



CANADA'S OIL & NATURAL GAS PRODUCERS

ENVIRONMENTAL INNOVATION - AIR



Canada's oil and natural gas industry works to reduce air emissions associated with our development activities through project design, operational excellence, innovation and technology.

Fossil fuels are burned for electricity generation, industrial uses, transportation, as well as to heat our homes and commercial buildings.

GLOBAL CHALLENGE

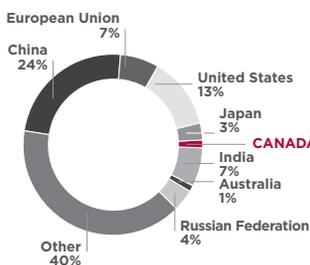
Reducing GHG emissions is an important global issue. Specifically for the oil and natural gas industry, our challenge is to reduce GHG emissions while the demand for energy - and the amount of energy the world is consuming - is growing. Global demand for energy is expected to increase 27 per cent by 2040, according to the International Energy Agency.

Canada generates less than 1.5 per cent of global GHG emissions. Of that, Canada's upstream oil and natural gas industry - including the oil sands sector - contributes about 21 per cent of Canada's total emissions.

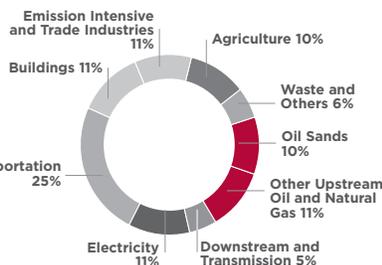
CANADA HAS ONE OF THE WORLD'S TOUGHEST CLIMATE POLICIES, BASED ON PRICE AND STRINGENCY.

Canada is the only country of the world's top 10 major oil and natural gas exporters implementing a carbon pricing initiative.

GLOBAL EMISSIONS - 2014



CANADIAN EMISSIONS - 2016



Source: Environment and Climate Change Canada, 2018 & World Resources Institute, 2017

CANADA IS A WORLD LEADER IN CLIMATE POLICY

Canada has very high environmental performance standards, a commitment to Indigenous engagement, opportunity and potential for national prosperity, and thriving innovation research. Canada is a safe, reliable and technologically savvy energy producer. Compared to global competitors, Canada has one of the world's toughest climate policies based on price and stringency. Climate policy is governed in Canada by both the provincial and federal governments.



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Currently, Canada is increasing the price on carbon, while the majority of our competitors are reducing regulations related to climate policy. Several provinces have put a price on carbon and the federal government has plans to implement a backstop policy that would raise the carbon price to \$50/tonne by 2020.

TECHNOLOGY IS KEY

The Canadian upstream oil and natural gas sector has a long history of innovation and technological advancements that have improved efficiency and environmental performance while growing production. Today, numerous organizations and alliances facilitate research and innovation across the industry and across the country. Investment in innovation and technology is the backbone of improvements in production, efficiency and environmental performance.

INDUSTRY IN ACTION

- **GAS-TURBINE ONCE THROUGH STEAM GENERATOR:** A fit-for-purpose co-generation technology that produces electricity at the same time as producing steam has the potential to reduce operators' reliance on electricity from the Alberta power grid, which may result in a net reduction in carbon intensity per-barrel of product.
- **ALGAE PROJECT:** The project is the work of Canadian Natural and its partners in the National Research Council of Canada and Pond Biofuels Inc., based in Markham, Ontario. Oil sands companies are investigating using algae (microscopic plants) to reduce greenhouse gas emissions while producing valuable products. The project involves creating biorefineries. Large cultivation tanks are built and seeded with algae, then filled with a mixture of carbon dioxide (CO₂), waste heat, and treated waste water from oil sands facilities. If the technology can be scaled to commercial size, the potential for real emissions reduction is substantial. The Algae Project has the potential to reduce emissions by 15 per cent at Canadian Natural's Horizon oil sands operations. At Canadian Natural's Primrose operations, the company believes emissions could be reduced by 30 per cent or more. Overall, Canadian Natural expects to reduce over 1.5 million tonnes of CO₂ equivalent emissions which is comparable to removing the emissions of up to 300,000 vehicles off the road.
- **METHANE DETECTOR PILOT:** Shell Canada launched a methane detector pilot at one of its shale gas sites near Rocky Mountain House, Alberta. This pilot project is part of the Methane Detectors Challenge, a partnership between various governments, industry and environmental stakeholders, and technology developers, to test next-generation methane detection technologies. The initiative aims to enable better early detection and repair of methane leaks, and ultimately reduce emissions. The sensing system used in the pilot is a new technology that can continuously monitor methane emissions, unlike hand-held optical gas imaging cameras.



FOR MORE INFORMATION:

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