

CLEANER CANADIAN NATURAL GAS:**OVERALL SECTOR CO₂E EMISSIONS INTENSITY****DOWN NEARLY 30 PERCENT SINCE 2010****Introduction**

As one of the world's largest producers of natural gas, Canada has the potential to capitalize on energy demand in the Asia-Pacific region through the export of liquified natural gas (LNG).

The question arises as to whether Canada's natural gas production and processing sector is continuing to get cleaner on an CO₂e per barrel of oil equivalent basis.

To answer this question, the CEC examined updated Environment and Climate Change Canada (ECCC) historical greenhouse gas (GHG) emissions intensity numbers, expressed as kilograms of CO₂ equivalent (CO₂e) per barrel of oil, for the Canadian natural gas production and processing sector between 1990 and 2021.

Tracking Canada's natural gas production and processing sector production and emissions intensity

For measurement purposes, the natural gas production and processing sector is comprised of the following, as per Natural Resources Canada definitions:

The upstream gas industry is made up of several hundred companies that engage in activities such as exploration, drilling, and production of raw natural gas. Some upstream companies also own and operate gathering pipelines and field processing facilities. The midstream natural gas industry operates natural gas

processing plants, which remove impurities and natural gas liquids (NGL), natural gas storage facilities, gathering pipelines, and NGL facilities (NRCan, undated).

Canadian natural gas production has gone through several peaks and valleys since 1990, responding to changes in natural gas prices.

Between 1990 and 2000, Canadian natural gas production rose from 683 million barrels of oil equivalent (boe) per year to nearly 1,153 million boe per year, an increase of nearly 69 percent.

Then, over the next twenty plus years, Canadian natural gas production fell to 1,121 million boe per year, a decline of nearly 3 percent.

In the decade between 2010 and 2021, Canadian natural gas production was on the rise -- from 984 million boe per year to 1,121 million boe per year, an increase of nearly 14 percent, the result of horizontal drilling and hydraulic fracturing techniques, notably in shale and other tight geologic formations.

Overall Canadian natural gas emissions intensity per barrel down over 8 percent since 2000 and nearly 30 percent since 2010

Emissions intensity is the emission rate of a given pollutant relative to the intensity of a specific activity or industrial production process. Emissions intensity is determined by

dividing absolute emissions by a unit of output, such as GDP, energy used, population, or, in this case, barrel of oil equivalent produced.

Reducing CO₂ emissions intensity means reducing the amount of CO₂ emitted per unit of output.

Using ECCC numbers drawn from the 2023 National Inventory Report (NIR), between 2000 and 2021, the CO₂ emissions intensity of Canadian natural gas production fell from 48.6 kilograms CO₂e per barrel of oil in 2000 to 44.5 kilograms CO₂e per barrel of oil in 2021, an overall reduction of over 8 percent over two decades.

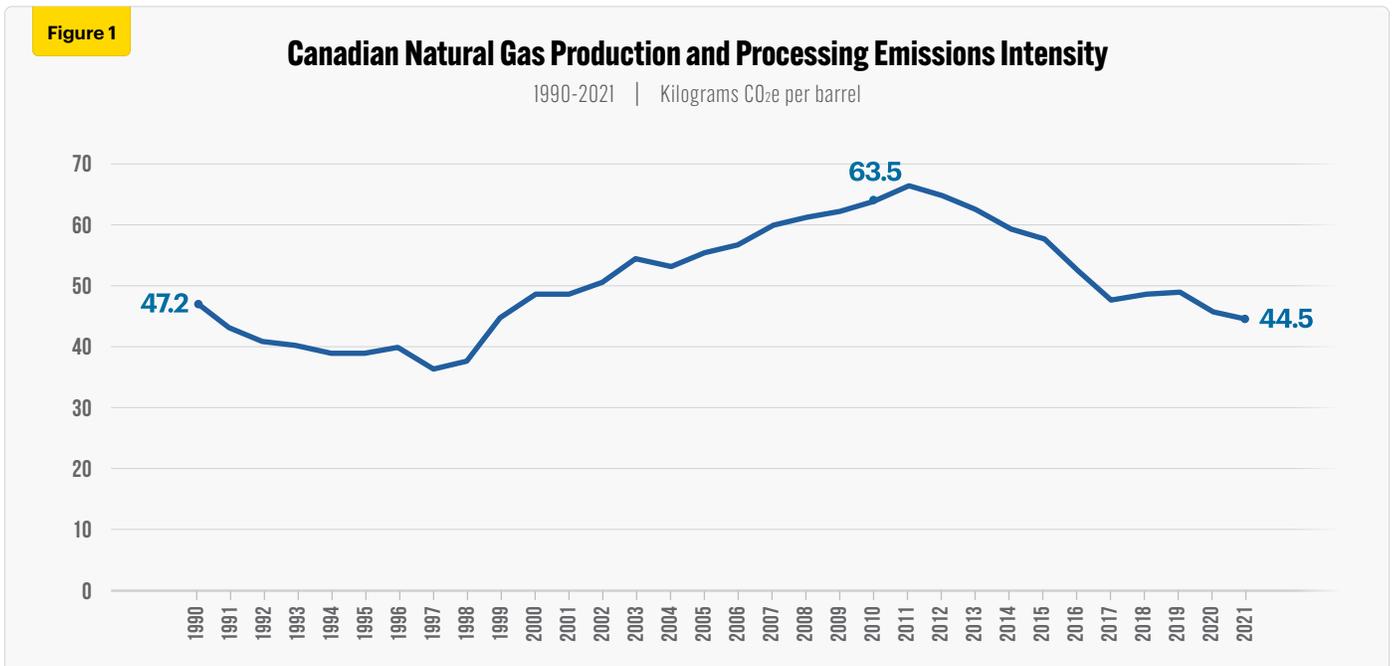
And, between 2010 and 2021, the CO₂ emissions intensity of Canadian natural gas production fell from 63.5 kilograms CO₂e per barrel of oil to 44.5 kilograms CO₂e per barrel of oil, a decline of nearly 30 percent.

According to the Canadian Association of Petroleum Producers, improved emissions management, particularly actions aimed at achieving methane emissions reduction targets and multi-well drilling pad approaches, are key drivers in emissions intensity reduction in the natural gas sector (CAPP, 2021).

Conclusion

Canadian natural gas production and processing continues to get cleaner. Between 2000 and 2021, the GHG emissions intensity of Canadian natural gas production fell from 48.6 kilograms CO₂e per barrel of oil to just under 44.5 kilograms CO₂e per barrel of oil, an overall reduction over those two decades of over 8 percent.

And, between 2010 and 2021, the GHG emissions intensity of Canadian natural gas production fell from 63.5 kilograms CO₂e per barrel of oil to 44.5 kilograms CO₂e per barrel of oil, a decline of nearly 30 percent.



Source: Derived from Environment and Climate Change Canada, 2023a and Environment and Climate Change Canada, 2023b.

Notes: Intensities are based on total subsector emissions and relevant production amounts. They represent overall averages, not facility intensities.

Notes

This CEC Fact Sheet was compiled by Lennie Kaplan at the Canadian Energy Centre (www.canadianenergycentre.ca). The author and the Canadian Energy Centre would like to thank and acknowledge the assistance of two anonymous reviewers in reviewing the original data and research for this Fact Sheet. Image credits: [Sasha Prasastika](#)

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