

# Emission Trends Associated with Natural Gas Liquids Supply

. For suppliers of natural gas liquids (NGLs), the reported CO<sub>2</sub> associated with NGLs supplied to the U.S. economy (i.e., ethane, propane, butane, isobutane and pentanes plus) has gradually increased from 211.4 million metric tons (MMT) in 2011 to 465.0 MMT in 2022. Except for a small decrease in 2013, the supply of NGLs has increased steadily every year with ethane and propane making up 70.9% by volume of the NGLs supplied each year by U.S. fractionators. [1]

The increase in reported NGL supply is due to increased production of natural gas in areas that are high in natural gas liquids, increased U.S. demand for NGL products, and increased exports. [2, 3, 4] Production capacity, however, decreased due to fewer fractionation plants reporting to GHGRP (114 plants in 2022 compared with 116 in 2011). The ratio of CO<sub>2</sub> to number of plants reporting has, therefore, increased from 1.85 MMT CO<sub>2</sub>/plant in 2011 to 4.1 MMT CO<sub>2</sub>/plant in 2022. Although the number of plants reporting in 2022 decreased from a high of 124 in 2020 to 114, the CO<sub>2</sub> per plant increased from 3.5 MMT CO<sub>2</sub>/plant in 2020 to 4.1 MMT CO<sub>2</sub>/plant in 2022. The year-over-year increases in the CO<sub>2</sub> emissions associated with NGLs were 11.7% for 2018 and 2019, 8.2% for 2020, 5.8% for 2021, and 1.5% for 2022. Domestic consumption of NGLs increased by 49.3% from 2.25 million barrels per day in 2011 to 3.36 million barrels per day in 2022. [4] Increases in ethane supply between 2017 and 2022 are in part a response to the completion of new petrochemical facilities in the U.S. that use ethane as a feedstock. [5] However, the increase in annual NGL production reported in recent years is driven primarily by increases in exports due to high international demand and expansion of U.S. export facilities through the construction of new pipelines and export terminals. [2, 3, 4]. The U.S. currently produces more NGLs than it consumes on an annual basis. Exports of NGL products increased from 0.25 million barrels a day in 2011 to 2.41 million barrels per day in 2022 (864% increase). [4] Although exports of all NGLs have increased over the decade, exports of propane have increased the most and make up the largest share of total NGL exports. Exports of propane increased from 0.30 million barrels per day in 2013 to 1.40 million barrels per day in 2022 driven by strong market demand in Asia. [3, 4]

The reported CO<sub>2</sub> for 2011 and 2012 are also affected by changes in the default emission factors. For suppliers of natural gas liquids, the default emission factors used for calculating the CO<sub>2</sub> for ethane, propane, butane and isobutene were revised in 2013. The default emission factors for propane, butane and isobutane were increased by a few percentage points over the factors used prior to 2013, while the default emission factor for ethane decreased by over 30 percent. The impact these changes had on the total CO<sub>2</sub> reported by an NGL fractionator depends on the mixture of products the plant supplies and whether the fractionator used the default value or a measured value. Since most NGL fractionators supply ethane, the reported CO<sub>2</sub> across the industry was lower beginning in 2013 than would have been reported if the factors had not been updated.

[1] U.S. Department of Energy, Energy Information Administration, U. S. Energy Information Administration/Petroleum Supply Annual 2022, Volume 1, Table 15. Natural Gas Plant Net Production and Stocks of Petroleum Products by PAD and Refining Districts, 2022, January 26, 2024. Available at: <https://www.eia.gov/petroleum/supply/annual/volume1/pdf/table15.pdf>.

[2] U.S. Department of Energy, Energy Information Administration, This Week in Petroleum, *In 2020, Increased Propane, Other HGL Exports Contribute to Continued Strong Product Exports Despite Reductions in Major Transport Fuels*, September 23, 2020. Available at: [https://www.eia.gov/petroleum/weekly/archive/2020/200923/includes/analysis\\_print.php](https://www.eia.gov/petroleum/weekly/archive/2020/200923/includes/analysis_print.php).

[3] U.S. Department of Energy, Energy Information Administration, *The United States Exported More Propane than Distillate in 2020*, March 8, 2021. Available at: <https://www.eia.gov/todayinenergy/detail.php?id=47036>

[4] U.S. Department of Energy, Energy Information Administration, *Hydrocarbon Gas Liquids Explained: Imports and Exports of Hydrocarbon Gas Liquids*, December 26, 2023. Available at: <https://www.eia.gov/energyexplained/hydrocarbon-gas-liquids/imports-and-exports-of-hydrocarbon-gas-liquids.php>.

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