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Briefing note

Is natural gas a climate change solution for Canada?

by the Pembina Institute and the David Suzuki Foundation

At a Glance

The David Suzuki Foundation and the Pembina Institute have completed an in-depth study of the potential role of natural gas in combating climate change. The study investigates what Canada's federal and provincial governments should be doing to shape future production and use of natural gas, in consideration of both its climate-related and other environmental impacts.

Why this issue is important

Natural gas accounts for over a quarter of the primary energy consumed in North America. New and abundant sources of "unconventional" gas — particularly shale gas — have reinvigorated the gas production sector, with Canada's resources now believed to exceed 100 years of supply at current rates. This has encouraged governments and industry to portray natural gas as a "bridging" fuel that should be used to reduce the greenhouse gas (GHG) emissions responsible for climate change in the near term. But there has been a lack of clear analysis of how gas fits into the evolution of energy production in Canada in light of the need for deep GHG reductions by 2050. In addition, there is significant public concern about the impacts of proposed gas developments on fresh water, the landscape and quality of life across the country, from the Northwest Territories, British Columbia and Alberta to Quebec and New Brunswick.

Methodology

We conducted an extensive review of the literature on natural gas supply and demand, the impacts of gas production and use, and the economics of natural gas under government policies designed to reduce GHG emissions. In particular we reviewed prominent economic modelling studies covering GHG reduction scenarios globally, in North America and in Canada.

We also commissioned our own economic modelling study to examine the medium-term future of natural gas in North America, using a model developed by M.K. Jaccard and Associates, a leading Canadian

economic analysis firm. Economic models balance factors that might lead to increased natural gas use, such as replacement of coal, with factors that might lead to lower gas use, such as energy conservation and a shift to renewable energy.

It is generally accepted that natural gas has considerably lower GHG emissions than other fossil fuels on a full lifecycle basis. But some scientists are now challenging this assumption, suspecting that emissions of methane (a powerful GHG) during the lifecycle of natural gas may be much higher than conventional estimates. However, information on this topic is sparse and there is a need for more research. Our study is based on the conventional estimates of methane emissions.

Key findings

1. Economic modelling studies show unequivocally that economically efficient policies to cut GHG emissions will lead to a lower level of natural gas production and use than the "business-as-usual" level. In this sense, natural gas is not a bridging fuel in the fight to curb climate change. Even a modest price on GHG emissions is projected to slow the growth in North American gas production. And when climate policies are designed to be consistent with limiting average global warming to 2°C — the objective that governments have unanimously endorsed in the UN climate negotiations — North American or Canadian natural gas production and use is projected either to rise only a little above current levels before falling, or to start falling immediately.

2. New production facilities for natural gas — and particularly shale gas — are likely to cause substantial environmental impacts aside from climate change. A region targeted for shale gas development will be subject to intense industrialization, with hundreds or thousands of wells drilled annually, a well pad roughly every square mile, considerable additional infrastructure, and the inevitability of accidents. The number of well pads needed to produce a given amount of shale gas over 25 years is on the order of 100 times greater than the expected number needed to produce the same amount of gas in the Mackenzie Delta, a high quality conventional-like resource.

It is not clear that there have been any cases where chemicals used in the hydraulic fracturing ("fracking") of unconventional gas wells have directly contaminated fresh water underground. However, migration of natural gas into drinking water supplies as a result of inadequate cementing/casing of gas wells, including modern shale gas wells, has been clearly established in multiple settings. In Pennsylvania, currently at the forefront of shale gas development, the industry has a poor track record in both preventing spills and safely disposing of wastewater.

3. Natural gas production currently escapes key aspects of government oversight and regulation. Most oil and gas wells in Canada are explicitly exempted from normal provincial environmental assessment processes. Operators of oil and gas wells do not have to report the chemicals they inject underground because they are exempted from the National Pollutant Release Inventory.

Although provincial environment ministries play a role in issuing certain authorizations, oil and gas wells are commonly subject to permitting procedures administered by regulatory bodies that face a conflict of interest because they have a role promoting oil and gas development. Canadian regulatory authorities generally have only a limited understanding of the structure of groundwater, and therefore lack information needed to properly assess risks to water from oil and gas development.

4. Proposed new markets for Canadian natural gas, such as liquefied natural gas (LNG) exports to Asia or natural gas vehicles, face major obstacles and appear much less plausible than is often claimed. LNG exports to other continents would face many hurdles, including competition from other suppliers and uncertainty about the prices in destination countries needed to support the high capital costs of LNG infrastructure. The International Energy Agency (IEA) forecasts no net LNG exports from North America over the next 25 years, and the U.S. Department of Energy foresees no new U.S. LNG export capacity during the same period. Natural gas vehicles also face major obstacles such as the lack of public refuelling infrastructure. In its most aggressive GHG reduction scenario, the IEA projects 20 times greater sales of electric light vehicles in 2035 than natural gas light vehicles.

5. There are several reasons why increased consumption of natural gas-fired electricity is not required to support a major expansion of intermittent wind or solar power. These include: the capacity of existing electricity systems to integrate new variable-output sources; the fact that backup natural gas-fired generating capacity may only need to be used sparingly; the use of "smart" grids to integrate a higher proportion of intermittent sources; the possibility of expanding interconnections to regions with hydropower; and emerging energy storage technologies that smooth the output of energy from the wind and the sun.

Key recommendations[1]

A. Because fighting climate change requires slower, not faster addition of new natural gas production capacity, **government approvals of new production facilities should be consistent with a lower level of natural gas production and use than would otherwise occur.** Put simply, governments should not be approving gas production levels that are incompatible with their GHG targets, especially since production is likely to cause substantial non-climate environmental impacts.

B. Because of the decline of conventional gas fields, strong climate policies would still probably result in a level of natural gas production and use that requires new production facilities. **Governments must exercise a high level of caution before approving new natural gas production facilities given the likelihood of substantial non-climate environmental impacts.** We believe this means that natural gas production should be brought under normal provincial environmental assessment processes; be subject to ongoing assessments of

[1] Note: we have grouped and numbered recommendations differently here than in Section 4.2 of the full Suzuki/Pembina report, which provides more detail.

cumulative environmental impacts; and have its environmental impacts regulated by environment ministries, not natural resource ministries or other regulatory agencies. Governments should not permit the introduction of shale gas production into a region unless thorough public consultation indicates a high level of acceptance by concerned citizens.

C. Given the significant risks that natural gas development poses to water resources, governments should review, strengthen as needed, and strictly enforce requirements regarding water monitoring, use and treatment. Governments should undertake improved public mapping of groundwater. They should also require natural gas producers to publicly disclose the chemical composition of hydraulic fracture fluids and report injected fluids under the National Pollutant Release Inventory.

D. The most important way to ensure that levels of production and use of natural gas are consistent with fighting climate change is for governments to immediately begin implementing climate change plans that are demonstrably capable, at a minimum, of meeting their GHG targets. These plans should include an economy-wide price on GHG emissions and a range of complementary regulations and investments. Where governments approve new natural gas processing plants that strip significant volumes of carbon dioxide from raw gas, those plants should be required to implement carbon capture and storage if they do not do so as a result of a carbon price.

E. In accordance with Canada's commitment as part of the G20 to eliminate subsidies for fossil fuels, Canada's governments should eliminate subsidies that encourage the expansion of natural gas production and use. In particular, governments must adjust royalty regimes to ensure that they collect the maximum value of the natural gas resource, which is owned by citizens; and eliminate all tax incentives for oil and gas production.