



Energy in Canada @ 150 and Beyond

Canada's Energy Story and Our Place in the World's Energy Future

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One in a series of papers prepared by Canadian energy sector leaders – at the invitation of the Energy Council of Canada – exploring key aspects of our ongoing national energy story on the occasion of the 150th anniversary of Confederation.

Summary: Building from early discoveries in the 1800s, Canada has become one of the world's largest producers of oil and gas. Innovation has made both further discoveries and our current focus on sustainability possible, and positions us well to meet growing energy needs even in a lower-carbon world. Industry collaborative efforts are already helping make this possible, and Canada is a preferred supplier of the oil and gas the world will continue to need in the decades ahead. The outlook for Canadian energy is tremendously positive, providing we are able both to develop the infrastructure needed to get our products to market, and to foster a competitive regulatory and fiscal environment.

In many ways, Canada's energy story over the 150 years since Confederation is a reflection of our history as a whole, and of our character as a nation. The tale of Canada's energy explorers, innovators and entrepreneurs also provides insight into what the next 150 years could hold, and how Canada can help lead the way toward a future of energy abundance through the responsible production of its oil and natural gas resources.

Canada's Energy Story: Entrepreneurism Meets Innovation

Today, Canada is considered a major energy producer. We are the world's sixth-largest oil producer and fifth-largest natural gas producer. The Canadian oil and natural gas industry supports about 500,000 jobs (direct and indirect) while contributing \$12 billion annually to government revenues (all levels). In 2016, the industry invested \$38 billion in capital.

But it wasn't always so. Canada – and North America's – first commercial oil well was drilled in Ontario back in 1858. James Miller Williams, a carriage maker and entrepreneur, dug the well near Oil Springs, a village in Lambton County. He also opened a large refinery in Hamilton in 1860.

The discovery of natural gas soon followed. In 1883, a Canadian Pacific Railway crew accidentally found natural gas near Medicine Hat, Alberta, while drilling for water. By 1890, community leaders in Medicine Hat were taking advantage of the find, drilling to supply natural gas for local cooking, heating and lighting needs.



These early discoveries highlight the spirit of exploration, persistence and entrepreneurship that still today characterizes Canada's oil and natural gas industry. Further discoveries and a focus on sustainability have required a critical additional ingredient: innovation.

For example, the search for and production of offshore oil along Canada's East Coast has been advanced through technologies like remotely operated submersible vehicles, gravity-based platforms and improvements in offshore drilling technology. Advancements in hydraulic fracturing techniques and horizontal drilling have allowed for the production of previously inaccessible shale gas and tight oil resources in Western Canada. Meanwhile, the use of multi-well drilling pads has greatly reduced the amount of land disturbed by drilling operations, while the use and recycling of saline water is decreasing the impact on water use.

Beginning with Karl A. Clark's patented hot-water extraction process in 1928, generations of scientists and engineers have worked to find ways to extract bitumen from oil sands formations. This led to the creation of the Great Canadian Oil Sands (now Suncor Energy) in 1967 – the country's first successful, commercial oil sands mining operation.

Since then, steam-assisted gravity drainage (SAGD), a process pioneered by a chemical engineer named Roger Butler, has enabled a less-invasive method of extracting bitumen from deposits too deep underground to mine. The technology has a reduced land footprint compared with mining, and producers are working to reduce the GHG emissions intensity of their operations through the development of

more energy-efficient methods of steam generation.

The Next 150: Canada's Place in the World's Energy Future

Canada's energy story shows that innovation is in our industry's DNA. It's a key reason why we are well-positioned to meet the challenges of the next 150 years. One challenge will be meeting the energy needs of a growing planet.

In its *2017 World Outlook* energy forecast, the International Energy Agency (IEA) estimates the world will need 30 per cent more energy in 2040 than we use today. That means more energy for India, China and around the world. That also means more energy for the three-billion-plus citizens of the planet who today still have to burn wood or animal dung to heat their homes or cook food for their families – let alone someday drive a car, fly somewhere they haven't been, or use iPhones made with oil.

The fact is global energy demand is growing. Energy demand drives energy production. This means more energy is needed – in all forms.

Demand drives production, and more energy is needed – in all forms.

Certainly, our global energy mix is changing. Renewable energy supply is increasing. But it won't happen overnight. The IEA says that wind, solar and geothermal energy sources will increase 400 per cent by 2040. Even with such a large increase, these energy sources will only account for six per cent of the total energy mix in 2040 – meaning that even in a lower-carbon future, the world will continue to need more energy from oil and natural gas.



It's expected that by 2030, India will be the number-one importer of oil in the world, ahead of China and the United States. Today, India consumes 4.4 million barrels per day – more than we make in all of Canada. That will grow. In fact, India and China will need about nine million more barrels of oil per day by 2040 than they consume today.

Meanwhile, growth in global natural gas consumption is expected to jump 45 per cent by 2040. Natural gas is the cleanest-burning hydrocarbon, producing 50 per cent fewer GHG emissions than coal when used to generate electricity.

It's worth noting that the IEA forecast incorporates policy shifts driving to meet commitments to reduce GHG emissions, arising from the Paris Accord. A key challenge for our industry will be to find innovative ways to continue supplying oil and natural gas the world needs, and that also help us meet our nation's GHG emissions reduction targets.

Canada is the top choice as a source of oil and gas imports.

The good news is that we've already started.

Energy companies are working together to create more energy with less impact. Since 2012, Canada's Oil Sands Innovation Alliance (COSIA) – a unique collaboration of oil sands companies – has invested \$1.33 billion to create hundreds of innovations, aimed at everything from cutting GHG emissions to eliminating tailings ponds and speeding up land reclamation.

Another industry-led group, the Petroleum Technology Alliance Canada (PTAC), has also made significant investments into environmental innovation. This includes funding projects that can help our industry develop technologies that enable cost-effective petroleum production within a low-carbon economy.

Some of the technologies being developed through groups like COSIA and PTAC include: specialized tubes that reduce the amount steam (and therefore energy) needed for underground bitumen recovery; microalgae that gobble up carbon dioxide emitted from industrial smokestacks; vent gas capture units that redirect natural gas normally emitted into the atmosphere to be used instead as fuel for compressor engines; and satellites that can identify CO₂ and methane emission hotspots from outer space.

The Future is Now: Becoming an Energy Leader

Today, Canada produces about 3.9 million barrels per day of oil. We are poised to grow even more. In CAPP's *2017 Crude Oil Forecast, Markets and Transportation* report, we forecast Canadian oil production will grow to 5.1 million barrels per day (b/d) by 2030. But this is a drop in the barrel – so to speak. The advent of oil sands production technologies has blessed Canada with the third-largest oil reserves in the world; just under 170 billion barrels at last count.

We also have an estimated 300-year supply of natural gas (based on domestic consumption rates). There's about 1,100 trillion cubic feet of natural gas, much of it found in shale plays across Western Canada – the Montney, Duvernay and Alberta's Deep Basin. There could



also be potential from shale plays in Quebec and New Brunswick, if regulations in these provinces are updated to allow the use of this safe and proven technology.

The fact is, we have energy the world needs and wants. In the 2017 *Global Energy Pulse*, a first-of-its-kind global survey conducted by Ipsos Public Affairs in April, Canada was the top choice for where people would like to see oil and natural gas imported from. The survey gathered responses from more than 22,000 people from 32 countries around the world.

Around the world, most oil is state-owned and controlled – but Canada has half of all the free-market oil in the world. That is a tremendous opportunity to attract investment into Canada – bringing in capital for projects that would create jobs and economic growth for our nation.

We also have the ingenuity and commitment to sustainability that will allow us to deliver our oil and natural gas resources in a safe, environmentally friendly and cost-effective manner. We are positioned to become a preferred global supplier of choice in a lower-carbon world.

This is all good news – but only if we can deliver our products to market.

The key will be to build the energy infrastructure – including pipelines and LNG facilities – needed to get our resources to growing energy markets overseas. The approval and construction of the Trans Mountain pipeline expansion from Hardisty, Alberta, to the West Coast is an important step. We'll need to take more.

Another key will be ensuring we have the right regulatory policies and fiscal framework to keep Canada's industry competitive relative to our competitors around the world. For example, continued lengthy delays and uncertainties concerning Canada's regulatory review process for energy projects would seriously undermine investment in our industry. Ultimately, it would allow Canadian producers to be crowded out by others who are as willing to meet global energy demand, but less committed than we are to environmental sustainability.

With our first 150 years behind us, it is time Canada begins laying the groundwork for the next 150 years. While our history has made us who we are today, it's the future of our energy industry, and the focus on innovation that will help determine who we become tomorrow. We are an energy leader. We have an opportunity to grow. By applying our trademark Canadian resourcefulness – our entrepreneurs and innovators, our engineers and environmental scientists, and our ideas and capital – we can help create a bright energy future; one that builds prosperity for all Canadians by meeting the growing energy needs of the world.

Tim McMillan became president and incoming CEO of CAPP in October 2014. At the time of his appointment, he was minister of rural health in the government of Saskatchewan. He had previously served as minister of energy and resources and had a strong connection to the energy industry over many years, including ownership of an oilfield services company. He grew up on a family farm near Lloydminster, and has an economics degree from the University of Victoria.