Why it will take more than a west-east pipeline to improve energy security in Atlantic Canada

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"It is in the national interest to replace higher-cost foreign crude with lower-cost Canadian crude to consumers and refineries in Quebec and Atlantic Canada… Moving Canadian energy east, subject to objective, science-based review, would contribute to Canadian energy security."

Joe Oliver, Canada's Minister of Natural Resources, April 2013 (NRCan, 2013)

1 Introduction

Although Canada is a major oil producing country, its export policies and past political decisions have resulted in Atlantic Canada relying on crude oil from non-domestic suppliers for over 80% of its refinery demand. Since the majority of the region's suppliers have reached a peak in production (e.g., eastern Canada, Norway, the U.K.), are facing some form of political instability (e.g., Saudi Arabia, Iraq, Venezuela), or both (e.g., Nigeria), any event that negatively affects the supply or price of crude oil could prove detrimental to energy security in Atlantic Canada.

With over 70% of the output from the region's refineries exported to the Atlantic Basin, proponents of a west-east pipeline from Alberta through Quebec to Saint John present the pipeline as a win-win proposition: allowing exports of refined petroleum (produced from western Canadian crude oil) while improving Atlantic Canada's energy security.

However, there is more to energy security than simply maintaining the availability of supply of an energy source.

2 Energy security

All jurisdictions, regardless of their size or complexity, have an energy system consisting of processes that convert and distribute flows of energy from various sources (such as crude oil and natural gas) to meet the energy demands of the jurisdiction's energy services (notably transportation, heating and cooling, and electricity).

Energy security, from the perspective of an energy consumer, is defined by the International Energy Agency as, "the uninterrupted physical availability [of energy] at a price which is affordable, while respecting environment concerns" (IEA, 2010a). From this, three dimensions of energy security can be obtained: availability (whether an energy flow meets demand), affordability (whether an energy flow is affordable), and acceptability (the environmental or social acceptance of an energy flow) (Hughes, 2012). If a dimension of an energy flow between a source and service changes (i.e., improves or deteriorates), it can affect the overall energy security of the jurisdiction.

Policies designed to improve energy security can be grouped into:

Reduction policies that reduce energy demand while keeping the same energy flows and processes.

Replacement policies that replace an existing energy flow or process with one that is more secure; for example, replacing an expensive brand of gasoline with a more affordable one or replacing a low-efficiency furnace with a high-efficiency one.

Restriction policies that change both the energy flow and process; for example, closing coal-fired generating stations in favour of those using natural gas.

The proposed pipeline to Atlantic Canada is an example of a replacement policy intended to improve the availability of crude oil to the Saint John refinery, although not the region's two other refineries: Dartmouth (due to close later this year) and Come-by-Chance.

3 Atlantic Canada and refined petroleum products

Canada has one of the highest per-capita demands for refined petroleum products in the world (BP, 2012); within Canada, the four Atlantic Provinces exceed the national average (Table 1). These differences cannot be attributed to transportation.

Table 1: Refined product consumption in Canada and Atlantic Canada for 2010 (Statistics Canada, 2011)

Region	Total volume (MMbbl)	Average litres/person	Transportation litres/person
Canada	539.2	2,512.1	2,267.1
Atlantic Canada	50.1	3,382.8	2,344.0

The additional demand for petroleum products in Atlantic Canada is due almost entirely to the use of light and heavy fuel-oil for space and water heating in the residential and commercial-institutional sectors (Table 2).

Table 2: Heating fuel consumption for 2010 (Statistics Canada, 2011c)

Region	Kerosene and stove oil (litres/person)	Light fuel oil litres/person	Heavy fuel oil litres/person
Canada	11.1	98.7	116.2
Atlantic Canada	19.7	616.2	397.6

4 Heating

While the availability and acceptability of crude oil and its products are seldom seen as energy security issues in Atlantic Canada, the same cannot be said of the affordability of fuel oil, given its importance for space and water heating.

Fuel oil is the principal energy source for space and water heating in the residential and commercial-institutional sectors in the region, although demand varies by province (Table 3). Hydroelectricity makes electric heating more affordable in Newfoundland and Labrador and New Brunswick, while traditionally high electricity costs have made fuel oil the energy of choice in Prince Edward Island.

Table 3: Secondary energy consumption for space and water heating by province in Atlantic Canada in 2009 (NRCan, 2011)

Province	Electricity	Natural Gas	Heating Oil	Wood	Other
NL	36.0%	0.0%	48.9%	11.4%	3.7%
PE	4.1%	0.0%	83.8%	8.0%	4.1%
NS	20.8%	3.3%	59.3%	11.5%	5.1%
NB	33.9%	5.3%	42.0%	15.8%	3.0%

Although shelter costs are typically lower in Atlantic Canada than Canada as a whole (Table 4), reliance on fuel oil for heating, combined with the cost of electricity and limited natural gas penetration means that energy takes a larger percentage of the region's shelter costs, from about 20% to 27% in Atlantic Canada as compared to 14% nationally. (For example, in January 2007, the cost-per-unit-energy of light fuel oil in Atlantic Canada was almost three-times higher than that of natural gas in Alberta; by December 2011, the cost of light fuel-oil rose by almost 42%, while natural gas fell by over 55% (NRCan, 2012; Government of Alberta, 2012)).

Table 4: Average household-energy costs in Canada and the region for 2009 (annual)
(Statistics Canada, 2011e; Statistics Canada, 2011d)

	Canada	NB	NL	NS	PE
Total shelter costs	$14,095	$10,627	$9,534	$11,524	$11,107
Total shelter-related energy costs	$1,946	$2,507	$2,573	$2,293	$2,768
Percent of shelter costs for energy	13.8%	23.6%	27.0%	19.9%	24.9%
Household after-tax income	$59,700	$51,300	$53,500	$50,700	$52,600
Percent after-tax income for energy	3.3%	4.9%	4.8%	4.5%	5.3%

In some provinces the average percentage of after-tax income required for energy is getting close to the 8% to 10% limit used to indicate whether a household is in energy poverty (Boardman, 2009). (Recent research suggests that all Nova Scotian households with the lowest after-tax income and about half of the households with after-tax incomes between $22,600 and $36,800 using fuel oil in a low-efficiency furnace can be expected to spend over eight percent of their after-tax income on space heating alone (Hughes & Ron, Energy security in the residential sector: Rapid responses to heating emergencues - Part 2: Nova Scotia, 2009).)

An argument made by the proponents of the pipeline is that western Canadian crude oil is less expensive (i.e., more affordable) than internationally-supplied crude. While this may be true, once it reaches the Atlantic "tidewater", its price will increase (McKenna, 2013). Moreover, the source of the crude appears to have little impact on the retail price of its refined product. For example, the wholesale price of regular gasoline in Canadian cities (including those in Alberta, Ontario, and Atlantic Canada) in 2012-13 was relatively constant, regardless of the source of its crude oil feedstock (NRCan, 2011c); the differences in pump prices were due to provincial motive fuel (road) and other taxes (gasoline rather than fuel oil prices were used since there are national, as opposed to regional, data for gasoline).

Ultimately, it is not the cost of crude oil that is of concern to consumers, but the cost of the refined products.

5 Alternatives

If built, the pipeline will probably remain in service for half-a-century, implying the locking-in of emissions associated with the extraction and transportation of the crude oil and the consumption of the refinery's production (IEA, 2012). Unlike affordability, the environmental acceptability of crude oil and refined petroleum is seldom considered by consumers, in part because of the lack of available alternatives. However, if domestic and international acceptance of the use of petroleum were to change and result in actions that restricted its use, the energy security of those Atlantic Canadians using fuel oil for heating would deteriorate even further.

Improving the affordability and acceptability of the energy used in the region for heating will require policies that focus on energy-reduction and restriction.

All provincial governments in the region have programs for energy-reduction in buildings (NRCan, 2011) (the federal government recently ended its energy-reduction programs (Canada, 2012)). Since reduction policies do not change insecure energy flows or processes, the insecurity remains. In the region's case, actions taken to reduce consumption may offer short-term solutions to, for example, energy affordability as a decline in demand should reduce the total cost of energy; however, the long-term issues of availability, affordability, and acceptability still remain.

Restriction policies for heating require a transition to (secure) alternatives to fuel oil and their associated conversion technologies. Atlantic Canada presents an additional challenge to policymakers since the region's population is split almost evenly between urban and rural (nationally it is about 80:20); this can add to distribution costs and consequently, rule out widespread adoption of some technologies.

Possible alternatives include:

Electricity. The availability of secure sources of electricity for heating is, at present, a limiting factor. However, with the prospect of the first phase of the Lower Churchill starting in 2017 and control of Churchill Falls returning to Newfoundland and Labrador in 2041, some 8,000MW could be available to the region for services such as heating. Similarly, variable sources of electricity (such as wind) could be used with a smart-grid for heating (Hughes, Meeting residential space heating demand with wind-generated electricity, 2010); however, the adoption of electric-heating could require significant grid upgrades and affect affordability.

Biomass. As sawmills and paper-mills close, some of the region's forested areas could, if managed properly, supply biomass for woodchips or pellets for heating purposes. This could be for individual buildings or, given the appropriate urban density, district heating. (Despite its availability, woodchips and pellets are exported from the region to Europe.)

Other. Buildings located with the correct orientation and design can take advantage of solar energy for both short-term (diurnal) and long-term (seasonal storage) heating. Similarly, buildings with the proper geology could use geothermal energy for heating.

This does not mean that western Canadian crude cannot be used to maintain availability during the region's transition to a more secure energy future. For example, since the Saint John refinery already receives crude oil almost exclusively by ocean-going tanker, crude oil could be shipped by tanker from Montreal or Quebec City to Saint John. When affordable and environmentally-acceptable alternatives to fuel oil become more commonplace and demand for the crude's products declines, tanker traffic could be scaled back.

6 Concluding remarks

A west-east pipeline would ensure the availability of western Canadian crude oil to the Saint John refinery, thereby shielding the refinery from any long-term production challenges faced by its existing crude oil suppliers. While replacing imported crude oil with domestic supplies may improve Canada's balance of trade, it will not address Atlantic Canada's fundamental energy security problem: the need for new approaches to space and water heating that are widely available, affordable, and environmentally acceptable.

It will take more than a west-east pipeline to improve to energy security in Atlantic Canada.

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