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Is natural gas a climate change solution for Canada?

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About this project

- What should federal and provincial governments be doing to shape future production and use of natural gas?
  - Both climate-related and other environmental impacts
- Extensive literature review
- New economic modelling study
- North America-wide perspective
- Report published Thursday July 14, 2011

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Why it's important

- Natural gas accounts for over a quarter of the primary energy consumed in North America
- "Unconventional" gas — particularly shale gas — has reinvigorated the gas production sector
  - Canada now believed to have over 100 years of supply at current rates
- Governments and industry are portraying natural gas as a "bridging" fuel that should be used to reduce GHG emissions in the near term — but lack of clear analysis
- Significant public concern about the impacts of proposed gas developments on fresh water, the landscape and quality of life: NWT, BC, AB, QC, NB

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A bridging fuel?

- Generally accepted that natural gas has considerably lower GHG emissions than other fossil fuels on a full lifecycle basis
  - Now being challenged (methane emissions), but information is sparse and more research is needed — our study is based on conventional estimates
- Replacement of coal by natural gas would increase gas consumption
- Energy conservation and a shift to renewable energy would reduce gas consumption
- Economic models balance these competing factors

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Key finding #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
  - Even with a low carbon price (e.g., $20/tonne)
  - With policies designed to limit average global warming to 2°C, 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
  - In this sense, natural gas is *not* a bridging fuel in the fight to curb climate change

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Key finding #1

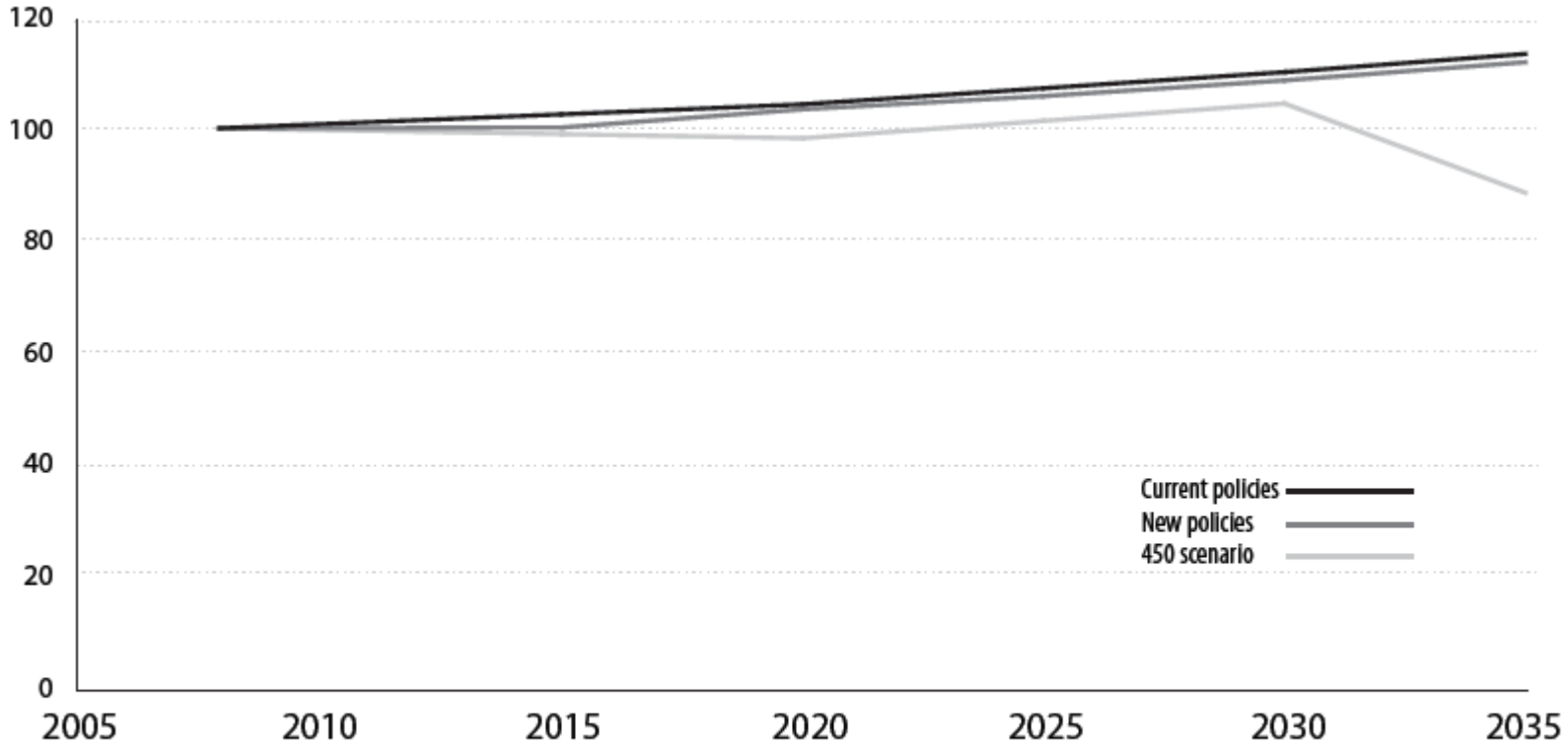

Figure 6. North American (U.S., Canada, Mexico) natural gas consumption in the IEA's World Energy Outlook 2010[193] (2008=100)

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Key finding #1

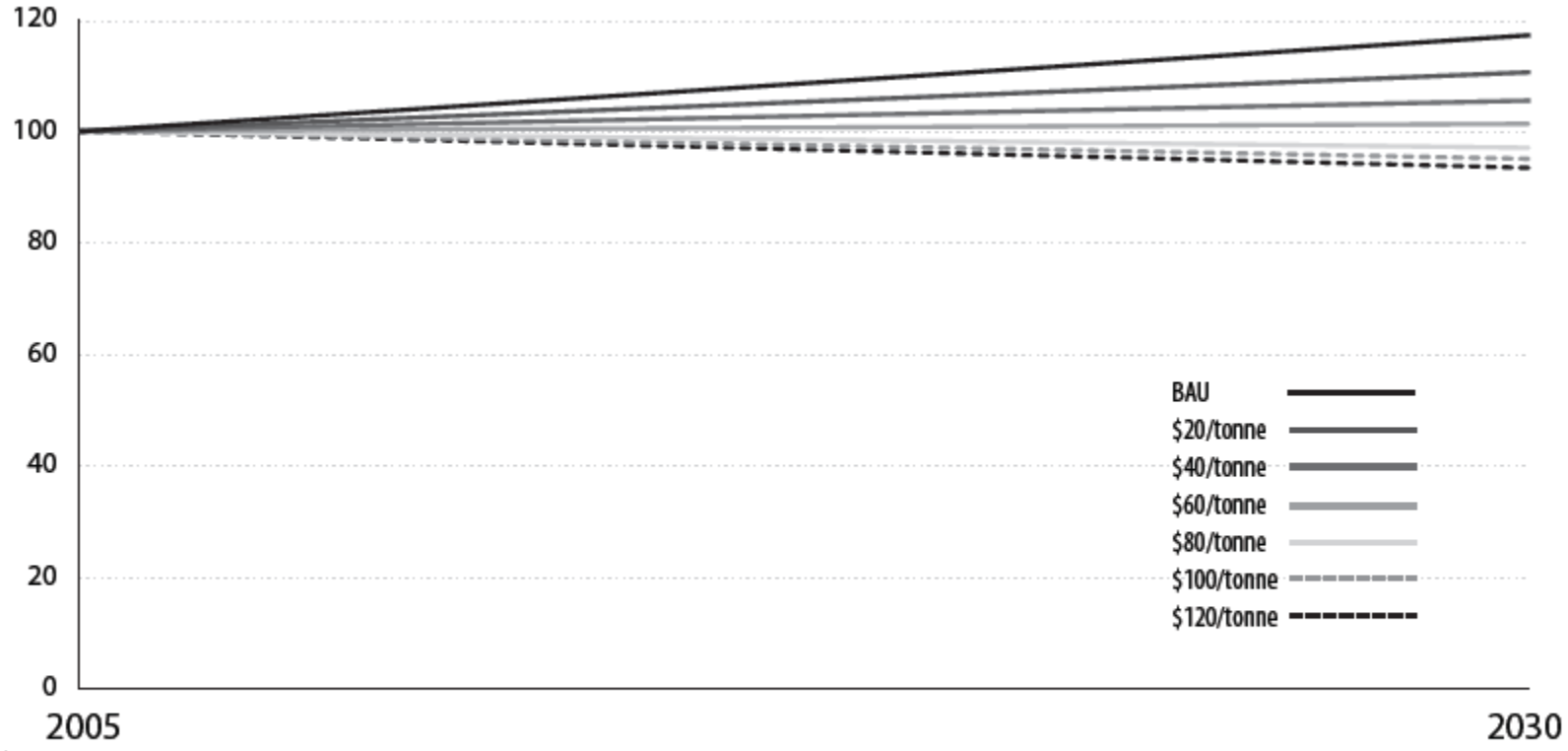

Figure 11. North American (U.S., Canada) natural gas consumption in the study commissioned for this report (2005=100)

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Key finding #2

- New production facilities for natural gas — particularly shale gas — are likely to cause substantial non-climate environmental impacts
  - Intense industrialization: 100s or 1000s of wells drilled annually, one well pad + infrastructure every square mile, inevitable accidents
  - # 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 # needed to produce the same amount of gas in the Mackenzie Delta
  - Not clear that there have been any cases where chemicals used in "fracking" have directly contaminated fresh water underground, but 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
  - Pennsylvania: poor track record on spills and wastewater disposal

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Key finding #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 do not have to report the chemicals they inject underground because they are exempted from the National Pollutant Release Inventory
  - Environment ministries play a role in issuing certain authorizations, but 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

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Key finding #4

- Proposed new markets for Canadian natural gas, such as LNG exports to Asia or natural gas vehicles, face major obstacles and appear much less plausible than 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
  - The lack of public refuelling infrastructure is a major obstacle to natural gas vehicles
  - 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

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Key finding #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:
  - Capacity of existing electricity systems to integrate new variable-output sources
  - Backup natural gas-fired generating capacity may only need to be used sparingly
  - Use of "smart" grids to integrate a higher proportion of intermittent sources
  - Possible expansion of interconnections to regions with hydropower
  - Emerging energy storage technologies that smooth the output of energy from the wind and the sun

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Key finding #5

Table 10. U.S. electricity generation in the IEA's World Energy Outlook 2010, 450 scenario[222]

ENERGY SOURCE		2008	2020	2030	2035
All	Generation (TWh)	4343	4572	4790	4876
Natural gas	Generation (TWh)	911	905	1317	735
	Share of generation (%)	21	20	27	15
	Generation capacity (GW)	409	392	427	428
Wind and solar	Generation (TWh)	59	316	813	1092
	Share of generation (%)	1	7	17	22
	Generation capacity (GW)	26	128	298	391

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Key recommendations 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

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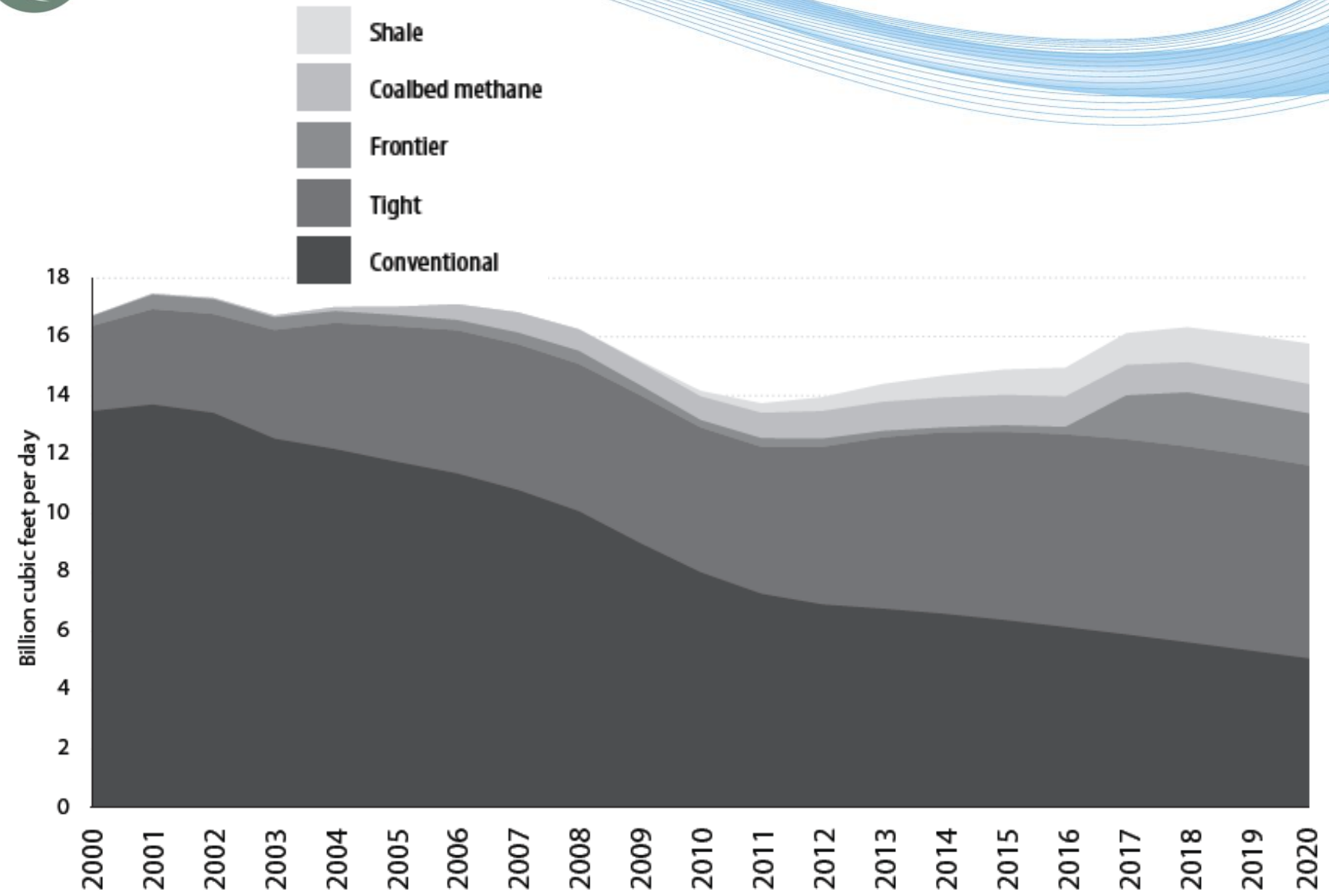

Figure 4. National Energy Board projection of types of gas production in Canada[76]

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Key recommendations B

- **Governments must exercise a high level of caution before approving new natural gas production facilities given the likelihood of substantial non-climate environmental impacts**
  - Natural gas production should be brought under normal provincial environmental assessment processes
  - Natural gas production should also be subject to ongoing assessments of *cumulative* environmental impacts
  - Environmental impacts of natural gas production should be 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

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Key recommendations 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
  - Natural gas producers should be required to publicly disclose the chemical composition of hydraulic fracture fluids and report injected fluids under the National Pollutant Release Inventory

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Key recommendations 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

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Key recommendations 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**
  - Governments must adjust royalty regimes to ensure that they collect the maximum value of the natural gas resource, which is owned by citizens
  - Governments should eliminate all tax incentives for oil and gas production