of the pipeline between Sarnia and Montreal, Alberta could once again become one of Quebec's suppliers.

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Crude oil must be refined to meet our energy needs and to supply those industries that use the by-products of oil as inputs to produce medication, fabrics, cosmetics, plastics, etc. Quebec's two refineries represent 20% of Canadian capacity. One of these is located in Montreal's east end (Suncor) and the other in Lévis (Ultramar).<sup>11</sup> The combined refining capacity of the two refineries is greater than the province's total consumption, which means that Quebec exports a certain amount of refined oil products to other countries or other Canadian provinces.

Quebec's balance of trade in this regard is clearly negative internationally, but it is positive interprovincially.<sup>12</sup>

Ethanol occupies very little of the market in Quebec, despite subsidies in the form of reimbursable tax credits.<sup>13</sup>

### Quebec's energy consumption

Quebecers also distinguish themselves as large consumers of electricity at the global level, once again coming in second behind Icelanders. On average, Quebecers consume 48% more electricity than Canadians in general and 90% more than Americans.<sup>14</sup> For the average Quebec household, energy represents 7% of the family budget, and all households spend nearly \$14 billion on energy.<sup>15</sup>

Electricity is the most-used form of energy in Quebec (40%), followed closely by oil (39%) and natural gas (13%) (see Figure 1). In comparison, Canada as a whole consumes far more oil products (41%) and natural gas (31%) than electricity (24%).<sup>16</sup> It is worth noting that biomass accounts for a non-negligible 7% of energy consumption.

Half of electricity consumption supplies the industrial sector, although this sector has been reducing its needs for several years, its consumption having fallen by 19% between 2006 and 2009. Industries also consume half of all natural gas used in Quebec.<sup>17</sup>

The residential sector counts more on electricity, of which

it consumes 31% in terms of kilowatt-hours. Heating is supplied by electricity in around three quarters of Quebec homes. The commercial sector consumes more than a third of all natural gas as well as a substantial portion of electricity, nearly 20%.

Finally, the transportation sector consumes little electricity or natural gas, but it is the main consumer of oil products at 68%, far ahead of the commercial (14%), industrial (12%) and residential (5%) sectors.<sup>18</sup> Industries and residences have actually reduced their consumption of oil products by a third in three years. Meeting the energy needs of transportation first of all, three quarters of oil products used for energy are in the form of gasoline and diesel fuel, while the share of fuel oil, used primarily for heating or electricity production, remains below 16%. Among the different modes of transportation, road transport alone accounts for 86% of consumption, followed by air transport and maritime transport.<sup>19</sup>

### **Electricity is the most-used form of energy in Quebec, followed closely by oil.**

The fact that Quebecers appear to be big energy consumers is largely due to Quebec's aluminum smelters. The smelting and refining sector, which includes aluminum smelters, by itself accounts for nearly half of the industrial sector's electricity consumption. The province of Quebec is nonetheless improving its efficiency when it comes to energy use, which is to say that less energy is required to produce a given good or service. What is called energy intensity (the energy consumed to produce \$1,000 of GDP) fell by 26% between 1984 and 2009.<sup>20</sup>

All in all, Quebecers consume less fossil fuels than other Canadians, which means less oil, natural gas and coal, which together represent a little over half of the total versus three quarters for Canada. Fossil fuels nonetheless remain a predominant part of our current needs.

And this will remain true for the foreseeable future. Indeed, the long-term energy consumption trend for Quebec shows that oil consumption increased by 8% from 1984 to 2009, and natural gas consumption by 27%. For several years now, this growth seems to have reversed for oil (-4.2% since 2005) while natural gas consumption remains stable. However, this does not signify a move to other forms of energy since total energy consumption has fallen faster over the same period (-5.6%) and electricity use even faster still (-6.5%). In other words, despite this recent reduction in consumption, the share of oil and natural gas in meeting Quebec's energy needs is on the rise.

### **Energy forecast**

Hydroelectric production, which occupies such a central position in Quebec's energy profile, may have reached a plateau in its development. New projects are proposed, but some of these are not thought to be cost-effective.<sup>21</sup> The same goes for wind energy, where the costs of electricity production are still high and must be heavily subsidized.<sup>22</sup> All of these controversies are taking place against a backdrop of surplus electricity.

In the context of developing a new energy policy, it would be desirable to factor in costs related to each form of energy, including granted subsidies. In this way, if we want to promote renewable energy for environmental reasons, the cost of this choice would be readily visible. Voters and consumers need to be aware of the trade-off since they are also taxpayers funding these support programs.

As for fossil fuels, it is likely that research into replacement solutions will continue. Like any other technology, fossil fuels may someday be replaced by more suitable solutions that are less expensive and less polluting. However, from Hydro-Québec's wheel motor to proposals for achieving "energy independence," promises in this regard have so far not borne fruit.

In addition, technological breakthroughs are also happening in the oil and gas sector. These are constantly allowing access to new reserves and lessening the environmental impacts of oil and natural gas extraction to make them more acceptable to communities.<sup>23</sup> For the foreseeable future, the most likely scenario for the province of Quebec is that consumption of fossil fuels, and oil in particular, will remain strong.

The same is true elsewhere, especially in the United States, which is experiencing a new abundance of oil. In just 15 months, the production of crude oil grew 25%, making 2012 a record year for the fastest increase since 1951, and the forecast for 2013 is positive.<sup>24</sup> The International Energy Agency predicts that in 2035, oil will still be the number one source of primary energy in the world.<sup>25</sup>

If oil continues to be used, should the province of Quebec produce some? Even if draconian policies reduced oil consumption in Quebec, hydrocarbon production in the province could find takers abroad and thereby spur economic vigour. Quebec's oil potential remains to be confirmed, but currently available data suggest a potential of 46 billion barrels, mainly in the Anticosti Island deposits.<sup>26</sup> The recoverable proportion of this potential corresponds to 60 to 120 times the current annual consumption of all Quebecers.<sup>27</sup>