

Canadian Energy Research Institute

Economic Potential of Onshore Oil and Gas for Nova Scotia and New Brunswick

Energy East Partners Forum

Saint John, New Brunswick

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Canadian Energy Research Institute

Founded in 1975, the Canadian Energy Research Institute (CERI) is an independent, registered charitable organization advancing education through the analysis of energy economics and related environmental policy issues in the production, transportation, and consumption of energy.

Our mission is to provide relevant, independent, objective economic research of energy and environmental issues to benefit business, regulators, government, Indigenous Peoples, academia and the public.

CERI publications include:

- Market specific studies
- Geopolitical analyses
- Commodity reports (oil, electricity and natural gas)

In addition, CERI hosts an annual Petrochemicals Conference, Oil and Gas Symposium and Electricity Conference.

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CORE FUNDING, DONATIONS AND CONTRIBUTIONS

CERI receives financial support from its **core funders** which include Natural Resources Canada, Alberta Energy and the Canadian Association of Petroleum Producers.

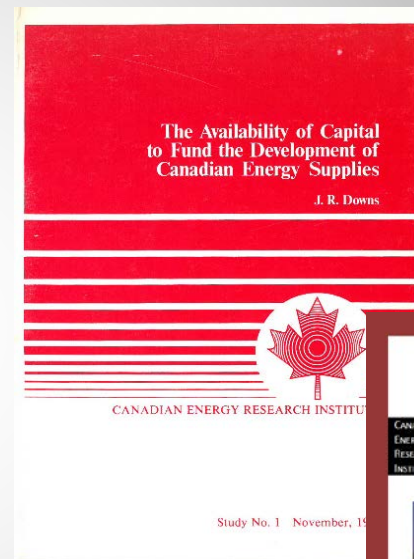
In addition, the institute benefits from funds provided by **donors** which include:

- Alberta Industrial Heartland
- Chemistry Industry Association of Canada
- Korean Energy Economics Institute
- Government of Saskatchewan
- University of Calgary

CERI also receives in-kind support from the following **contributors**:

- Alberta Energy Regulator
- Advisian Worley Parsons Group
- Petroleum Services Association of Canada

Support from the above mentioned organizations allows CERI to conduct research, independent of outside influence, which reflects the opinion of the institute, not that of our financial partners.



Setting the Stage: History

- Nova Scotia and New Brunswick have extensive histories in oil and gas exploration and production
- New Brunswick's oil and gas industry dates to 1859 while Nova Scotia's dates to the 1860s
- Both jurisdictions ranked as some of the oldest in North America, rivalling Pennsylvania's famous Drake Well, often regarded as the first commercial oil well in the world
- Both provinces are producers of natural gas, while New Brunswick is also currently an oil producer as well
- Nova Scotia's production is entirely offshore, while New Brunswick's gas production is onshore



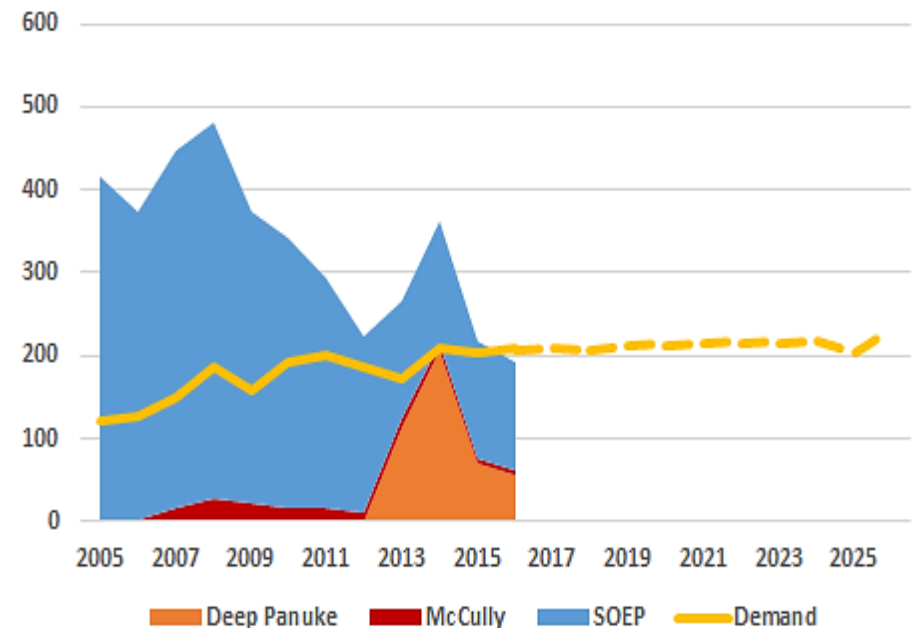
Setting the Stage: Increasing Demand

- Production decline is rapid in both provinces, with the region already looking to imports of gas in times of high local demand
- Natural gas use in the two provinces has increased dramatically since 1999 — the completion of the Maritime & Northeast Pipeline (M&NP) delivering offshore Nova Scotia gas to these provinces and the US Northeast.
- Over the next few years that impending supply gap between domestic/regional natural gas production and regional demand for natural gas will likely grow
- With its many applications for various end-users, including residential, commercial, industrial and power generation, the demand for natural gas in both provinces is slated to increase over the next 20 years.
- Both provinces are without a doubt on the cusp of a fundamental change — a nexus point.

Setting the Stage: Declining Production

- Deep Panuke, McCully and SOEP appear to be in natural decline
- Beginning with SOEP, the energy landscape of both provinces changed with the onset of Nova Scotia's offshore production
- Beginning production in 1999, the life expectancy of **SOEP** was expected to be 25 years, but this now looks to be in doubt with the 2010 ExxonMobil announcement that Sable is being wound down.
- **Deep Panuke** began production in 2013 and was anticipated to have a 13-year production life, however, production was reduced to seasonal in the fall of 2015, decreasing from ~8.8 Bcf in January 2014 to ~1.7 Bcf by November 2016
- Compared to SOEP and Deep Panuke, **McCully** gas production is 2,771 million cubic feet (MMcf) of natural gas in 2014, however, production at McCully is also in decline.

New Brunswick and Nova Scotia Gas Production and Local Demand (MMcfd)



Setting the Stage: Resource Potential

While Nova Scotia estimates its offshore resource potential at more than 8 billion barrels of oil and 120 trillion cubic feet (Tcf) of natural gas, the region also has significant onshore oil and gas potential.

This potential stems largely from unconventional resources, particularly shale gas, in three productive assets (McCully, Frederick Brook Shale and the Horton Bluff Shale).

Frederick Brook Shale (FBS) is estimated to contain 67.3 Tcf of Shale gas in-place, while the estimates of the Horton Bluff Shale (HBS) range from 17 Tcf to 69 Tcf of gas in-place.



Challenges & Opportunities: Environmental Concerns

Concerns:

Water use and water contamination from methane and fracturing fluid - most significant concern expressed. Current state of knowledge indicates uncertainty as to impacts.

Waste treatment and disposal

Local air quality

Land use and biodiversity

Induced seismicity – stop light framework

Greenhouse gas emissions – beyond federal or provincial policy?

Cumulative environmental effects

These are addressed in other jurisdictions through specific and rigorous regulatory frameworks which include baseline measurements and regular reporting

Challenges & Opportunities: Indigenous Peoples Concerns

Mi'kmaq and Maliseet Indigenous cultures

Existing treaties do not cede or surrender rights to traditional lands or resources. This means aboriginal title may be established.

Concerns:

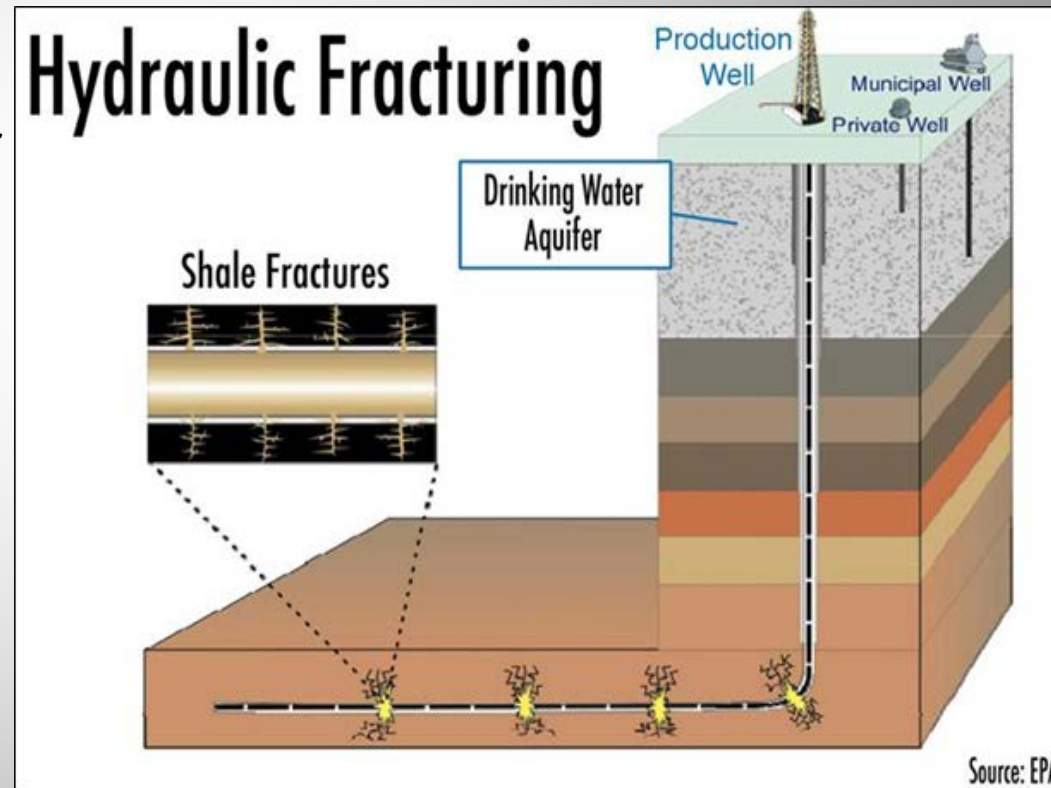
- health and socio-economic conditions (e.g. water contamination);
- physical and cultural heritage;
- the current use of lands and resources for traditional purposes (e.g. fishing);
- any structure, site or thing that is of historical, archeological, paleontological or architectural significance.

Addressing these concerns needs to occur through consultation and accommodation of Indigenous concerns by way of principles of integrity and good faith, respect, transparency, accountability and timeliness.

Governments are responsible for the duty to consult and cannot delegate that responsibility to a third party.

Challenges & Opportunities: Moratorium on Fracking

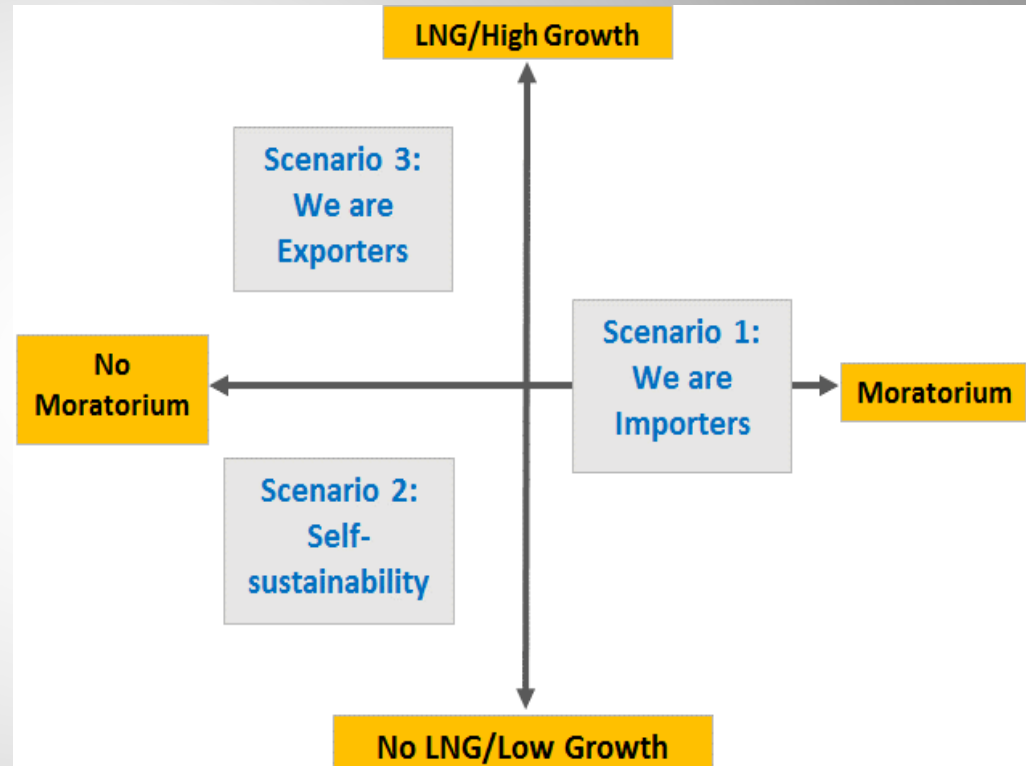
- While technological advances, such as hydraulic fracturing (fracking) could be a boon for the region's oil and gas sector and their economies, to utilize hydrocarbons for domestic purposes or to export them, there are also controversies, particularly regarding fracking.
- Fracking is without a doubt a game-changer for shale gas and tight oil, however, it is also a lightning rod for controversy, and is banned or has led to moratoriums in NB and NS.
- On March 27, 2015, NB enacted an Act to amend the Oil and Natural Gas Act, prohibiting fracking in the province, while NS banned fracking in the fall of 2014, following the Report of the Nova Scotia Independent Review Panel on Hydraulic Fracturing.



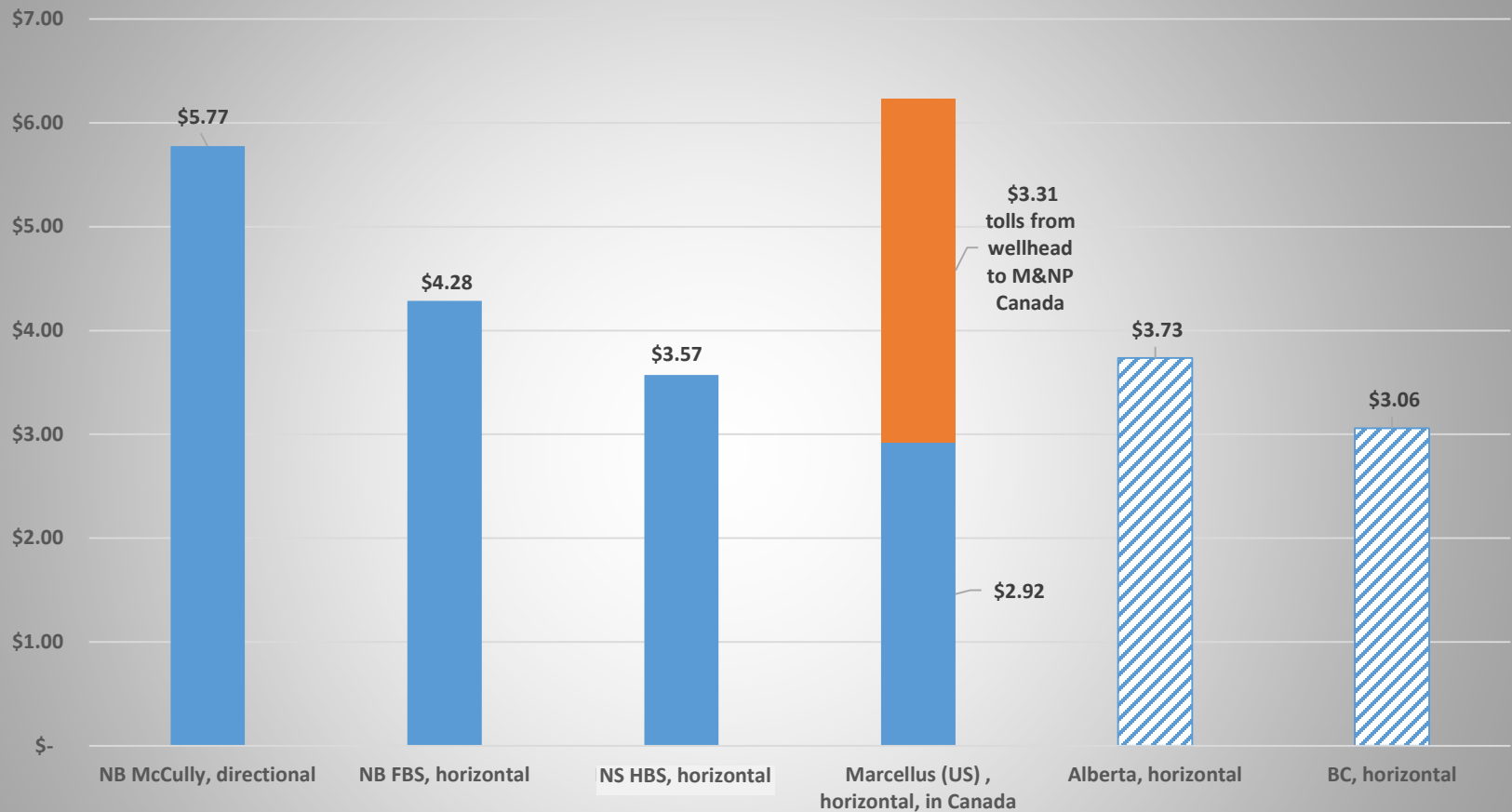
Source: EPA

CERI's Study: Scenarios

- There are an infinite amount of possibilities for New Brunswick and Nova Scotia to move forward from their nexus point
- The Canadian Energy Research Institute (CERI) outlines three plausible scenarios, depicting the influence of high/low natural gas production and whether the current moratorium remains or is removed
- These scenarios take into consideration onshore gas potential only, and exclude oil potential as it was found to be insignificant
- Offshore potential is also excluded as it was out of scope of this study



CERI's Study: Domestic Supply Costs



Scenario 1: We are Importers

GDP



- Canada = \$166 million
- Nova Scotia = \$7 million
- New Brunswick = \$153 million
- Ontario and Quebec = \$5 million and \$3 million, respectively



Total employment in person years (over 11 years)

- Canada = 267
- Nova Scotia = 5
- New Brunswick = 201
- Ontario and Quebec = 27 and 17, respectively



Total tax impacts

- Canada = \$24 million (federal + provincial)
- Nova Scotia = \$0 million
- New Brunswick = \$22 million
- Ontario and Quebec = \$1 M each

Scenario 2: Self-sustainability

GDP



- Canada = \$14,634 million
- Nova Scotia = \$6,923 million (0.8% GDP growth)
- New Brunswick = \$5,905 million (0.9% GDP growth)
- Ontario and Quebec = \$825 million and \$384 million, respectively

Total employment in person years (over 11 years)



- Canada = 42,031
- Nova Scotia = 19,032
- New Brunswick = 14,089
- Ontario and Quebec = 4,300 and 2,142, respectively

Total tax impacts



- Canada = \$2,262 million (federal + provincial)
- Nova Scotia = \$1,093 million
- New Brunswick = \$855 million
- Ontario and Quebec = \$147 M and \$77 M, respectively

Scenario 3: We are Exporters

GDP



- Canada = \$42,561 million
- Nova Scotia = \$17,715 million (2.1% GDP growth)
- New Brunswick = \$18,855 million (2.7% GDP growth)
- Ontario and Quebec = \$2,723 million and \$1,300 million, respectively



Total employment in person years (over 11 years)

- Canada = 141,242
- Nova Scotia = 57,853
- New Brunswick = 53,666
- Ontario and Quebec = 14,232 and 7,280, respectively



Total tax impacts

- Canada = \$6,648 million (federal + provincial)
- Nova Scotia = \$2,838 million
- New Brunswick = \$2,766 million
- Ontario and Quebec = \$486 M and \$262 M, respectively

Conclusion

1. The default option is for NB/NS to be importers to serve domestic requirements. Fracked gas will likely be sourced from the Marcellus
2. The development of natural gas production on-shore in NB/NS can contribute upwards of 2% GDP growth for both provinces. Significant job creation is also possible.
3. Indigenous Peoples and environmental concerns will need to be addressed if scenario 2 or 3 are to be realized. NB/NS can learn from other Canadian jurisdictions regarding how these can be addressed through benefits agreements and regulatory frameworks.
4. Geological information regarding oil and gas plays in NB/NS is lacking. CERl's estimates are on the low end of what is potentially available.

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Thank you for your time

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Upcoming studies:

“Economic Impacts of Canadian Oil and Gas Supply in Canada and the US (2017-2027)” *Just Released*

“An Economic Assessment of Electricity Generation Options”

“A Comparison of Interprovincial Crude Flows versus Foreign Imports”

Check out our upcoming conference!

Opportunities and Challenges to Greening the Canadian Electricity System

Oct 16-17, Calgary

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