**Emissions Intensity in the Oil and Gas Sector**

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While, there has been considerable discussion about the absolute greenhouse gas emissions arising from the activities of Canada’s oil and gas sector, much less attention has been paid to reductions in greenhouse gas emissions intensity that have occurred within the sector since the turn of the 21st century.

Emissions intensity is determined by dividing the amount of absolute greenhouse gas emissions by some unit of output, such as GDP, population, energy used, or barrel of crude oil produced. Canada’s GHG emissions intensity, expressed in these terms, has been in noticeable decline over the past two decades. Evaluating these trends in emission intensity is critical to gaining a better understanding of Canada’s overall ESG performance.

In our latest Research Brief, the Canadian Energy Centre uses the year 2000 as a realistic starting point to evaluate emissions intensity trends in the Canadian oil and gas sector because it incorporates some of the dramatic increase in oil sands production that has occurred.

For example, between 2000 and 2017, Canadian crude oil and lease condensate production increased from just under 2 million barrels per day to nearly 4 million barrels per day, a doubling of production. Much of this increase is due to the dramatic increase in oil sands production, which reached nearly 2.7 million barrels per day in 2017 compared to 0.61 million barrels per day in 2000. Yet, despite that increase in production, the emissions intensity in Canada’s upstream oil sector fell by around 12 percent.

In our research, we also found that Canada’s mining, quarrying, and oil and gas extraction sector compares favourably with other industrial sectors in Canada when it comes to emissions intensity. In 2017, the emissions intensity of the mining, quarrying, and oil and gas extraction sector in Canada was 62.7 tonnes of carbon dioxide equivalent (CO2e) per terajoule (TJ) of energy used in extraction. This compares to 68.7 tonnes used in the construction sector, 69.4 tonnes used in the iron and steel sector, 73.2 tonnes used in the forestry sector, and 73.6 tonnes used in the cement sector.

Fuel combustion emissions intensity in Canada’s industrial sector, which includes the oil and gas extraction sector, is also falling, and is comparable with some other energy-producing and consuming countries.

According to the International Energy Agency (IEA), between 2000 and 2017, GHG fuel combustion emissions intensity in Canada’s industrial sector fell by 42 percent. As of 2017, GHG fuel combustion emissions intensity in Canada were slightly higher than in Australia, but lower than in India, Iran, Oman, Qatar, Russia, Saudi Arabia and the United Arab Emirates.

What about emissions intensity in Canada’s oil sands sector, a subject of intense scrutiny when talking about Canada’s ESG performance? Our research shows that oil sands emissions intensity has fallen by about 22% between 2011 and 2018.

According to a recent report by IHS Markit, the overall weighted average of the upstream greenhouse gas intensity of Canadian oil sands (including steam-assisted gravity drainage, mined synthetic crude oil, mined dilbit, primary, experimental, and enhanced oil recovery) continued to decline in 2018. In fact, the upstream greenhouse gas emissions intensity of Canada’s oil sands is down by about 20 percent when compared with 2009.

IHS Markit also projects that, by 2030, the deployment of commercial and near-commercial technologies and efficiencies could result in a 17 to 27 percent reduction in the greenhouse gas emissions intensity of steam-assisted gravity drainage operations (which accounted for 45 percent of oil sands supply in 2017) and a 15 to 20 percent reduction in the greenhouse gas emissions intensity of mined oil sands. On a full life-cycle basis (inclusive of emissions from production to combustion), these upstream intensities would place steam-assisted gravity drainage operations within two to four percent and mined oil sands within five to seven percent of the average crude oil refined in the United States.

As Environment and Climate Change Canada has recently noted, more efficient industrial processes and technological improvements have all contributed to decreases in Canada’s emissions intensity. As emissions intensity in the Canadian oil and gas sector continues to decline, the rest of the world will begin to take notice. This will result in opportunities for Canada to become a hub in the export of new and emerging greenhouse gas emissions reduction technologies. Not only will Canada continue to proactively deal with its 1.6% share of total global emissions, it will be able to assist the rest of the world in dealing with their 98.4% share of remaining global emissions.

In conclusion, our analysis of credible data sources shows the improvements in emissions intensity made by Canada and its oil and gas sector since 2000, even with the dramatic increase in oil sands production over the period. Improvements in the oil and gas sector’s emission intensity within the context of Canada’s already high ESG ranking versus other energy-producing and consuming countries is a good news story that needs to be told more often to Canadians. Clearly, Canada’s oil and gas sector has made real and measurable progress in reducing its emissions intensity.

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