

NORTHWEST TERRITORIES

## Energy Facts

2012

# NATURAL GAS: A FUEL FOR THE FUTURE

### What are the benefits of natural gas?

- Lower greenhouse gas emissions than other fuels.
- An existing pipeline system throughout much of North America.
- Less expensive than oil, gasoline, diesel, or propane.
- High efficiency (>95%) natural gas appliances are more widely available than high efficiency oil appliances.
- As a gas, natural gas poses no expensive spill hazards.
- Natural gas is lighter than air, thus posing less explosion risk than propane.
- Natural gas can be stored underground or in high-volume pipelines.

### Sources of Natural Gas

• Conventional wells	• Gas hydrates
• Coalbed methane	• Biogas reactors
• Shale gas	

Coalbed methane, shale gas, and gas hydrates are all referred to as unconventional gas since these reserves are more difficult to extract than conventional reserves. About 25% of current gas production in Canada is unconventional<sup>1</sup>, but the National Energy Board predicts that unconventional gas could account for two-thirds of production by 2020.

### Gas Consumption Is Increasing

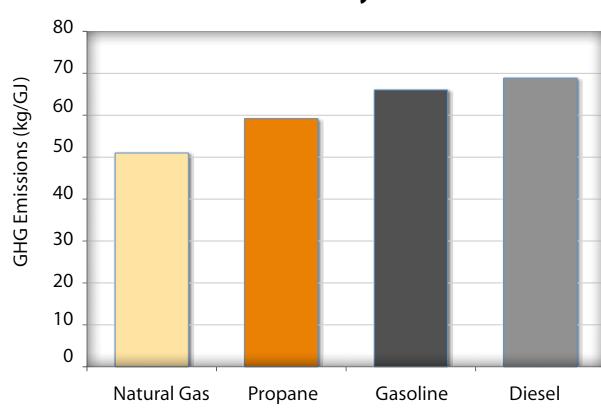
- The percentage of electricity in North America produced from natural gas is increasing.
- The use of natural gas in transportation is accelerating.
- There are cost advantages to the use of natural gas.
- Policy support for less greenhouse gas (GHG) intensive fuels is increasing.
- Carbon taxes and cap & trade mechanisms provide further incentives for natural gas.

### Electricity Generation: Why Natural Gas?

In the United States, 26% of new generating capacity in 2009 was from natural gas,<sup>2</sup> and natural gas-fired generation is expected to increase from 23% currently to 25% in 2035.<sup>3</sup> In Canada, the proportion of electricity generated with gas is expected to increase from 5% in 2006 to 16% in 2020.<sup>4</sup> Natural gas is a popular fuel for new generation for many reasons:

- Natural gas power plants adapt quickly to fluctuating electricity demand, and are less expensive to install than most other types of power plants. This makes them ideal for loads that are not required 24/7 such as peak load generation. For the same reason, they combine well with renewable energy sources that are intermittent.
- Natural gas is well suited for combined heat and power.
- Natural gas power plants have more flexibility regarding location and size than many other power plants.

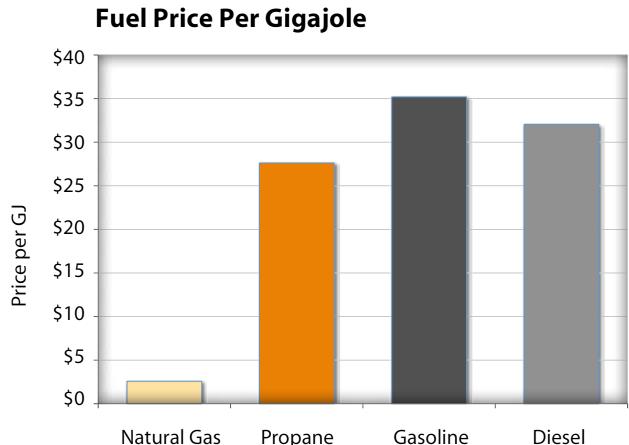
### GHG Emissions Intensity



## Increasing Use in Transportation

The first natural gas engine for heavy-duty vehicles was introduced in 1985.<sup>5</sup> Natural gas engines are now used around the world, most commonly in transit buses and refuse trucks. A Canadian trucking company recently ordered 180 natural gas trucks to use in Quebec and Ontario.<sup>6</sup> Why is the use of natural gas increasing in transportation?

- Lower life-cycle carbon emissions when compared to diesel, equal to reductions of 40-60 tonnes per year for a typical highway transport truck.<sup>7</sup>
- New natural gas heavy duty engines have been developed that are as efficient as diesel engines.<sup>7</sup>
- Truck manufacturers such as Kenworth, Peterbilt, and Freightliner now manufacture natural gas trucks.<sup>7</sup>
- The Quebec government is providing financial incentives for the purchase of natural gas transport trucks.<sup>8</sup>
- A transport truck uses an average of 2.2 million litres of diesel per year.<sup>8</sup>
- Fuel cost savings of 45% or \$990,000 per year are achieved from switching a highway transport truck to natural gas (see chart Fuel Price Per GJ).<sup>8</sup>
- Conversion of a highway transport truck to natural gas has a simple payback of about 1.8 years, with a return on investment of 58% over ten years.<sup>8</sup>



See references 9-10 for pricing details.

## Liquified Natural Gas (LNG)

Technology has been developed to cool, store, and transport natural gas as a liquid. In North America, the combination of new gas supplies and lower prices are providing impetus for the construction of liquefied natural gas terminals to enable gas export and the use of LNG as a transportation fuel. LNG is not widely used in North America but is in many other countries. Japan, for example, imported 3.8 trillion cubic feet of natural gas as LNG in 2011.

Natural gas liquefies at -162C, and in liquid form, has an energy density of 23 GJ per m<sup>3</sup> which is 60% that of diesel. LNG can be stored in double wall containers that have either insulation or a vacuum in the space between the walls. The gas is re-vaporised before it is used.

Shell Canada is installing LNG fueling stations in the Edmonton–Calgary corridor to enable LNG use for transport trucks.

## References

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