LOW CARBON BUSINESS ACTION
CANADA

Funded by
the European Union

KEY SECTOR OVERVIEW
OIL & GAS

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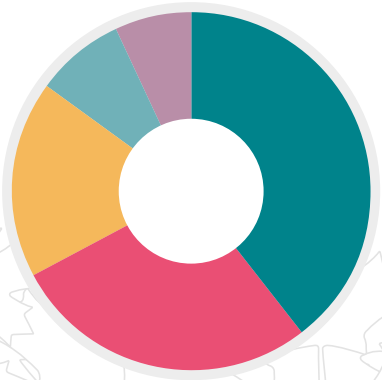
OVERVIEW

Canada's oil and gas sector remains a cornerstone of the national economy, contributing significantly to GDP and provincial revenues. The industry is undergoing a transformative shift, with increasing focus on sustainability, emissions reduction, and clean energy alternatives. With large-scale investments in carbon capture, renewable natural gas, alternative fuels, and electrification of operations, there is a growing demand for clean technology solutions. For cleantech providers, this is a pivotal moment to collaborate on technologies that help decarbonize Canada's energy landscape while maintaining its role as a global energy leader. The oil and gas sector includes extraction, distribution, refining, and upgrading of oil and gas products.

OIL & GAS REPRESENTS

- The world's fourth-largest producer of oil and the fifth-largest producer of natural gas.
- Canada's largest source of greenhouse gas emissions: 31% (217 million tonnes CO_2 equivalent) of Canada's total greenhouse gas emissions.
- A major role in Canada's economy: $71.4 billion annual GDP contribution, equivalent to over 3% of Canada's total, and $34 billion in provincial royalties.
- Significant water consumption: Production methods are highly water-intensive, with oil sands production requiring 0.4–0.6 barrels of water per barrel of oil and mining operations using 2–4 barrels of water per barrel of oil.

Emissions from Canada's Oil and Gas Sector



- 40% OIL SANDS
- 28% NATURAL GAS PRODUCTION & PROCESSING
- 18% CONVENTIONAL OIL PRODUCTION
- 8% PETROLEUM REFINING
- 7% TRANSMISSION & DISTRIBUTION

Source: Environment and Climate Change Canada. (2024). National Inventory Report, 1990–2022: Greenhouse Gas Sources and Sinks in Canada. Available online at: canada.ca/ghg-inventory

DRIVERS & LEADERSHIP

- Canada's oil and gas sector is undergoing significant transformation and diversification due to a suite of policies aimed at promoting sustainability and reducing emissions.
- The sector is forecast to contribute the greatest magnitude of emissions reductions by 2030, totalling 100 million tonnes CO_2 equivalent.
- Carbon pricing is incentivizing energy efficiency and low-carbon innovation.
- Canada's clean fuel standard is spurring investments into biofuels production and integration.
- The Carbon Management Strategy is catalyzing interest in carbon capture technologies.
- Companies are seeking new methane detection and mitigation technologies to meet Canada's goal of reducing methane emissions from the sector by 75% by 2030.
- Canadian oil and gas companies continue to invest heavily in low-carbon energy and clean technology; Canada's largest oil and gas companies are working together through the Pathways Alliance and other coalitions to advance CCUS and other clean technologies.

CLEANTECH CHALLENGE AREAS

Addressing methane emissions from venting, fugitive leaks, and area sources through advanced detection and monitoring technologies.

Enhancing leak detection and monitoring systems for methane and CO_2 emissions from oil and gas pipelines.

Repurposing pipeline infrastructure to transport hydrogen and CO_2, addressing challenges like hydrogen embrittlement and leak detection.

Low-carbon fuel production processes such as autothermal reforming for blue ammonia, electrolysers for green hydrogen, and integrating biomass feedstocks in refineries.

Reducing water use and improving reclamation efficiency in mining operations.

Exploring non-steam alternatives (electrical, chemical, or electromagnetic) to improve bitumen extraction efficiency and reduce environmental impact.

Alternative uses for bitumen such as carbon fiber, asphalt binders, and energy carbons for energy storage technologies.

Capturing and storing CO_2 from production and processing facilities; operational challenges include high energy use, storage capacity, infrastructure requirements, and costs.

Advanced devices and coating technologies to reduce scaling and fouling in heat exchangers and improve operational efficiency.

Alternative seismic exploration techniques to minimize land disturbance and biodiversity impacts.

Digital technologies (AI, big data, IoT) to improve operational efficiency, decision-making, safety, and sustainability through real-time monitoring and predictive maintenance.

OPPORTUNITIES: AREA OF ALIGNMENT WITH EU STRENGTHS & SOLUTIONS PROVIDERS

Low Carbon/Renewable Fuels Production and Integration

Many solutions for advancing renewable fuels and bioenergy have been identified in the EU. Hydrogen is a key component of the EU's energy transition strategy and a particular area of opportunity with established solutions providers.

Water Recycling and Reduction

The EU has developed water recycling and reduction technologies that could be tailored to oil & gas operations.

Heat Exchanger Fouling Mitigation

Several EU-funded research projects are exploring advanced devices and coating technologies.

Carbon Capture, Utilization & Storage (CCUS)

Increasing focus on fuels production in the EU with expanding market players.