THE FACTS ABOUT GREENHOUSE GAS EMISSIONS

Greenhouse gas (GHG) emissions are the frequent subject of discussions relating to natural gas. The facts about emissions, particularly how much methane is released from natural gas production and delivery systems, are often skewed. This is particularly troubling when fact-based decision-making is crucial to crafting long-term and far-reaching energy policy.

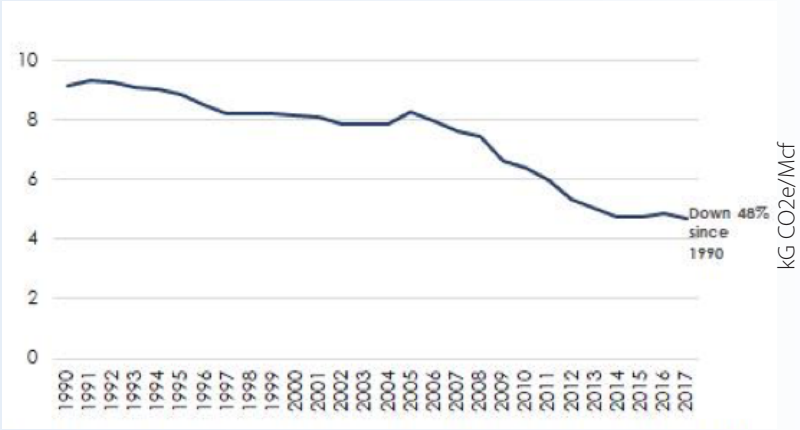
A better understanding of methane emissions released from natural gas production and delivery systems helps clarify how the proper deployment of natural gas can deliver significant environmental benefits. Let's take a closer look at the numbers.

Industry-wide Natural Gas Emissions are Low and Declining

The U.S. Environmental Protection Agency (EPA) made further updates to its estimates of methane emissions in its *Inventory of U.S. Greenhouse Gas (GHG) Emissions and Sinks: 1990–2017* ("Inventory"), released in 2019. The Inventory incorporates new data available from studies on emissions as well as the EPA's own Greenhouse Gas Reporting Program (GHGRP).

The Inventory found that industry-wide methane emissions[8] as a rate of natural gas production were 1.3 percent. (In BC, this methane leakage rate is estimated to be as low as 0.5 percent.) The ratio of methane emissions per unit of natural gas produced has declined continuously during the past several decades, dropping 48 percent since 1990.

U.S. Methane Emissions per Mcf of Gas Produced [9]

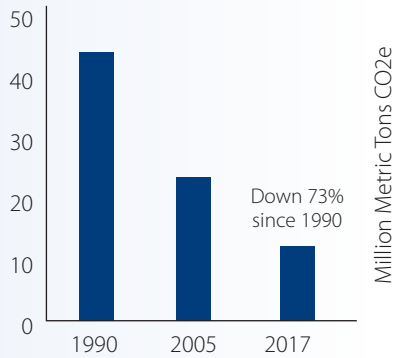


Source: EPA Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2017

The Inventory also confirmed that natural gas distribution systems have a small emissions footprint that continues to decline. Distribution systems emit less than 0.1 percent of produced natural gas annually, a decline of 73 percent from 1990 to 2017 even as U.S. natural gas utility companies added more than 730,000 miles of pipeline to serve 19 million more customers, increases of 50 and 36 percent respectively, and natural gas production increased by 50 percent.

The bottom line: New control technologies, replacement of old cast iron and bare steel pipes, and better industry practices have contributed to significant emissions reductions, even as annual natural gas production and consumption have hit record highs.

U.S. Methane Emissions from Natural Gas Distribution Systems



Source: EPA Inventory, 1990-2017

[8]Industry-wide, or "lifecycle" emissions, as defined by the EPA, include natural gas field production, processing, transmission and storage, and distribution.

[9]Includes methane emissions from petroleum production based on the natural gas fraction of total energy content produced from oil wells.

Regionally, Emissions are Already Lower and Expected to Decline Even Faster

In the basins from which the Pacific Northwest sources most of its natural gas, policy-makers and regulators have taken action to further decrease methane emissions from upstream operations. Effective January 2020 in BC, the source of about two-thirds of our region's natural gas, the BC Oil and Gas Commission (BC OGC) has committed to reducing methane emissions from upstream oil and gas operations by 45 percent by 2025 relative to 2014 levels, targeting everything from compressor seals to storage tanks. The BC approach is expected to reduce methane emissions by 10.9 megatonnes (10.9 million metric tons) of CO2 equivalent over a 10-year period, the equivalent of taking 390,000 cars off the road each year.[10] In addition, BC's natural gas transmission sector is expected to reduce its emissions by 40 to 45 percent below 2012 levels by 2050 under the Canadian federal Methane Regulation, which also came into force in January 2020. Like the BC OGC, the federal Methane Regulation is focused on reducing emissions from fugitives and venting.

In 2014, Colorado (which provides much of our region's Rockies' gas, about one-third of our supply) approved the first methane regulations in the U.S. requiring energy companies to reduce methane emissions from oil and natural gas operations by routinely checking their oil and natural gas wells—both new and existing—statewide, and immediately addressing any leaks. The regulations go beyond those of the EPA, which apply only to new or modified operations, according to the Environmental Defense Fund, which helped craft Colorado's regulations.

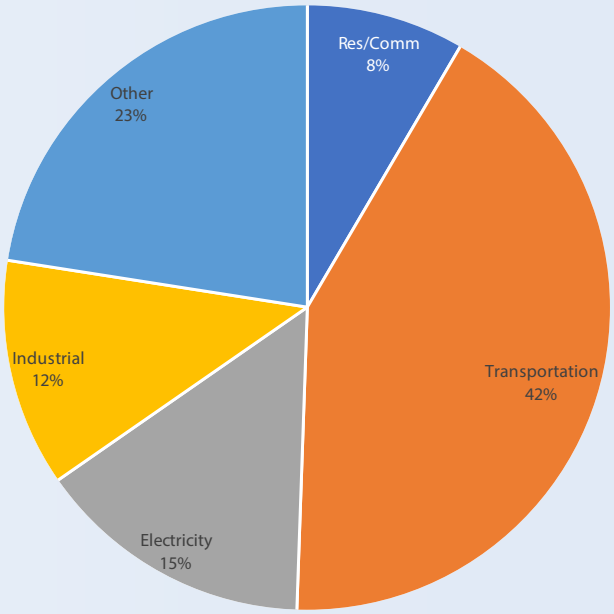
By 2016, field surveys of oil and gas equipment by the Colorado Department of Public Health and Environment (CDPHE) found a 75 percent drop in the number of sites where methane leaks were detected compared to similar surveys conducted prior to the regulations taking effect, said Will Allison, former director of the department's Air Pollution Control Division. By 2018, Garry Kaufman, the division's new director, said, "Colorado's program has reduced emissions of methane and volatile organic compounds from the oil and gas sector by hundreds of thousands of tons per year, while still allowing for growth in this important economic resource for Colorado."

So another bottom line: gas pipelines serving the Northwest have the lowest methane emissions on the continent and will continue to improve.

Regional Natural Gas Emissions are Small Relative to Other Sectors

Overall, direct use of natural gas for space and water heating in homes and commercial buildings in the Pacific Northwest account for 8 percent of total regional GHG emissions (see pie chart). The transportation sector (trucking, fleets, personal vehicles, public transit, etc.) produces the largest share of regional emissions (42 percent). The "other" category in the chart includes agriculture, forest practices, waste streams (landfills, waste water treatment), building heat from fuels other than natural gas, oil and gas extraction (BC only), and industrial emissions not related to natural gas combustion.

Current Emissions by Source in Pacific Northwest



Sources: BC 2017 Inventory: BC Community Energy Emissions Inventory for Residential/Commercial Combustion of Natural Gas; Oregon 2017 GHG Inventory; Washington 2017 GHG Inventory; U.S. EIA State Carbon Dioxide Emissions Data for 2017 Residential/Commercial combustion of Natural Gas in OR/WA, October 2019.

[10]For details from the BC Oil and Gas Commission, see https://www.bcogc.ca/public-zone/reducing-methane-emissions

Electrification: High Costs with Minimal Emissions Reduction

So what is the best path forward to achieve meaningful emissions reductions in the Northwest? Some believe "electrifying everything" is the answer. But the electrification option has serious economic and reliability costs, as well as its own environmental consequences. If you rely on one source for all energy, what happens during outages? What happens during peak cold days in the winter, when even demand-response systems and utility-scale power storage systems (large batteries) cannot sufficiently supplement intermittent production by solar and wind sources?

Again, let's look at some numbers. FortisBC's current natural gas system is designed to meet the peak demand equivalent of 28.1 GW. In contrast, BC Hydro's current peak demand is 11.1 GW; when its Site C dam is completed, that will add an additional 1.1 GW of generation at a cost of about $10 billion. Based on the expected cost of the Site C project, electrifying just FortisBC's natural gas demand would require multiple billion dollars in investments in BC Hydro's system. Ultimately, electrification would require staggering investments in the electric grid (e.g., transmission and distribution infrastructure) along with significant investments in additional power sources – whether energy efficiency, power storage, demand-response, new generation, or potentially costly purchases on the spot market. At the consumer level, this would also come with power bill increases and equipment replacement costs.

According to a 2018 American Gas Association study, aggressive policy-driven residential electrification could reduce GHG emissions across the U.S. by only 1 to 1.5 percent by 2035.[11] In the Northwest, served by gas distribution[12] and transmission systems with lower emissions relative to elsewhere, the reduction achievements would be even smaller. And no one has yet estimated the environmental costs of the new electric transmission and distribution infrastructure that would have to be built to move the replacement electricity to market, nor the incremental emissions that will result from increased electricity generation in the near-term,[13] nor the waste stream created by renewables.[14]

Steps towards a Low-Emissions, Diversified Energy Future

It makes considerably more sense to keep our options open in the future – by maintaining a mix of energy sources and employing each where it is most efficient and cost-effective – while continuing to innovate and reduce emissions no matter the energy source. In the Pacific Northwest, the natural gas industry is committed to supporting GHG abatement targets while also continuing to provide its customer with choices and solutions at a reasonable and predictable cost now and in the future. To that end, we are making investments in:

- Energy efficiency and demand-side management programs
- Replacing higher-carbon fuels for all possible uses (space and water heating, transportation, electricity generation) with cleaner alternatives such as RNG and hydrogen.[15]
- Efficient natural gas-fired generation plants to support intermittent renewable energy sources and meet peak demand
- An ever tighter natural gas delivery system

These actions will help maintain a healthy and diversified energy system across our region, ensuring system reliability and continuing to put North America's abundant, low-priced natural gas supply to good use, while still allowing opportunities to drive emissions lower through innovation.

–Contributor: Robert Schuster, FortisBC

[11] For a summary of potential implications of residential electrification, see https://www.aga.org/globalassets/research--insights/reports/a-thoughtful-pathway-towards-u.s.-emissions-reductions.pdf

[12] A study conducted by Washington State University found that methane emissions from natural gas local distribution systems throughout the U.S. are also declining. https://methane.wsu.edu/

[13] In BC, this includes investments in liquefied natural gas (LNG) systems to displace marine fuel oil in the international marine segment and to displace coal in Asian economies, with associated emissions reductions.

[14] Renewables alone will not make up projected regional power needs through 2030. See https://www.ethree.com/wp-content/uploads/2019/12/E3-PNW-Capacity-Need-FINAL-Dec-2019.pdf

[15] Decommissioned wind farm turbines are not recyclable, and already posing issues at landfills. See https://www.npr.org/2019/09/10/759376113/unfurling-the-waste-problem-caused-by-wind-energy