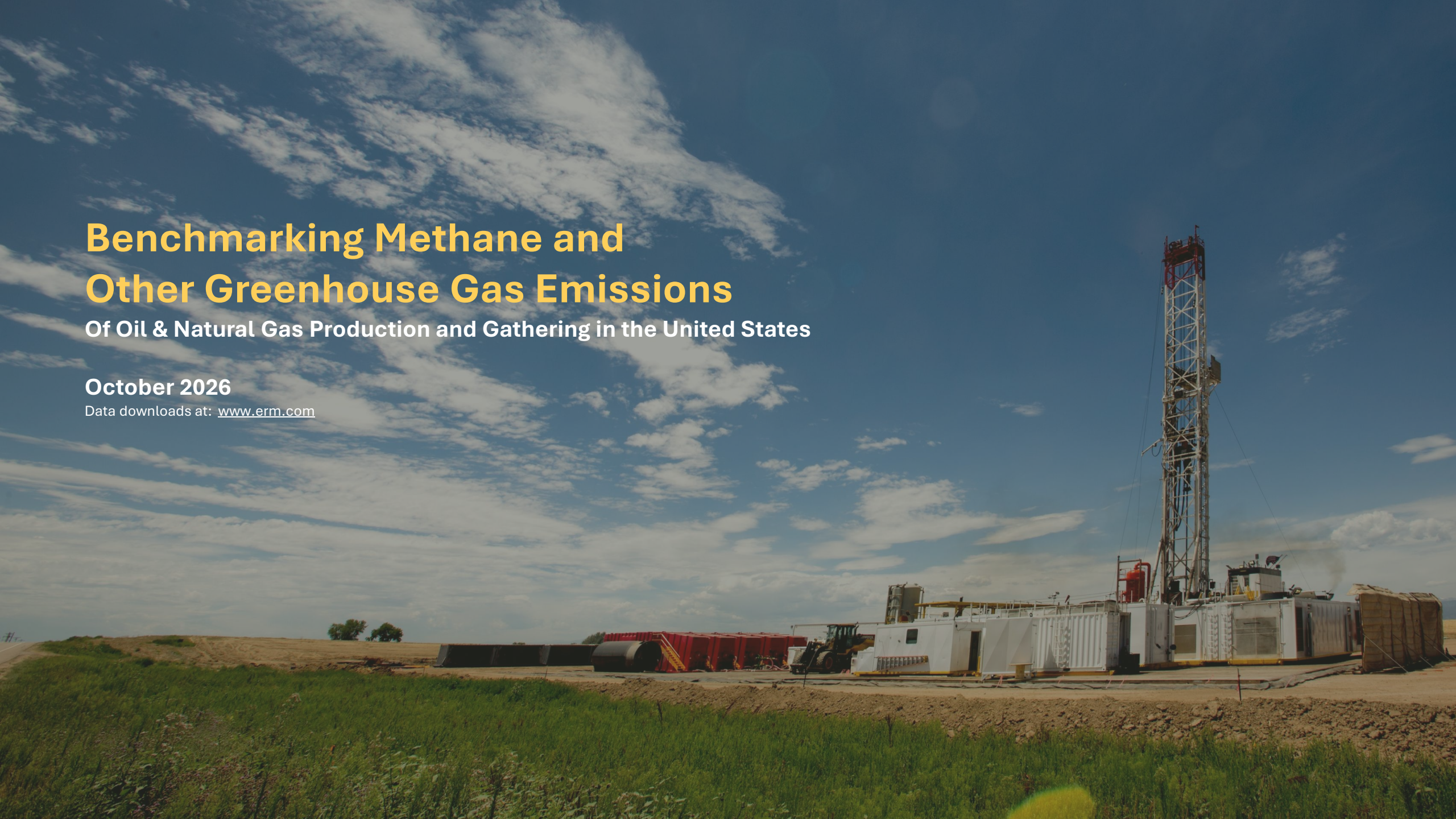

Benchmarking Methane and Other Greenhouse Gas Emissions

Of Oil & Natural Gas Production and Gathering in the United States

October 2026

Data downloads at: www.erm.com

Acknowledgements

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Data used in this report can also be accessed via an interactive data platform hosted at www.erm.com.

The information analyzed in this report was gathered from publicly available sources. ERM did not independently verify this information; and, therefore, ERM does not represent or warrant that the information contained in this report is accurate, sufficient or appropriate for any purpose. This report should not be construed as an invitation or inducement to engage or otherwise participate in any transaction, to provide any financing, or to make any investment. Under no circumstances may this report or any extract or summary thereof be used in connection with any public offering of securities or included in any related memorandum or prospectus for any public offering of securities or stock exchange listing or announcement.

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A standalone document with the data and charts from this report for the 2023 reporting year is available for download here.

Key Findings

- Reported EPA data show that methane and GHG emissions intensities from onshore production and gathering & boosting (G&B) operations continue to decline. These reductions in intensities are the result of both a drop in emissions and an increase in natural gas and total hydrocarbon production and throughput. One exception to this is total GHG emissions from G&B operations, which have risen due to increased combustion-related emissions from the expansion of gathering networks. However, these trends are not consistent across basins or individual companies and can fluctuate year to year.
- Emissions and production and throughput are highly concentrated among a small number of companies. For example, in the production segment in 2024, five companies out of 268 were responsible for over 25% of total hydrocarbon production (more than the combined production of the 233 lowest-producing companies). Furthermore, six companies were responsible for 25% of total reported GHG emissions (more than the combined emissions of the 209 lowest-emitting companies).
- There is no consistent relationship between production and emissions intensity; while the top five producers account for over 18% of methane and 17% of GHG emissions in the production segment, the combined throughput-weighted intensities across these five companies are one-third of that of the 233 lowest-producing companies. There is less variation in methane intensity across G&B companies, but larger companies (by transported energy) generally have lower GHG intensities.
- The methane and GHG emissions intensities of hydrocarbon production and throughput vary dramatically across companies. Natural gas production/G&B companies in the highest quartile of methane emissions intensity have an average emissions intensity that is over 30/23 times higher than producers/gatherers in the lowest quartile of methane emissions intensity. Oil and gas producers/gatherers in the highest quartile of GHG emissions intensity have an average emissions intensity that is over 13/12 times higher than oil and gas producers/gatherers in the lowest quartile.
- CO_2 is the main source of GHG emissions across the production and G&B segments, representing 81% of total CO_2e. CO_2 emissions significantly outweigh methane emissions in the G&B segment, where they are responsible for 85% of total reported GHGs compared to 76% in the production segment.
- Methane emissions from production-segment pneumatic devices declined 56% 2023-2024, due in part to changes in the methodology used to calculate emissions. Pneumatic devices remained the largest source of methane emissions in the production segment in 2024, where they made up 50% of total reported methane emissions. Equipment leaks were the largest source of methane in the G&B segment (26%).

Benchmarking Methane and Other GHG Emissions

Of Oil & Natural Gas Production and Gathering in the United States

Download detailed data from the 2026 Benchmarking GHG Emissions report at: www.erm.com

Oil and Gas Production in the United States

The oil and gas production sector in the United States includes a wide array of companies that produce hydrocarbons from diverse geographies and geological formations. For 2024, companies reported to the U.S. Environmental Protection Agency (EPA) information on nearly 520 thousand onshore wells which together produced 40 trillion cubic feet of natural gas and 3.8 billion barrels of oil. Onshore oil and gas production reported under EPA's Greenhouse Gas Reporting Program increased 4.3% and 1.8%, respectively, from 2023 to 2024.

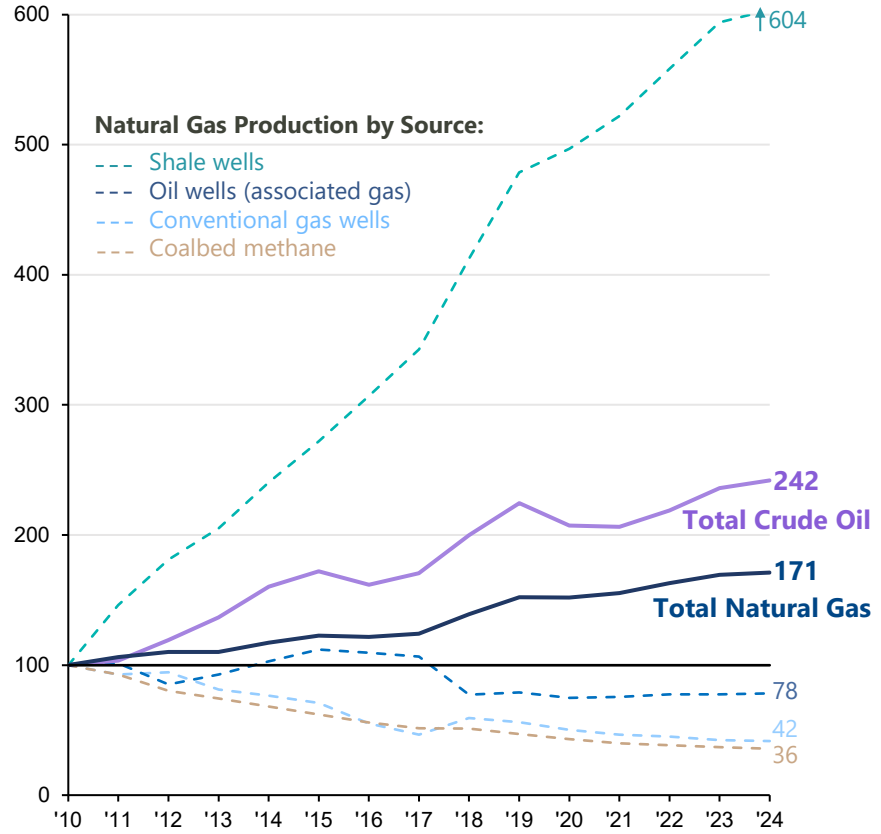
Background

Over the last decade, rising U.S. hydrocarbon production and concern over climate change has brought increased attention to methane and greenhouse gas (GHG) emissions from the oil and gas supply chain. In addition, a well-established body of research indicates that total methane emissions associated with oil and natural gas operations are higher than those reported in official inventories. A wide range of stakeholders, including oil and gas operators, policymakers, environmental organizations, and financial institutions, are interested in better understanding industry-wide and company-specific emissions trends. At the same time, natural gas purchasers are increasingly focused on supply-chain GHG emissions transparency and sourcing gas differentiated by lower associated GHG emissions. Oil and gas companies that minimize and most effectively manage their emissions will be better positioned to meet emerging regulatory requirements and market expectations.

The 2026 Oil & Gas Benchmarking Report uses publicly available data to develop comparable metrics that highlight the GHG performance of onshore oil and gas operators in the U.S. The report uses data reported to EPA under subpart W of the Greenhouse Gas Reporting Program (GHGRP) and data calculated from assumptions in EPA's annual Greenhouse Gas Inventory (GHG Inventory).* The report focuses on the onshore oil and natural gas production and gathering & boosting segments and does not include emissions or production from offshore operations or other midstream or downstream segments of the oil and gas supply chains.

This report references 2024 throughput and emissions data, and includes throughput and emissions trends for 2015 to 2024. A separate appendix to this report includes standalone 2023 data for many of the charts and tables in the main body of the report (a 2025 report focusing on 2023 emissions was not released).

U.S. Hydrocarbon Production
(Indexed; 2010 = 100)



Data Year and Company Operations

This report focuses on 2024 data, the most recent year for which data are currently publicly available. It is important to note that current company production, throughput, and emissions may be different for individual facilities and companies due to operational changes and changes in asset ownership.

*For simplicity, the emissions captured in this report are referred to as "reported emissions."

Introduction and Overview of Oil & Gas Data

Data on U.S. oil and gas facility throughput and air emissions are available to the public through several databases maintained by state and federal agencies. Publicly-traded and privately-held oil and gas production and gathering & boosting (G&B) operators are required to report hydrocarbon production, throughput, and GHG emissions data under EPA's GHGRP for any basin in which their annual GHG emissions exceed 25,000 metric tons of carbon dioxide equivalent (CO_2e). In this report, these data are combined for companies operating in multiple basins and presented such that company-level comparisons can be made across U.S. onshore operations.

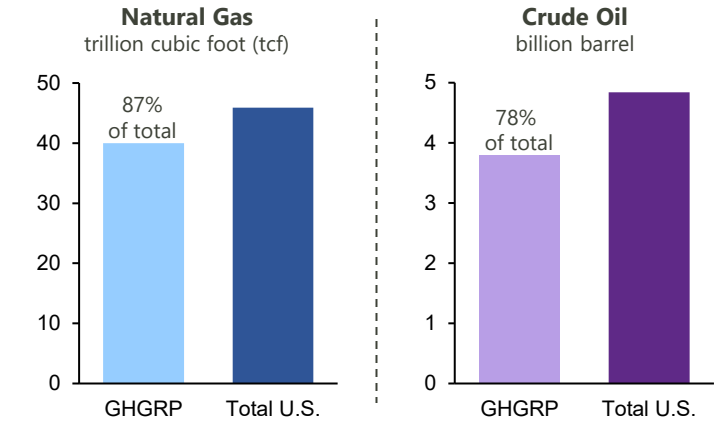
The Oil & Gas Benchmarking Report facilitates the comparison of emissions performance by using reported throughput and emissions data to calculate methane and GHG emissions intensities and presenting this information and source data in a graphical format that aids in understanding and evaluating the data. The report is intended for a wide audience, including oil and gas industry executives, oil and gas operators, environmental advocates, financial analysts, investors, journalists, and public policymakers.

Detailed information on the data sources and methodologies used in this report, including the various emission intensity equations, can be found in the Data Sources & Methodology section. Basin-and company-specific values in this report may differ from those in the GHGRP database due to corrections to facility ownership, as well as GHGRP data resubmissions that were filed after the primary data source for this report was released (see 2024 data discussion on page 9). Further, data in this report may also differ from company disclosures as this report assigns hydrocarbon production and throughput volumes based on facility equity ownership reported to EPA, while companies may report certain data based on operational control.

Global Warming Potential (GWP)

This report uses 100-year GWPs from the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (AR6; see page 232). The 2021 version of this report used GWPs from the Fifth Assessment Report, which were current at the time of publication. While data for all years in this report and the online data dashboard use AR6 GWPs, the emissions data in this written report cannot be directly compared with the emissions data in the 2021 written report. Note that the CO_2e values in this report also differ from those published in EPA's GHGRP database, as the GHGRP currently uses GWPs from the Fifth Assessment Report.

2024 Hydrocarbon Production
GHGRP vs. Total U.S.*



*Source: U.S. EIA

Relative Scope of Data Analyzed (2024)

- Onshore oil and gas production reported to the GHGRP represents 78% of total U.S. annual oil production, and 87% of total U.S. annual gas production
- Reported onshore production segment methane represents 33% of total methane reported under subpart W
- Reported onshore production segment CO_2e represents 36% of total CO_2e reported under Subpart W
- Oil and gas production reported to GHGRP as a percent of total U.S. oil and gas production slightly increased from 2023-2024

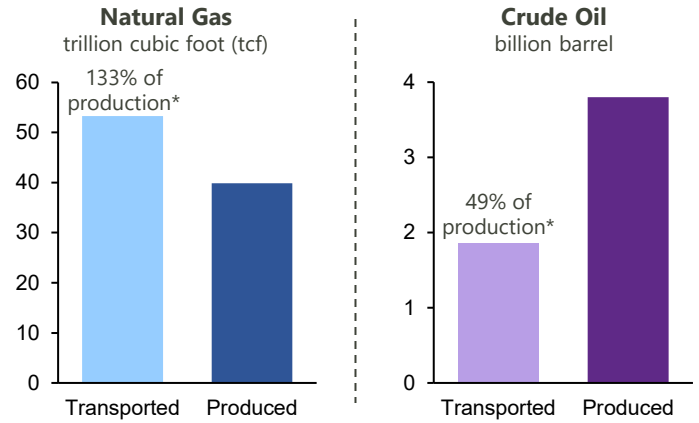
Gathering & Boosting Segment Data

This year's report includes data from the G&B segment for the first time. The G&B data in this report are presented in two different ways: as standalone G&B segment data and as combined onshore production and G&B data. While this report's methodology allows for comparison of operator emission performance, there are a number of factors that impact individual operator emissions and throughput, and thus emission intensity, across onshore production, G&B, and combined onshore production and G&B operations. These factors and context are important to consider when evaluating the performance of companies within and across segments.

- Companies operating across both onshore production and G&B may design infrastructure differently. For example, one company may choose to install compression on the well pad, where emissions are reported in the production segment, while others may concentrate compression at a standalone gathering station, where emissions are reported under the G&B segment. These differences may lead to increases or decreases in emissions and corresponding emission intensities for individual segments.
- Companies operating in both the onshore production and G&B segments may operate differently across basins. For example, in one basin they may produce and gather, in another they may produce but use third-party gatherers, and in another they may only have G&B operations that take hydrocarbons from other producers. Additionally, in basins where they operate in both segments, these companies may not gather all of the hydrocarbons they produce, or they may gather more hydrocarbons than they produce.
- The build out of gas gathering capacity in oil producing regions impacts the distribution of emissions. When pipelines are built, associated gas that was previously flared can be sent to market. While this has overall benefits both environmentally and economically, it also shifts emissions, leading to a decrease in production segment GHGs and an increase in G&B segment GHGs.

The combined onshore production and G&B intensities presented in this report are standalone metrics created to compare the performance of companies operating in both segments. **These intensities should not be used as a point of comparison outside of this report to intensities calculated under other protocols or methodologies. Relatedly, the segment-specific onshore production and G&B intensities of companies with operations in both segments are not additive and should not be summed**. For more information on the combined production-G&B metrics, see page 238 in the methodology.

2024 Transported vs. Produced*
GHGRP



*Data reported to GHGRP; not reflective of total U.S. oil/gas production (see page 6)

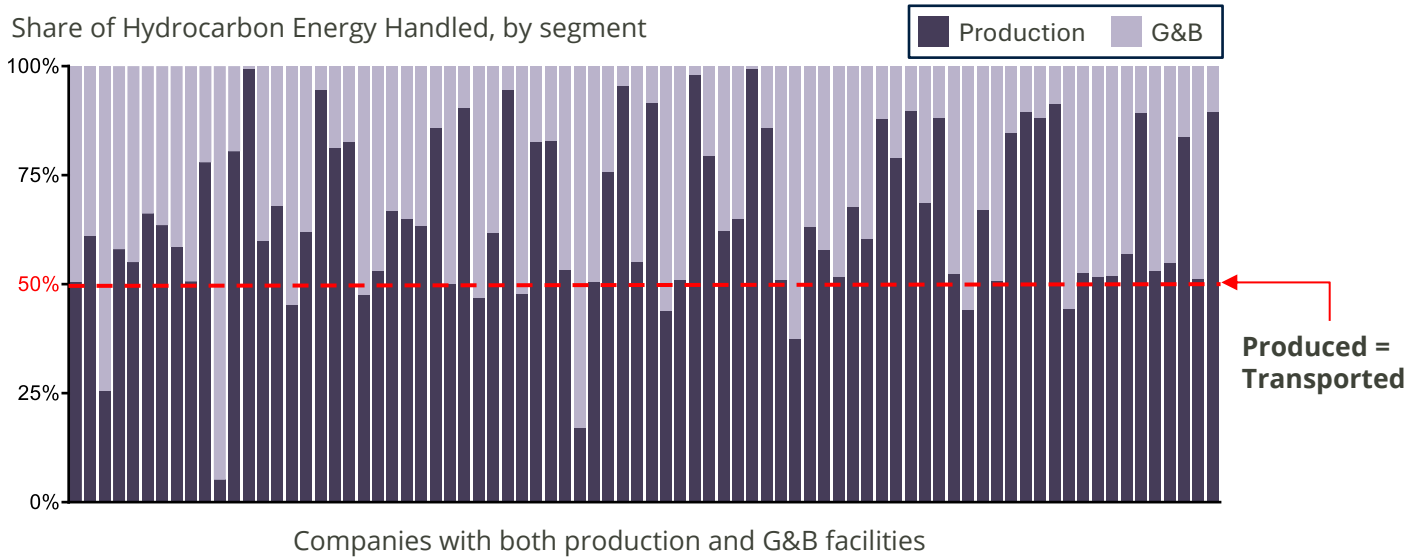
GHGRP Production and G&B Throughput Volumes

- Gas volumes transported by G&B facilities are greater than total produced volumes due to the same gas flowing through multiple G&B facilities, as well as G&B facilities transporting gas produced by smaller facilities that do not report under GHGRP because they are below the reporting threshold
- Subpart W transported oil volumes are lower than produced oil volumes because oil may be collected by liquids gathering systems that do not report under subpart W or trucked from the wellsite.

Interpretation of Combined Segment Intensity Metrics

Industry groups and organizations have developed multiple methodologies for calculating emissions intensities across multiple segments of the oil and gas supply chain, and individual oil and gas companies may report intensity values based on one or several of those methodologies in their public disclosures. For example, certain companies with integrated operations across the production and G&B segments may normalize combined emissions from both segments by production volumes, only, to calculate emissions intensity. However, many of these metrics are best applied to companies with roughly equal throughput volumes in production and G&B. To expand this benchmarking exercise beyond the minority of companies that produce and transport similar volumes of hydrocarbons, this report utilizes an approach that also supports the comparison across companies with much higher throughput in one segment than the other. This report presents "combined" intensity values that account for the difference in throughput of each segment and provide metrics that reflect the relative magnitude of a combined company's emissions profile. **Because these throughput-weighted intensity values have been developed to directly compare company performance within the boundaries of this report, these values should not be referenced independently and cannot be compared to combined segment intensity values outside of this report that are calculated using different methodologies.** Please refer to the "Combined Production and Gathering & Boosting Segment" slides for more details and considerations.

Variability in Segment-Level Hydrocarbon Throughput
by companies with both production and G&B facilities



Intensity metrics that normalize combined production and G&B operations based on produced energy (i.e., production and G&B emissions divided by production) are generally appropriate for integrated companies that gather most or all of their own production. **This only applies to a subset of companies; across the 80 companies with operations in both segments assessed in this report (2024), less than one-fifth have segment-level hydrocarbon energy throughputs that are within 10% of each other.**

For companies with significantly more throughput in one segment than the other – or with standalone production or G&B facilities in a given basin – normalizing by produced energy can result in intensity values that are over- or underestimated due to inconsistent denominators. The combined segment intensities used in this report allow all companies with operations in both segments to be directly compared while accounting for the relative scale and emissions performance of operations in each segment.

2024 Data Discussion

Data Source

The data in this report are primarily sourced from information oil and gas companies report to EPA under subpart W of the GHGRP. Historically, EPA has released subpart W data for the previous calendar year in October. In September 2025, EPA proposed to rescind the GHGRP for most industries and delay reporting for nine of the ten subpart W industry segments until 2034 (EPA proposed to end reporting for the natural gas distribution segment altogether). Following this proposal, EPA never released the 2024 GHGRP data, including the subpart W data that forms the foundation of this report.

In March 2026, the Environmental Integrity Project (EIP) publicly released 2024 subpart W data, which it had obtained from EPA via a Freedom of Information Act (FOIA) request. The 2019-2024 subpart W data used in this report are sourced from the EIP data release. Each year for this report, ERM retroactively updates historic reporting year data based on the current EPA data set. Because companies often submit data corrections and updates for previous reporting years, using the most recently released EPA dataset ensure these resubmissions are captured in this report. Similarly, the data released by EIP includes updates to pre-2024 reporting year submissions, which is why the FOIA data are used for all possible data years and not just 2024. The 2015-2018 subpart W data in this report is from EPA's current Envirofacts database, as the EIP release only contained 2019-2024 data.

While the 2024 subpart W data has not been publicly released by EPA, EPA has indicated that the information in the FOIA release has undergone all of the validation and data checks that EPA regularly conducts before publicly releasing GHGRP data. Further, EPA has confirmed that the data released by EPA contains all of the subpart W data submitted by reporters (except confidential business information), including data associated with new "empirical data" calculation methodologies that some operators chose to voluntarily use for the 2024 reporting year. Based on this information, the subpart W data released by EIP should be identical to any data that would have been published by EPA in its Envirofacts database. For several companies, the 2024 subpart W data in this report differs from the data in the EIP release. There are two possible reasons for these differences: 1) the operator provided ERM with updated data that were resubmitted to EPA after the EIP FOIA release, or 2) the parent company assignments reported to EPA were incorrect and did not reflect 2024 year-end facility ownership. More information on these changes are provided in the methodology on page 235.

Time Series Trends

EPA's 2024 subpart W revision rule expanded reporting to additional emission sources and introduced new "empirical data" reporting methodologies incorporating direct measurement. While these new requirements did not go into effect until the 2025 reporting year, EPA allowed reporters to voluntarily use new methodologies for sources with existing reporting requirements in their 2024 calculations. Many operators elected to use one of the direct measurement methodologies to calculate methane emissions from natural gas pneumatic devices in 2024 instead of the existing default emission factor approach. This methodological change contributed to a significant drop in methane emissions from pneumatic devices.

Past versions of this report have shown subpart W trends beginning with the 2015 data.* **Because different methodologies were used to calculate 2024 subpart W emissions, these data cannot be directly compared to historic subpart W emissions data. While this report presents trends through 2024 for completeness and convenience, all 2024 emissions bars in trend charts are hashed to indicate that the 2024 data must be considered separately from the rest of the time series.**

* The first year for charts displaying G&B data trends is 2016, which is the first year in which subpart W reporting applied to the G&B segment.

2015-2024 Trends Analysis

Year-over-year changes in emissions, production, and intensities are driven by a variety of factors. These factors can result in both increases and decreases to company- , basin-, and national-level metrics. The reasons for changes may not be able to be determined by analysis of the GHGRP data alone, and company-specific trends often need additional narrative and context to explain the causes of annual variability. This report presents national trends as well as basin trends for the largest hydrocarbon producing basins. Data for all other basins and individual companies are available in the online dashboards.

The factors driving annual trends fall into several categories:

Operational Changes. Operational changes reflect tangible changes captured within the GHGRP methodology and include updates to technologies, practices, and activities. These could include deployment of new systems and strategies to mitigate emissions, such as conversion to non-venting pneumatic devices or installation of gas capture systems (e.g., vapor recovery units) on sources that previously vented emissions. Operational changes also include increases and decreases in hydrocarbon production or throughput, which could be the result of multiple factors (e.g., new well completions, recompletions, natural production declines). New, high-producing wells can also drive down emissions intensities, as increased production initially outpaces resulting emissions. Activity can also reduce emissions from certain sources while increasing emissions from other sources. For example, the build-out of gas gathering infrastructure in oil-rich basins may reduce emissions from associated gas venting and flaring, but increase emissions from compression equipment at production or G&B facilities.

Structural Changes. Structural changes include acquisitions, divestments, and mergers that affect company size. These types of changes can lead to significant year-over-year variation in throughput and emissions at the company level as throughput and emissions shift from one company to another. Total production and emissions as measured at the basin or national level are not affected by structural changes, unless such changes result in assets moving from GHGRP reporters to non-reporters, or vice versa. It is important to note that due to the lag in data disclosure, the most recently available company data (i.e., 2024) may not reflect current asset ownership.

Methodological Changes. Methodological changes are changes to the way companies estimate emissions within the GHGRP's prescribed calculation methodologies. For example, several approaches use equipment operating hours as an input to the emissions calculation equation. Different interpretations of how to apply the operating hour factor can lead to inconsistency across companies, while inconsistent application of the factor year-over-year results in fluctuating emissions within a company or facility. These types of changes are the result of changes to the methodology used to calculate emissions rather than operational changes. Changes in emissions identified as resulting from methodological revisions must be carefully scrutinized.*

Boundary Changes. Boundary changes are related to the GHGRP's annual reporting threshold of 25,000 metric tons CO_2e. As facilities exceed or fall below this threshold, they will be captured or dropped from the EPA dataset. For example, a facility that began operations in 2021 and ramped up production in 2022 may be included in the 2022 data but not the 2021 data. Similarly, if assets are sold to smaller firms that do not meet the reporting threshold, emissions associated with those assets may no longer be reflected in the GHGRP.

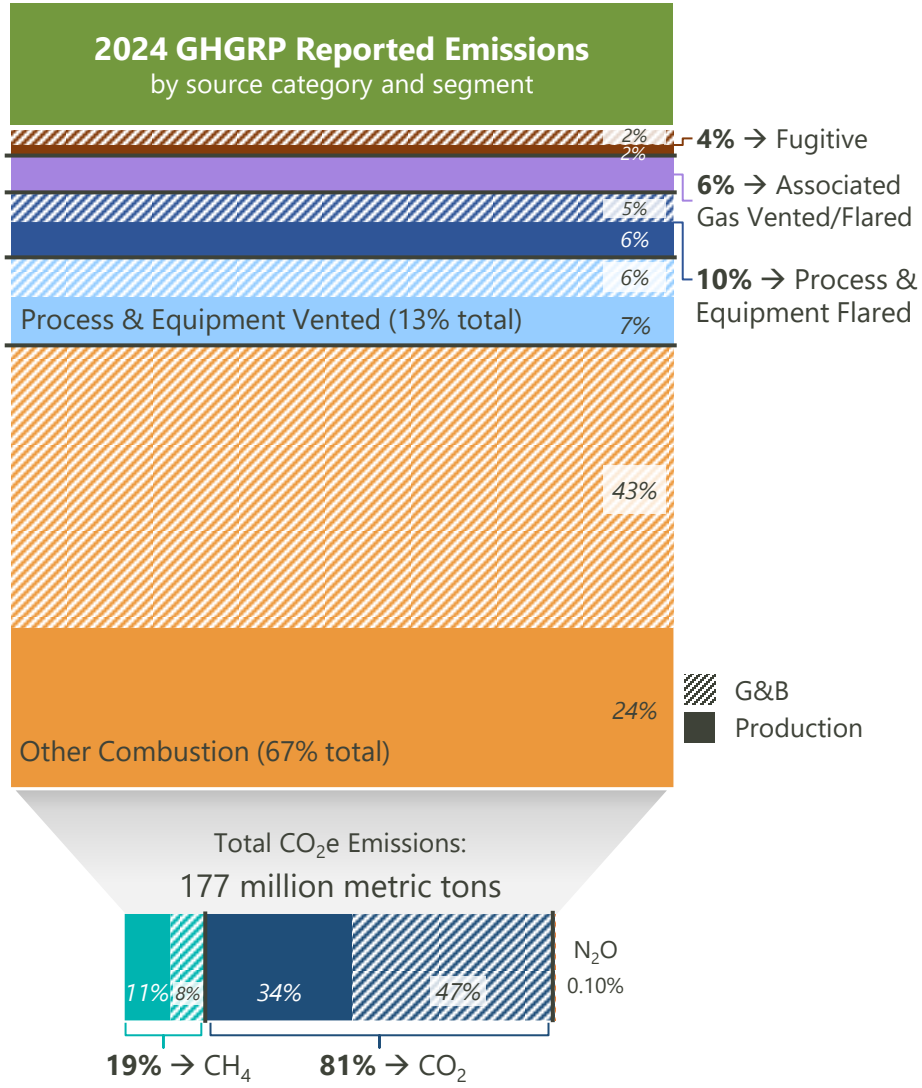
* As previously described, 2024 data must be considered separately from pre-2024 data; consequently, 2024 data bars in emissions and intensity trends charts have been hashed.

Types of Emissions Associated with Oil & Gas Operations

The GHGRP includes reporting on emissions from 18 emissions sources (see page 229) across the onshore production and G&B segments. In addition, this report attributes emissions associated with six additional sources that are estimated at the national level by EPA in the GHG Inventory, but not included in GHGRP (see page 230). The relative contribution of GHG emissions from oil and gas production can vary widely by both type of gas and emissions source. Factors influencing the relative contribution of emissions include geology, targeted hydrocarbons (e.g., dry gas vs. wet gas), available infrastructure, and company policies and practices.

For purposes of comparison within this report, emissions sources are grouped into five categories:

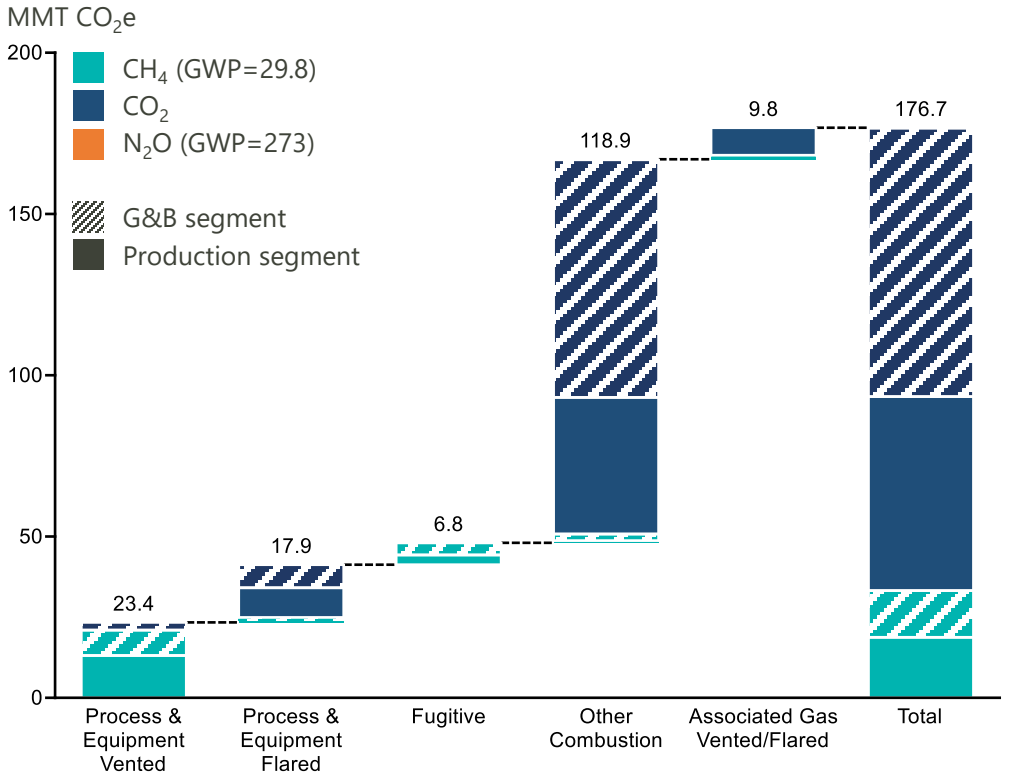
- **Process & Equipment Vented** Vented emissions are intentional releases of natural gas from equipment and processes. Common sources of vented emissions include gas-driven pneumatic devices, compressor seals, tanks, and liquids unloading.
- **Process & Equipment Flared** Flared emissions consist primarily of CO_2 from the combustion of gas that is captured from equipment and processes. Flaring also results in methane emissions from uncombusted gas that escapes through the flare stack.
- **Associated Gas Vented & Flared** Associated gas vented and flared emissions occur at oil wells that do not capture a portion or any of the gas that is produced alongside oil. The gas is directly released to the atmosphere or combusted in a flare rather than captured for sale, on-site use, or reinjection. Note that associated gas emissions only occur in the onshore production segment.
- **Fugitive** Fugitive emissions are unintentional releases, or leaks, of natural gas. These emissions are often caused by faulty or worn-out equipment. Sources of fugitive emissions include seals and cracks on equipment such as tanks and piping, and leakage from infrastructure components such as valves and connectors.
- **Other Combustion** Non-flaring combustion is a significant source of CO_2 emissions from oil and gas production. Diesel and natural gas engines used to power equipment and provide electricity represent the largest source of other combustion emissions. Other combustion also includes methane emissions from uncombusted gas in engine exhaust.



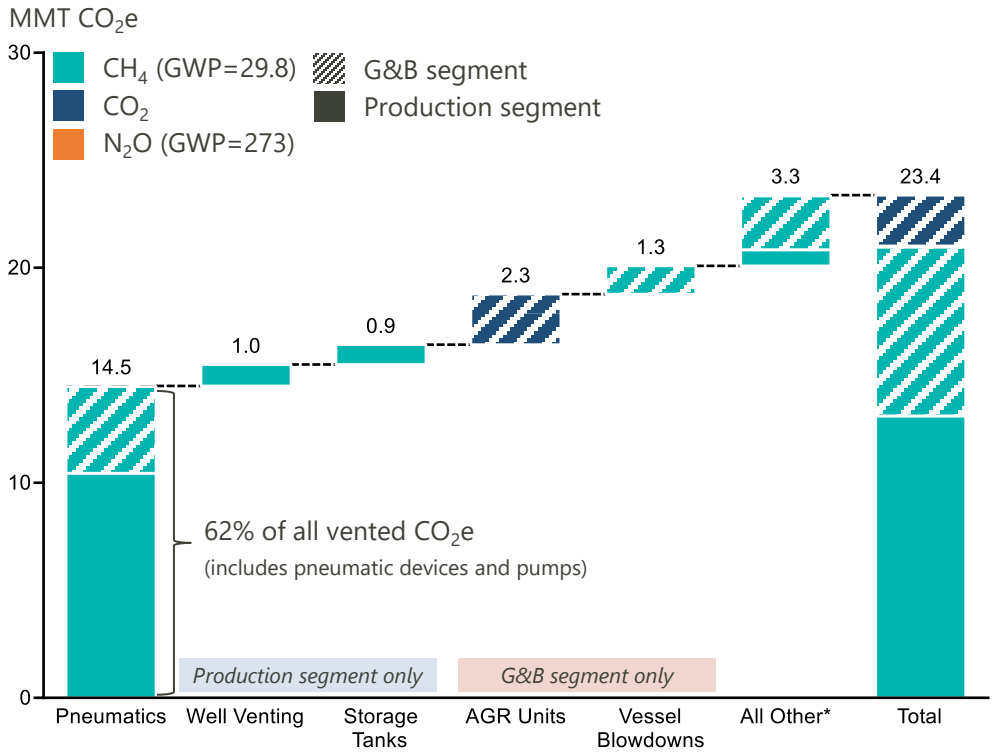
Sources of Emissions

Process and equipment vented, and fugitive methane emissions make up approximately 83% and 17% of the total methane and GHG emissions, respectively, reported across all sources included in this report. Pneumatic devices are the largest source of reported methane emissions.

2024 Reported Production and G&B Emissions
by source category and segment; million metric ton CO_2e (MMT CO_2e)



2024 Reported Process & Equipment Vented Emissions
by source and segment; million metric ton CO_2e (MMT CO_2e)



*Includes: Centrifugal compressors, Completions/workovers, dehydrators, reciprocating compressors, compressor blowdowns and starts, well drilling, pressure relief valves, well testing, acid gas removal units (production segment), well venting (G&B), and storage tanks (G&B)

Challenges Associated with Estimating Oil & Gas Emissions

The GHGRP currently represents the most robust and comprehensive inventory of company-level GHG emissions from the oil and gas industry. By applying a uniform emissions calculation methodology across all reporting companies, it creates a dataset that can be used to directly compare company-level data and identify historical trends. As noted earlier, the emissions in this report also include sources that are not included in the GHGRP but that can be estimated using emissions factors from the GHG Inventory. However, there are important limitations users should keep in mind when reviewing the data:

- **GHGRP emissions factors do not represent actual emissions**. The use of emissions factors to estimate total emissions relies on the emissions factor being representative of average emissions for a given activity. This approach can be effective where there is robust data on emissions per unit of activity. For example, automobile emissions are routinely and reliably estimated using emissions factors despite the fact that emissions from a single vehicle may be different than predicted by an emissions factor. With a diversity of emissions sources and the presence of low-frequency, high-emissions events, the use of emissions factors is significantly less reliable in the oil and gas sector, and typically underestimates actual emissions from a number of sources.
- **Emissions from facilities below GHGRP reporting threshold not included.** Emissions from facilities below the GHGRP's reporting threshold of 25,000 metric tons CO_2e/year are not included in this analysis. Because the GHGRP does not capture facilities responsible for 22% of oil production and 13% of gas production, emissions associated with that portion of oil and gas production activities are not reported to EPA or included in this analysis.
- **Emissions source definitions from production and gathering & boosting activities inconsistently applied**. GHGRP requires companies to report emissions from production sources separately from gathering & boosting sources. However, the line between these two activities may be unclear and sometimes overlaps. Thus, companies must decide which section of the GHGRP is appropriate for reporting each source, and the decision is not uniform among all companies. As a result of these inconsistencies, emissions reporting boundaries may vary from company to company across segments.
- **Emissions from certain sources not covered by GHGRP.** Companies are not required to report emissions from certain equipment and processes. Estimated emissions from some of these sources are included in this analysis by applying GHG Inventory emissions factors to GHGRP reported activity data, as described in the methodology (see page 230).
- **Some emissions reduction activities not included.** Many producers implement work practices to reduce emissions and, in some cases, separately report these reductions through voluntary programs. However, unless the practices result in the use of a lower emissions factor (e.g., the replacement of pneumatic devices) or changes in activity data, these reductions may not be incorporated into reported GHGRP data and thus not accounted for in this analysis.
- **Abandoned infrastructure not included.** Research has highlighted that abandoned oil and gas wells are a significant source of methane emissions. These sources are not reported under the GHGRP and represent another source of the industry's GHG emissions that are not accounted for in this report. As a result, if companies are responsible for significant amounts of abandoned infrastructure, emissions from that infrastructure will not be captured in this report.
- **EPA flags on GHGRP data not considered.** EPA may include a flag on company data to indicate that some of its verification requirements have not been met. Reports can be flagged because the facility has not provided an acceptable explanation for the potential error identified in their report, has not submitted a revised report to correct the potential error, or has submitted a revised report that does not resolve the error or contains new potential errors. However, EPA does not specify the specific reason for flagging individual facilities, and these flags are not considered in this analysis.

Methane Detection and Quantification Methods

A growing number of advanced technologies that detect and measure methane emissions are being developed and deployed by operators and industry stakeholders. However, no single method is suitable for all applications; different technologies and platforms provide complementary information at a range of spatial and temporal scales. Multiple methods can be employed to mitigate shortcomings of an individual technology or deployment platform's capabilities. Observed measurements can be further analyzed in conjunction with operational information (where available) to better understand the nature of detected methane emissions.

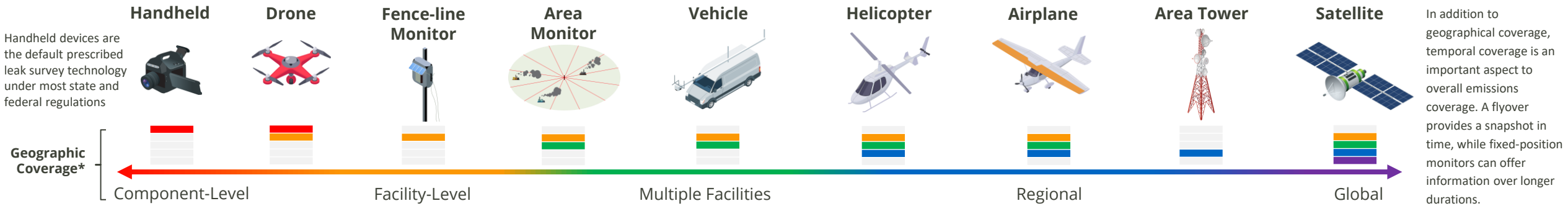
Technologies for methane detection and measurement have progressed rapidly. A portfolio of methods can reliably detect the presence of methane emissions events over a wide range of emissions rates. However, quantification techniques – estimating the amount of methane emissions associated with these measurements – can still have large uncertainties. Quantification methods often involve analyzing and interpreting observed methane concentrations alongside environmental data (such as wind speed and direction) to estimate an emissions rate (e.g., kg/hr) for the observed emissions source. This rate may then be extrapolated over the desired temporal or spatial scale, depending on the type of data collected. This process, particularly converting remote atmospheric measurements into an estimated emissions rate, is a major contributor to the quantification uncertainties.

EPA Alternative Test Methods

EPA's 2024 New Source Performance Standards and Emission Guidelines (NSPS/EG) for Oil and Natural Gas Operations provide operators the opportunity to use advanced monitoring technologies to meet certain requirements. This was intended to facilitate adoption of state-of-the-art detection methods for emission sources. EPA must approve applications from technology providers before oil and gas operators may use the Alternative Test Method (ATM). Advanced methane detection technology is permitted for applications like periodic screening, continuous monitoring, and/or super-emitter detection.

Technology providers and oil and gas operators may submit requests for alternative test methods to demonstrate the performance of advanced methane detection technologies. At the time of writing, eighteen different methods have been approved from fifteen different providers. Notably, while EPA's 2024 revisions to subpart W allowed for use of additional direct measurement approaches to quantify methane emissions, the final rule did not allow for the use of advanced quantification technologies due to the uncertainty associated with their use. Advanced technology is therefore currently allowed to detect methane emissions under the NSPS/EG rules, but not quantify methane emissions under subpart W.

Advanced Emissions Detection and Quantification Platforms



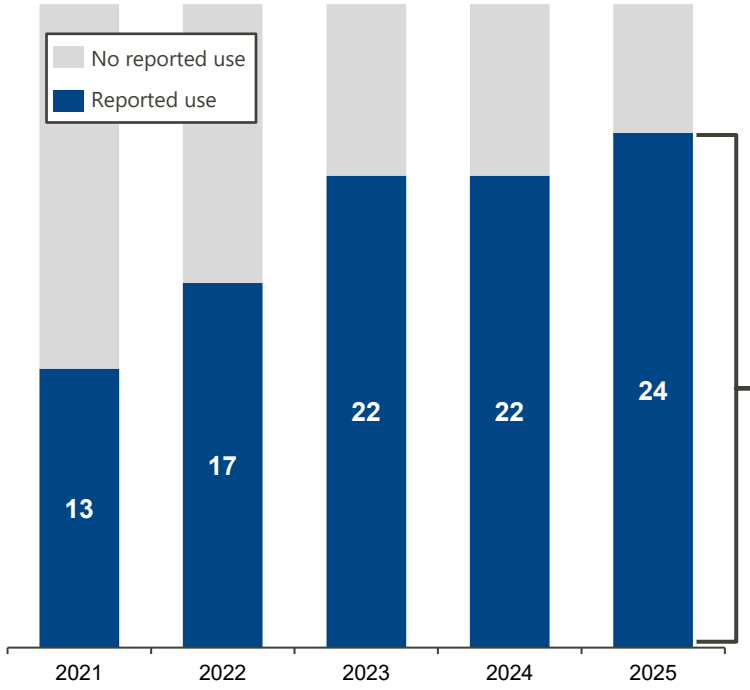
*Geographic coverage of platforms is for illustrative purposes. Coverage of individual technologies and emissions detection resolution varies across platforms.

Methane Detection and Quantification Methods

Companies are making use of these new methane technologies to varying degrees. A review of public disclosure material among the top thirty gas producers in the U.S. onshore production segment shows that at least 80% of these companies are employing at least one type of advanced detection technology platform. This number has risen steadily over the past five years.

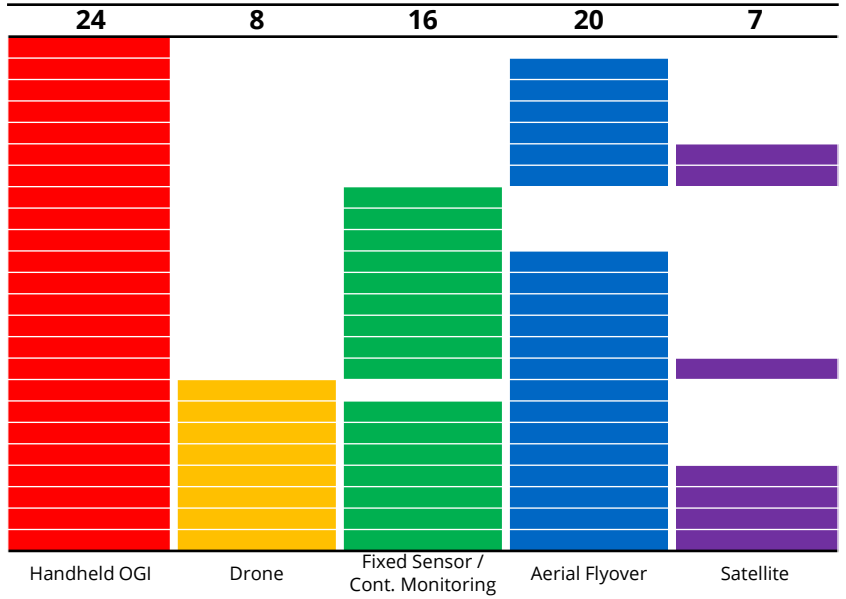
Reported use of advanced methane detection technology*
Top 30 gas producers (2025)

Companies reporting use of any technologies (of top 30)



*Analysis based on review of the public disclosures of the 30 largest natural gas producers in the 2024 subpart W data; companies may be deploying technologies even if they are not included in public disclosures.

Companies reporting use of specific technologies
Each row corresponds with a specific producer



Methane Detection Technology

As the default option to fulfill certain regulatory requirements, handheld optical gas imaging (OGI) cameras are often used in leak detection and repair (LDAR) programs and are the most widely implemented methane detection technology across companies. Aerial flyover observations (manned) and stationary fixed sensors are also commonly used.

Public disclosures rarely detail the extent of technology implementation, but deployment can range significantly, from individual pilot projects to widespread use capturing the majority of a company's facilities in some or all of their operating basins.

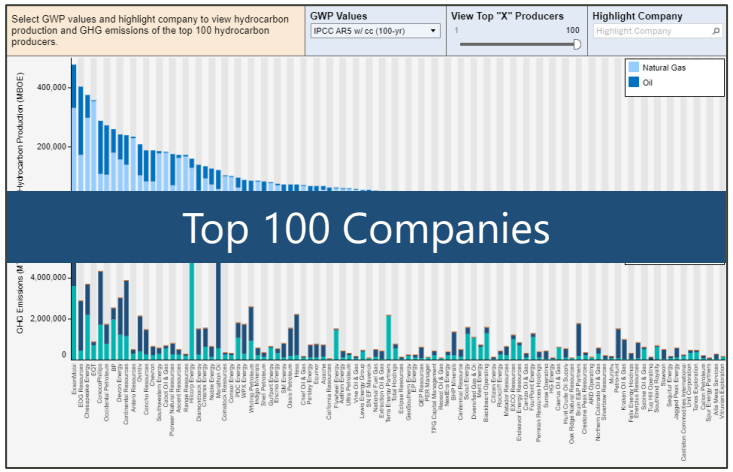
Benchmarking Analytical Resources

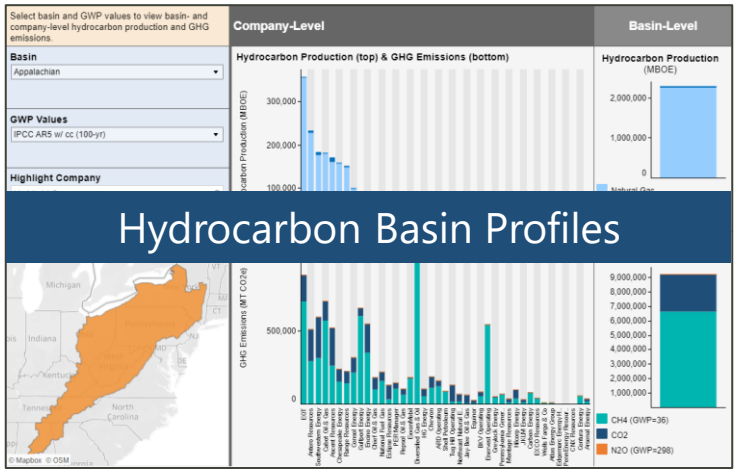
The Oil & Gas Benchmarking Report includes a series of interactive, web-based dashboards to further visualize GHG emissions from oil and gas production and gathering & boosting companies and basins in the United States. These tools provide insight into how company- and basin-level emissions and emissions intensity vary as well as information on the types of sources that contribute to GHG emissions.

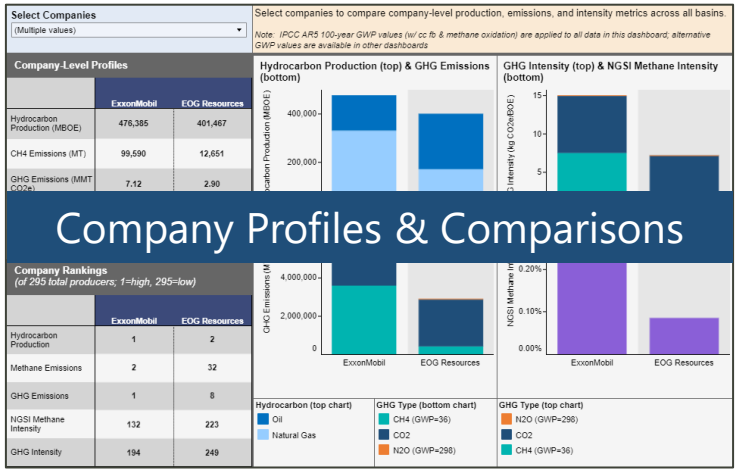
The online resources include data for all companies and basins in the GHGRP database, including those not highlighted in this report. Data dashboards include:

- **Top 100 Producers and Gatherers:** Oil and gas production, gathering & boosting throughput volumes, source-specific emissions, and emissions intensities of the top 100 hydrocarbon production and gathering & boosting companies, with additional company rankings of other key metrics;
- **Hydrocarbon Basin Profiles:** Production, throughput, detailed emissions, and emissions intensities by basin and companies that operate within selected basins;
- **Company Profiles & Comparisons:** Production, throughput, detailed emissions, and emissions intensities at a company and basin level with the ability to select and directly compare companies.

These tools are available at https://www.erm.com/insights







Production Segment

Key Findings – Production

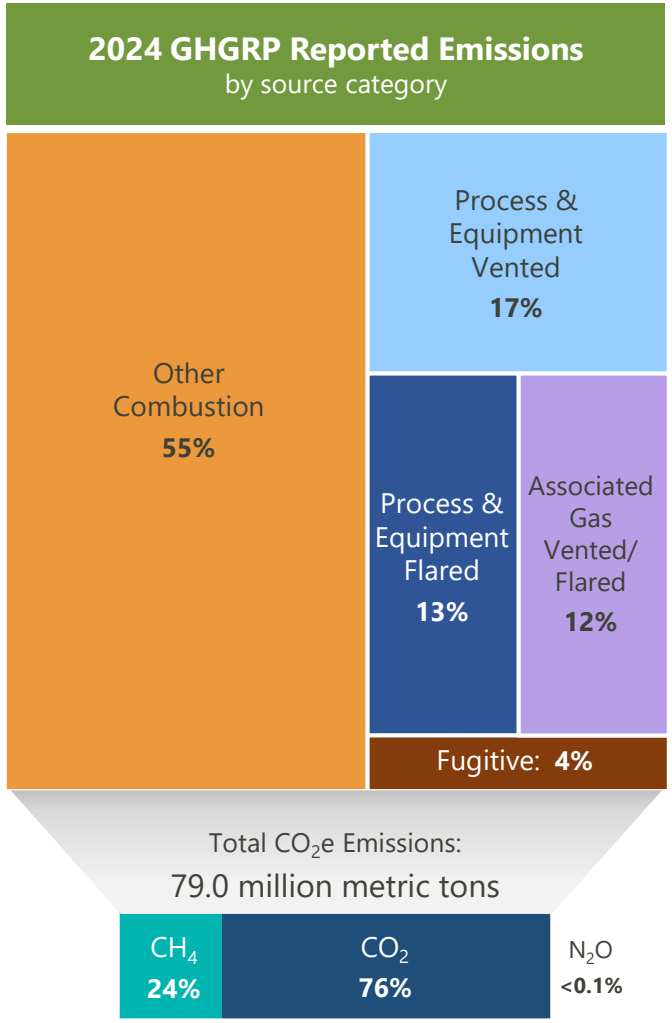
- Of 268 oil and natural gas producers with reported data, the top 100 oil and gas producers (by total energy production) were responsible for 93% of energy production and approximately 81% of both total reported methane and GHG emissions in 2024. While most top-100 producers are also among the top 100 emitters, production rank does not correspond to emissions rank.
- The methane emissions intensity of natural gas production and the GHG emissions intensity of oil and gas production varies dramatically across producers. Natural gas producers in the highest quartile of methane emissions intensity have an average emissions intensity that is over 30 times higher than natural gas producers in the lowest quartile of methane emissions intensity. Oil and gas producers in the highest quartile of GHG emissions intensity have an average emissions intensity that is over 13 times higher than oil and gas producers in the lowest quartile.
- Pneumatic devices were the largest source of total reported production-segment methane emissions, making up 50% of total reported methane emissions.
- Fuel combustion equipment, such as engines and heaters, was the largest source of total reported production-segment CO_2 emissions, responsible for 70% of total reported CO_2 emissions.
- In oil-heavy basins, associated gas venting and flaring can be a significant contributor to GHG emissions. In the Williston basin, for example, this source is responsible for 50% of total reported GHG emissions. In gas-heavy basins, associated gas is limited or non-existent; for example, there was effectively no reported associated gas venting and flaring in the Appalachian basin. Across all basins, associated gas venting and flaring was responsible for 12% of total reported onshore production-segment GHG emissions.
- Methane and GHG intensity declined 56% and 27%, respectively, between 2022 and 2024 due to a reduction in methane and total GHG emissions reported to EPA and an increase in natural gas and total hydrocarbon production. However, these trends are not consistent across basins or individual companies and can fluctuate year to year (e.g., increase 2022-2023 and decrease 2023-2024).
- Total reported methane emissions have declined since 2019, largely driven by the reduction of reported emissions from pneumatic devices and equipment leaks. Total CO_2 emissions have plateaued since 2020 as flaring emissions fall but emissions from combustion equipment increase. As a result, CO_2 as a percentage of total GHGs has increased over the time series, making up 76% of reported emissions in 2024.

Types of Emissions Associated with Oil & Gas Production

The GHGRP includes reporting on emissions from 17 emissions sources in the onshore production segment. In addition, this report attributes emissions associated with six additional sources that are estimated at the national level by EPA in the GHG Inventory, but not included in GHGRP. The relative contribution of GHG emissions from oil and gas production can vary widely by both type of gas and emissions source. Factors influencing the relative contribution of emissions include geology, targeted hydrocarbons (e.g., dry gas vs. wet gas), available infrastructure, and company policies and practices.

For purposes of comparison within this report, production segment emissions sources are grouped into five categories:

- **Process & Equipment Vented** Vented emissions are intentional releases of natural gas from equipment and processes. Common sources of vented emissions include gas-driven pneumatic devices, compressor seals, tanks, and liquids unloading.
- **Process & Equipment Flared** Flared emissions consist primarily of CO_2 from the combustion of gas that is captured from equipment and processes. Flaring also results in methane emissions from uncombusted gas that escapes through the flare stack.
- **Associated Gas Vented & Flared** Associated gas vented and flared emissions occur at oil wells that do not capture a portion or any of the gas that is produced alongside oil. The gas is directly released to the atmosphere or combusted in a flare rather than captured for sale, on-site use, or reinjection.
- **Fugitive** Fugitive emissions are unintentional releases, or leaks, of natural gas. These emissions are often caused by faulty or worn-out equipment. Sources of fugitive emissions include seals and cracks on equipment such as tanks and piping, and leakage from infrastructure components such as valves and connectors.
- **Other Combustion** Non-flaring combustion is a significant source of CO_2 emissions from oil and gas production. Diesel and natural gas engines used to power equipment and provide electricity represent the largest source of other combustion emissions. Other combustion also includes methane emissions from uncombusted gas in engine exhaust.

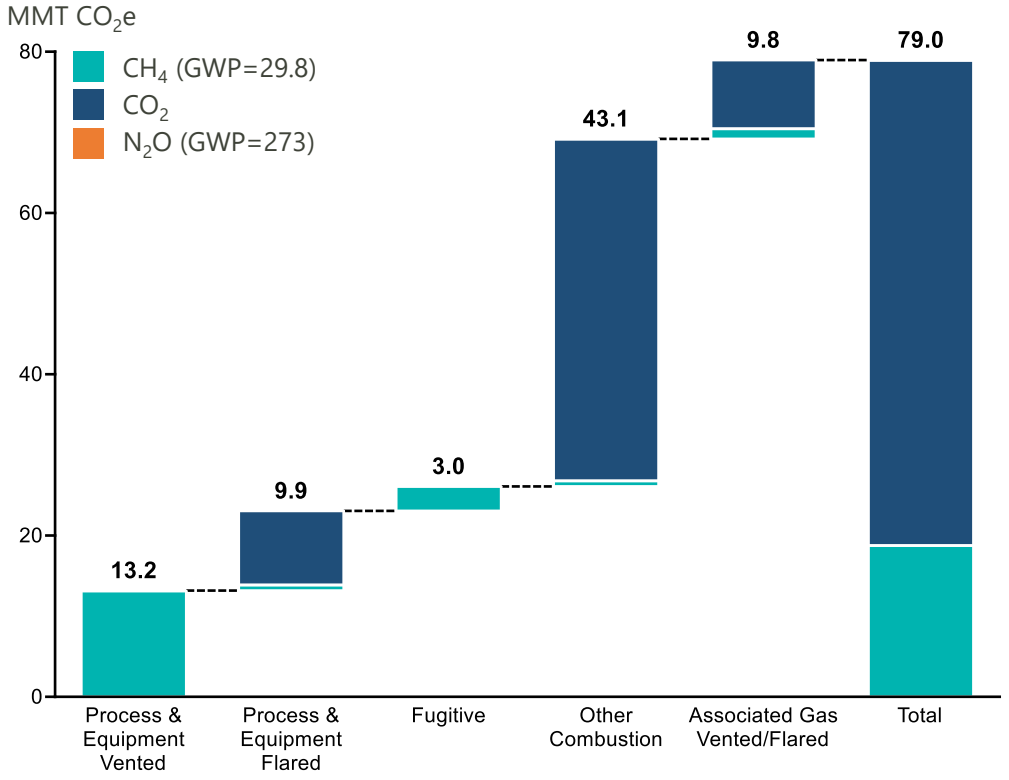


Sources of Methane Emissions

Process and equipment vented, and fugitive methane emissions make up approximately 86% and 20% of the total methane and GHG emissions, respectively, reported across all production-segment sources included in this report. Pneumatic devices are the largest source of reported methane emissions.

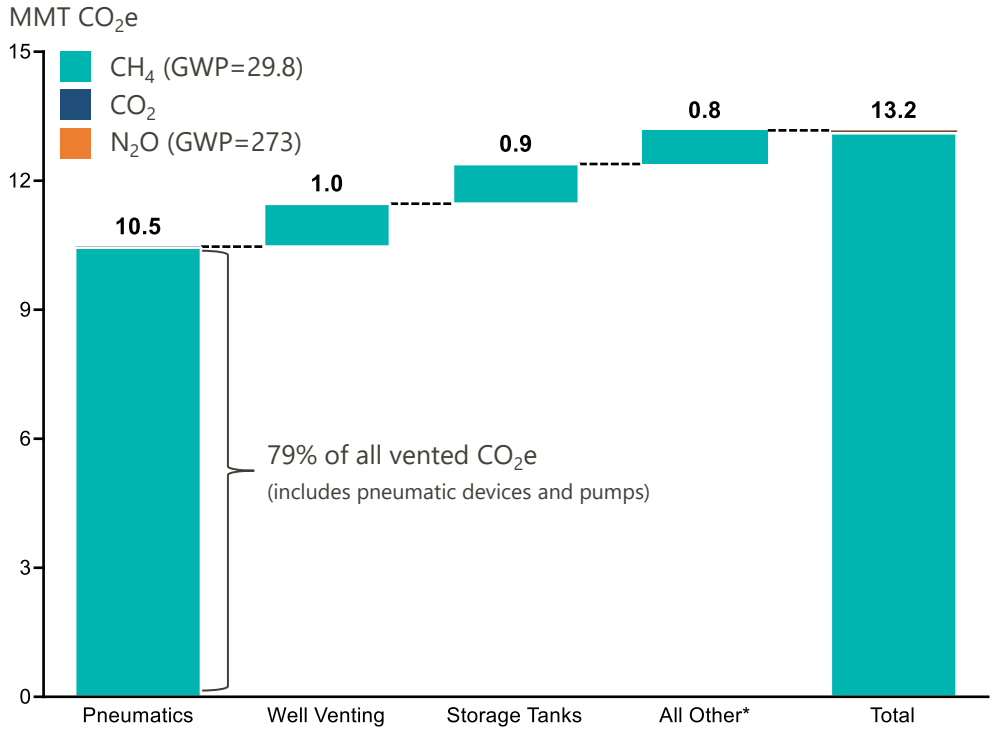
2024 Reported Production Emissions, by Source Category

million metric ton CO_2e (MMT CO_2e)



2024 Reported Process & Equipment Vented Emissions, by Source

million metric ton CO_2e (MMT CO_2e)

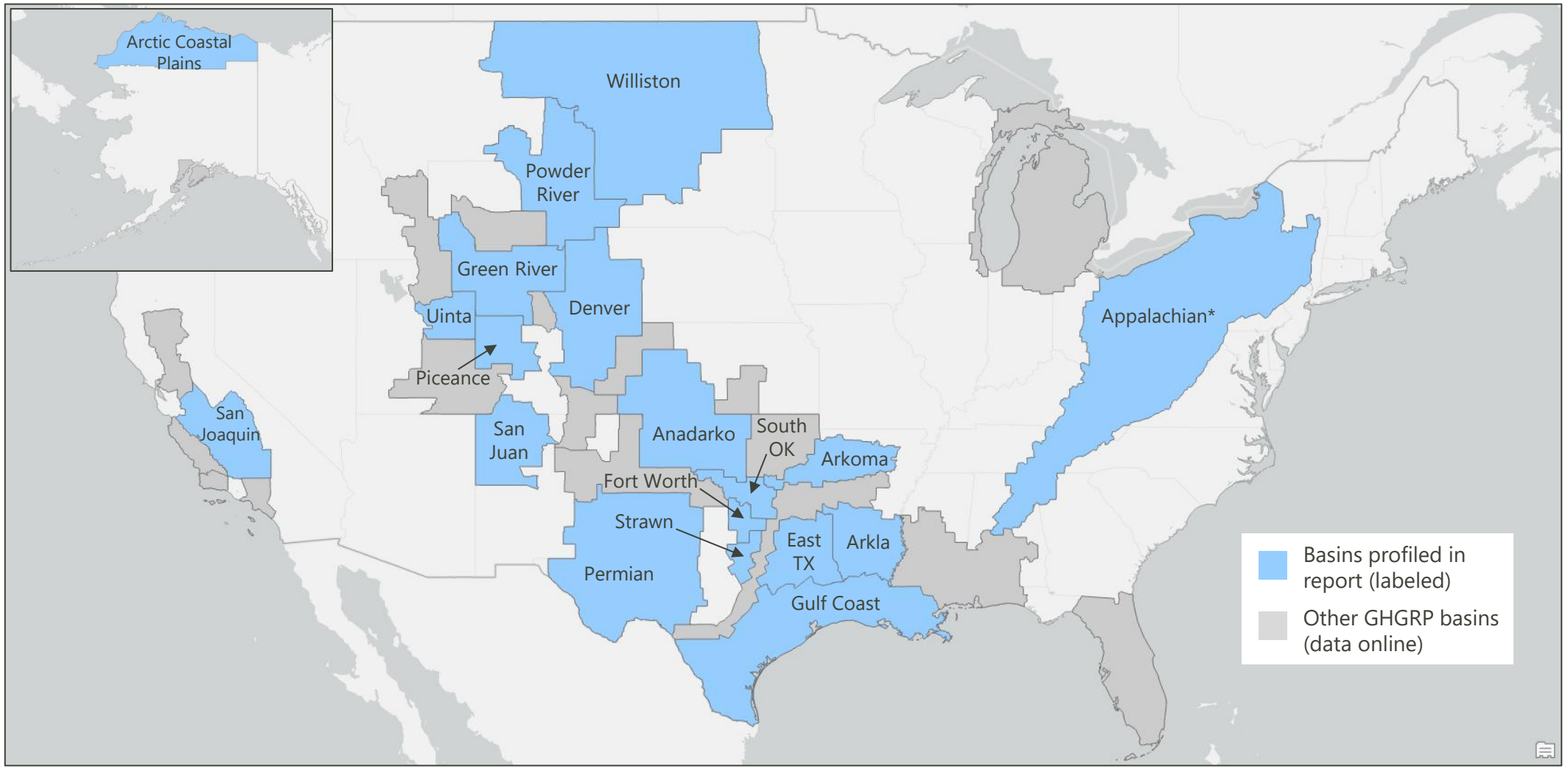


*Includes: Centrifugal compressors, Completions/workovers, dehydrators, reciprocating compressors, compressor blowdowns and starts, well drilling, pressure relief valves, well testing, and acid gas removal units

Basin-Level Summary Data

This section provides data on hydrocarbon production, GHG emissions, emissions intensity, and sources of emissions for the 19 largest hydrocarbon production basins in the U.S. by 2024 production volume. Together these basins represent 98.9% and 99.4% of total 2024 natural gas and oil production, respectively, in the EPA data.

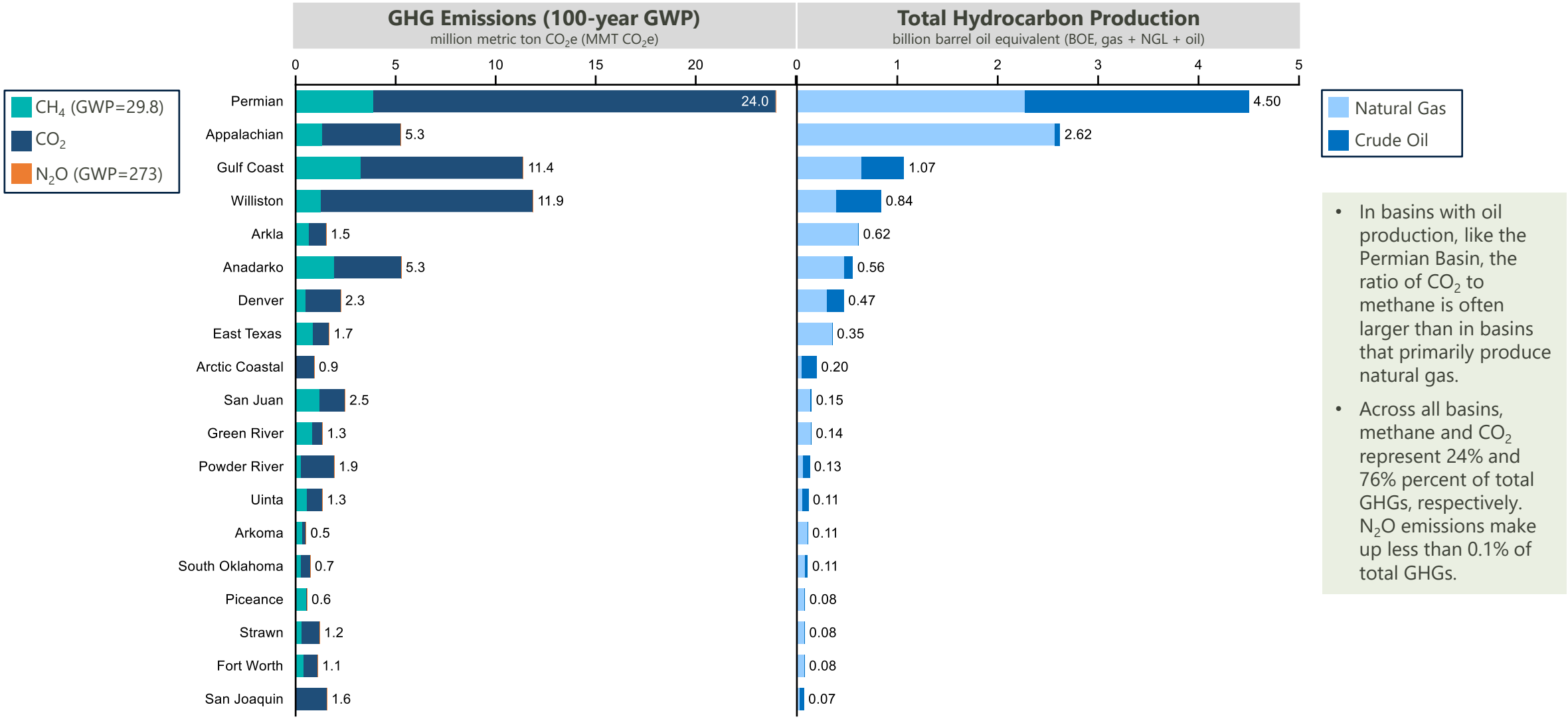
GHGRP Basins



* GHGRP data contain two distinct Appalachian basins (160 & 160A). This analysis combines data reported across both basins and presents them as a single basin.
Note: Basin boundaries defined by geologic provinces published by the American Association of Petroleum Geologists; data provided by U.S. EPA.

2024 Data

GHGRP Basin Production & Emissions

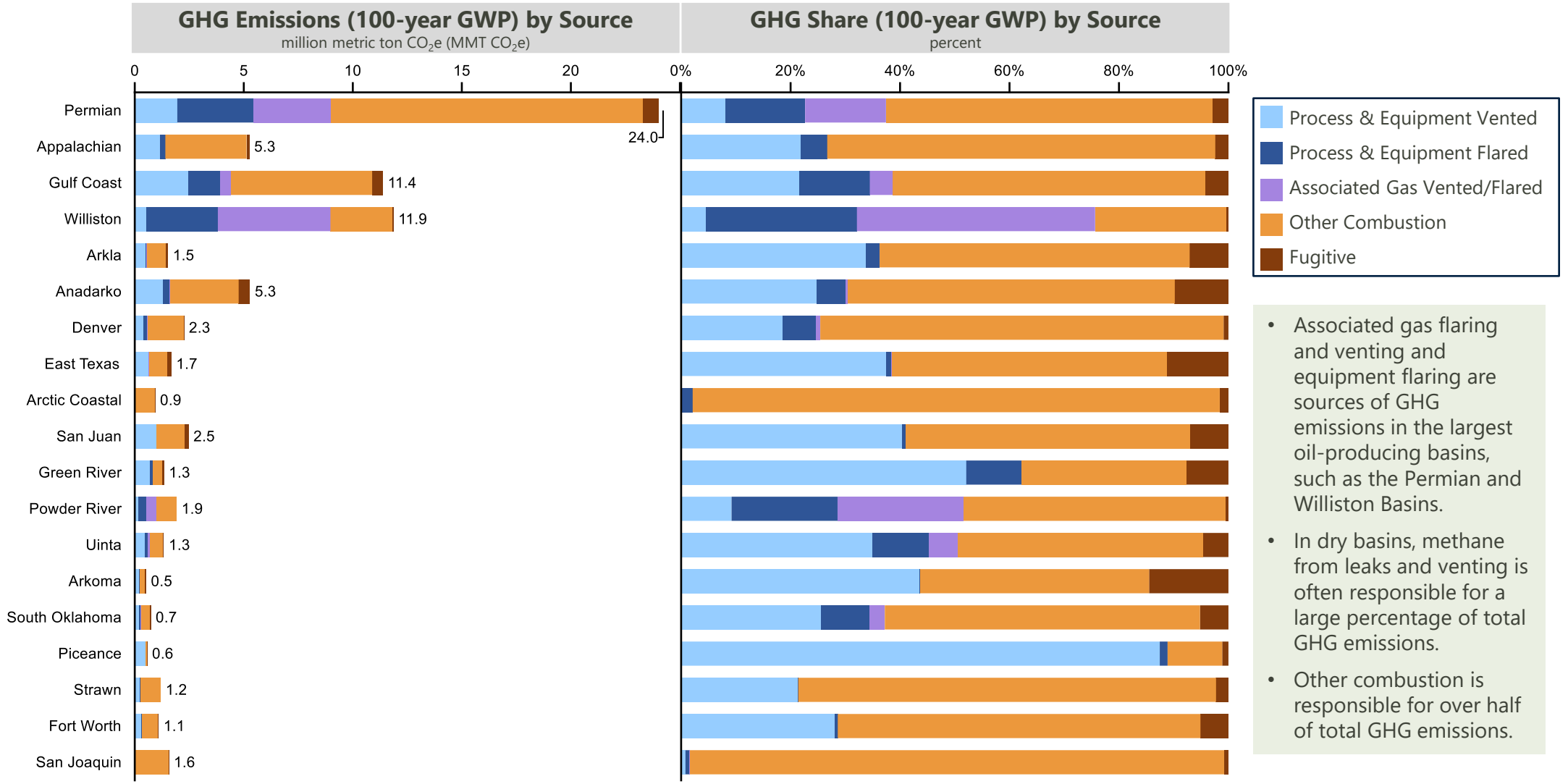


- In basins with oil production, like the Permian Basin, the ratio of CO_2 to methane is often larger than in basins that primarily produce natural gas.
- Across all basins, methane and CO_2 represent 24% and 76% percent of total GHGs, respectively. N_2O emissions make up less than 0.1% of total GHGs.

Note: Basins are ranked in descending order of hydrocarbon production (BOE)

2024 Data

GHGRP Basin Emissions by Source

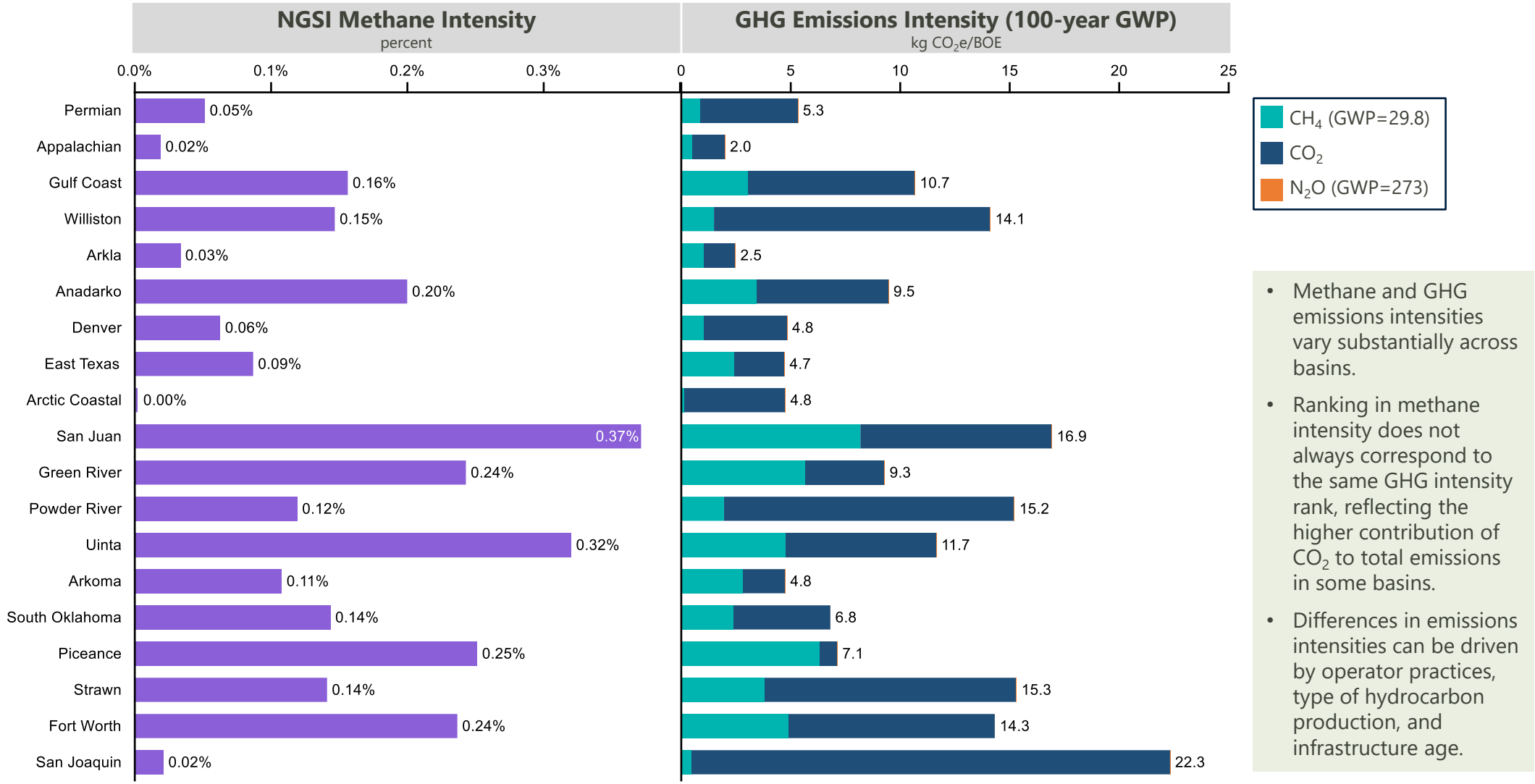


- Associated gas flaring and venting and equipment flaring are sources of GHG emissions in the largest oil-producing basins, such as the Permian and Williston Basins.
- In dry basins, methane from leaks and venting is often responsible for a large percentage of total GHG emissions.
- Other combustion is responsible for over half of total GHG emissions.

Note: Basins are ranked in descending order of hydrocarbon production (BOE)

2024 Data

GHGRP Basin Methane & GHG Intensity

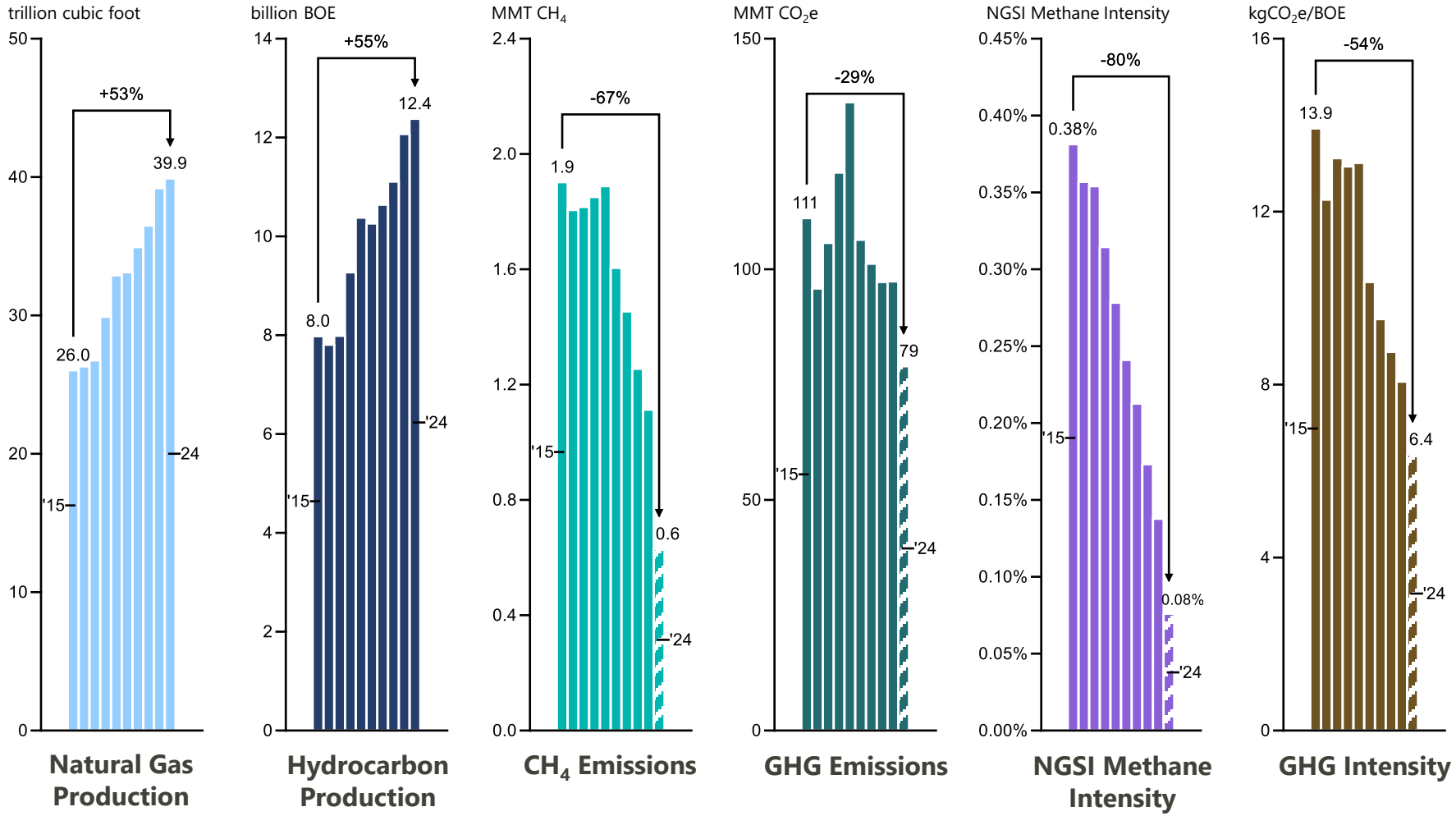


- Methane and GHG emissions intensities vary substantially across basins.
- Ranking in methane intensity does not always correspond to the same GHG intensity rank, reflecting the higher contribution of CO_2 to total emissions in some basins.
- Differences in emissions intensities can be driven by operator practices, type of hydrocarbon production, and infrastructure age.

Note: Basins are ranked in descending order of hydrocarbon production (BOE)

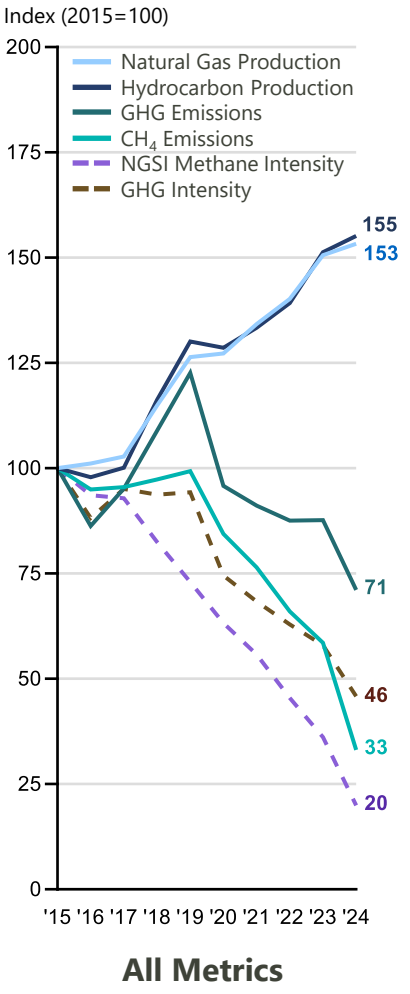
2015-2024 Trends Analysis: Production & Emissions Metrics

GHGRP Data Trends, 2015-2024



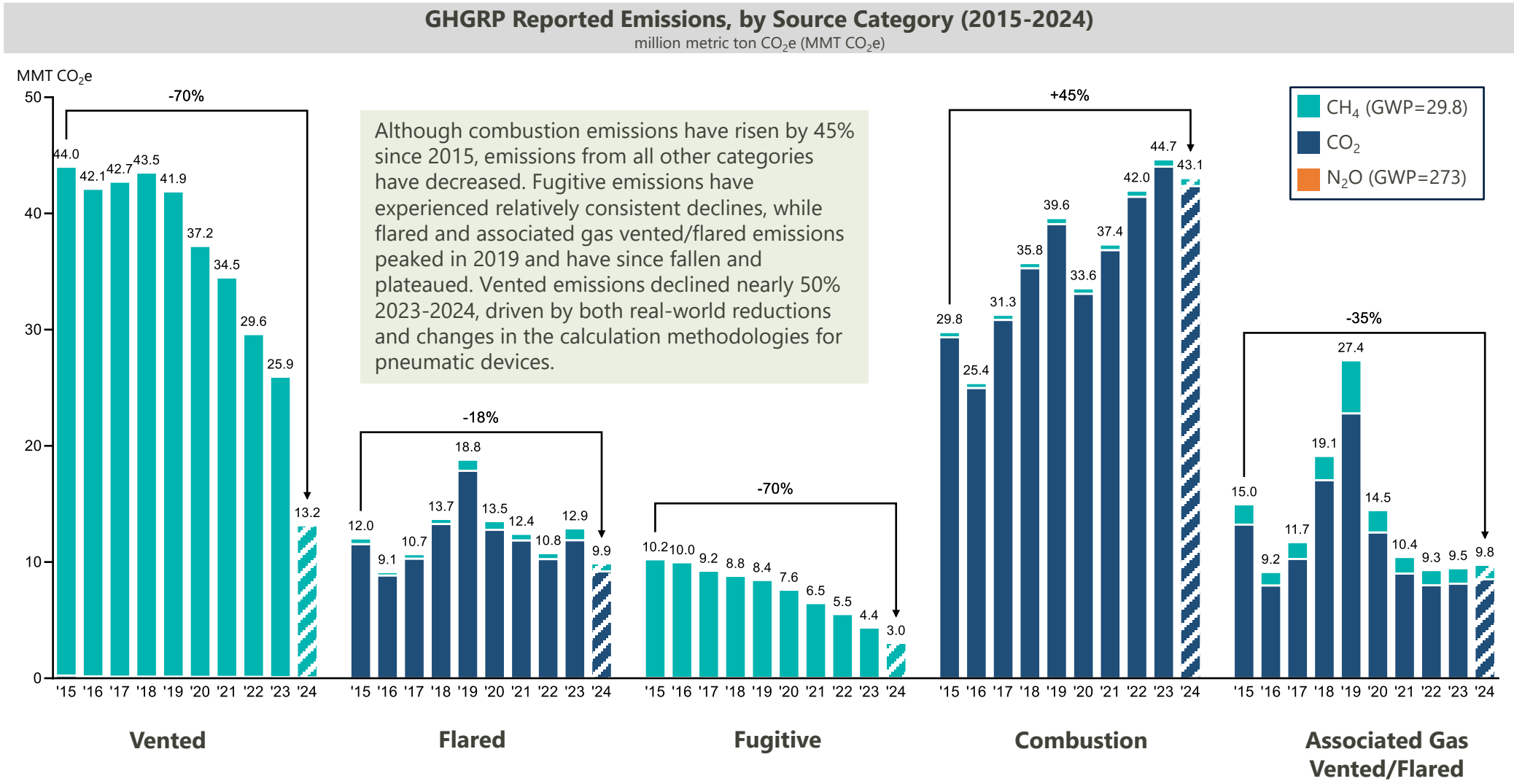
Combined Data Metrics

Indexed; 2015 = 100

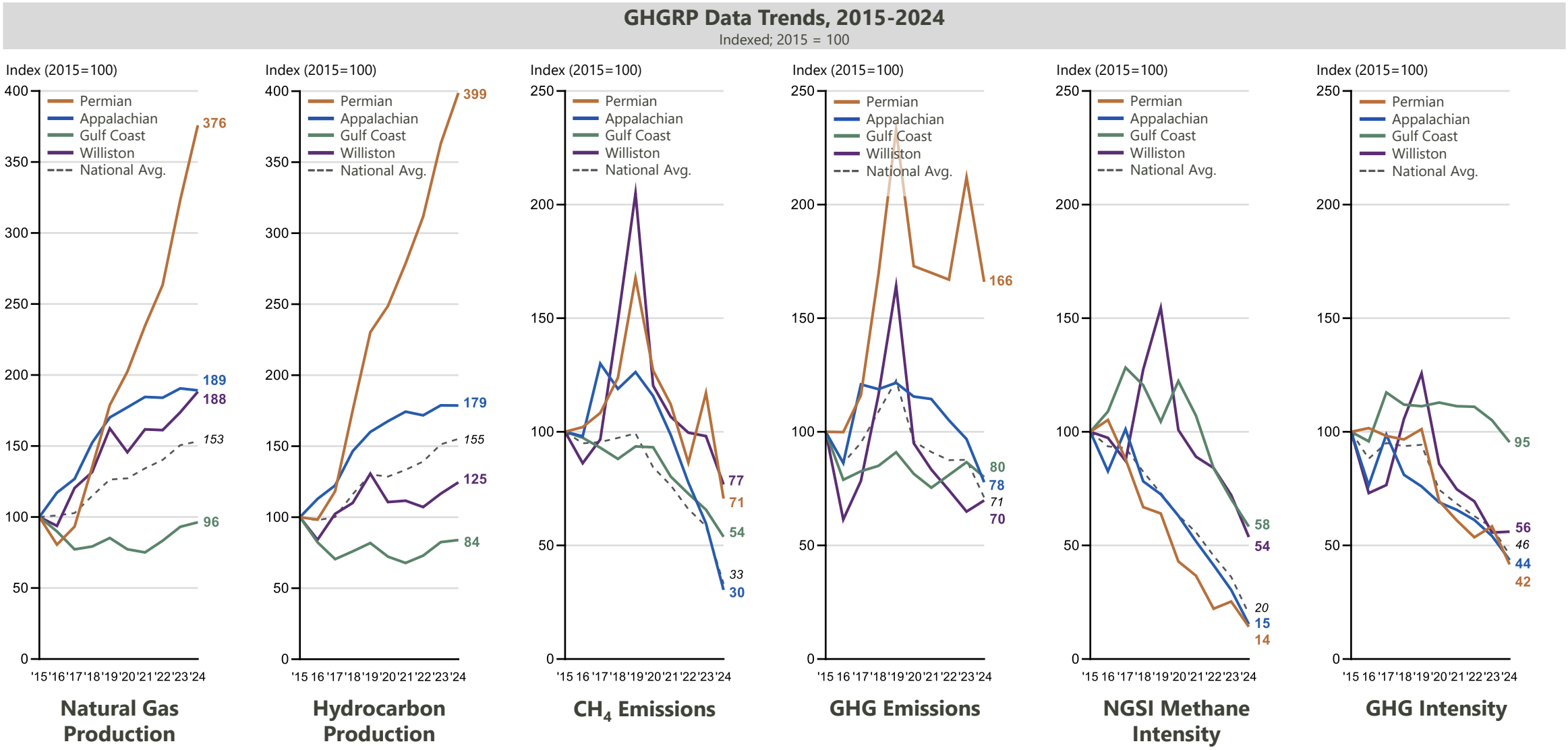


2015-2024 Trends Analysis: Emissions Sources

GHG Emissions (MMT CO_2e)



2015-2024 Trends Analysis: Production & Emissions Metrics of Top Production Basins



Company-Level Summary Data

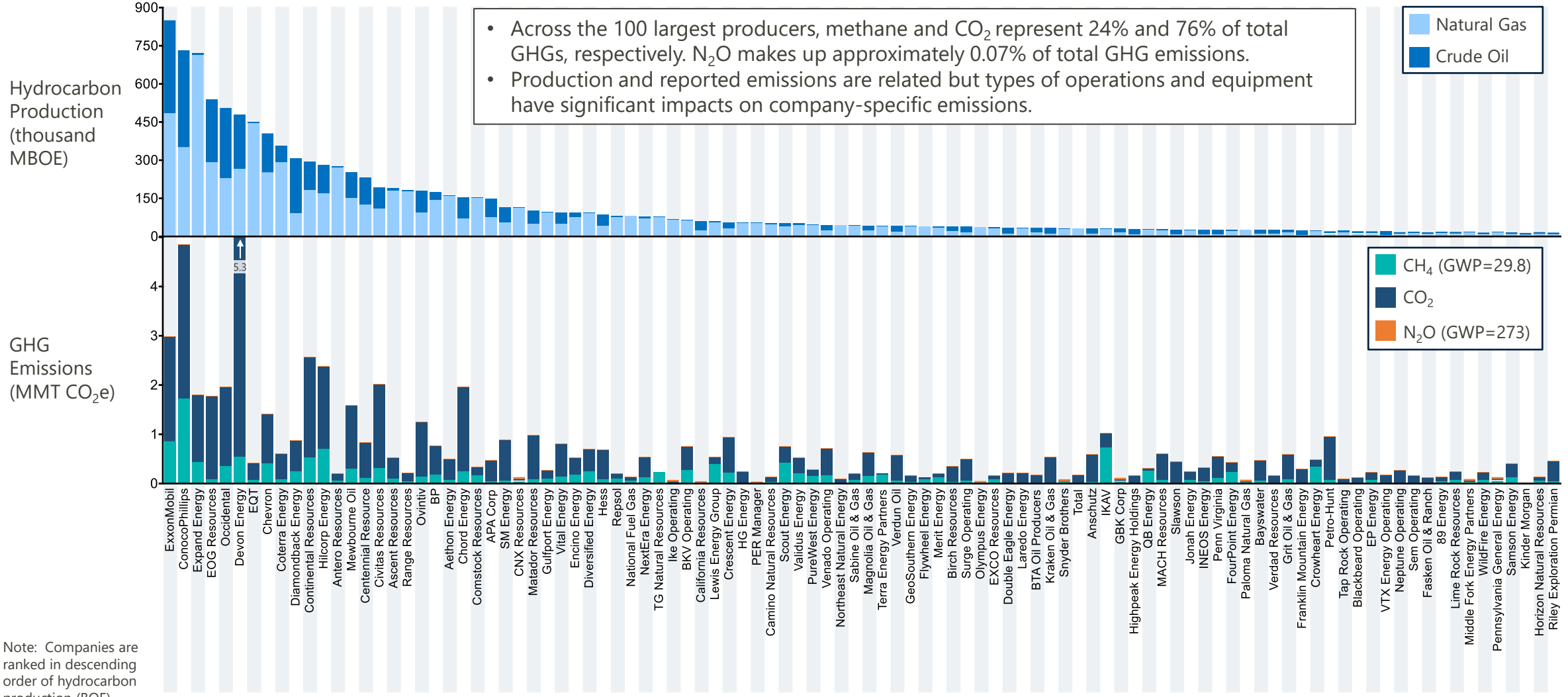
This section summarizes data on hydrocarbon production, GHG emissions, emissions intensity, and sources of emissions for the 100 largest hydrocarbon producers in the U.S. Additional graphics show the relative distribution of hydrocarbon production, GHG emissions, and methane and GHG emissions intensities across the 100 largest producers. Detailed tables list the data and associated rankings for the primary metrics included in this analysis for each of the 100 companies.

Top 100 Hydrocarbon Producers

2024 Data

Hydrocarbon Production & Emissions (100-year GWP)

- Across the 100 largest producers, methane and CO_2 represent 24% and 76% of total GHGs, respectively. N_2O makes up approximately 0.07% of total GHG emissions.
- Production and reported emissions are related but types of operations and equipment have significant impacts on company-specific emissions.

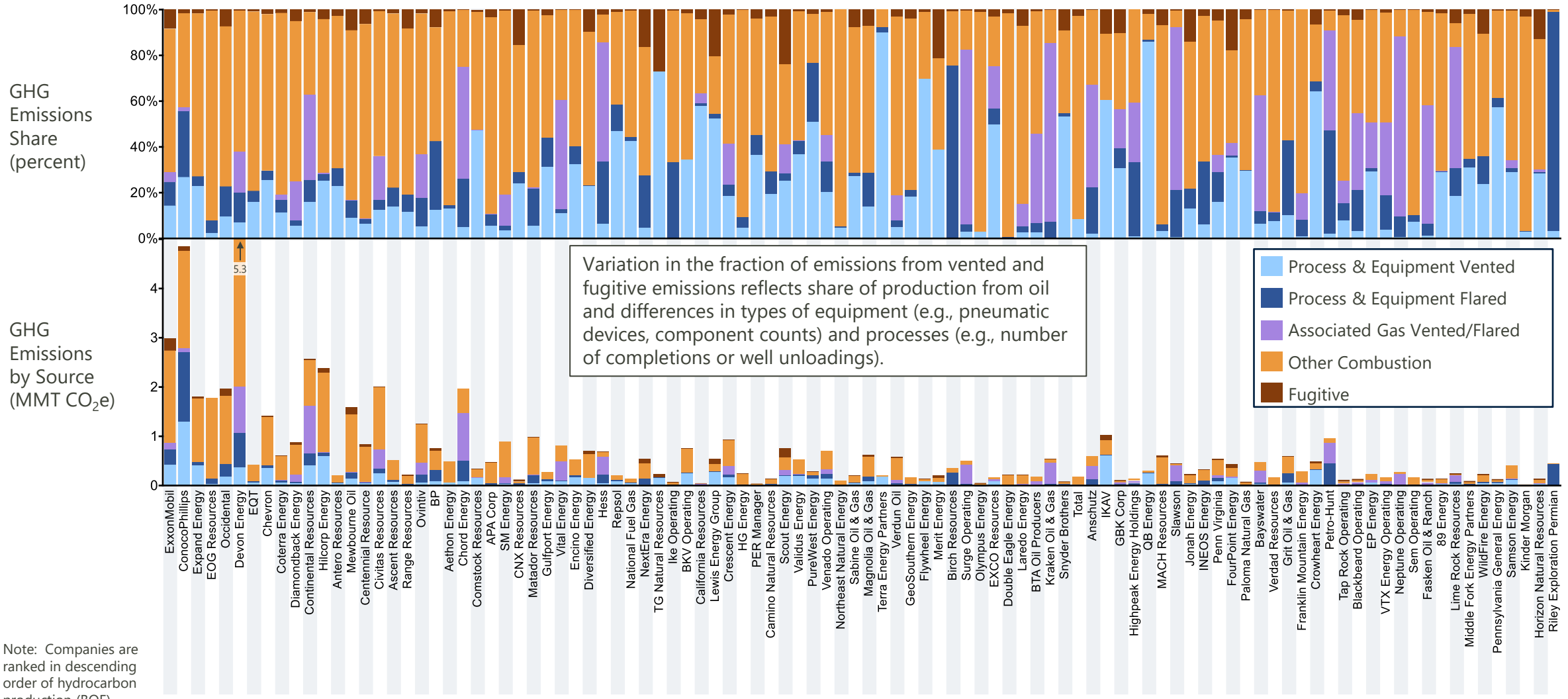


Note: Companies are ranked in descending order of hydrocarbon production (BOE)

Top 100 Hydrocarbon Producers

2024 Data

GHG Emissions by Source (100-year GWP)

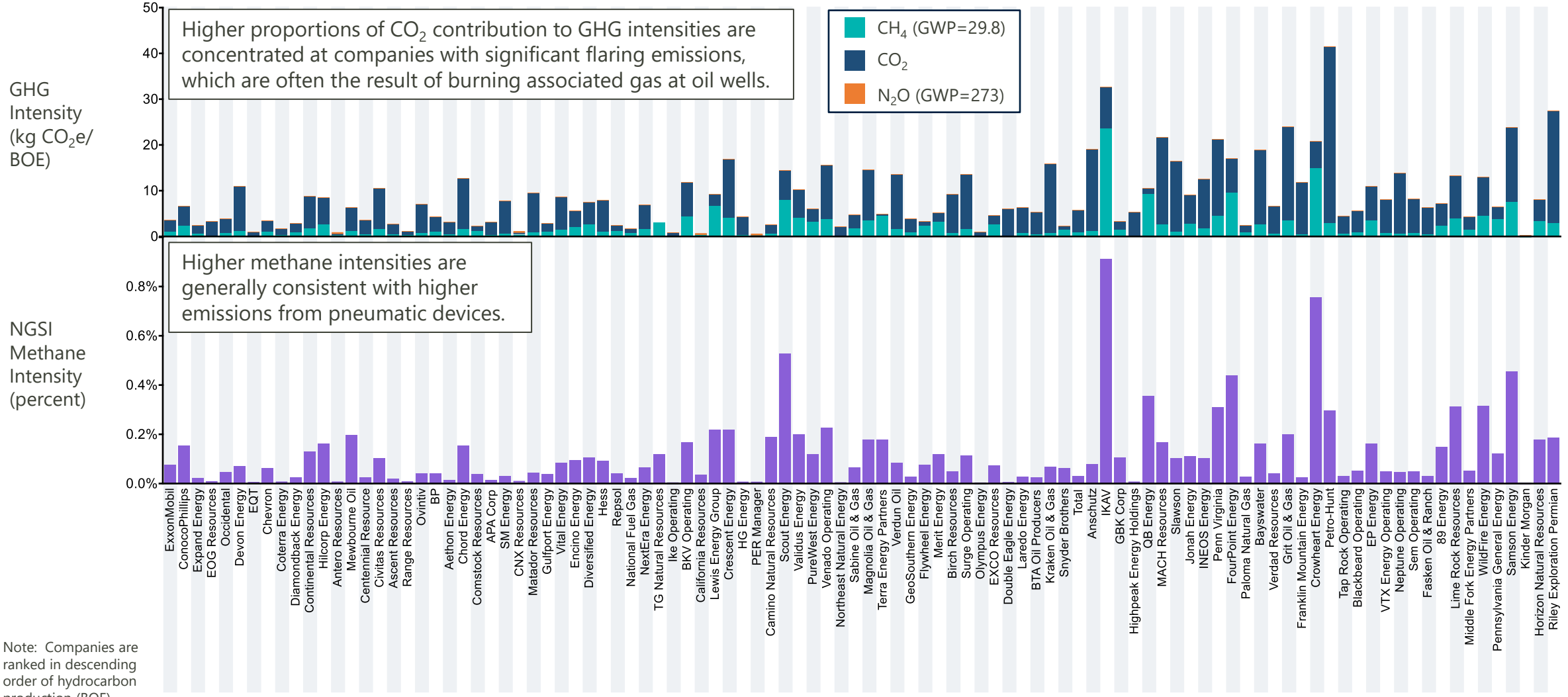


Note: Companies are ranked in descending order of hydrocarbon production (BOE)

Top 100 Hydrocarbon Producers

2024 Data

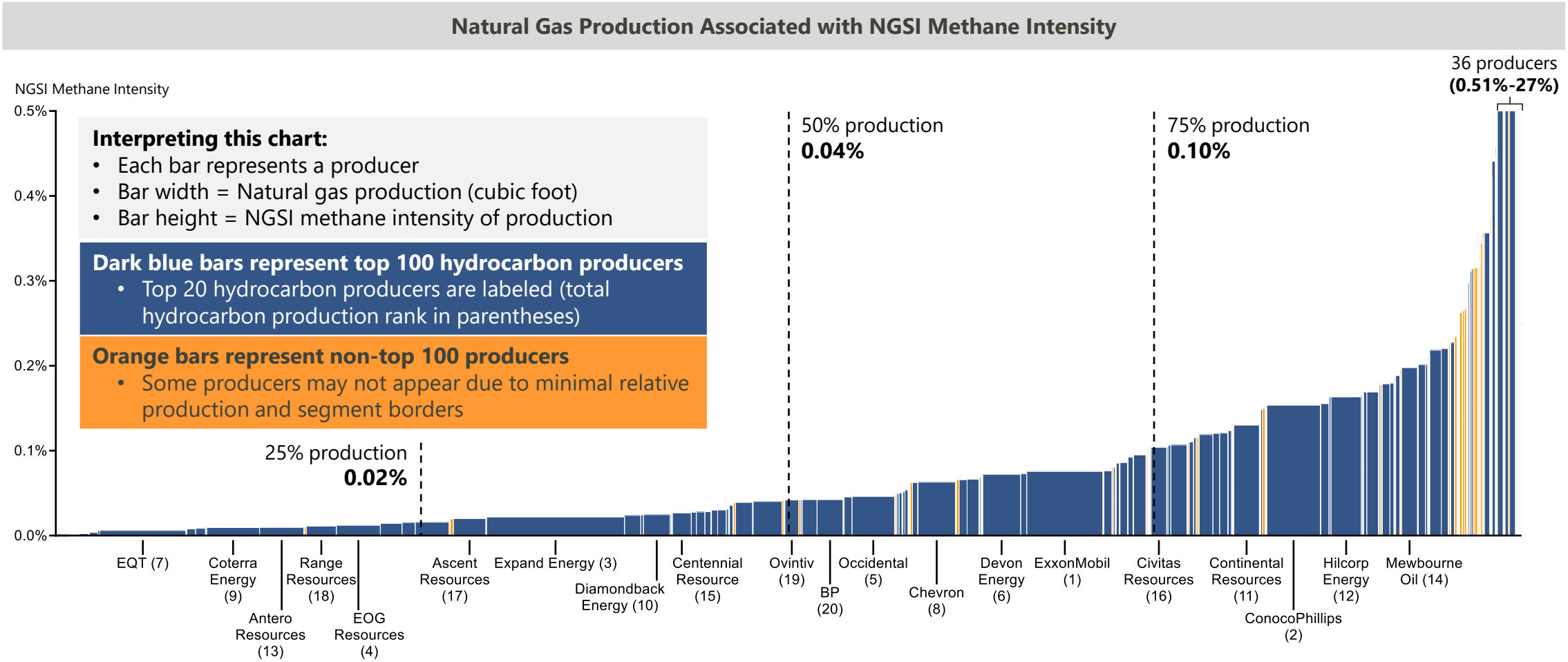
Methane & GHG Intensity (100-year GWP)



Note: Companies are ranked in descending order of hydrocarbon production (BOE)

2024 Data

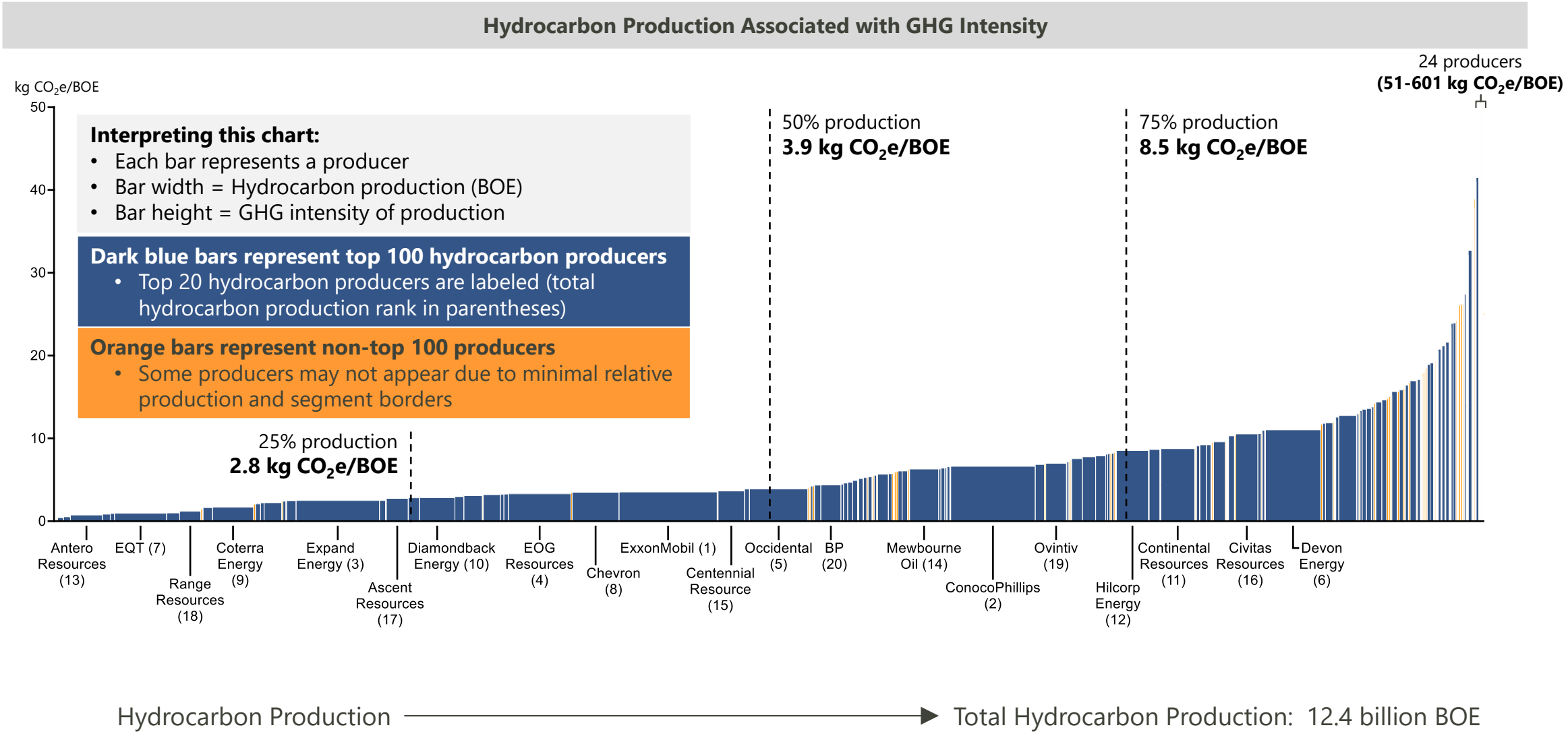
Total GHGRP Natural Gas Production, by Methane Intensity



Natural Gas Production → Total Gas Production: 39.9 trillion cubic feet

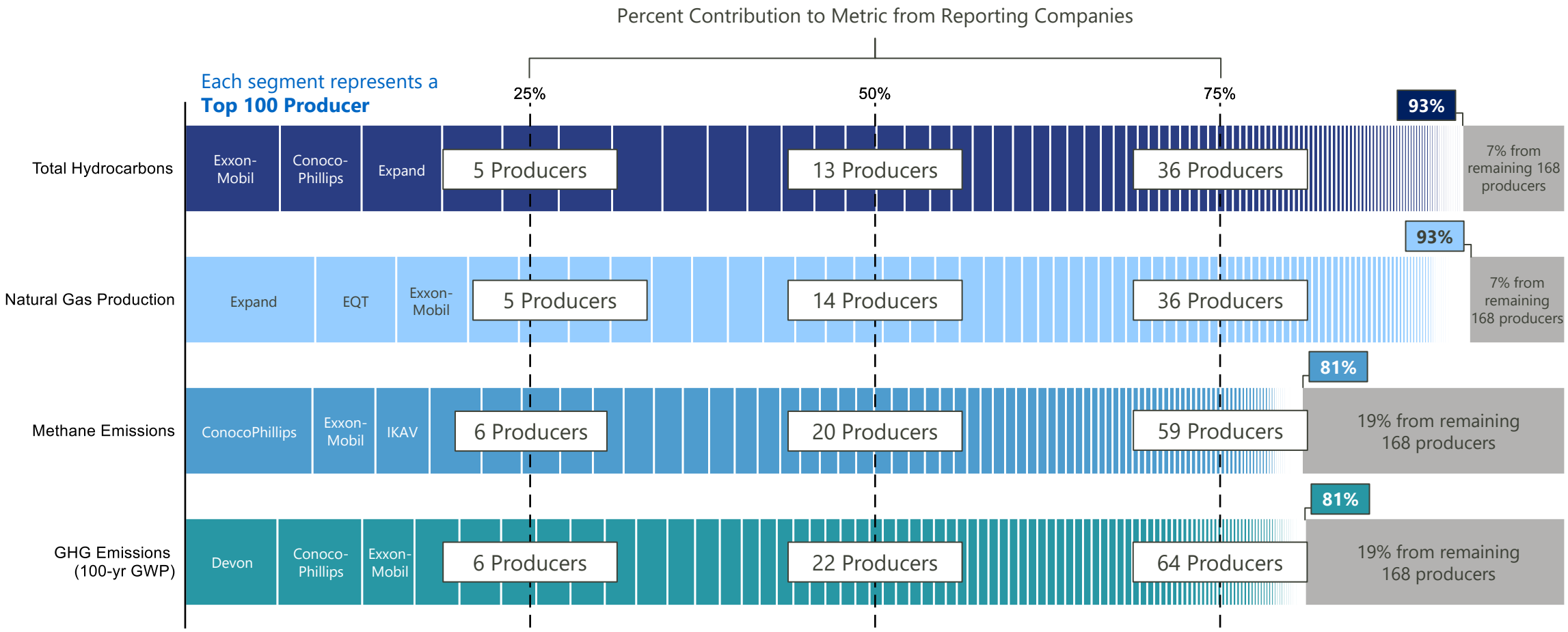
2024 Data

Total GHGRP Hydrocarbon Production, by GHG Intensity



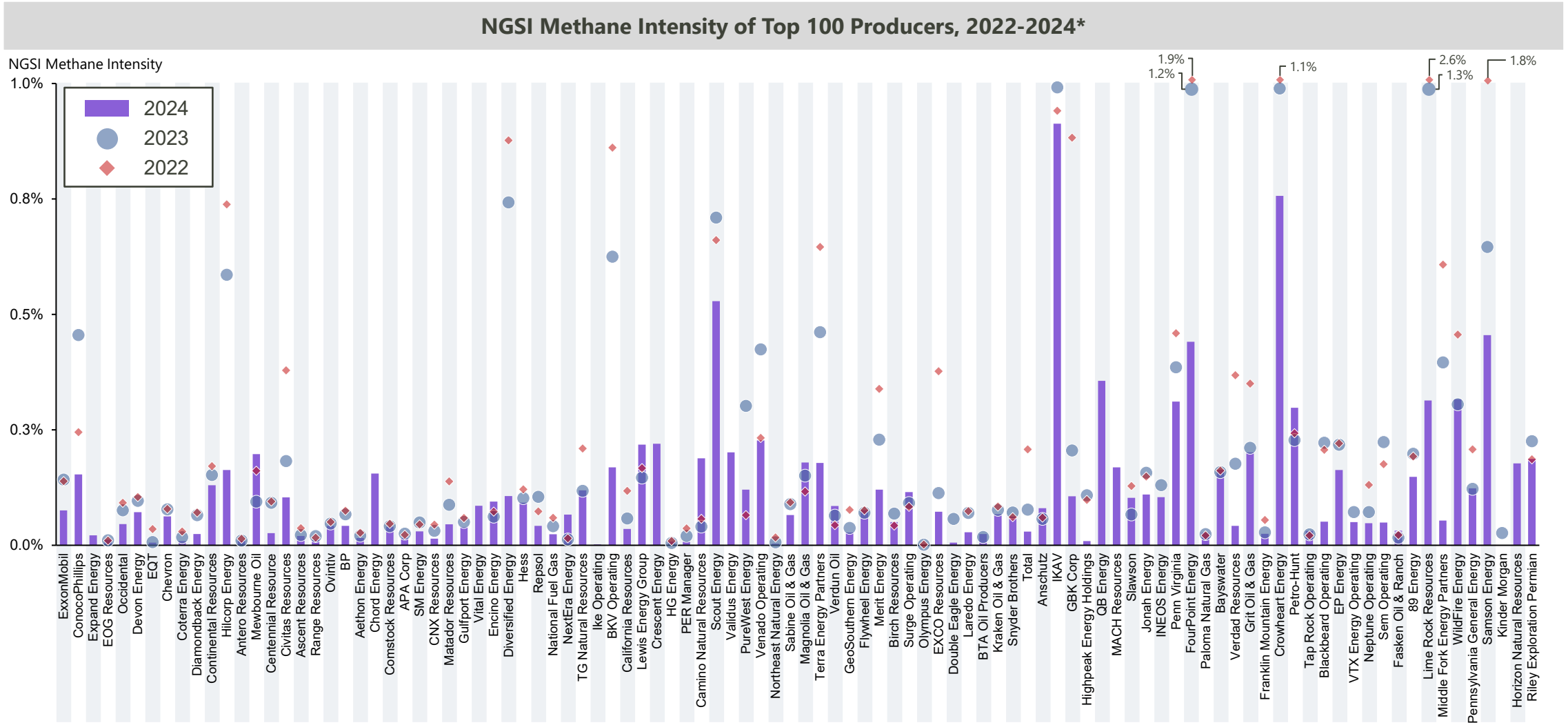
2024 Data

GHGRP Hydrocarbon Production & Emissions Contributions



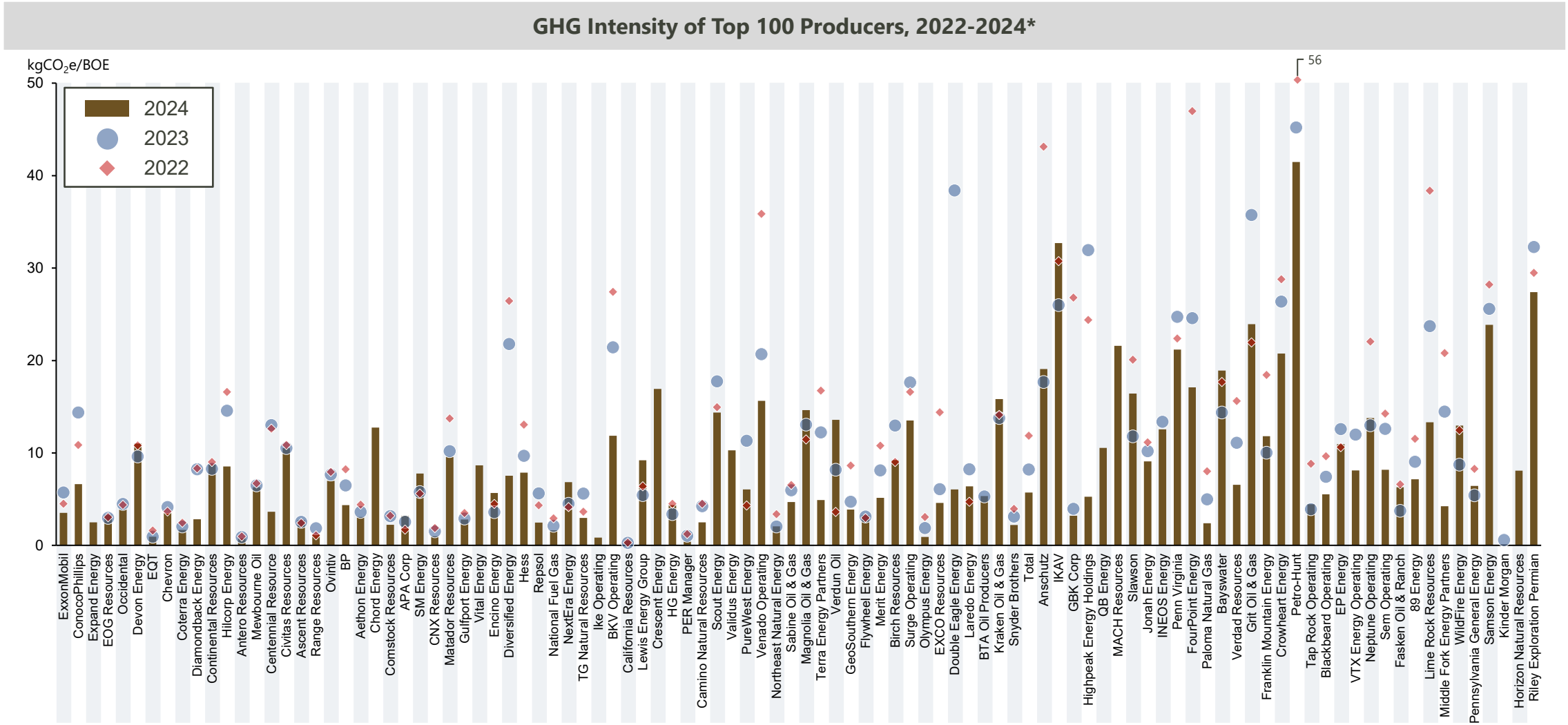
Hydrocarbon production and absolute GHG emissions reported to EPA are highly concentrated among a small number of companies. 25% of total reported hydrocarbons produced and GHGs emitted are by five and six companies, respectively. However, the 168 companies that fall outside the top 100 are responsible for 19% of reported GHG emissions but only 7% of total hydrocarbon production.

2022-2024 Trends Analysis: Change in Methane Intensity, by Top 100 Producer



*14 of the top 100 producers in 2024 were not in the EPA database for all three years and may not have data for 2022 and/or 2023.

2022-2024 Trends Analysis: Change in GHG Intensity, by Top 100 Producer



*14 of the top 100 producers in 2024 were not in the EPA database for all three years and may not have data for 2022 and/or 2023.

2024 Data

Emissions & Emissions Intensities of the Top 100 Producers

		Production		Emissions		Intensity		Metric Rank (among top 100 producers) 1=highest, 100=lowest				
Rank	Company	Total MBOE	Gas (bcf)	MT CH4	MT GHG	NGSI Intensity	GHG Intensity	Gas (bcf)	CH4 Emissions	GHG Emissions	NGSI Intensity	GHG Intensity
1	ExxonMobil	850,039	2,077	28,697	2,989,919	0.08%	3.52	3	2	3	48	72
2	ConocoPhillips	732,277	1,468	58,026	4,848,172	0.15%	6.62	4	1	2	28	48
3	Expand Energy	722,557	3,759	14,866	1,797,638	0.02%	2.49	1	7	9	83	84
4	EOG Resources	540,320	1,198	2,836	1,781,193	0.01%	3.30	7	46	10	88	74
5	Occidental	505,391	1,161	11,948	1,962,925	0.05%	3.88	8	11	7	62	69
6	Devon Energy	479,114	1,037	18,311	5,279,796	0.07%	11.02	9	5	1	50	27
7	EQT	450,938	2,344	2,437	423,101	0.01%	0.94	2	53	49	95	94
8	Chevron	405,424	1,021	13,875	1,414,966	0.06%	3.49	10	9	12	54	73
9	Coterra Energy	356,522	1,441	2,853	603,907	0.01%	1.69	5	44	30	91	90
10	Diamondback Energy	306,636	726	8,149	870,425	0.02%	2.84	16	19	19	80	80
11	Continental Resources	294,203	695	17,586	2,573,629	0.13%	8.75	18	6	4	30	36
12	Hilcorp Energy	279,652	825	23,694	2,385,536	0.16%	8.53	13	4	5	25	38
13	Antero Resources	277,331	1,206	1,847	204,995	0.01%	0.74	6	64	69	90	97
14	Mew bourne Oil	252,278	433	10,303	1,586,887	0.20%	6.29	24	14	11	16	53
15	Centennial Resource	229,917	515	3,651	838,622	0.03%	3.65	20	37	20	78	71
16	Civitas Resources	190,999	425	10,416	2,010,836	0.10%	10.53	25	13	6	40	30
17	Ascent Resources	189,850	885	3,161	521,325	0.02%	2.75	12	40	40	84	82
18	Range Resources	182,153	821	1,517	216,598	0.01%	1.19	14	69	66	89	92
19	Ovintiv	179,598	379	4,529	1,254,253	0.04%	6.98	29	32	13	67	46
20	BP	174,382	709	6,117	761,492	0.04%	4.37	17	26	22	64	66
21	Aethon Energy	159,911	923	2,673	492,275	0.02%	3.08	11	48	42	85	78
22	Chord Energy	153,854	228	8,243	1,960,714	0.16%	12.74	41	18	8	27	23
23	Comstock Resources	152,285	791	5,515	339,233	0.04%	2.23	15	28	52	68	87
24	APA Corp	147,432	357	1,499	471,853	0.02%	3.20	30	70	45	86	77
25	SM Energy	114,946	233	2,005	892,930	0.03%	7.77	38	60	18	73	43
26	CNX Resources	114,195	591	1,535	112,996	0.01%	0.99	19	66	88	87	93
27	Matador Resources	102,663	213	2,846	982,118	0.05%	9.57	45	45	15	63	32
28	Gulfport Energy	97,718	468	3,235	275,195	0.04%	2.82	21	39	57	69	81
29	Vital Energy	93,839	211	4,736	812,124	0.09%	8.65	46	31	21	44	37
30	Encino Energy	93,648	339	6,128	530,879	0.09%	5.67	31	25	38	42	57
31	Diversified Energy	93,469	446	8,357	704,032	0.11%	7.53	22	17	26	37	44
32	Hess	87,256	142	2,956	687,552	0.09%	7.88	59	43	27	43	42
33	Repsol	81,874	405	3,292	202,637	0.04%	2.47	26	38	70	65	85
34	National Fuel Gas	81,783	442	1,957	133,702	0.02%	1.63	23	61	82	82	91

2024 Data

Emissions & Emissions Intensities of the Top 100 Producers

		Production		Emissions		Intensity		Metric Rank (among top 100 producers) 1=highest, 100=lowest				
Rank	Company	Total MBOE	Gas (bcf)	MT CH4	MT GHG	NGSI Intensity	GHG Intensity	Gas (bcf)	CH4 Emissions	GHG Emissions	NGSI Intensity	GHG Intensity
35	NextEra Energy	79,049	321	4,059	540,754	0.07%	6.84	32	35	35	52	47
36	TG Natural Resources	77,272	380	7,673	229,086	0.12%	2.96	28	21	64	34	79
37	Ike Operating	67,340	244	70	56,767	0.00%	0.84	36	98	96	98	96
38	BKV Operating	63,891	318	9,157	757,463	0.17%	11.86	33	15	23	22	25
39	California Resources	58,753	96	681	30,738	0.04%	0.52	65	83	98	70	98
40	Lew is Energy Group	58,404	316	13,146	538,344	0.22%	9.22	34	10	36	13	34
41	Crescent Energy	55,332	188	7,389	937,475	0.22%	16.94	50	22	17	12	12
42	HG Energy	54,664	269	394	237,774	0.01%	4.35	35	89	60	93	67
43	PER Manager	53,148	240	307	22,476	0.01%	0.42	37	93	99	94	99
44	Camino Natural Resources	52,880	119	1,029	131,849	0.19%	2.49	62	75	83	17	83
45	Scout Energy	52,542	159	14,024	754,873	0.53%	14.37	56	8	24	3	17
46	Validus Energy	50,995	195	6,857	524,966	0.20%	10.29	49	23	39	15	31
47	PureWest Energy	45,941	225	4,978	278,345	0.12%	6.06	42	30	56	32	54
48	Venado Operating	45,218	102	5,631	707,479	0.23%	15.65	64	27	25	11	15
49	Northeast Natural Energy	43,607	232	151	90,532	0.00%	2.08	39	95	92	97	89
50	Sabine Oil & Gas	42,976	220	2,543	202,029	0.07%	4.70	44	50	71	53	63
51	Magnolia Oil & Gas	42,810	112	5,074	626,232	0.18%	14.63	63	29	28	19	16
52	Terra Energy Partners	42,472	206	6,298	208,705	0.18%	4.91	47	24	68	20	62
53	Verdun Oil	42,446	84	2,156	577,138	0.09%	13.60	71	59	33	45	19
54	GeoSouthern Energy	42,218	232	1,230	163,691	0.03%	3.88	40	74	77	76	70
55	Flyw heel Energy	40,014	222	3,112	130,778	0.08%	3.27	43	41	85	47	75
56	Merit Energy	39,163	183	4,180	201,391	0.12%	5.14	51	34	72	33	61
57	Birch Resources	38,544	81	950	355,562	0.05%	9.22	72	76	51	59	33
58	Surge Operating	37,272	59	1,895	503,253	0.12%	13.50	77	62	41	35	20
59	Olympus Energy	36,820	197	49	34,082	0.00%	0.93	48	99	97	99	95
60	EXCO Resources	36,098	165	3,086	165,976	0.07%	4.60	53	42	76	49	64
61	Double Eagle Energy	35,462	56	147	214,675	0.01%	6.05	79	96	67	96	55
62	Laredo Energy	33,915	161	806	216,998	0.03%	6.40	54	81	65	75	51
63	BTA Oil Producers	33,902	72	491	181,299	0.02%	5.35	74	87	73	81	59
64	Kraken Oil & Gas	33,898	38	862	536,754	0.07%	15.83	89	79	37	51	14
65	Snyder Brothers	31,291	144	1,463	69,249	0.06%	2.21	58	71	94	55	88
66	Total	31,267	168	895	178,914	0.03%	5.72	52	77	74	74	56
67	Anschutz	31,252	48	1,251	596,607	0.08%	19.09	83	73	31	46	9

2024 Data

Emissions & Emissions Intensities of the Top 100 Producers

		Production		Emissions		Intensity		Metric Rank (among top 100 producers) 1=highest, 100=lowest				
Rank	Company	Total MBOE	Gas (bcf)	MT CH4	MT GHG	NGSI Intensity	GHG Intensity	Gas (bcf)	CH4 Emissions	GHG Emissions	NGSI Intensity	GHG Intensity
68	IKAV	31,241	160	24,696	1,021,673	0.91%	32.70	55	3	14	1	2
69	GBK Corp	30,883	74	1,531	99,313	0.11%	3.22	73	67	90	38	76
70	Highpeak Energy Holdings	29,745	32	95	156,397	0.01%	5.26	93	97	80	92	60
71	QB Energy	28,681	150	8,940	302,799	0.36%	10.56	57	16	54	6	29
72	MACH Resources	28,124	89	2,515	607,374	0.17%	21.60	69	51	29	23	6
73	Slaw son	26,688	30	884	438,231	0.10%	16.42	95	78	47	41	13
74	Jonah Energy	26,132	122	2,396	237,286	0.11%	9.08	61	54	61	36	35
75	INEOS Energy	25,875	37	1,529	324,896	0.10%	12.56	90	68	53	39	24
76	Penn Virginia	25,849	38	3,860	547,438	0.31%	21.18	88	36	34	9	7
77	FourPoint Energy	25,376	95	8,094	433,881	0.44%	17.10	67	20	48	5	11
78	Paloma Natural Gas	25,273	139	695	60,766	0.03%	2.40	60	82	95	77	86
79	Baysw ater	25,102	39	2,169	474,846	0.16%	18.92	86	58	44	24	10
80	Verdad Resources	24,817	39	485	162,926	0.04%	6.57	87	88	78	66	49
81	Grit Oil & Gas	24,648	64	2,810	589,902	0.20%	23.93	75	47	32	14	4
82	Franklin Mountain Energy	24,541	32	349	289,813	0.02%	11.81	94	92	55	79	26
83	Crow heart Energy	23,474	89	11,700	487,266	0.76%	20.76	68	12	43	2	8
84	Petro-Hunt	22,992	33	2,263	953,868	0.30%	41.49	91	56	16	10	1
85	Tap Rock Operating	22,295	63	390	99,067	0.03%	4.44	76	90	91	72	65
86	Blackbeard Operating	21,478	55	663	118,999	0.05%	5.54	80	84	87	57	58
87	EP Energy	21,010	51	2,451	230,272	0.16%	10.96	82	52	63	26	28
88	VTX Energy Operating	20,790	25	550	168,803	0.05%	8.12	98	85	75	58	40
89	Neptune Operating	19,592	24	356	270,055	0.05%	13.78	99	91	58	61	18
90	Sem Operating	19,573	57	499	160,371	0.05%	8.19	78	86	79	60	39
91	Fasken Oil & Ranch	19,206	26	302	120,965	0.03%	6.30	97	94	86	71	52
92	89 Energy	18,314	54	1,384	131,143	0.15%	7.16	81	72	84	29	45
93	Lime Rock Resources	17,928	42	2,370	238,882	0.31%	13.32	85	55	59	8	21
94	Middle Fork Energy Partners	17,856	86	856	75,840	0.05%	4.25	70	80	93	56	68
95	WildFire Energy	17,847	22	2,642	231,197	0.32%	12.95	100	49	62	7	22
96	Pennsylvania General Energy	17,557	95	2,191	112,875	0.12%	6.43	66	57	89	31	50
97	Samson Energy	17,010	33	4,249	406,016	0.45%	23.87	92	33	50	4	5
98	Kinder Morgan	16,875	387	3	1,577	0.00%	0.09	27	100	100	100	100
99	Horizon Natural Resources	16,619	44	1,882	134,345	0.18%	8.08	84	63	81	21	41
100	Riley Exploration Permian	16,440	28	1,556	450,615	0.19%	27.41	96	65	46	18	3

Company- & Basin-Level Summary Data

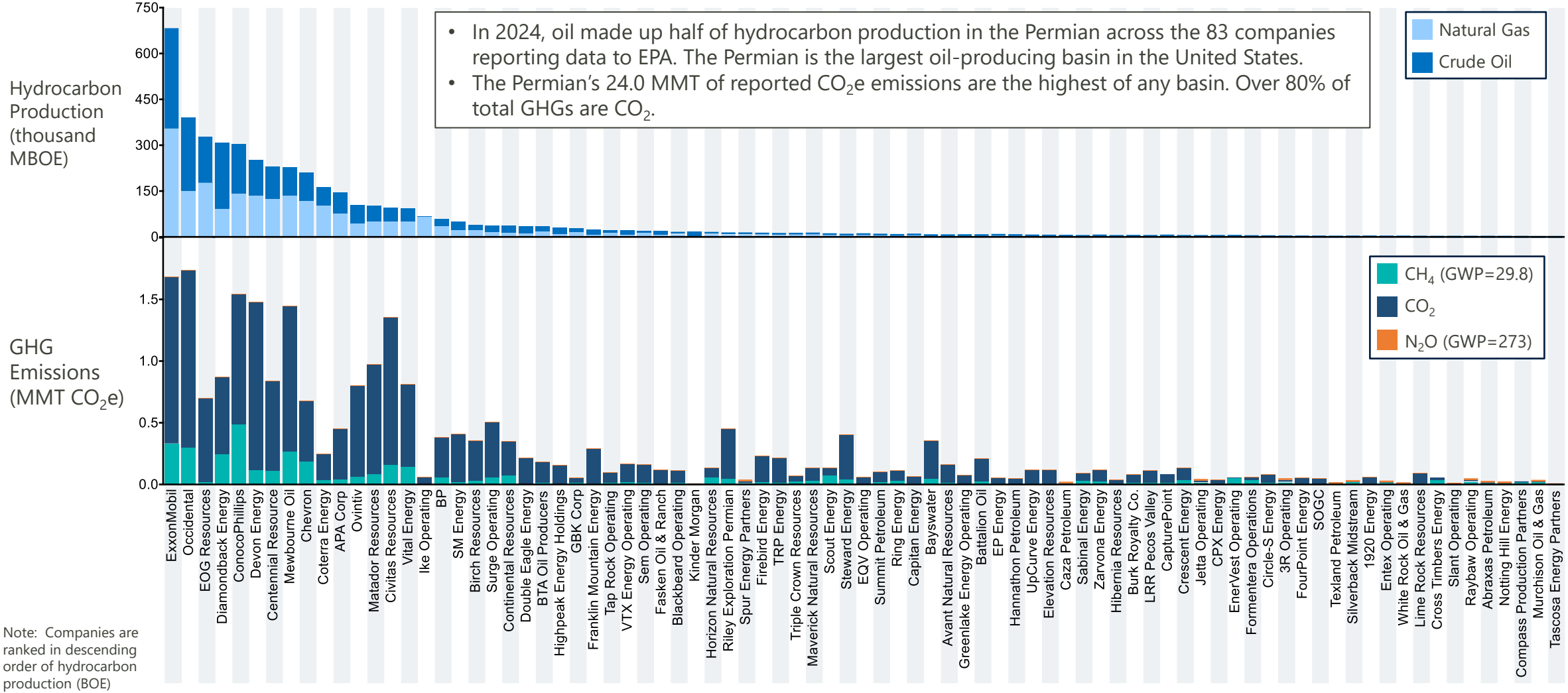
This section summarizes company-level data on hydrocarbon production, GHG emissions, emissions intensity, and sources of emissions for each of the following basins: Permian, Appalachian, Gulf Coast, and Williston. Additional data show the distribution of methane and GHG emissions intensities by volume in each basin.

Permian Basin Producers

2024 Data

Hydrocarbon Production & Emissions (100-year GWP)

- In 2024, oil made up half of hydrocarbon production in the Permian across the 83 companies reporting data to EPA. The Permian is the largest oil-producing basin in the United States.
- The Permian's 24.0 MMT of reported CO_2e emissions are the highest of any basin. Over 80% of total GHGs are CO_2.

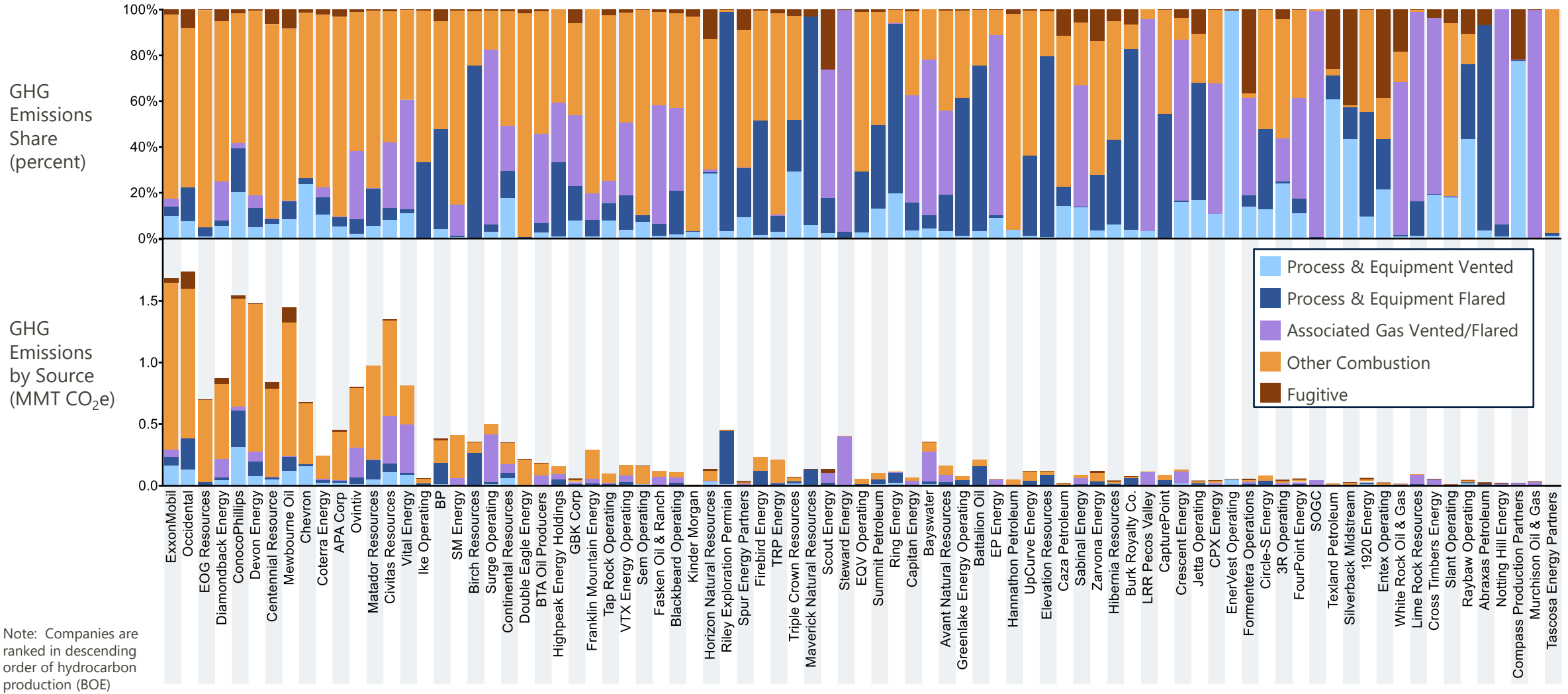


Note: Companies are ranked in descending order of hydrocarbon production (BOE) within basin

Permian Basin Producers

2024 Data

GHG Emissions by Source (100-year GWP)

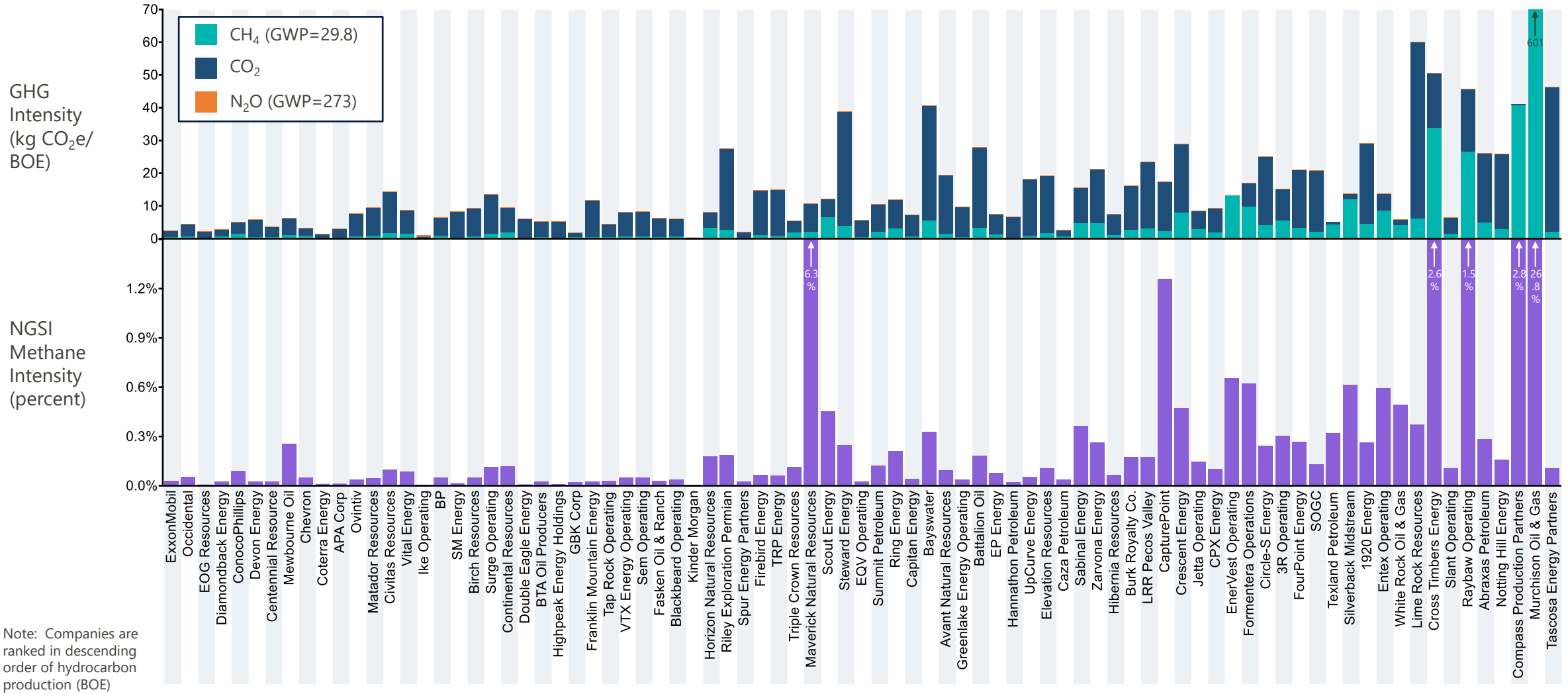


Note: Companies are ranked in descending order of hydrocarbon production (BOE) within basin

Permian Basin Producers

2024 Data

Methane & GHG Intensity (100-year GWP)

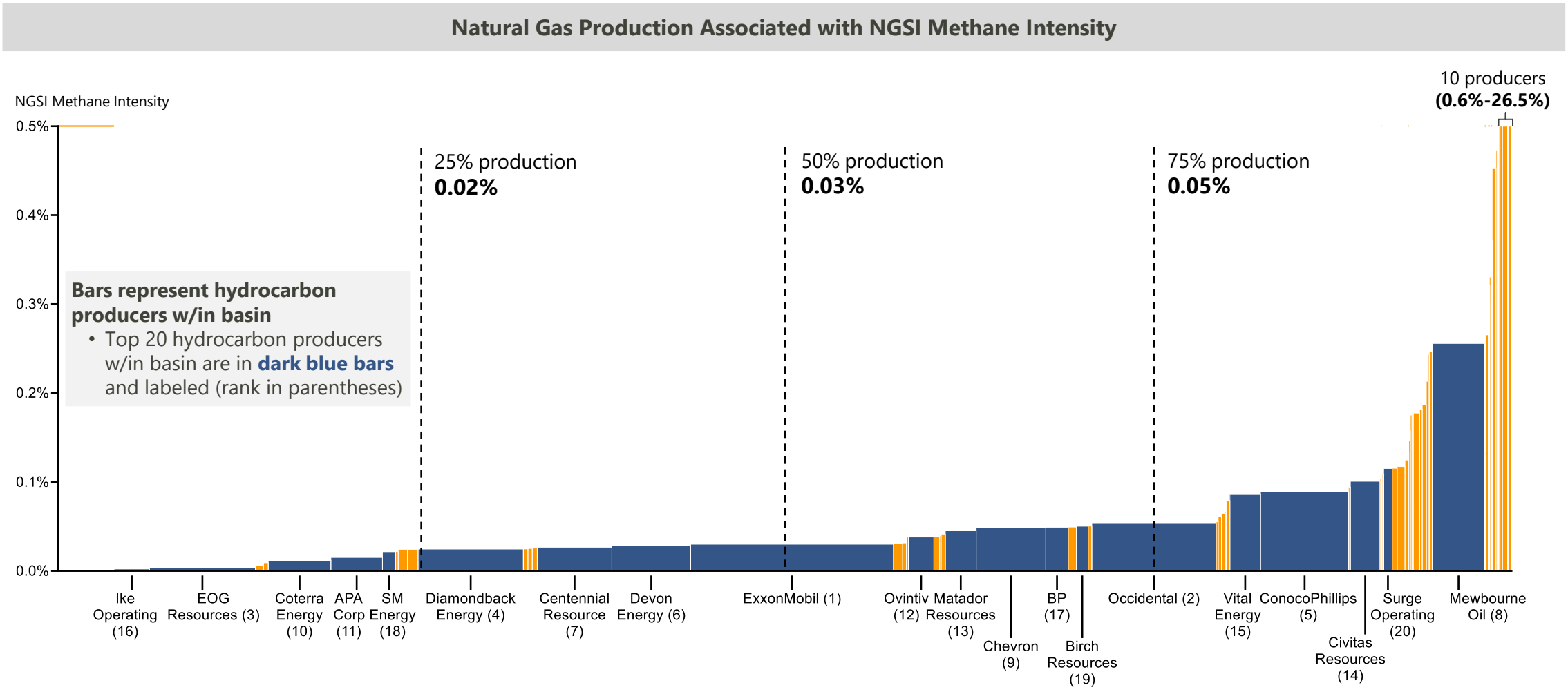


Note: Companies are ranked in descending order of hydrocarbon production (BOE) within basin

Permian Basin Producers

2024 Data

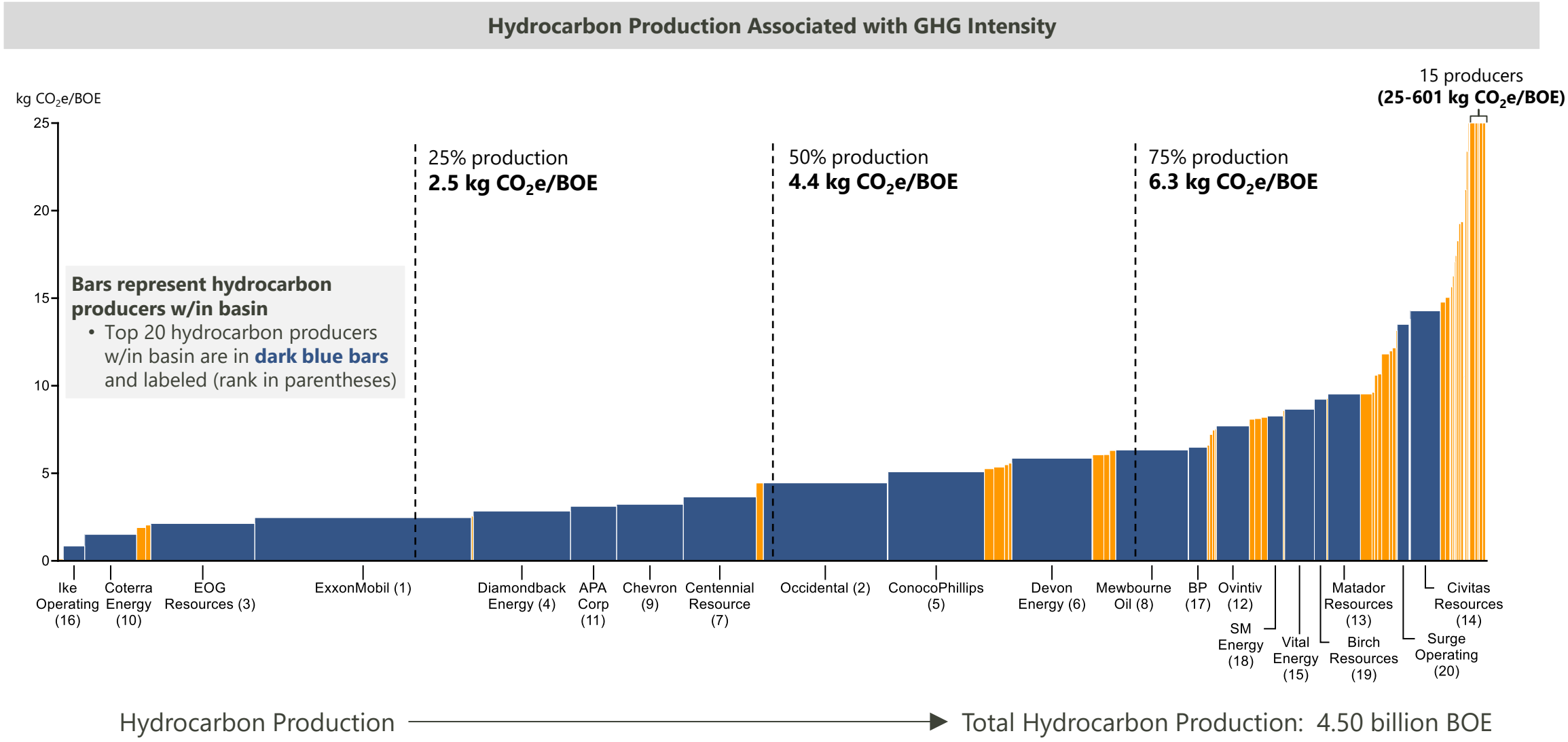
Total GHGRP Natural Gas Production, by Methane Intensity



Permian Basin Producers

2024 Data

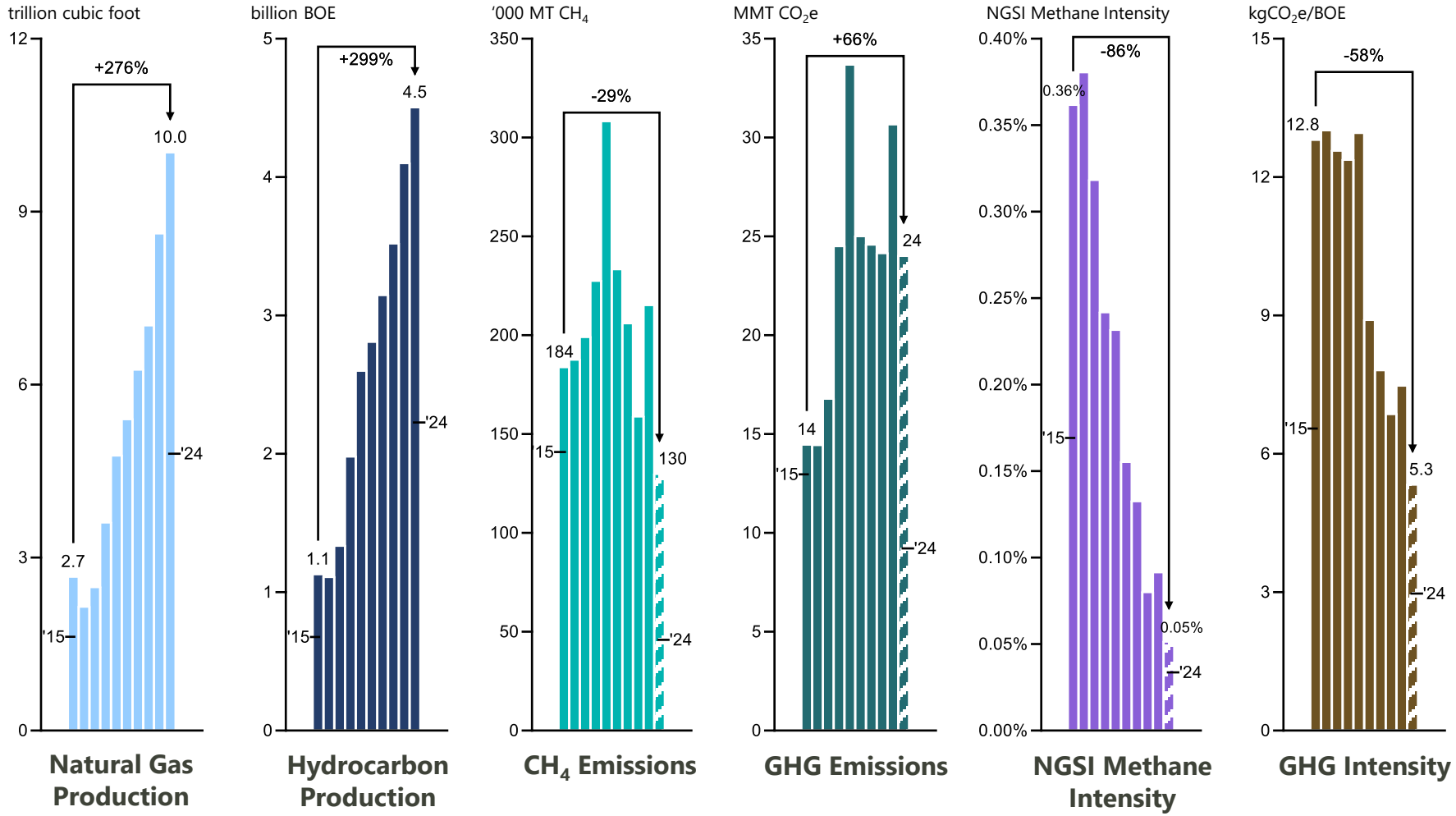
Total GHGRP Hydrocarbon Production, by GHG Intensity



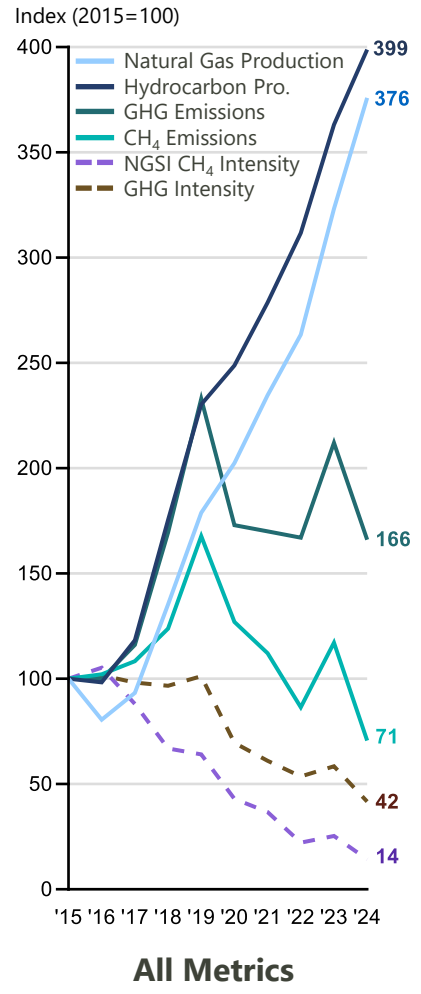
Permian Basin Producers

2015-2024 Trends Analysis: Production & Emissions Metrics

GHGRP Data Trends, 2015-2024
Permian Basin



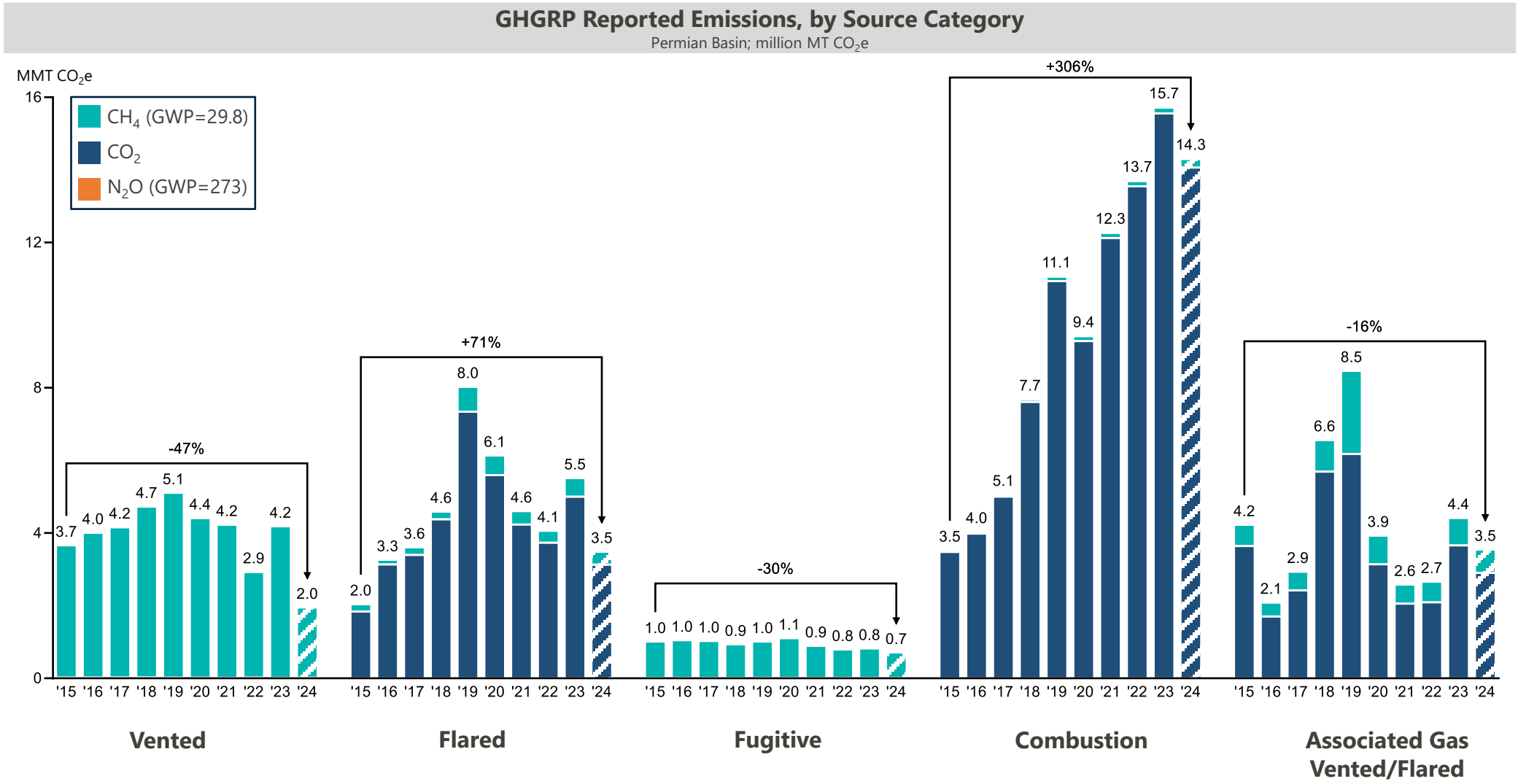
Combined Data Metrics
Indexed; 2015 = 100



Permian Basin Producers

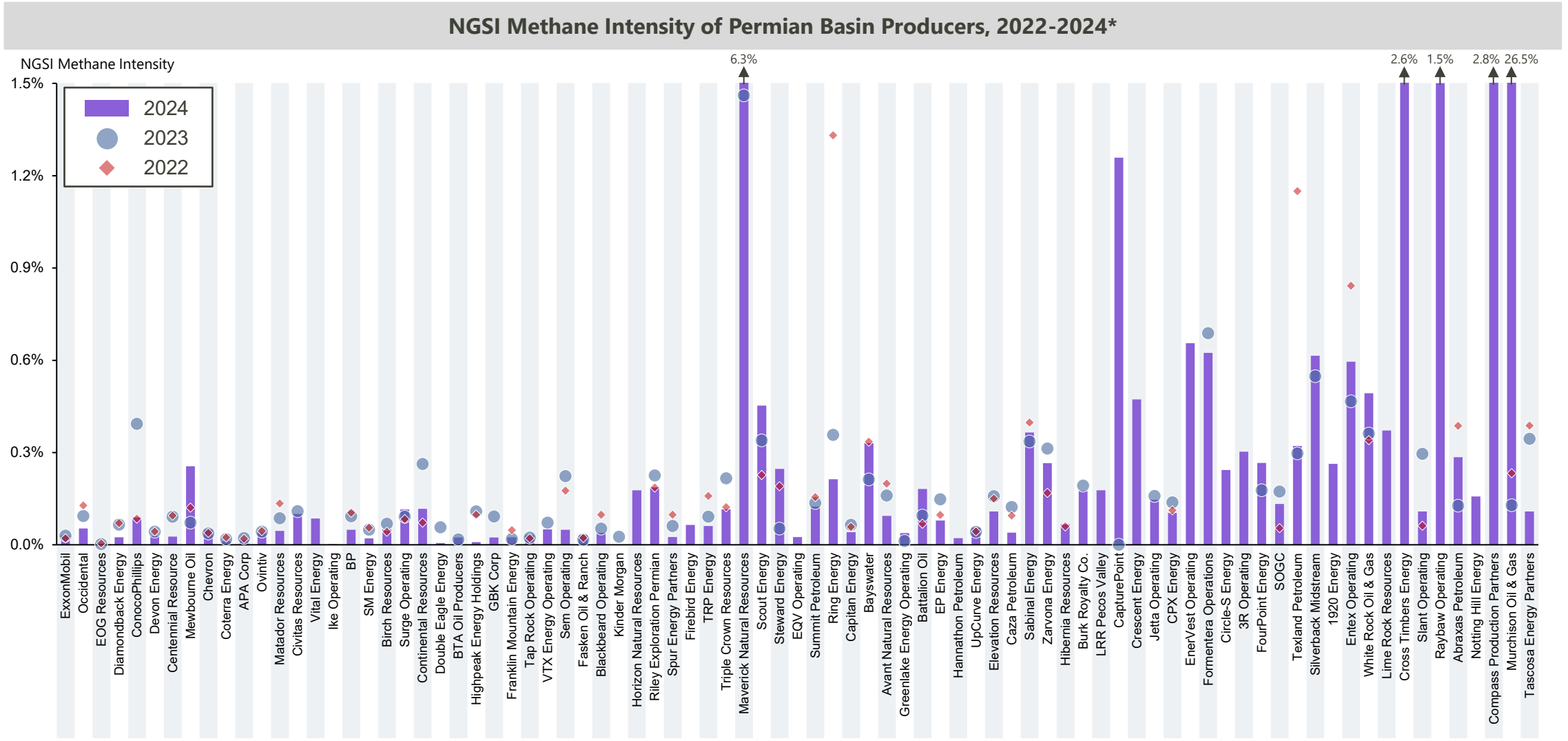
2015-2024 Trends Analysis: Emissions Sources

GHG Emissions (MMT CO_2e)



Permian Basin Producers

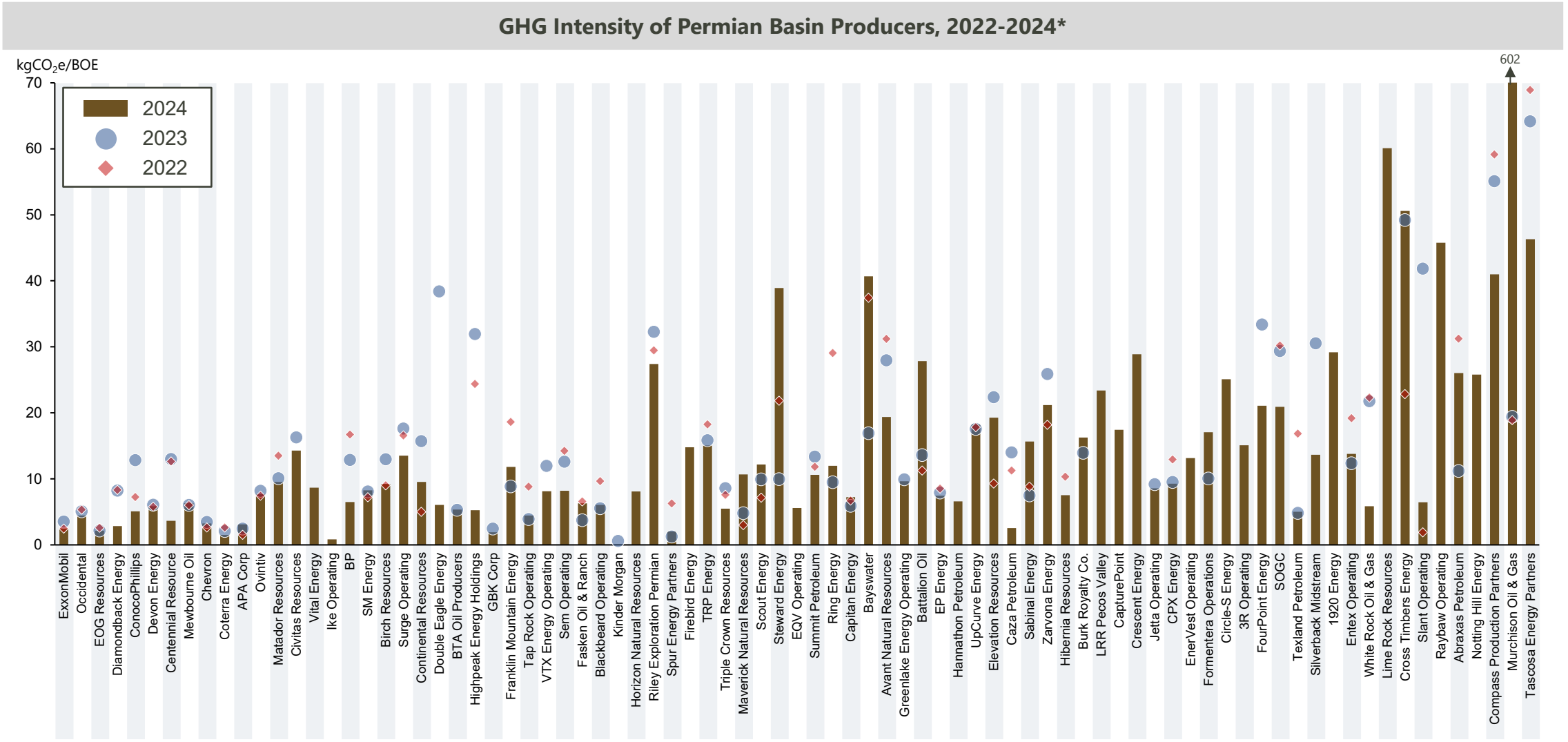
2022-2024 Trends Analysis: Change in Methane Intensity



*Note that some producers in 2024 were not in the EPA database for all three years and may not have data for 2022 and/or 2023.

Permian Basin Producers

2022-2024 Trends Analysis: Change in GHG Intensity



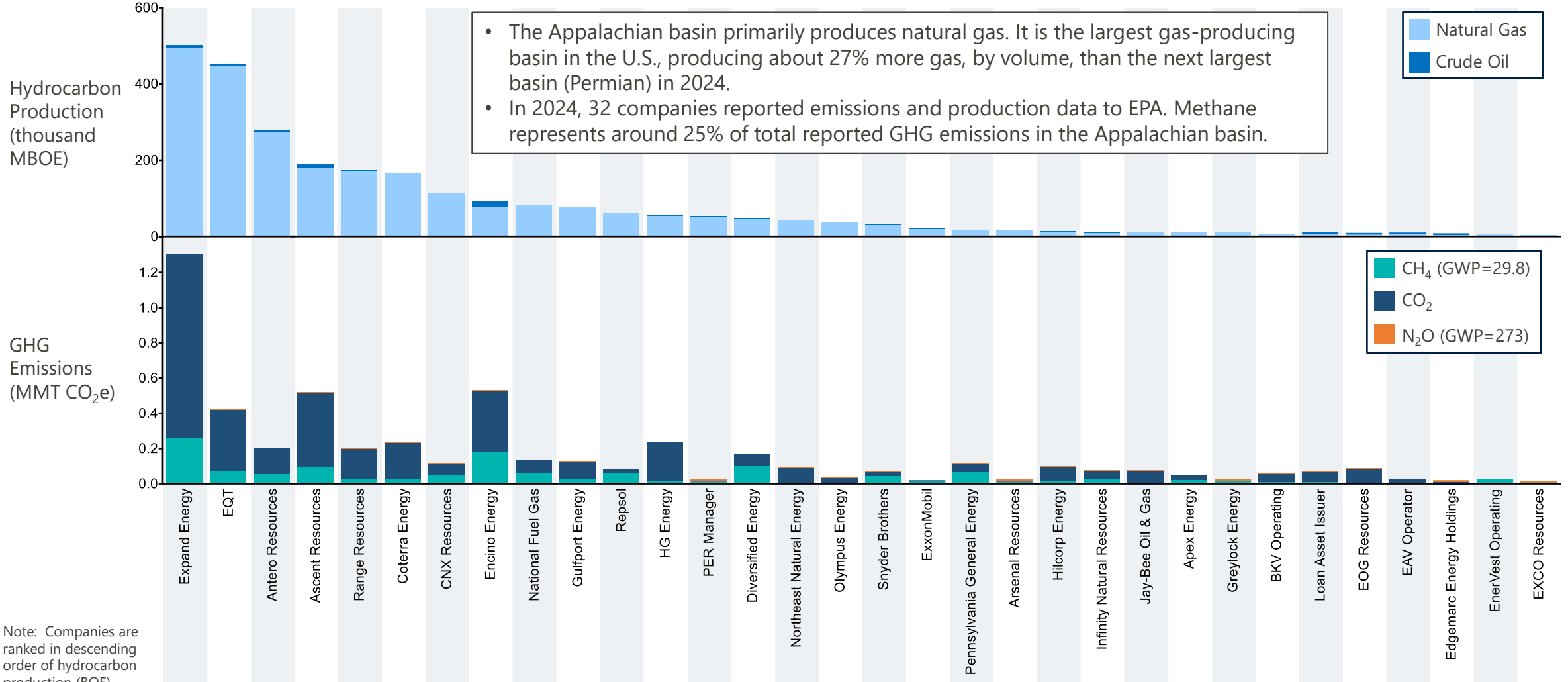
*Note that some producers in 2024 were not in the EPA database for all three years and may not have data for 2022 and/or 2023.

Appalachian Basin Producers

2024 Data

Hydrocarbon Production & Emissions (100-year GWP)

- The Appalachian basin primarily produces natural gas. It is the largest gas-producing basin in the U.S., producing about 27% more gas, by volume, than the next largest basin (Permian) in 2024.
- In 2024, 32 companies reported emissions and production data to EPA. Methane represents around 25% of total reported GHG emissions in the Appalachian basin.

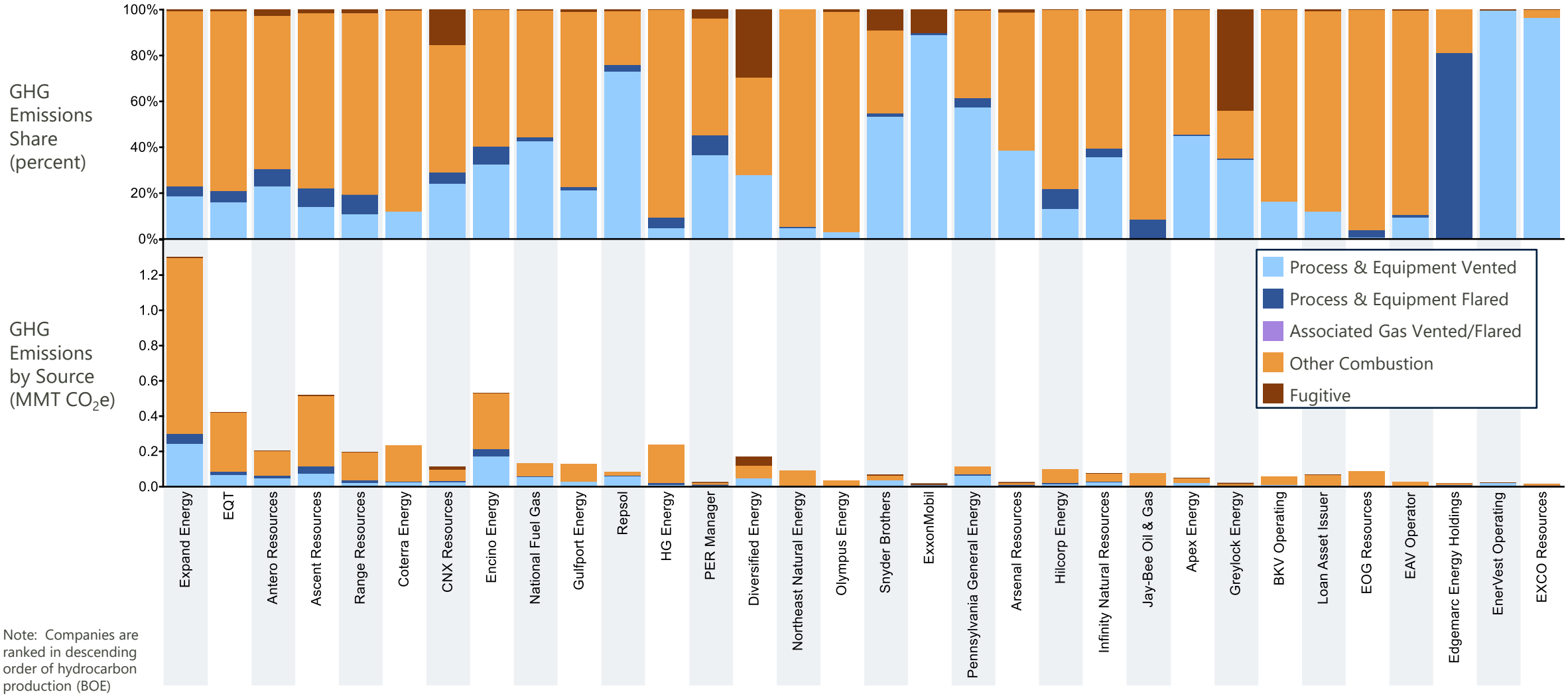


Note: Companies are ranked in descending order of hydrocarbon production (BOE) within basin

Appalachian Basin Producers

2024 Data

GHG Emissions by Source (100-year GWP)

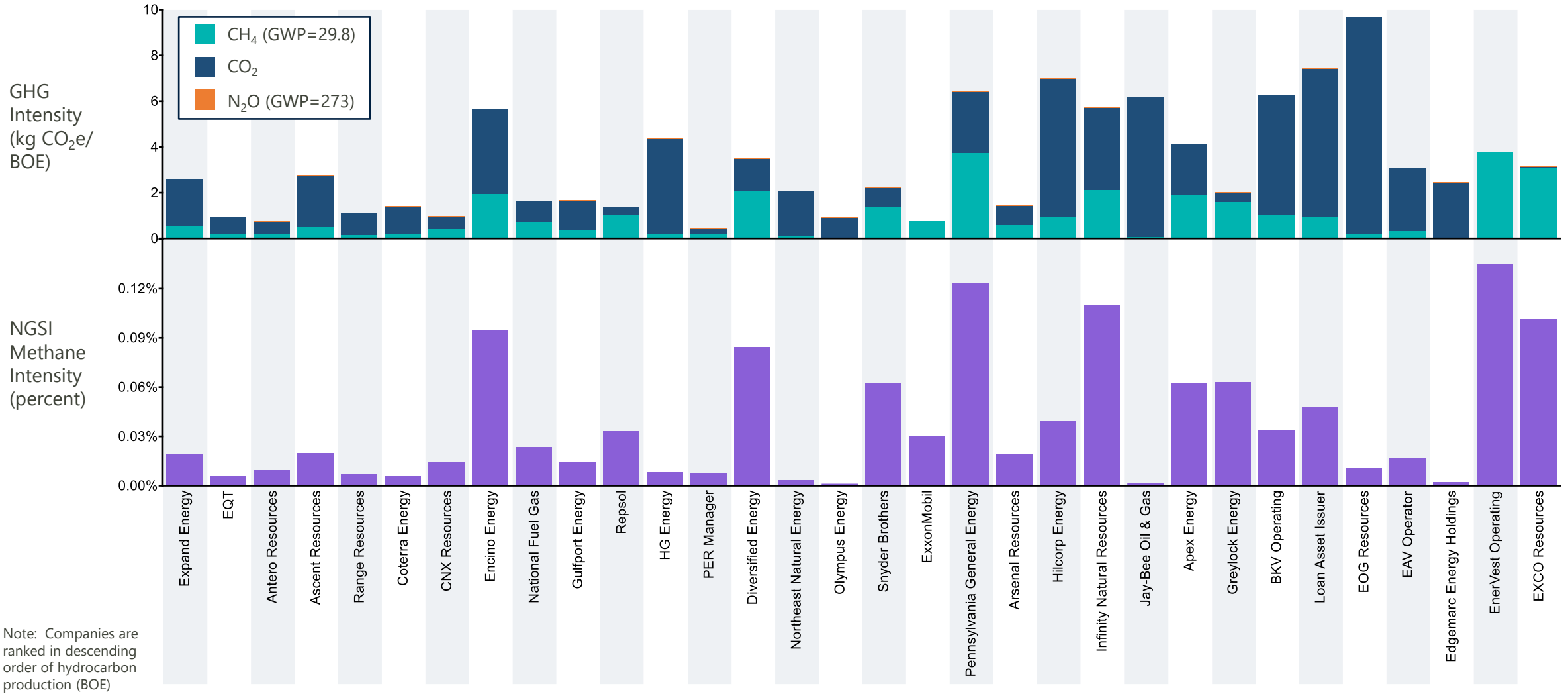


Note: Companies are ranked in descending order of hydrocarbon production (BOE) within basin

Appalachian Basin Producers

2024 Data

Methane & GHG Intensity (100-year GWP)



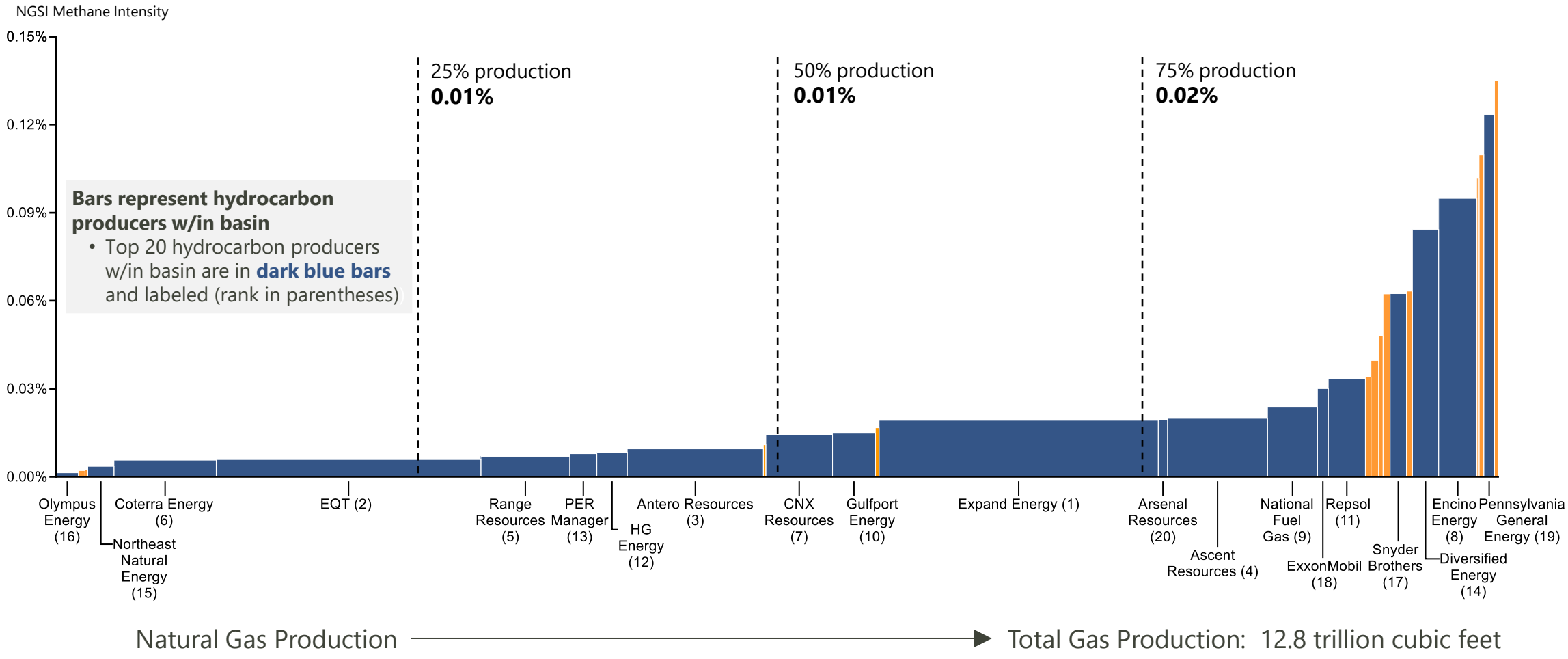
Note: Companies are ranked in descending order of hydrocarbon production (BOE) within basin

Appalachian Basin Producers

2024 Data

Total GHGRP Natural Gas Production, by Methane Intensity

Natural Gas Production Associated with NGSI Methane Intensity



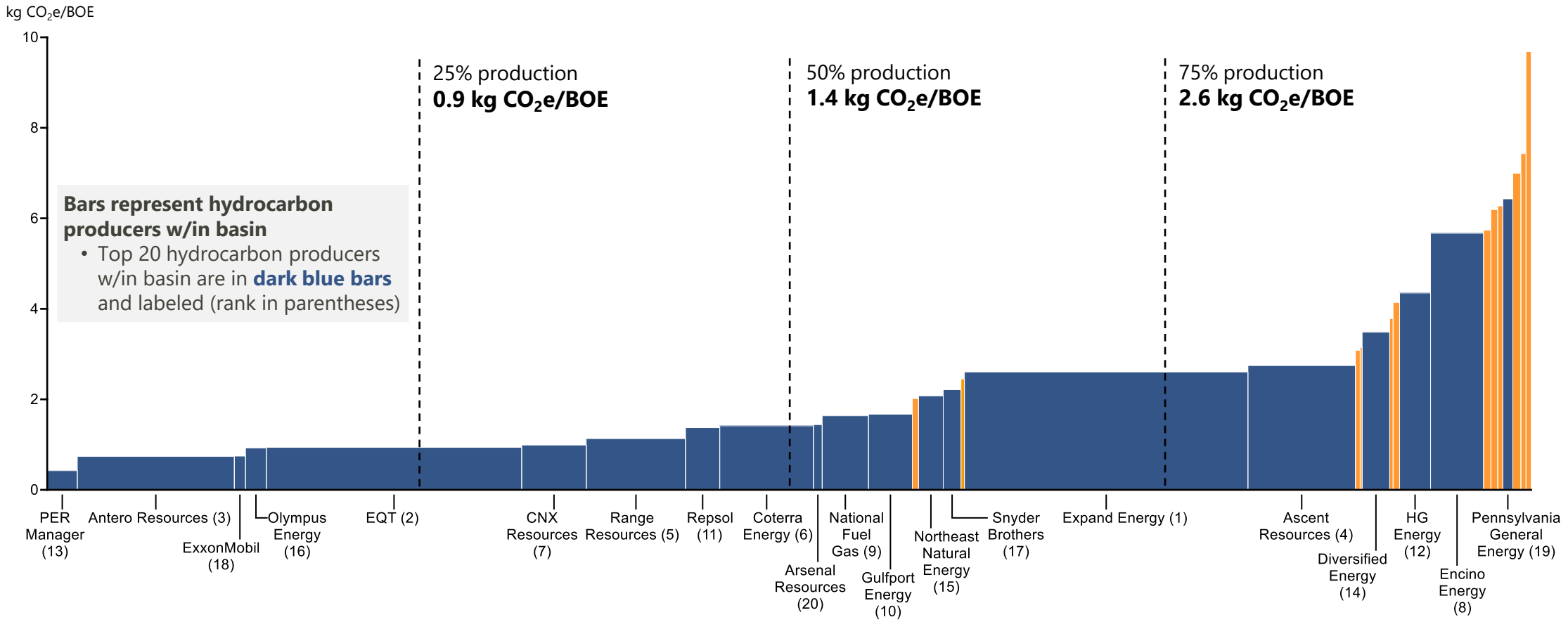
Natural Gas Production → Total Gas Production: 12.8 trillion cubic feet

Appalachian Basin Producers

2024 Data

Total GHGRP Hydrocarbon Production, by GHG Intensity

Hydrocarbon Production Associated with GHG Intensity



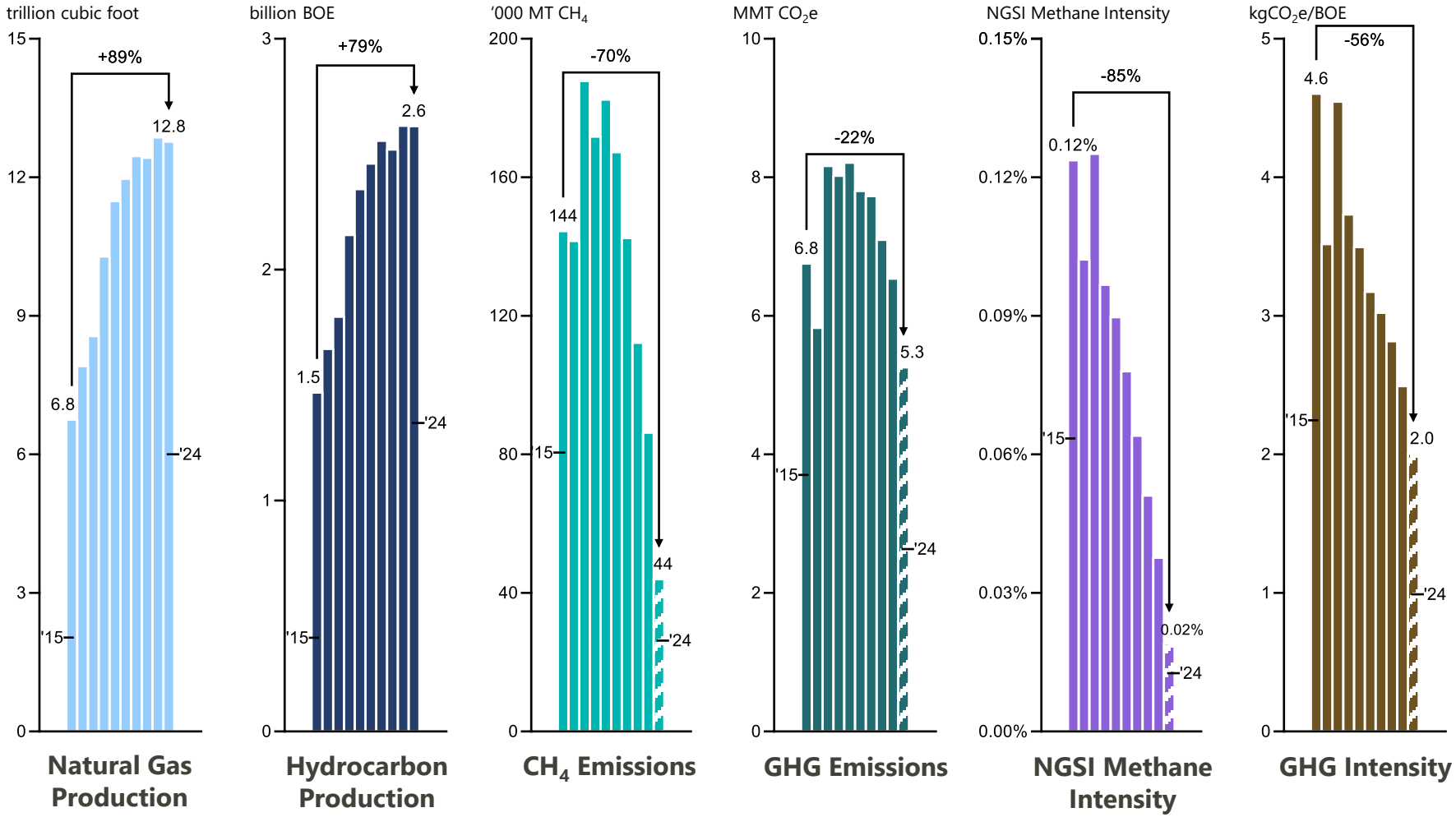
Hydrocarbon Production → Total Hydrocarbon Production: 2.62 billion BOE

Appalachian Basin Producers

2015-2024 Trends Analysis: Production & Emissions Metrics

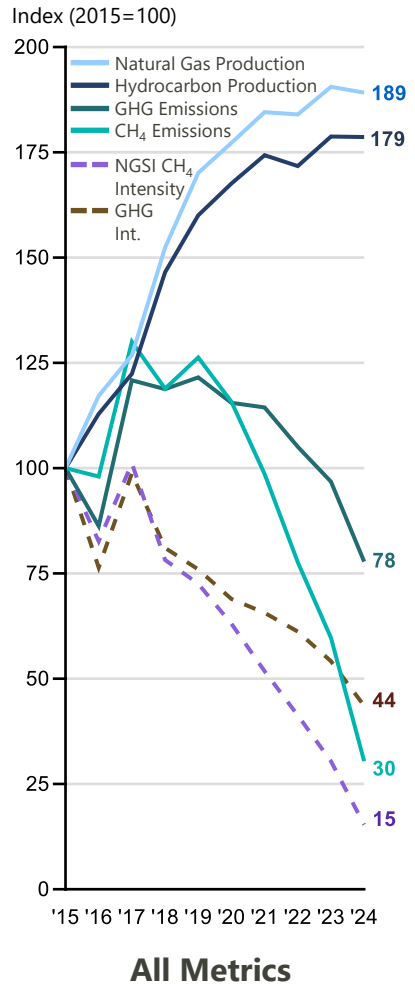
GHGRP Data Trends, 2015-2024

Appalachian Basin



Combined Data Metrics

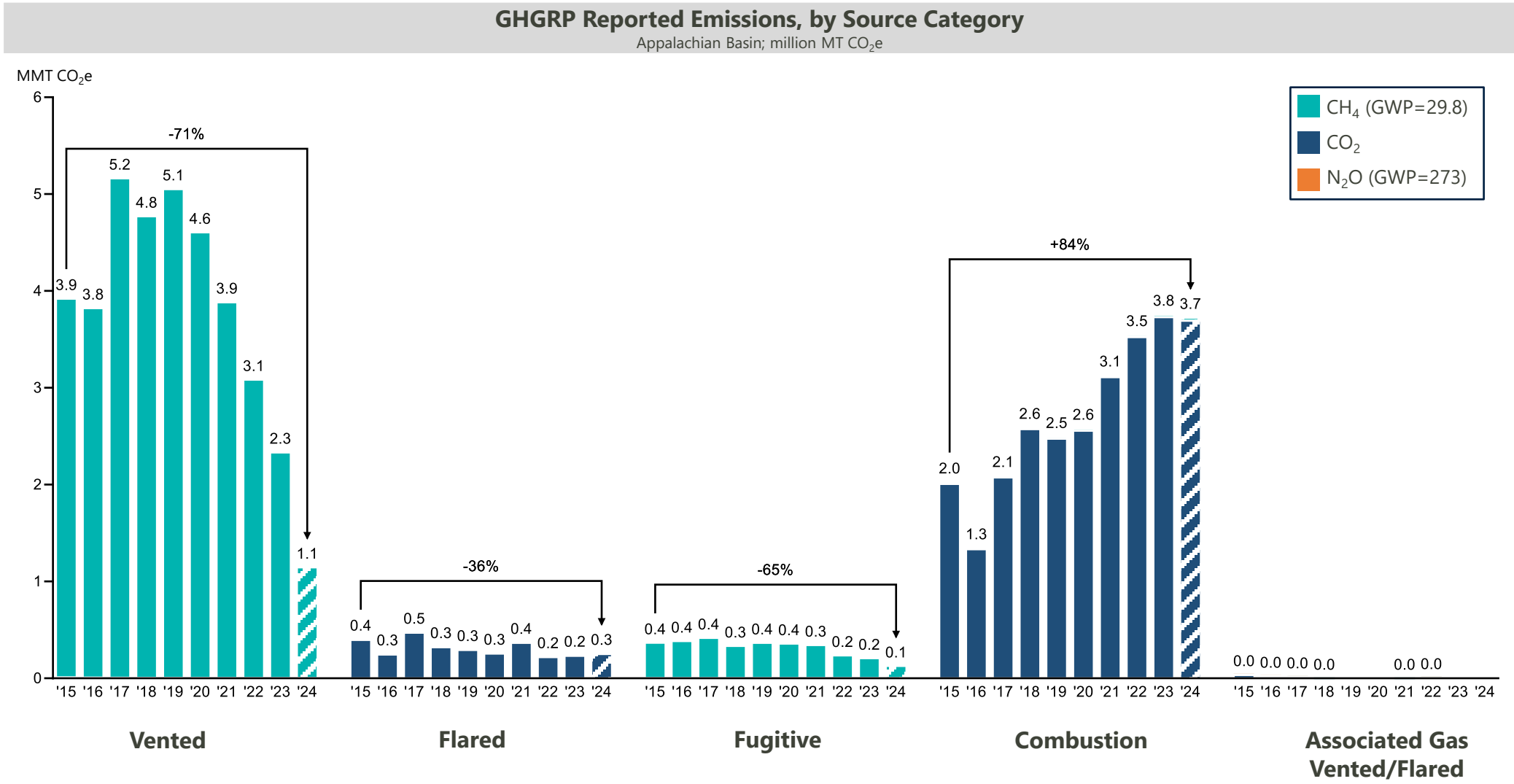
Indexed; 2015 = 100



Appalachian Basin Producers

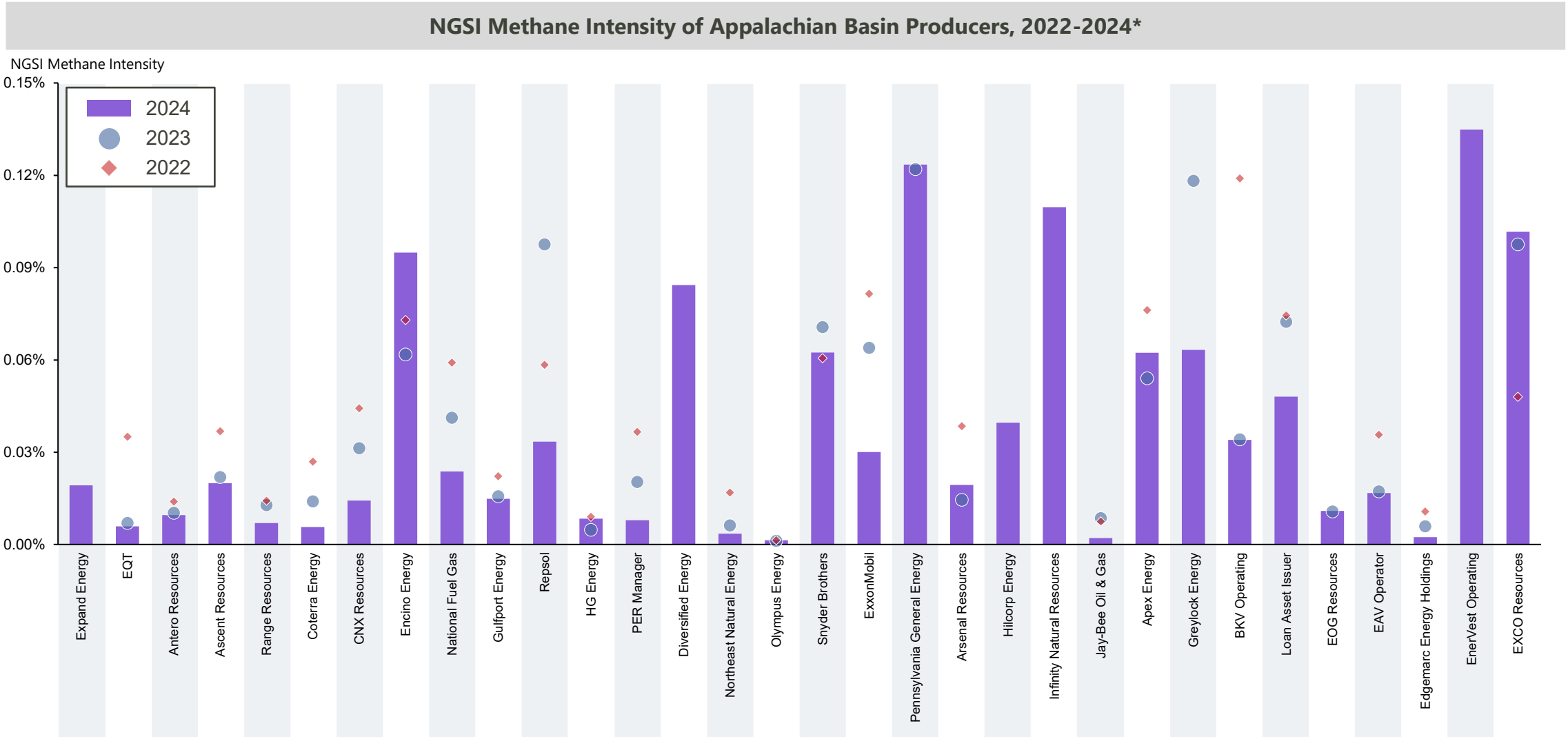
2015-2024 Trends Analysis: Emissions Sources

GHG Emissions (MMT CO_2e)



Appalachian Basin Producers

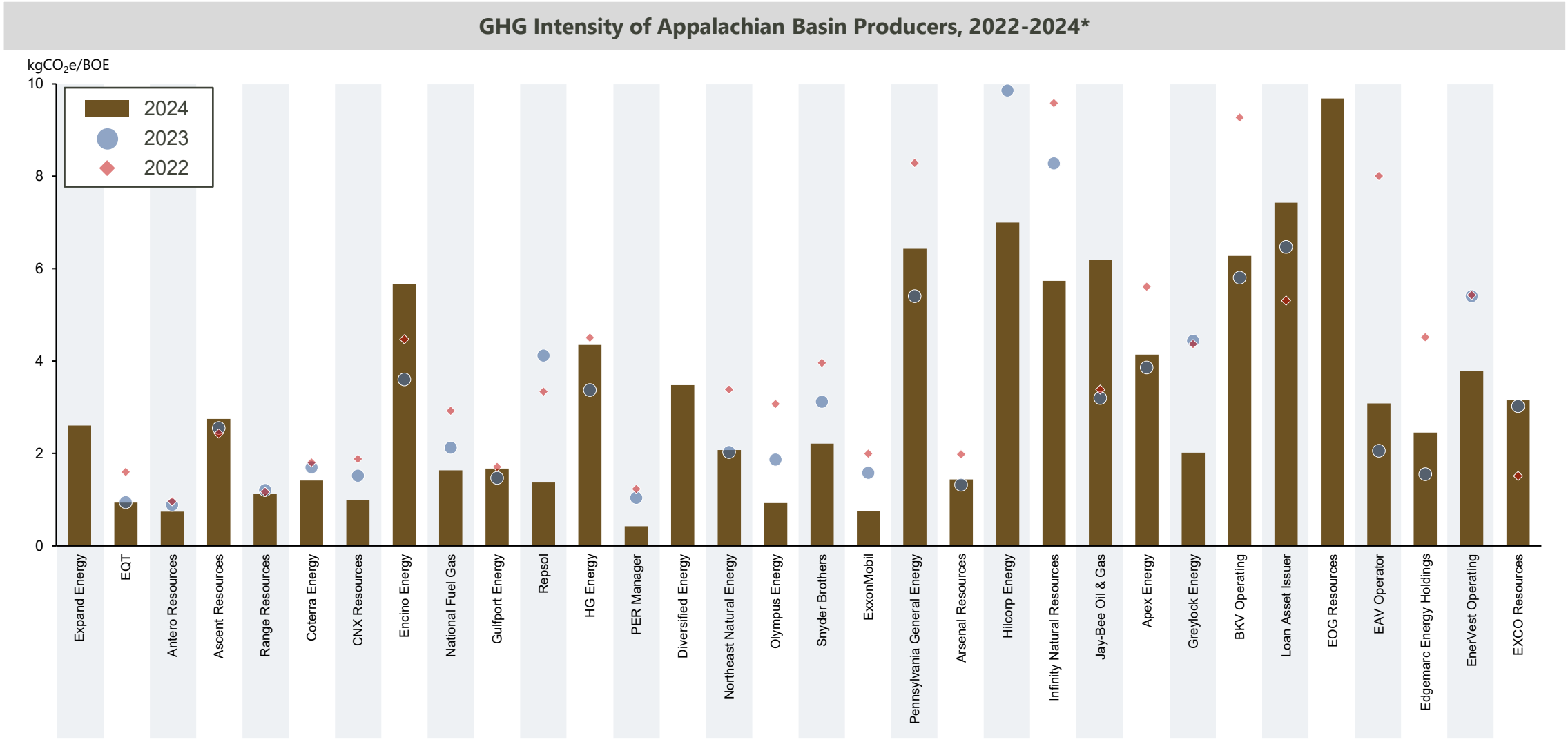
2022-2024 Trends Analysis: Change in Methane Intensity



*Note that some producers in 2024 were not in the EPA database for all three years and may not have data for 2022 and/or 2023.

Appalachian Basin Producers

2022-2024 Trends Analysis: Change in GHG Intensity



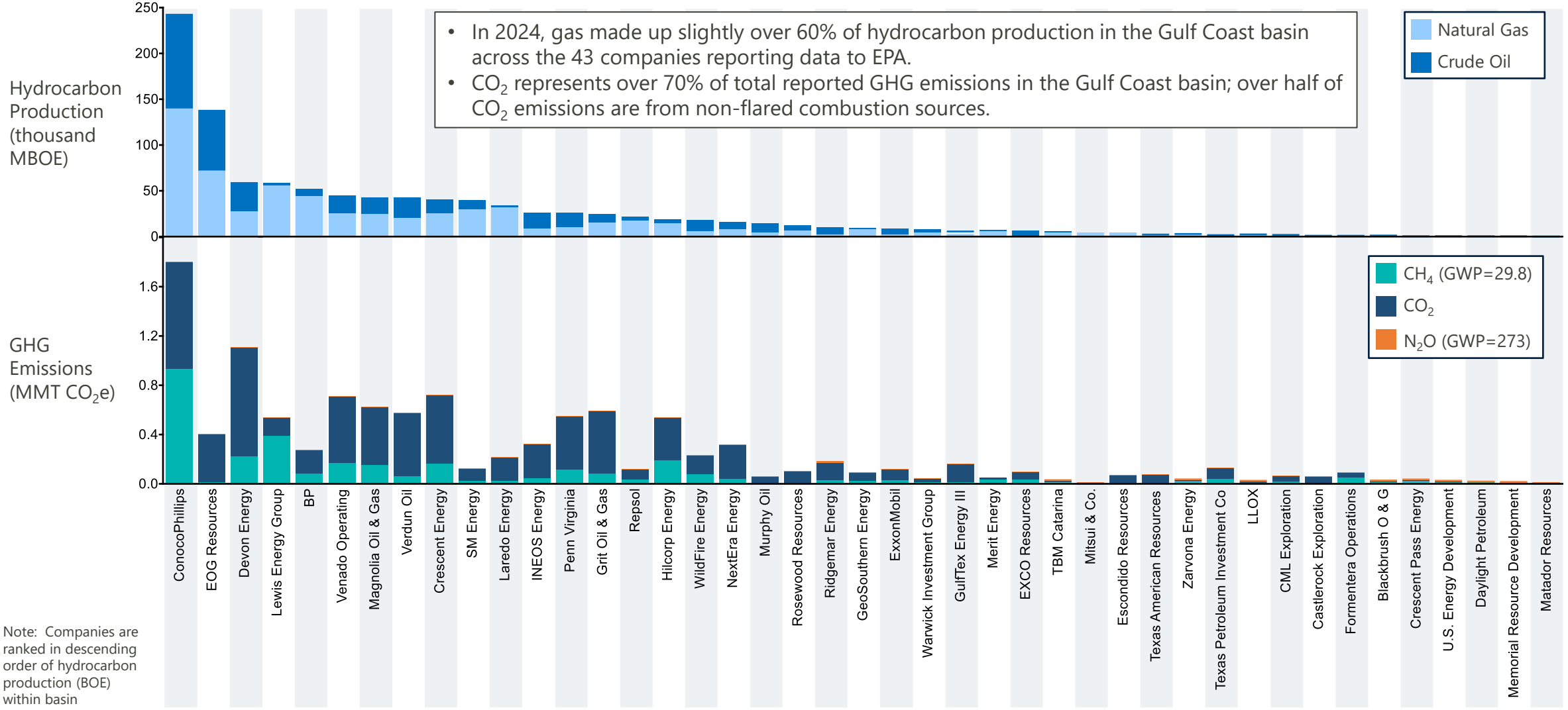
*Note that some producers in 2024 were not in the EPA database for all three years and may not have data for 2022 and/or 2023.

Gulf Coast Basin Producers

2024 Data

Hydrocarbon Production & Emissions (100-year GWP)

- In 2024, gas made up slightly over 60% of hydrocarbon production in the Gulf Coast basin across the 43 companies reporting data to EPA.
- CO_2 represents over 70% of total reported GHG emissions in the Gulf Coast basin; over half of CO_2 emissions are from non-flared combustion sources.

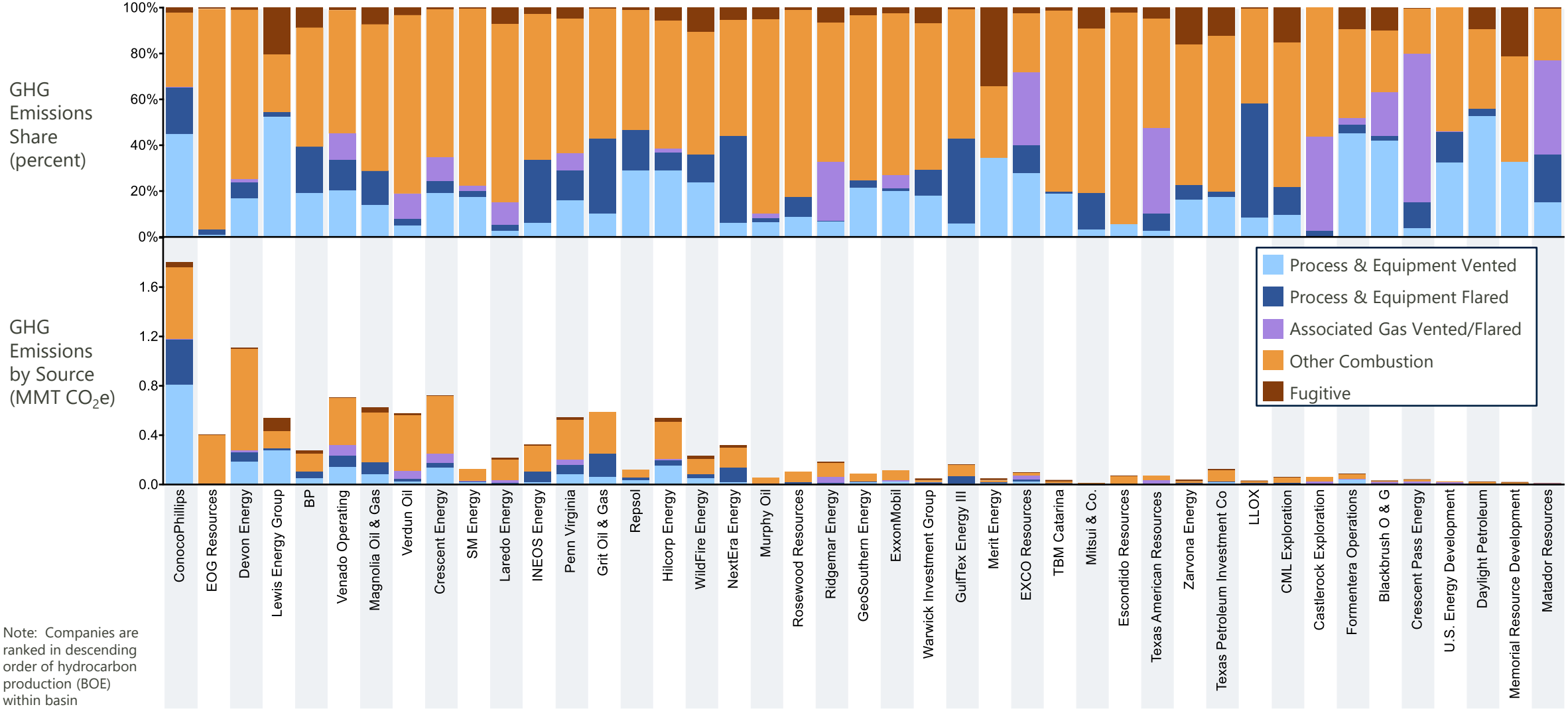


Note: Companies are ranked in descending order of hydrocarbon production (BOE) within basin

Gulf Coast Basin Producers

2024 Data

GHG Emissions by Source (100-year GWP)

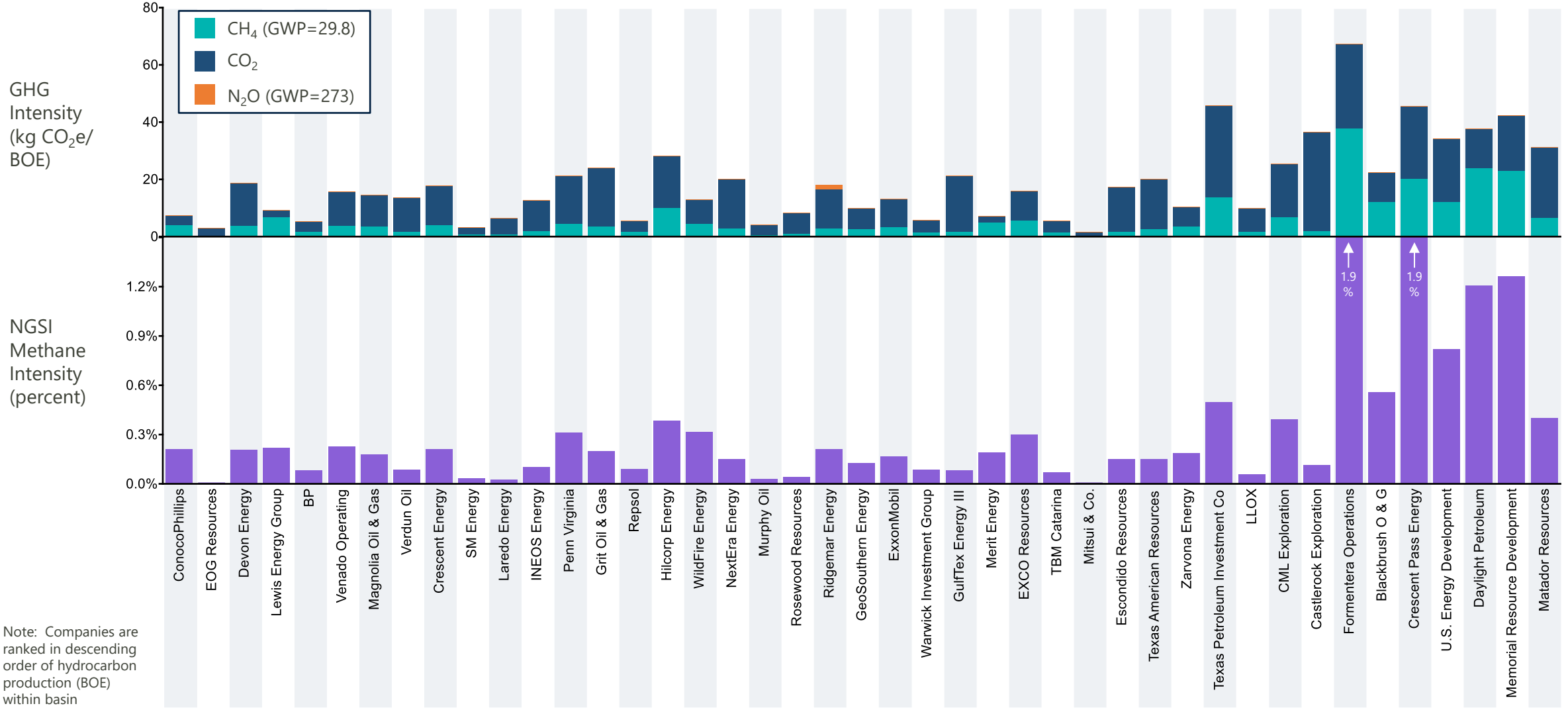


Note: Companies are ranked in descending order of hydrocarbon production (BOE) within basin

Gulf Coast Basin Producers

2024 Data

Methane & GHG Intensity (100-year GWP)

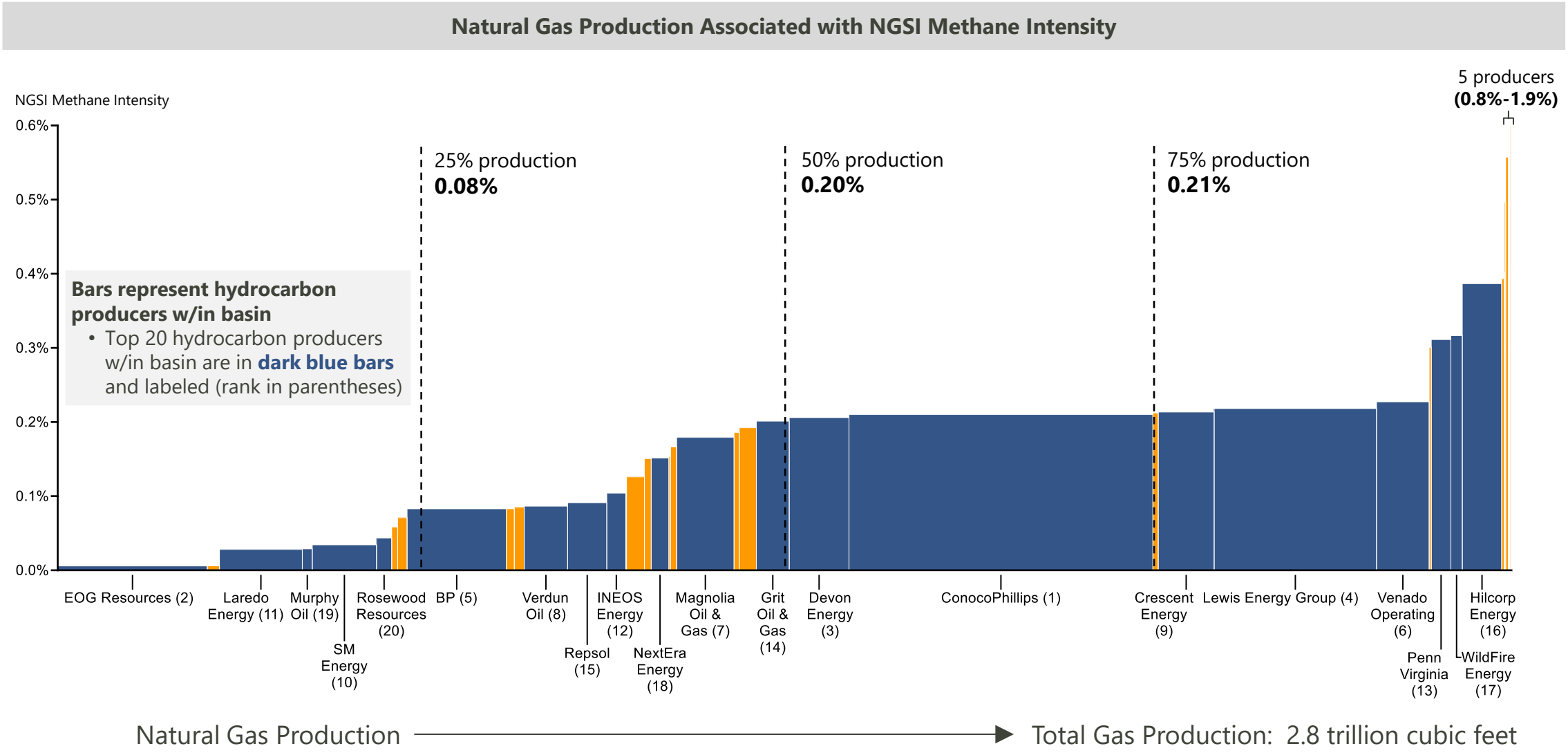


Note: Companies are ranked in descending order of hydrocarbon production (BOE) within basin

Gulf Coast Basin Producers

2024 Data

Total GHGRP Natural Gas Production, by Methane Intensity

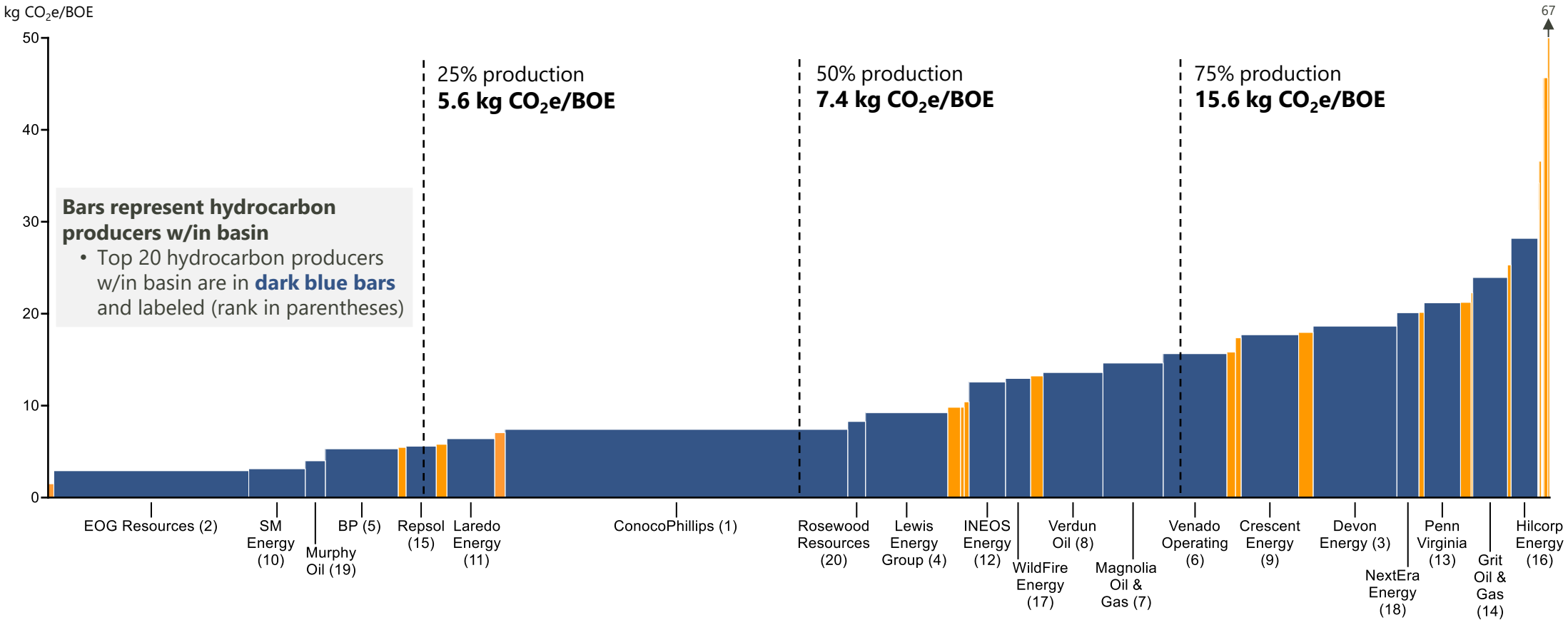


Gulf Coast Basin Producers

2024 Data

Total GHGRP Hydrocarbon Production, by GHG Intensity

Hydrocarbon Production Associated with GHG Intensity

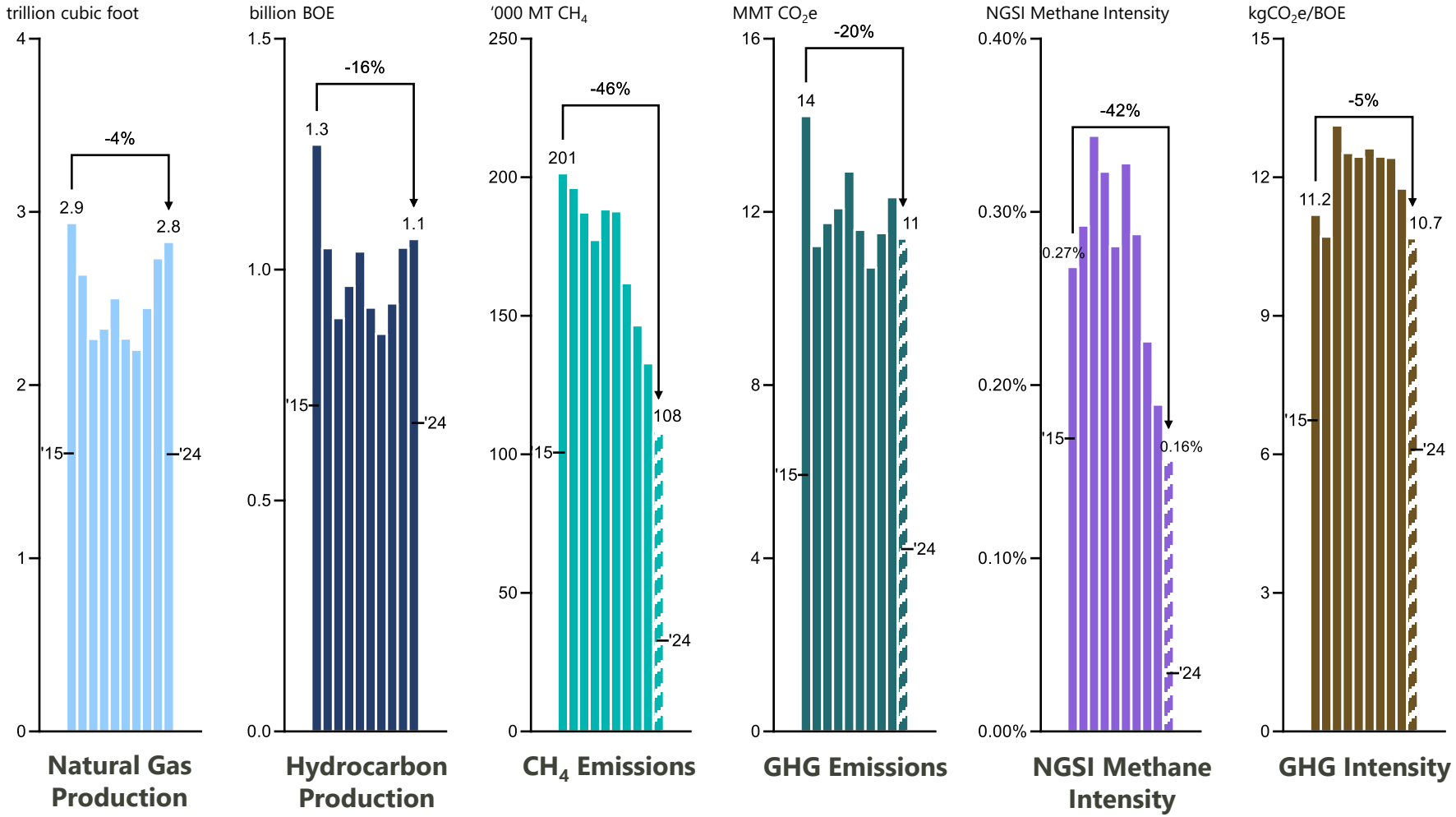


Hydrocarbon Production → Total Hydrocarbon Production: 1.07 billion BOE

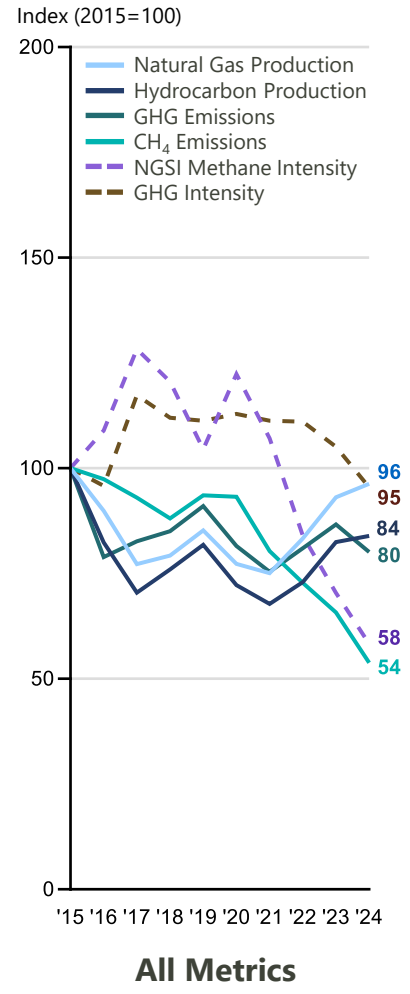
Gulf Coast Basin Producers

2015-2024 Trends Analysis: Production & Emissions Metrics

GHGRP Data Trends, 2015-2024
Gulf Coast Basin



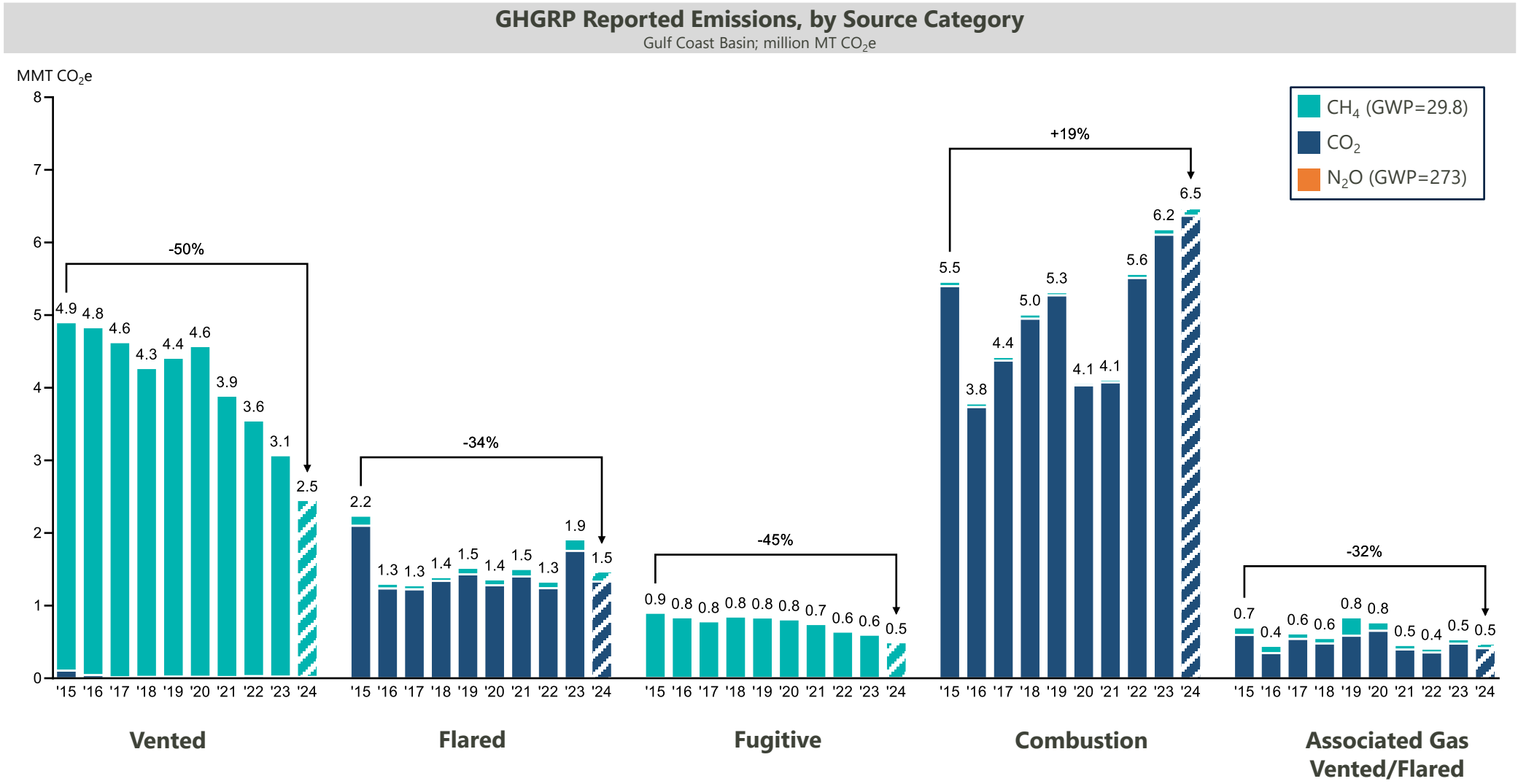
Combined Data Metrics
Indexed; 2015 = 100



Gulf Coast Basin Producers

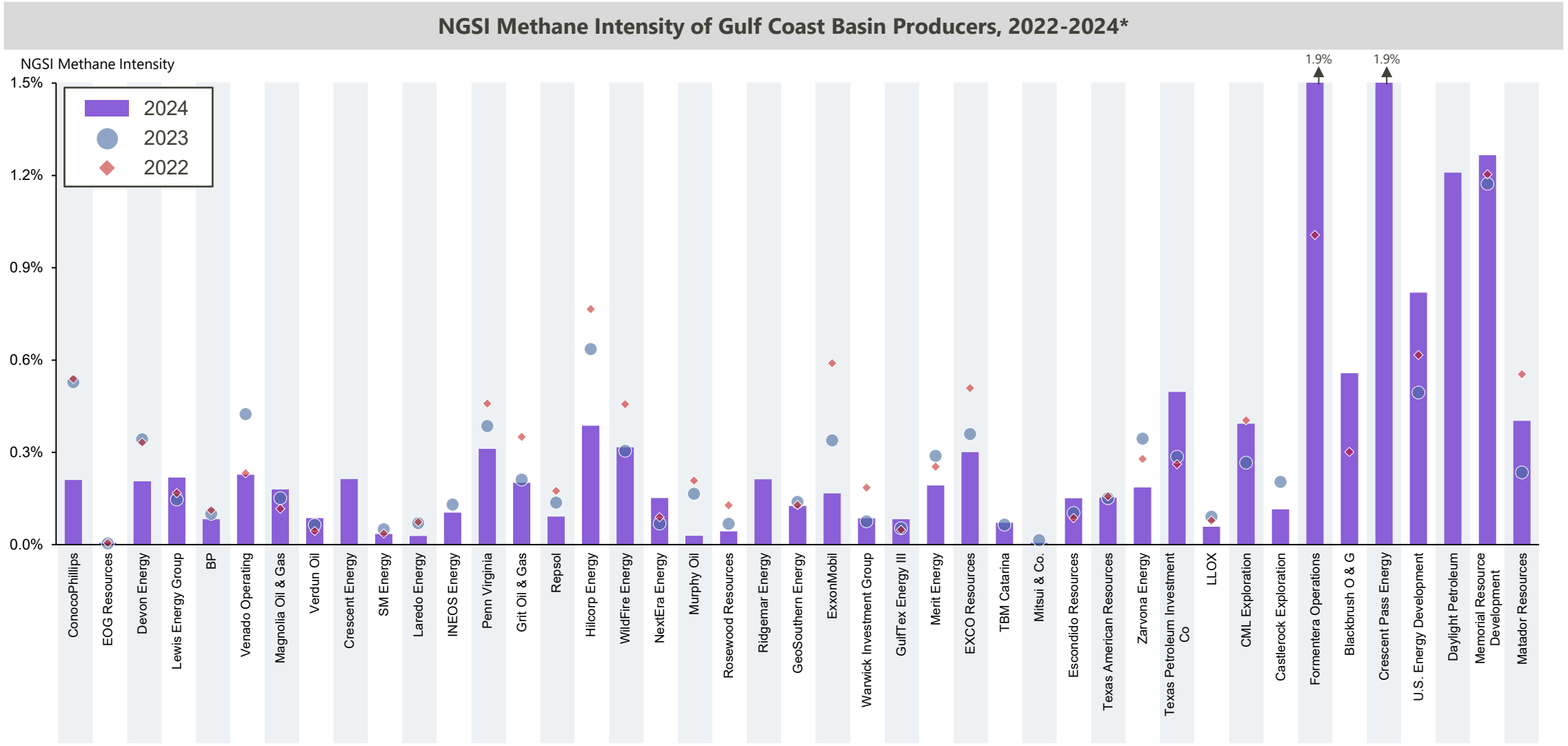
2015-2024 Trends Analysis: Emissions Sources

GHG Emissions (MMT CO_2e)



Gulf Coast Basin Producers

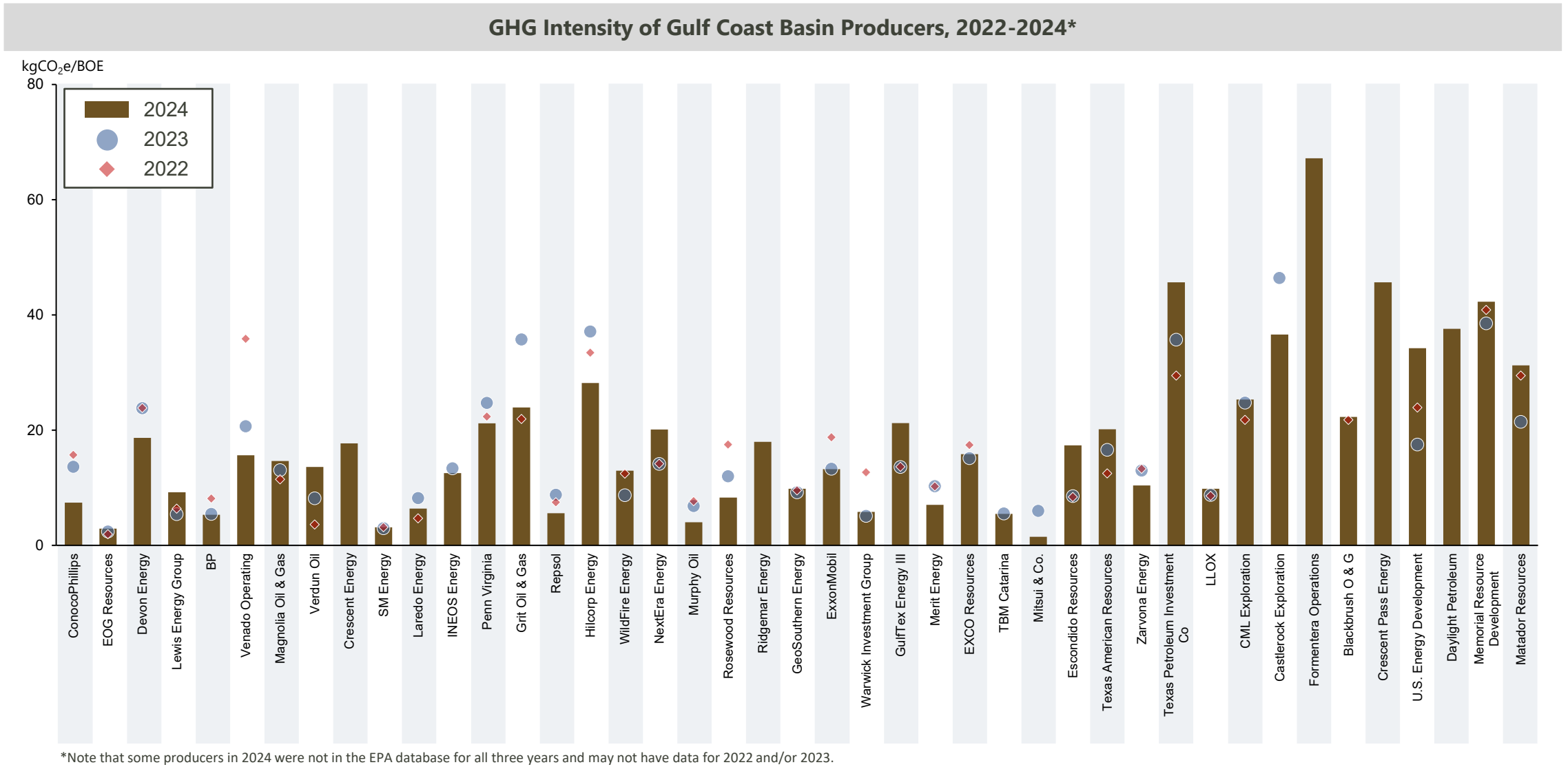
2022-2024 Trends Analysis: Change in Methane Intensity



*Note that some producers in 2024 were not in the EPA database for all three years and may not have data for 2022 and/or 2023.

Gulf Coast Basin Producers

2022-2024 Trends Analysis: Change in GHG Intensity



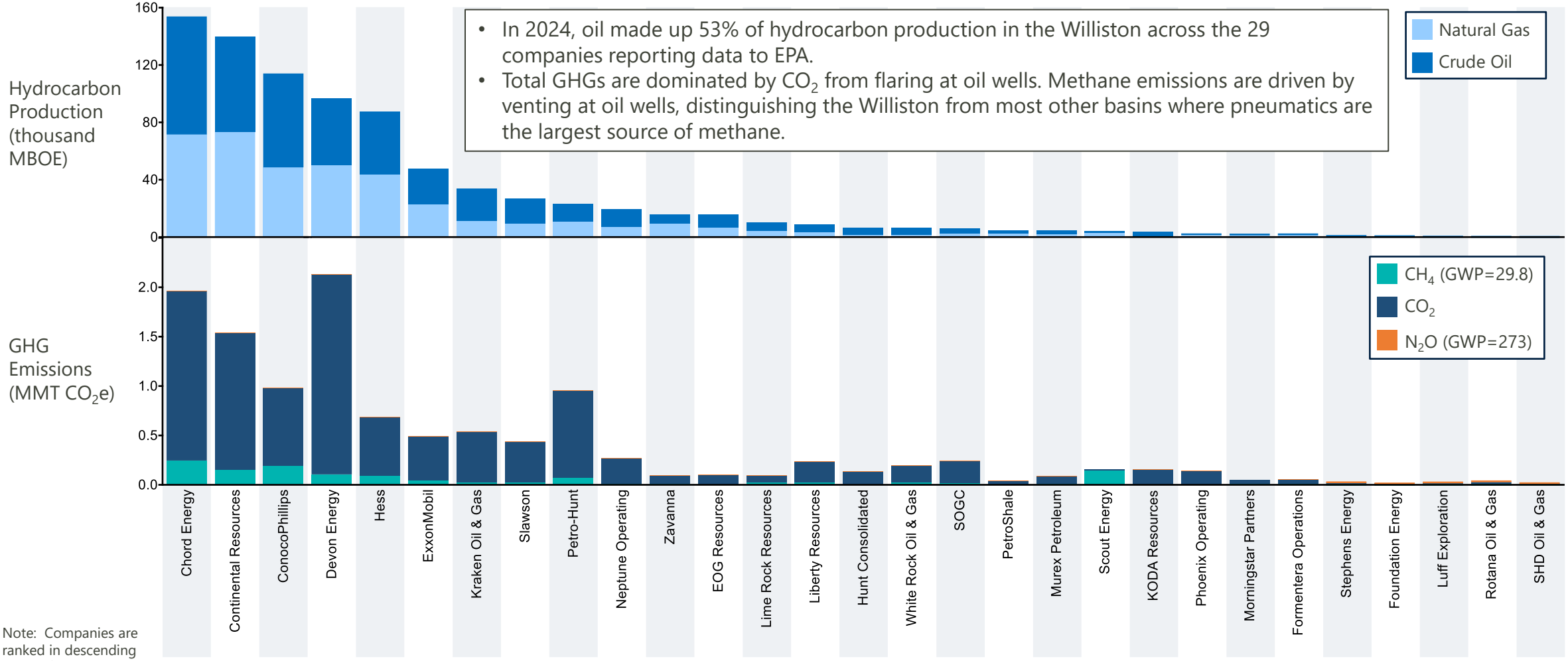
*Note that some producers in 2024 were not in the EPA database for all three years and may not have data for 2022 and/or 2023.

Williston Basin Producers

2024 Data

Hydrocarbon Production & Emissions (100-year GWP)

- In 2024, oil made up 53% of hydrocarbon production in the Williston across the 29 companies reporting data to EPA.
- Total GHGs are dominated by CO_2 from flaring at oil wells. Methane emissions are driven by venting at oil wells, distinguishing the Williston from most other basins where pneumatics are the largest source of methane.

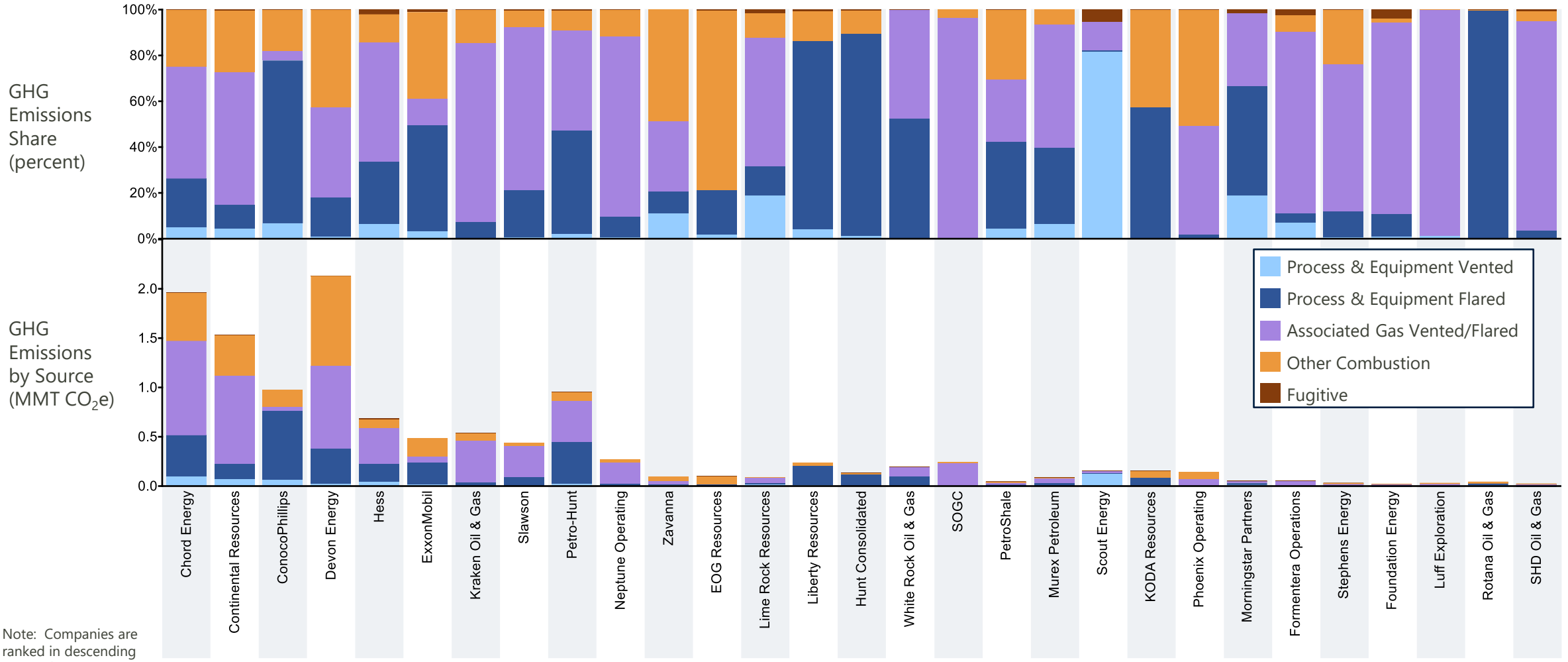


Note: Companies are ranked in descending order of hydrocarbon production (BOE) within basin

Williston Basin Producers

2024 Data

GHG Emissions by Source (100-year GWP)

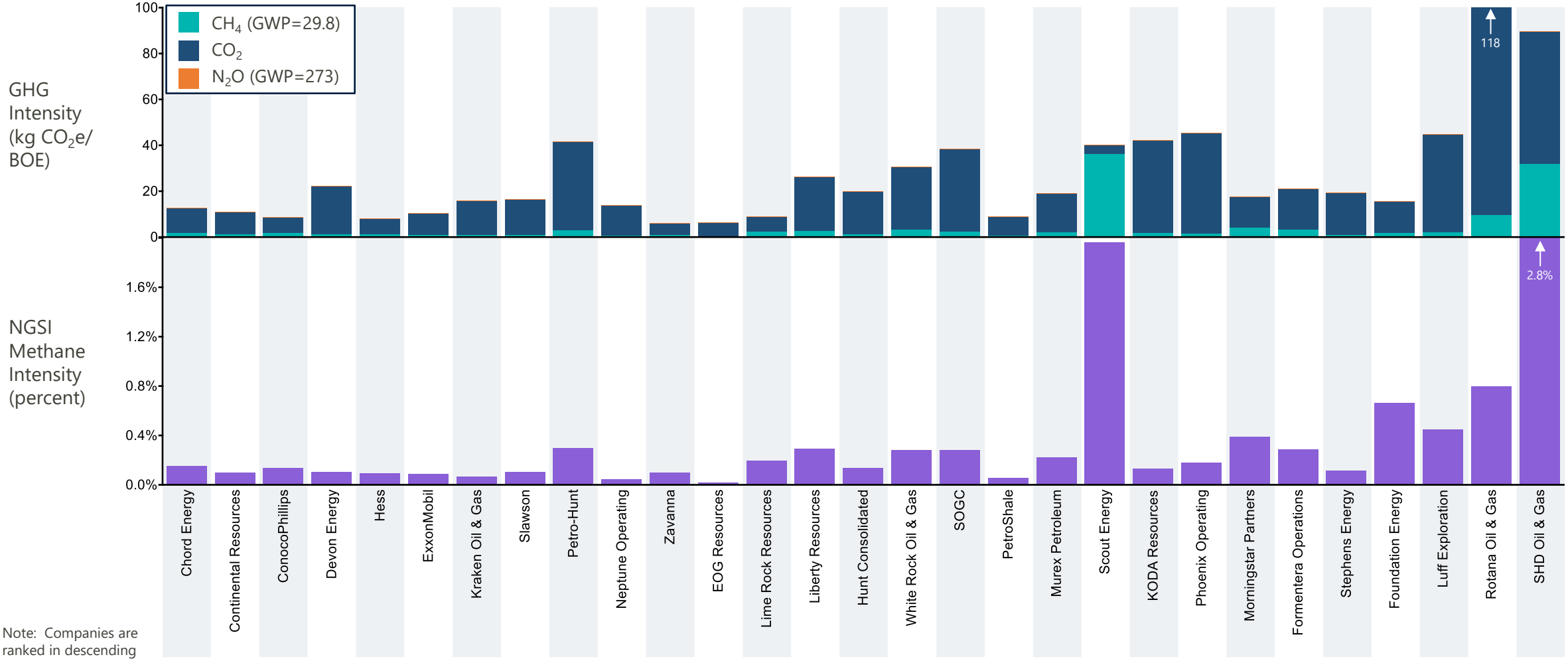


Note: Companies are ranked in descending order of hydrocarbon production (BOE) within basin

Williston Basin Producers

2024 Data

Methane & GHG Intensity (100-year GWP)

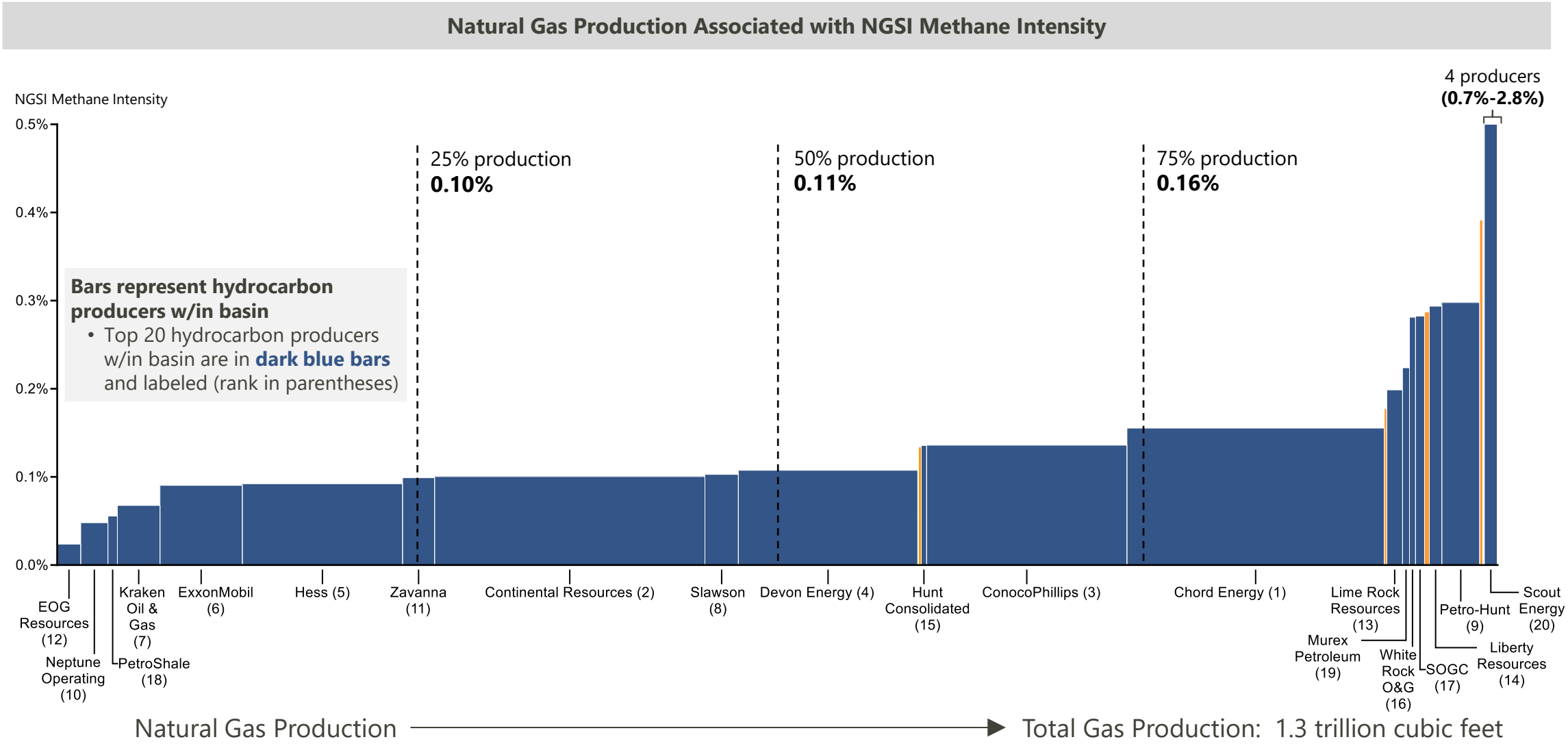


Note: Companies are ranked in descending order of hydrocarbon production (BOE) within basin

Williston Basin Producers

2024 Data

Total GHGRP Natural Gas Production, by Methane Intensity

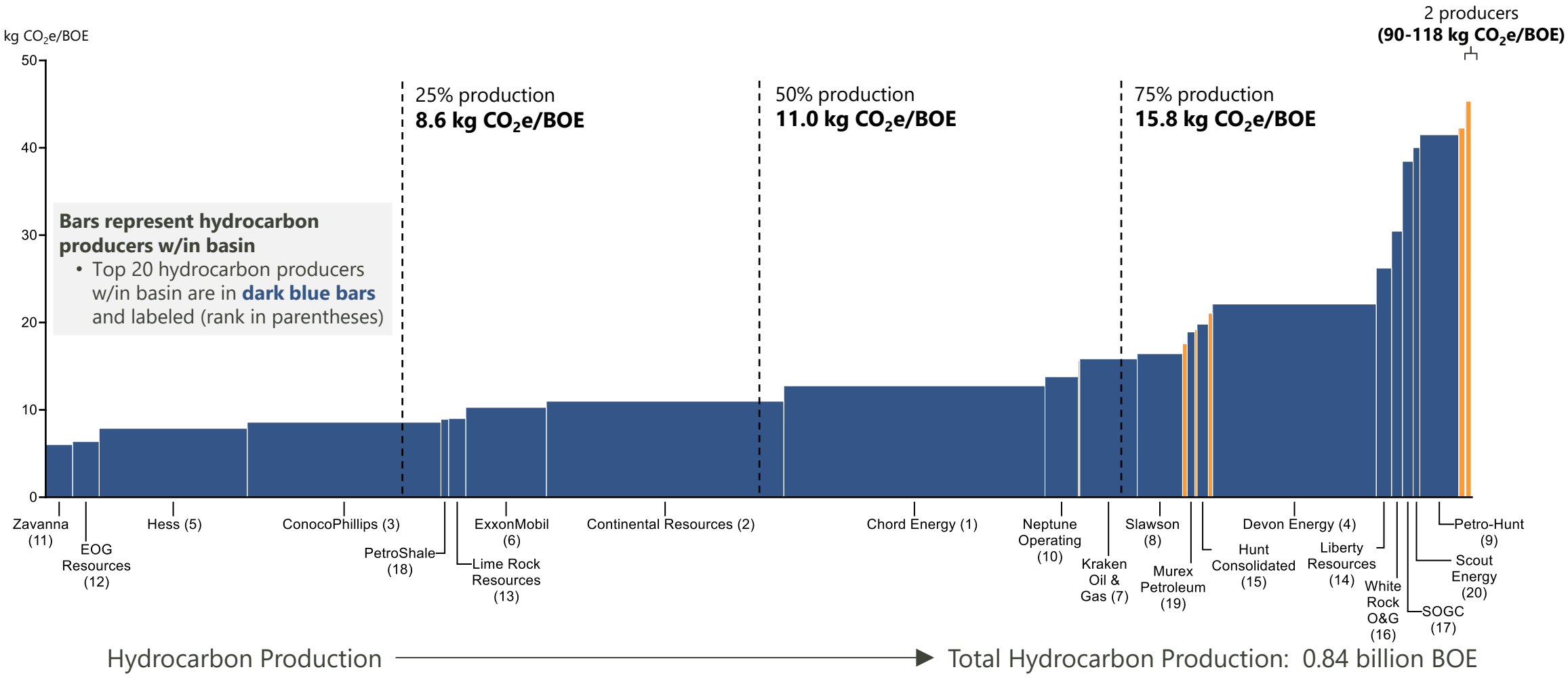


Williston Basin Producers

2024 Data

Total GHGRP Hydrocarbon Production, by GHG Intensity

Hydrocarbon Production Associated with GHG Intensity

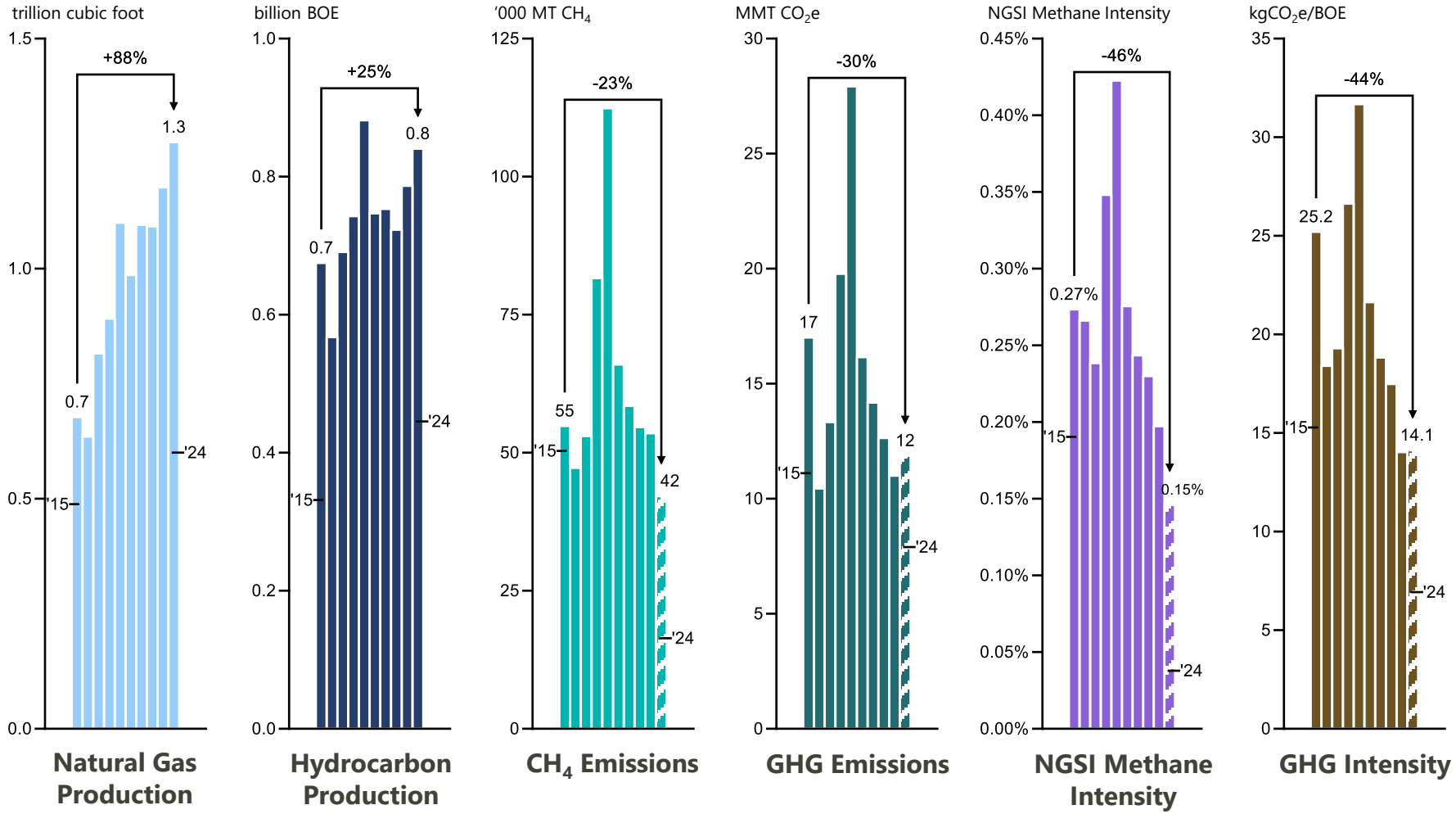


Williston Basin Producers

2015-2024 Trends Analysis: Production & Emissions Metrics

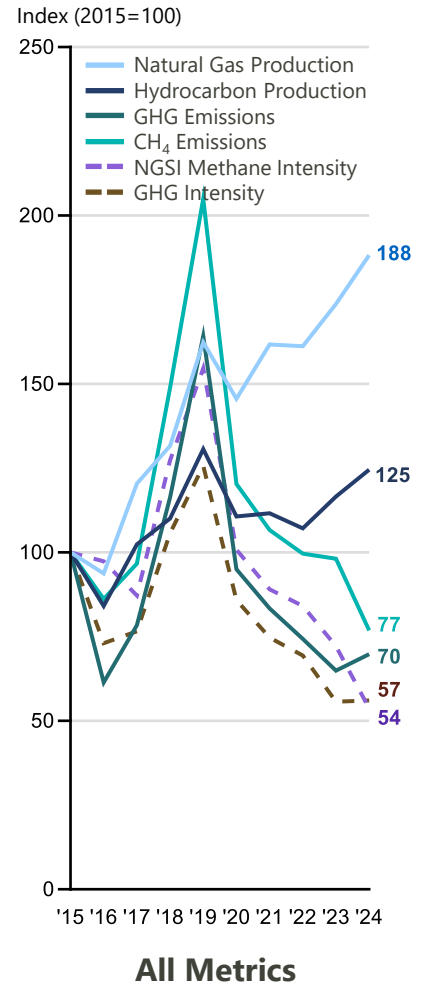
GHGRP Data Trends, 2015-2024

Williston Basin



Combined Data Metrics

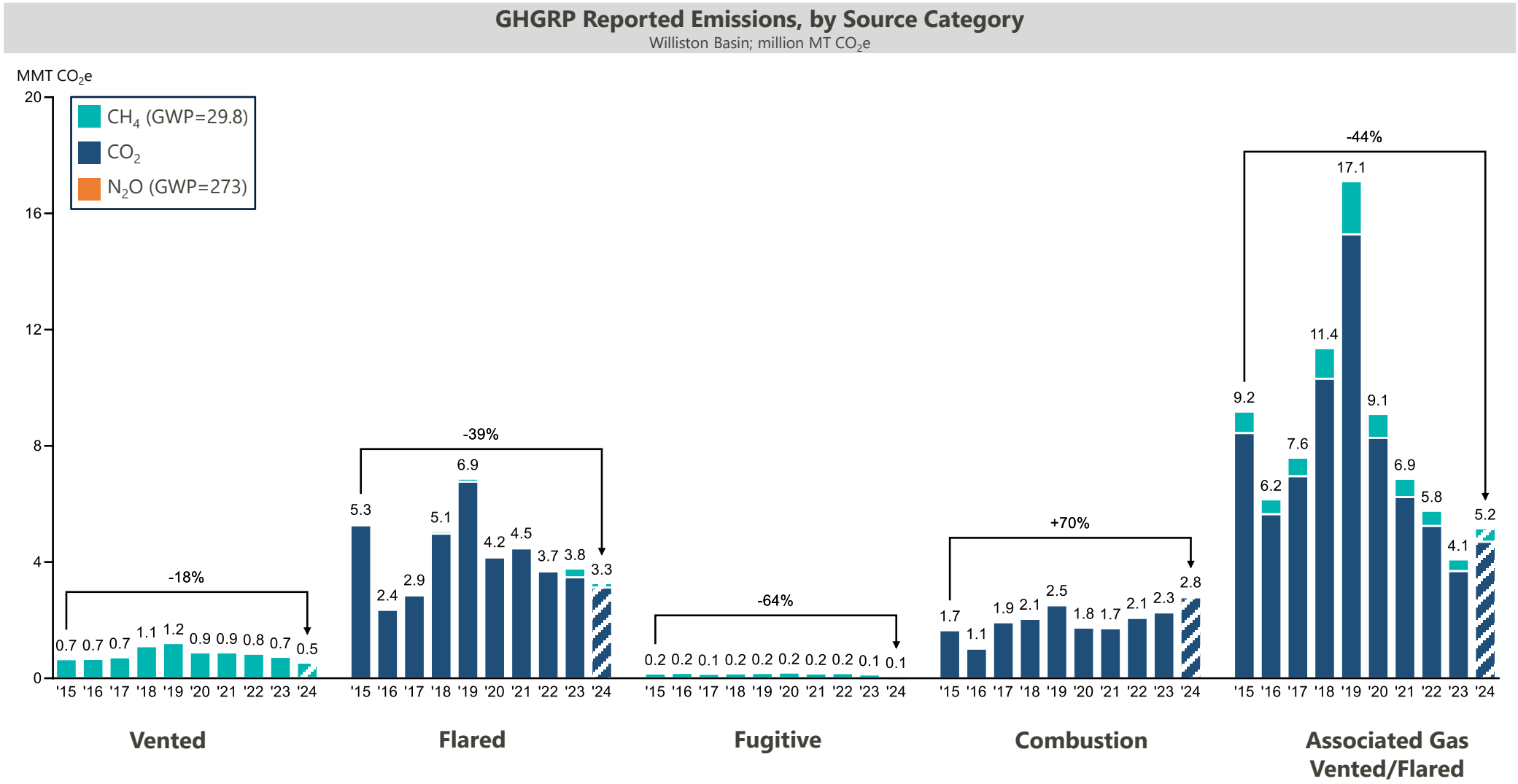
Indexed; 2015 = 100



Williston Basin Producers

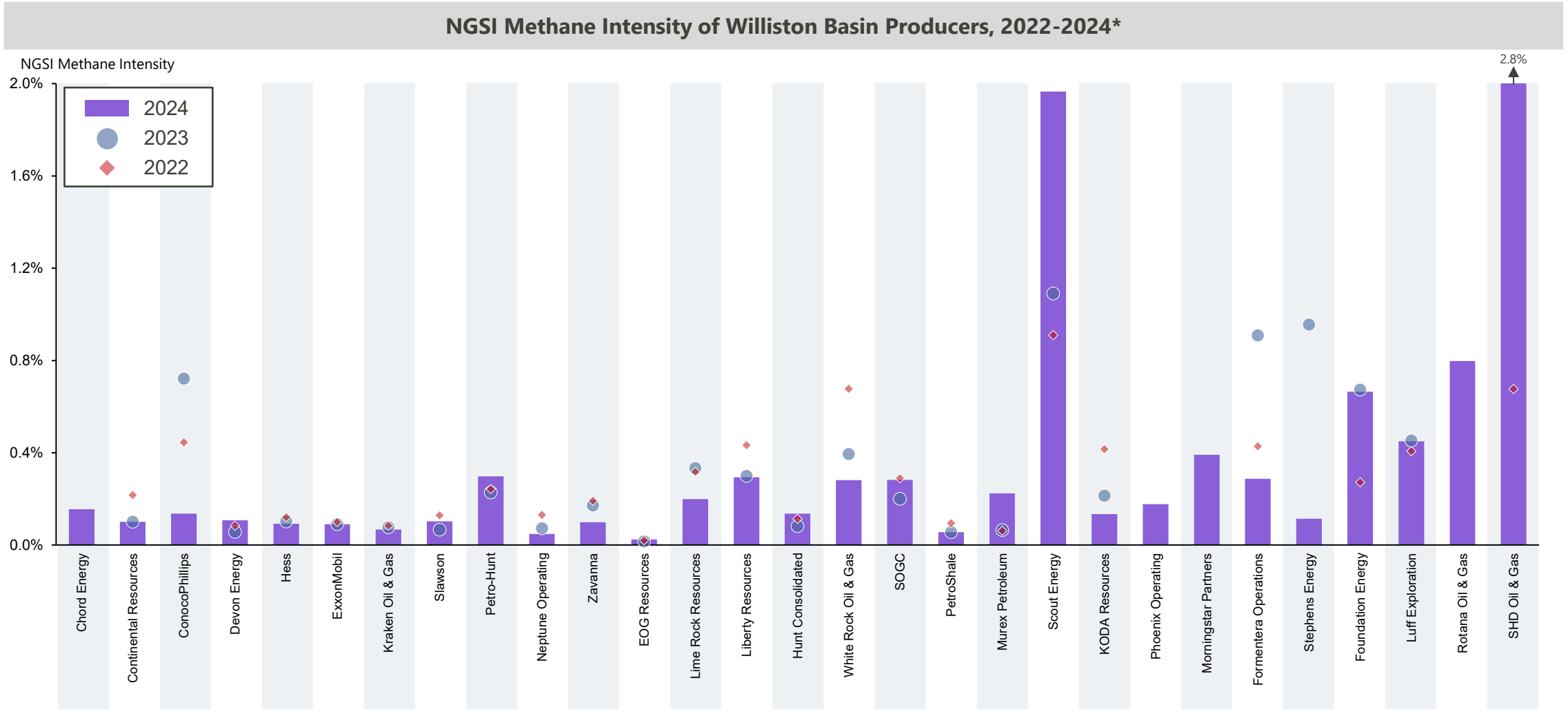
2015-2024 Trends Analysis: Emissions Sources

GHG Emissions (MMT CO_2e)



Williston Basin Producers

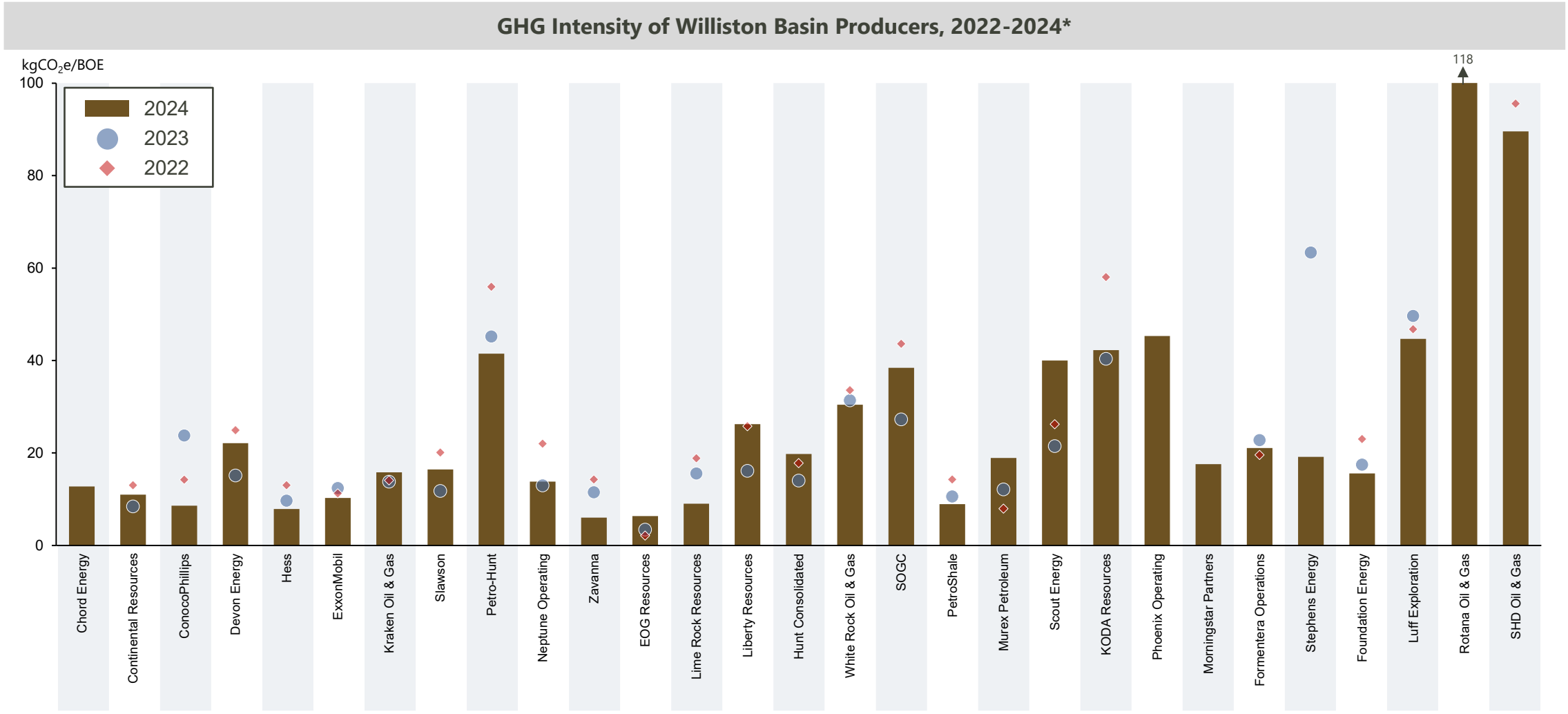
2022-2024 Trends Analysis: Change in Methane Intensity



*Note that some producers in 2024 were not in the EPA database for all three years and may not have data for 2022 and/or 2023.

Williston Basin Producers

2022-2024 Trends Analysis: Change in GHG Intensity



*Note that some producers in 2024 were not in the EPA database for all three years and may not have data for 2022 and/or 2023.

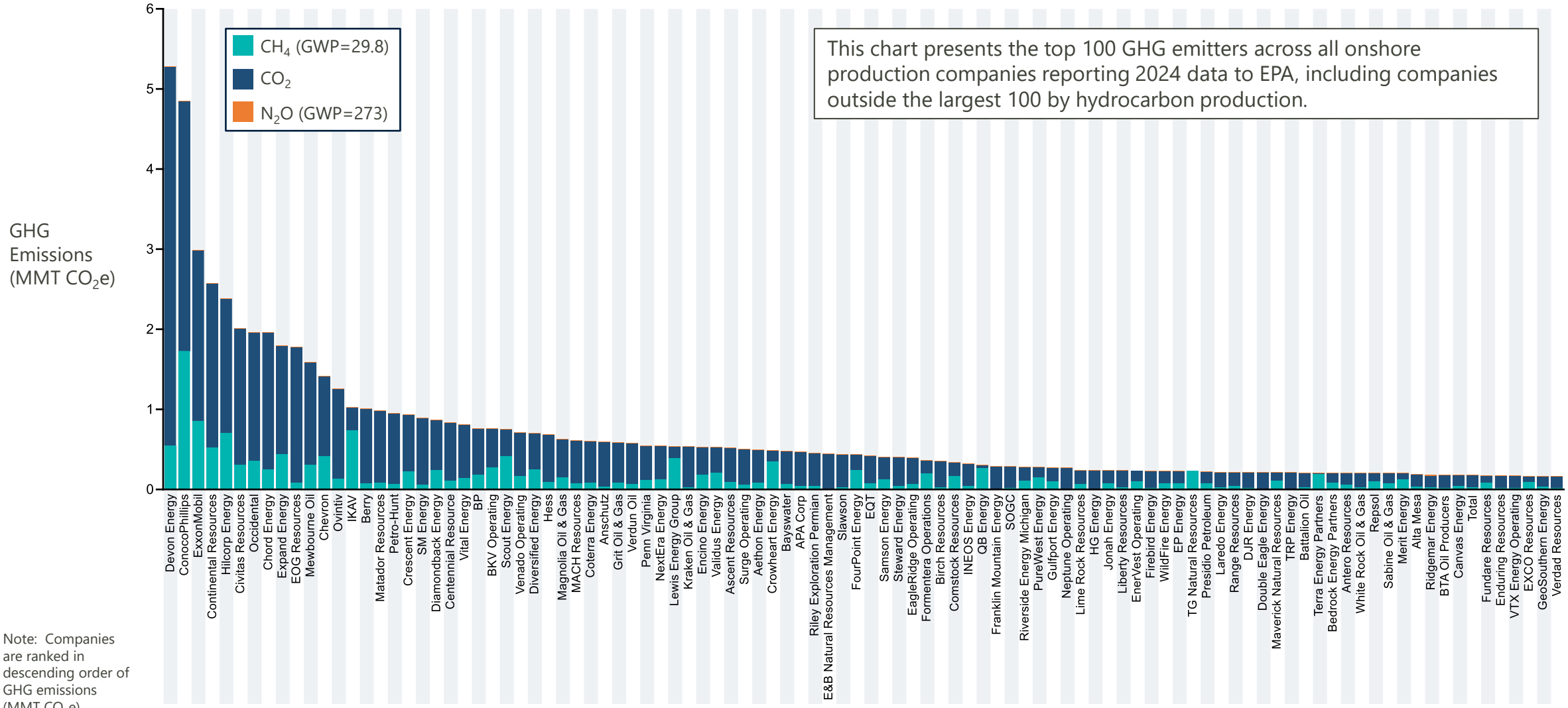
Additional Production Segment Data

The following charts present emissions and emissions intensity data rankings for key metrics. They include companies inside and outside of the top 100 companies by total hydrocarbon production.

Top 100 GHG Emitters

2024 Data

GHG Emissions (100-year GWP)

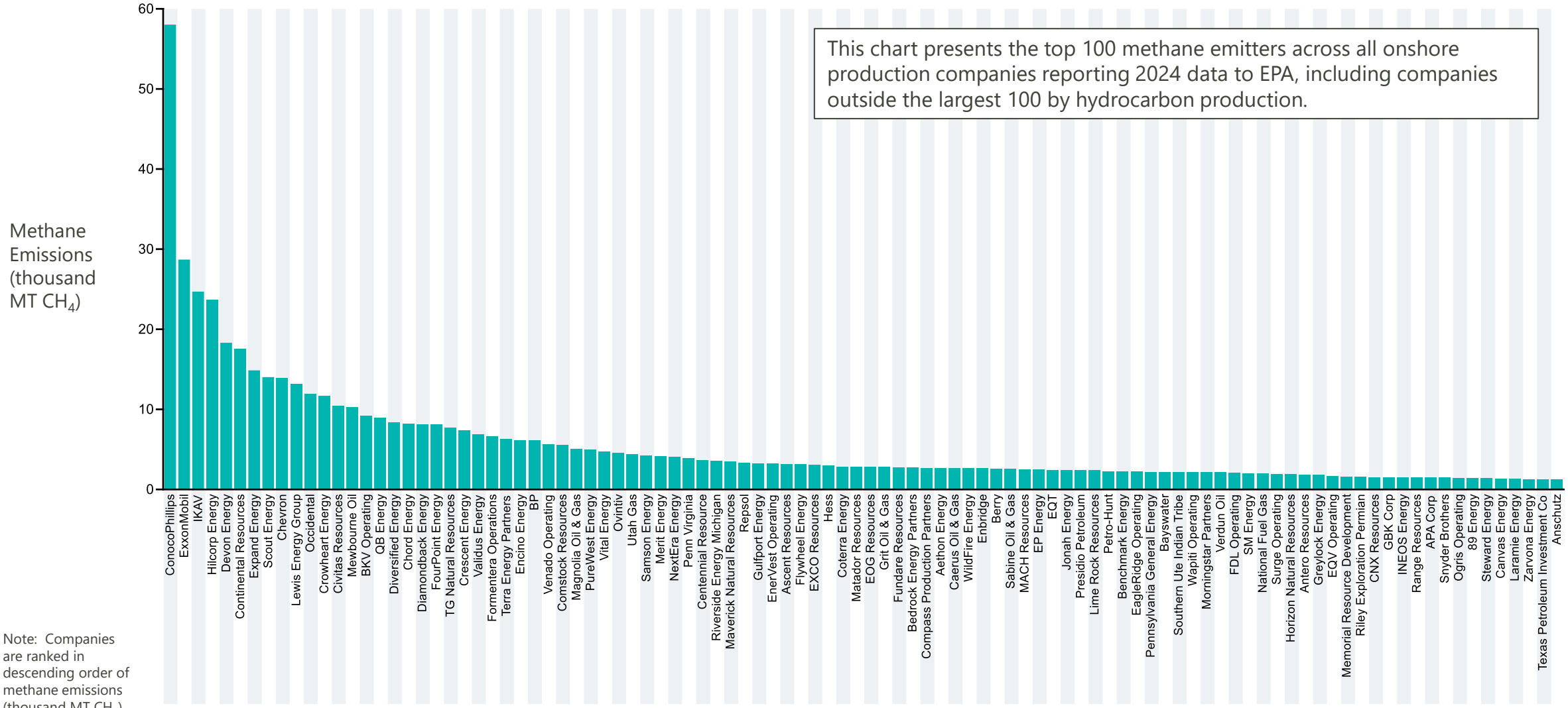


Note: Companies are ranked in descending order of GHG emissions (MMT CO_2e)

Top 100 Methane Emitters

Methane Emissions

2024 Data

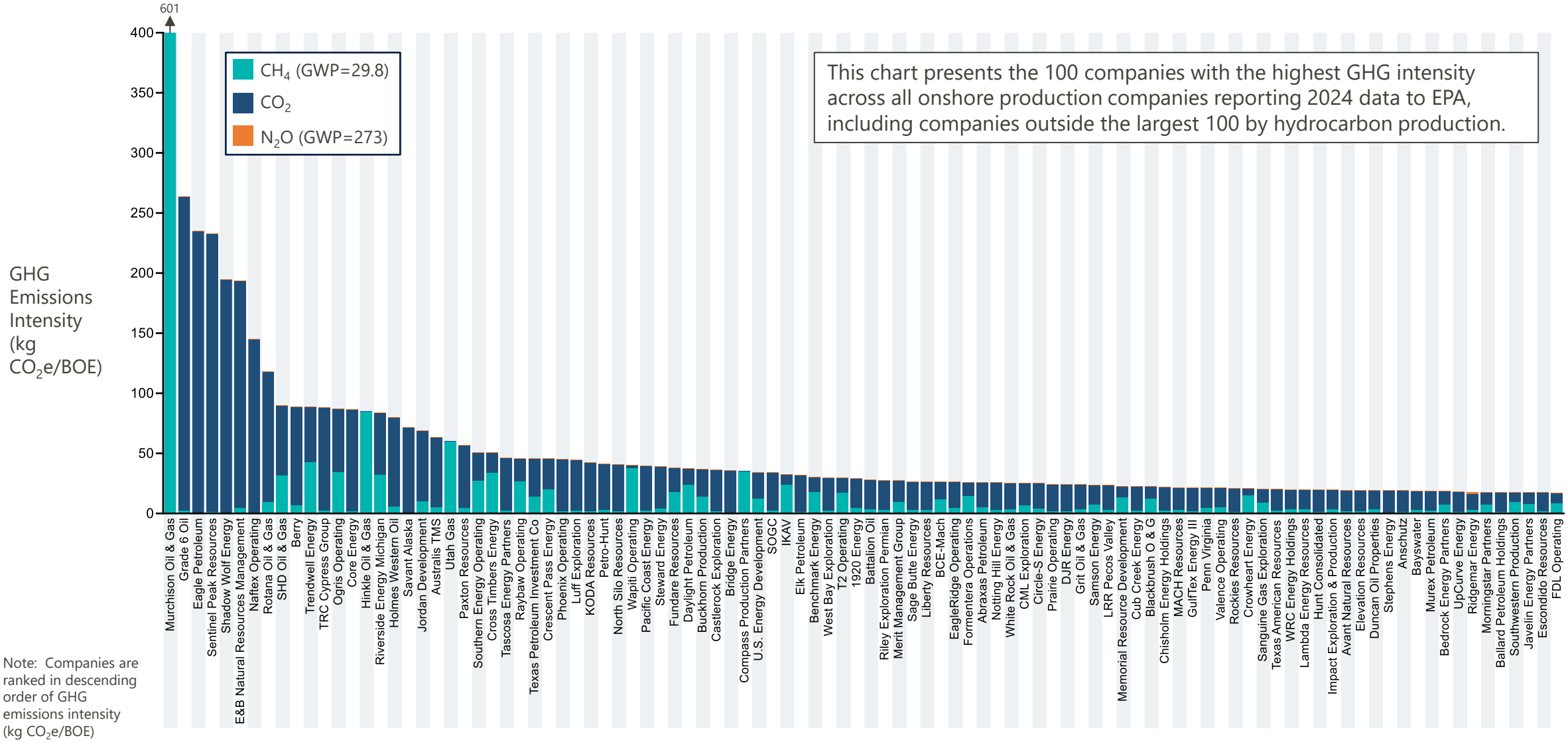


Note: Companies are ranked in descending order of methane emissions (thousand MT CH_4)

Top 100 Highest GHG Emissions Intensities

2024 Data

GHG Emissions Intensity

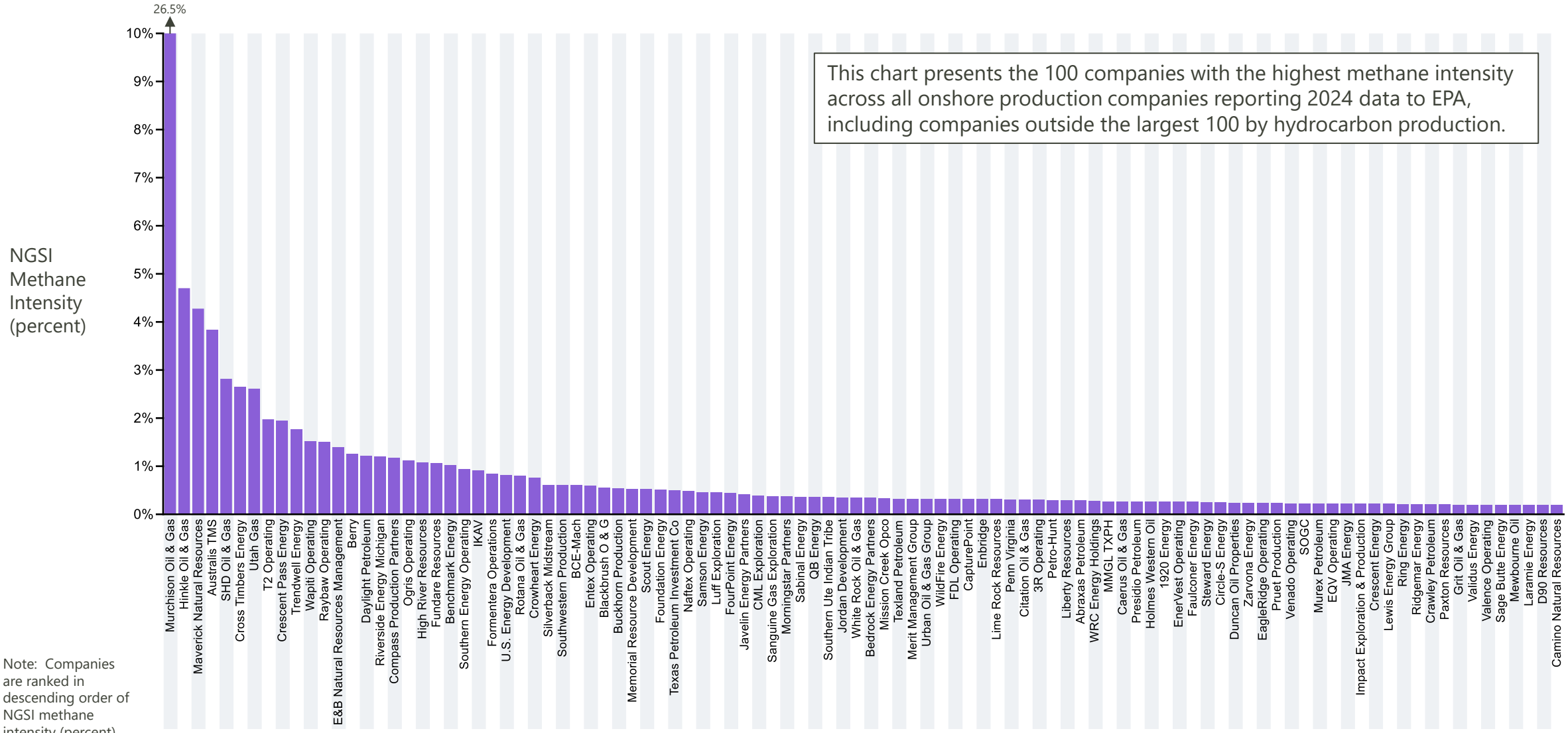


Note: Companies are ranked in descending order of GHG emissions intensity (kg CO_2e/BOE)

Top 100 Highest NGSI Methane Intensities

2024 Data

Methane Intensity

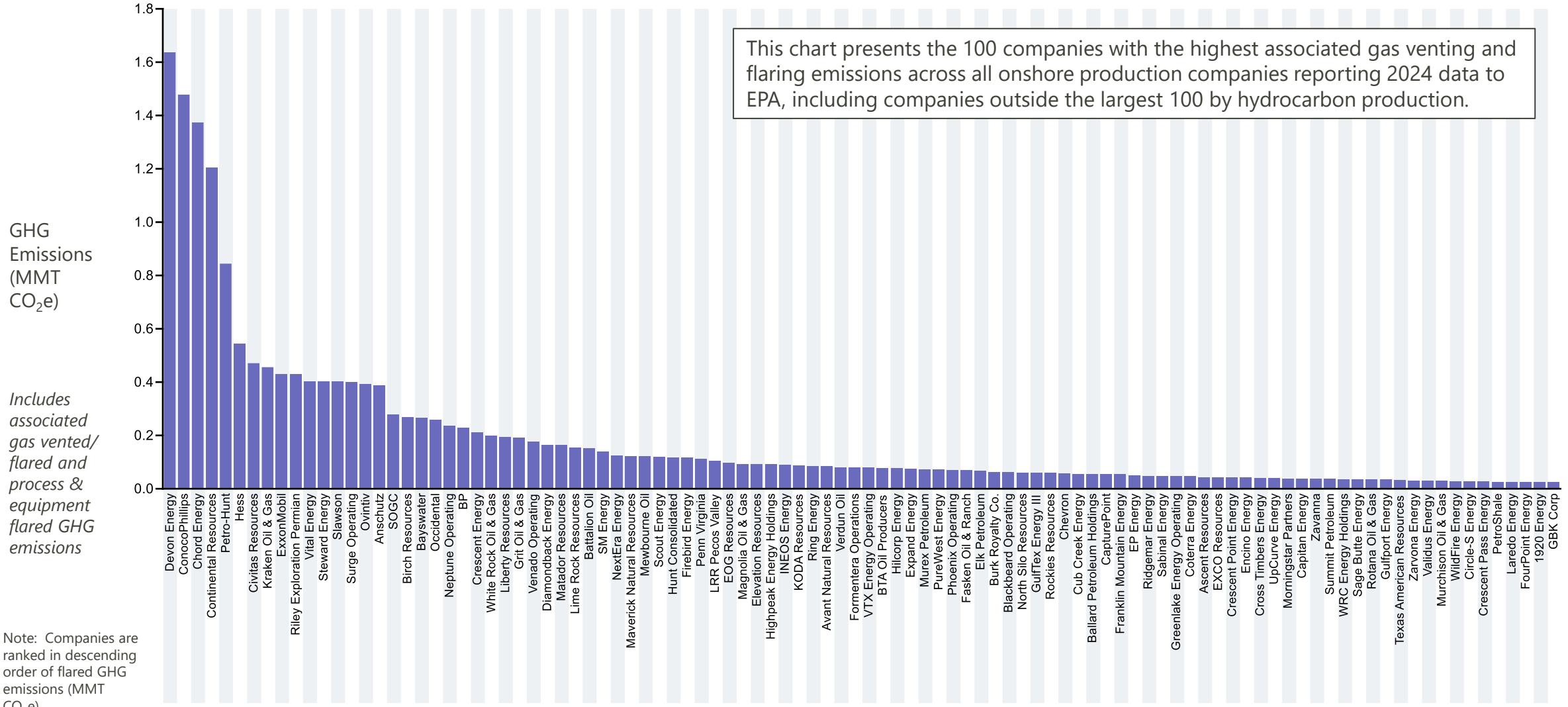


Note: Companies are ranked in descending order of NGSI methane intensity (percent)

Top 100 Flared GHG Emissions

2024 Data

Associated Gas Venting/Flaring and Other Flaring GHG Emissions (100-year GWP)



Includes associated gas vented/ flared and process & equipment flared GHG emissions

Note: Companies are ranked in descending order of flared GHG emissions (MMT CO_2e)

Gathering & Boosting Segment

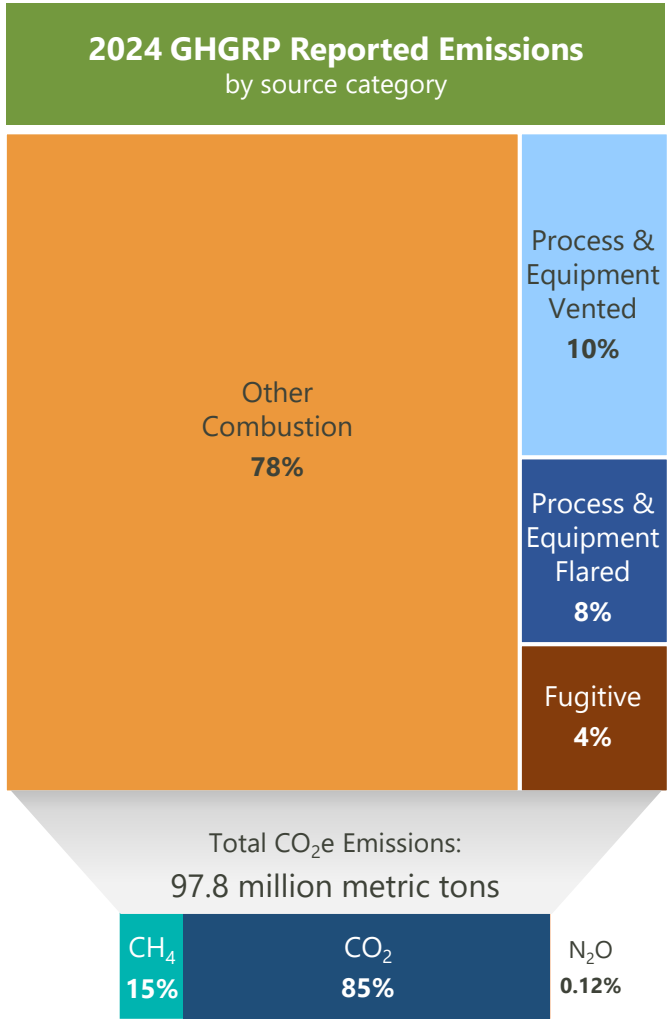
Key Findings – G&B

- Of 164 G&B companies with reported data, the top 100 G&B companies (by total energy transported) were responsible for approximately 99% of energy transports and 95% of total reported methane and GHG emissions in 2024. While most top-100 G&B companies are also among the top 100 emitters, transport rank does not correspond to emissions rank.
- The methane and GHG emissions intensity of transported hydrocarbons and natural gas varies dramatically across companies. Companies in the highest quartile of methane emissions intensity have an average emissions intensity that is over 23 times higher than companies in the lowest quartile of methane emissions intensity. G&B companies in the highest quartile of GHG emissions intensity have an average emissions intensity that is 12 times higher than companies in the lowest quartile.
- Equipment leaks and pneumatic devices were the largest sources of total reported G&B-segment methane emissions, making up 26% and 25%, respectively, of total reported methane emissions.
- Fuel combustion equipment, such as engines used to power compressors, was the largest source of total reported G&B-segment CO_2 emissions, responsible for 89% of total reported CO_2 emissions.
- Reported G&B GHG emissions are dominated by CO_2, which make up 85% of total CO_2e compared to methane's 15%. N_2O represents 0.12% of total CO_2e from the segment.
- Methane and GHG intensity declined 20% and 4%, respectively, between 2022 and 2024 due to a reduction in methane emissions reported to EPA and an increase in transported natural gas and total hydrocarbons. However, these trends are not consistent across basins or individual companies and can fluctuate year to year (e.g., increase 2022-2023 and decrease 2023-2024).
- While total reported methane emissions from G&B facilities declined 34% 2016-2024, total CO_2e increased 22%. This rise was primarily caused by the expansion of gathering systems, where additional engines used to drive compressors contributed to a nearly 40% increase in combustion emissions.

Types of Emissions Associated with Gathering & Boosting

The GHGRP includes reporting on emissions from 12 emissions sources in the G&B segment. In addition, this report attributes emissions associated with four additional sources that are estimated at the national level by EPA in the GHG Inventory, but not included in GHGRP. The relative contribution of GHG emissions from oil and gas gathering and boosting can vary widely by both type of hydrocarbons gathered and emissions source. For purposes of comparison within this report, G&B segment emissions sources are grouped into four categories:

- **Process & Equipment Vented** Vented emissions are intentional releases of natural gas from equipment and processes. Common sources of vented emissions include gas-driven pneumatic devices, compressor seals, acid gas removal units, and equipment blowdowns.
- **Process & Equipment Flared** Flared emissions consist primarily of CO_2 from the combustion of gas that is captured from equipment and processes. Flaring also results in methane emissions from uncombusted gas that escapes through the flare stack.
- **Fugitive** Fugitive emissions are unintentional releases, or leaks, of natural gas. These emissions are often caused by faulty or worn-out equipment. Sources of fugitive emissions include seals and cracks on equipment such as tanks and piping, and leakage from infrastructure components such as valves and connectors.
- **Other Combustion** Non-flaring combustion is a significant source of CO_2 emissions from oil and gas gathering and boosting operations. Natural gas-fired engines used to power compressors represent the largest source of other combustion emissions. Other combustion also includes methane emissions from uncombusted gas in engine exhaust.

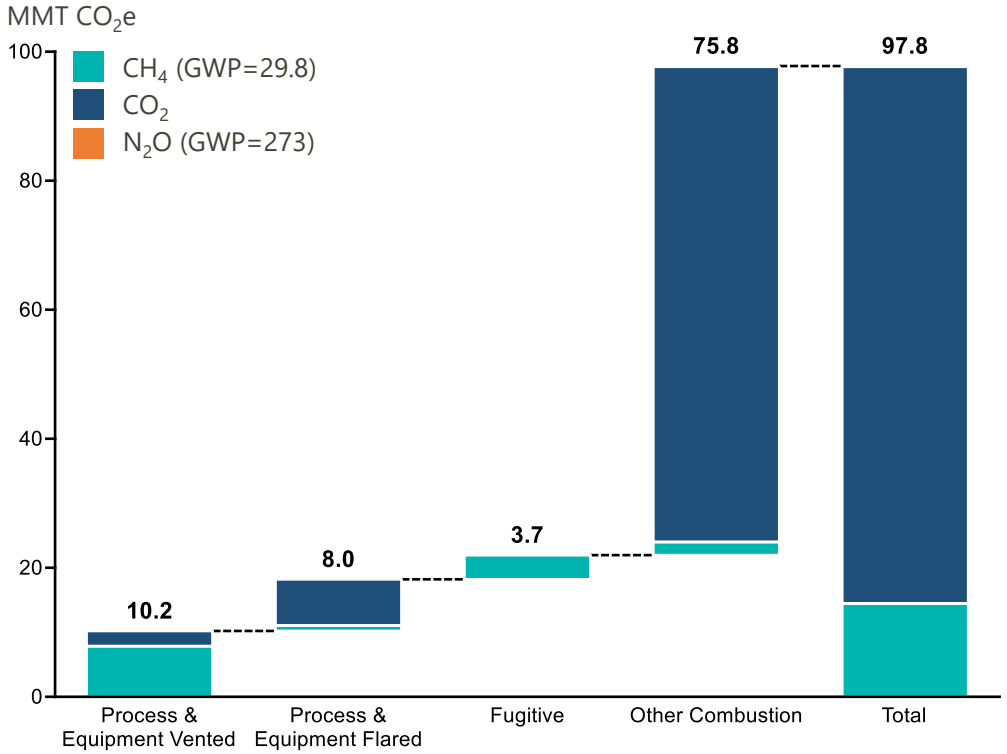


Sources of Methane Emissions

Process and equipment vented, and fugitive methane emissions make up approximately 80% and 12% of the total methane and GHG emissions, respectively, reported across all sources included in this report. Equipment leaks (fugitive) and pneumatic devices account for around 54% of reported methane emissions.

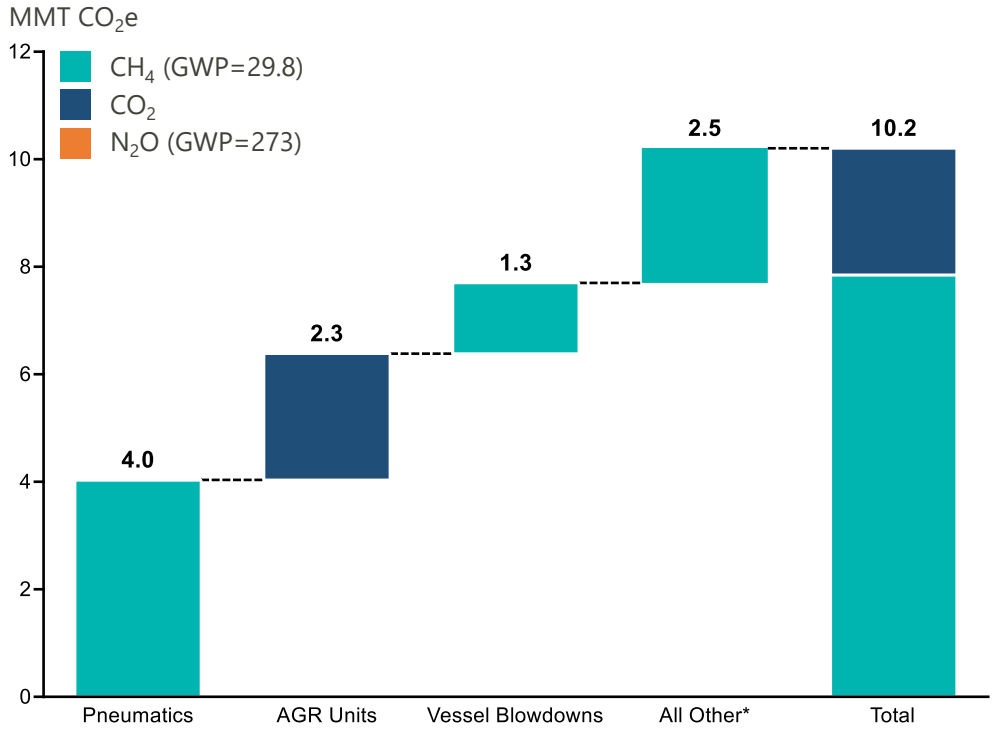
2024 Reported G&B Emissions, by Source Category

million metric ton CO_2e (MMT CO_2e)



2024 Reported Process & Equipment Vented Emissions, by Source

million metric ton CO_2e (MMT CO_2e)

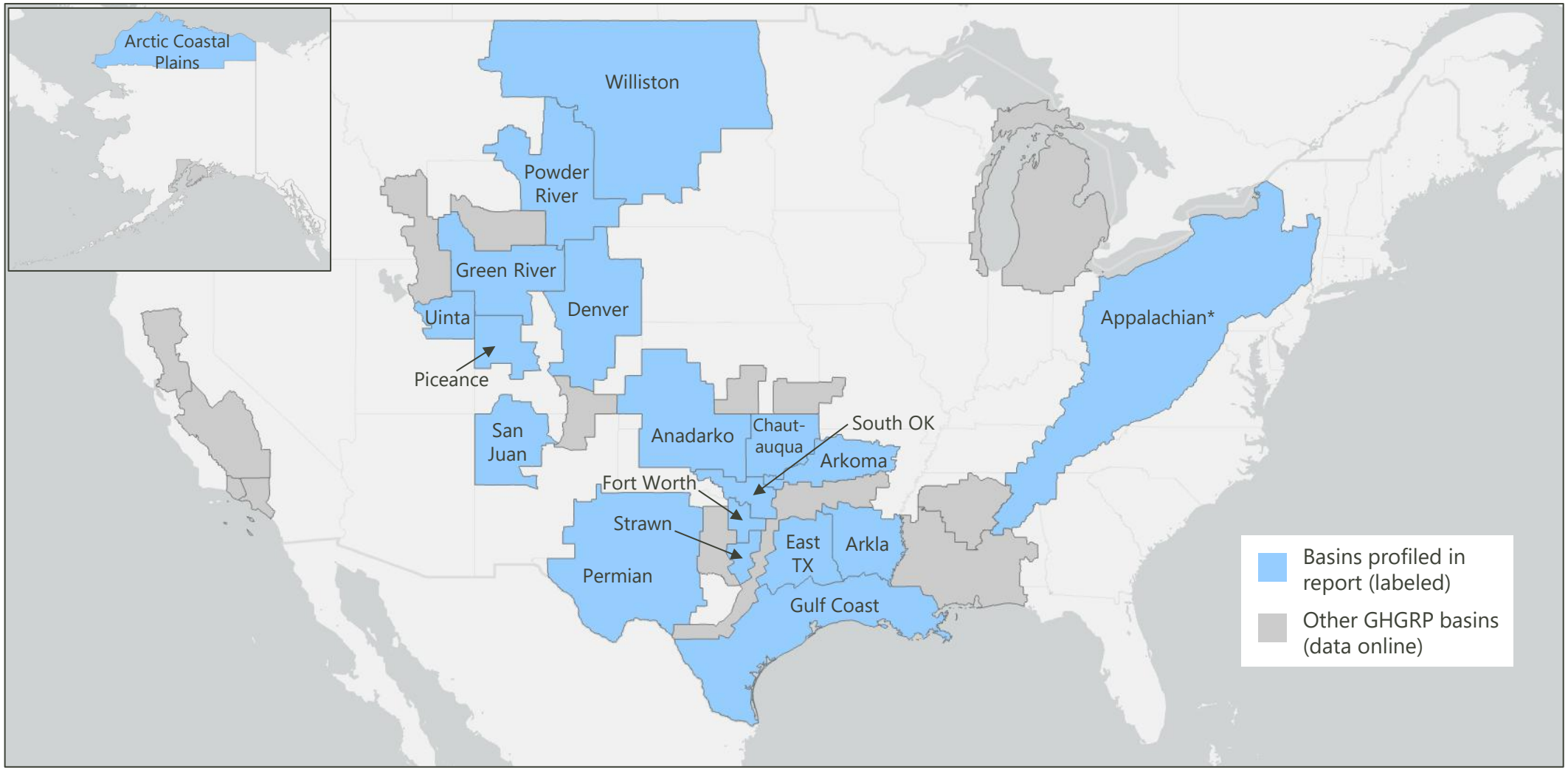


*Includes: Centrifugal compressors, dehydrators, reciprocating compressors, compressor blowdowns and starts, and pressure relief valves

Basin-Level Summary Data

This section provides data on transported hydrocarbons, GHG emissions, emissions intensity, and sources of emissions for the 19 largest G&B basins in the U.S. by 2024 transported volume. Together these basins represent approximately 99.5% of both total 2024 transported natural gas and hydrocarbon liquids in the EPA data.

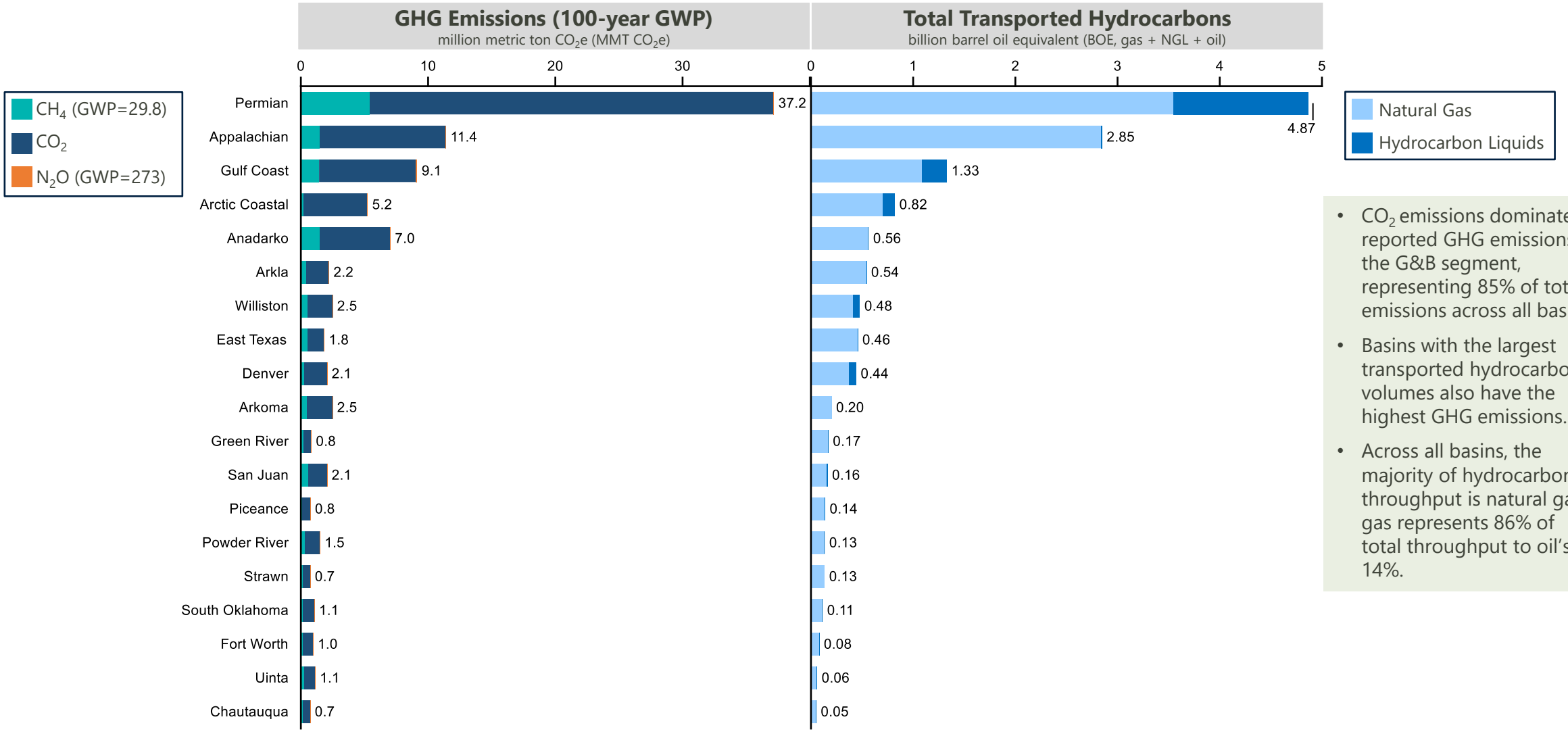
GHGRP Basins



* GHGRP data contain two distinct Appalachian basins (160 & 160A). This analysis combines data reported across both basins and presents them as a single basin.
Note: Basin boundaries defined by geologic provinces published by the American Association of Petroleum Geologists; data provided by U.S. EPA.

2024 Data

GHGRP Basin Production & Emissions

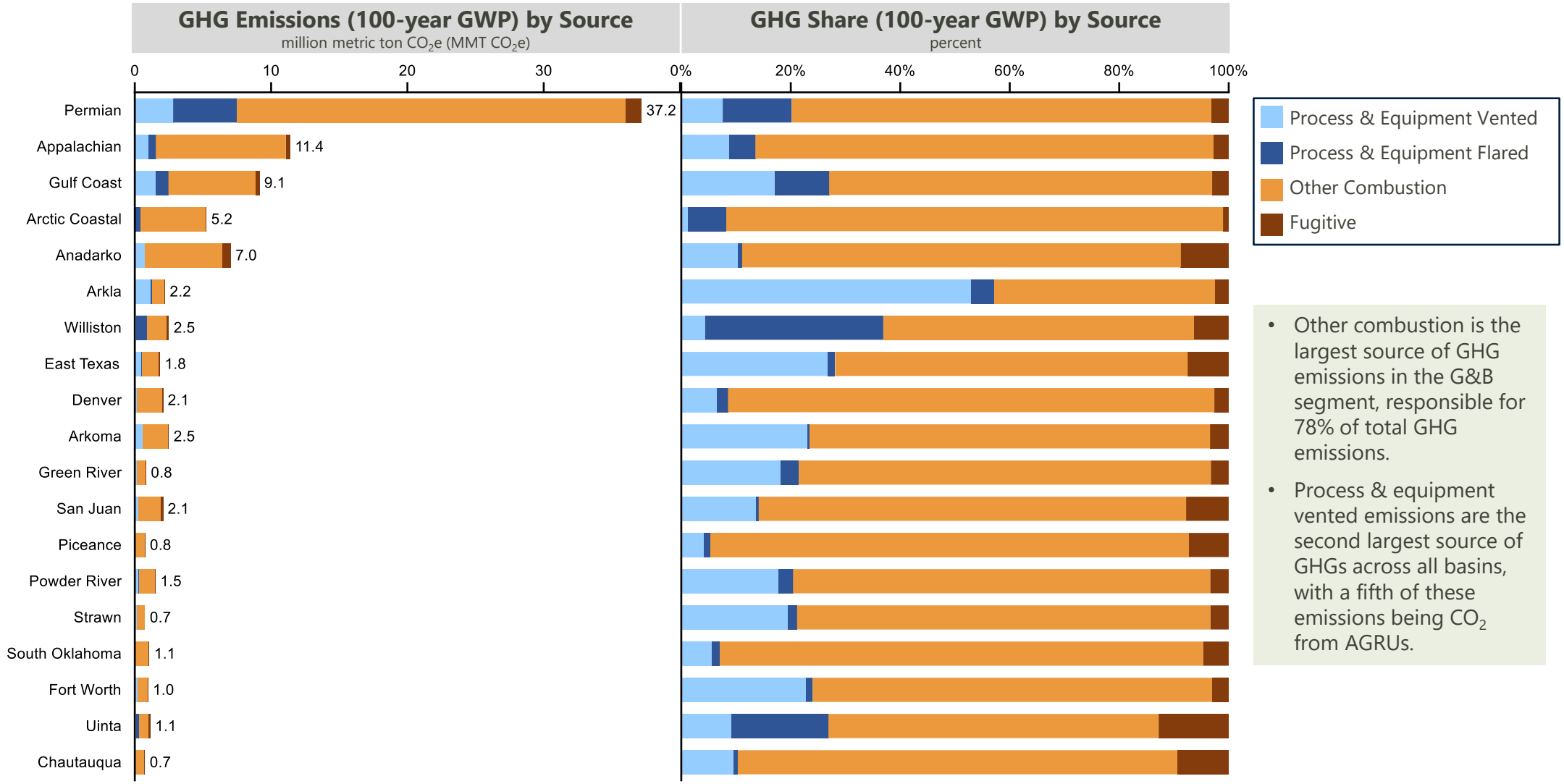


- CO_2 emissions dominate reported GHG emissions in the G&B segment, representing 85% of total emissions across all basins.
- Basins with the largest transported hydrocarbon volumes also have the highest GHG emissions.
- Across all basins, the majority of hydrocarbon throughput is natural gas; gas represents 86% of total throughput to oil's 14%.

Note: Basins are ranked in descending order of transported hydrocarbons (BOE)

2024 Data

GHGRP Basin Emissions by Source

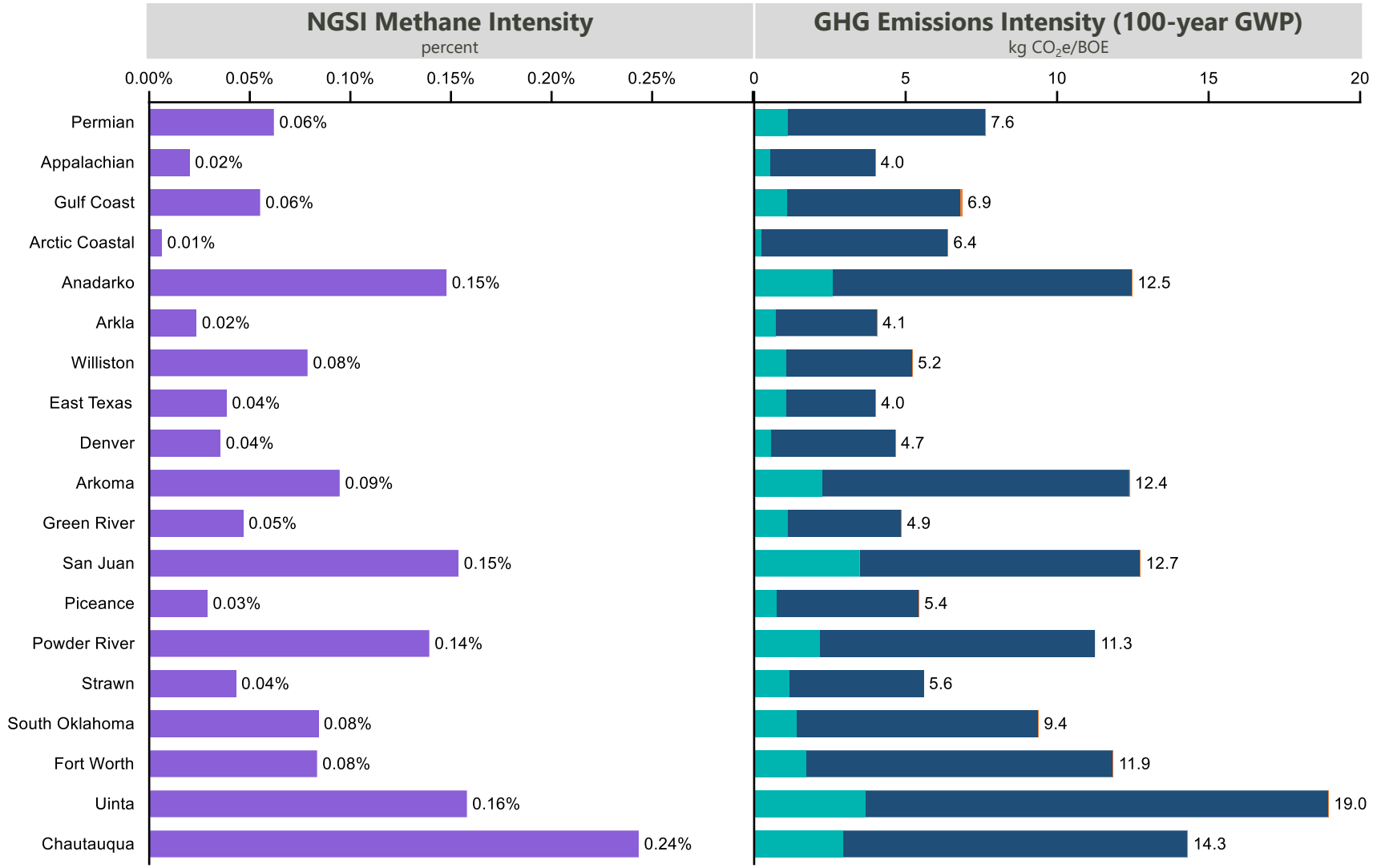


- Other combustion is the largest source of GHG emissions in the G&B segment, responsible for 78% of total GHG emissions.
- Process & equipment vented emissions are the second largest source of GHGs across all basins, with a fifth of these emissions being CO_2 from AGRUs.

Note: Basins are ranked in descending order of transported hydrocarbons (BOE)

2024 Data

GHGRP Basin Methane & GHG Intensity

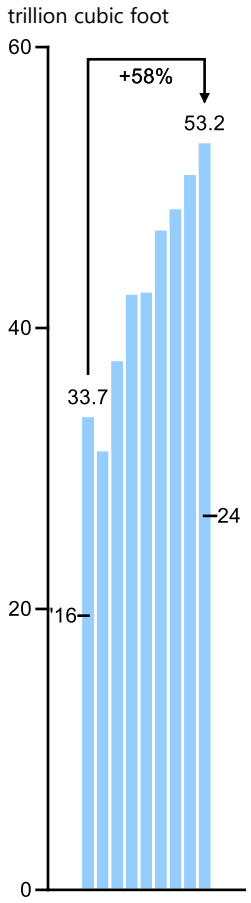


- Methane and GHG emissions intensities vary substantially across basins.
- Ranking in methane intensity does not always correspond to the same GHG intensity rank, reflecting the higher contribution of methane to total emissions in some basins.

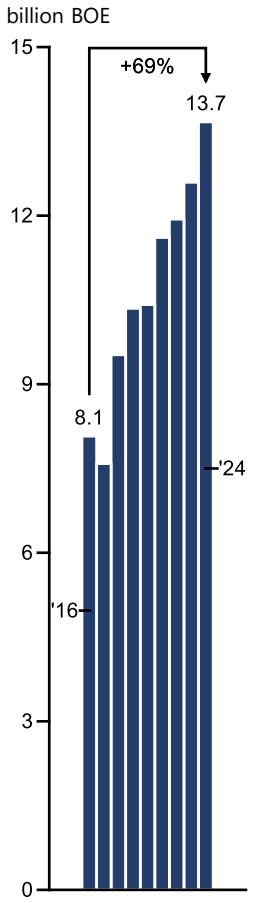
Note: Basins are ranked in descending order of transported hydrocarbons (BOE)

2016-2024 Trends Analysis: Transported Energy & Emissions Metrics

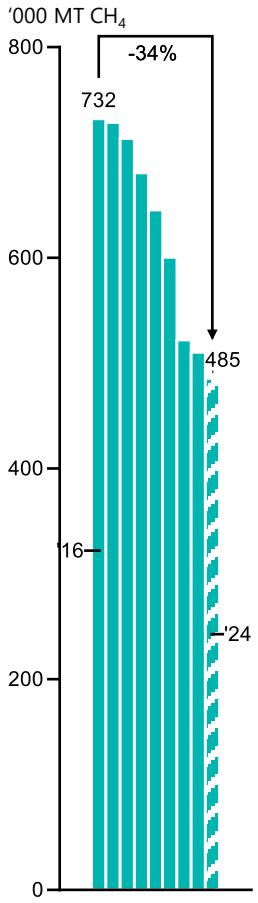
GHGRP Data Trends, 2016-2024



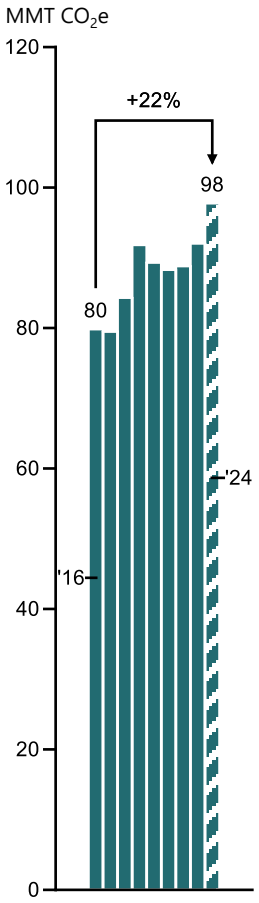
Natural Gas Transported



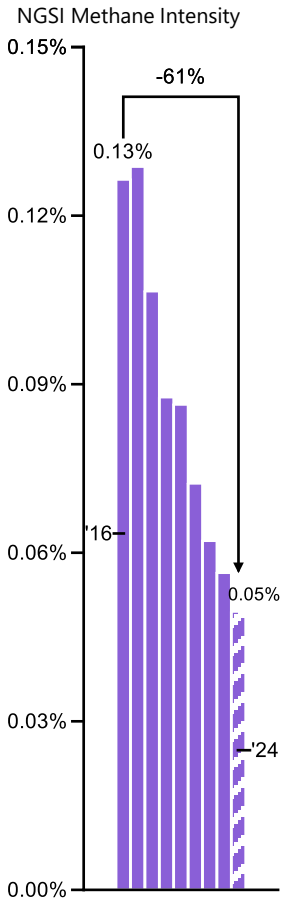
Hydrocarbons Transported



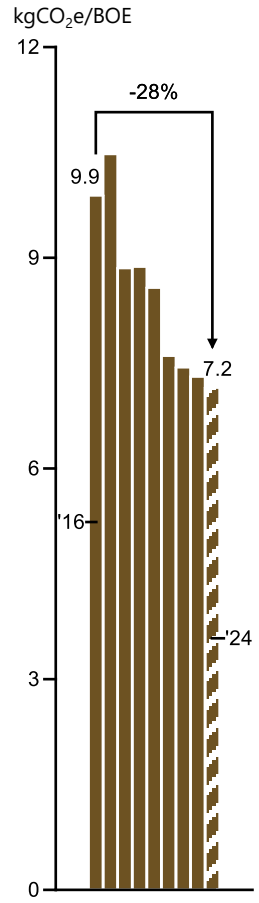
CH_4 Emissions



GHG Emissions



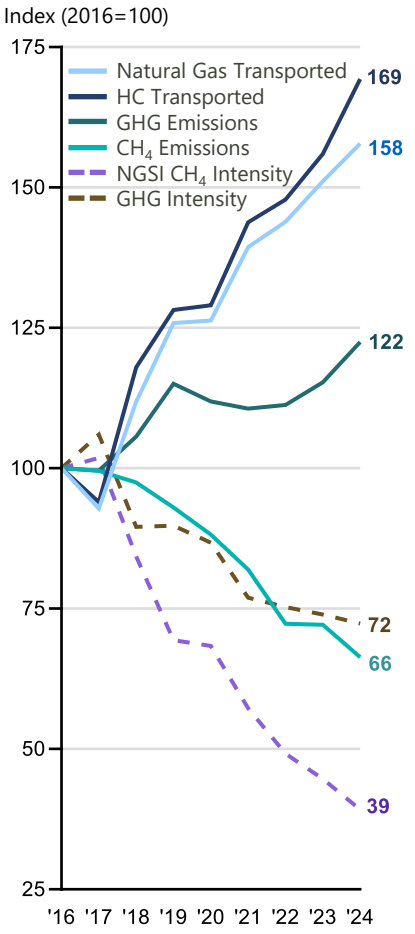
NGSI Methane Intensity



GHG Intensity

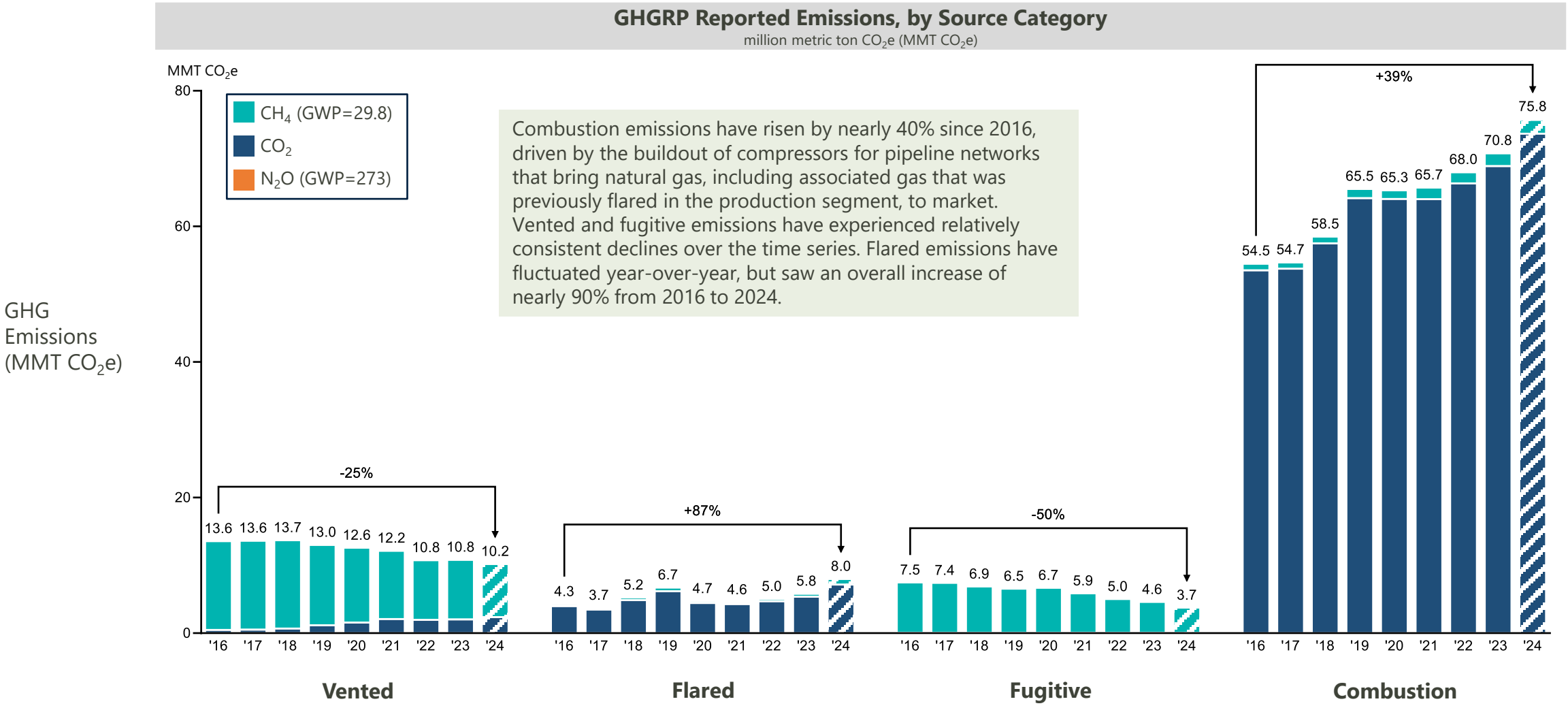
Combined Data Metrics

Indexed; 2016 = 100

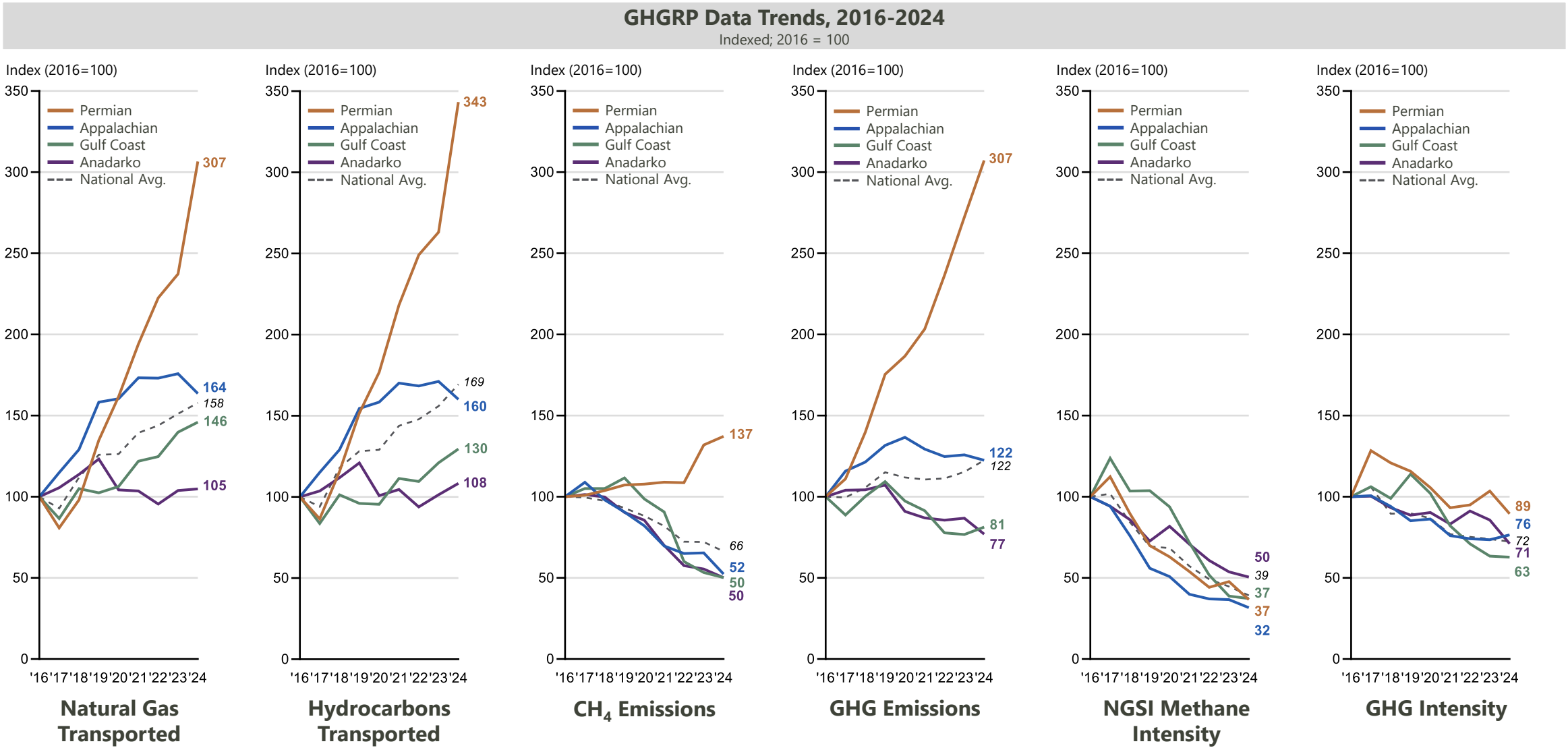


All Metrics

2016-2024 Trends Analysis: Emissions Sources



2016-2024 Trends Analysis: Transported Energy & Emissions Metrics of Top Production Basins



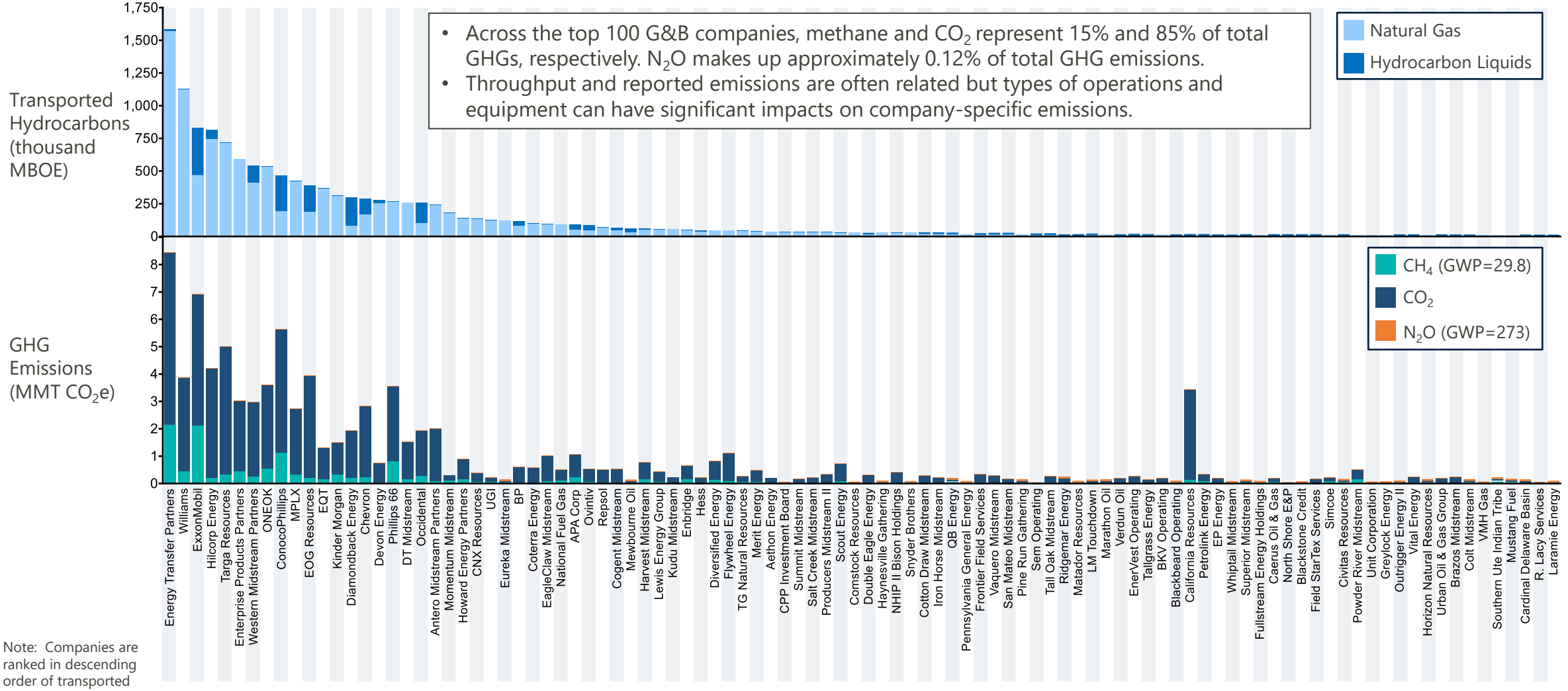
Company-Level Summary Data

This section summarizes data on transported hydrocarbons, GHG emissions, emissions intensity, and sources of emissions for the 100 largest G&B companies in the U.S. Additional graphics show the relative distribution of transported hydrocarbons, GHG emissions, and methane and GHG emissions intensities across the 100 largest companies. Detailed tables list the data and associated rankings for the primary metrics included in this analysis for each of the 100 companies.

Top 100 G&B Companies

2024 Data

Transported Hydrocarbons & Emissions (100-year GWP)

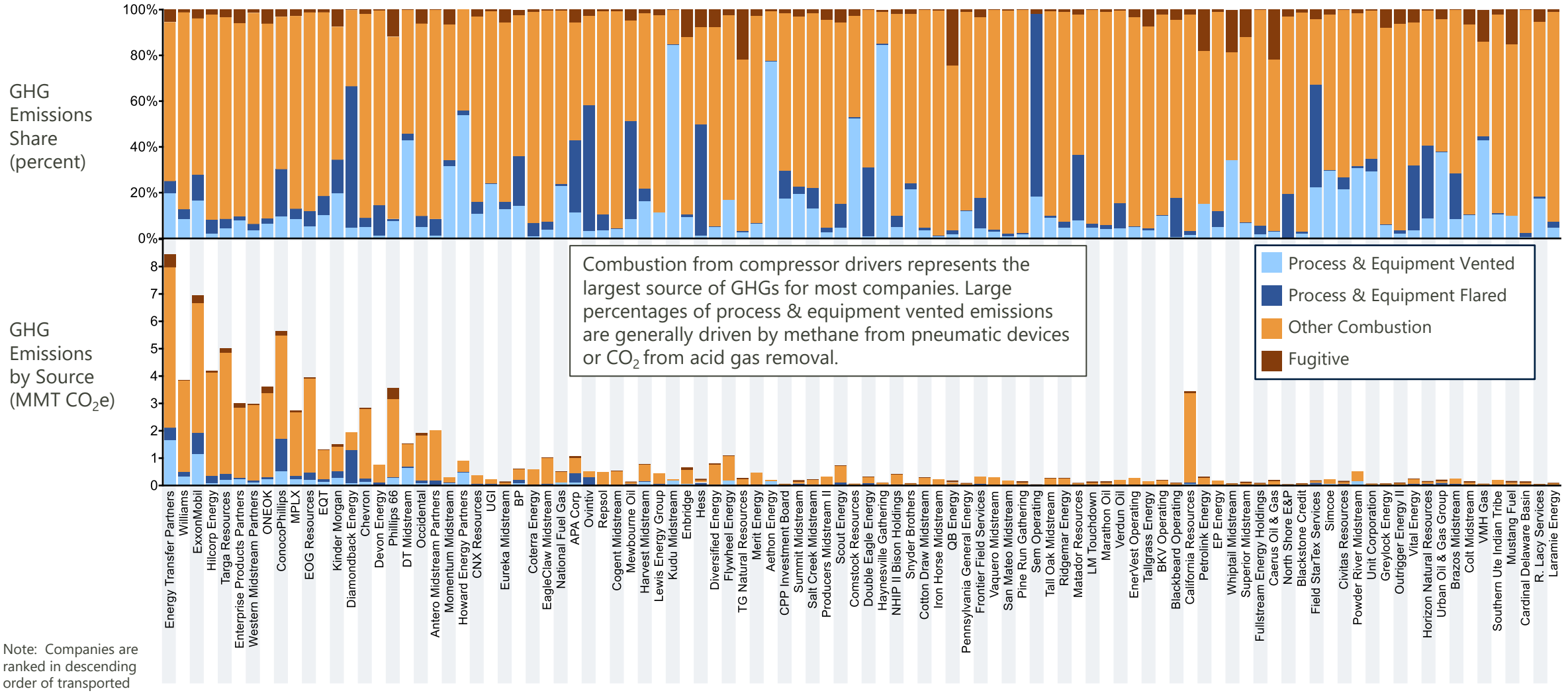


Note: Companies are ranked in descending order of transported hydrocarbons (BOE)

Top 100 G&B Companies

2024 Data

GHG Emissions by Source (100-year GWP)

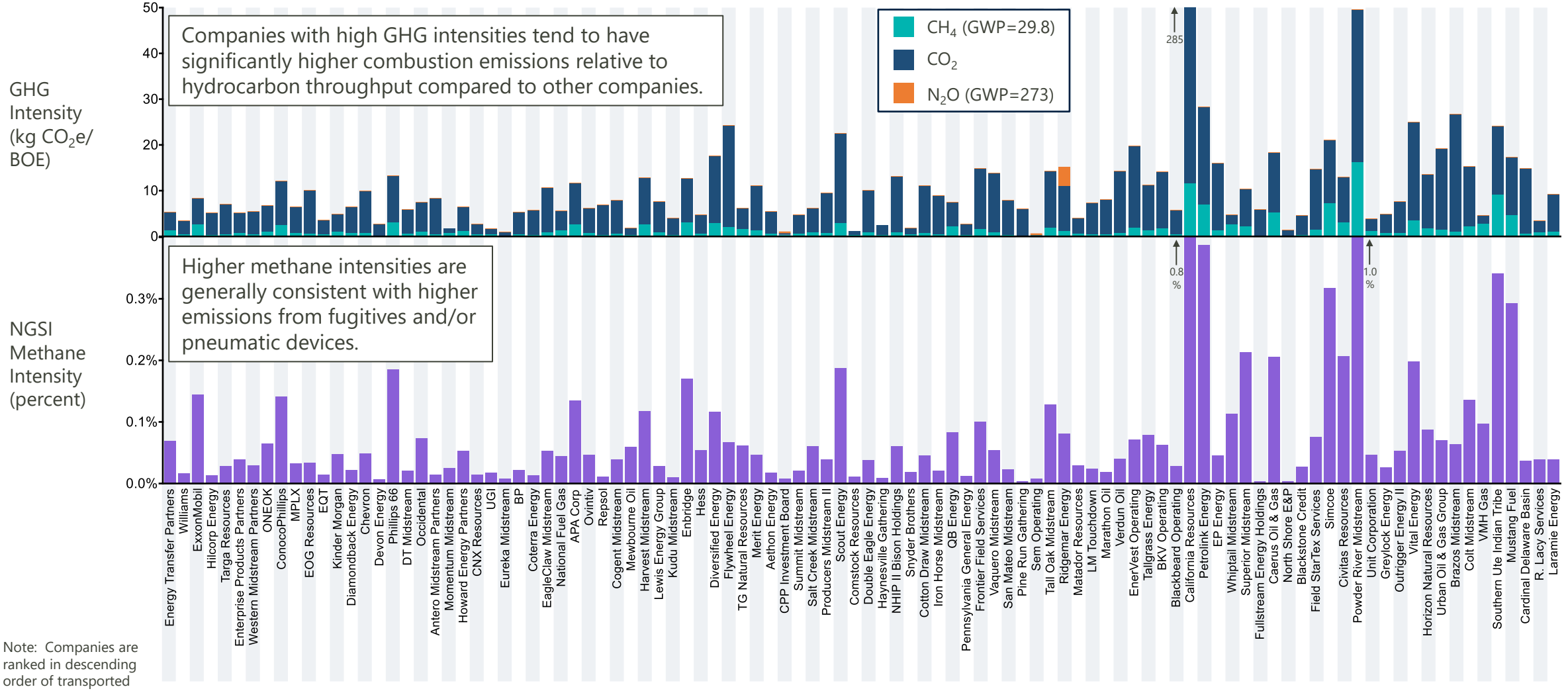


Note: Companies are ranked in descending order of transported hydrocarbons (BOE)

Top 100 G&B Companies

2024 Data

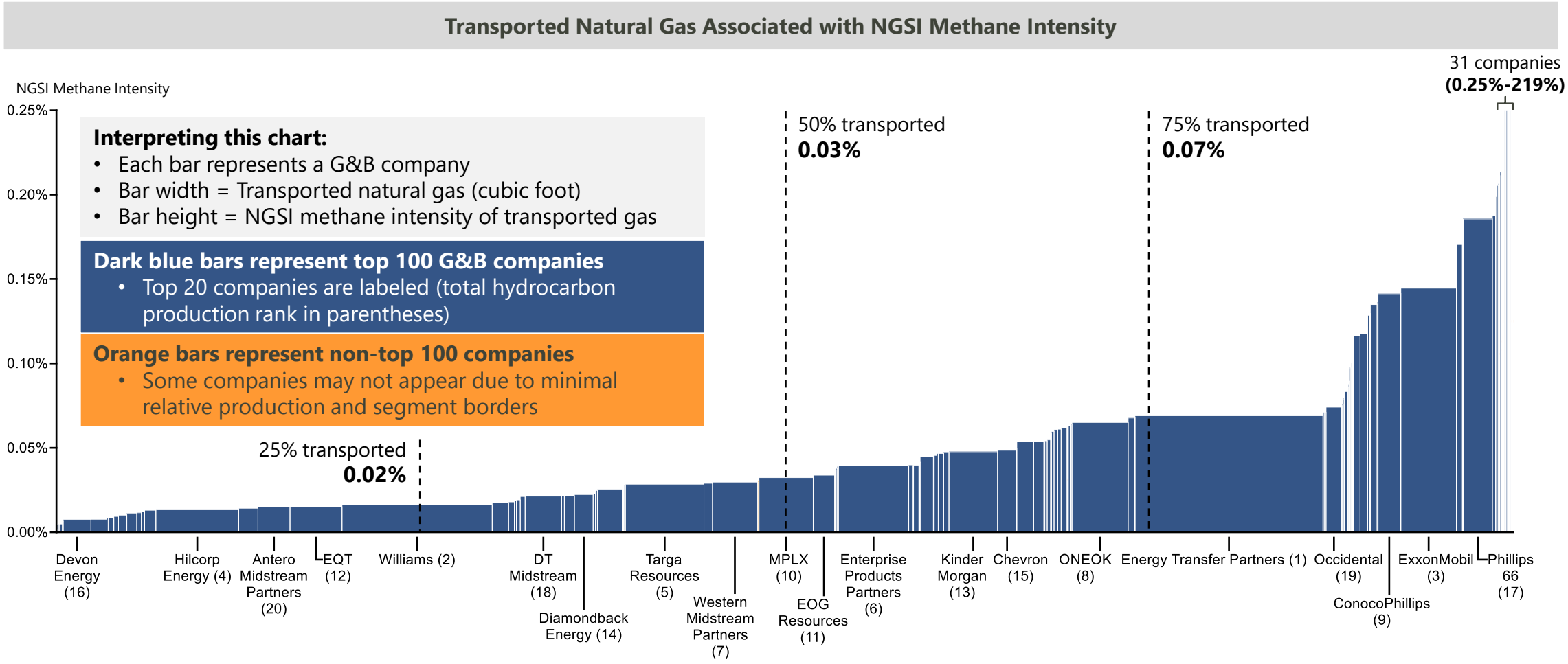
Methane & GHG Intensity (100-year GWP)



Note: Companies are ranked in descending order of transported hydrocarbons (BOE)

2024 Data

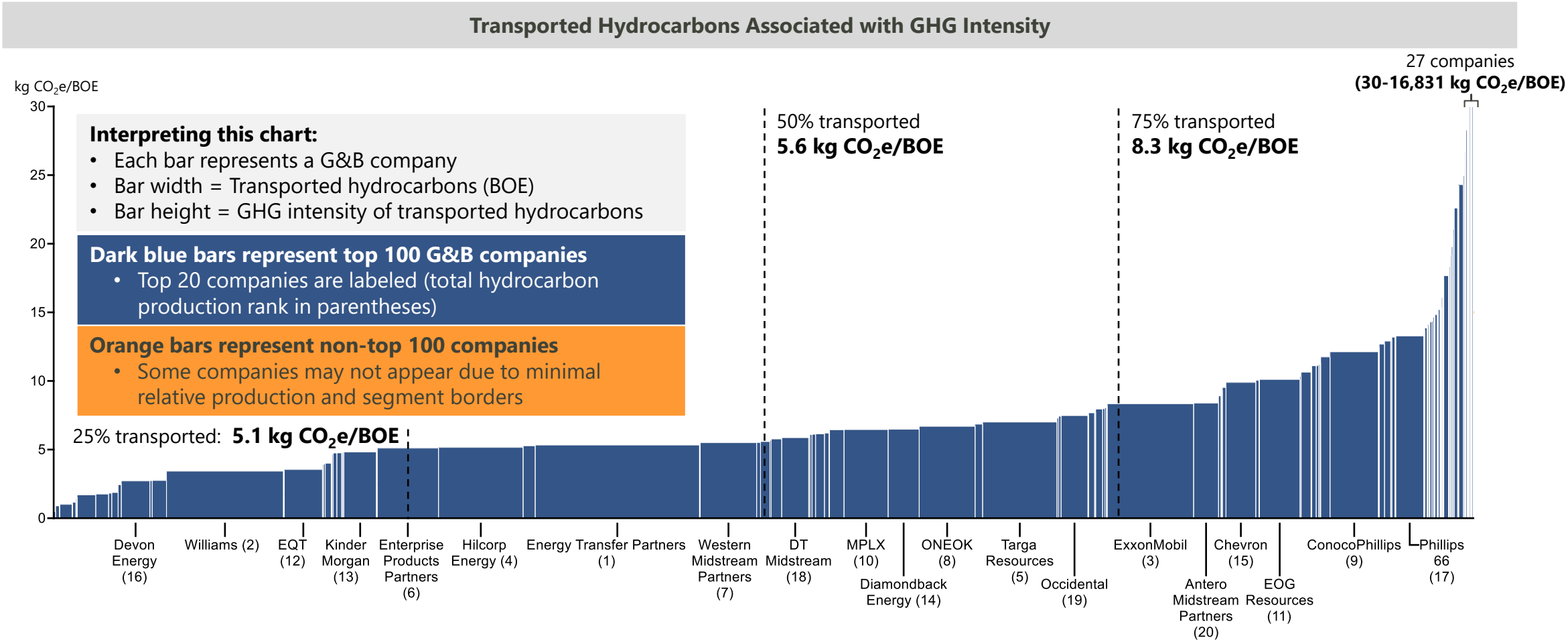
Total GHGRP Transported Natural Gas, by Methane Intensity



Transported Natural Gas → Total Gas Transported: 53.2 trillion cubic feet

2024 Data

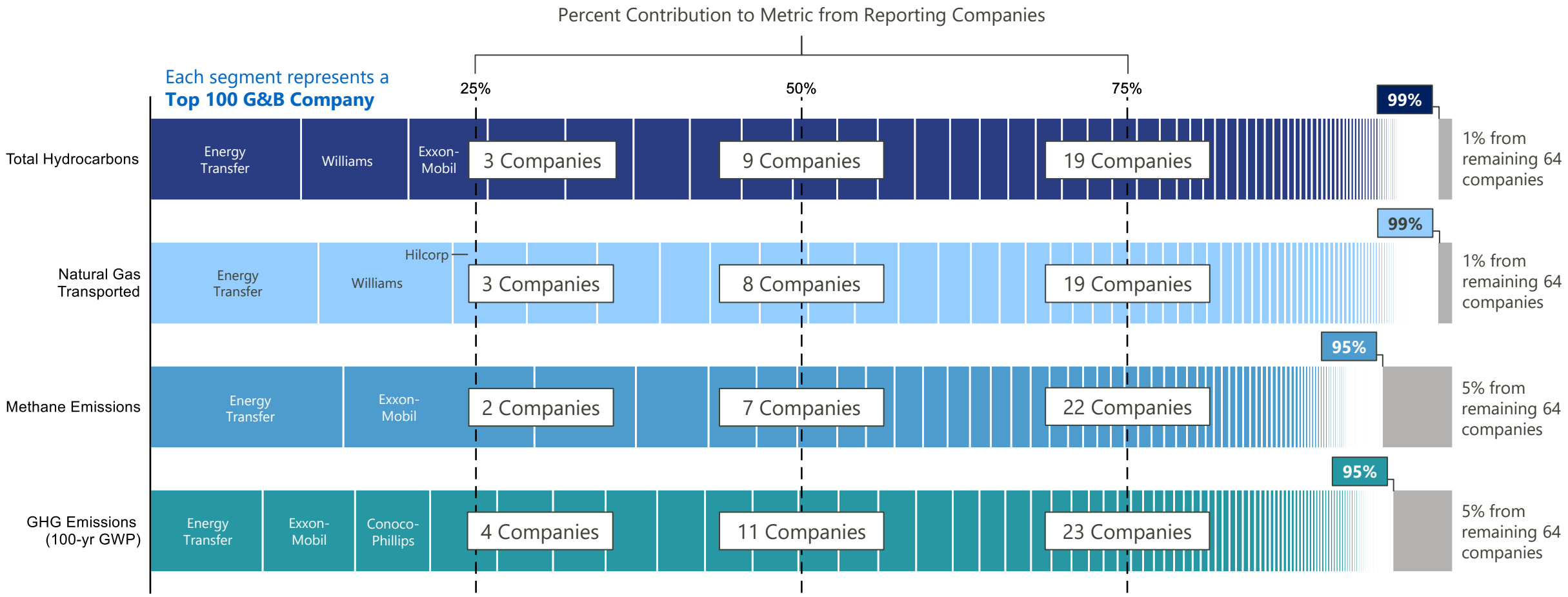
Total GHGRP Transported Hydrocarbons, by GHG Intensity



Transported Hydrocarbons → Total Hydrocarbons Transported: 13.7 billion BOE

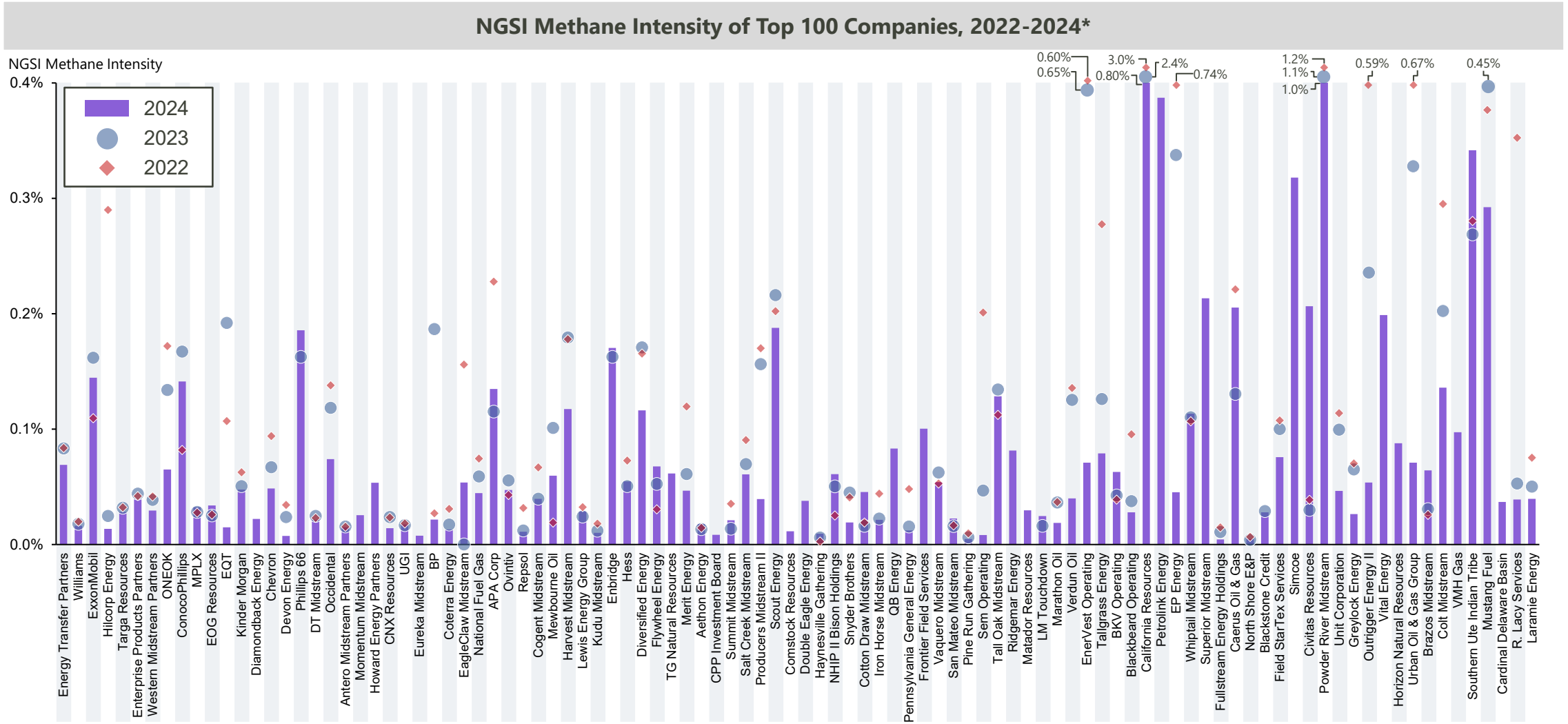
2024 Data

GHGRP Transported Hydrocarbons & Emissions Contributions



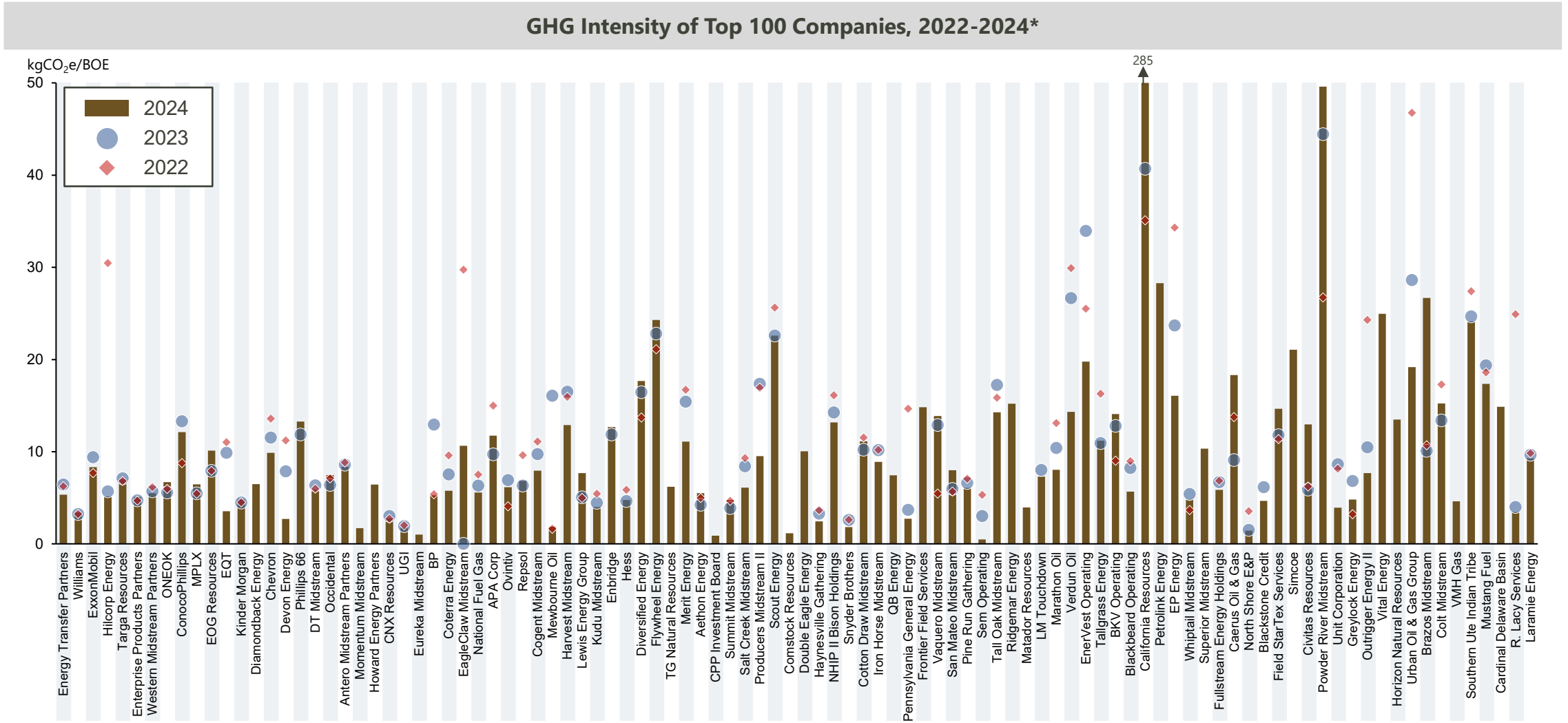
Transported hydrocarbons and absolute GHG emissions reported to EPA are highly concentrated among a small number of companies. 25% of total reported transported hydrocarbons and GHGs emitted are by three and four companies, respectively. In general, only around 20 companies are responsible for 75% of transported hydrocarbons and GHG emissions.

2022-2024 Trends Analysis: Change in Methane Intensity, by Top 100 G&B Company



*23 of the top 100 companies in 2024 were not in the EPA database for all three years and may not have data for 2022 and/or 2023.

2022-2024 Trends Analysis: Change in GHG Intensity, by Top 100 G&B Company



*23 of the top 100 companies in 2024 were not in the EPA database for all three years and may not have data for 2022 and/or 2023.

2024 Data

Emissions & Emissions Intensities of the Top 100 G&B Companies

		Transported		Emissions		Intensity		Metric Rank (among top 100 G&B companies) 1=highest, 100=lowest				
Rank	Company	Total MBOE	Gas (bcf)	MT CH4	MT GHG	NGSI Intensity	GHG Intensity	Gas (bcf)	CH4 Emissions	GHG Emissions	NGSI Intensity	GHG Intensity
1	Energy Transfer Partners	1,582,375	6,870	71,934	8,432,645	0.07%	5.33	1	1	1	32	71
2	Williams	1,126,633	5,490	15,164	3,862,023	0.02%	3.43	2	6	7	83	87
3	ExxonMobil	831,818	2,030	71,196	6,930,963	0.14%	8.33	7	2	2	14	45
4	Hilcorp Energy	814,332	3,029	6,871	4,198,820	0.01%	5.16	3	17	5	87	73
5	Targa Resources	716,145	2,873	10,605	5,017,567	0.03%	7.01	4	10	4	67	54
6	Enterprise Products Partners	590,410	2,572	14,921	3,013,502	0.04%	5.10	5	7	11	58	74
7	Western Midstream Partners	543,098	1,633	8,337	2,987,505	0.03%	5.50	11	12	12	65	70
8	ONEOK	538,103	2,053	17,859	3,601,688	0.06%	6.69	6	5	8	34	56
9	ConocoPhillips	465,433	821	37,829	5,642,983	0.14%	12.12	17	3	3	15	31
10	MPLX	424,799	1,981	10,628	2,741,539	0.03%	6.45	8	9	14	63	58
11	EOG Resources	390,725	785	7,067	3,950,199	0.03%	10.11	18	16	6	62	38
12	EQT	368,121	1,903	5,081	1,304,587	0.02%	3.54	9	21	20	85	85
13	Kinder Morgan	312,700	1,778	10,717	1,508,597	0.05%	4.82	10	8	19	47	75
14	Diamondback Energy	299,289	685	7,219	1,939,416	0.02%	6.48	21	15	16	74	57
15	Chevron	287,352	693	7,576	2,841,886	0.05%	9.89	20	14	13	46	40
16	Devon Energy	275,097	1,015	1,090	746,289	0.01%	2.71	15	50	27	97	90
17	Phillips 66	268,297	1,067	27,066	3,562,060	0.19%	13.28	14	4	9	12	26
18	DT Midstream	259,896	1,334	5,014	1,523,623	0.02%	5.86	12	23	18	77	65
19	Occidental	258,389	576	9,178	1,931,844	0.07%	7.48	25	11	17	29	51
20	Antero Midstream Partners	240,084	1,170	3,037	2,010,531	0.02%	8.37	13	29	15	84	44
21	Momentum Midstream	179,213	906	3,907	304,060	0.03%	1.70	16	27	45	71	95
22	How ard Energy Partners	139,203	615	5,126	896,590	0.05%	6.44	22	20	24	45	59
23	CNX Resources	137,483	704	1,800	378,278	0.01%	2.75	19	39	40	86	88
24	UGI	123,572	599	1,805	216,918	0.02%	1.76	23	38	58	82	94
25	Eureka Midstream	119,671	584	769	120,141	0.01%	1.00	24	62	79	96	98
26	BP	116,325	366	1,588	613,576	0.02%	5.27	29	43	30	75	72
27	Coterra Energy	100,996	410	804	583,031	0.01%	5.77	27	59	31	88	66
28	EagleClaw Midstream	94,870	374	2,596	1,009,425	0.05%	10.64	28	33	23	44	36
29	National Fuel Gas	90,249	484	3,996	503,971	0.04%	5.58	26	26	35	53	68
30	APA Corp	90,192	246	7,811	1,059,275	0.13%	11.74	34	13	22	17	32
31	Ovintiv	84,932	192	2,010	521,782	0.05%	6.14	42	36	33	48	61
32	Repsol	72,564	364	815	497,297	0.01%	6.85	30	57	36	91	55
33	Cogent Midstream	66,930	196	1,353	532,010	0.04%	7.95	41	44	32	55	48
34	Mew bourne Oil	61,277	94	554	114,735	0.06%	1.87	58	71	82	40	92

2024 Data

Emissions & Emissions Intensities of the Top 100 G&B Companies

		Transported		Emissions		Intensity		Metric Rank (among top 100 G&B companies) 1=highest, 100=lowest				
Rank	Company	Total MBOE	Gas (bcf)	MT CH4	MT GHG	NGSI Intensity	GHG Intensity	Gas (bcf)	CH4 Emissions	GHG Emissions	NGSI Intensity	GHG Intensity
35	Harvest Midstream	59,600	259	5,076	769,085	0.12%	12.90	33	22	26	19	29
36	Lew is Energy Group	57,994	313	1,732	445,243	0.03%	7.68	31	41	38	66	50
37	Kudu Midstream	56,878	303	537	227,667	0.01%	4.00	32	73	54	92	82
38	Enbridge	51,495	213	5,240	652,778	0.17%	12.68	38	19	29	13	30
39	Hess	46,788	127	940	222,667	0.05%	4.76	50	54	56	41	78
40	Diversified Energy	46,096	225	4,492	814,422	0.12%	17.67	36	25	25	20	13
41	Flyw heel Energy	45,369	245	3,015	1,102,317	0.07%	24.30	35	30	21	33	6
42	TG Natural Resources	44,414	217	2,369	275,394	0.06%	6.20	37	35	48	37	60
43	Merit Energy	42,663	196	1,761	473,886	0.05%	11.11	40	40	37	49	35
44	Aethon Energy	36,849	212	701	203,226	0.02%	5.52	39	64	60	81	69
45	CPP Investment Board	36,137	175	259	32,323	0.01%	0.89	44	86	97	94	99
46	Summit Midstream	35,173	177	637	167,045	0.02%	4.75	43	65	69	78	79
47	Salt Creek Midstream	34,819	138	1,079	212,827	0.06%	6.11	49	51	59	39	62
48	Producers Midstream II	34,510	140	795	328,711	0.04%	9.53	48	60	43	57	41
49	Scout Energy	32,612	115	3,085	736,728	0.19%	22.59	54	28	28	11	8
50	Comstock Resources	32,025	168	341	37,016	0.01%	1.16	46	79	96	90	97
51	Double Eagle Energy	30,991	48	851	311,100	0.04%	10.04	74	55	44	60	39
52	Haynesville Gathering	30,741	172	290	75,044	0.01%	2.44	45	84	84	93	91
53	NHIP II Bison Holdings	30,737	120	956	405,441	0.06%	13.19	51	53	39	38	27
54	Snyder Brothers	30,550	141	437	55,645	0.02%	1.82	47	77	90	79	93
55	Cotton Draw Midstream	25,140	101	583	279,449	0.05%	11.12	57	69	47	51	34
56	Iron Horse Midstream	24,900	101	316	221,887	0.02%	8.91	56	80	57	76	43
57	QB Energy	23,379	117	1,703	173,772	0.08%	7.43	53	42	67	25	52
58	Pennsylvania General Energy	22,509	119	266	61,645	0.01%	2.74	52	85	89	89	89
59	Frontier Field Services	22,323	57	1,143	330,891	0.10%	14.82	66	47	42	22	19
60	Vaquero Midstream	21,709	85	599	300,902	0.05%	13.86	60	68	46	42	24
61	San Mateo Midstream	21,585	86	249	172,302	0.02%	7.98	59	87	68	73	47
62	Pine Run Gathering	20,725	101	84	125,975	0.00%	6.08	55	97	76	98	63
63	Sem Operating	18,699	55	80	8,911	0.01%	0.48	67	98	100	95	100
64	Tall Oak Midstream	18,158	70	1,122	259,439	0.13%	14.29	63	48	51	18	22
65	Ridgemar Energy	17,222	9	631	261,776	0.08%	15.20	100	66	50	26	17
66	Matador Resources	16,877	26	303	66,600	0.03%	3.95	98	82	87	64	83
67	LM Touchdow n	15,814	63	199	115,300	0.02%	7.29	65	94	80	72	53

2024 Data

Emissions & Emissions Intensities of the Top 100 G&B Companies

		Transported		Emissions		Intensity		Metric Rank (among top 100 G&B companies) 1=highest, 100=lowest				
Rank	Company	Total MBOE	Gas (bcf)	MT CH4	MT GHG	NGSI Intensity	GHG Intensity	Gas (bcf)	CH4 Emissions	GHG Emissions	NGSI Intensity	GHG Intensity
68	Marathon Oil	15,470	75	238	124,427	0.02%	8.04	61	90	77	80	46
69	Verdun Oil	13,551	30	314	194,274	0.04%	14.34	96	81	63	54	21
70	EnerVest Operating	13,527	68	846	267,596	0.07%	19.78	64	56	49	30	10
71	Tallgrass Energy	13,437	36	554	150,348	0.08%	11.19	87	70	71	27	33
72	BKV Operating	13,309	70	767	187,535	0.06%	14.09	62	63	64	36	23
73	Blackbeard Operating	13,057	31	211	74,115	0.03%	5.68	95	93	85	68	67
74	California Resources	12,066	48	4,654	3,437,915	0.80%	284.93	75	24	10	2	1
75	Petrolink Energy	11,746	48	2,727	332,104	0.39%	28.27	73	31	41	3	3
76	EP Energy	11,339	30	497	182,350	0.05%	16.08	97	75	66	52	15
77	Whiptail Midstream	11,255	18	978	53,920	0.11%	4.79	99	52	91	21	77
78	Superior Midstream	11,127	42	806	114,921	0.21%	10.33	81	58	81	7	37
79	Fullstream Energy Holdings	11,099	54	42	65,174	0.00%	5.87	68	99	88	100	64
80	Caerus Oil & Gas	11,056	54	1,914	202,420	0.21%	18.31	69	37	61	9	12
81	North Shore E&P	11,033	44	32	15,888	0.00%	1.44	80	100	99	99	96
82	Blackstone Credit	11,018	35	108	51,334	0.03%	4.66	88	96	92	69	80
83	Field StarTex Services	10,955	46	522	160,503	0.08%	14.65	77	74	70	28	20
84	Simcoe	10,758	51	2,623	226,642	0.32%	21.07	70	32	55	5	9
85	Civitas Resources	10,668	40	1,098	138,257	0.21%	12.96	84	49	73	8	28
86	Pow der River Midstream	10,352	40	5,622	513,588	1.04%	49.61	85	18	34	1	2
87	Unit Corporation	10,321	50	405	40,446	0.05%	3.92	71	78	94	50	84
88	Greylock Energy	10,260	50	229	49,421	0.03%	4.82	72	91	93	70	76
89	Outrigger Energy II	10,156	35	240	78,079	0.05%	7.69	89	89	83	43	49
90	Vital Energy	9,954	40	1,165	248,453	0.20%	24.96	83	46	52	10	5
91	Horizon Natural Resources	9,704	41	544	130,985	0.09%	13.50	82	72	74	24	25
92	Urban Oil & Gas Group	9,690	46	452	185,755	0.07%	19.17	78	76	65	31	11
93	Brazos Midstream	8,998	35	294	240,065	0.06%	26.68	90	83	53	35	4
94	Colt Midstream	8,595	34	614	130,958	0.14%	15.24	91	67	75	16	16
95	VMH Gas	8,512	45	777	39,308	0.10%	4.62	79	61	95	23	81
96	Southern Ute Indian Tribe	8,358	46	2,546	201,649	0.34%	24.13	76	34	62	4	7
97	Mustang Fuel	8,329	33	1,301	144,524	0.29%	17.35	93	45	72	6	14
98	Cardinal Delaw are Basin	8,124	32	153	120,822	0.04%	14.87	94	95	78	61	18
99	R. Lacy Services	7,453	34	220	25,644	0.04%	3.44	92	92	98	59	86
100	Laramie Energy	7,374	36	241	68,452	0.04%	9.28	86	88	86	56	42

Company- & Basin-Level Summary Data

This section summarizes company-level data on transported hydrocarbons, GHG emissions, emissions intensity, and sources of emissions for each of the following basins: Permian, Appalachian, Gulf Coast, and Arkla. Additional data show the distribution of methane and GHG emissions intensities by volume in each basin.

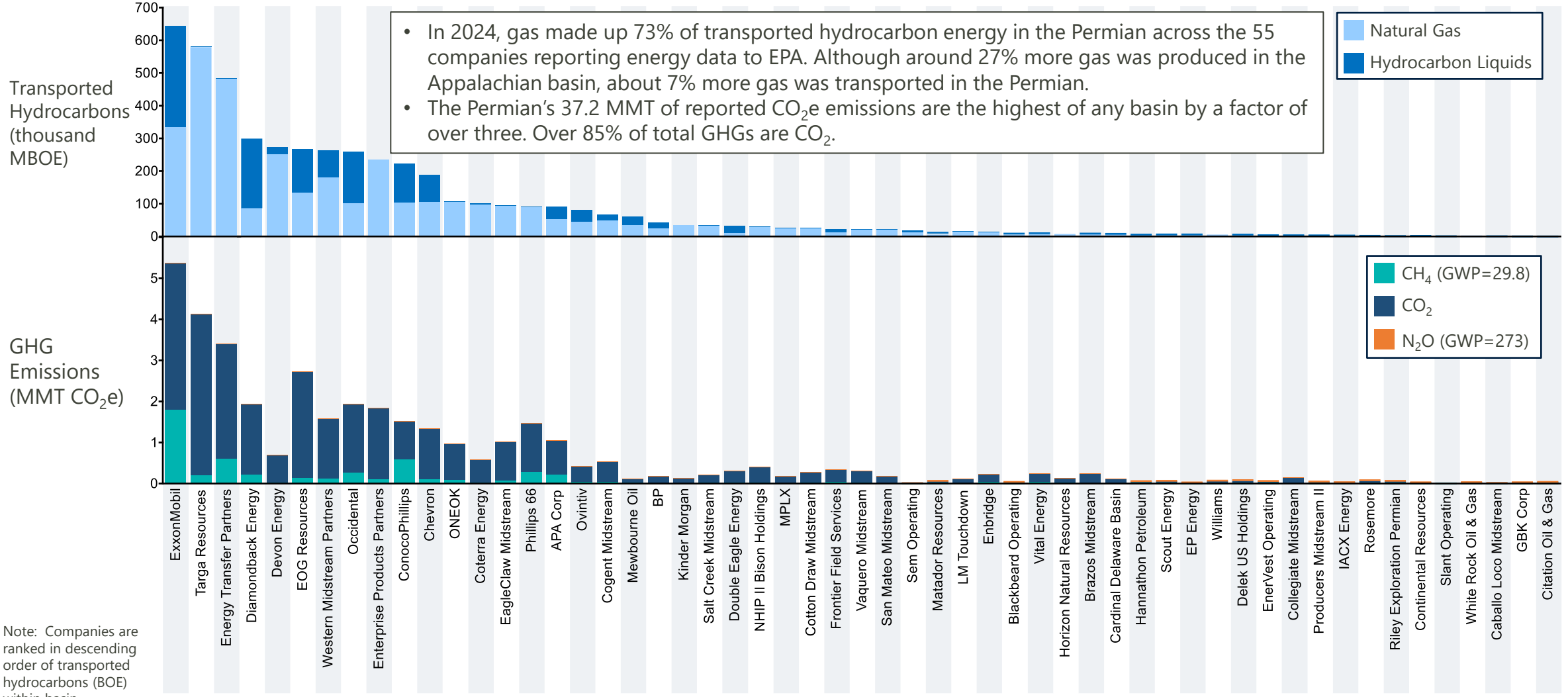
Note that the Arctic Coastal basin has more reported transported hydrocarbons than the Arkla basin. The Arctic Coastal basin in Alaska represents unique operations and only two companies reported G&B operations there in 2024. This section includes information on the Arkla basin rather than the Arctic Coastal basin for the G&B segment to facilitate benchmarking and provide more detailed data for a larger number of companies.

Permian Basin Companies

2024 Data

Transported Hydrocarbons & Emissions (100-year GWP)

- In 2024, gas made up 73% of transported hydrocarbon energy in the Permian across the 55 companies reporting energy data to EPA. Although around 27% more gas was produced in the Appalachian basin, about 7% more gas was transported in the Permian.
- The Permian's 37.2 MMT of reported CO_2e emissions are the highest of any basin by a factor of over three. Over 85% of total GHGs are CO_2.

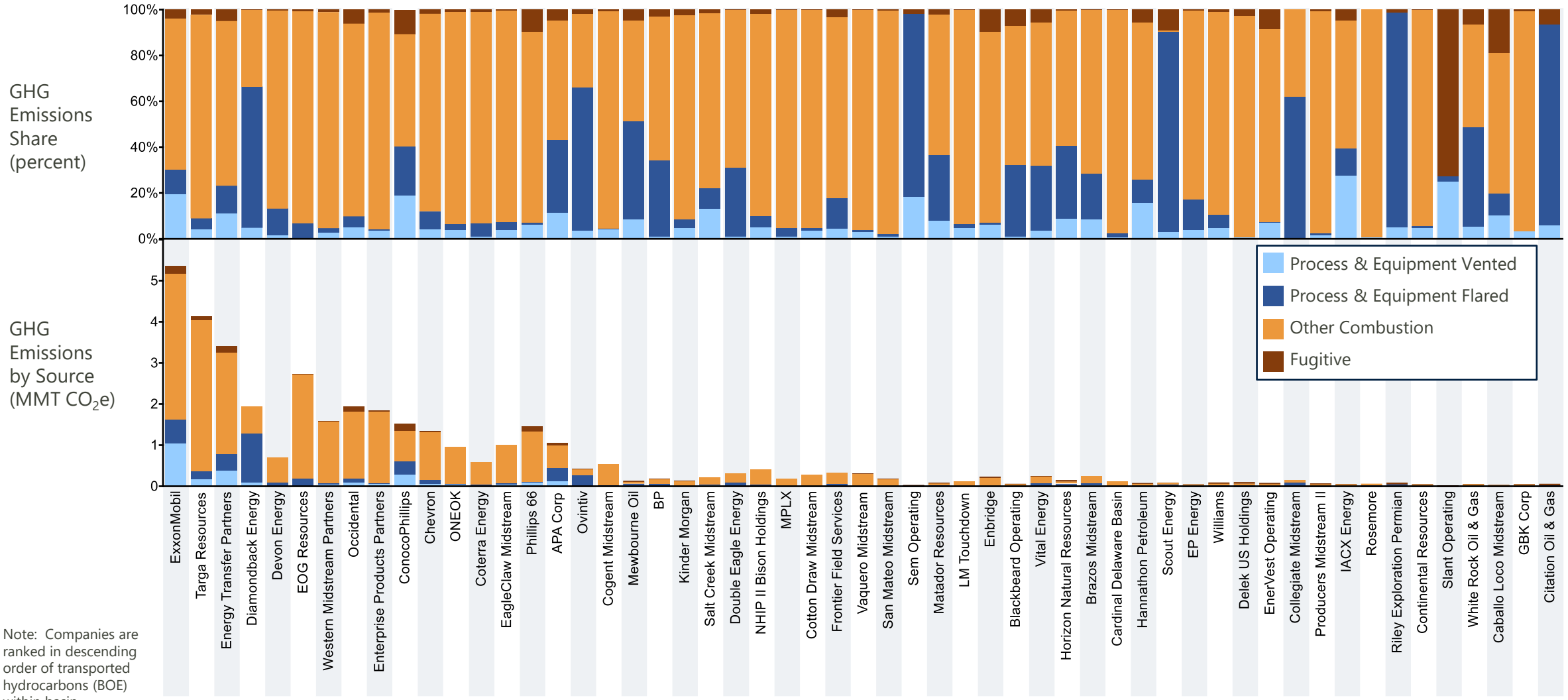


Note: Companies are ranked in descending order of transported hydrocarbons (BOE) within basin

Permian Basin Companies

2024 Data

GHG Emissions by Source (100-year GWP)

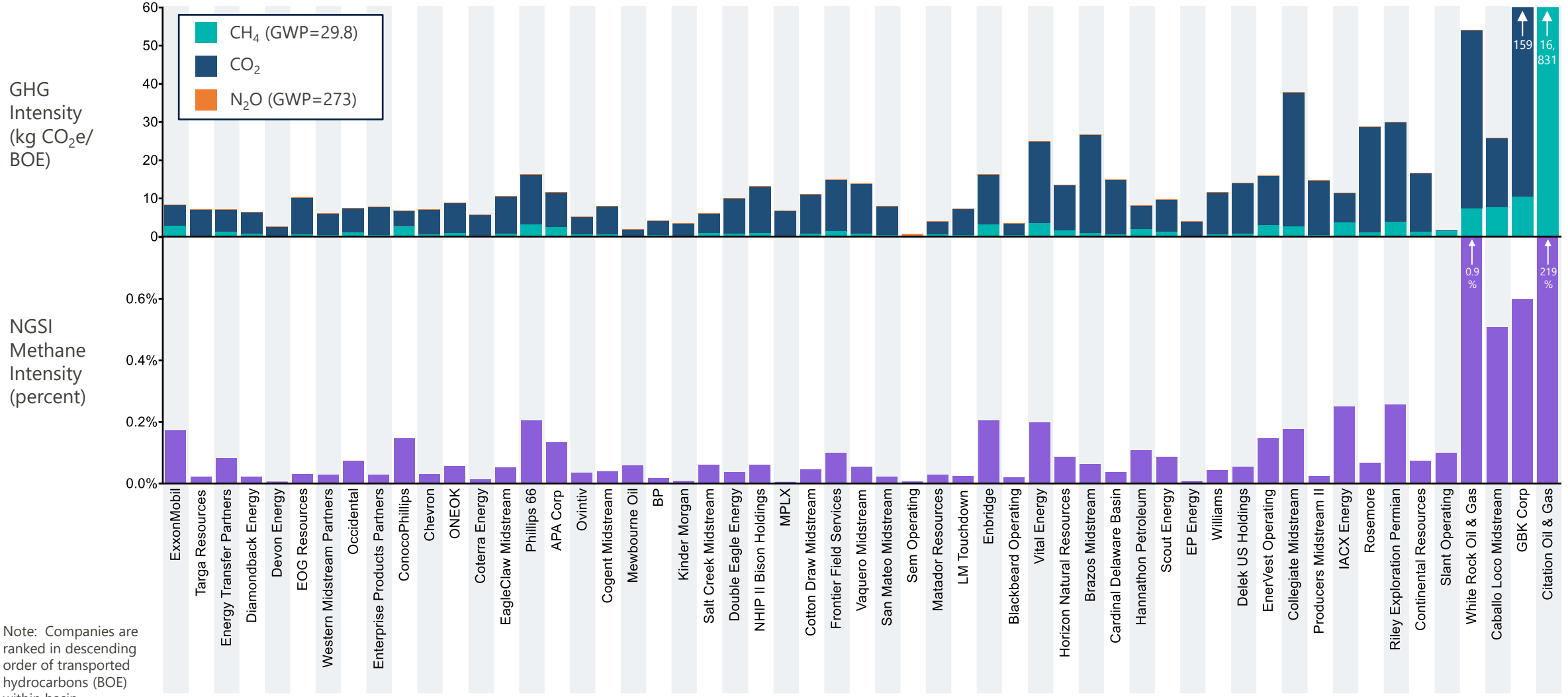


Note: Companies are ranked in descending order of transported hydrocarbons (BOE) within basin

Permian Basin Companies

2024 Data

Methane & GHG Intensity (100-year GWP)



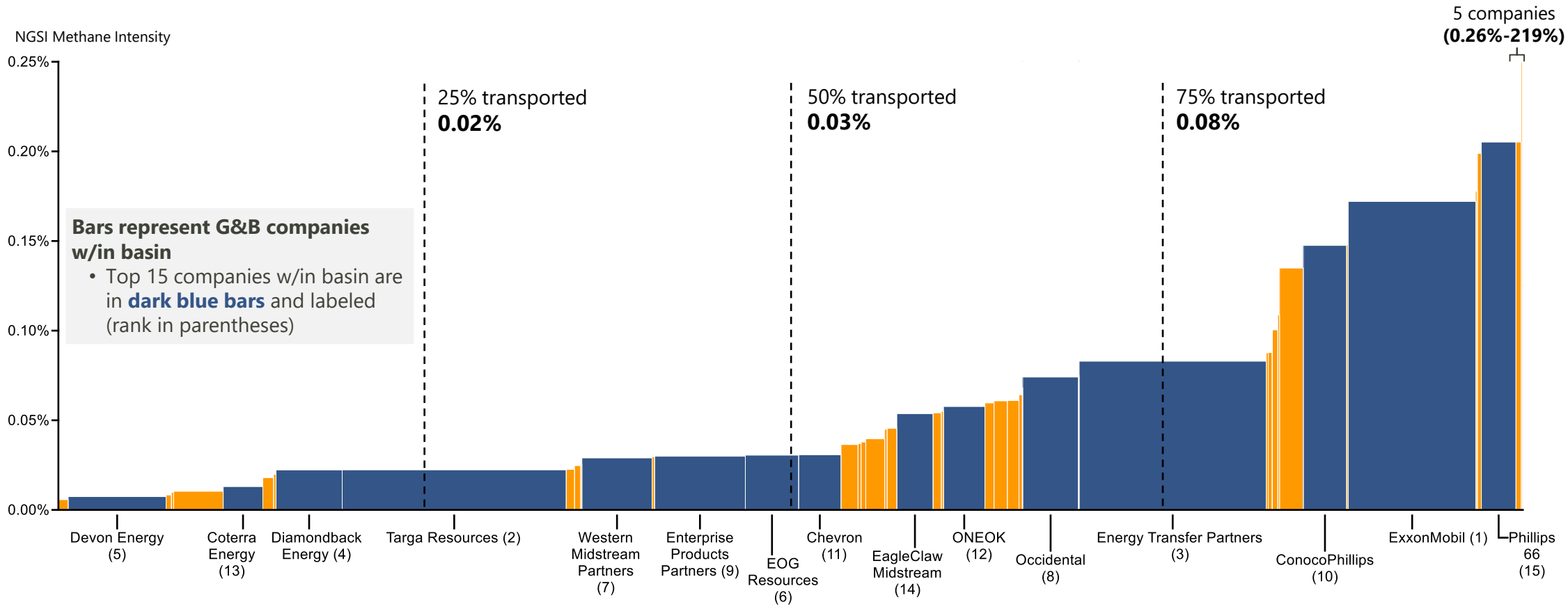
Note: Companies are ranked in descending order of transported hydrocarbons (BOE) within basin

Permian Basin Companies

2024 Data

Total GHGRP Transported Natural Gas, by Methane Intensity

Transported Natural Gas Associated with NGSI Methane Intensity



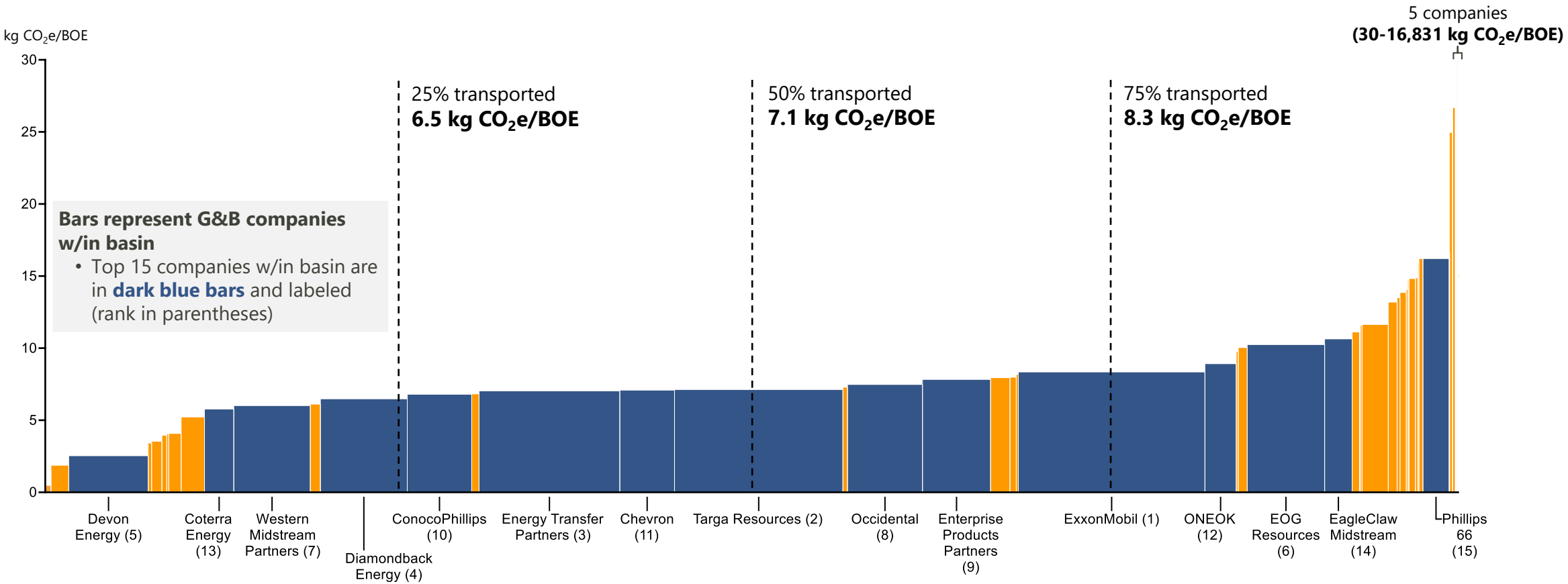
Transported Natural Gas ⟶ Total Gas Transported: 15.1 trillion cubic feet

Permian Basin Companies

2024 Data

Total GHGRP Transported Hydrocarbons, by GHG Intensity

Transported Hydrocarbons Associated with GHG Intensity



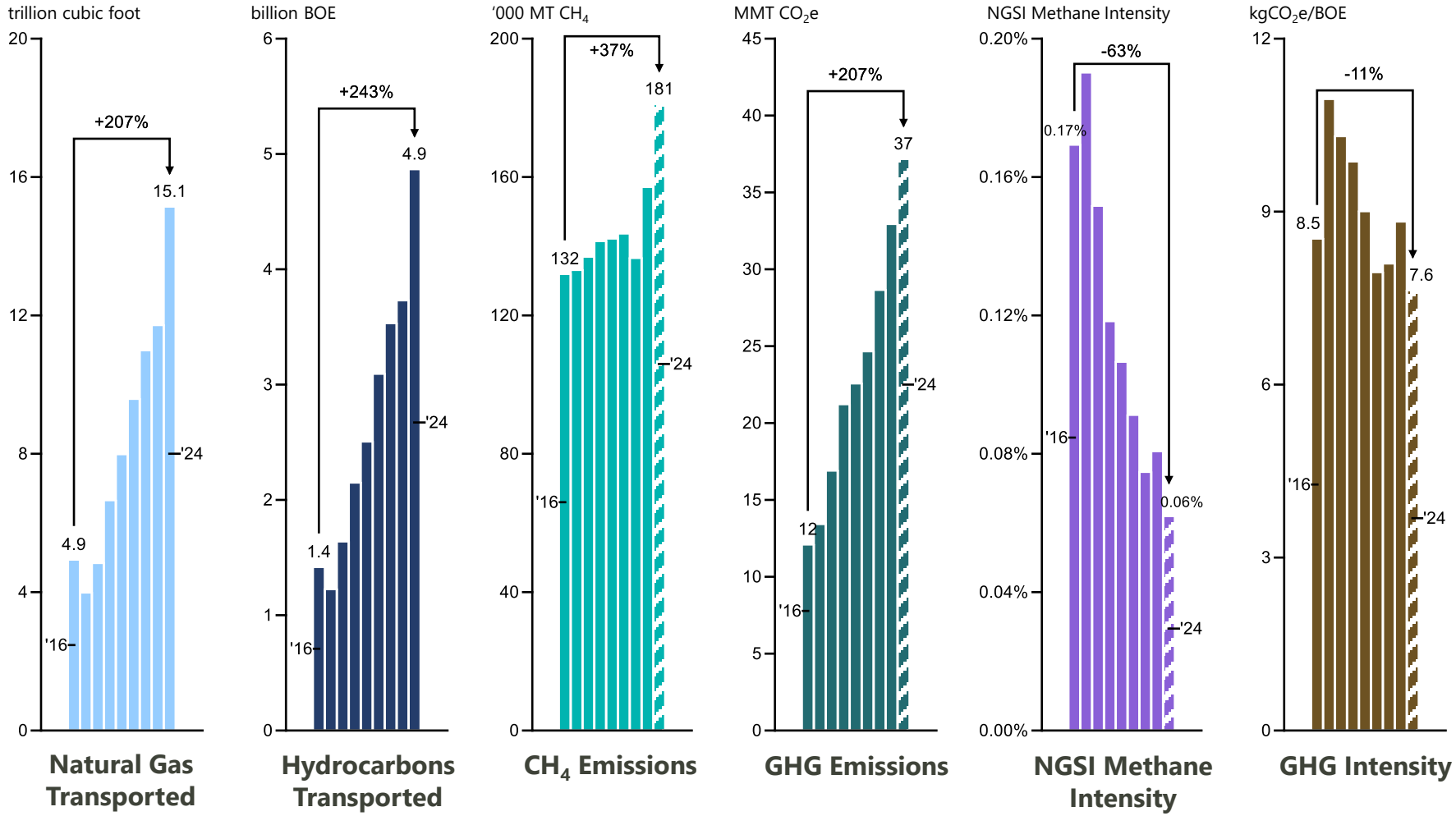
Transported Hydrocarbons → Total Hydrocarbons Transported: 4.87 billion BOE

Permian Basin Companies

2016-2024 Trends Analysis: Transported Energy & Emissions Metrics

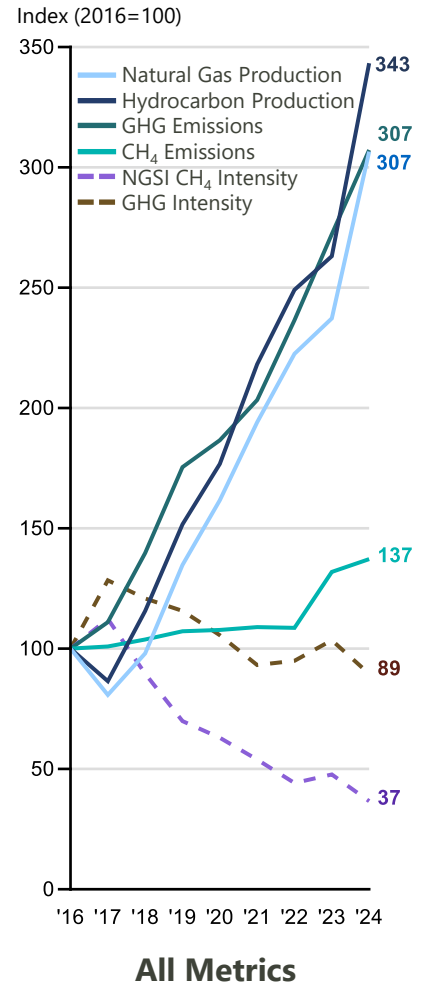
GHGRP Data Trends, 2016-2024

Permian Basin



Combined Data Metrics

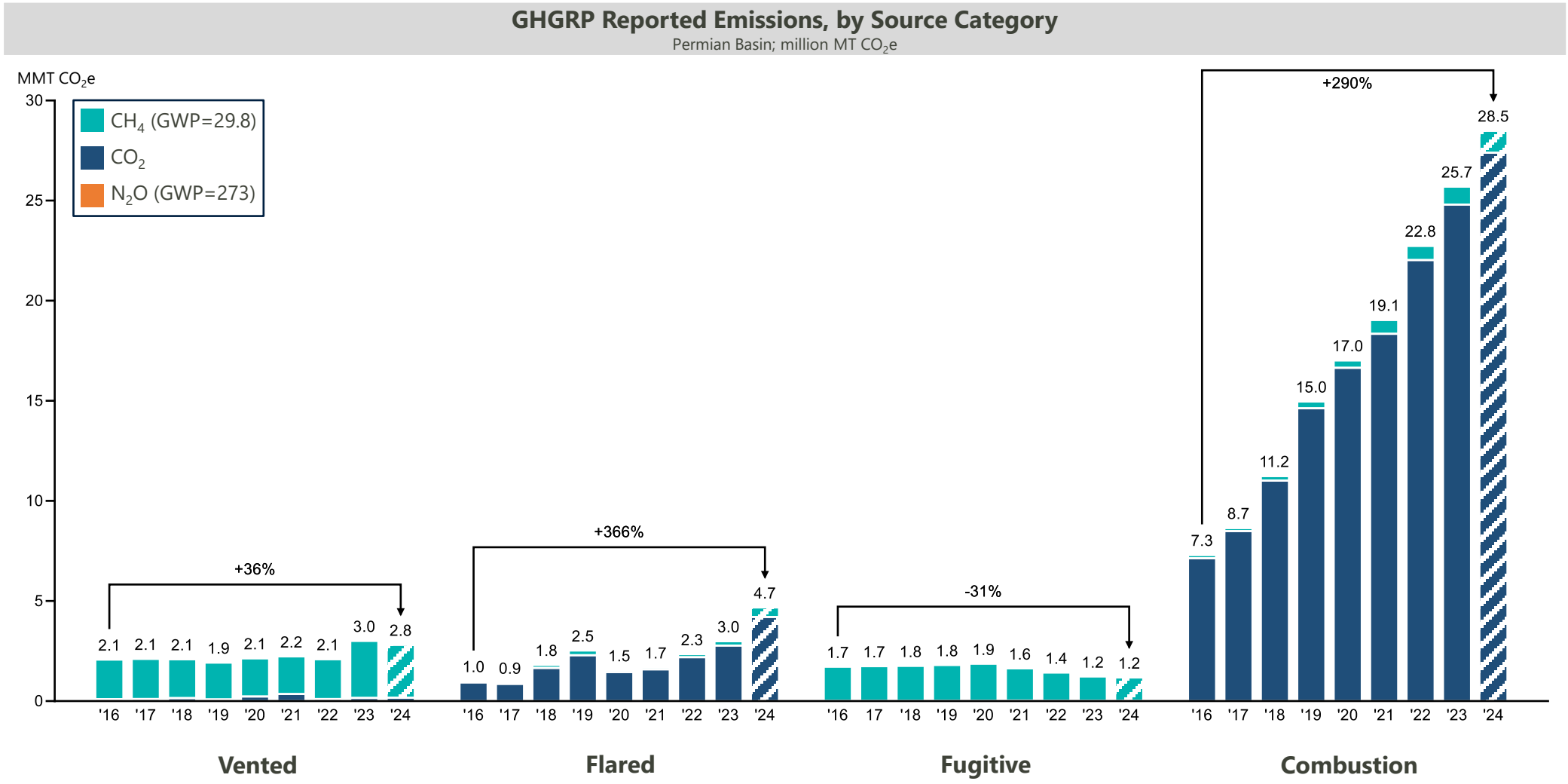
Indexed; 2016 = 100



Permian Basin Companies

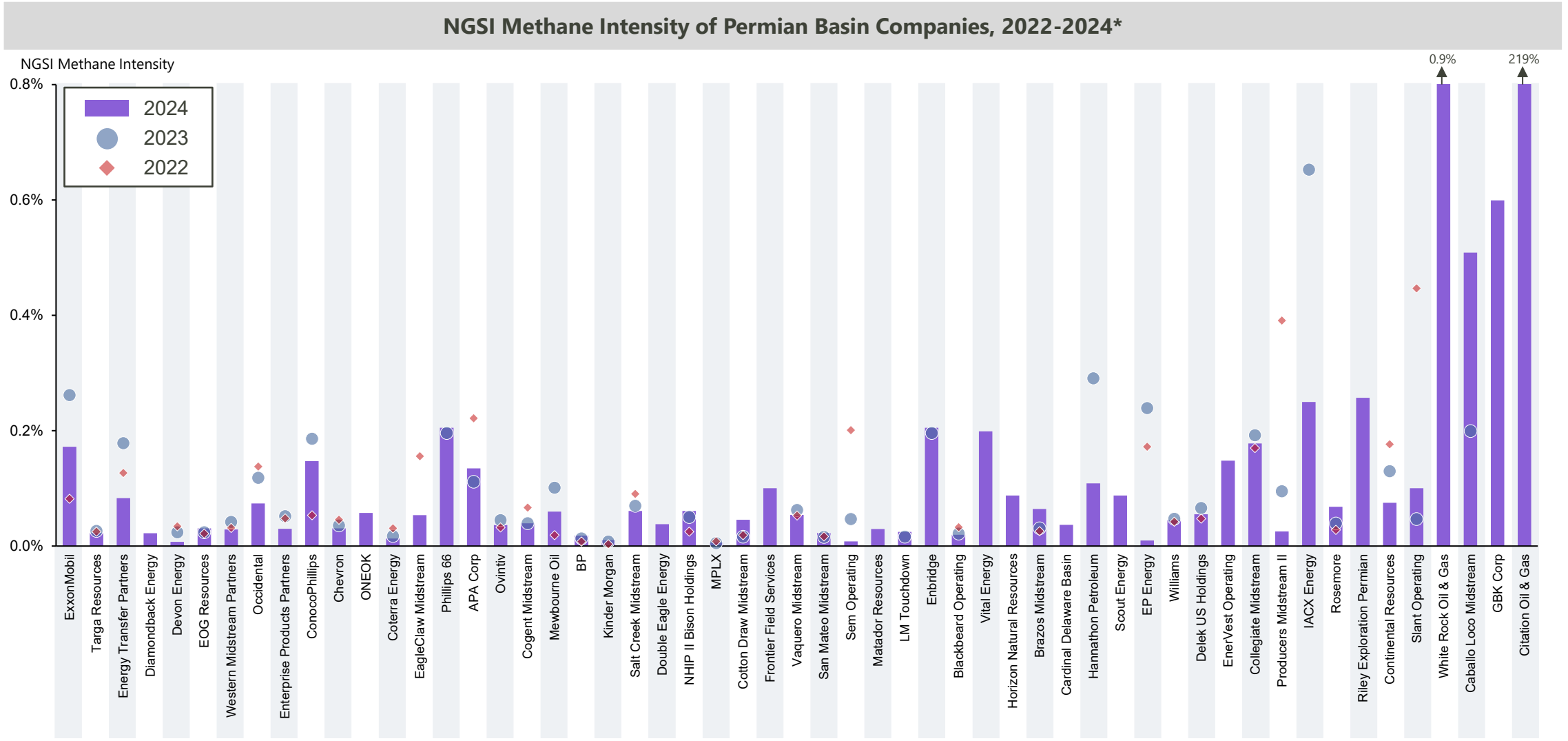
2016-2024 Trends Analysis: Emissions Sources

GHG Emissions (MMT CO_2e)



Permian Basin Companies

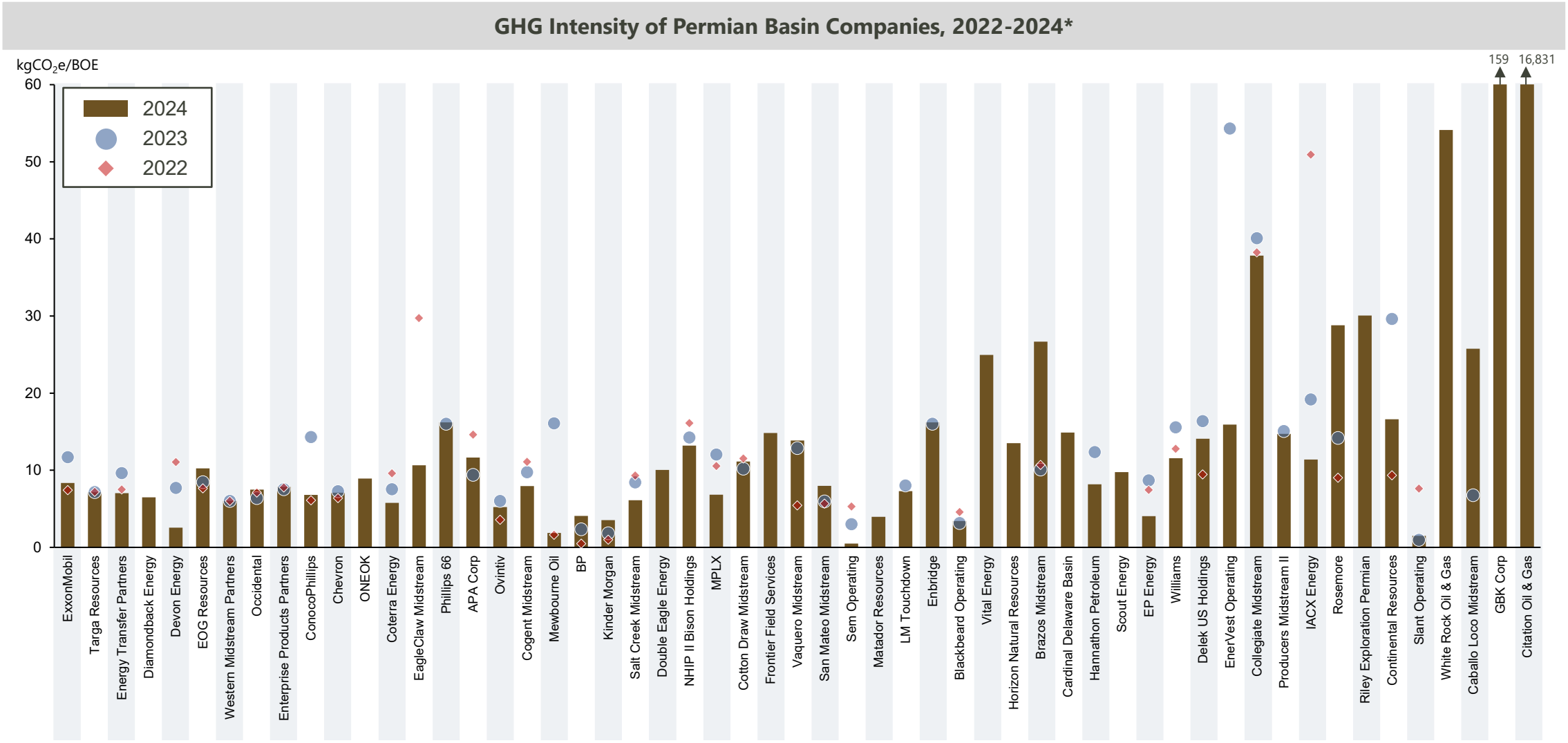
2022-2024 Trends Analysis: Change in Methane Intensity, by Top Company



*Note that some producers in 2024 were not in the EPA database for all three years and may not have data for 2022 and/or 2023.

Permian Basin Companies

2022-2024 Trends Analysis: Change in GHG Intensity, by Top Company



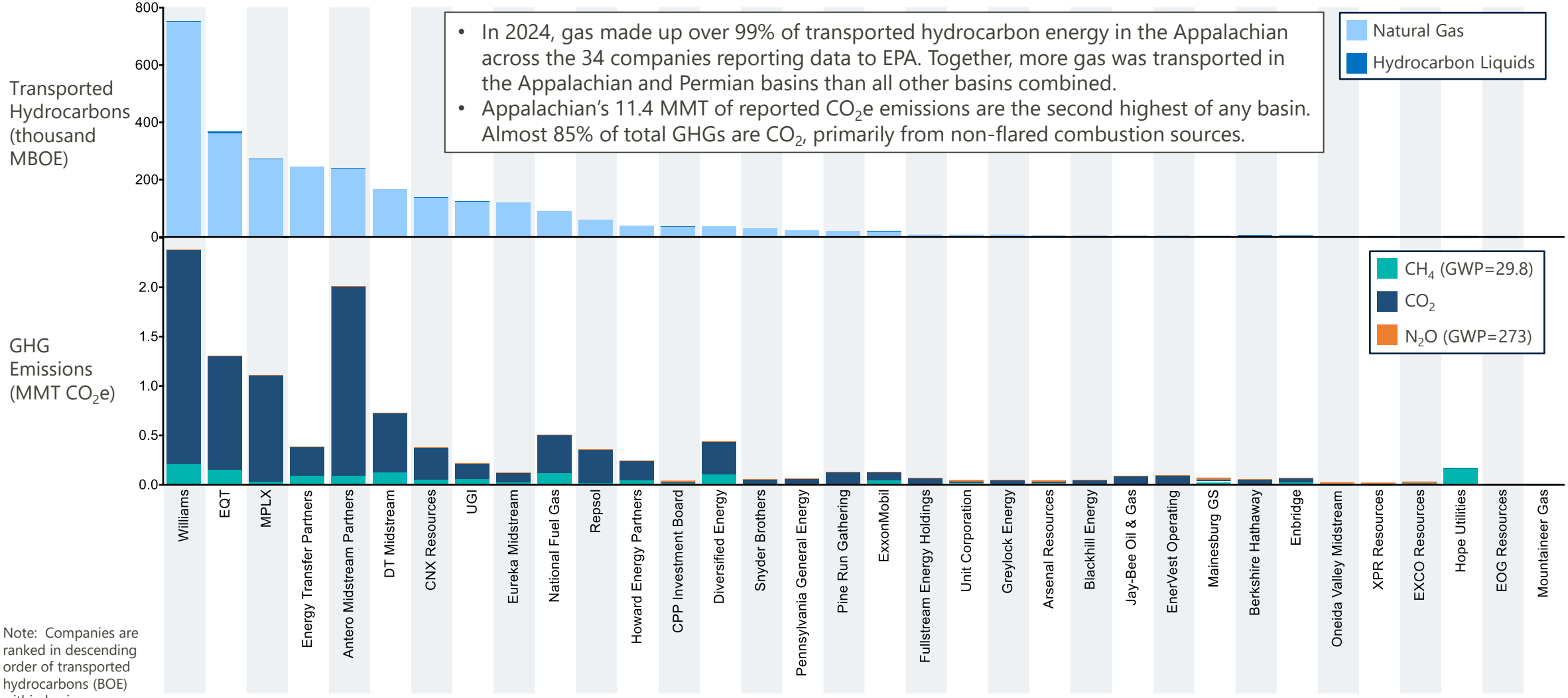
*Note that some producers in 2024 were not in the EPA database for all three years and may not have data for 2022 and/or 2023.

Appalachian Basin Companies

2024 Data

Transported Hydrocarbons & Emissions (100-year GWP)

- In 2024, gas made up over 99% of transported hydrocarbon energy in the Appalachian across the 34 companies reporting data to EPA. Together, more gas was transported in the Appalachian and Permian basins than all other basins combined.
- Appalachian's 11.4 MMT of reported CO_2e emissions are the second highest of any basin. Almost 85% of total GHGs are CO_2, primarily from non-flared combustion sources.

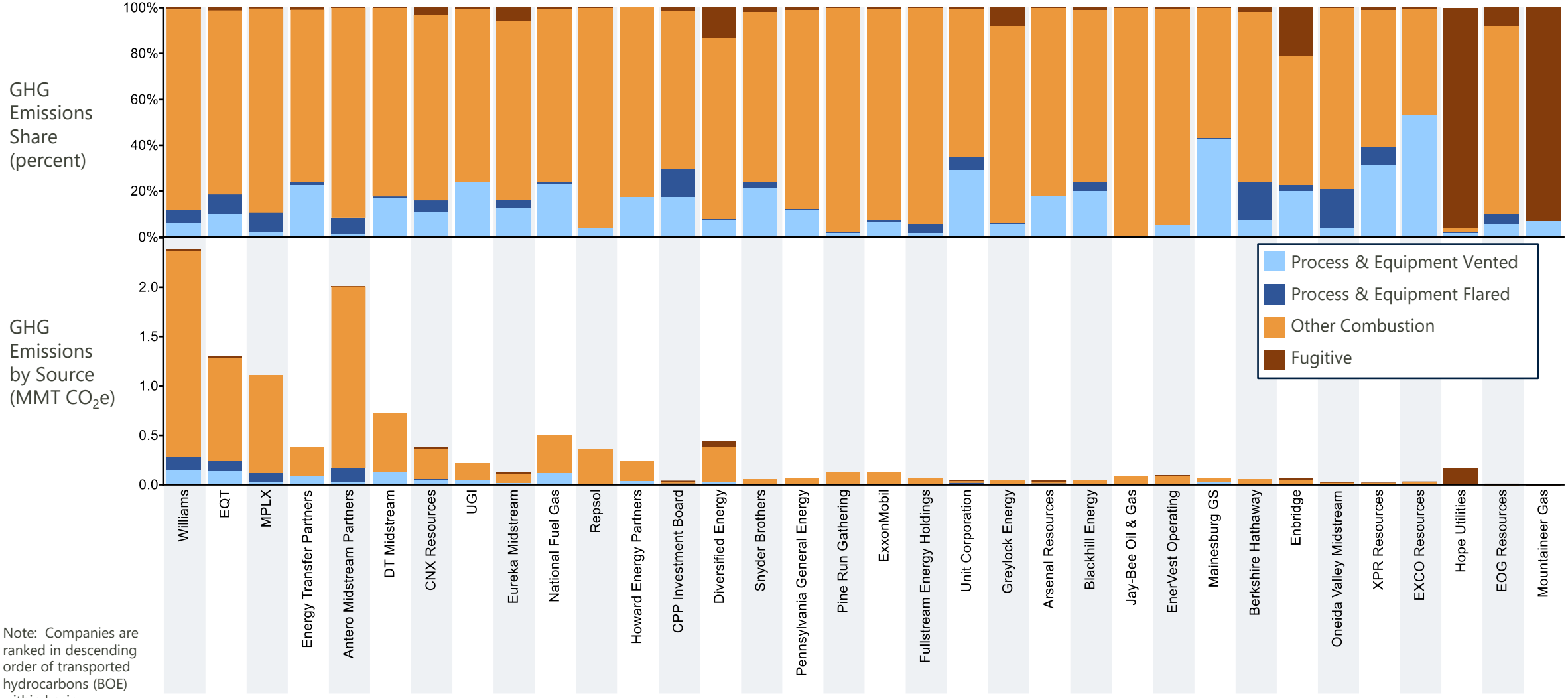


Note: Companies are ranked in descending order of transported hydrocarbons (BOE) within basin

Appalachian Basin Companies

2024 Data

GHG Emissions by Source (100-year GWP)

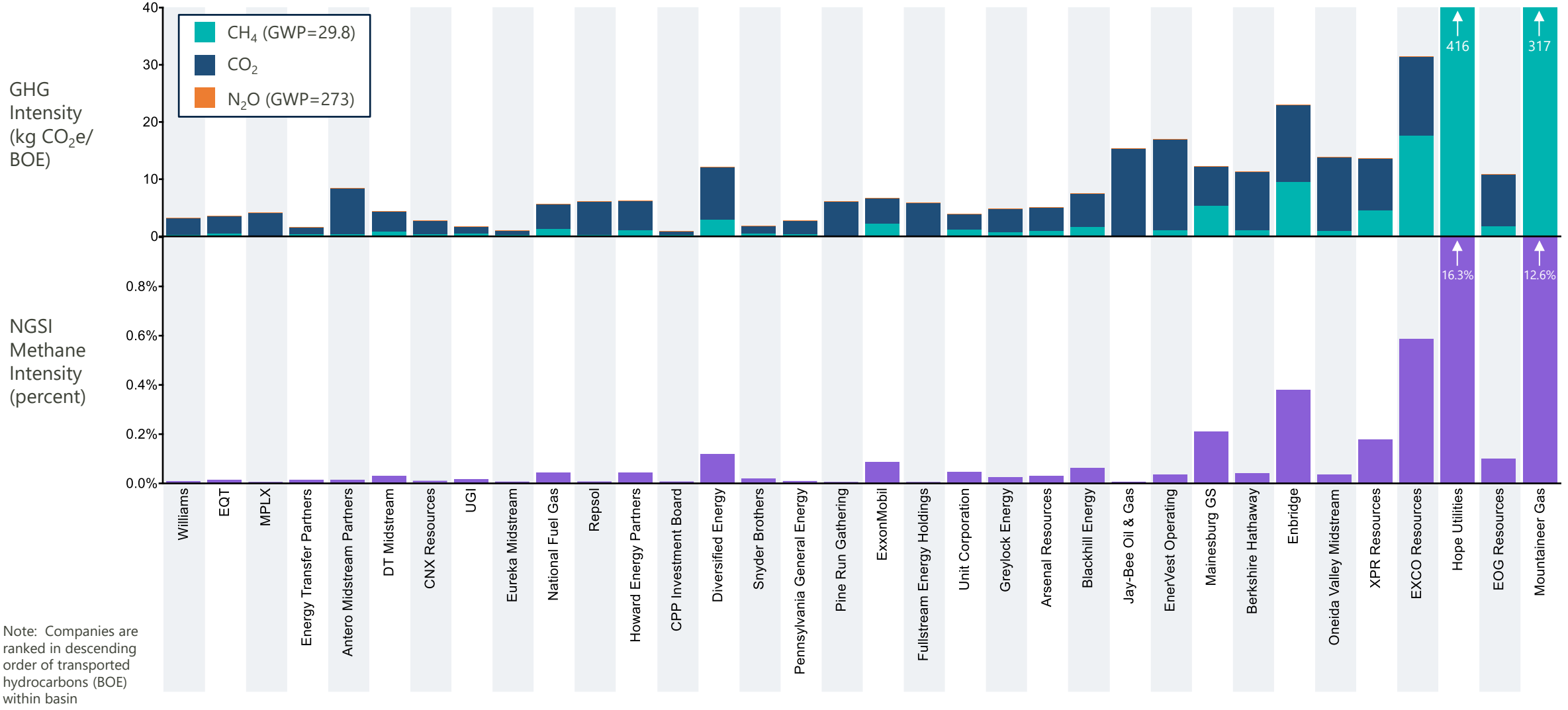


Note: Companies are ranked in descending order of transported hydrocarbons (BOE) within basin

Appalachian Basin Companies

2024 Data

Methane & GHG Intensity (100-year GWP)

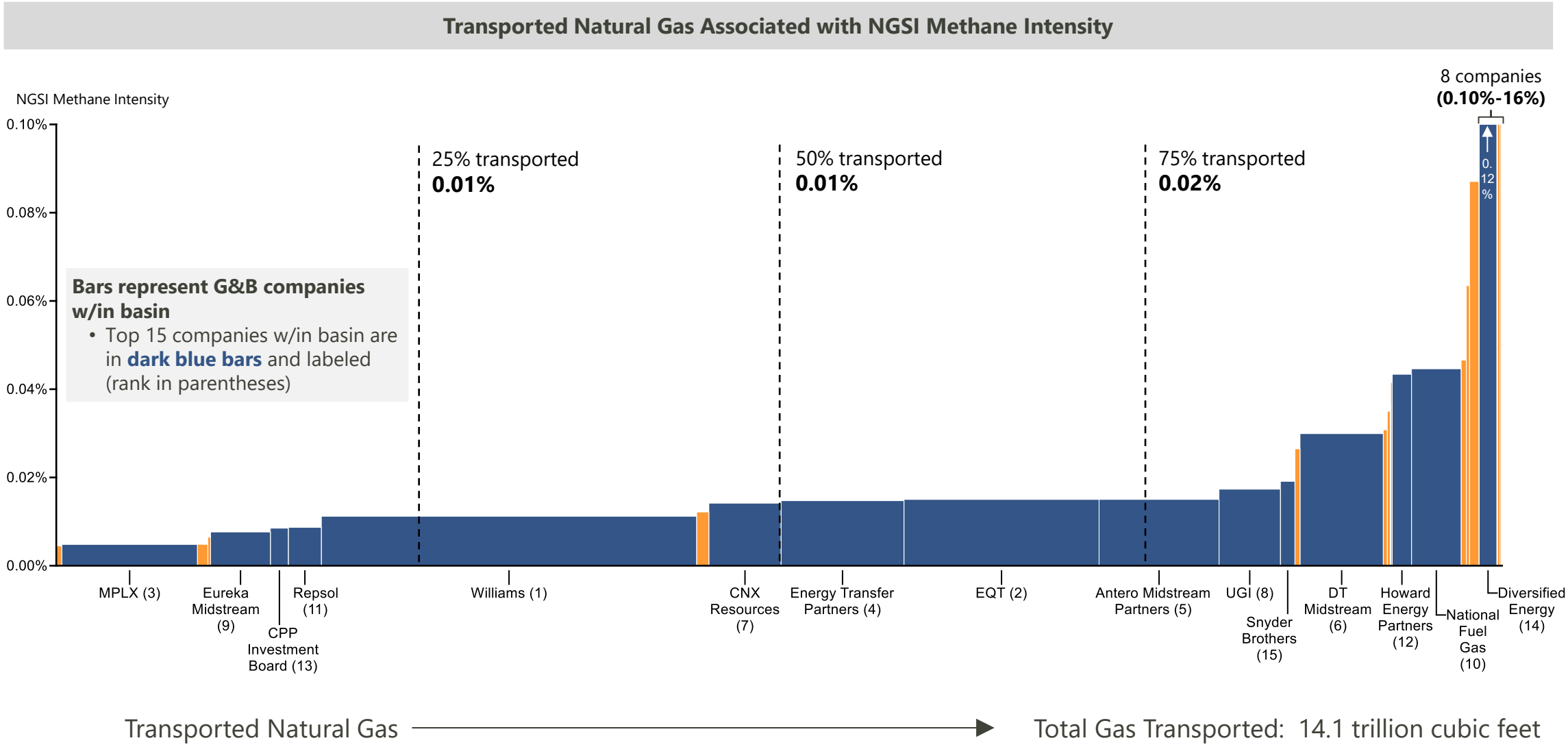


Note: Companies are ranked in descending order of transported hydrocarbons (BOE) within basin

Appalachian Basin Companies

2024 Data

Total GHGRP Transported Natural Gas, by Methane Intensity

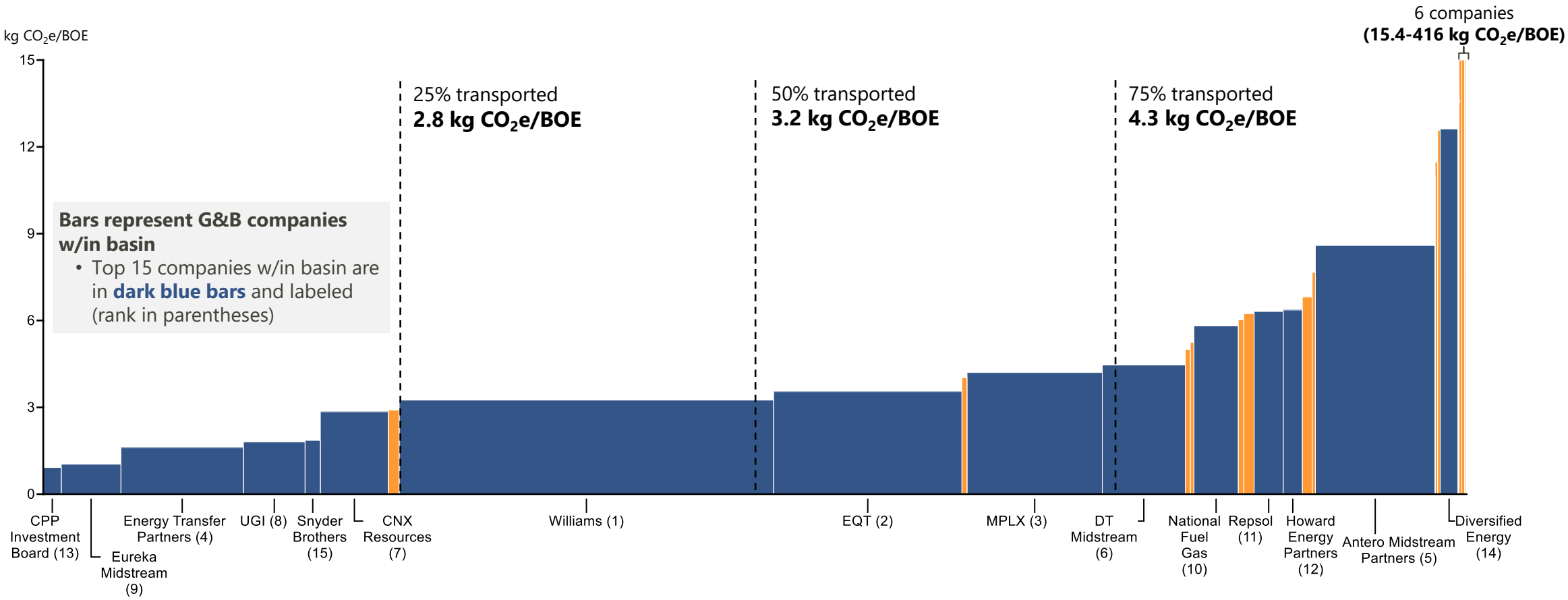


Appalachian Basin Companies

2024 Data

Total GHGRP Transported Hydrocarbons, by GHG Intensity

Transported Hydrocarbons Associated with GHG Intensity



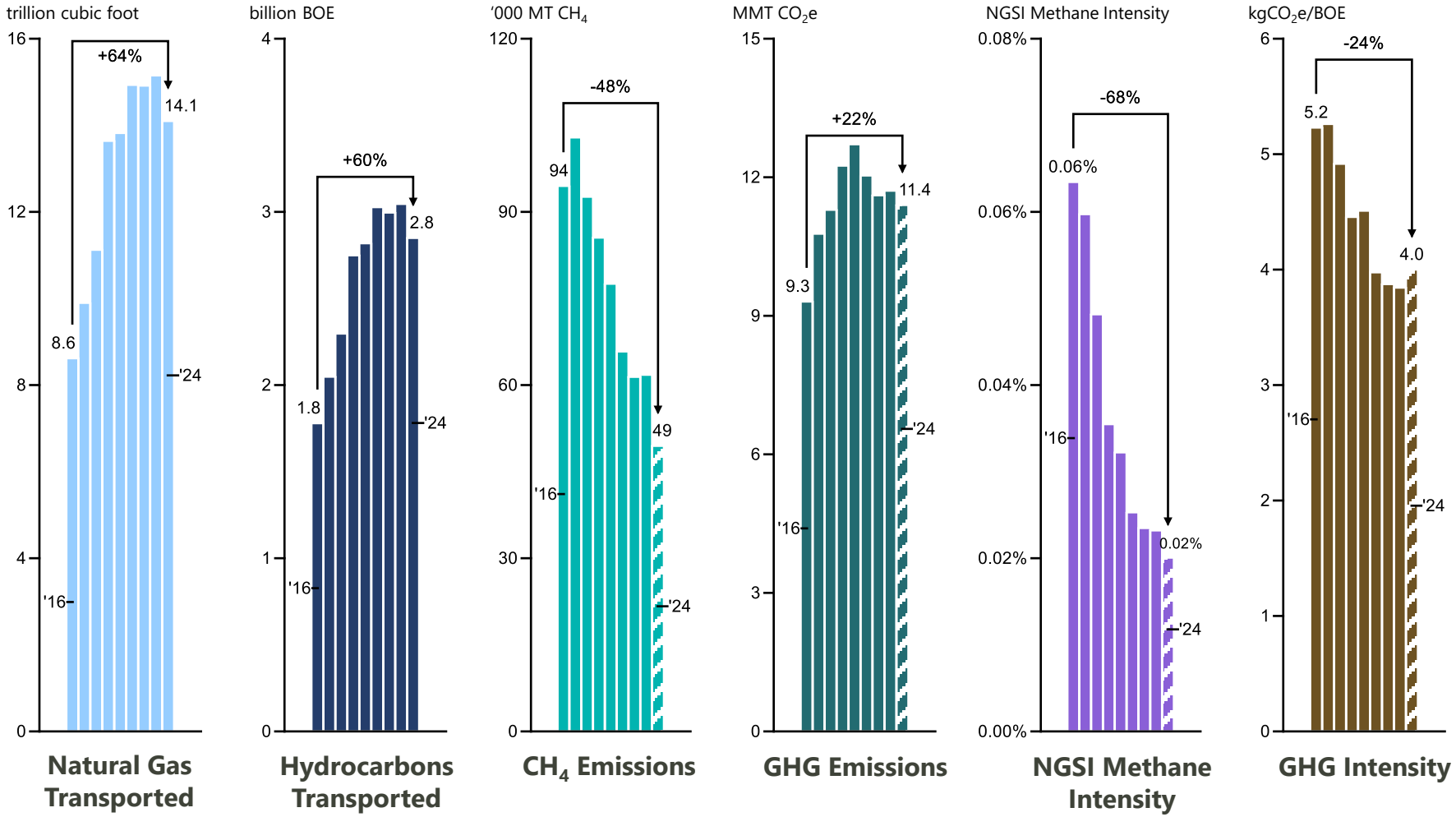
Transported Hydrocarbons → Total Hydrocarbons Transported: 2.85 billion BOE

Appalachian Basin Companies

2016-2024 Trends Analysis: Transported Energy & Emissions Metrics

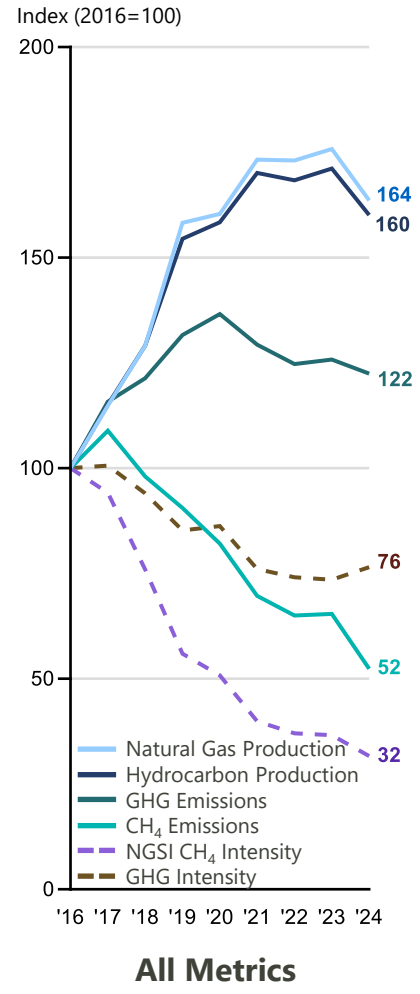
GHGRP Data Trends, 2016-2024

Appalachian Basin



Combined Data Metrics

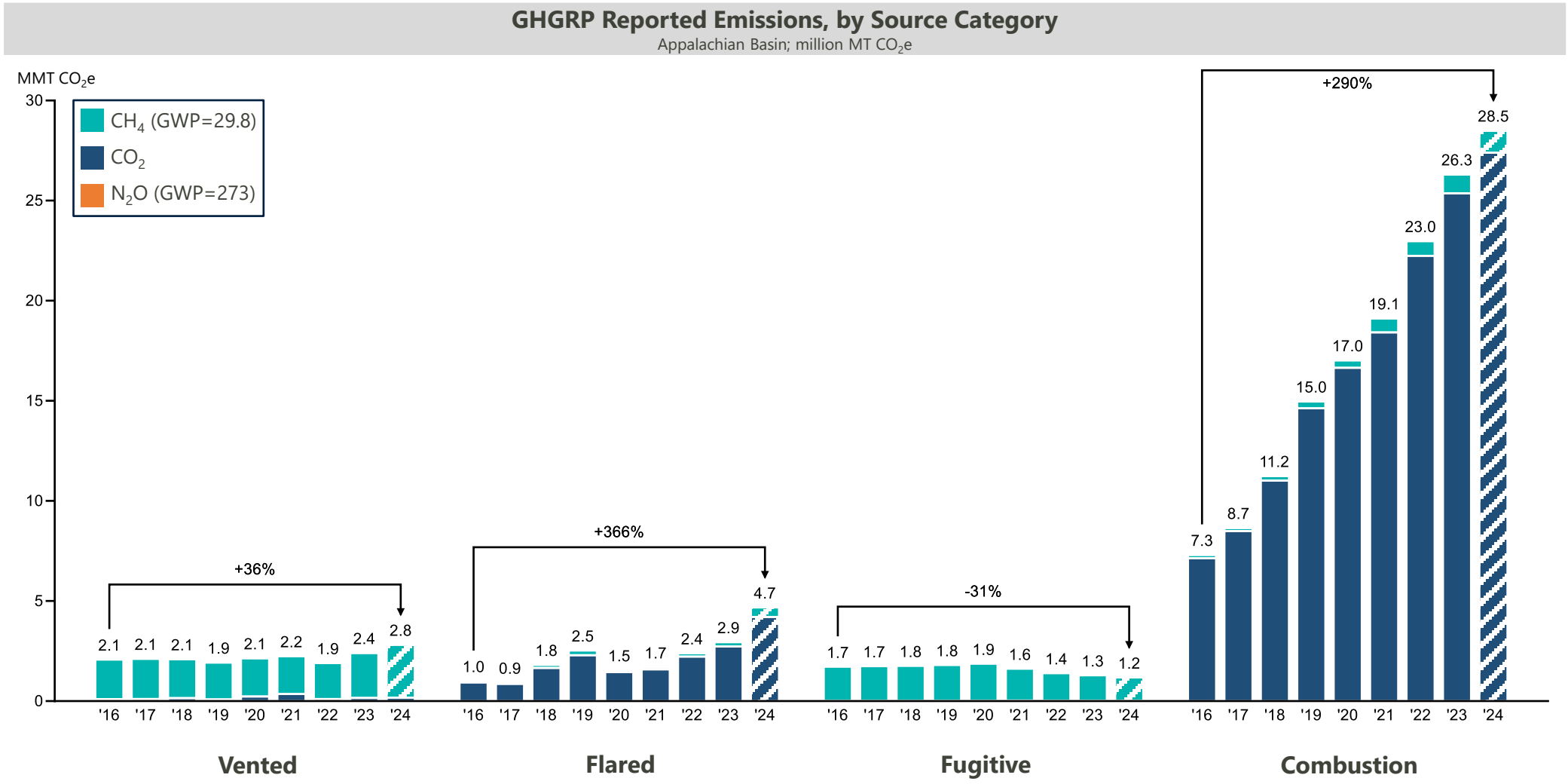
Indexed; 2016 = 100



Appalachian Basin Companies

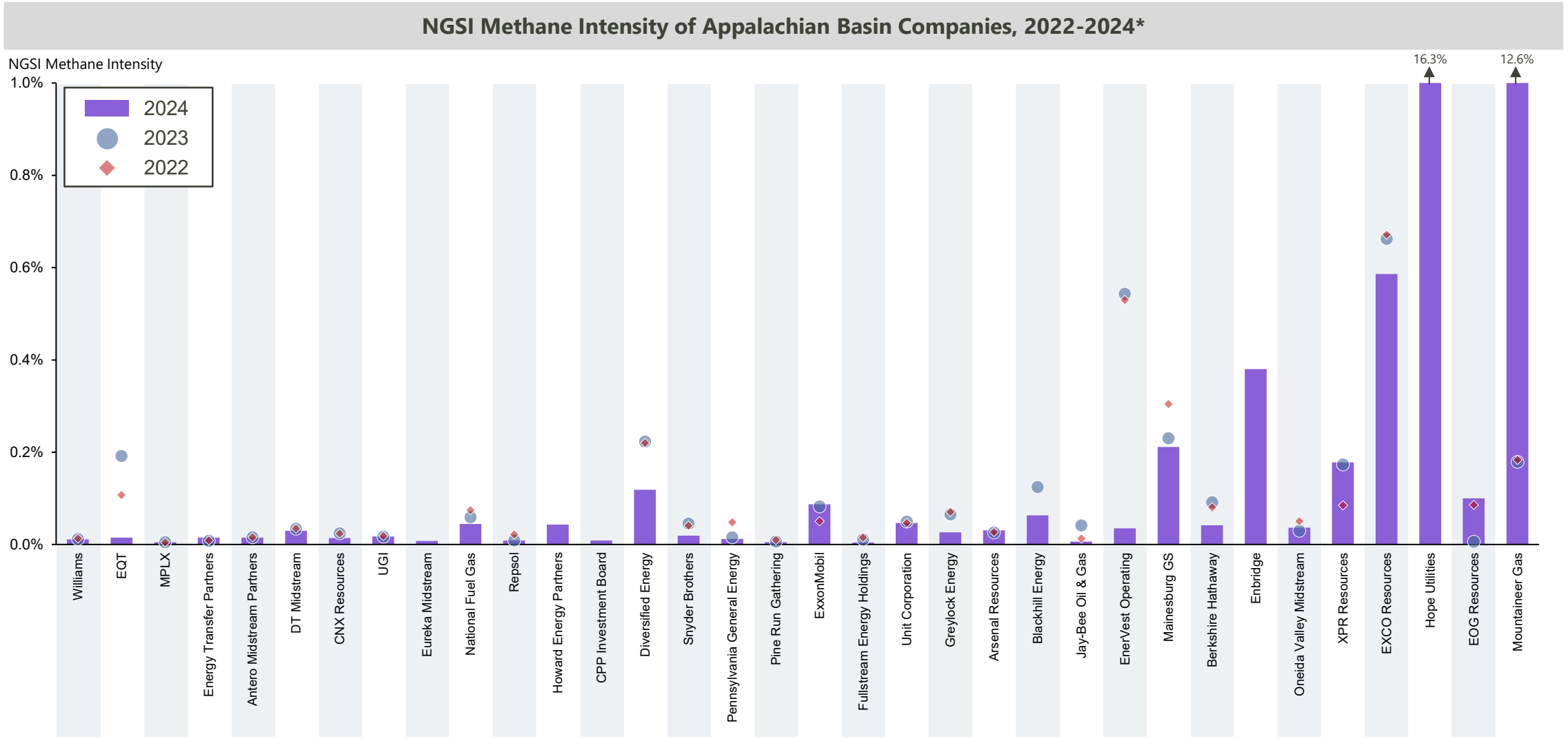
2016-2024 Trends Analysis: Emissions Sources

GHG Emissions (MMT CO_2e)



Appalachian Basin Companies

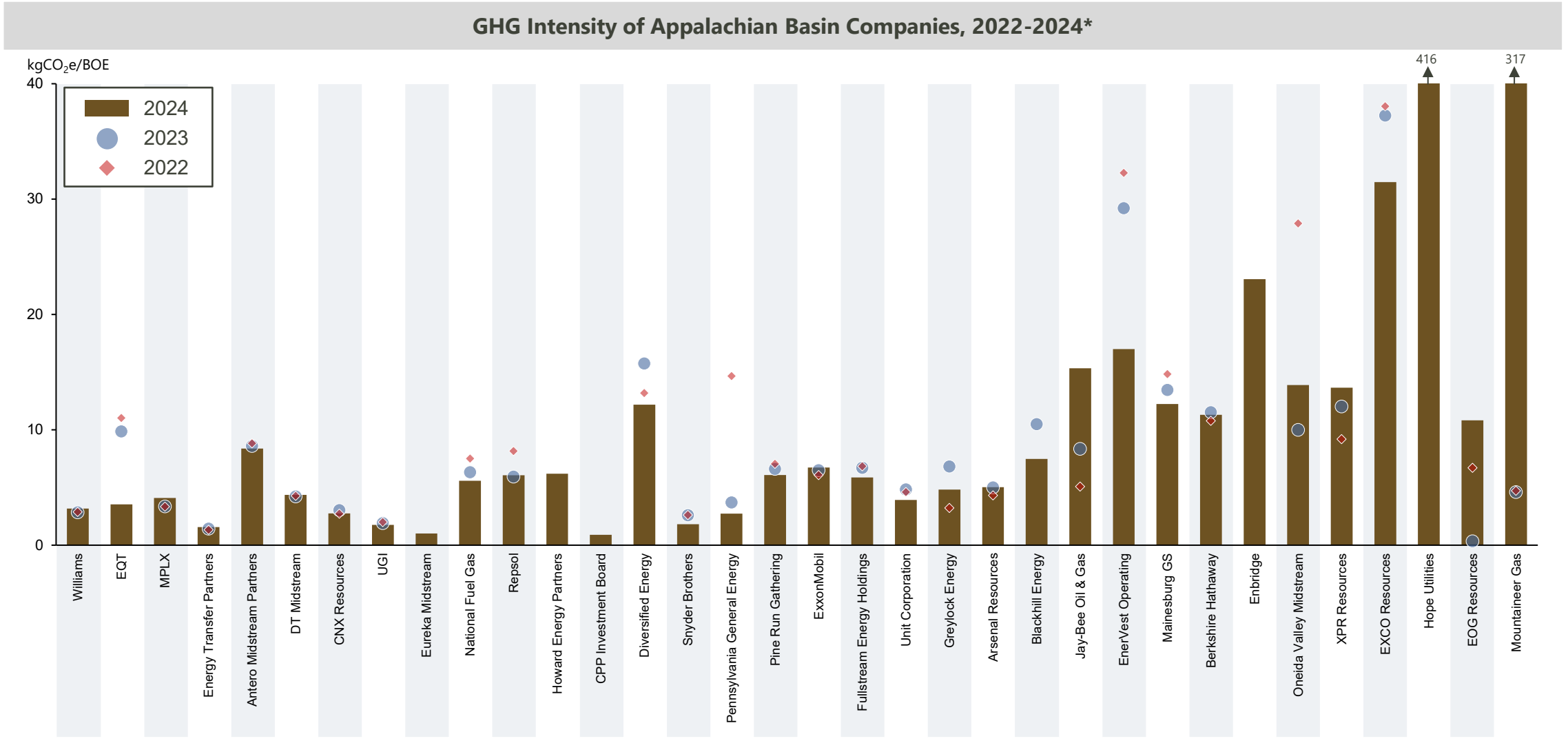
2022-2024 Trends Analysis: Change in Methane Intensity



*Note that some producers in 2024 were not in the EPA database for all three years and may not have data for 2022 and/or 2023.

Appalachian Basin Companies

2022-2024 Trends Analysis: Change in GHG Intensity

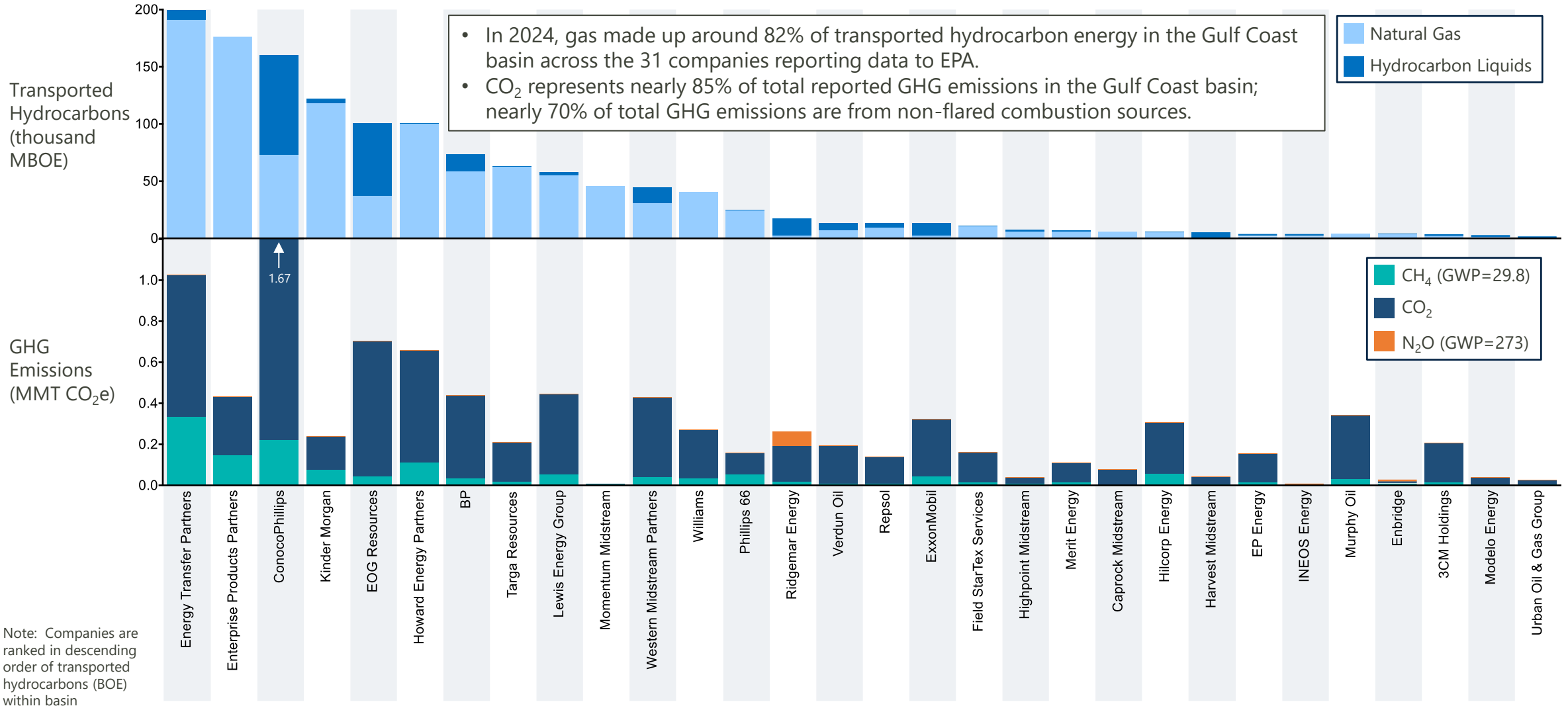


*Note that some producers in 2024 were not in the EPA database for all three years and may not have data for 2022 and/or 2023.

Gulf Coast Basin Companies

2024 Data

Transported Hydrocarbons & Emissions (100-year GWP)

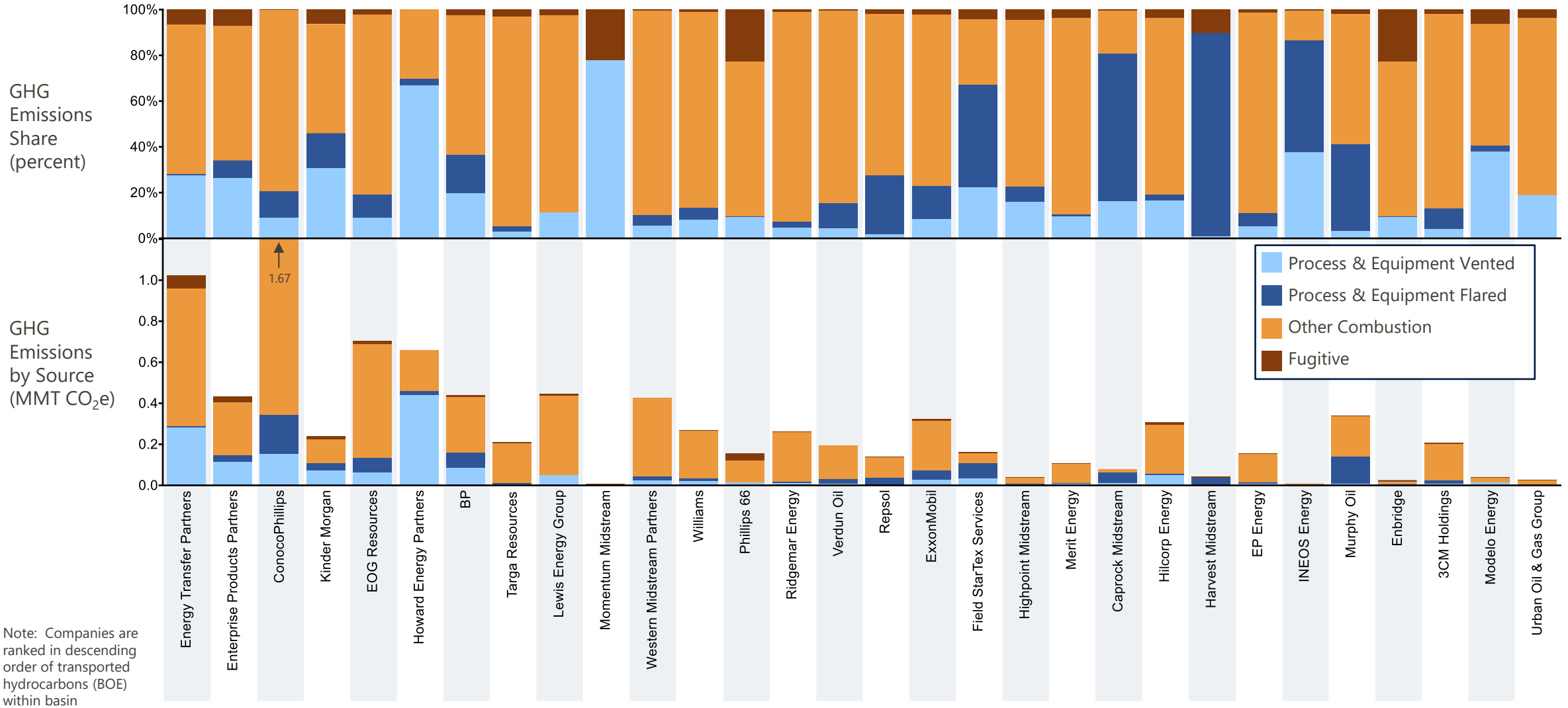


Note: Companies are ranked in descending order of transported hydrocarbons (BOE) within basin

Gulf Coast Basin Companies

2024 Data

GHG Emissions by Source (100-year GWP)

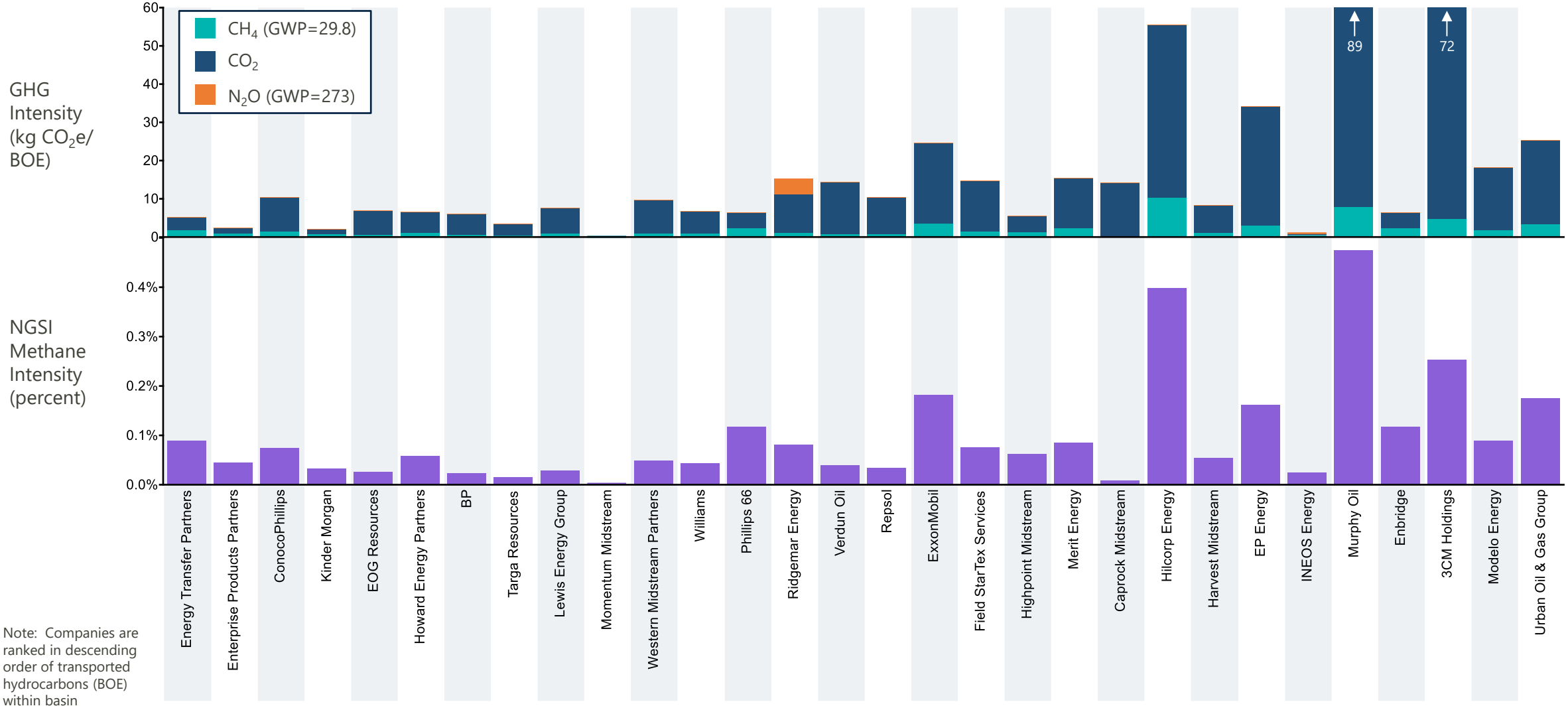


Note: Companies are ranked in descending order of transported hydrocarbons (BOE) within basin

Gulf Coast Basin Companies

2024 Data

Methane & GHG Intensity (100-year GWP)

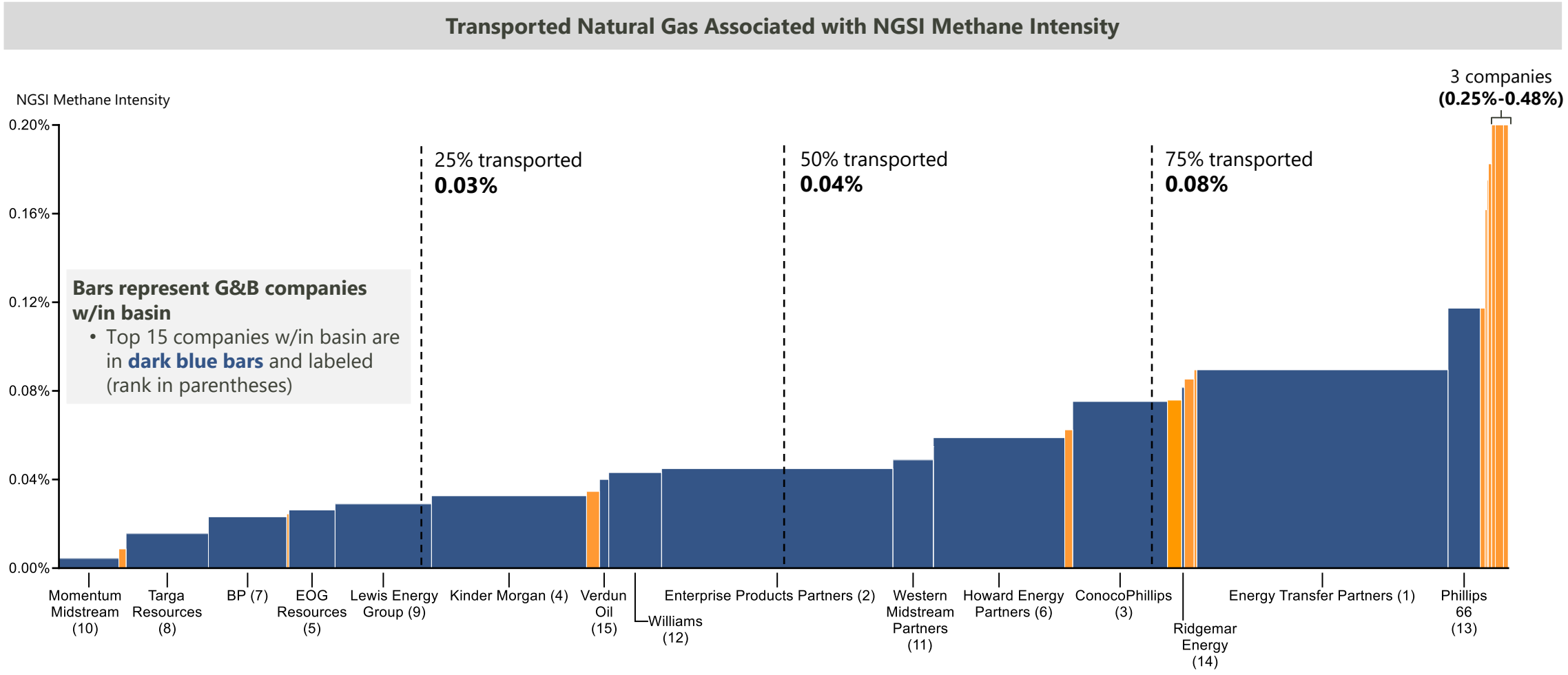


Note: Companies are ranked in descending order of transported hydrocarbons (BOE) within basin

Gulf Coast Basin Companies

2024 Data

Total GHGRP Transported Natural Gas, by Methane Intensity



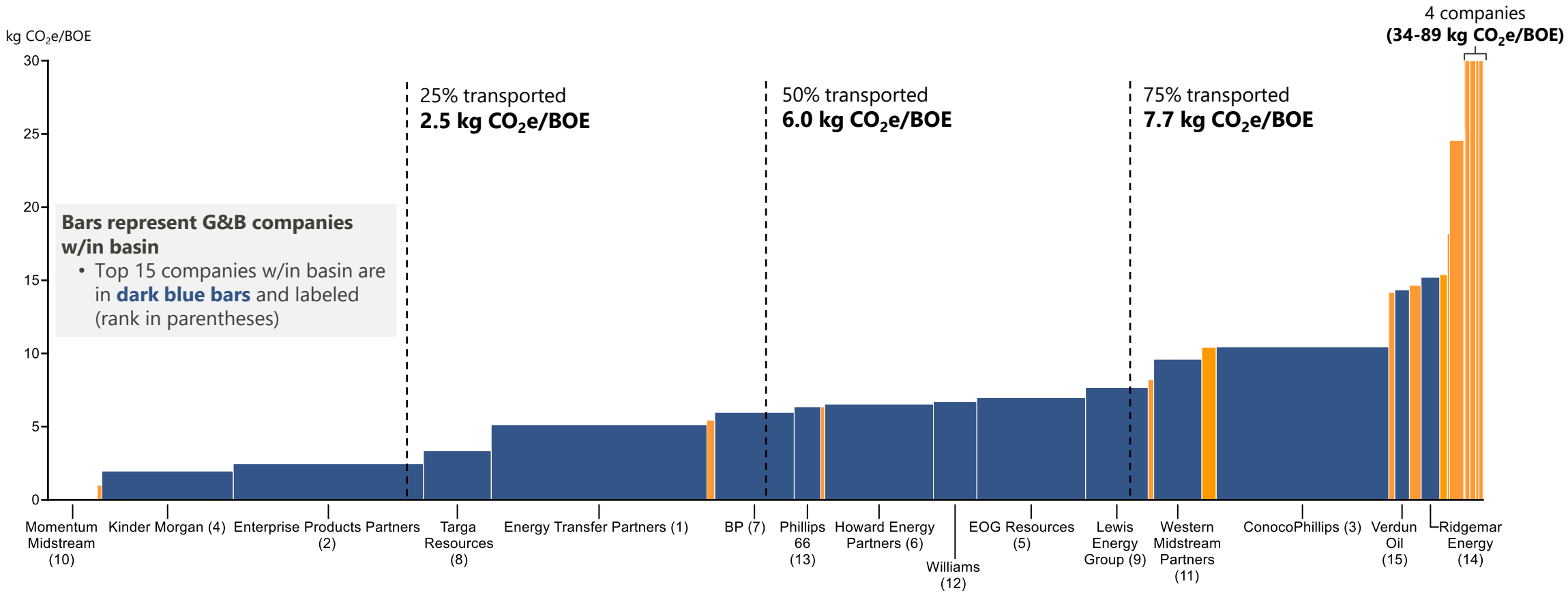
Transported Natural Gas → Total Gas Transported: 4.7 trillion cubic feet

Gulf Coast Basin Companies

2024 Data

Total GHGRP Transported Hydrocarbons, by GHG Intensity

Transported Hydrocarbons Associated with GHG Intensity

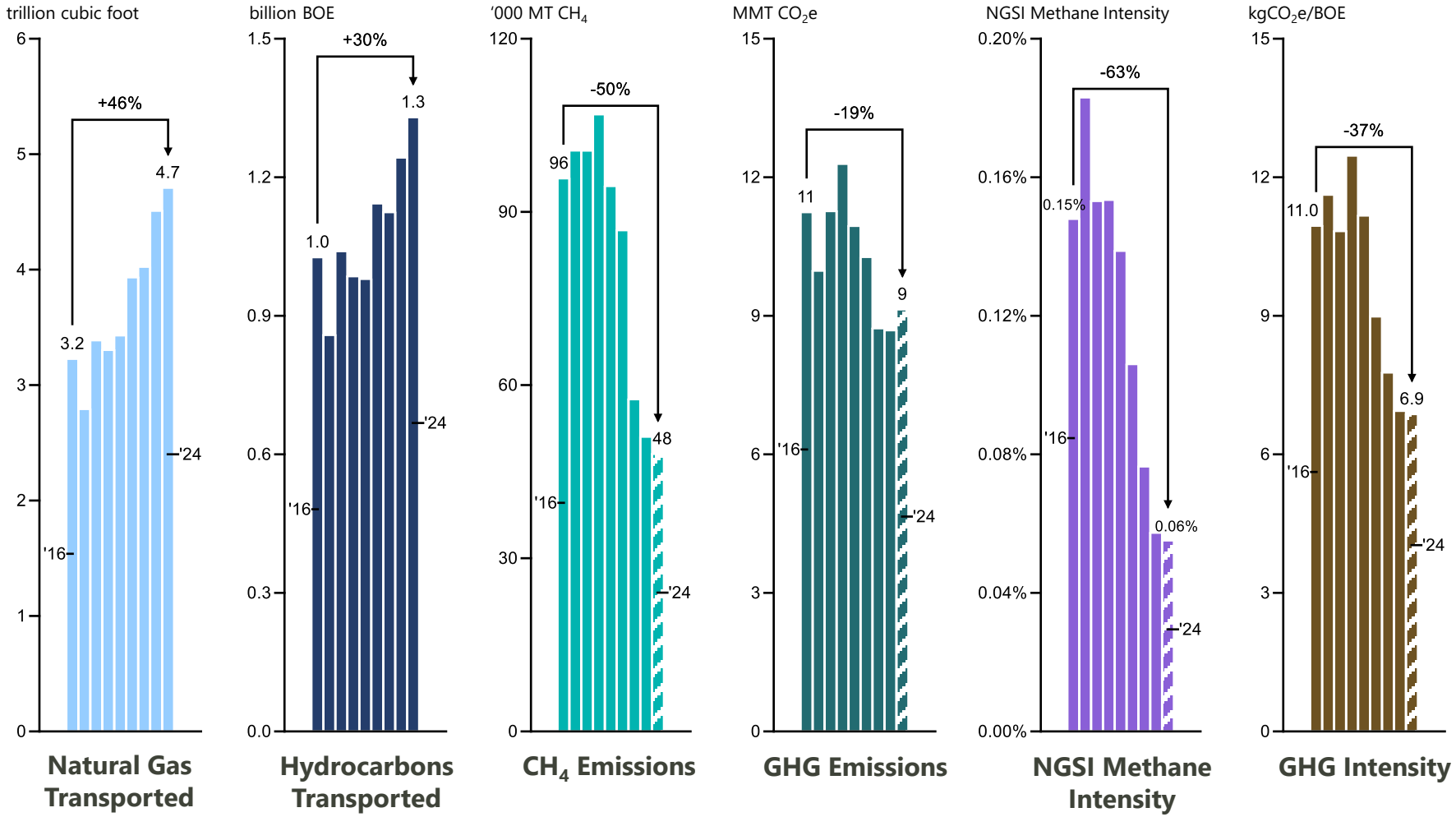


Transported Hydrocarbons → Total Hydrocarbons Transported: 1.33 billion BOE

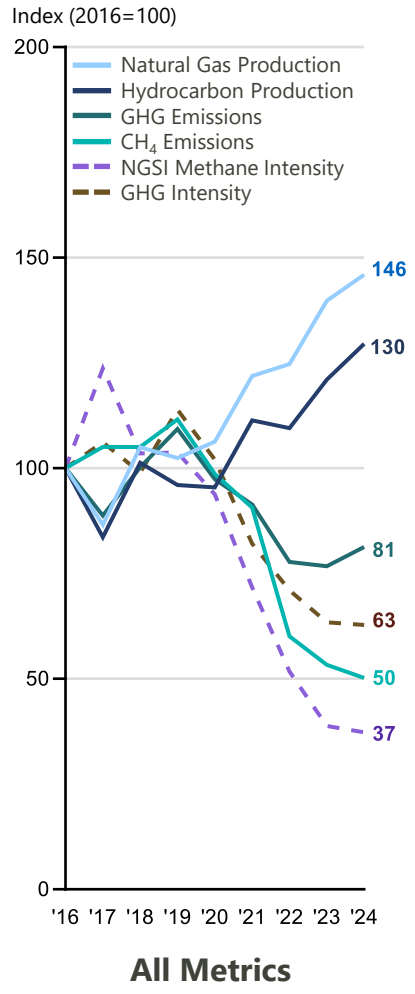
Gulf Coast Basin Companies

2016-2024 Trends Analysis: Transported Energy & Emissions Metrics

GHGRP Data Trends, 2016-2024
Gulf Coast Basin



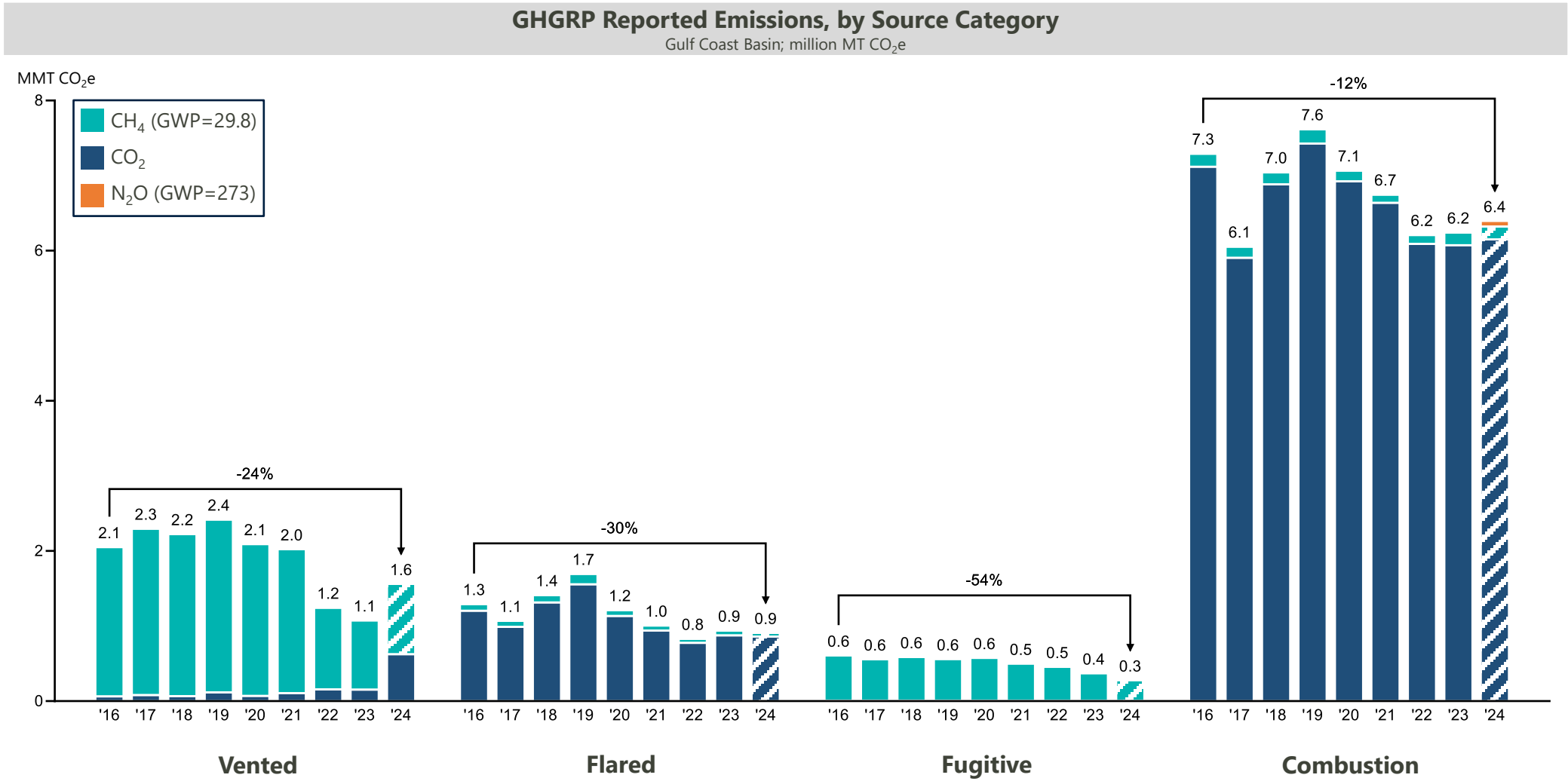
Combined Data Metrics
Indexed; 2016 = 100



Gulf Coast Basin Companies

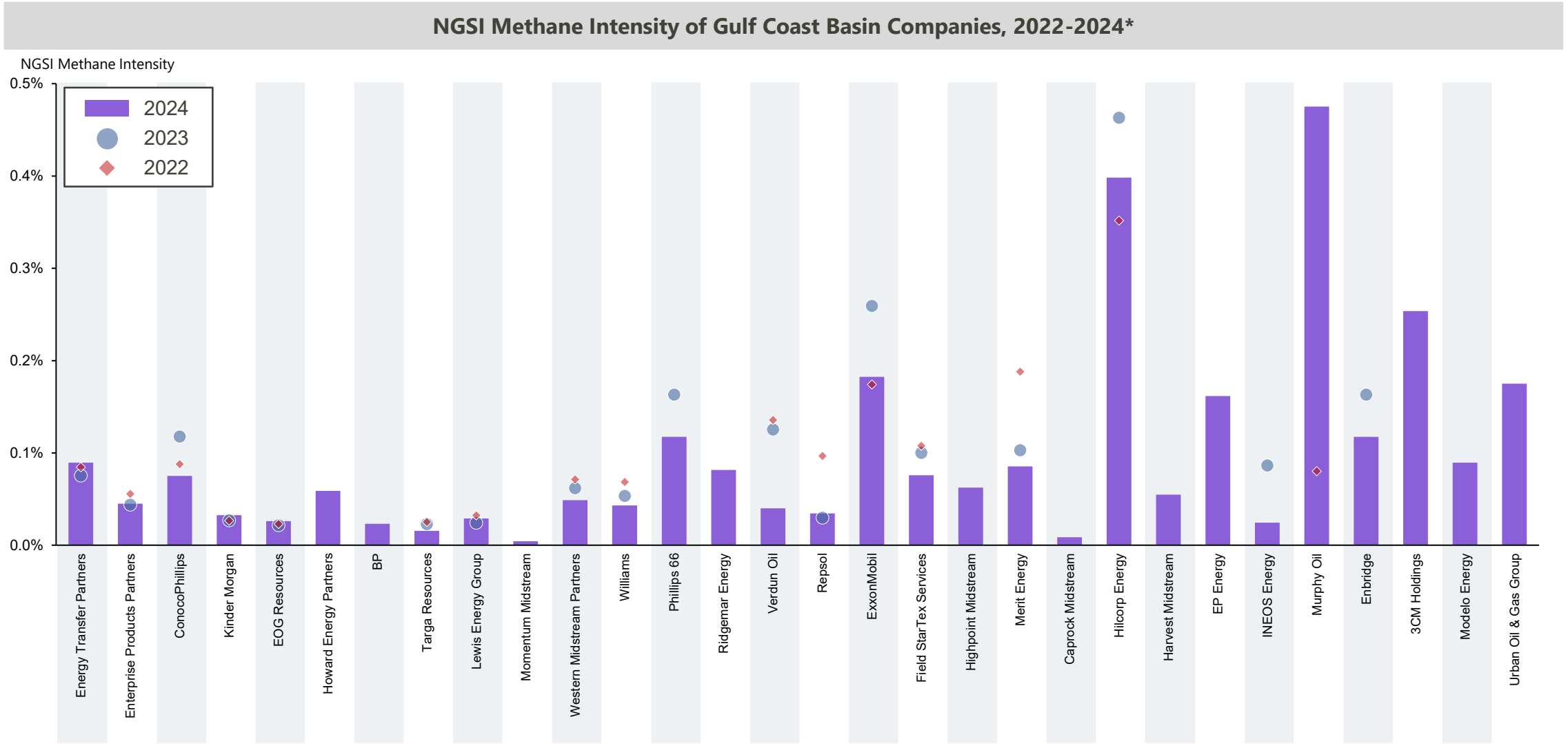
2016-2024 Trends Analysis: Emissions Sources

GHG Emissions (MMT CO_2e)



Gulf Coast Basin Companies

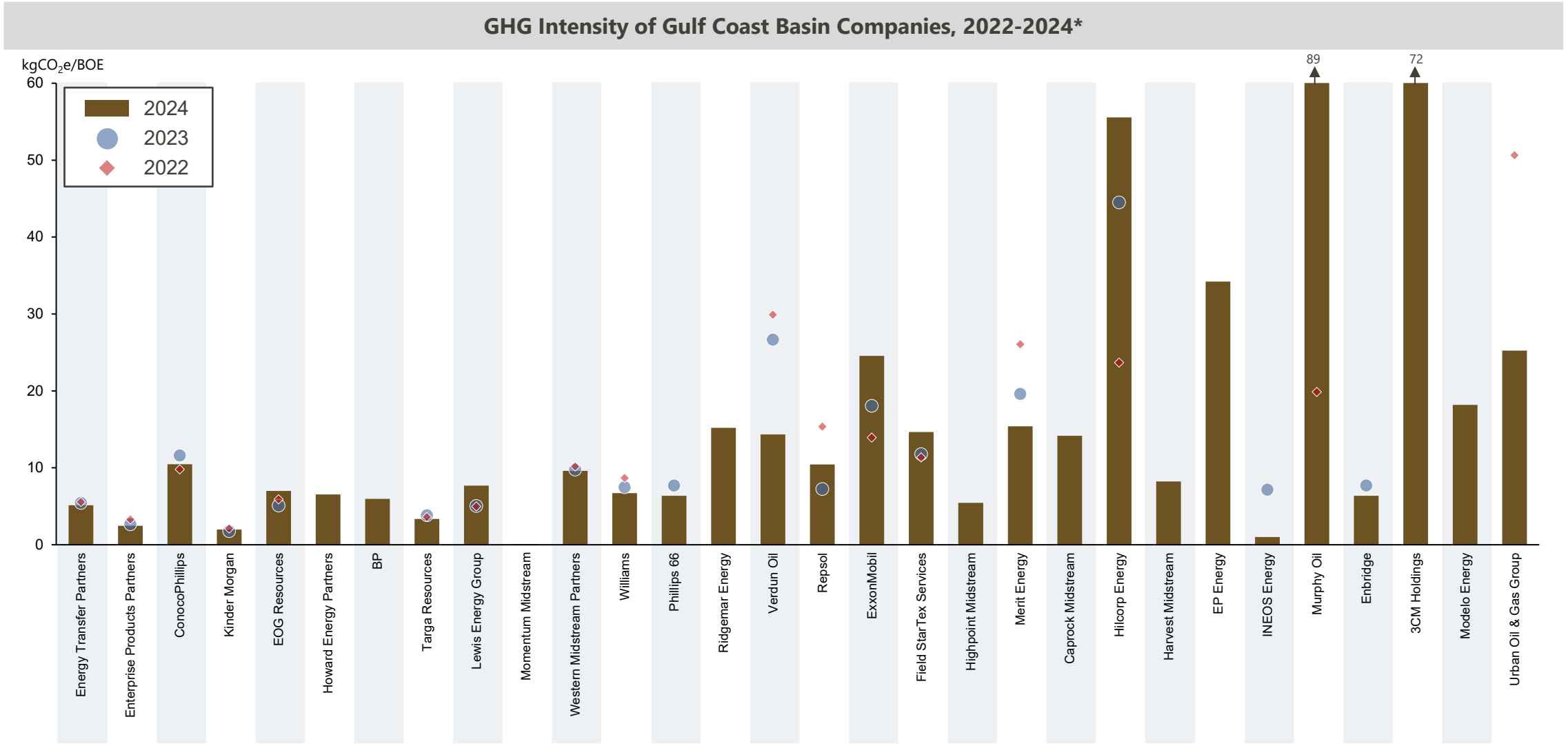
2022-2024 Trends Analysis: Change in Methane Intensity



*Note that some producers in 2024 were not in the EPA database for all three years and may not have data for 2022 and/or 2023.

Gulf Coast Basin Companies

2022-2024 Trends Analysis: Change in GHG Intensity

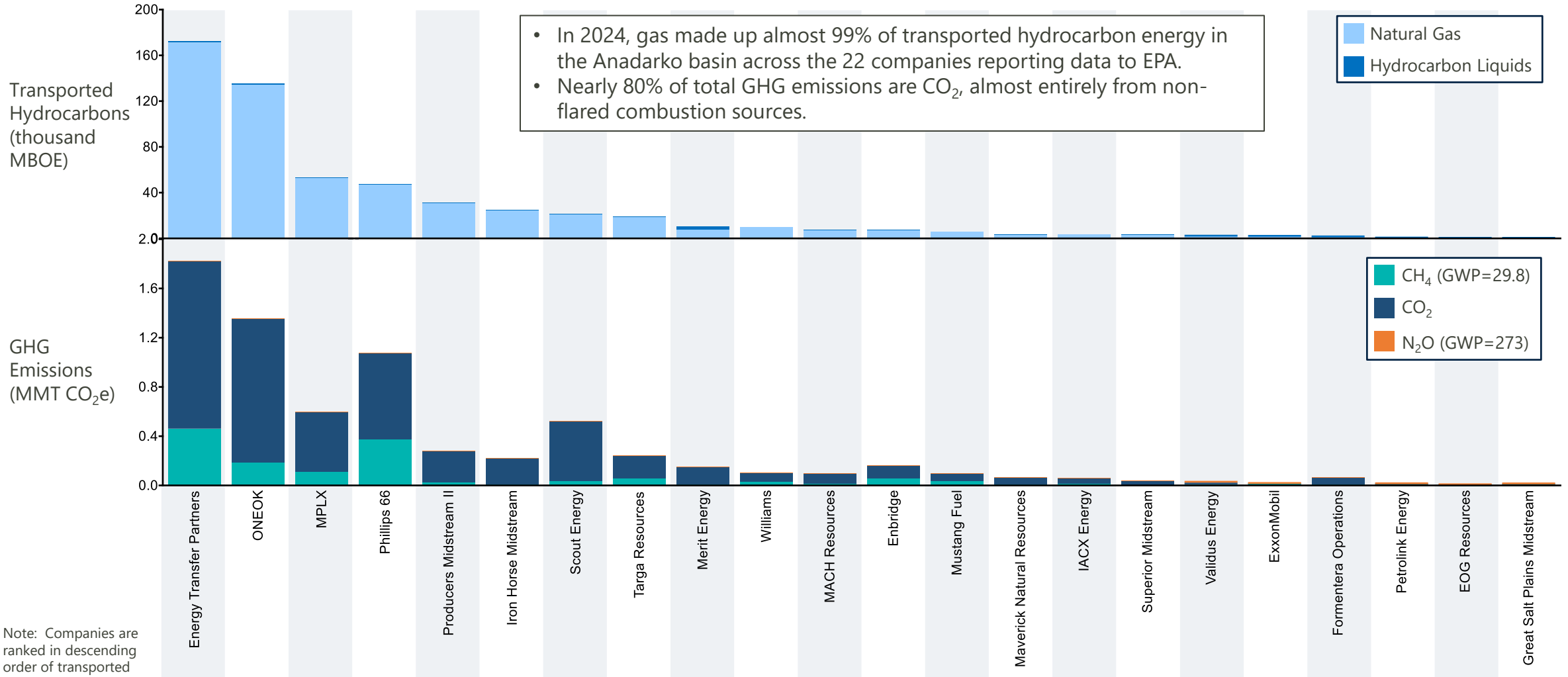


*Note that some producers in 2024 were not in the EPA database for all three years and may not have data for 2022 and/or 2023.

Anadarko Basin Companies

2024 Data

Transported Hydrocarbons & Emissions (100-year GWP)



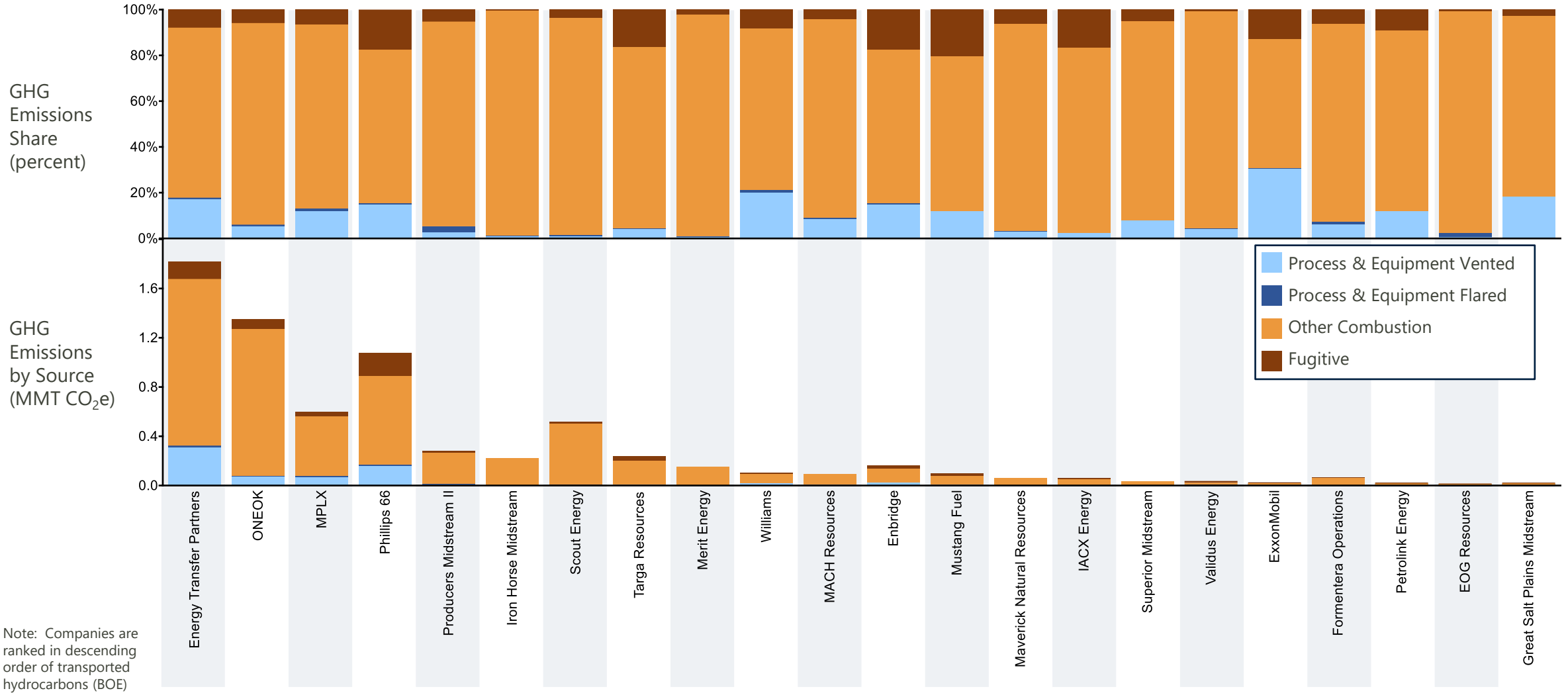
- In 2024, gas made up almost 99% of transported hydrocarbon energy in the Anadarko basin across the 22 companies reporting data to EPA.
- Nearly 80% of total GHG emissions are CO_2, almost entirely from non-flared combustion sources.

Note: Companies are ranked in descending order of transported hydrocarbons (BOE) within basin

Anadarko Basin Companies

2024 Data

GHG Emissions by Source (100-year GWP)

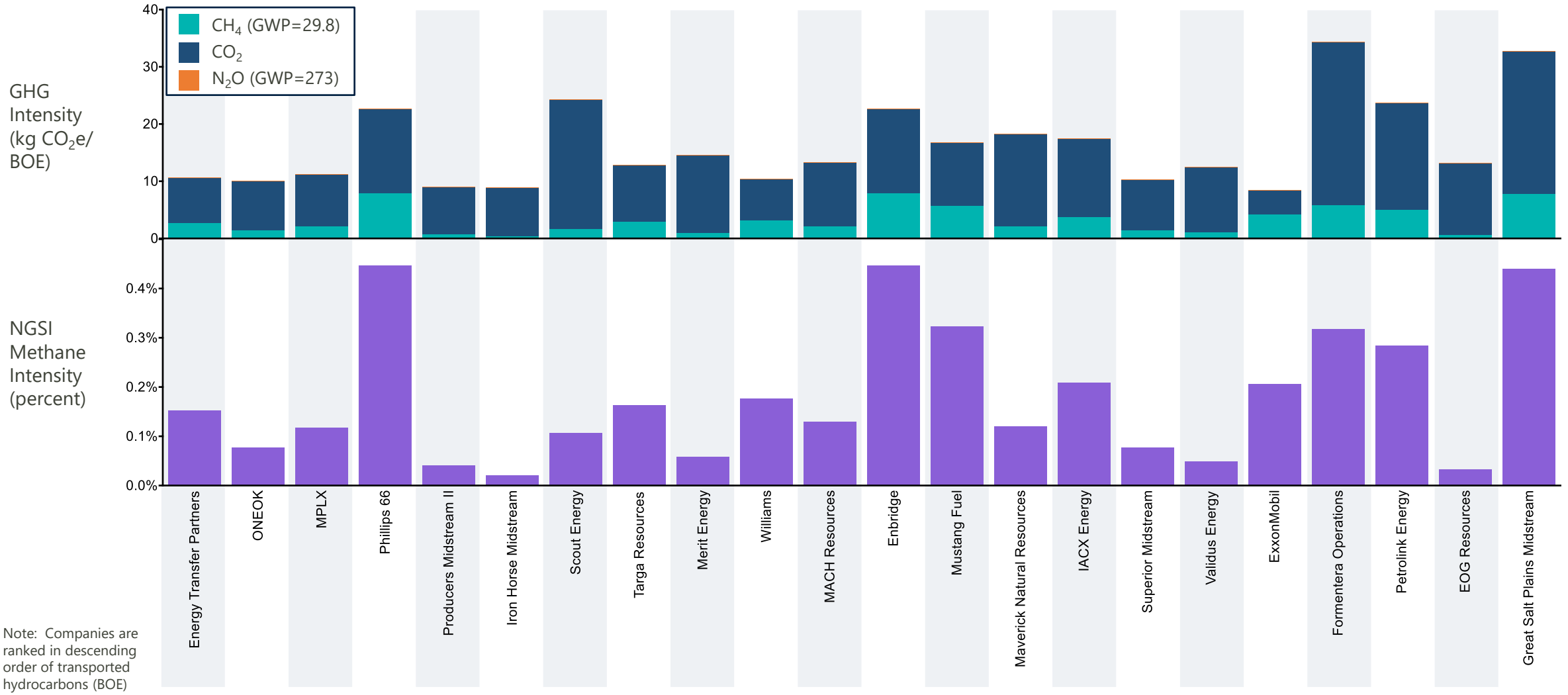


Note: Companies are ranked in descending order of transported hydrocarbons (BOE) within basin

Anadarko Basin Companies

2024 Data

Methane & GHG Intensity (100-year GWP)



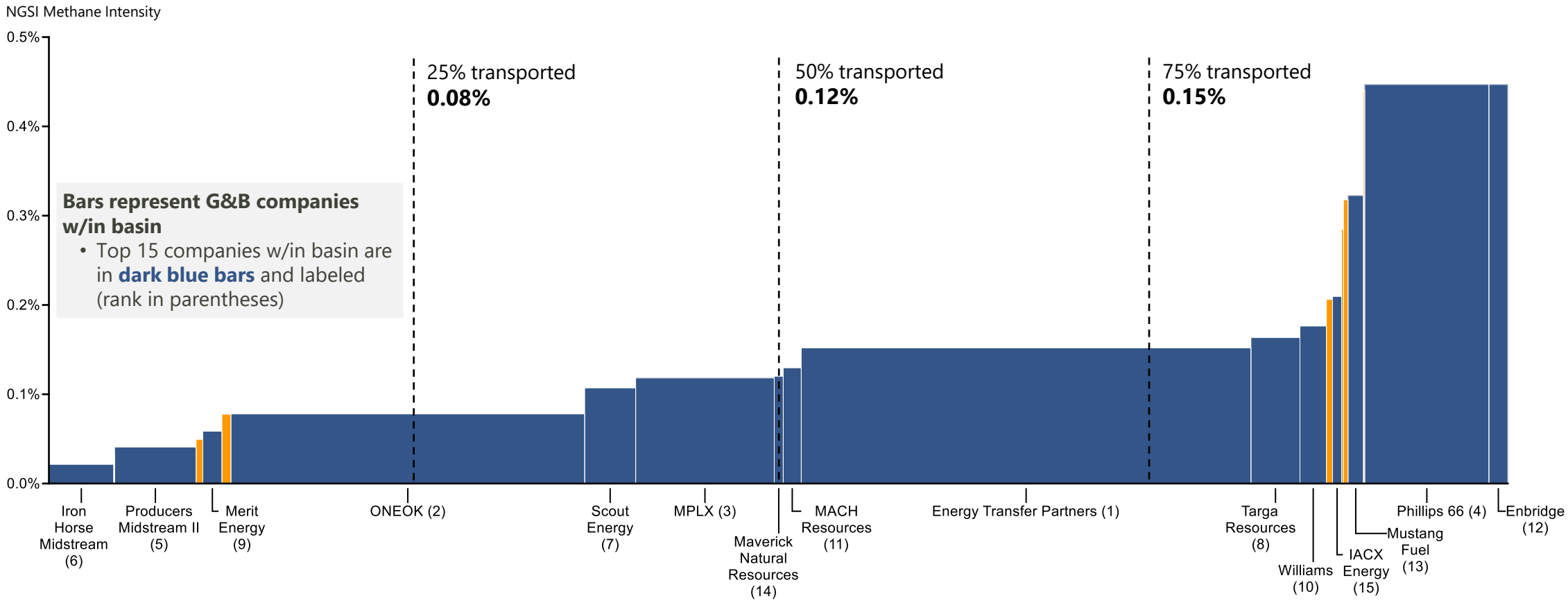
Note: Companies are ranked in descending order of transported hydrocarbons (BOE) within basin

Anadarko Basin Companies

2024 Data

Total GHGRP Transported Natural Gas, by Methane Intensity

Transported Natural Gas Associated with NGSI Methane Intensity



Transported Natural Gas ⟶

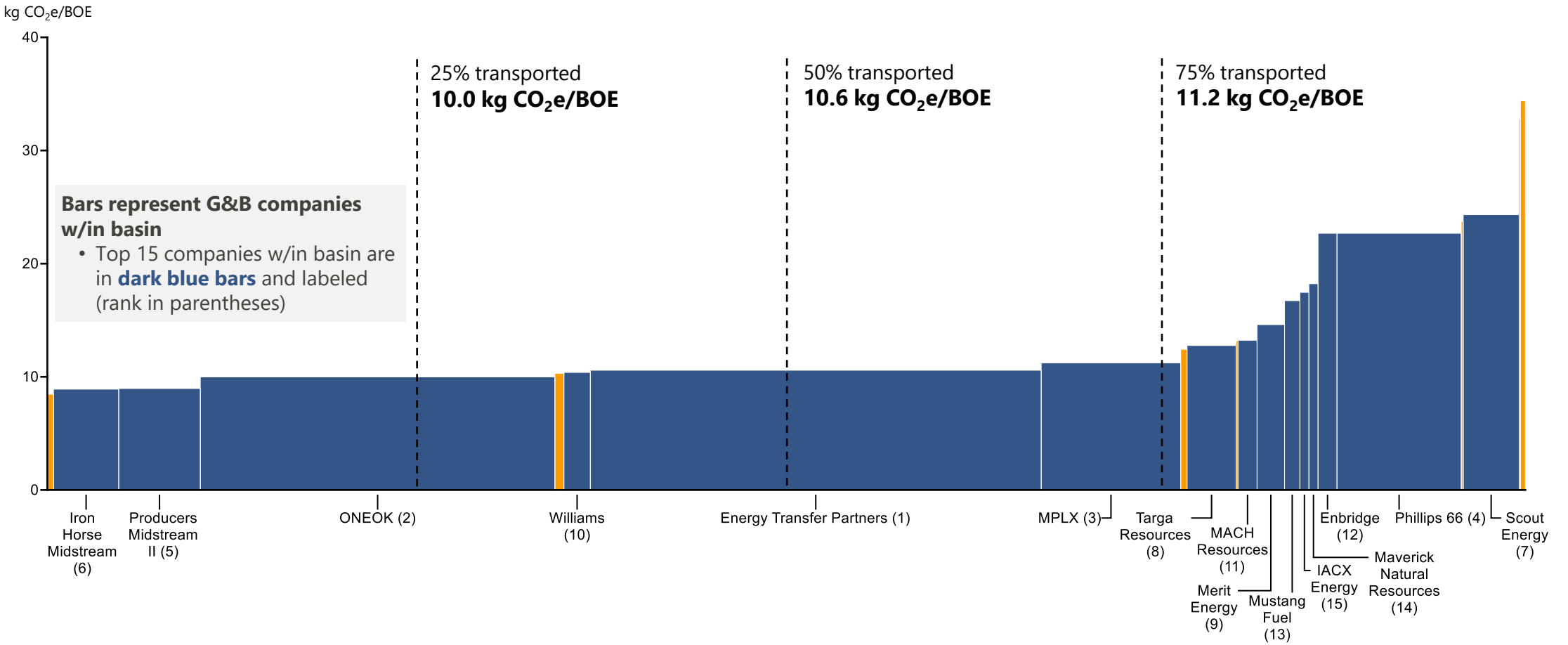
Total Gas Transported: 2.3 trillion cubic feet

Anadarko Basin Companies

2024 Data

Total GHGRP Transported Hydrocarbons, by GHG Intensity

Transported Hydrocarbons Associated with GHG Intensity

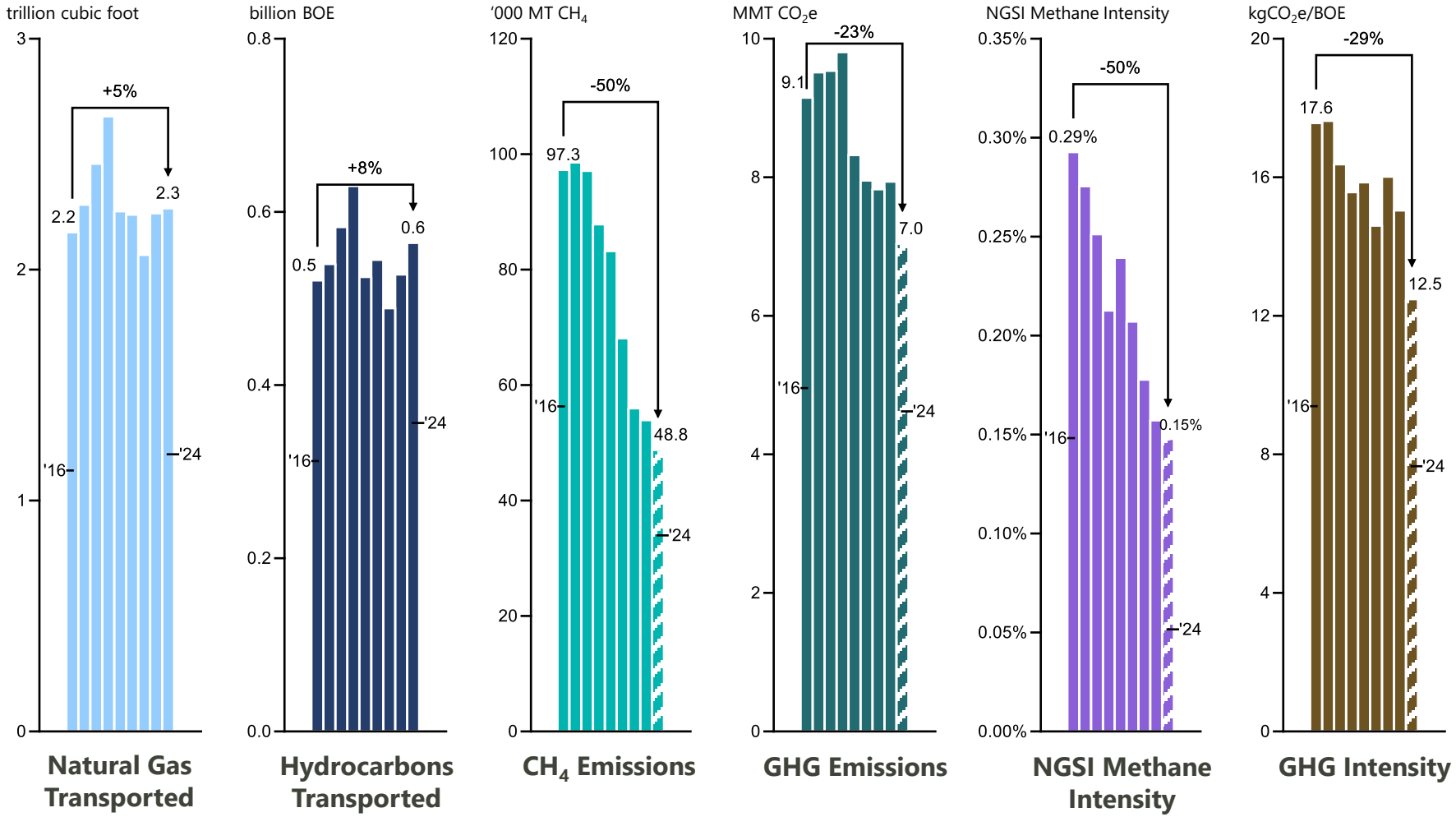


Anadarko Basin Companies

2016-2024 Trends Analysis: Transported Energy & Emissions Metrics

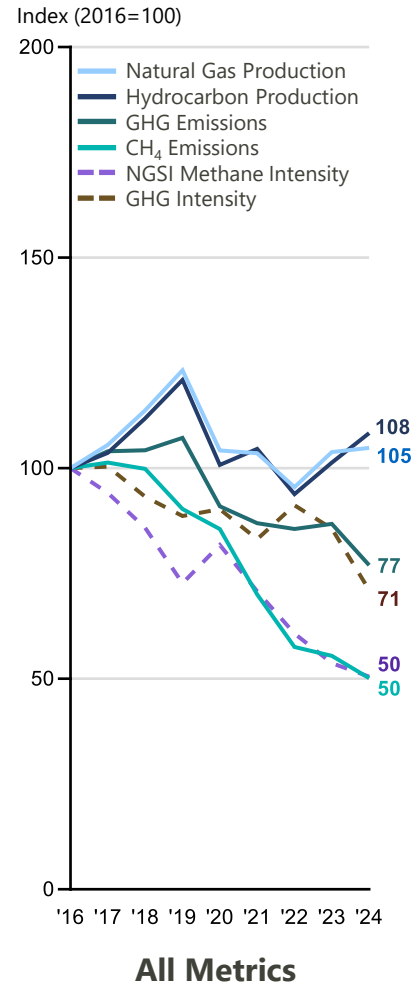
GHGRP Data Trends, 2016-2024

Anadarko Basin



Combined Data Metrics

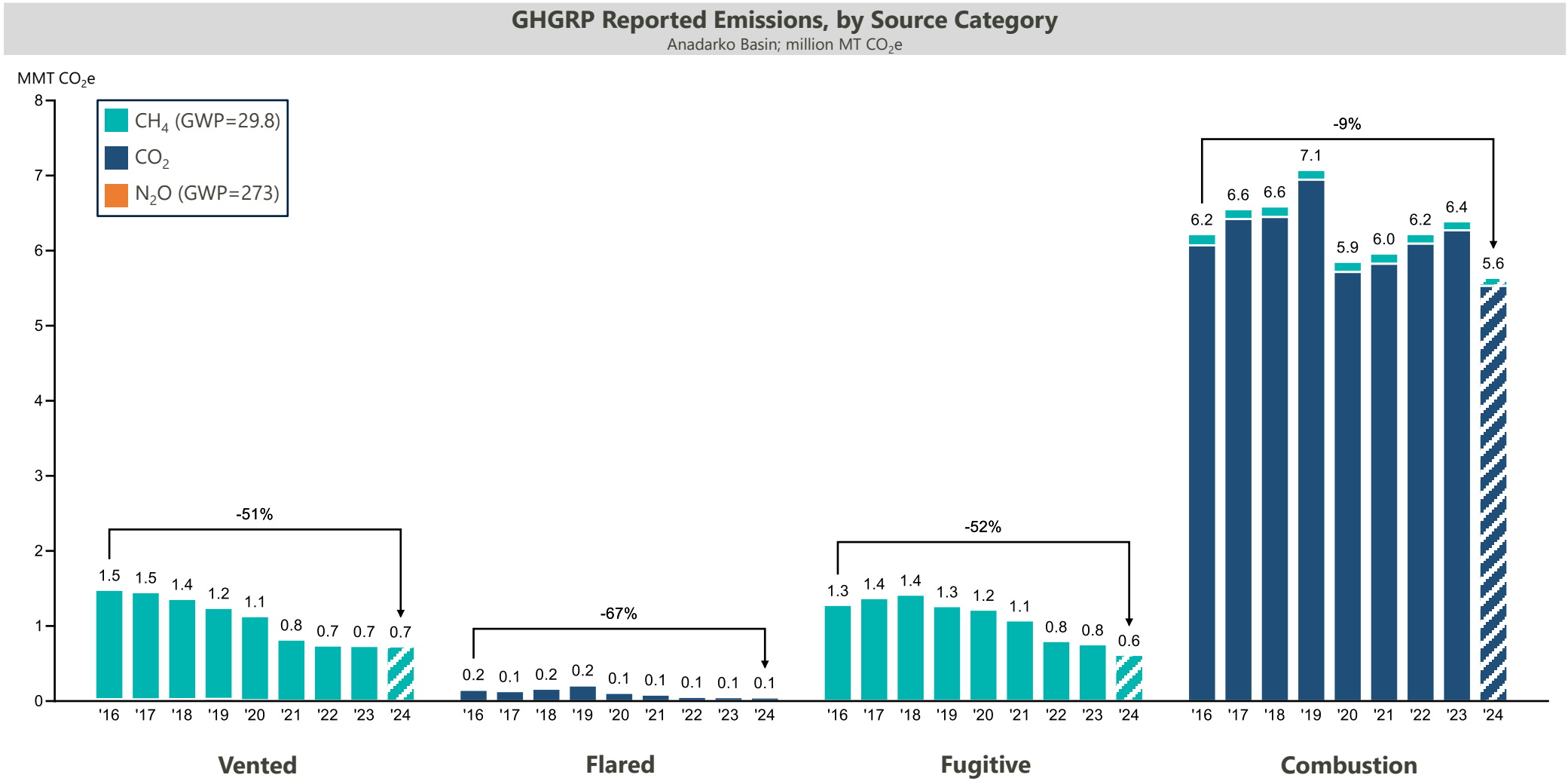
Indexed; 2016 = 100



Anadarko Basin Companies

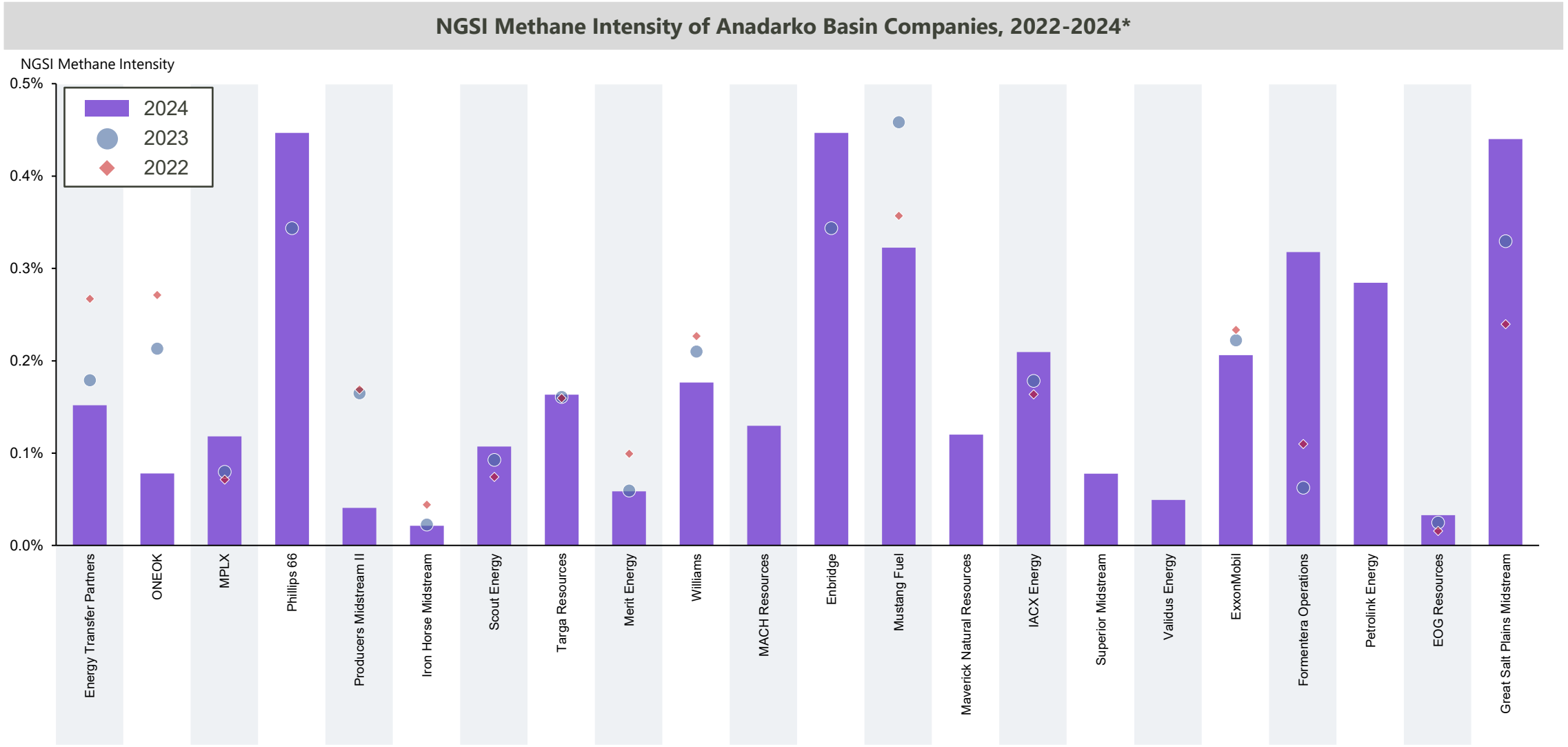
2016-2024 Trends Analysis: Emissions Sources

GHG Emissions (MMT CO_2e)



Anadarko Basin Companies

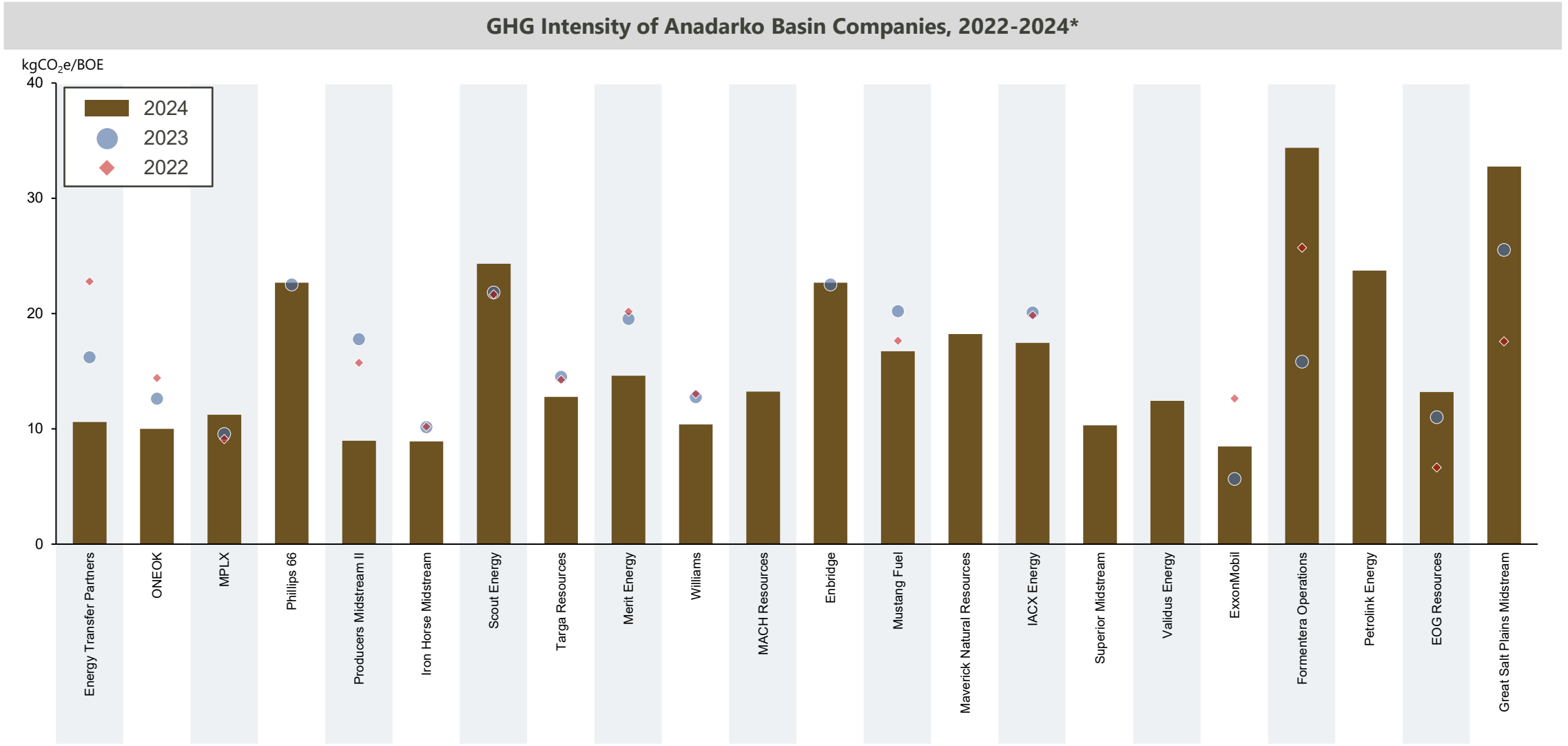
2022-2024 Trends Analysis: Change in Methane Intensity



*Note that some producers in 2024 were not in the EPA database for all three years and may not have data for 2022 and/or 2023.

Anadarko Basin Companies

2022-2024 Trends Analysis: Change in GHG Intensity



*Note that some producers in 2024 were not in the EPA database for all three years and may not have data for 2022 and/or 2023.

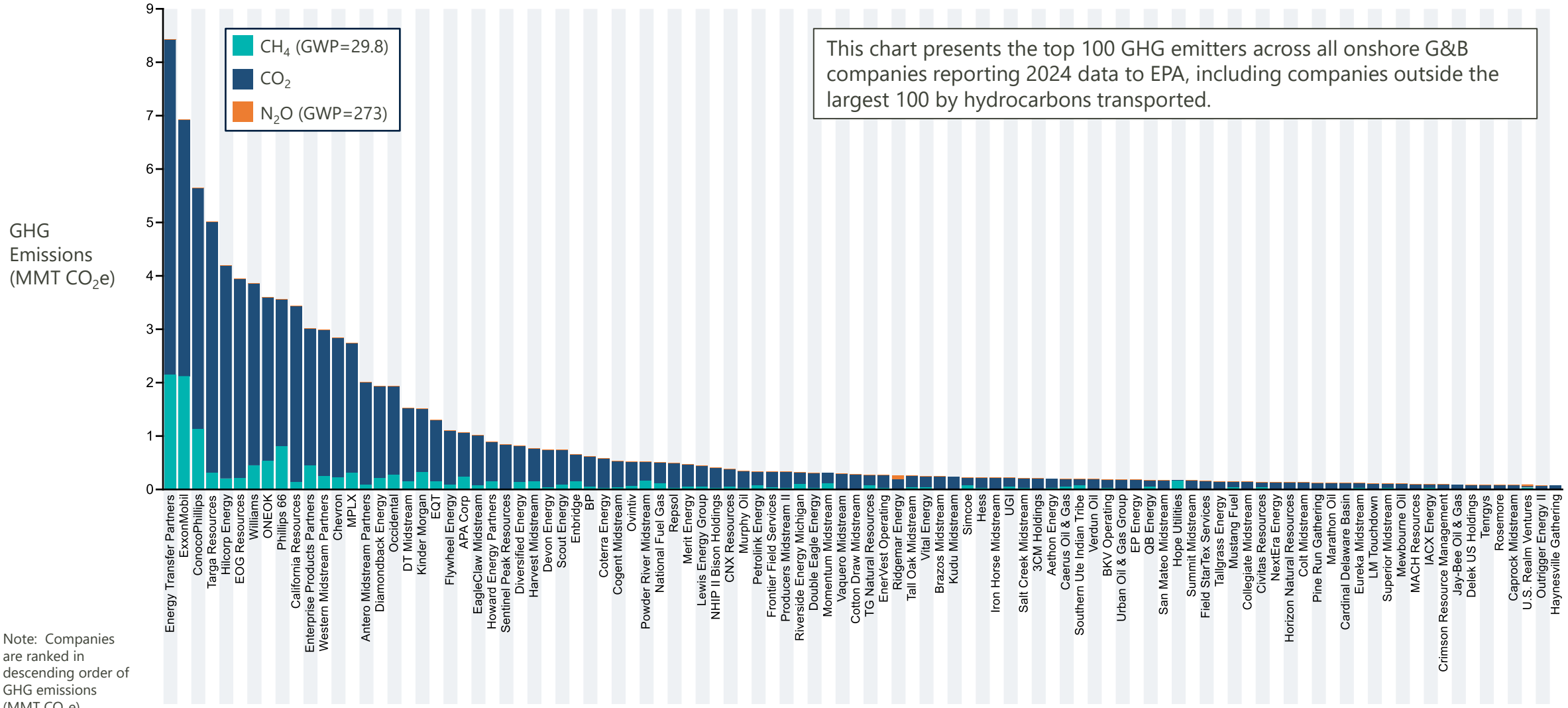
Additional G&B Segment Data

The following charts present emissions and emissions intensity data rankings for key metrics. They include companies inside and outside of the top 100 companies by total hydrocarbons transported.

Top 100 GHG Emitters

2024 Data

GHG Emissions (100-year GWP)

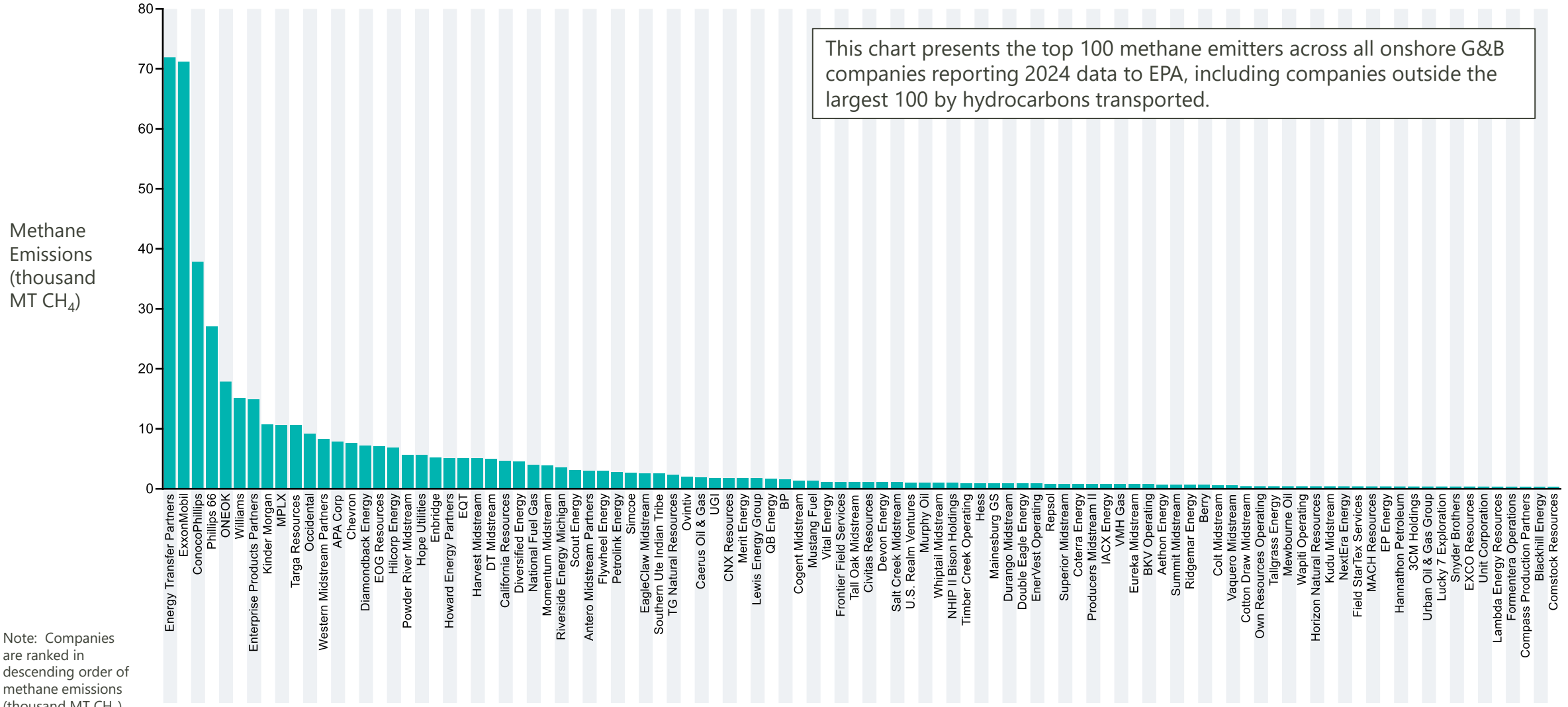


Note: Companies are ranked in descending order of GHG emissions (MMT CO_2e)

Top 100 Methane Emitters

Methane Emissions

2024 Data

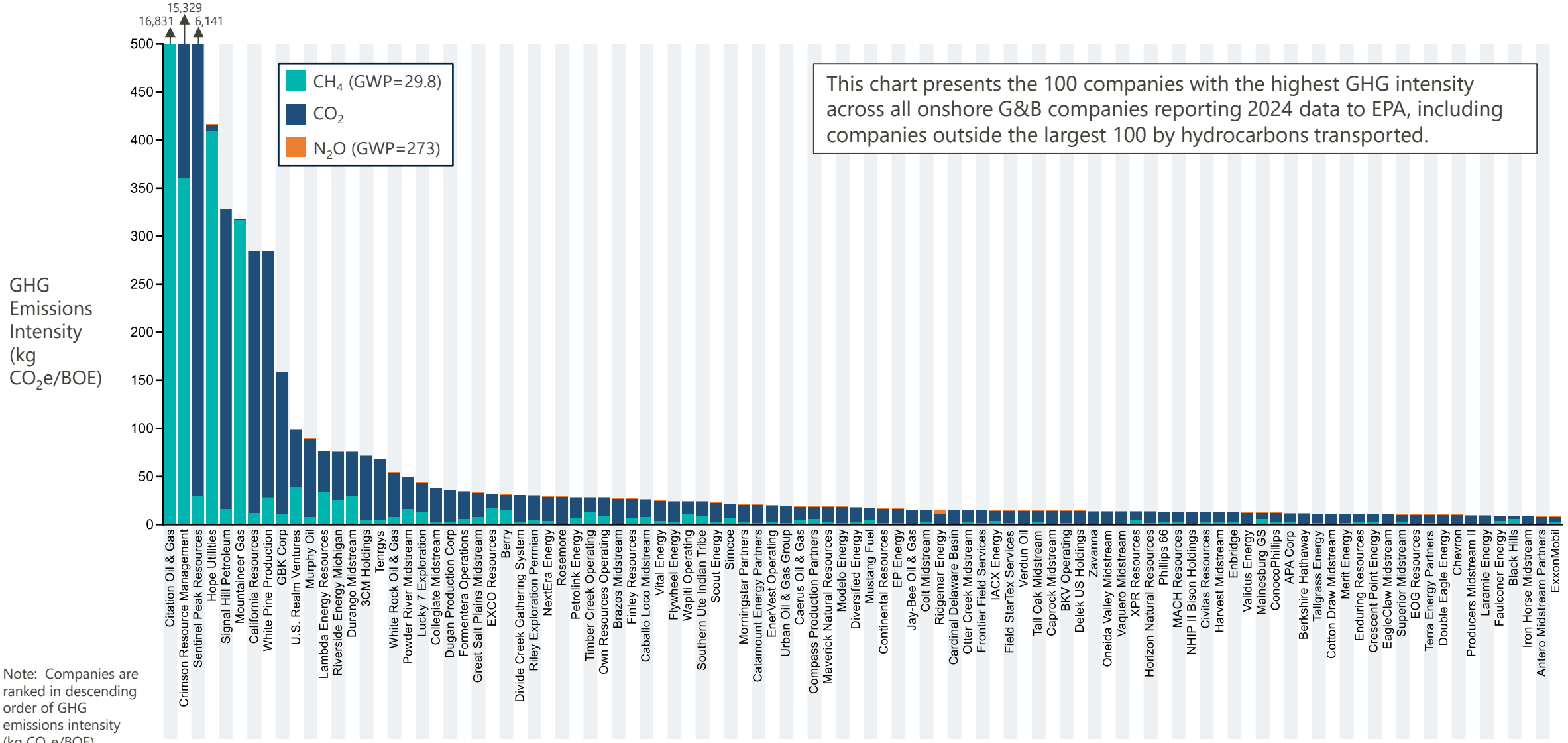


Note: Companies are ranked in descending order of methane emissions (thousand MT CH_4)

Top 100 Highest GHG Emissions Intensities

2024 Data

GHG Emissions Intensity

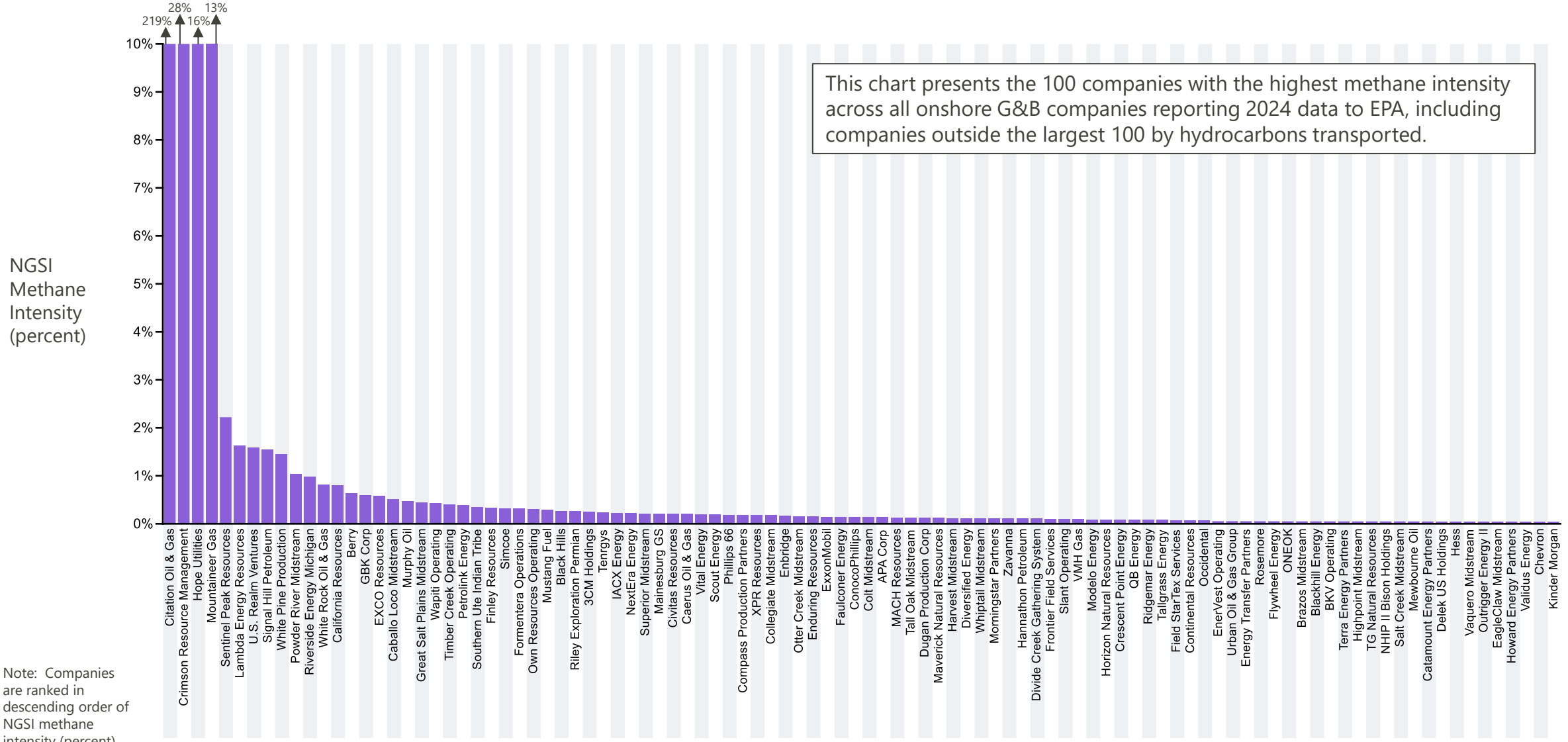


Note: Companies are ranked in descending order of GHG emissions intensity (kg CO_2e/BOE)

Top 100 Highest NGSI Methane Intensities

2024 Data

Methane Intensity



This chart presents the 100 companies with the highest methane intensity across all onshore G&B companies reporting 2024 data to EPA, including companies outside the largest 100 by hydrocarbons transported.

Note: Companies are ranked in descending order of NGSI methane intensity (percent)

Combined Production and Gathering & Boosting Segment

Key Findings – Combined Production and G&B

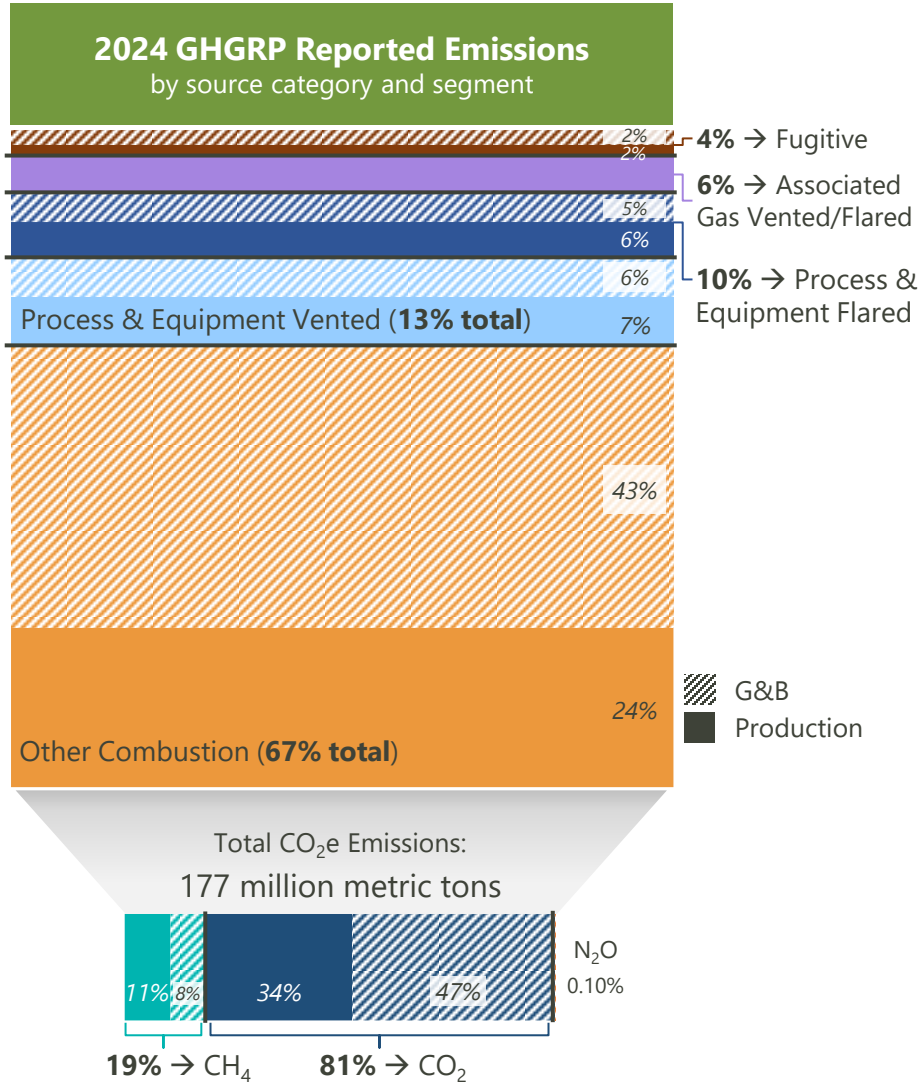
- The 80 companies with reported facilities in both the onshore production and G&B segments in 2024 represent a wide range of operations. Some companies have integrated operations across both segments, while others are primarily production or midstream focused, with the majority of assets in either the production or G&B segment and only minor operations in the other segment.
- While combined-segment intensity values are always closer to the segment-specific intensity value of the segment with higher throughput, the relative contribution of each individual segment to combined methane and GHG intensity varies across individual companies. For some companies, the relative throughput of an individual segment is a major driver, whereas at others significantly higher or lower emissions in one segment is what drives the combined emissions intensity value.
- The methane emissions intensity of handled natural gas and the GHG emissions intensity of handled hydrocarbons vary dramatically across companies. Companies in the highest quartile of methane emissions intensity have an average emissions intensity that almost 14 times higher than companies in the lowest quartile of methane emissions intensity. Companies with both production and G&B operations in the highest quartile of GHG emissions intensity have an average emissions intensity that is 7 times higher than companies in the lowest quartile.
- Combined methane emissions from the production and G&B segments have declined 56% 2016-2024. However, combined total GHG emissions have increased 1% over the time series, as the increase in combustion emissions from G&B facilities has offset all other GHG reductions across both segments.
- Reported combined GHG emissions are increasingly dominated by CO_2. In 2024, CO_2 accounted for over 81% of total GHG emissions (up from 57% in 2016).
- Fuel combustion equipment, such as engines and heaters, was by far the largest source of total reported combined GHG emissions, responsible for over two-thirds of total reported GHG emissions.
- Pneumatic devices and equipment leaks were the largest sources of total reported combined-segment methane emissions, making up 39% and 20%, respectively, of total reported methane emissions.
- Methane and GHG intensity declined 45% and 16%, respectively, between 2022 and 2024 due to a reduction in methane emissions reported to EPA and an increase in transported natural gas and total hydrocarbons. However, these trends are not consistent across basins or individual companies and can fluctuate year to year (e.g., increase 2022-2023 and decrease 2023-2024).

Types of Emissions Associated with Oil & Gas Operations

The GHGRP includes reporting on emissions from 18 emissions sources across the onshore production and G&B segments. In addition, this report attributes emissions associated with six additional sources that are estimated at the national level by EPA in the GHG Inventory, but not included in GHGRP. The relative contribution of GHG emissions from oil and gas production can vary widely by both type of gas and emissions source. Factors influencing the relative contribution of emissions include geology, targeted hydrocarbons (e.g., dry gas vs. wet gas), available infrastructure, and company policies and practices.

For purposes of comparison within this report, emissions sources are grouped into five categories:

- **Process & Equipment Vented** Vented emissions are intentional releases of natural gas from equipment and processes. Common sources of vented emissions include gas-driven pneumatic devices, compressor seals, tanks, and liquids unloading.
- **Process & Equipment Flared** Flared emissions consist primarily of CO_2 from the combustion of gas that is captured from equipment and processes. Flaring also results in methane emissions from uncombusted gas that escapes through the flare stack.
- **Associated Gas Vented & Flared** Associated gas vented and flared emissions occur at oil wells that do not capture a portion or any of the gas that is produced alongside oil. The gas is directly released to the atmosphere or combusted in a flare rather than captured for sale, on-site use, or reinjection. Note that associated gas emissions only occur in the onshore production segment.
- **Fugitive** Fugitive emissions are unintentional releases, or leaks, of natural gas. These emissions are often caused by faulty or worn-out equipment. Sources of fugitive emissions include seals and cracks on equipment such as tanks and piping, and leakage from infrastructure components such as valves and connectors.
- **Other Combustion** Non-flaring combustion is a significant source of CO_2 emissions from oil and gas production. Diesel and natural gas engines used to power equipment and provide electricity represent the largest source of other combustion emissions. Other combustion also includes methane emissions from uncombusted gas in engine exhaust.



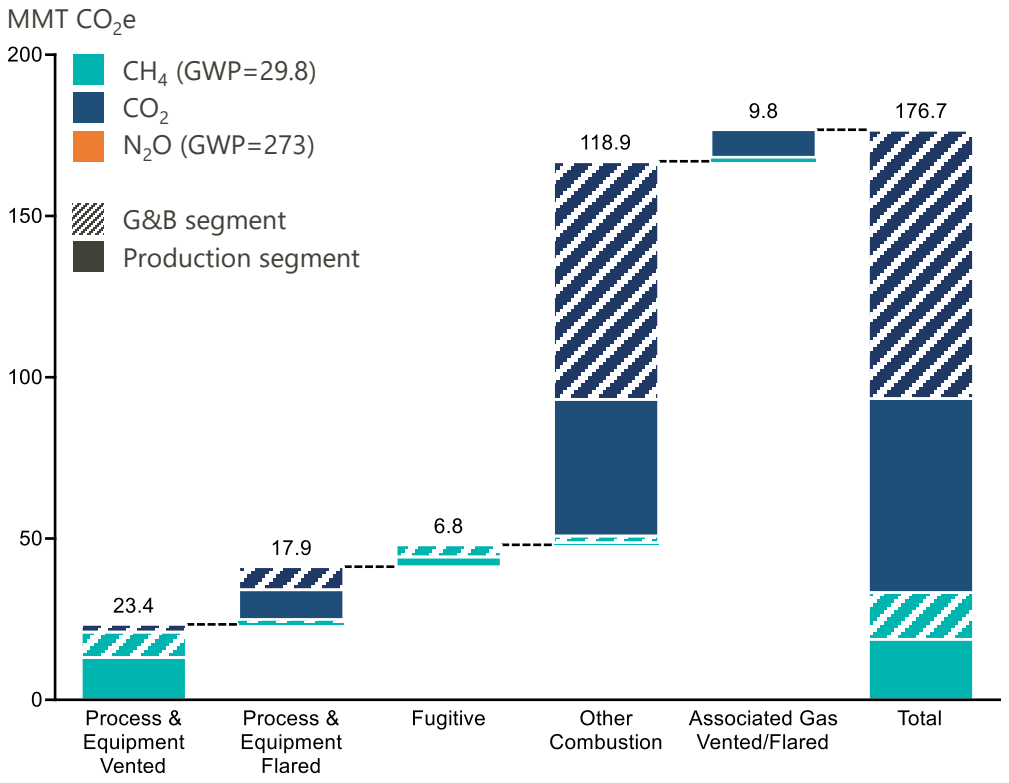
Note: this graphic also appears on page 11

Sources of Emissions

Process and equipment vented, and fugitive methane emissions make up approximately 83% and 17% of the total methane and GHG emissions, respectively, reported across all sources included in this report. Pneumatic devices are the largest source of reported methane emissions.

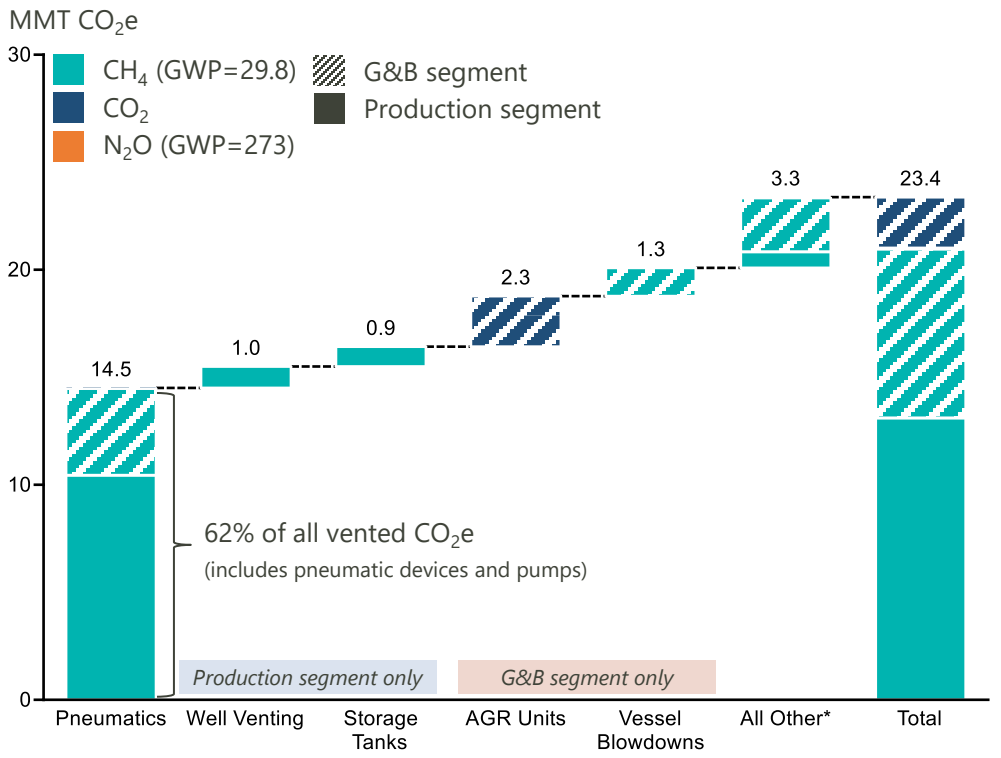
2024 Reported Production and G&B Emissions

by source category and segment; million metric ton CO_2e (MMT CO_2e)



2024 Reported Process & Equipment Vented Emissions

by source and segment; million metric ton CO_2e (MMT CO_2e)



*Includes: Centrifugal compressors, Completions/workovers, dehydrators, reciprocating compressors, compressor blowdowns and starts, well drilling, pressure relief valves, well testing, acid gas removal units (production segment), well venting (G&B), and storage tanks (G&B)

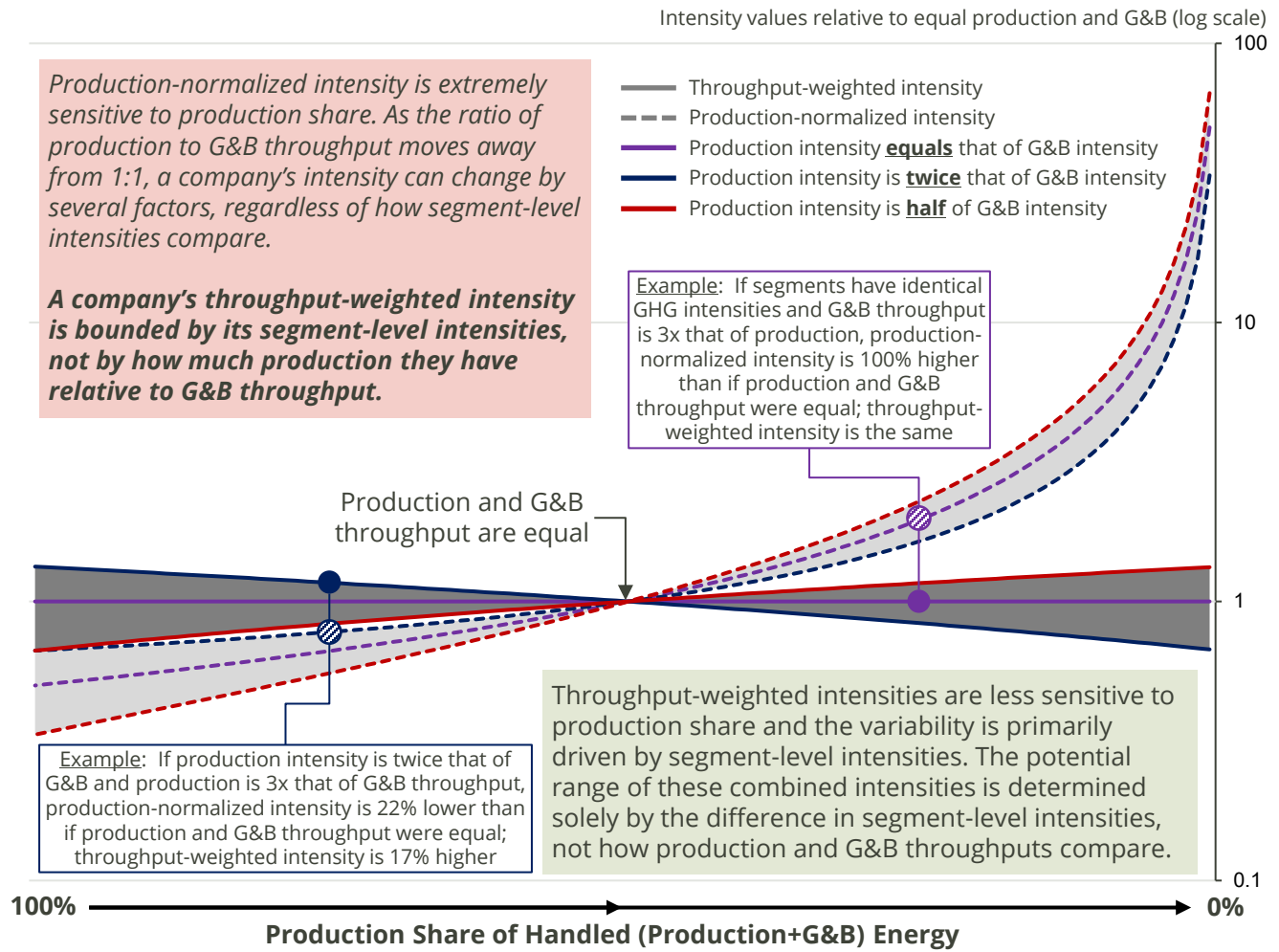
Upstream Companies: Owners of assets in both production and G&B segments

Interpretation of Combined Intensity Metrics

Production-normalized and throughput-weighted intensities accomplish different objectives and should not be directly compared. Production-normalized intensities can provide insights into the emissions profile of a representative hydrocarbon molecule through a portion of the oil and gas supply chain, but at a company-level, these values should only be utilized when production and G&B throughput is equivalent (i.e., companies gather all of their own production). When company production and G&B throughput are not equivalent, these intensity values are highly sensitive to the difference. Regardless of whether G&B segment-level GHG intensity is higher or lower than the production segment, production-normalized intensities will always trend lower as the production share increases.

In a benchmarking exercise comparing companies with varying levels of production and G&B operations, this bias would generally benefit companies that are primarily producers. Consequently, this report uses a different metric – throughput-weighted averages – that is better suited for comparing a wide range of company types and more accurately reflects the emissions performance of each individual segment. These average intensity values remove much of the throughput sensitivity and allow segment-level GHG intensities to drive the relative difference between combined company intensities.

Variability in Intensity Metrics
Changes to intensity values relative to equal production and G&B throughput



Upstream Companies: Owners of assets in both production and G&B segments

Interpretation of Combined Intensity Metrics

The tables below provide two illustrative examples of different approaches to calculating combined emissions intensities for upstream companies. Each example highlights how variables impact which companies have higher or lower combined intensities. Production-normalized intensity values for the 80 companies in this report with both onshore production and G&B operations are shown on page 225.

Example 1: Impact of Different Segment-level Throughput

This example illustrates how a company's relative throughput (production vs. G&B throughput) impacts combined intensity values. Segment-level intensities are identical across all three companies, but segment-level throughput varies.

		Company A	Company B	Company C
Production Segment	Production (million BOE)	100	100	100
	GHG Emissions (metric ton)	300,000	300,000	300,000
	Intensity ($kgCO_2e$/BOE)	3	3	3
G&B Segment	Transported (million BOE)	100	50	300
	GHG Emissions (metric ton)	300,000	150,000	900,000
	Intensity ($kgCO_2e$/BOE)	3	3	3
Production Share of Combined Throughput		*50%*	*67%*	*25%*
Production-Normalized		**6.0**	**4.5**	**12.0**
Throughput-Weighted		**3.0**	**3.0**	**3.0**

Segment-level intensities are identical but companies that produce more than they transport have lower production-normalized intensities. Throughput-weighted values, however, reflect that the emissions profile of each company and segment are identical and suggest that – from an emissions intensity performance perspective – these three companies are equivalent.

Example 2: Impact of Different Segment-level Throughput & Intensity

This example uses the same conditions associated with Example 1 but shows how adjusting the G&B segment intensity of each company impacts combined intensity values. Relative throughput and production segment intensities are maintained (i.e., same as Example 1).

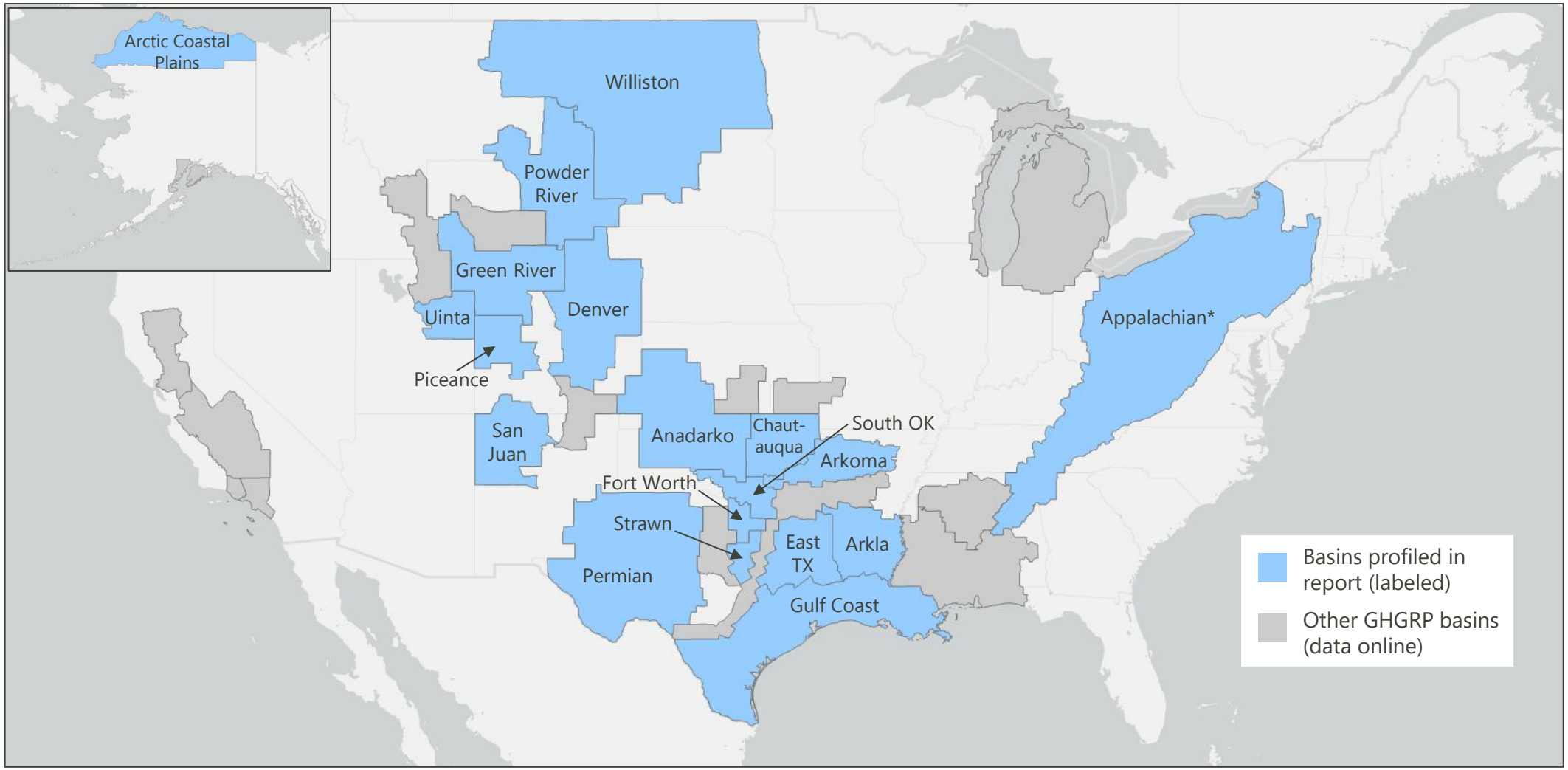
		Company A	Company B	Company C
Production Segment	Production (million BOE)	100	100	100
	GHG Emissions (metric ton)	300,000	300,000	300,000
	Intensity ($kgCO_2e$/BOE)	3	3	3
G&B Segment	Transported (million BOE)	100	50	300
	GHG Emissions (metric ton)	150,000	75,000	450,000
	Intensity ($kgCO_2e$/BOE)	1.5	1.5	1.5
Production Share of Combined Throughput		*50%*	*67%*	*25%*
Production-Normalized		**4.50**	**3.75**	**7.50**
Throughput-Weighted		**2.25**	**2.50**	**1.88**

Although G&B segment intensities are half of production segment intensities, the primary gathering company (Company C; transports three times more energy than it produces) has the highest production-normalized intensity. Throughput-weighted values, however, account for the size and intensity of each segment, and characterizes Company C as the company with the lowest combined intensity.

Basin-Level Summary Data

This section provides data on hydrocarbon energy, GHG emissions, emissions intensity, and sources of emissions for the 19 largest hydrocarbon basins in the U.S. by 2024 energy handled (produced and transported). Together these basins represent 99.3% and 99.5% of total 2024 natural gas and hydrocarbon energy handled, respectively, across the production and G&B segments in the EPA data.

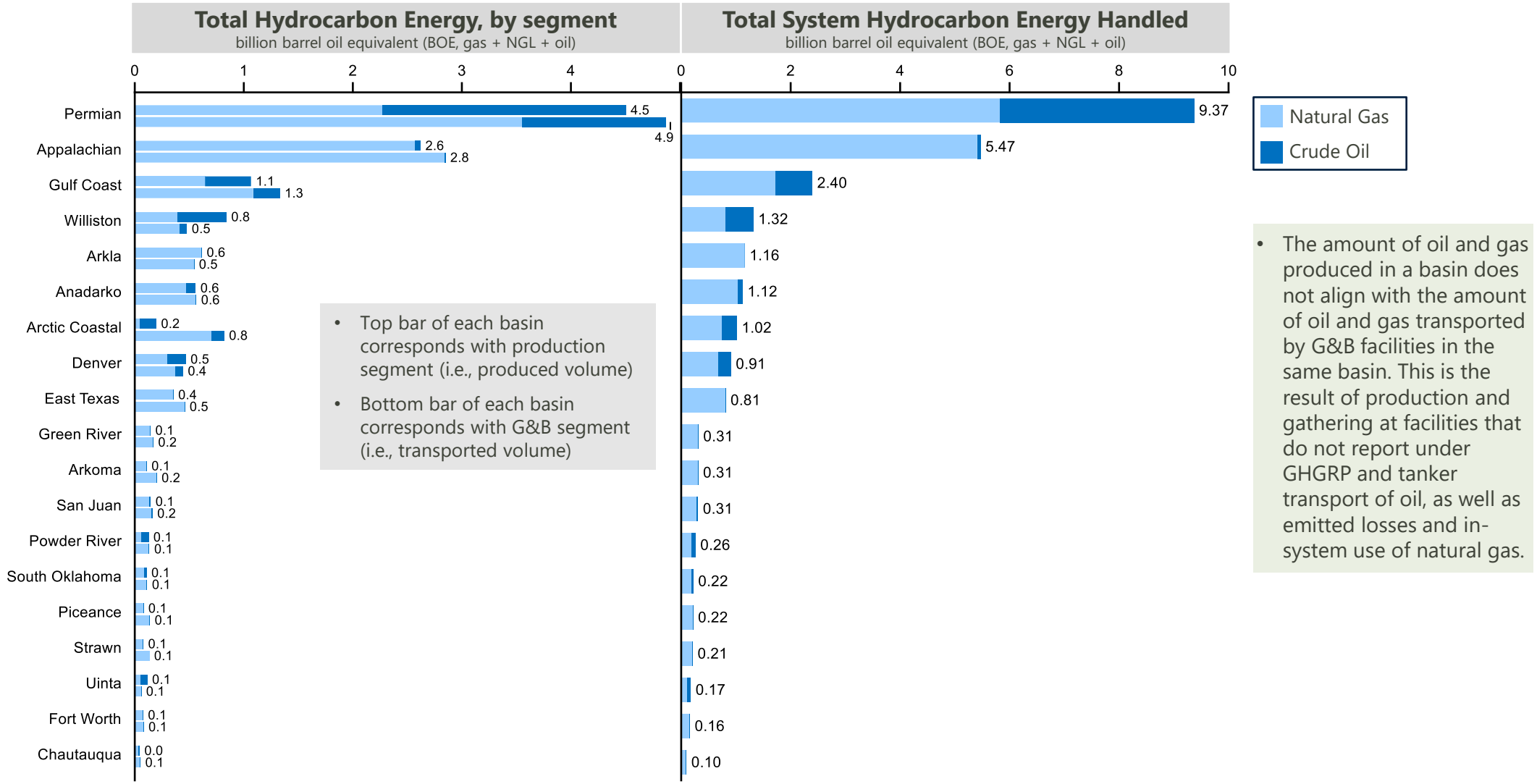
GHGRP Basins



* GHGRP data contain two distinct Appalachian basins (160 & 160A). This analysis combines data reported across both basins and presents them as a single basin.
Note: Basin boundaries defined by geologic provinces published by the American Association of Petroleum Geologists; data provided by U.S. EPA.

2024 Data

GHGRP Basin Hydrocarbon Energy

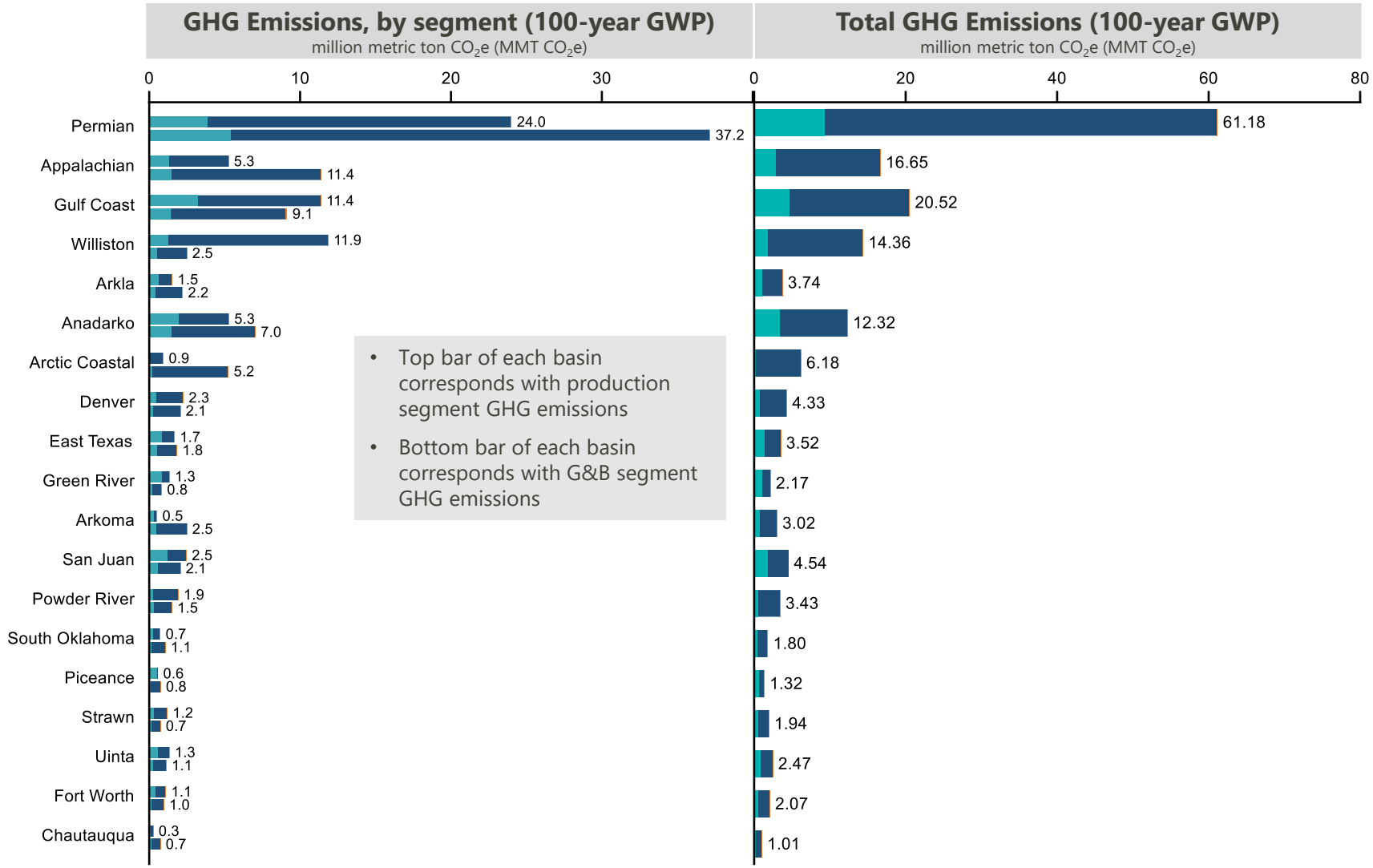


- The amount of oil and gas produced in a basin does not align with the amount of oil and gas transported by G&B facilities in the same basin. This is the result of production and gathering at facilities that do not report under GHGRP and tanker transport of oil, as well as emitted losses and in-system use of natural gas.

Note: Basins are ranked in descending order of hydrocarbon energy handled (BOE, produced + transported)

2024 Data

GHGRP Basin Emissions



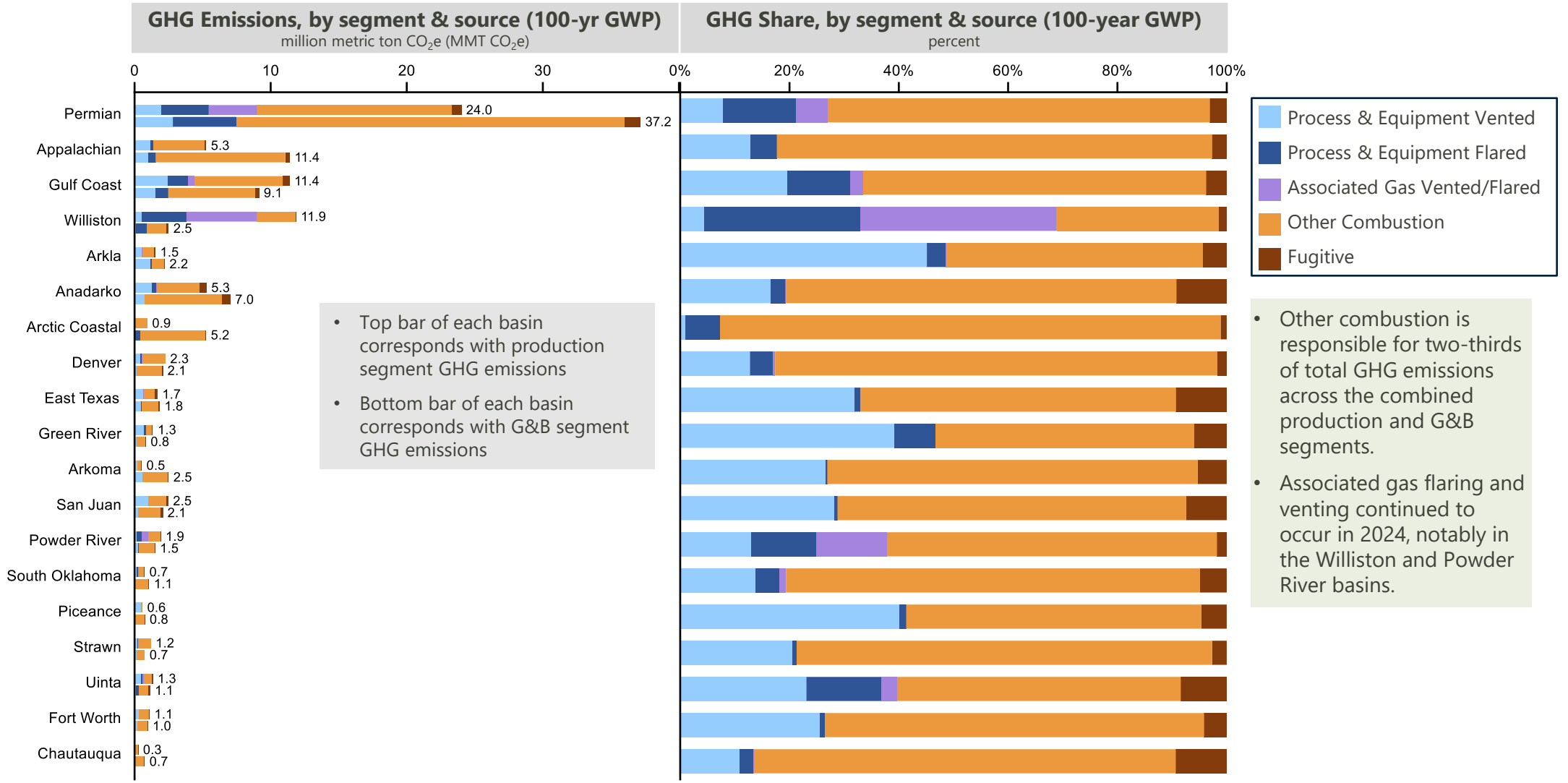
- Top bar of each basin corresponds with production segment GHG emissions
- Bottom bar of each basin corresponds with G&B segment GHG emissions

- The segment responsible for the most combined GHG emissions varies by basin, but G&B emissions dominate the two largest production basins (Permian & Appalachian).
- Methane generally represents a higher proportion of total emissions in the production segment compared to the G&B segment.
- Across all basins, methane and CO_2 represent 19% and 81% percent of total GHGs, respectively. N_2O accounts for around 0.1% of total GHGs.

Note: Basins are ranked in descending order of hydrocarbon energy handled (BOE, produced + transported)

2024 Data

GHGRP Basin Emissions by Source

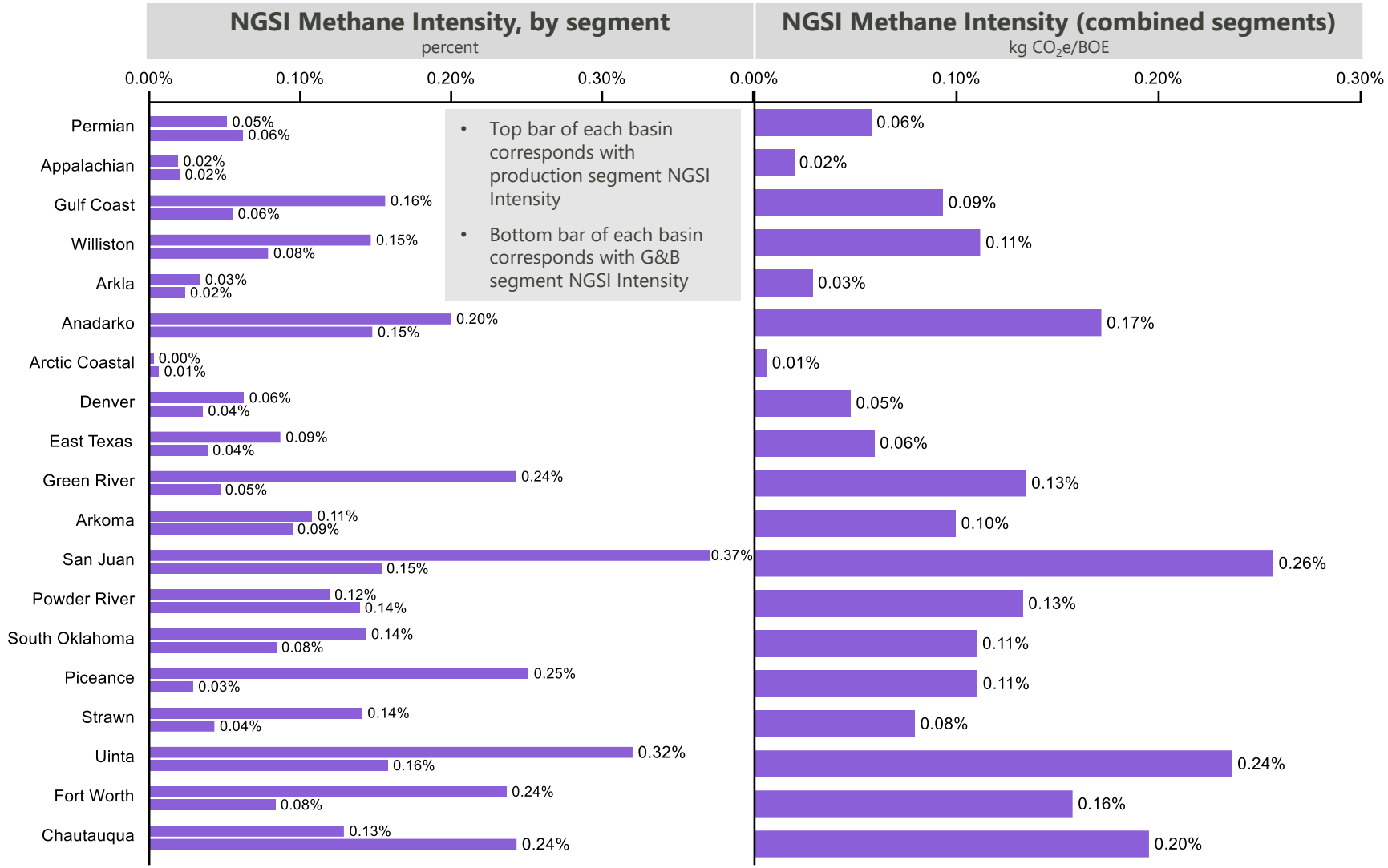


- Top bar of each basin corresponds with production segment GHG emissions
- Bottom bar of each basin corresponds with G&B segment GHG emissions

- Other combustion is responsible for two-thirds of total GHG emissions across the combined production and G&B segments.
- Associated gas flaring and venting continued to occur in 2024, notably in the Williston and Powder River basins.

Note: Basins are ranked in descending order of hydrocarbon energy handled (BOE, produced + transported)

GHGRP Basin Methane Intensity

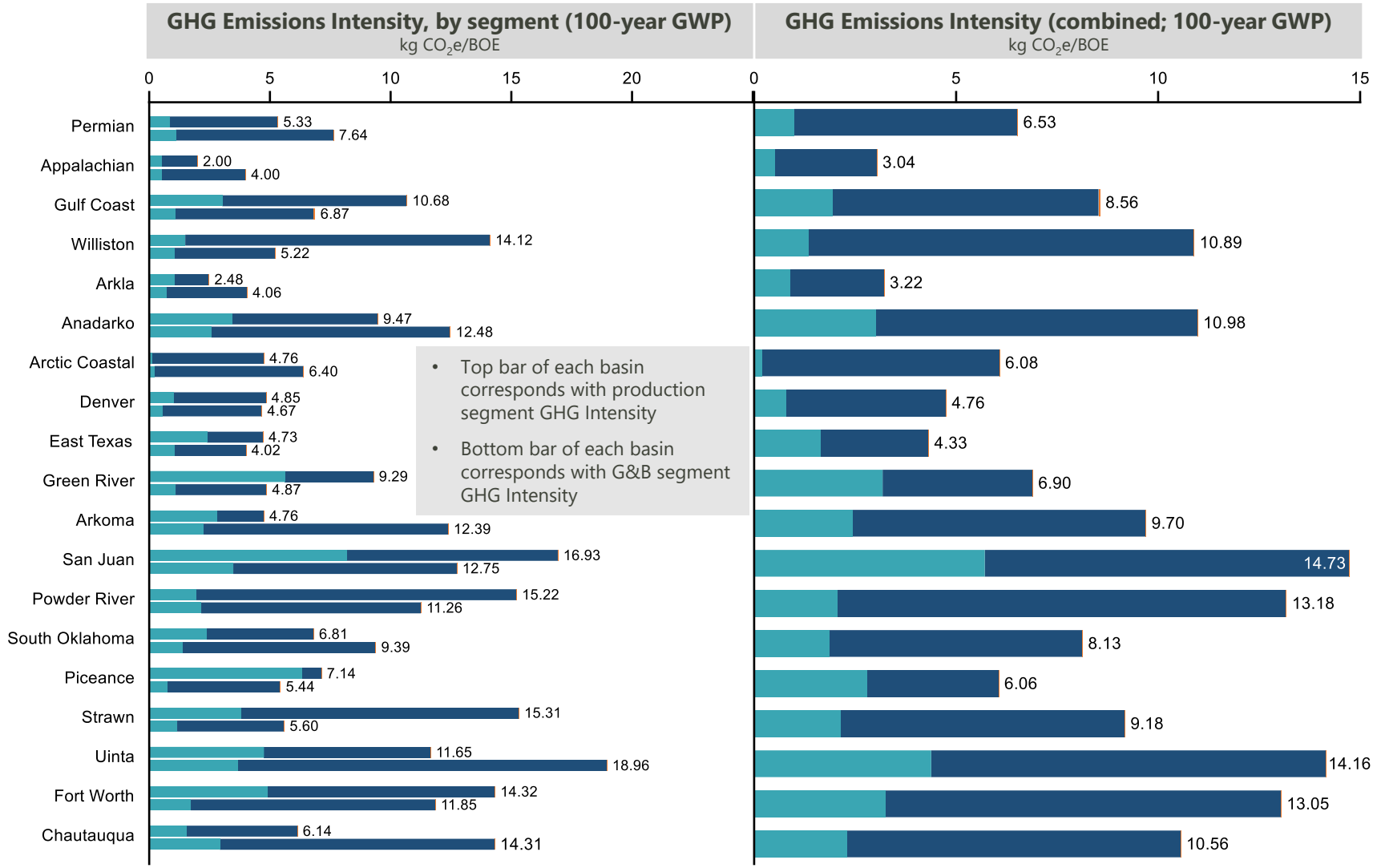


Note: Basins are ranked in descending order of hydrocarbon energy handled (BOE, produced + transported)

- Despite reductions in reported emissions from pneumatic devices in 2024, the source remains the main driver of higher methane intensities.
- Although methane intensities in the production segment are generally higher, combined intensities are closer to G&B segment intensities due to higher gas throughput.
- **Note that combined segment intensity is effectively weighted by segment throughput and is not a sum of each segment's respective intensity.**

2024 Data

GHGRP Basin GHG Intensity

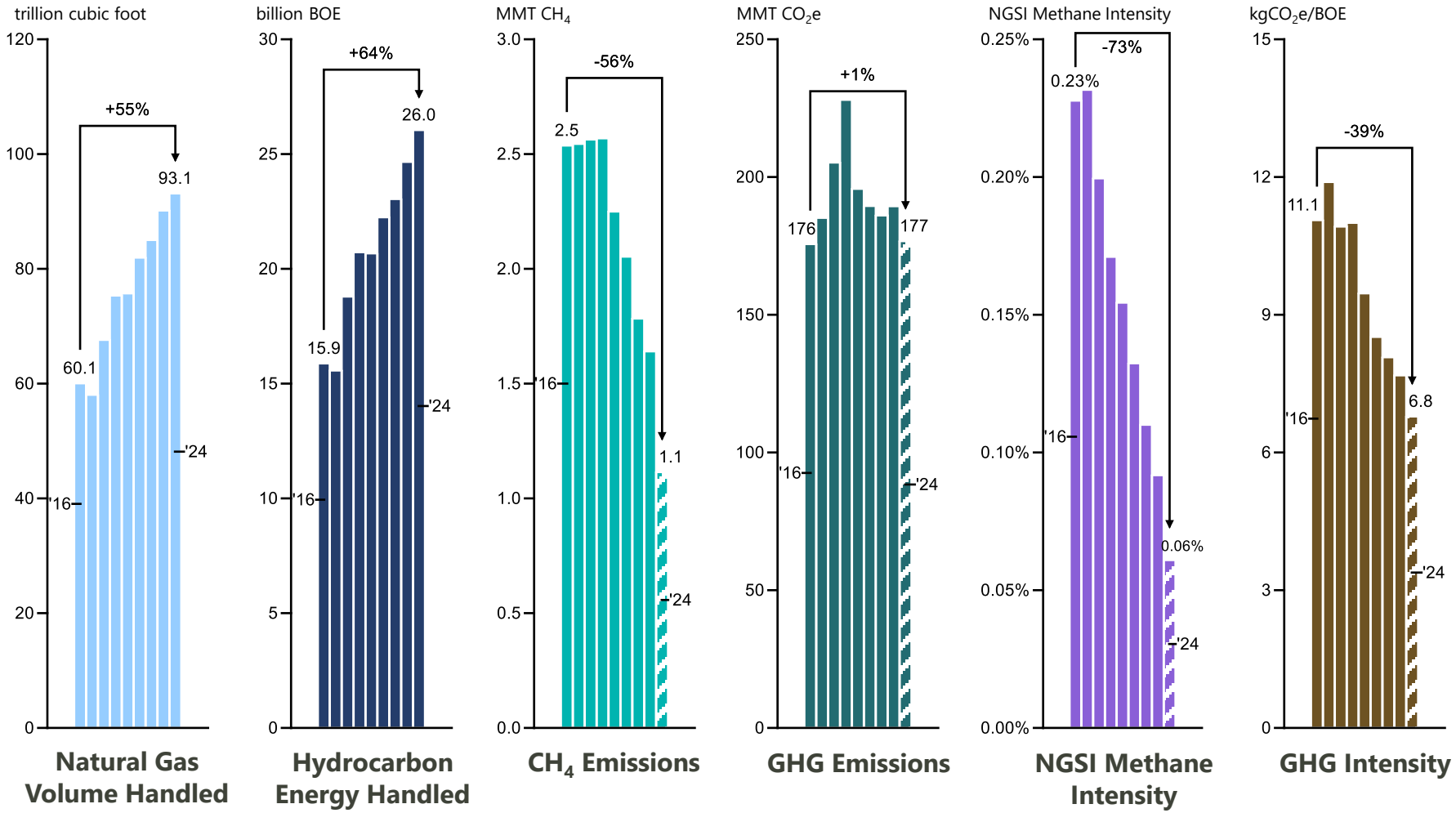


- CO_2 is the primary driver of GHG emission intensity across basins for combined production and G&B operations.
- The value of GHG intensity in one segment relative to the other varies widely across basins and individual companies.
- **Note that combined segment intensity is effectively weighted by segment throughput and is not a sum of each segment's respective intensity.**

Note: Basins are ranked in descending order of hydrocarbon energy handled (BOE, produced + transported)

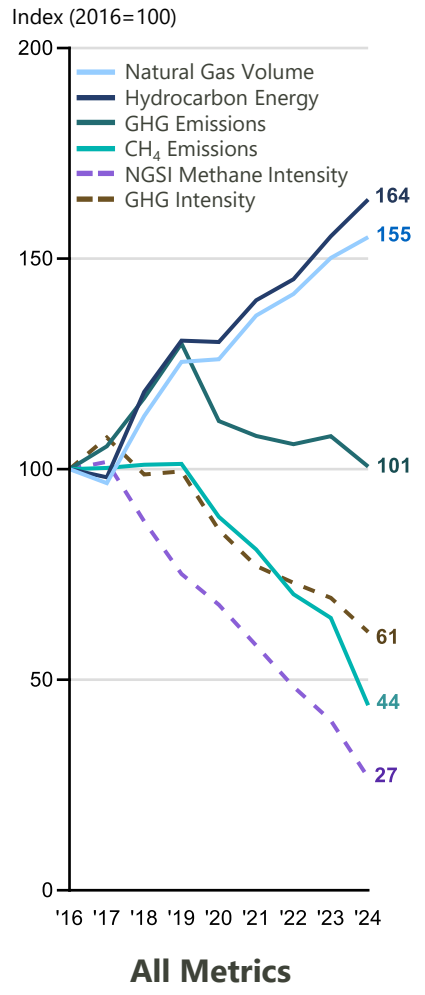
2016-2024 Trends Analysis: Throughput & Emissions Metrics

GHGRP Data Trends, 2016-2024



Combined Data Metrics

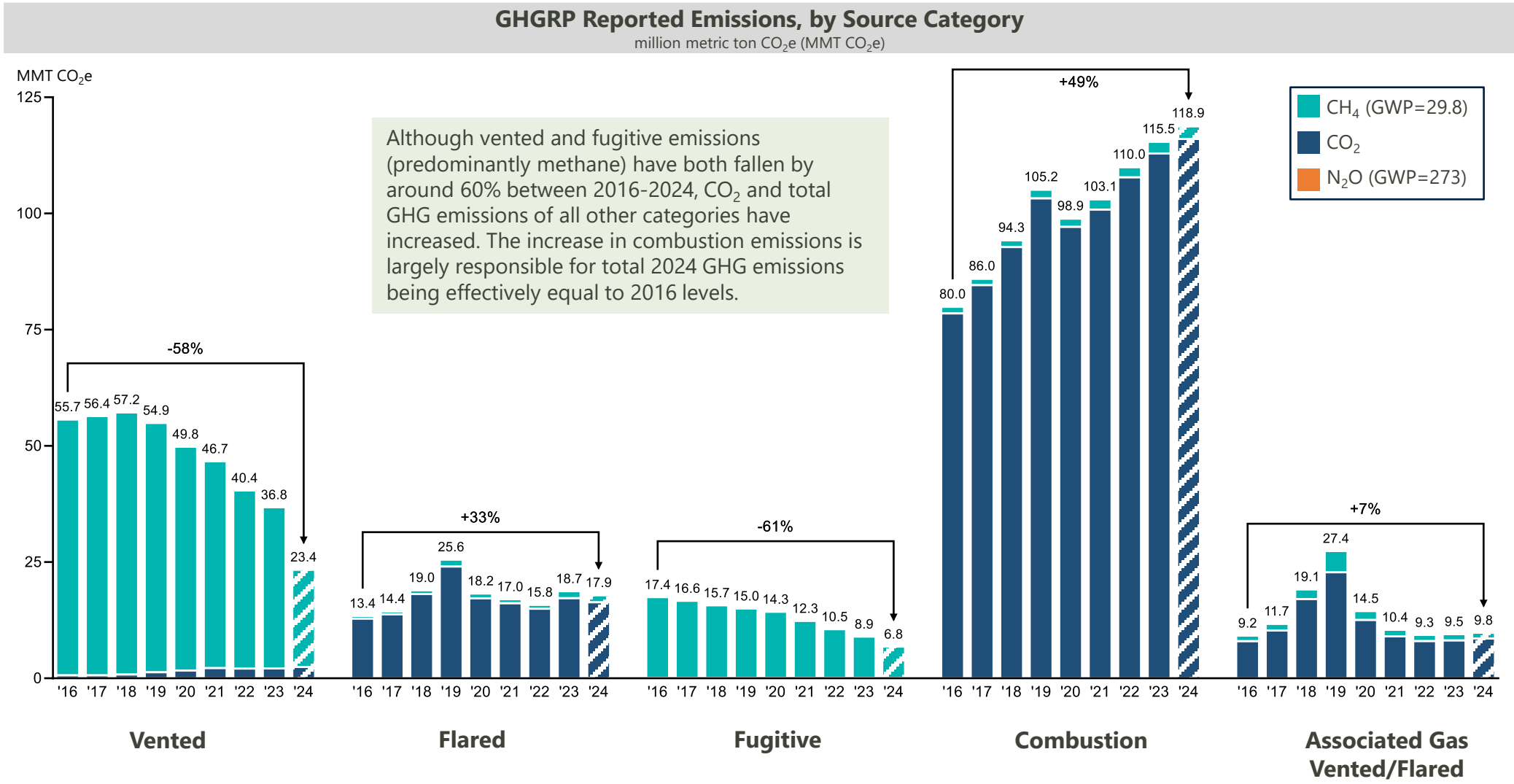
Indexed; 2016 = 100



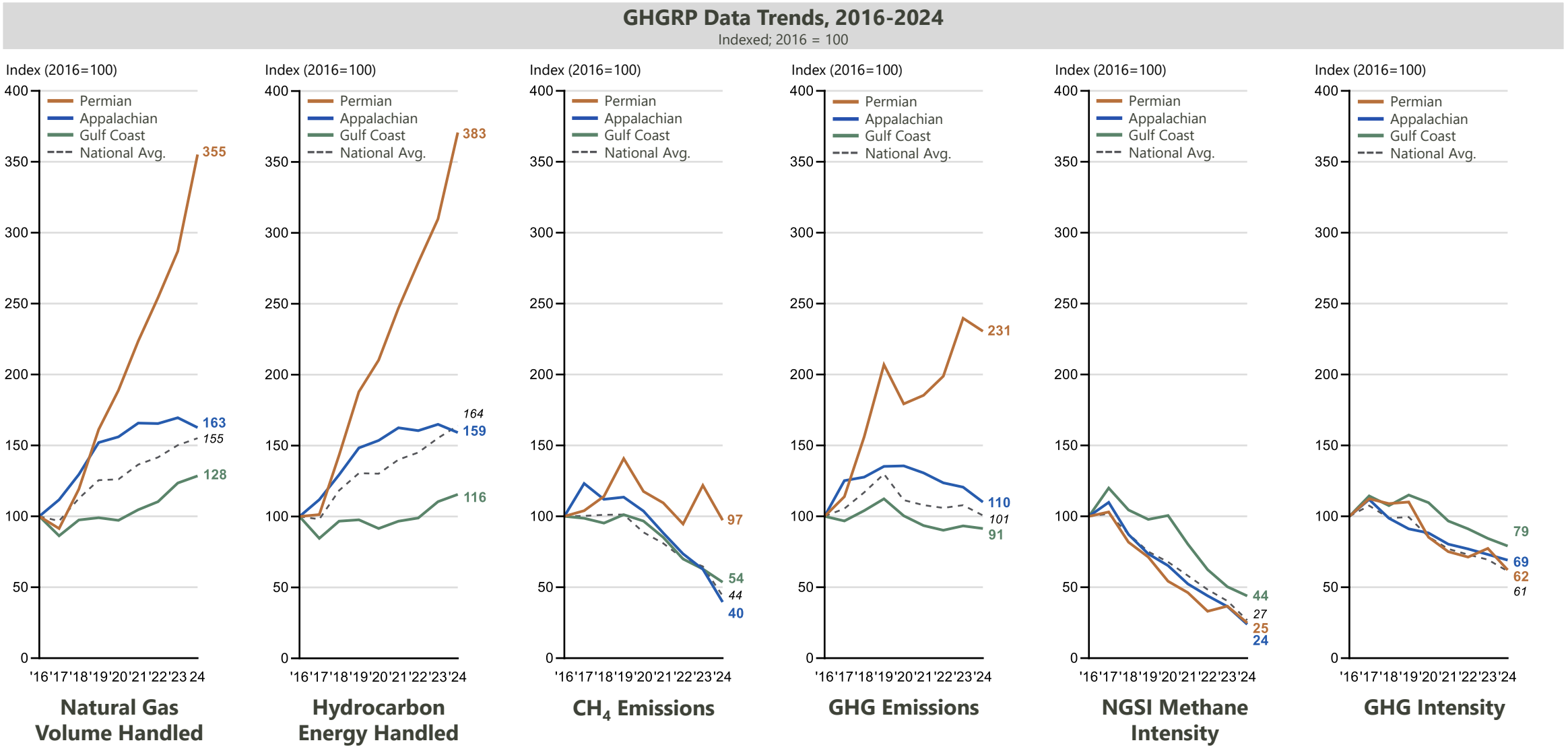
2016-2024 Trends Analysis: Emissions Sources

GHG Emissions* (MMT CO_2e)

**Production+G&B emissions*



2016-2024 Trends Analysis: Energy & Emissions Metrics of Top Hydrocarbon Basins



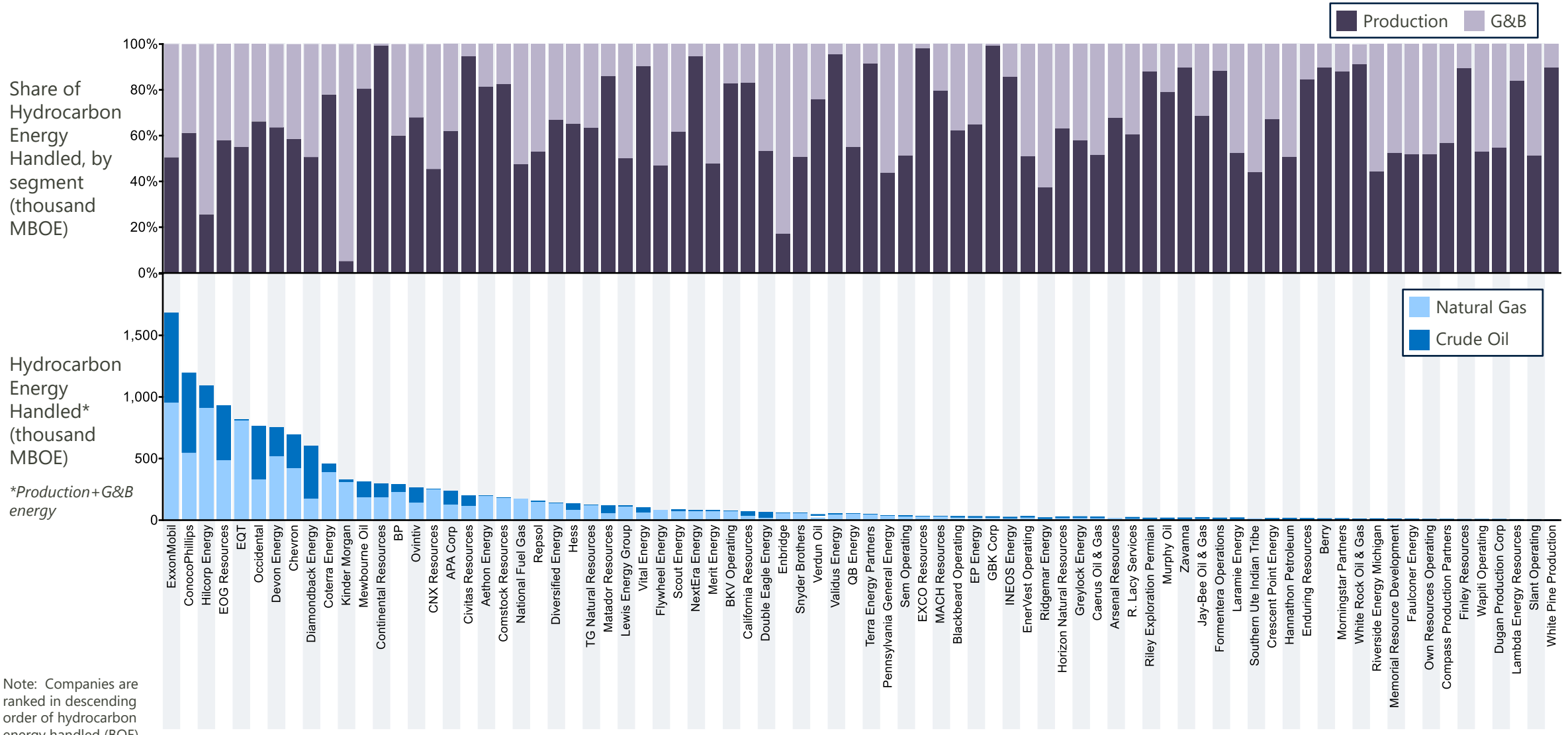
Company-Level Summary Data

This section summarizes data on hydrocarbon energy, GHG emissions, emissions intensity, and sources of emissions for companies that own assets in both the production and gathering & boosting segments. Additional graphics show the relative distribution of hydrocarbon energy, GHG emissions, and methane and GHG emissions intensities across these 80 upstream companies. Detailed tables list the data and associated rankings for the primary metrics included in this analysis for each of these companies.

Upstream Companies: Owners of assets in both production and G&B segments

2024 Data

Total Hydrocarbon Energy Handled



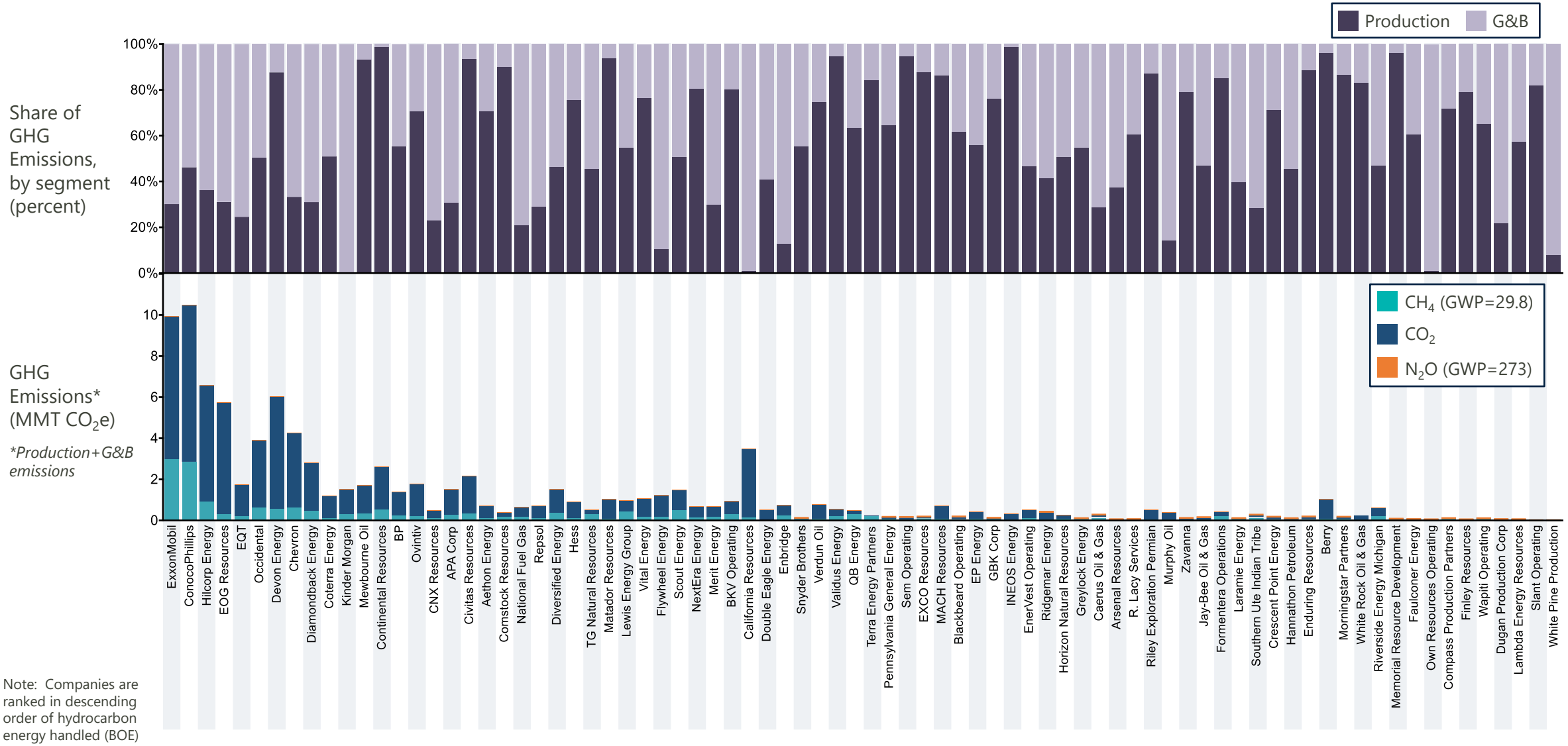
*Production+G&B energy

Note: Companies are ranked in descending order of hydrocarbon energy handled (BOE)

Upstream Companies: Owners of assets in both production and G&B segments

2024 Data

Total GHG Emissions (100-year GWP)

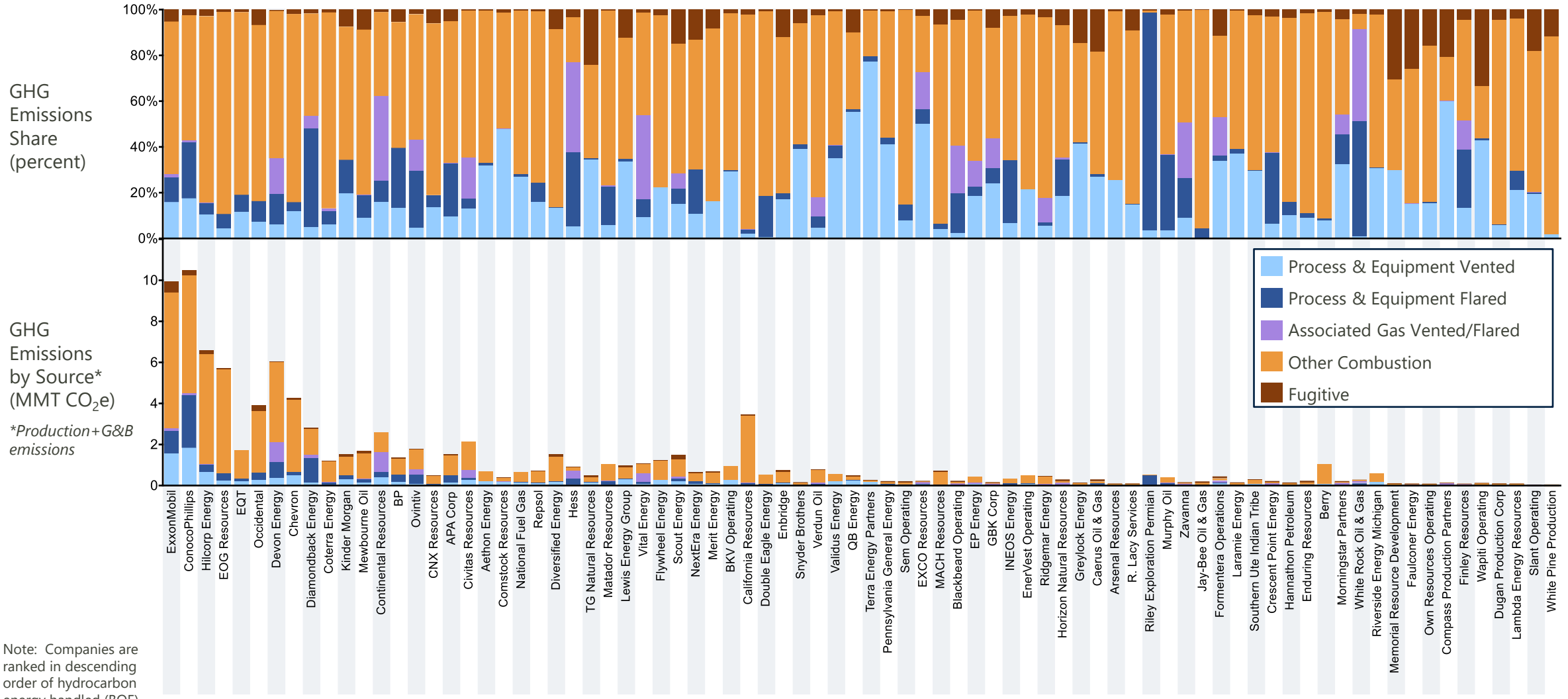


Note: Companies are ranked in descending order of hydrocarbon energy handled (BOE)

Upstream Companies: Owners of assets in both production and G&B segments

2024 Data

GHG Emissions by Source (100-year GWP)

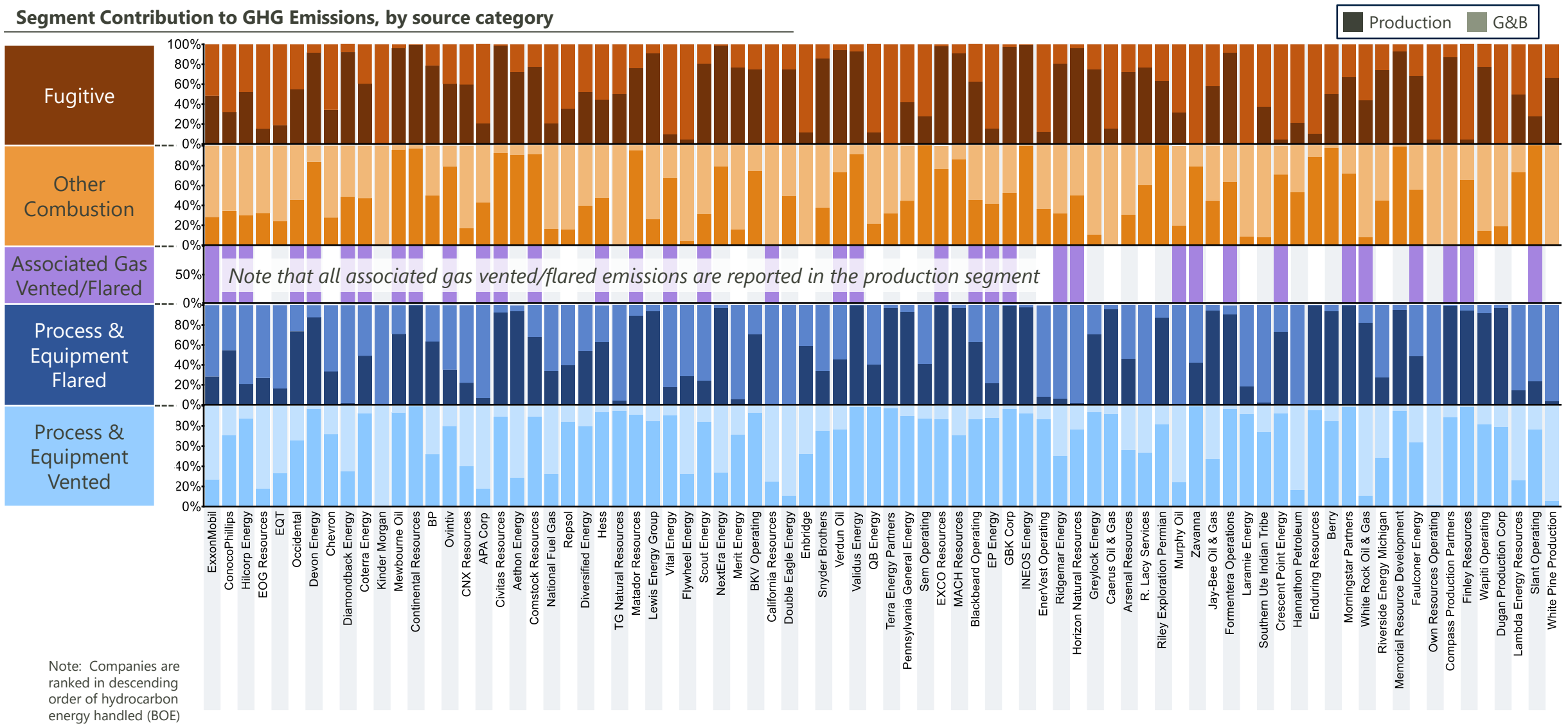


Note: Companies are ranked in descending order of hydrocarbon energy handled (BOE)

Upstream Companies: Owners of assets in both production and G&B segments

2024 Data

Total GHG Emissions Share, by Source & Segment (100-year GWP)

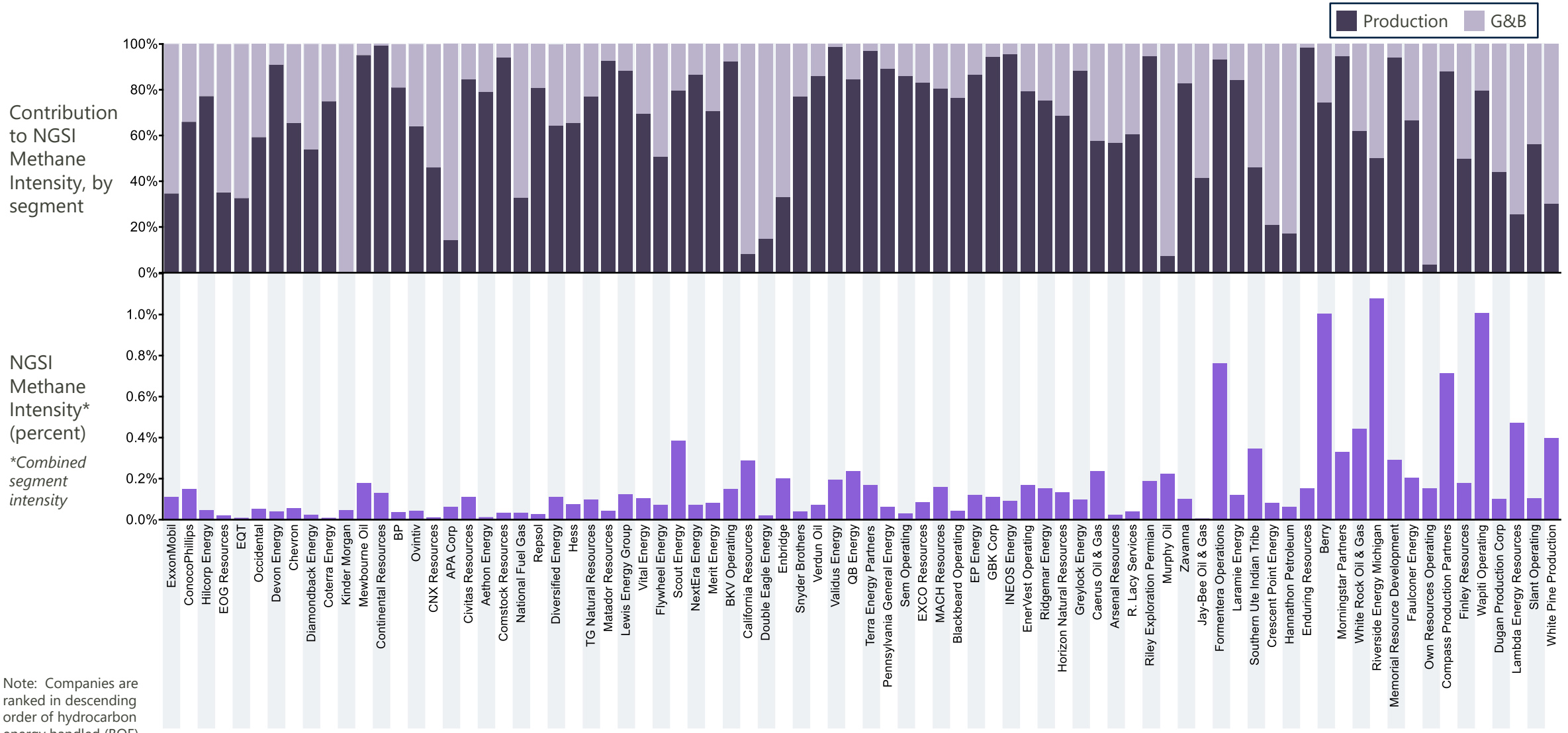


Note: Companies are ranked in descending order of hydrocarbon energy handled (BOE)

Upstream Companies: Owners of assets in both production and G&B segments

2024 Data

Methane Intensity

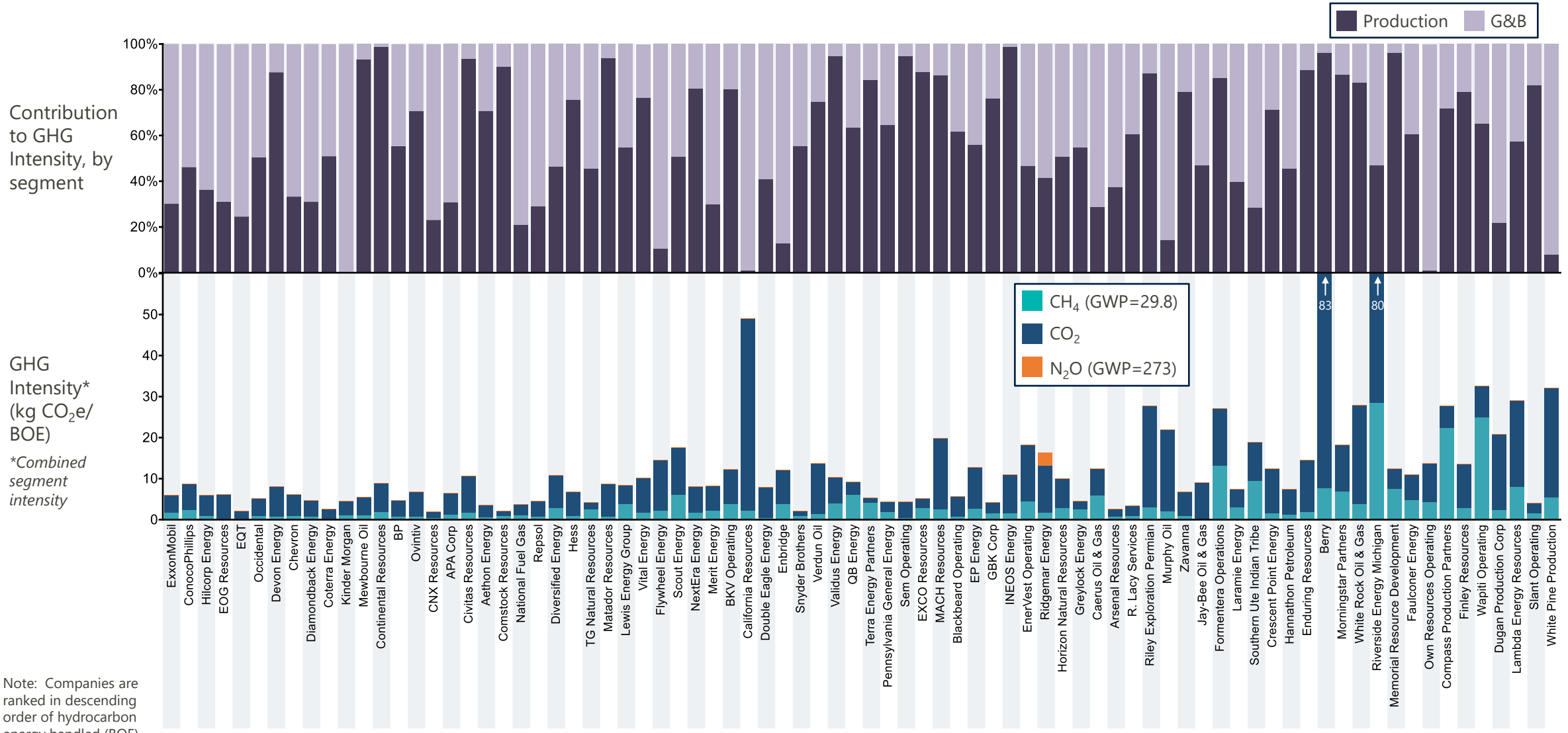


Note: Companies are ranked in descending order of hydrocarbon energy handled (BOE)

Upstream Companies: Owners of assets in both production and G&B segments

2024 Data

GHG Emissions Intensity (100-year GWP)

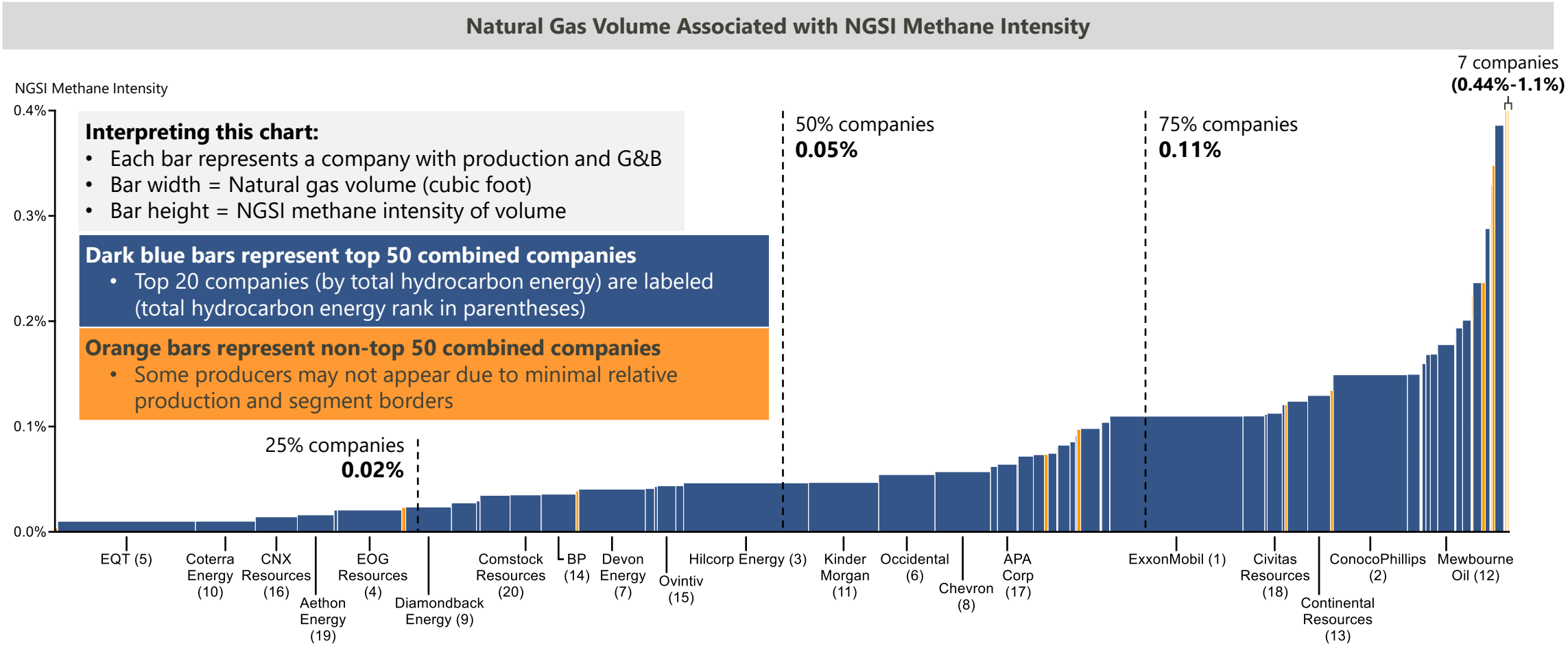


Note: Companies are ranked in descending order of hydrocarbon energy handled (BOE)

Upstream Companies: Owners of assets in both production and G&B segments

2024 Data

Total GHGRP Natural Gas Volume, by Methane Intensity

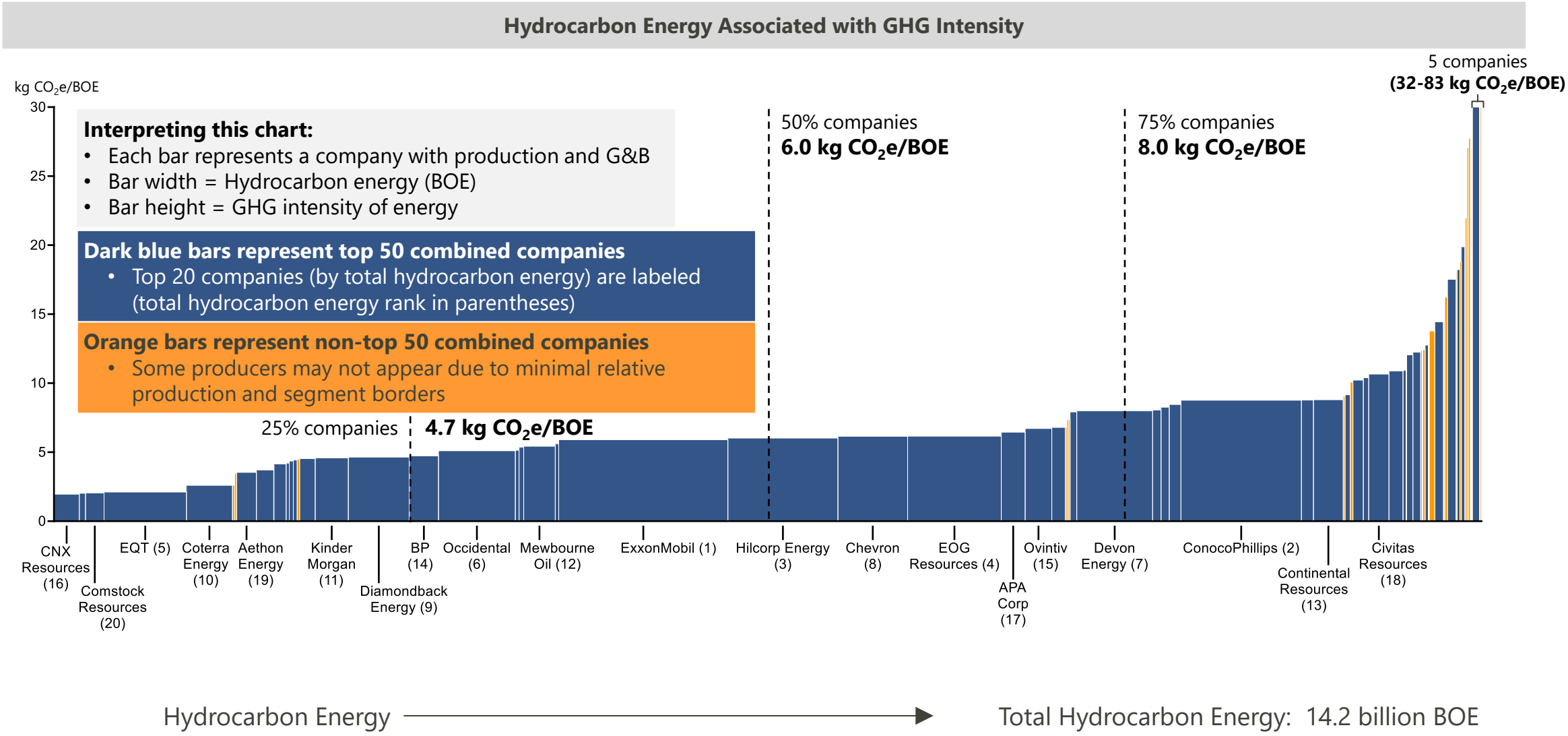


Natural Gas Volume → Total Gas Volume: 44.9 trillion cubic feet

Upstream Companies: Owners of assets in both production and G&B segments

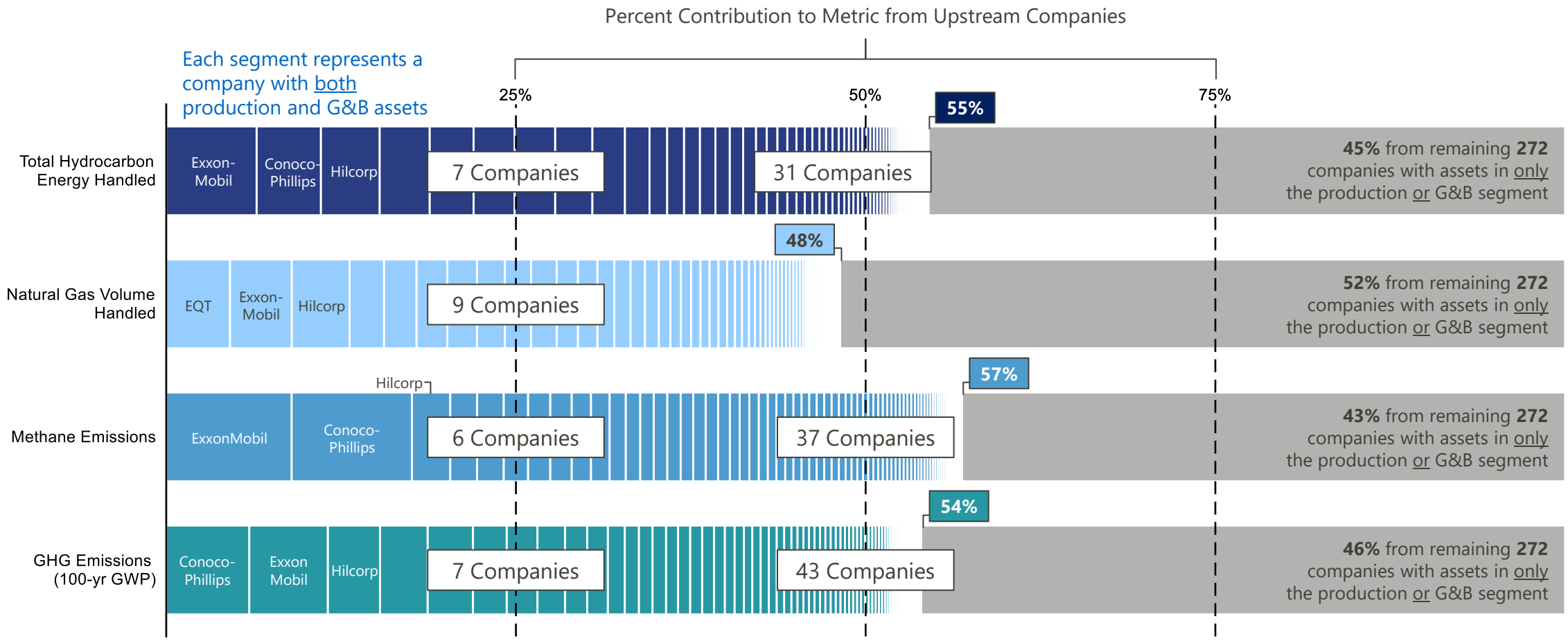
2024 Data

Total GHGRP Hydrocarbon Energy, by GHG Intensity



2024 Data

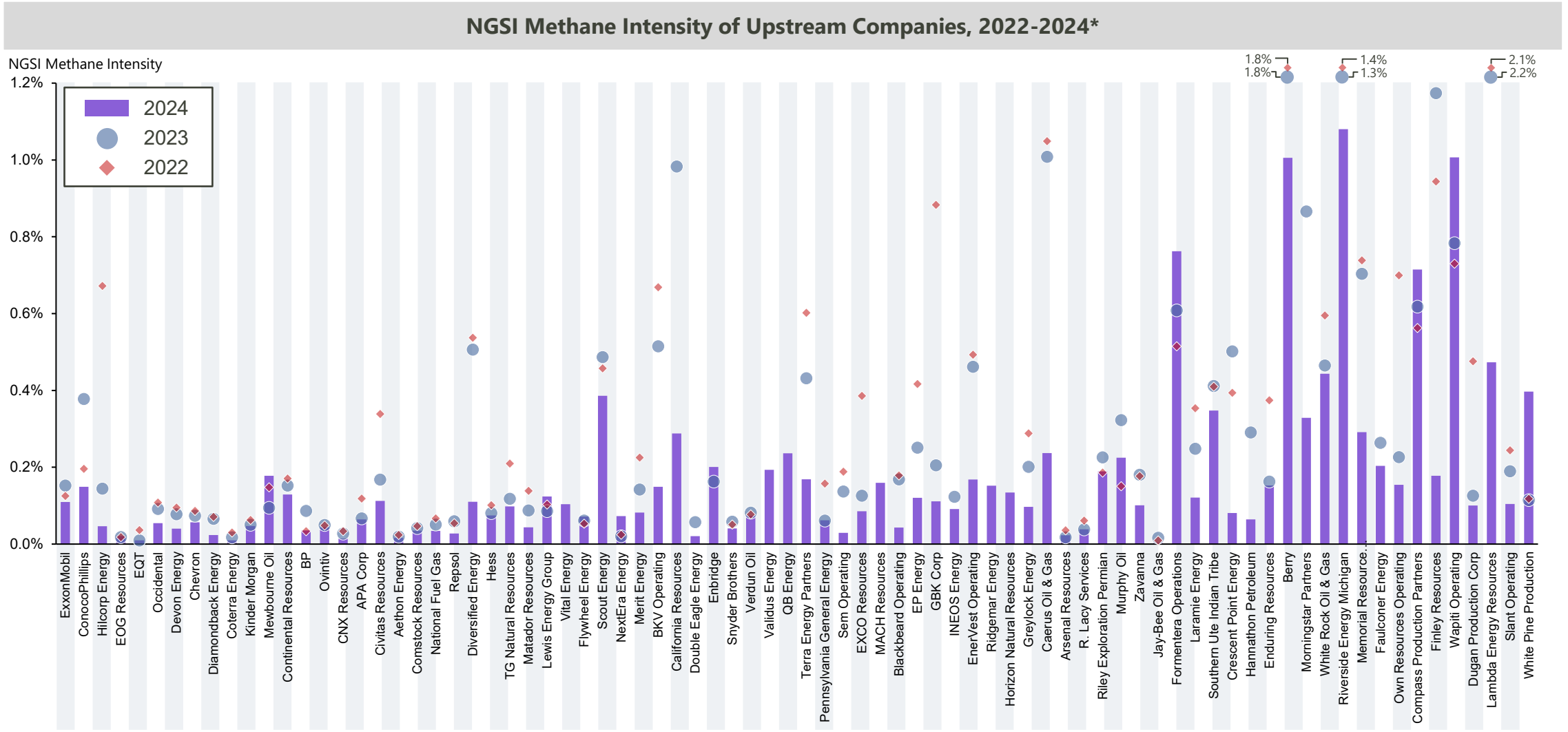
GHGRP Hydrocarbon Energy & Emissions Contributions



Handled hydrocarbon energy and natural gas volume reported to EPA are relatively concentrated among a small number of companies. 25% of total reported hydrocarbon energy and natural gas volume are by seven and nine companies, respectively. Reported methane and absolute GHG emissions are similarly concentrated; six and seven companies, respectively, are responsible for 25% of cumulative methane and GHG emissions across the production and G&B segments.

Upstream Companies: Owners of assets in both production and G&B segments

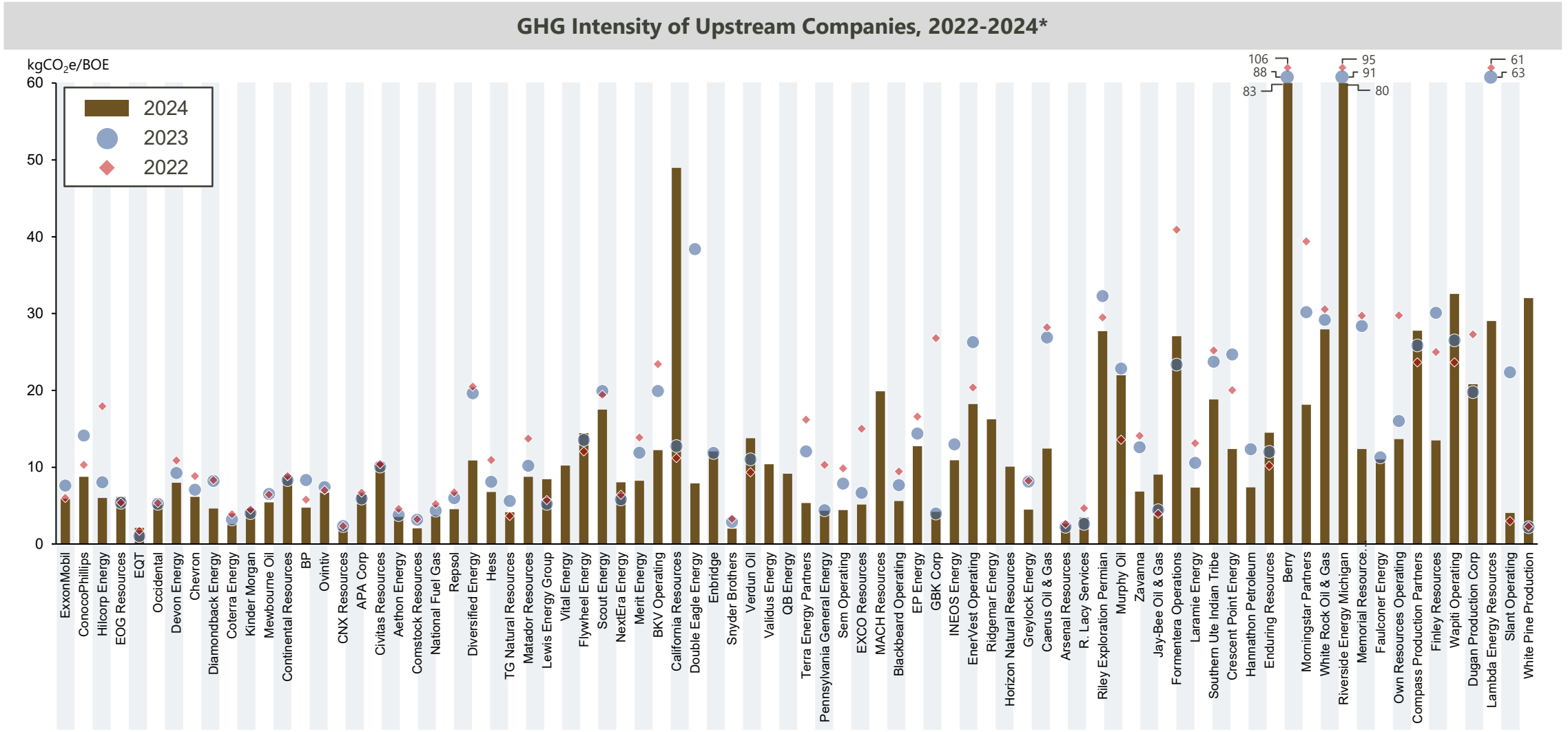
2022-2024 Trends Analysis: Change in Methane Intensity, by Upstream Company



*Combined segment intensity; 11 of the 80 upstream companies in 2024 were not in the EPA database for all three years and may not have data for 2022 and/or 2023.

Upstream Companies: Owners of assets in both production and G&B segments

2022-2024 Trends Analysis: Change in GHG Intensity, by Upstream Company



*Combined segment intensity; 11 of the 80 upstream companies in 2024 were not in the EPA database for all three years and may not have data for 2022 and/or 2023.

2024 Data

Emissions & Emissions Intensities of Upstream Companies

		Hydrocarbons (production+transported)		Emissions		Intensity		Metric Rank (among production and G&B companies) 1=highest, 80=lowest				
Rank	Company	Total MBOE	Gas (bcf)	MT CH4	MT GHG	NGSI Intensity	GHG Intensity	Gas (bcf)	CH4 Emissions	GHG Emissions	NGSI Intensity	GHG Intensity
1	ExxonMobil	1,681,857	4,107	99,894	9,920,882	0.11%	5.90	2	1	2	39	56
2	ConocoPhillips	1,197,710	2,289	95,855	10,491,155	0.15%	8.76	4	2	1	30	41
3	Hilcorp Energy	1,093,984	3,854	30,565	6,584,356	0.05%	6.02	3	3	3	60	55
4	EOG Resources	931,045	1,983	9,903	5,731,393	0.02%	6.16	7	18	5	74	53
5	EQT	819,058	4,247	7,519	1,727,688	0.01%	2.11	1	22	13	79	77
6	Occidental	763,779	1,737	21,125	3,894,769	0.05%	5.10	9	5	7	58	61
7	Devon Energy	754,211	2,052	19,401	6,026,086	0.04%	7.99	6	6	4	65	45
8	Chevron	692,776	1,714	21,451	4,256,852	0.06%	6.14	10	4	6	57	54
9	Diamondback Energy	605,925	1,411	15,368	2,809,841	0.02%	4.64	11	9	9	72	63
10	Coterra Energy	457,517	1,851	3,657	1,186,939	0.01%	2.59	8	40	21	78	76
11	Kinder Morgan	329,575	2,165	10,720	1,510,174	0.05%	4.58	5	14	17	59	64
12	Mew bourne Oil	313,555	528	10,857	1,701,623	0.18%	5.43	24	13	14	22	58
13	Continental Resources	296,017	703	17,662	2,603,758	0.13%	8.80	18	7	10	32	39
14	BP	290,707	1,075	7,706	1,375,068	0.04%	4.73	14	21	19	67	62
15	Ovintiv	264,530	571	6,539	1,776,034	0.04%	6.71	23	26	12	62	51
16	CNX Resources	251,677	1,295	3,335	491,274	0.01%	1.95	12	43	42	77	80
17	APA Corp	237,623	603	9,310	1,531,128	0.06%	6.44	21	19	15	55	52
18	Civitas Resources	201,667	465	11,514	2,149,093	0.11%	10.66	26	12	11	36	33
19	Aethon Energy	196,760	1,135	3,374	695,501	0.02%	3.53	13	42	32	76	73
20	Comstock Resources	184,311	959	5,856	376,250	0.04%	2.04	15	32	48	68	78
21	National Fuel Gas	172,031	926	5,953	637,674	0.03%	3.71	16	29	35	69	72
22	Repsol	154,438	769	4,107	699,934	0.03%	4.53	17	37	31	71	65
23	Diversified Energy	139,565	671	12,848	1,518,454	0.11%	10.88	19	11	16	38	32
24	Hess	134,044	268	3,896	910,220	0.07%	6.79	32	39	27	50	50
25	TG Natural Resources	121,686	597	10,042	504,480	0.10%	4.15	22	16	40	44	70
26	Matador Resources	119,540	239	3,149	1,048,717	0.04%	8.77	36	45	23	61	40
27	Lew is Energy Group	116,398	629	14,877	983,586	0.12%	8.45	20	10	25	33	42
28	Vital Energy	103,793	251	5,901	1,060,577	0.10%	10.22	35	31	22	41	35
29	Flyw heel Energy	85,383	467	6,127	1,233,095	0.07%	14.44	25	28	20	53	20
30	Scout Energy	85,154	274	17,109	1,491,602	0.39%	17.52	31	8	18	9	17
31	NextEra Energy	83,589	339	4,591	672,972	0.07%	8.05	29	35	34	52	44
32	Merit Energy	81,826	380	5,941	675,277	0.08%	8.25	28	30	33	48	43
33	BKV Operating	77,200	388	9,924	944,999	0.15%	12.24	27	17	26	29	28
34	California Resources	70,819	144	5,336	3,468,653	0.29%	48.98	41	33	8	13	3

2024 Data

Emissions & Emissions Intensities of Upstream Companies

		Hydrocarbons (production+transported)		Emissions		Intensity		Metric Rank (among production and G&B companies) 1=highest, 80=lowest				
Rank	Company	Total MBOE	Gas (bcf)	MT CH4	MT GHG	NGSI Intensity	GHG Intensity	Gas (bcf)	CH4 Emissions	GHG Emissions	NGSI Intensity	GHG Intensity
35	Double Eagle Energy	66,453	105	998	525,774	0.02%	7.91	49	64	38	75	46
36	Enbridge	62,048	262	7,859	747,418	0.20%	12.05	34	20	29	18	29
37	Snyder Brothers	61,842	285	1,901	124,894	0.04%	2.02	30	55	64	64	79
38	Verdun Oil	55,997	114	2,470	771,412	0.07%	13.78	46	50	28	51	21
39	Validus Energy	53,402	205	6,937	554,880	0.19%	10.39	39	25	37	19	34
40	QB Energy	52,060	267	10,643	476,572	0.24%	9.15	33	15	43	15	37
41	Terra Energy Partners	46,380	225	6,502	248,156	0.17%	5.35	37	27	53	23	59
42	Pennsylvania General Energy	40,065	214	2,457	174,520	0.06%	4.36	38	51	60	56	68
43	Sem Operating	38,272	112	579	169,282	0.03%	4.42	47	70	61	70	67
44	EXCO Resources	36,839	169	3,523	189,284	0.09%	5.14	40	41	57	47	60
45	MACH Resources	35,389	117	3,013	703,452	0.16%	19.88	45	47	30	25	13
46	Blackbeard Operating	34,535	86	874	193,114	0.04%	5.59	51	66	55	63	57
47	EP Energy	32,349	80	2,948	412,622	0.12%	12.76	55	48	46	35	24
48	GBK Corp	31,081	75	1,600	130,670	0.11%	4.20	57	59	63	37	69
49	INEOS Energy	30,150	44	1,589	329,148	0.09%	10.92	59	60	49	46	31
50	EnerVest Operating	27,562	138	4,076	502,252	0.17%	18.22	42	38	41	24	15
51	Ridgemar Energy	27,555	19	1,617	447,317	0.15%	16.23	72	58	44	28	18
52	Horizon Natural Resources	26,324	86	2,425	265,330	0.13%	10.08	53	52	52	31	36
53	Greylock Energy	24,374	118	2,060	109,407	0.10%	4.49	44	54	68	45	66
54	Caerus Oil & Gas	22,873	110	4,569	284,077	0.24%	12.42	48	36	50	14	25
55	Arsenal Resources	22,589	122	521	58,711	0.02%	2.60	43	74	76	73	75
56	R. Lacy Services	18,814	87	551	64,860	0.04%	3.45	50	73	74	66	74
57	Riley Exploration Permian	18,671	30	1,847	517,656	0.19%	27.73	66	56	39	20	9
58	Murphy Oil	18,089	35	1,223	397,648	0.23%	21.98	63	62	47	16	11
59	Zavanna	17,679	34	500	120,666	0.10%	6.83	64	75	65	42	49
60	Jay-Bee Oil & Gas	17,595	86	52	159,335	0.00%	9.06	52	79	62	80	38
61	Formentera Operations	15,777	44	6,964	426,891	0.76%	27.06	58	24	45	4	10
62	Laramie Energy	15,467	76	1,547	113,635	0.12%	7.35	56	61	66	34	48
63	Southern Ute Indian Tribe	14,949	84	4,715	281,254	0.35%	18.81	54	34	51	10	14
64	Crescent Point Energy	14,654	29	733	181,137	0.08%	12.36	67	68	58	49	27
65	Hannathon Petroleum	14,636	37	568	107,997	0.06%	7.38	61	71	69	54	47
66	Enduring Resources	13,233	26	827	191,964	0.15%	14.51	69	67	56	27	19
67	Berry	12,602	14	3,228	1,045,165	1.01%	82.94	74	44	24	3	1

2024 Data

Emissions & Emissions Intensities of Upstream Companies

		Hydrocarbons (production+transported)		Emissions		Intensity		Metric Rank (among production and G&B companies) 1=highest, 80=lowest				
Rank	Company	Total MBOE	Gas (bcf)	MT CH4	MT GHG	NGSI Intensity	GHG Intensity	Gas (bcf)	CH4 Emissions	GHG Emissions	NGSI Intensity	GHG Intensity
68	Morningstar Partners	9,900	37	2,263	179,702	0.33%	18.15	62	53	59	11	16
69	White Rock Oil & Gas	8,764	11	1,119	244,943	0.44%	27.95	76	63	54	7	7
70	Riverside Energy Michigan	7,515	42	7,159	597,804	1.08%	79.55	60	23	36	1	2
71	Memorial Resource Development	6,776	32	1,700	83,864	0.29%	12.38	65	57	71	12	26
72	Faulconer Energy	6,014	27	965	66,248	0.20%	11.02	68	65	72	17	30
73	Ow n Resources Operating	4,056	21	581	55,361	0.15%	13.65	71	69	77	26	22
74	Compass Production Partners	4,027	22	3,025	111,887	0.72%	27.78	70	46	67	5	8
75	Finley Resources	4,004	7	378	54,015	0.18%	13.49	78	76	78	21	23
76	Wapiti Operating	3,227	15	2,704	105,110	1.01%	32.57	73	49	70	2	4
77	Dugan Production Corp	3,166	14	241	65,891	0.10%	20.81	75	77	73	43	12
78	Lambda Energy Resources	2,065	7	558	59,938	0.47%	29.03	77	72	75	6	6
79	Slant Operating	2,035	2	103	8,229	0.10%	4.04	79	78	80	40	71
80	White Pine Production	281	1	51	9,010	0.40%	32.03	80	80	79	8	5

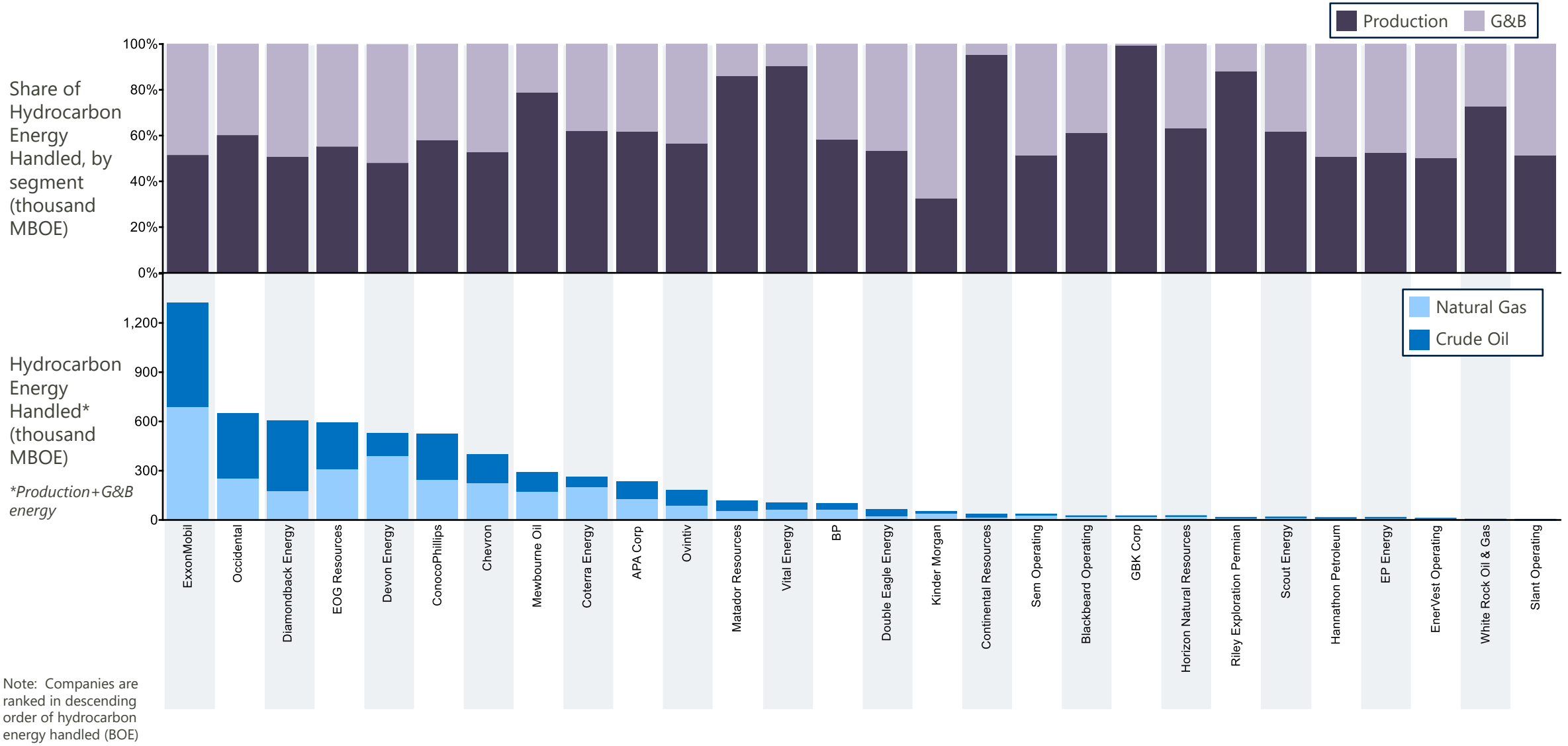
Company- & Basin-Level Summary Data

This section summarizes company-level data on produced and transported hydrocarbons, GHG emissions, emissions intensity, and sources of emissions for each of the following basins: Permian, Appalachian, and Gulf Coast. Additional data show the distribution of methane and GHG emissions intensities by volume in each basin.

Permian Basin Companies

2024 Data

Total Hydrocarbon Energy Handled

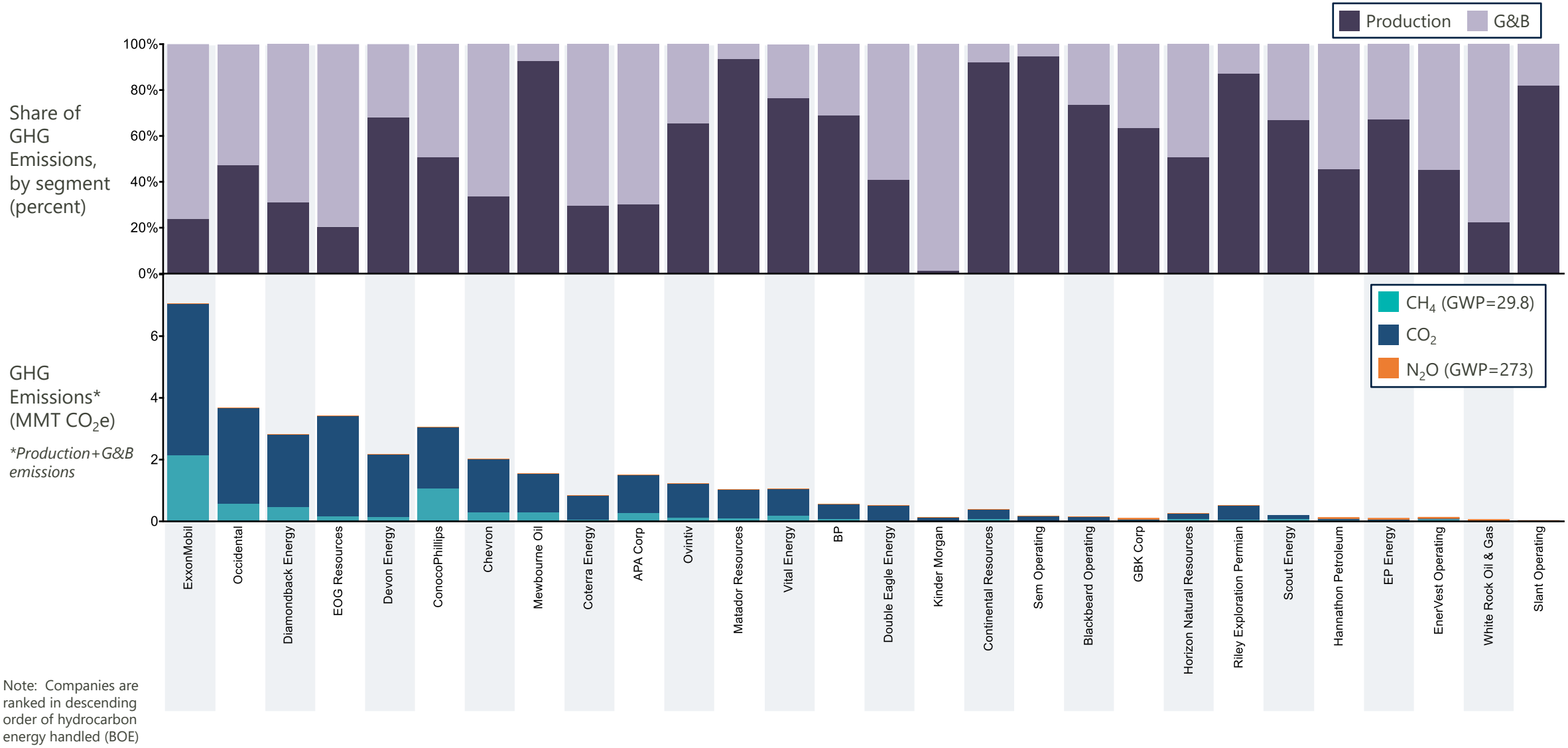


Note: Companies are ranked in descending order of hydrocarbon energy handled (BOE)

Permian Basin Companies

2024 Data

Total GHG Emissions (100-year GWP)

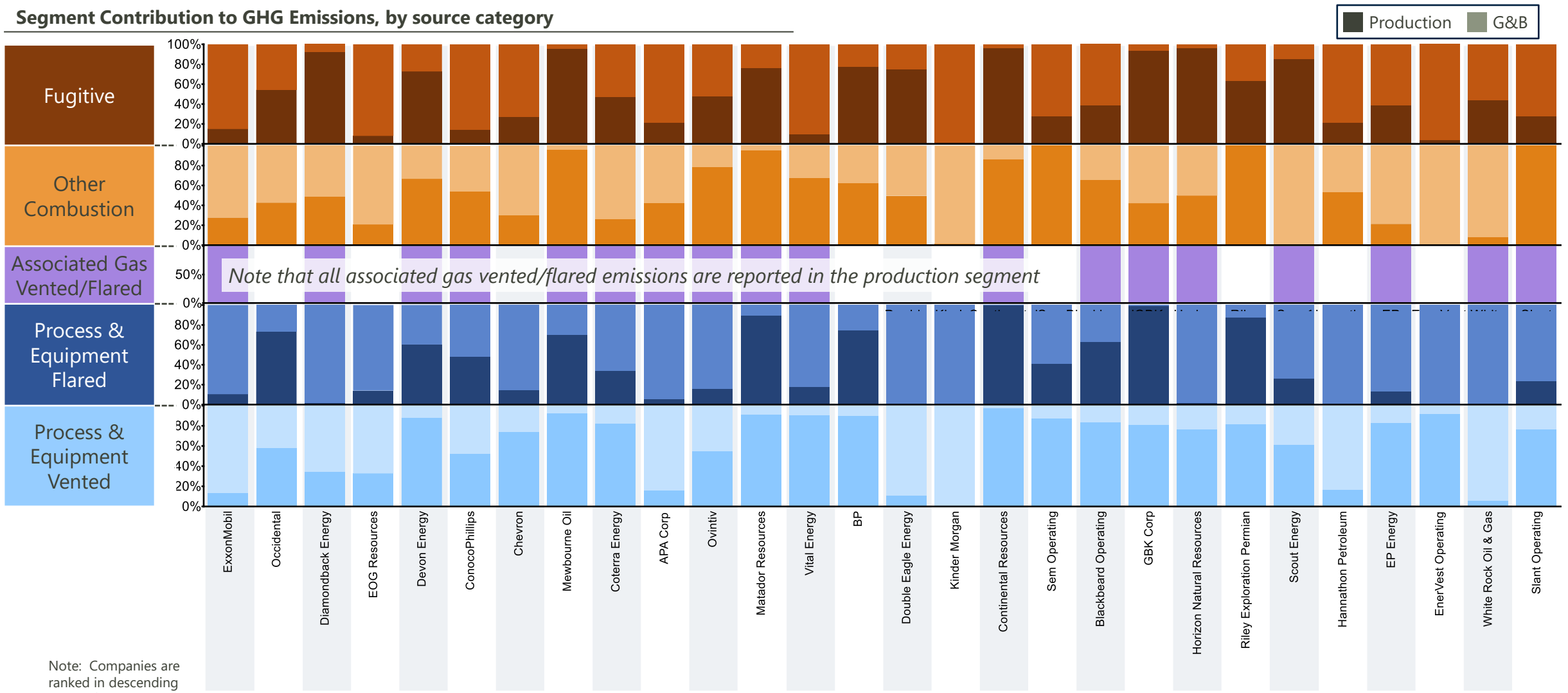


Note: Companies are ranked in descending order of hydrocarbon energy handled (BOE)

Permian Basin Companies

2024 Data

Total GHG Emissions Share, by Source & Segment (100-year GWP)

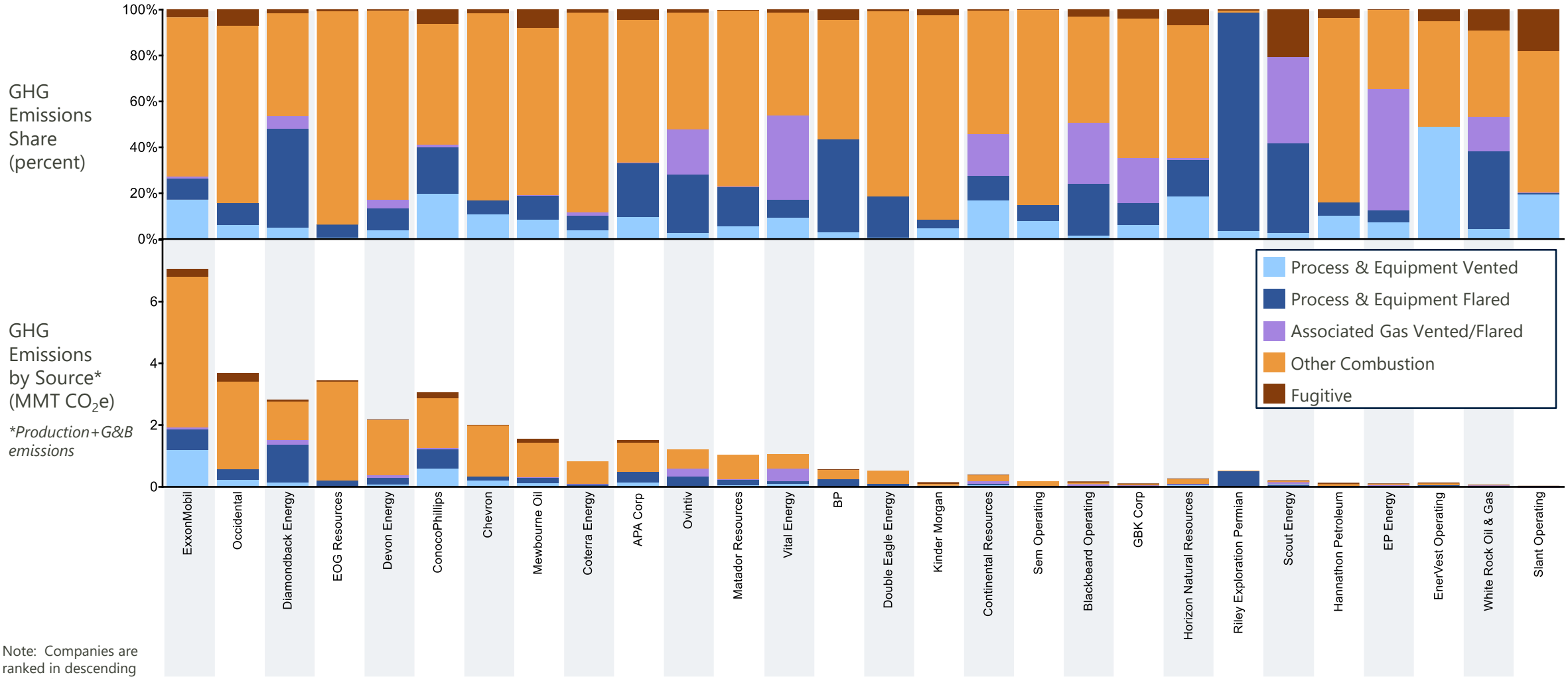


Note: Companies are ranked in descending order of hydrocarbon energy handled (BOE)

Permian Basin Companies

2024 Data

GHG Emissions by Source (100-year GWP)

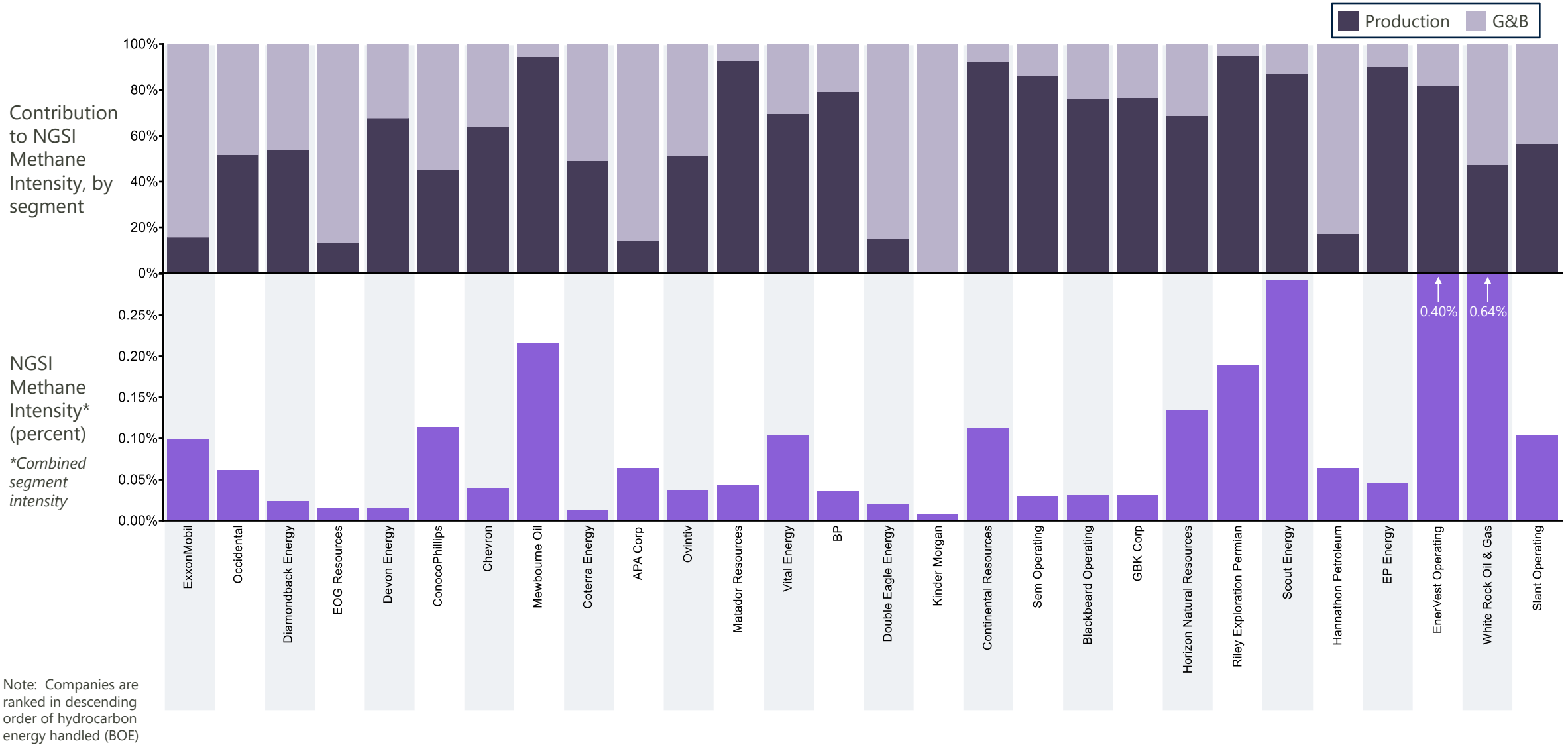


Note: Companies are ranked in descending order of hydrocarbon energy handled (BOE)

Permian Basin Companies

2024 Data

Methane Intensity

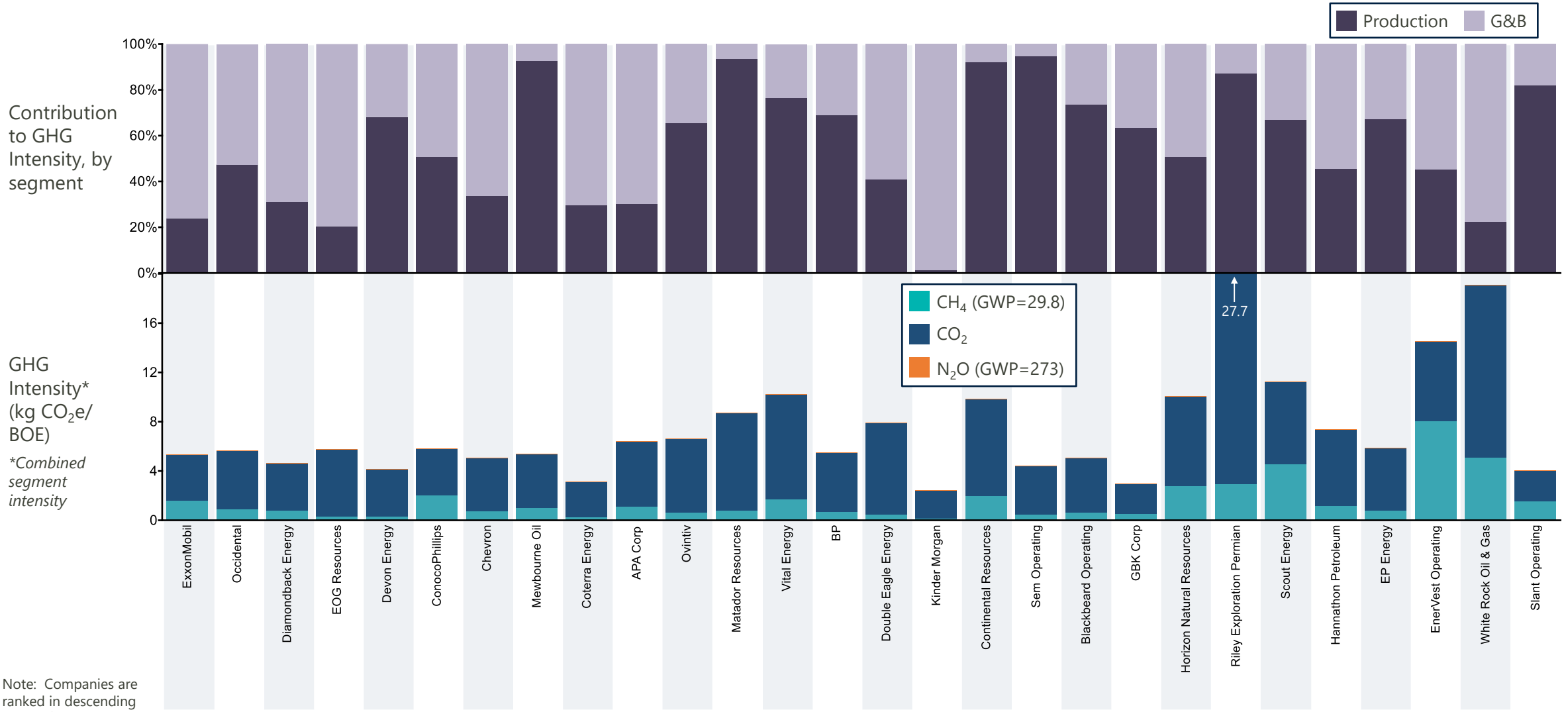


Note: Companies are ranked in descending order of hydrocarbon energy handled (BOE)

Permian Basin Companies

2024 Data

GHG Emissions Intensity (100-year GWP)

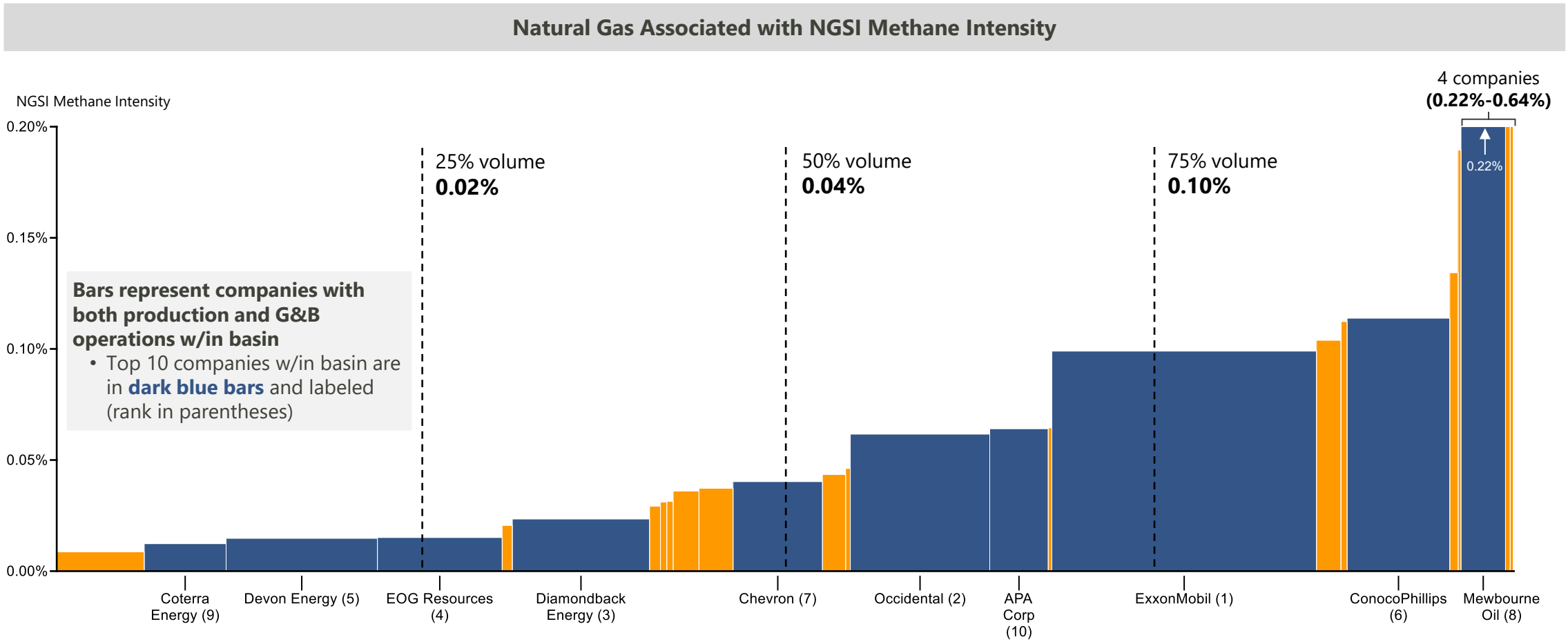


Note: Companies are ranked in descending order of hydrocarbon energy handled (BOE)

Permian Basin Companies

2024 Data

Total GHGRP Natural Gas Volume, by Methane Intensity



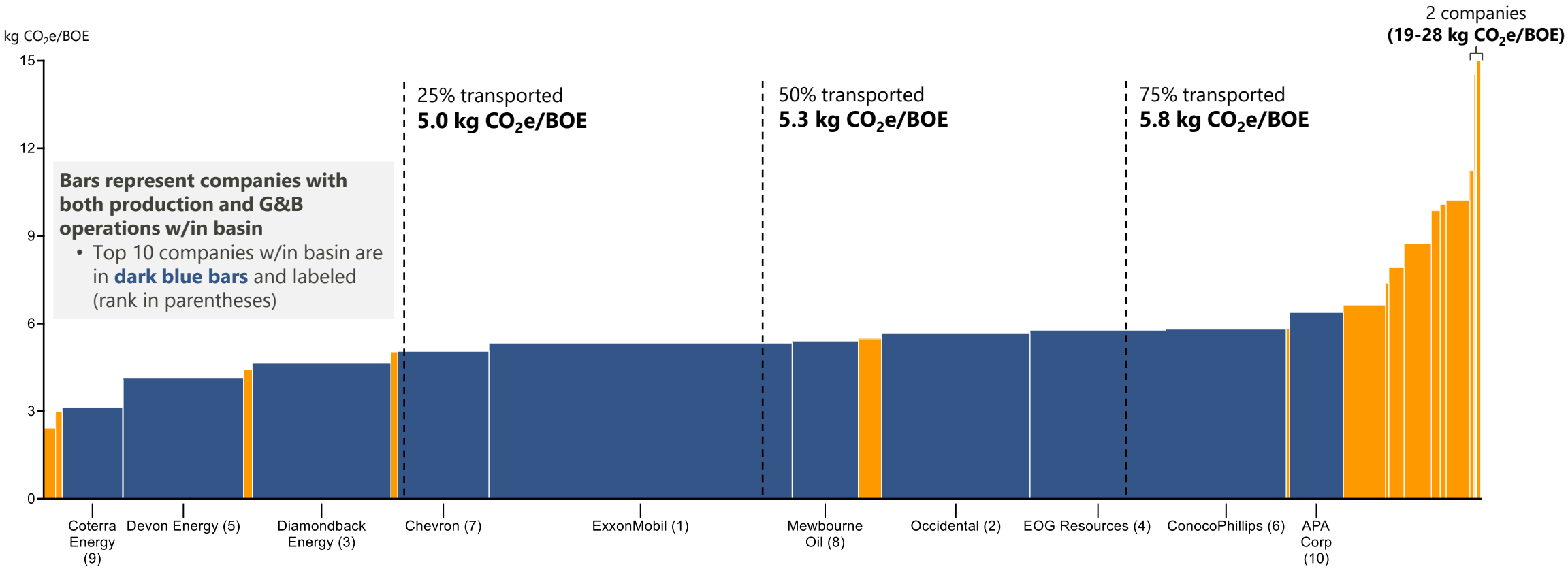
Natural Gas Volume ⟶ Total Gas Volume: 15.0 trillion cubic feet

Permian Basin Companies

2024 Data

Total GHGRP Hydrocarbon Energy, by GHG Intensity

Hydrocarbons Associated with GHG Intensity



Hydrocarbon Energy →

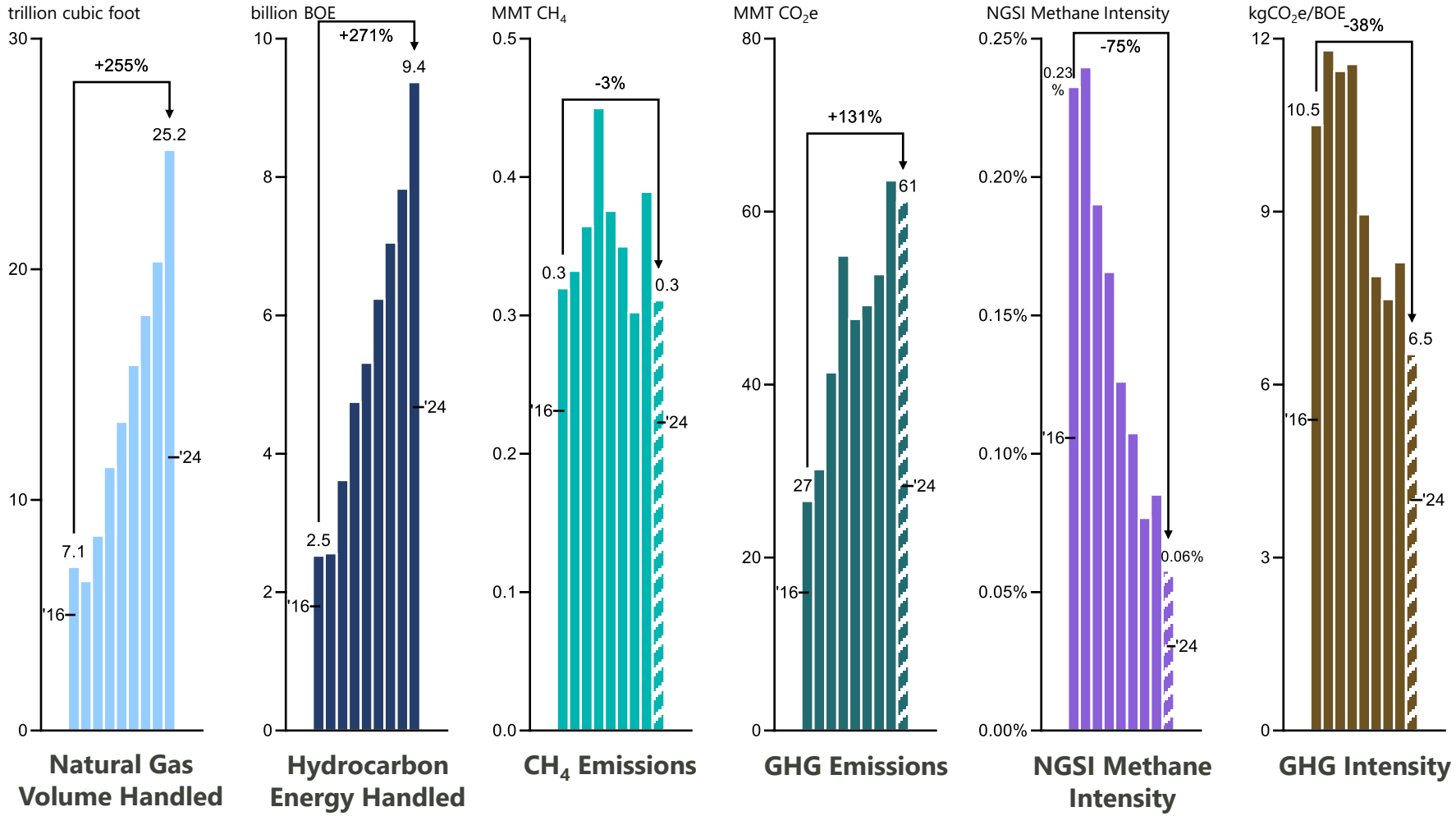
Total Hydrocarbon Energy: 6.28 billion BOE

Permian Basin Companies

2016-2024 Trends Analysis: Throughput & Emissions Metrics

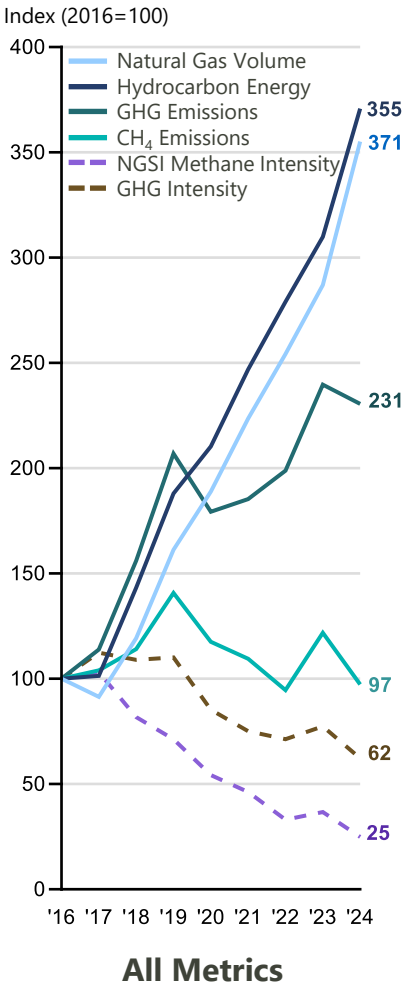
GHGRP Data Trends, 2016-2024

Permian Basin



Combined Data Metrics

Indexed; 2016 = 100

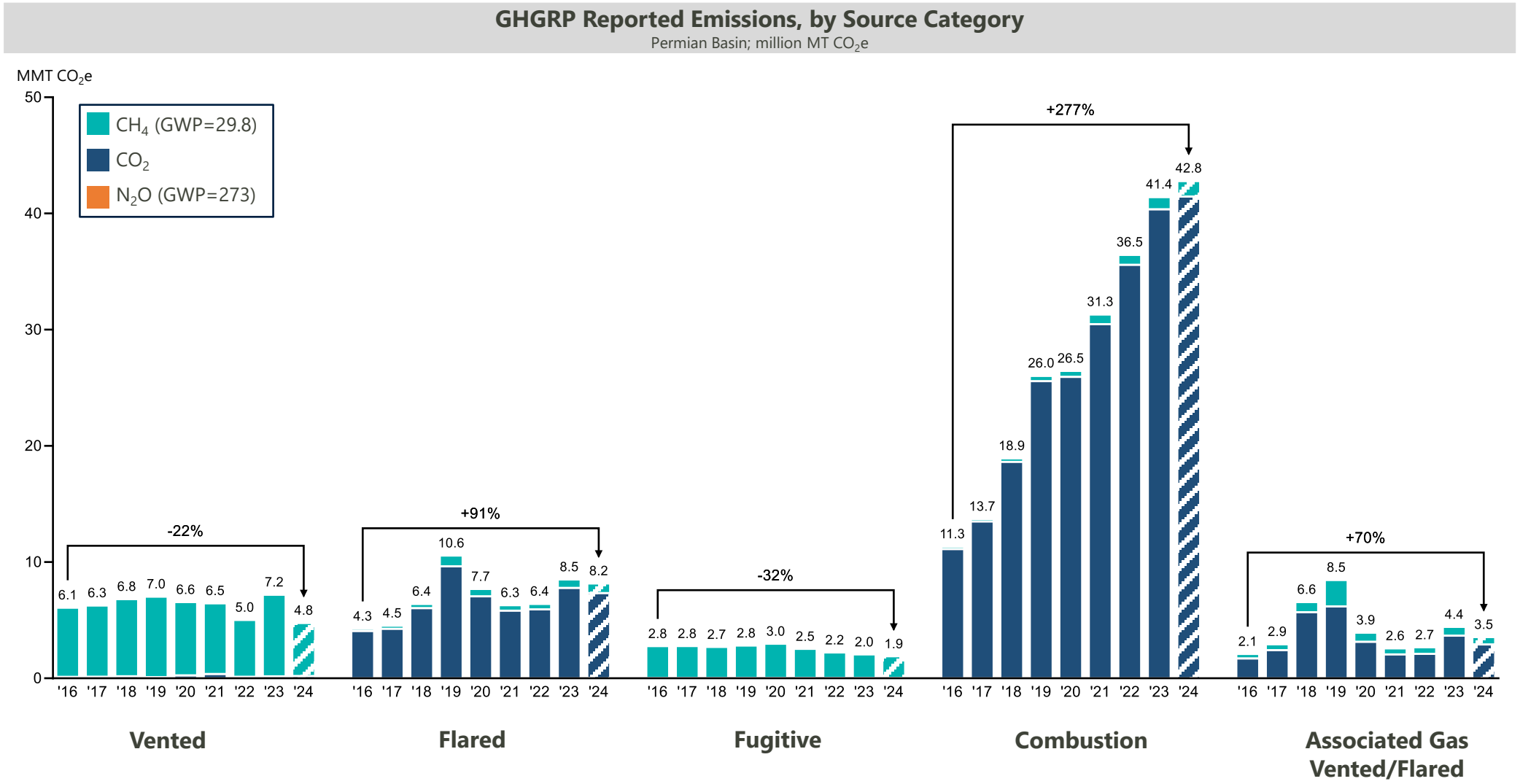


Permian Basin Companies

2016-2024 Trends Analysis: Emissions Sources

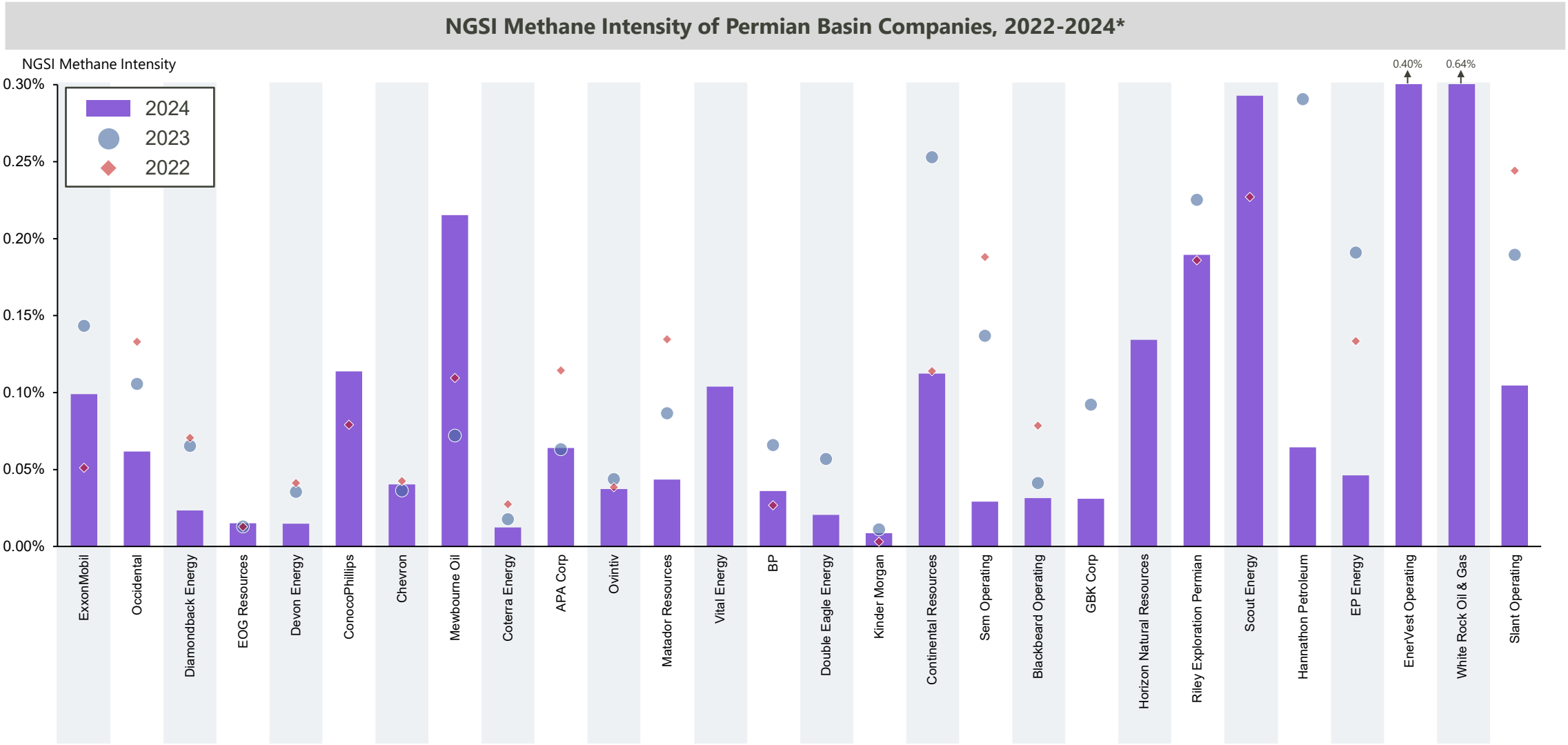
GHG Emissions* (MMT CO_2e)

**Production+G&B emissions*



Permian Basin Companies

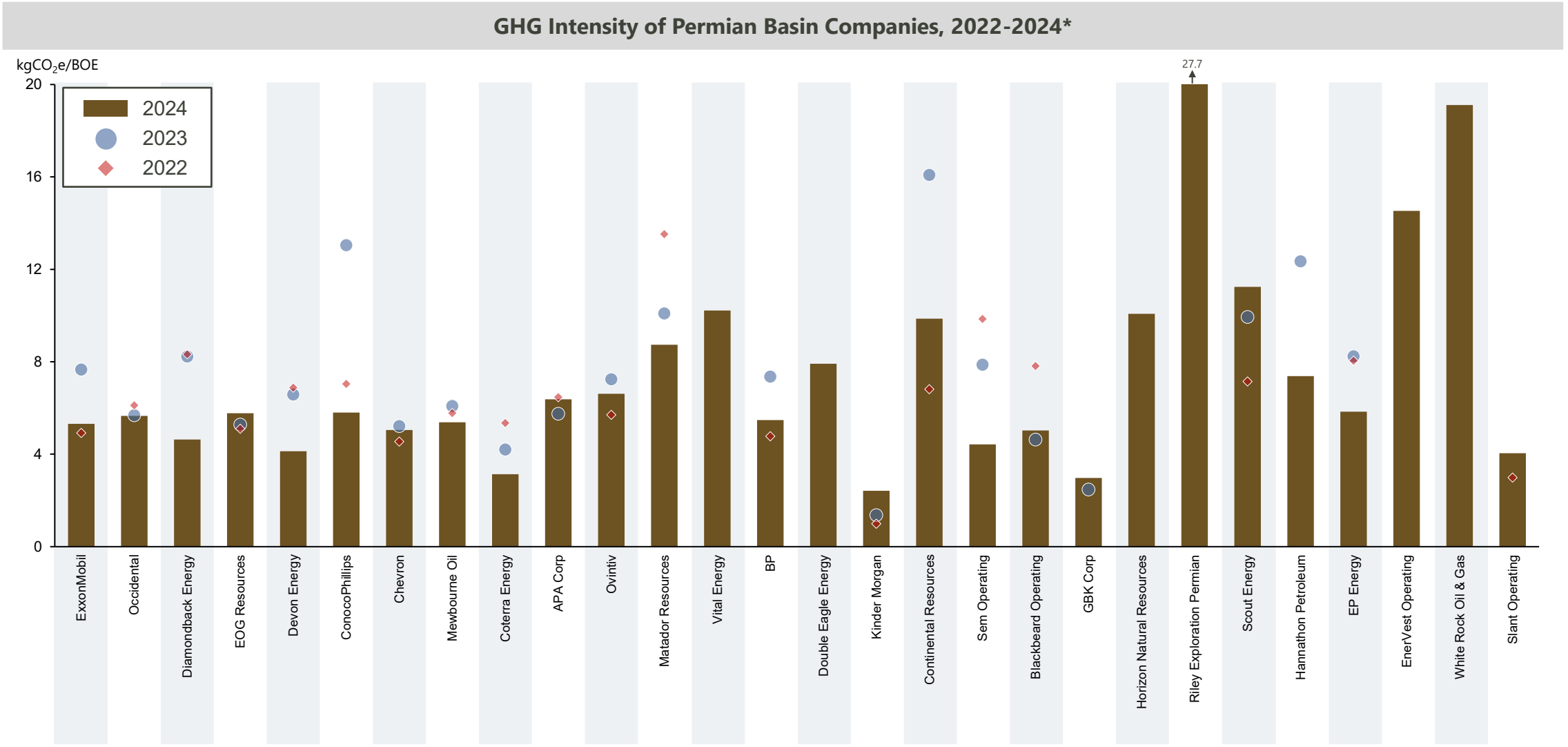
2022-2024 Trends Analysis: Change in Methane Intensity



*Note that some companies in 2024 were not in the EPA database for all three years and may not have data for 2022 and/or 2023.

Permian Basin Companies

2022-2024 Trends Analysis: Change in GHG Intensity

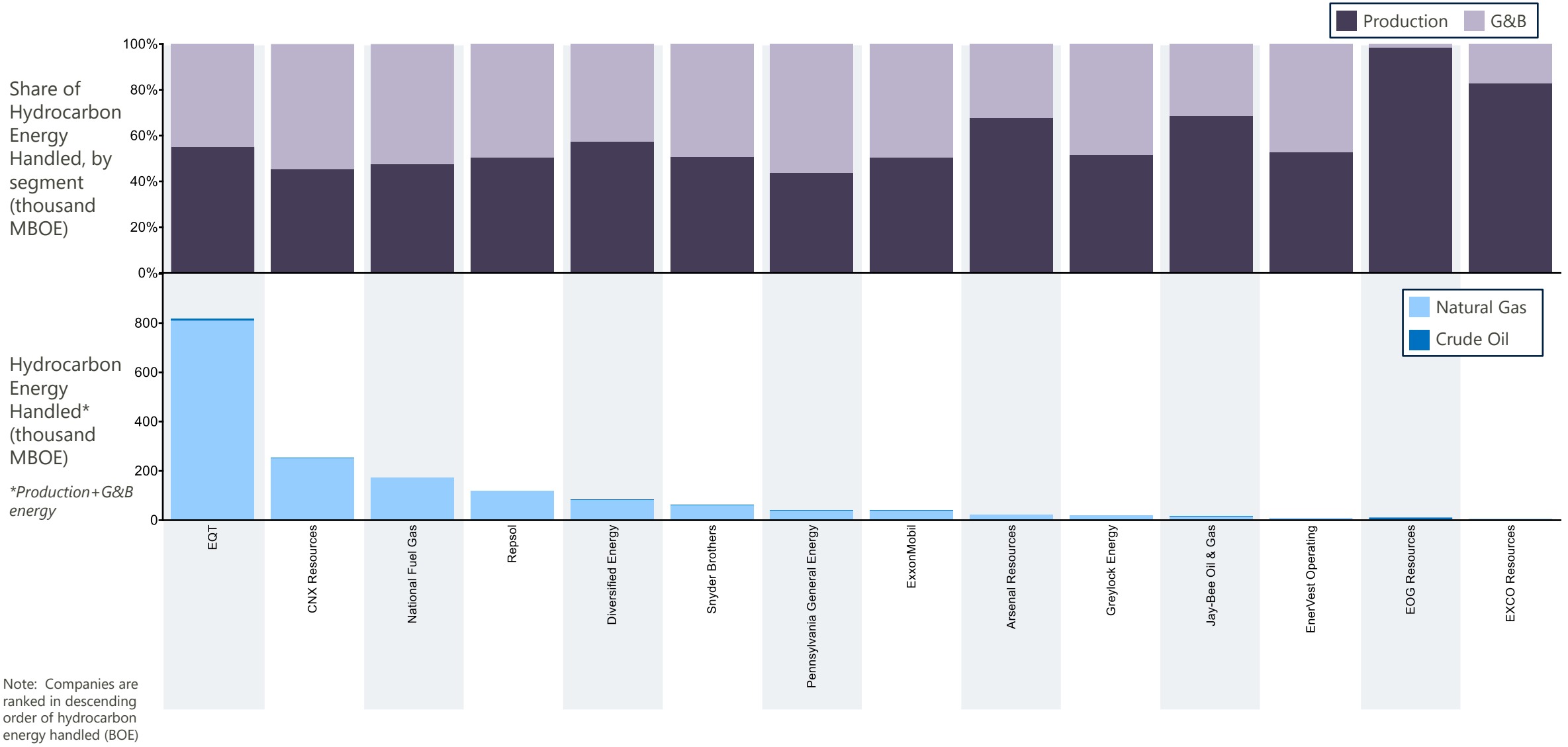


*Note that some companies in 2024 were not in the EPA database for all three years and may not have data for 2022 and/or 2023.

Appalachian Basin Companies

2024 Data

Total Hydrocarbon Energy Handled

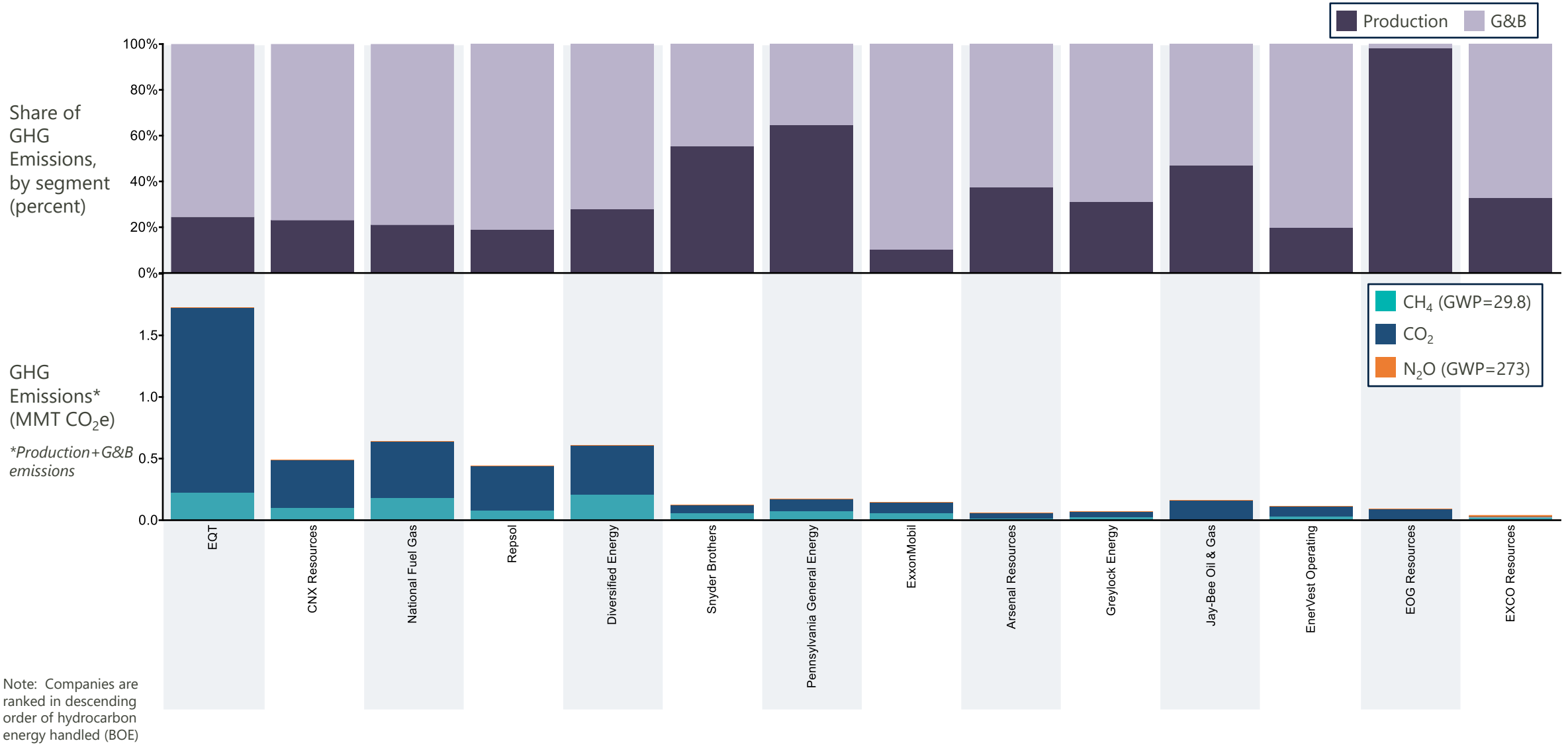


Note: Companies are ranked in descending order of hydrocarbon energy handled (BOE)

Appalachian Basin Companies

2024 Data

Total GHG Emissions (100-year GWP)

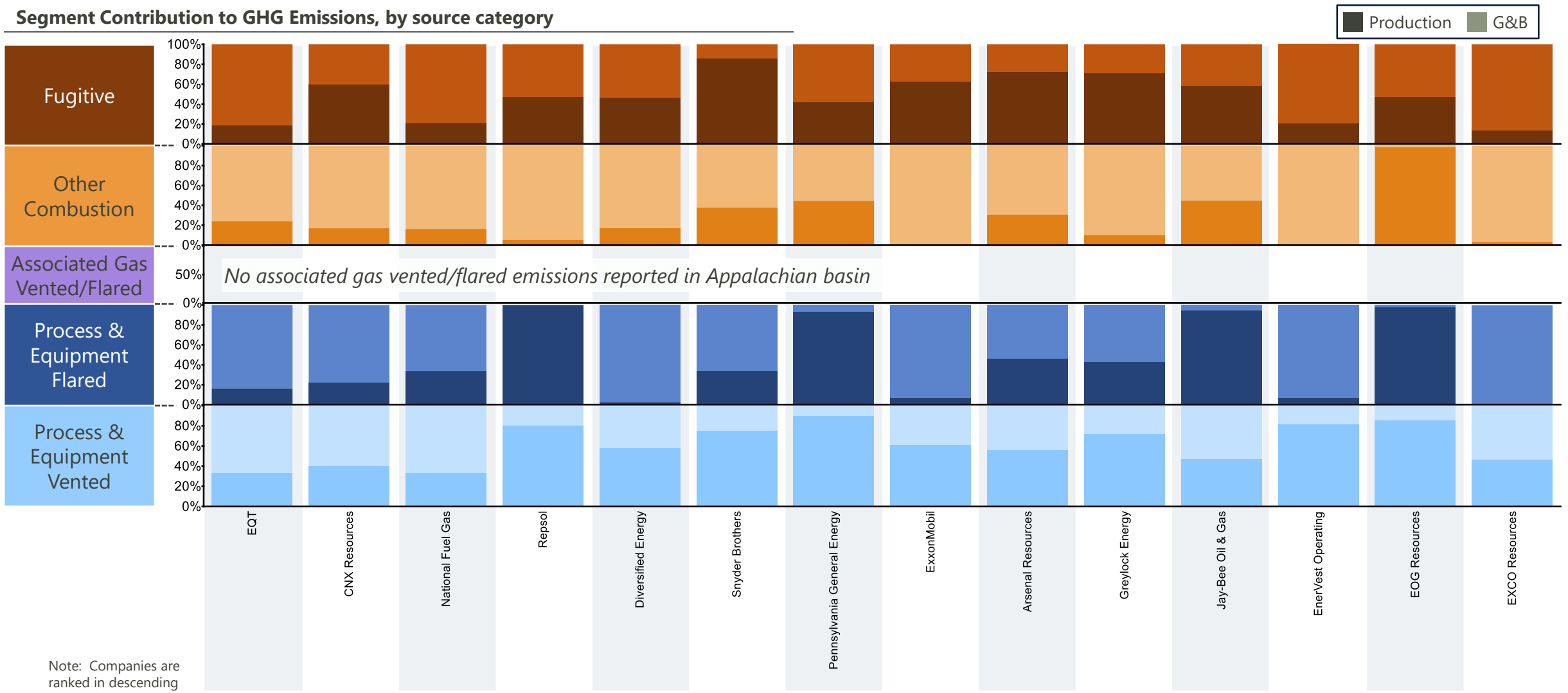


Note: Companies are ranked in descending order of hydrocarbon energy handled (BOE)

Appalachian Basin Companies

2024 Data

Total GHG Emissions Share, by Source & Segment (100-year GWP)

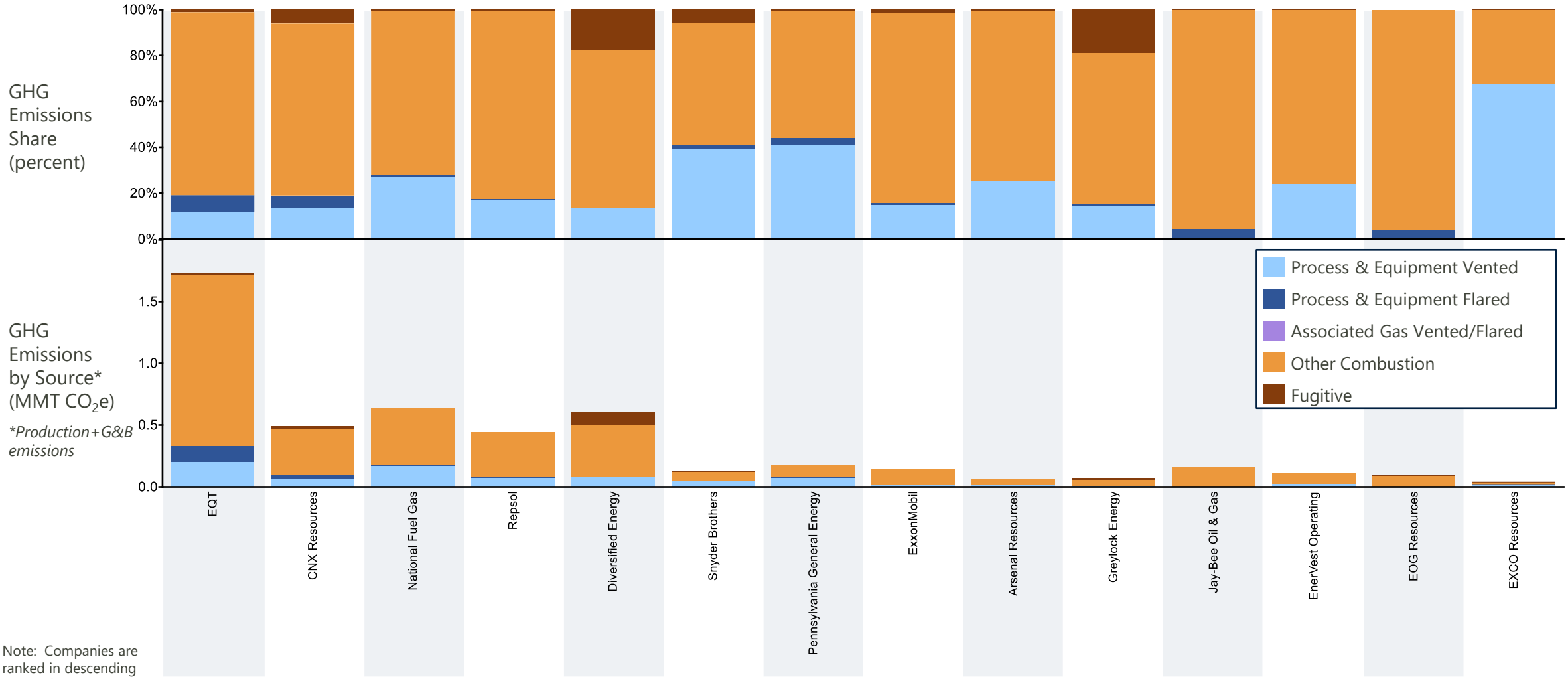


Note: Companies are ranked in descending order of hydrocarbon energy handled (BOE)

Appalachian Basin Companies

2024 Data

GHG Emissions by Source (100-year GWP)

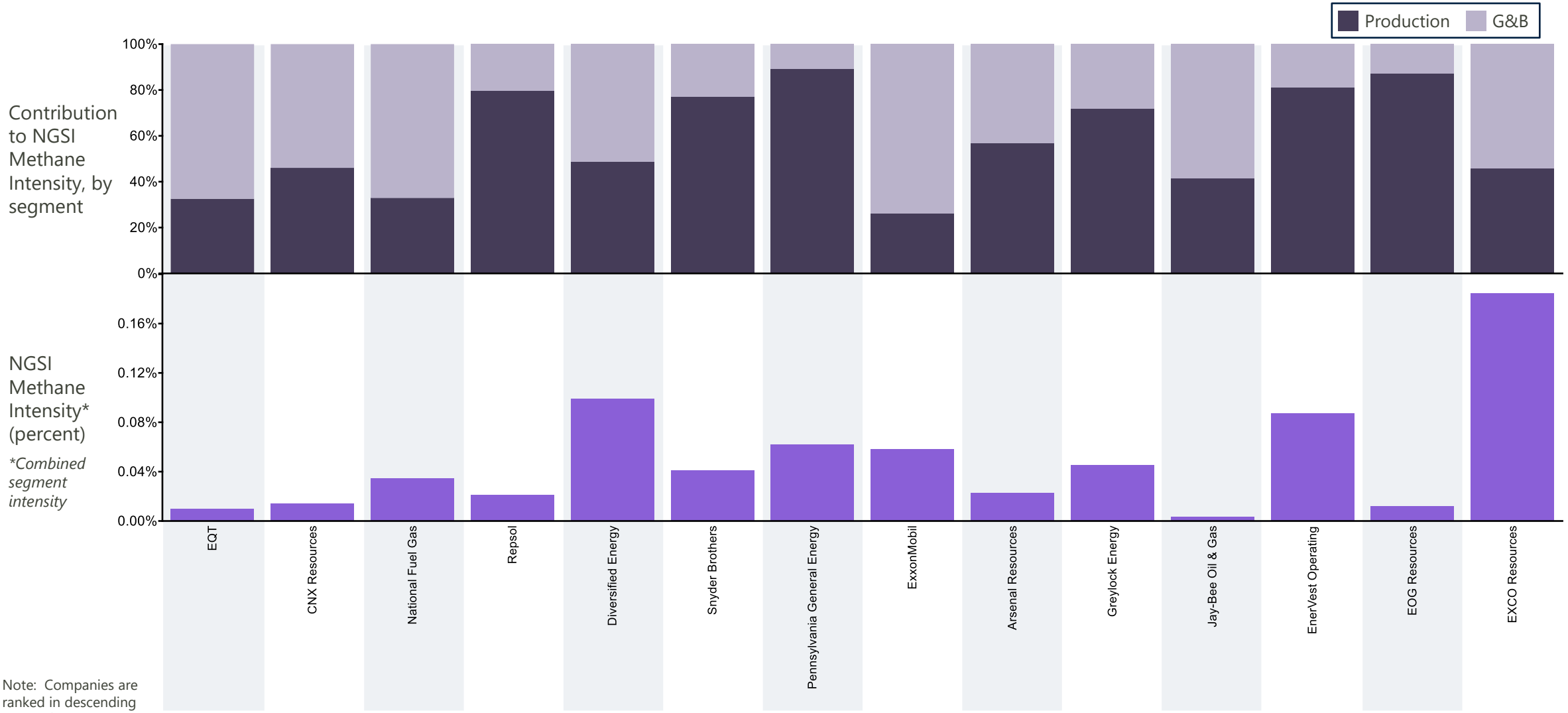


Note: Companies are ranked in descending order of hydrocarbon energy handled (BOE)

Appalachian Basin Companies

2024 Data

Methane Intensity

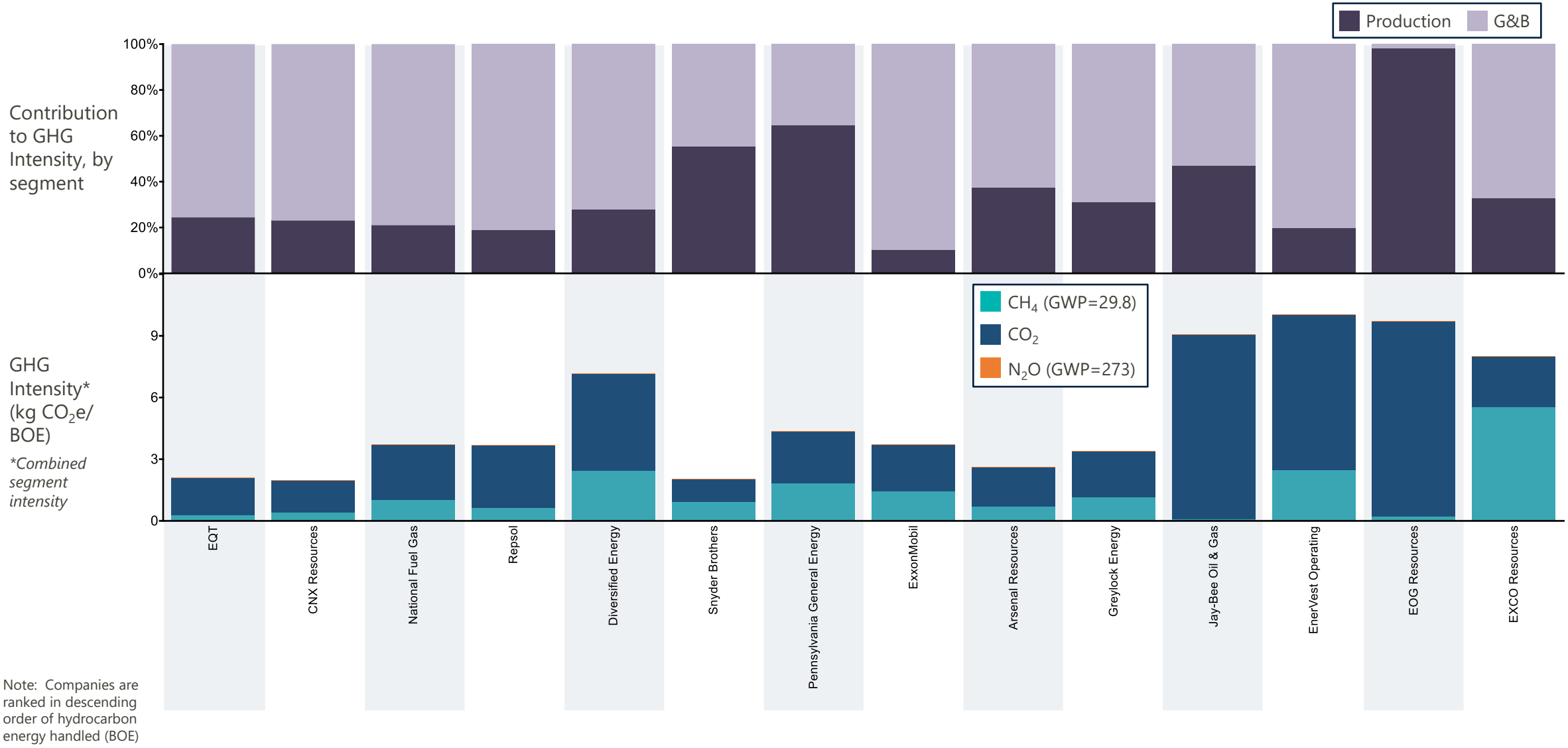


Note: Companies are ranked in descending order of hydrocarbon energy handled (BOE)

Appalachian Basin Companies

2024 Data

GHG Emissions Intensity (100-year GWP)



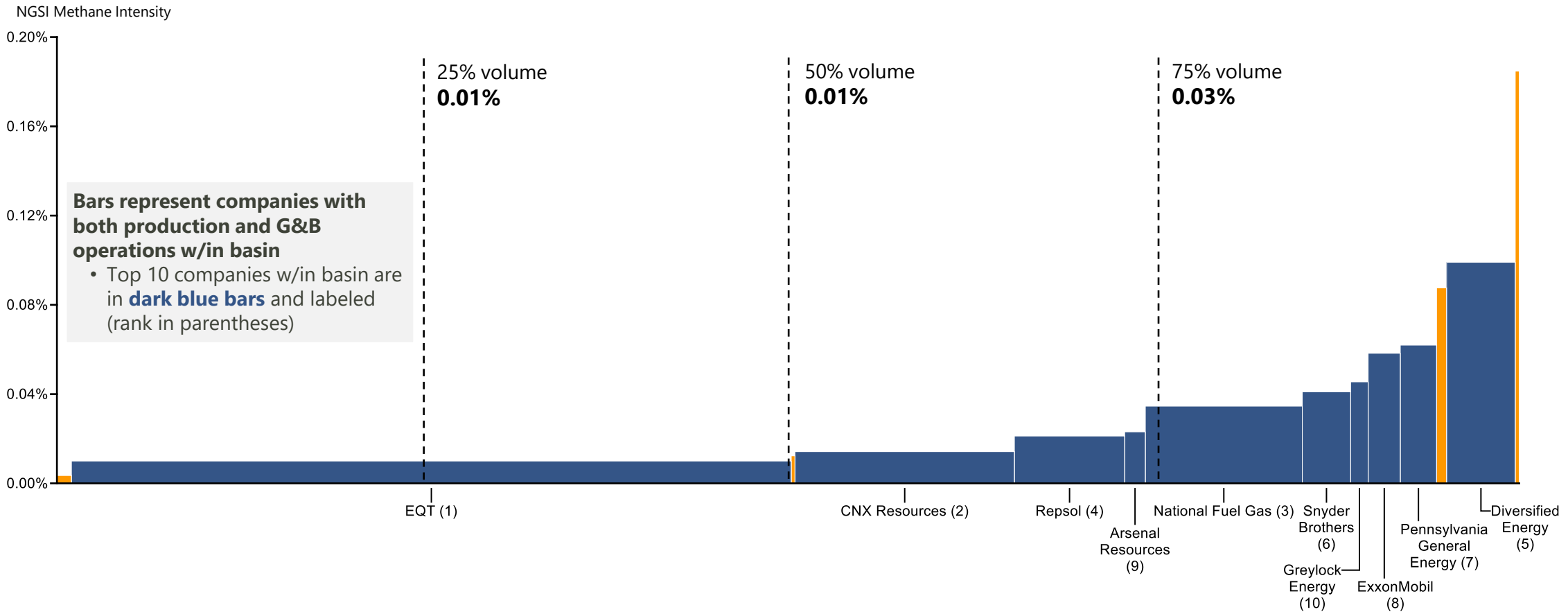
Note: Companies are ranked in descending order of hydrocarbon energy handled (BOE)

Appalachian Basin Companies

2024 Data

Total GHGRP Natural Gas Volume, by Methane Intensity

Natural Gas Associated with NGSI Methane Intensity



Natural Gas Volume ⟶

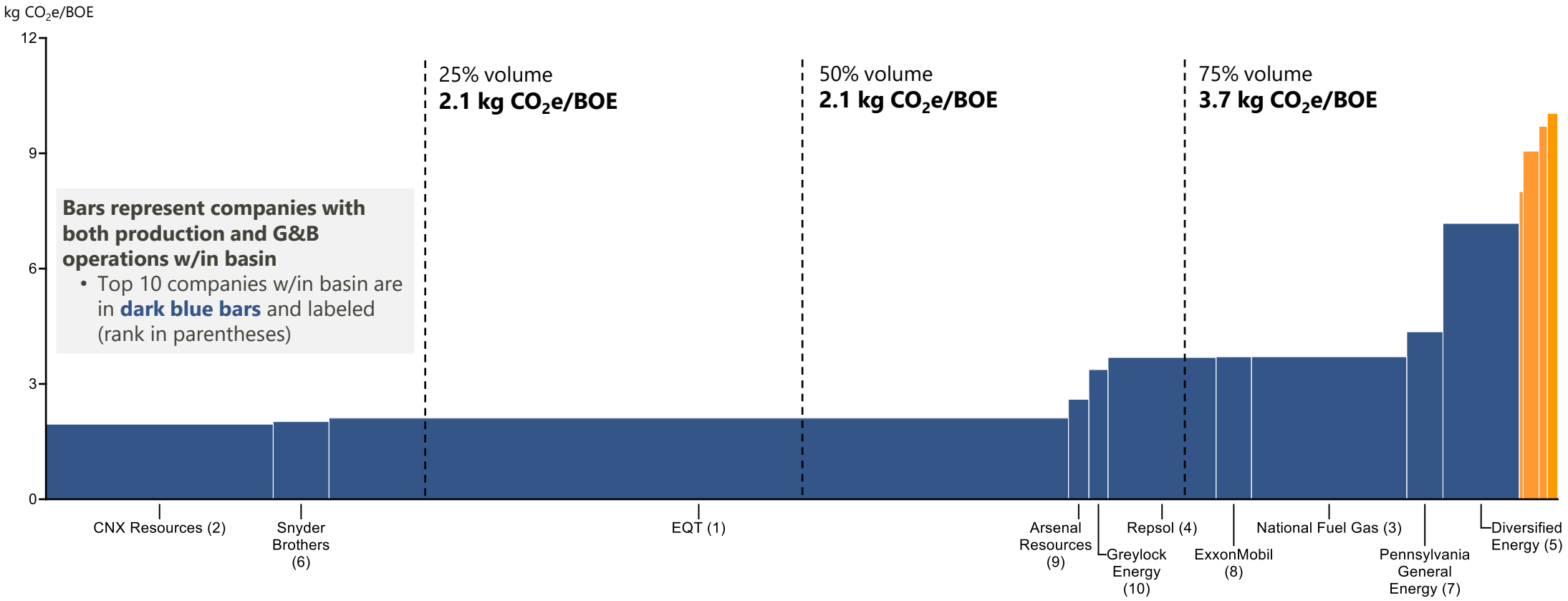
Total Gas Volume: 8.6 trillion cubic feet

Appalachian Basin Companies

2024 Data

Total GHGRP Hydrocarbon Energy, by GHG Intensity

Hydrocarbons Associated with GHG Intensity



Hydrocarbon Energy ⟶

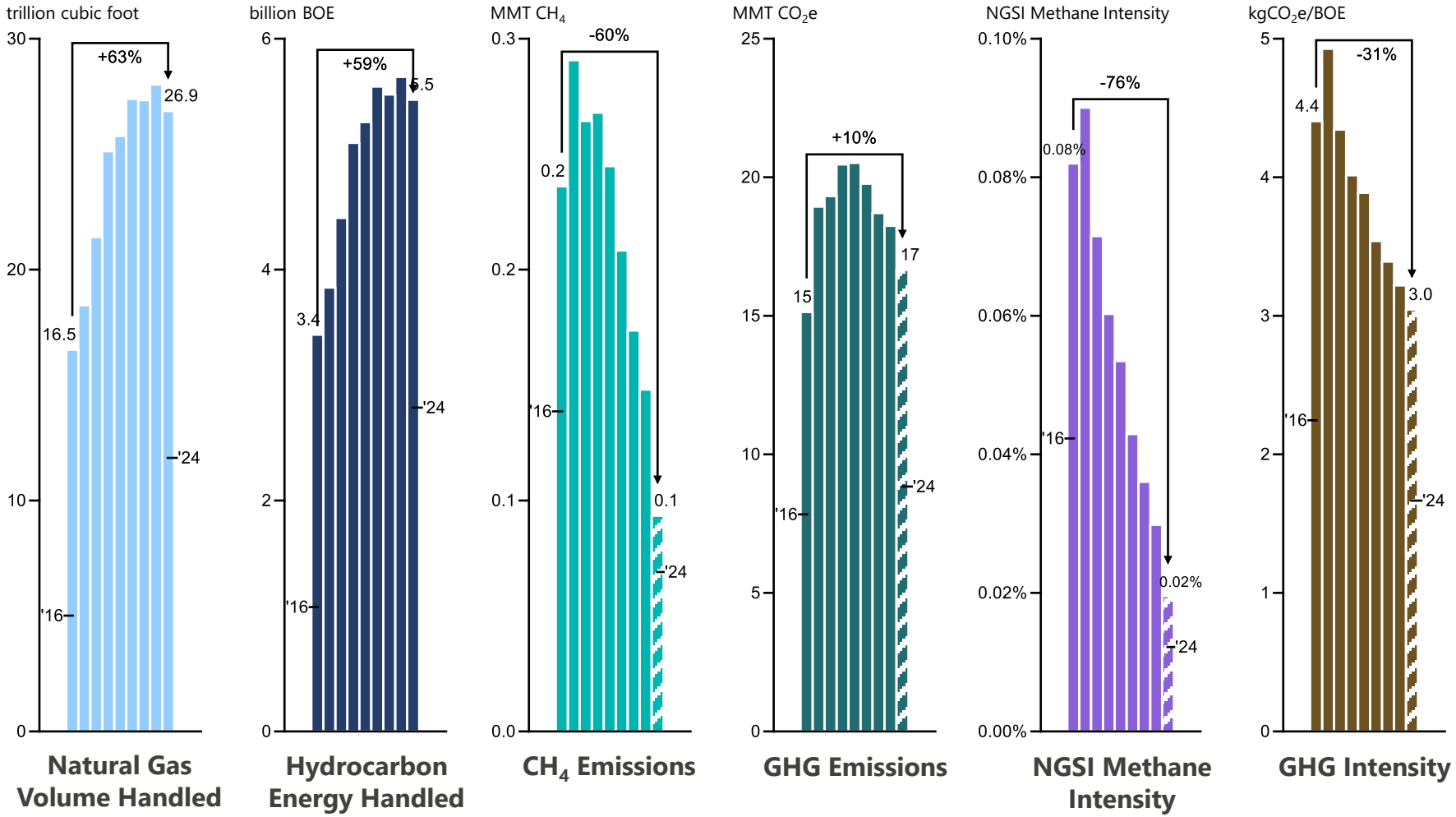
Total Hydrocarbon Energy: 1.67 billion BOE

Appalachian Basin Companies

2016-2024 Trends Analysis: Throughput & Emissions Metrics

GHGRP Data Trends, 2016-2024

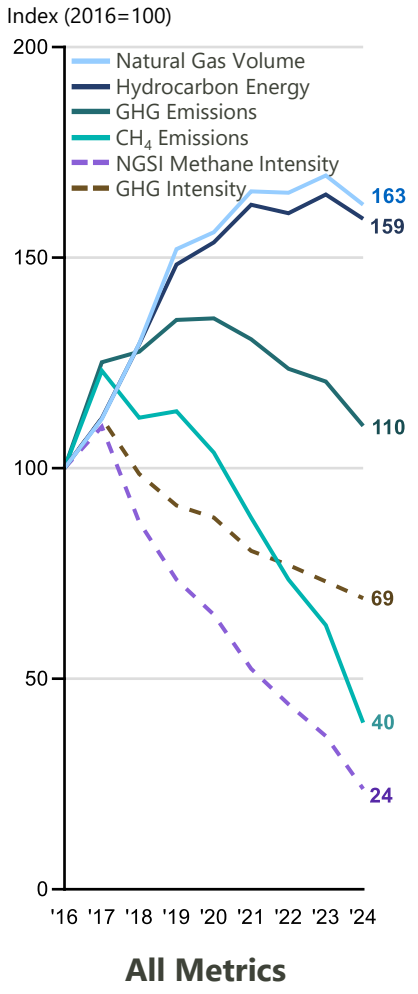
Appalachian Basin



Natural Gas Volume Handled | **Hydrocarbon Energy Handled** | **CH_4 Emissions** | **GHG Emissions** | **NGSI Methane Intensity** | **GHG Intensity**

Combined Data Metrics

Indexed; 2016 = 100



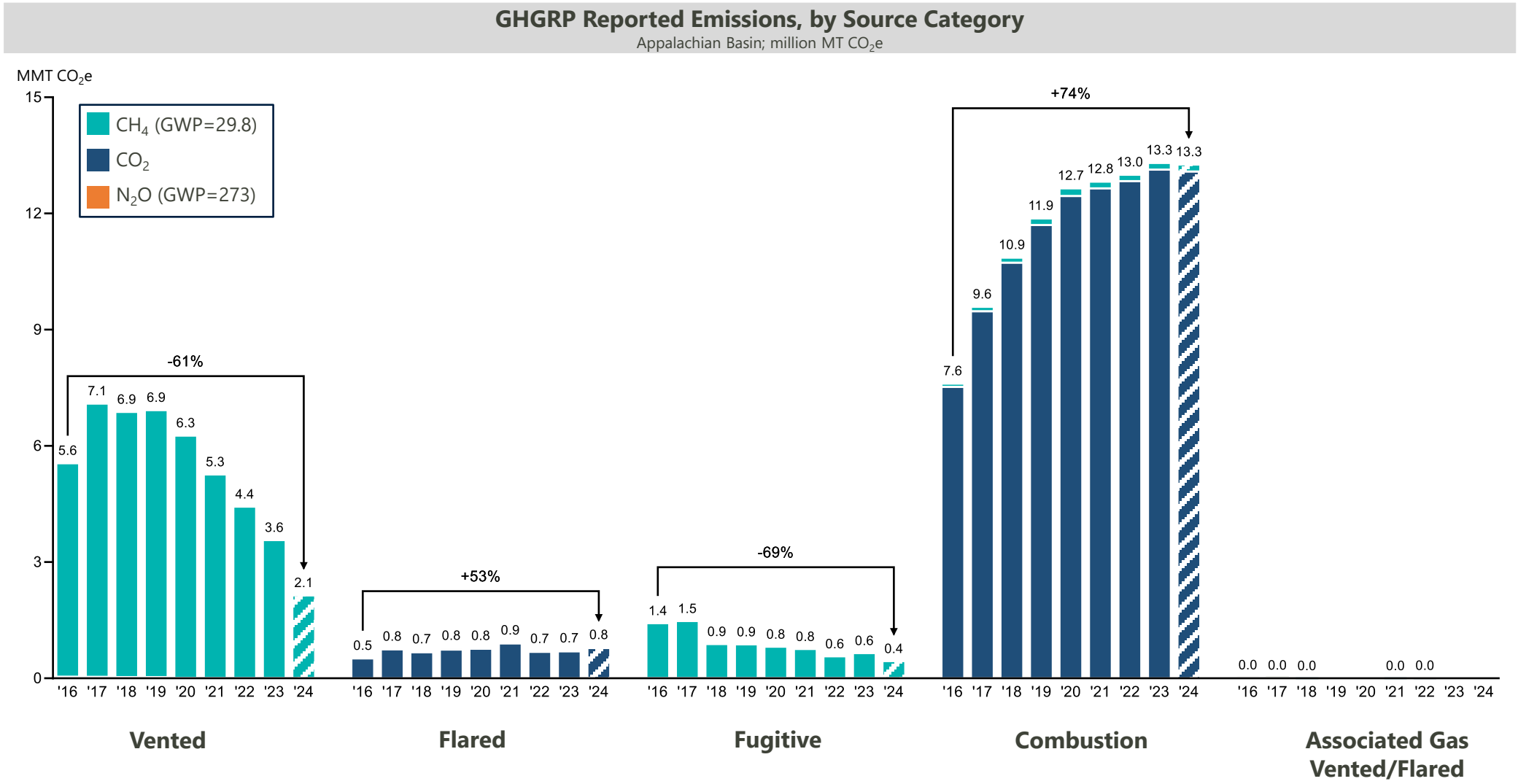
All Metrics

Appalachian Basin Companies

2016-2024 Trends Analysis: Emissions Sources

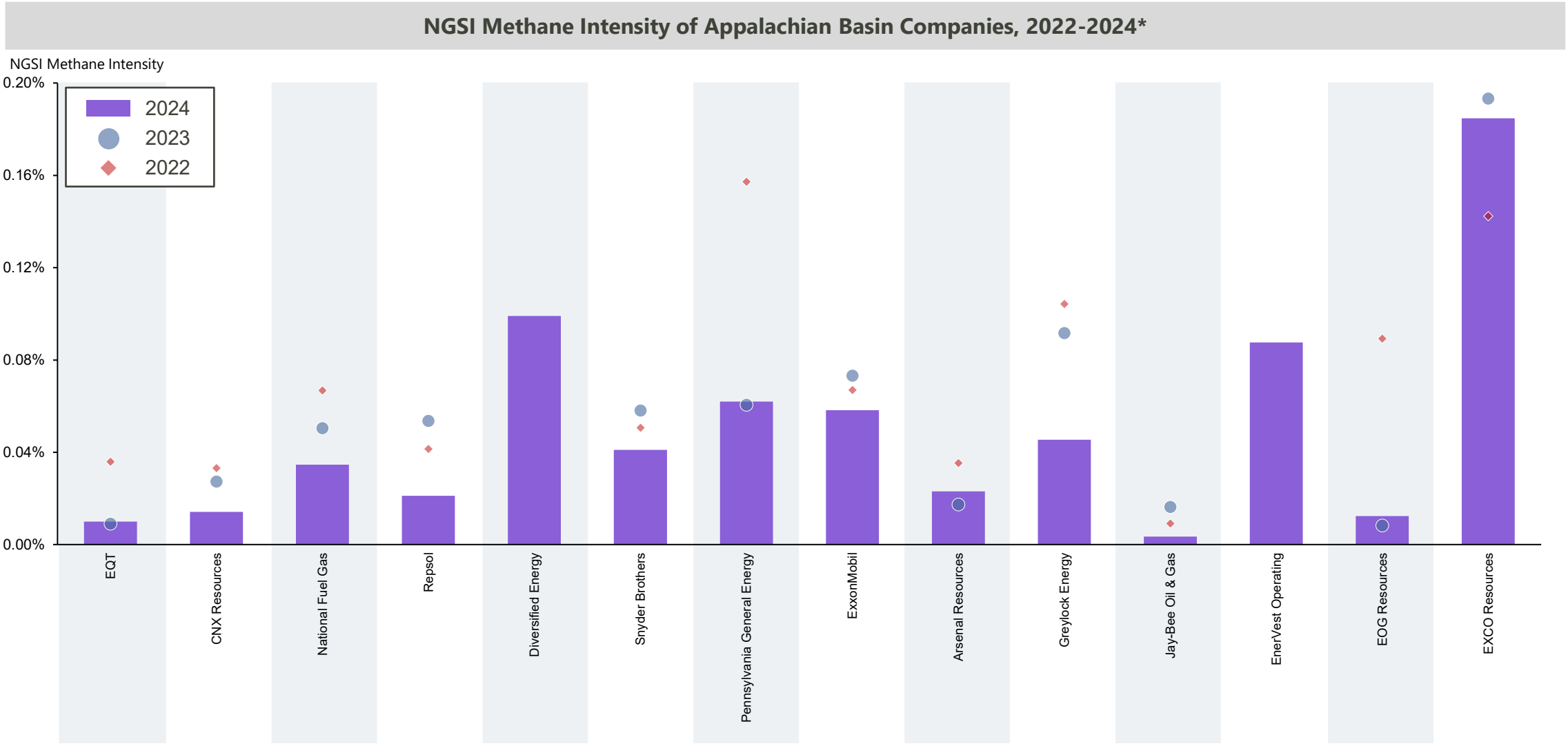
GHG Emissions* (MMT CO_2e)

**Production+G&B emissions*



Appalachian Basin Companies

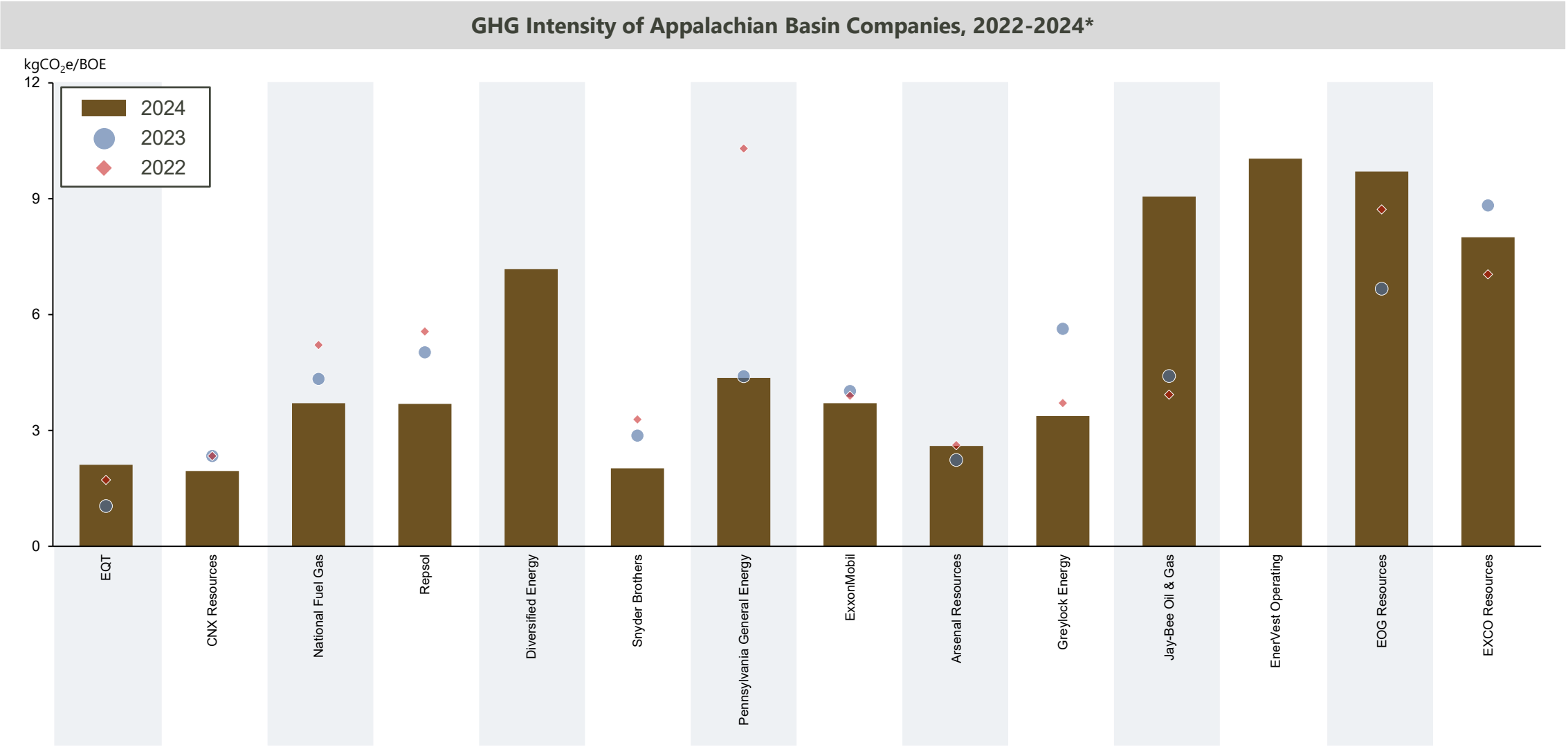
2022-2024 Trends Analysis: Change in Methane Intensity



*Note that some companies in 2024 were not in the EPA database for all three years and may not have data for 2022 and/or 2023.

Appalachian Basin Companies

2022-2024 Trends Analysis: Change in GHG Intensity

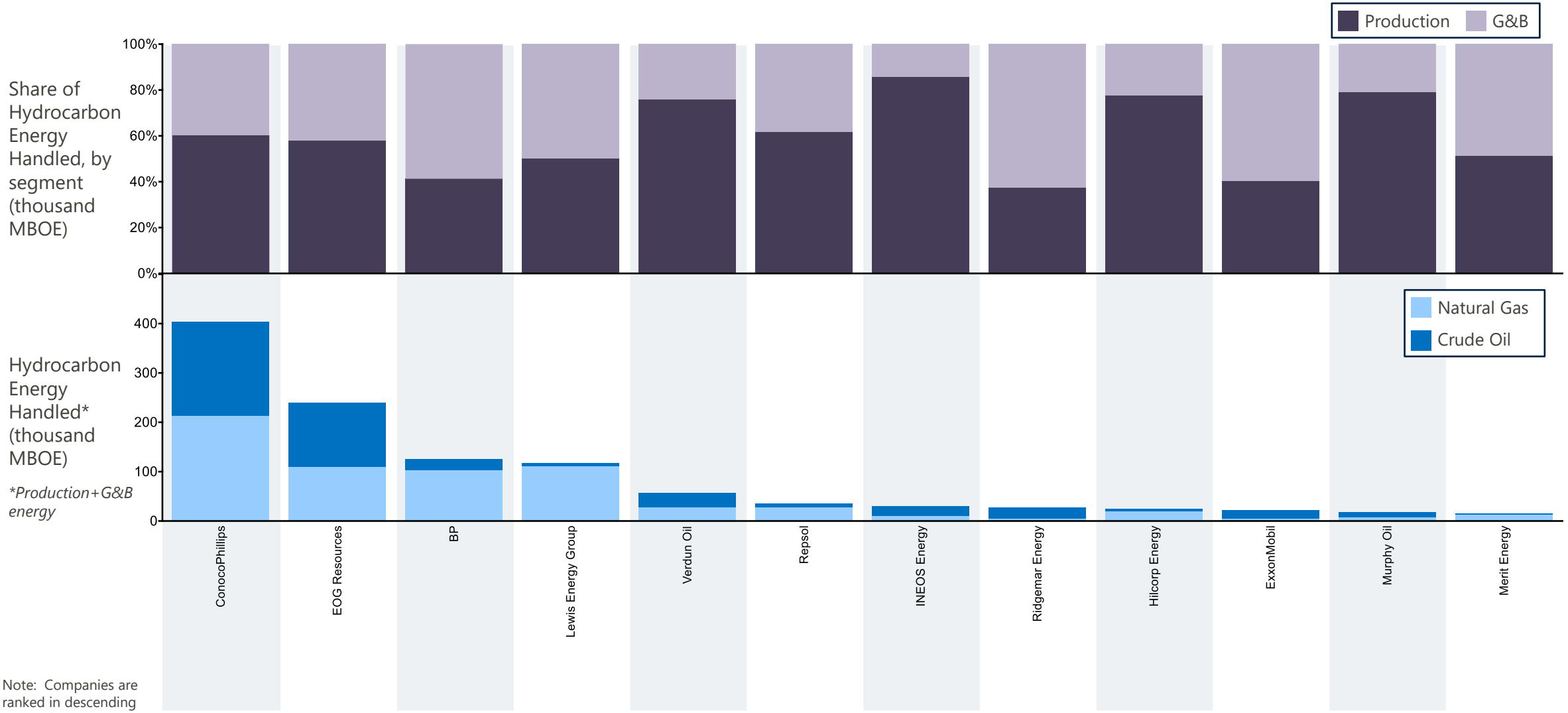


*Note that some companies in 2024 were not in the EPA database for all three years and may not have data for 2022 and/or 2023.

Gulf Coast Basin Companies

2024 Data

Total Hydrocarbon Energy Handled

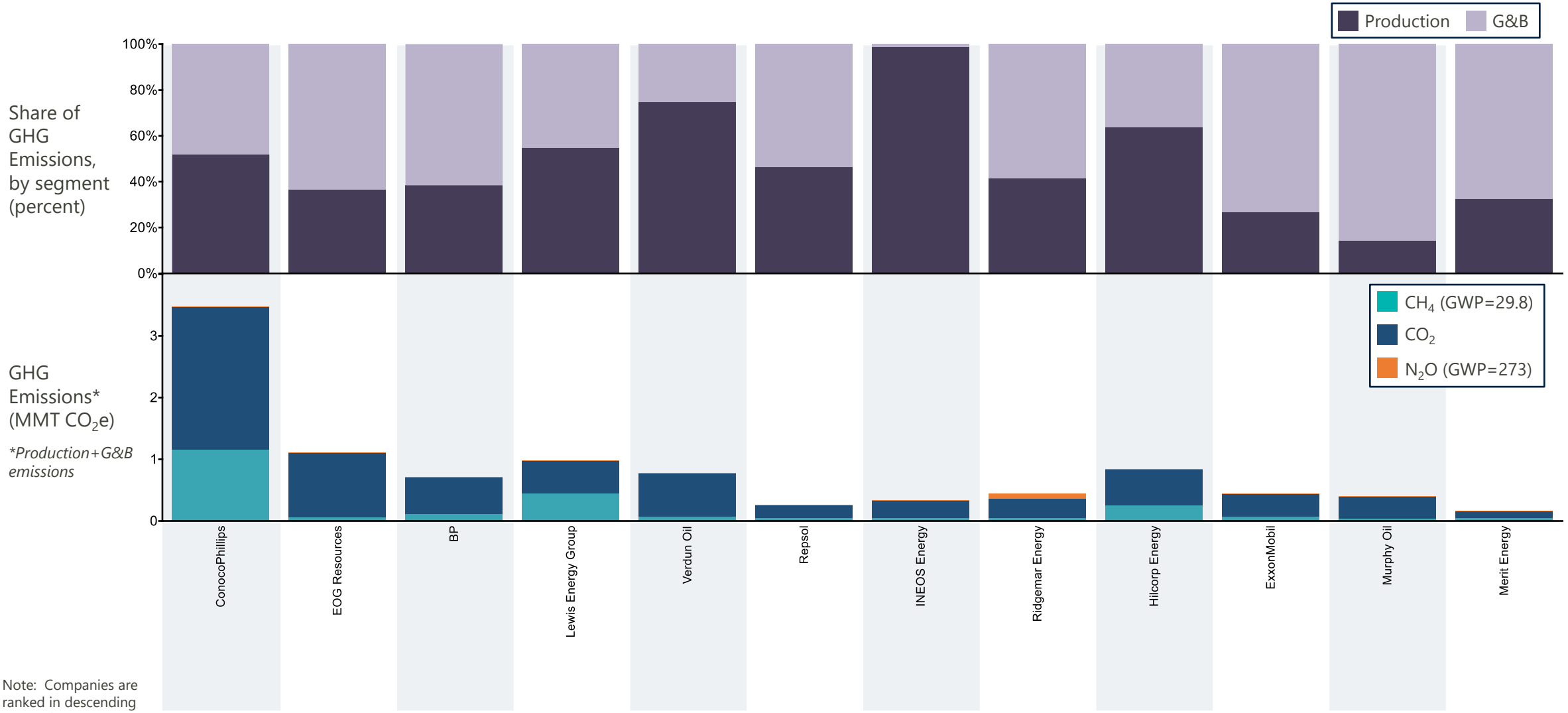


Note: Companies are ranked in descending order of hydrocarbon energy handled (BOE)

Gulf Coast Basin Companies

2024 Data

Total GHG Emissions (100-year GWP)

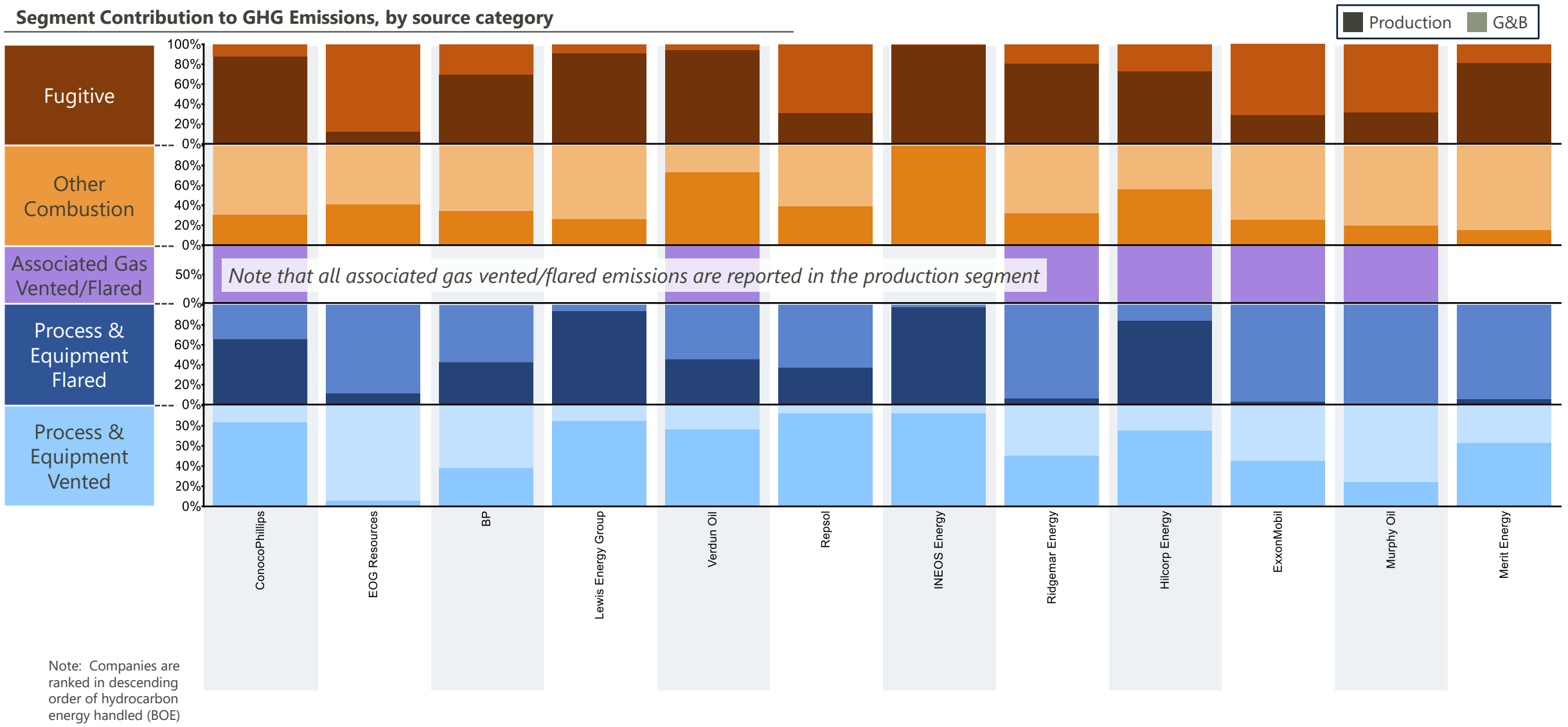


Note: Companies are ranked in descending order of hydrocarbon energy handled (BOE)

Gulf Coast Basin Companies

2024 Data

Total GHG Emissions Share, by Source & Segment (100-year GWP)

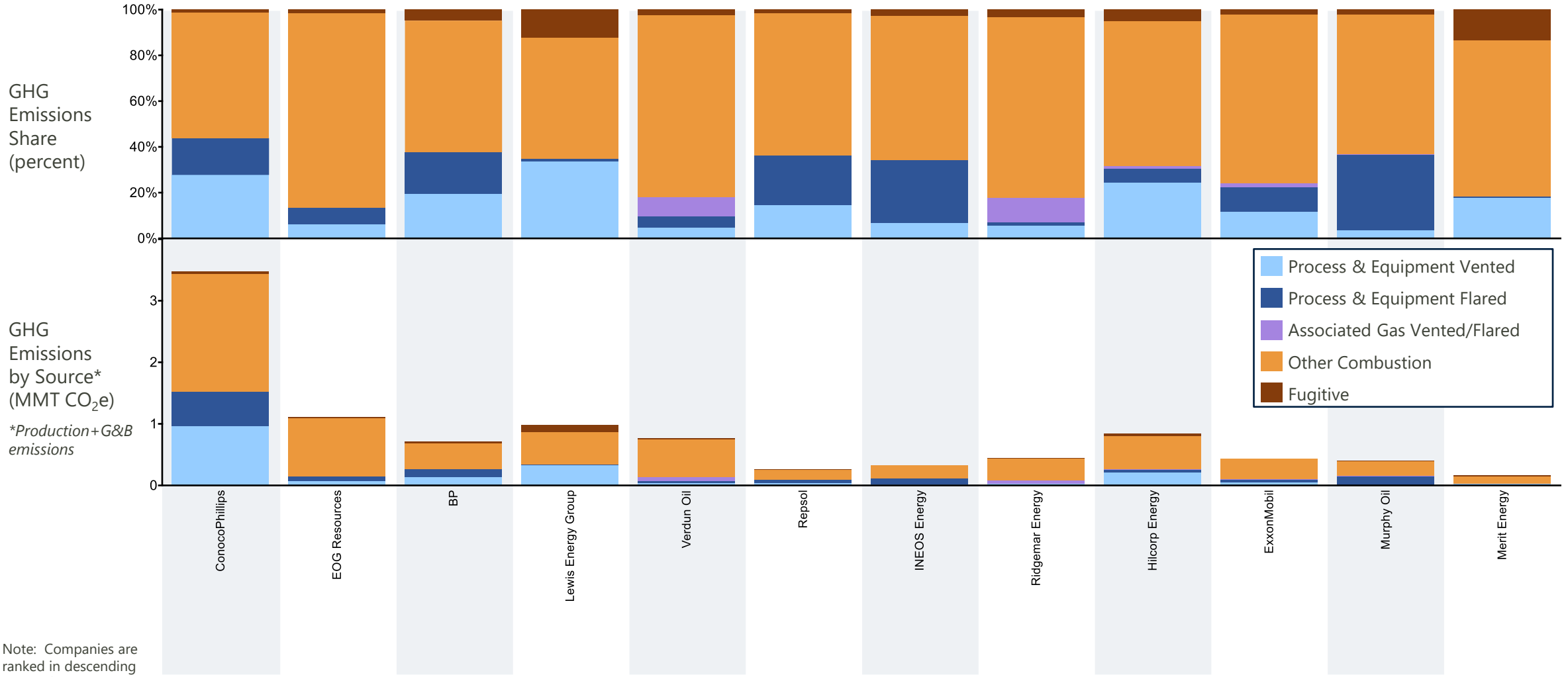


Note: Companies are ranked in descending order of hydrocarbon energy handled (BOE)

Gulf Coast Basin Companies

2024 Data

GHG Emissions by Source (100-year GWP)

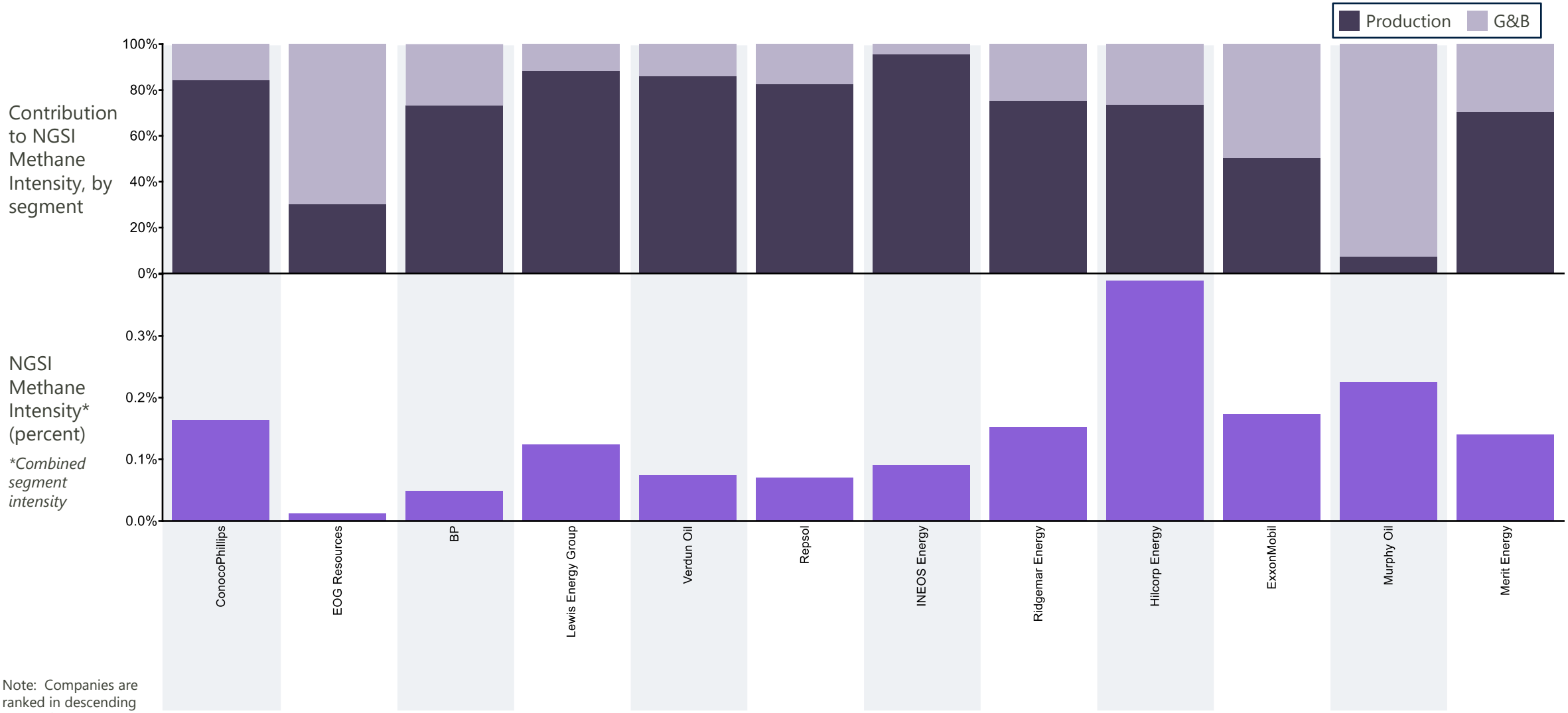


Note: Companies are ranked in descending order of hydrocarbon energy handled (BOE)

Gulf Coast Basin Companies

2024 Data

Methane Intensity

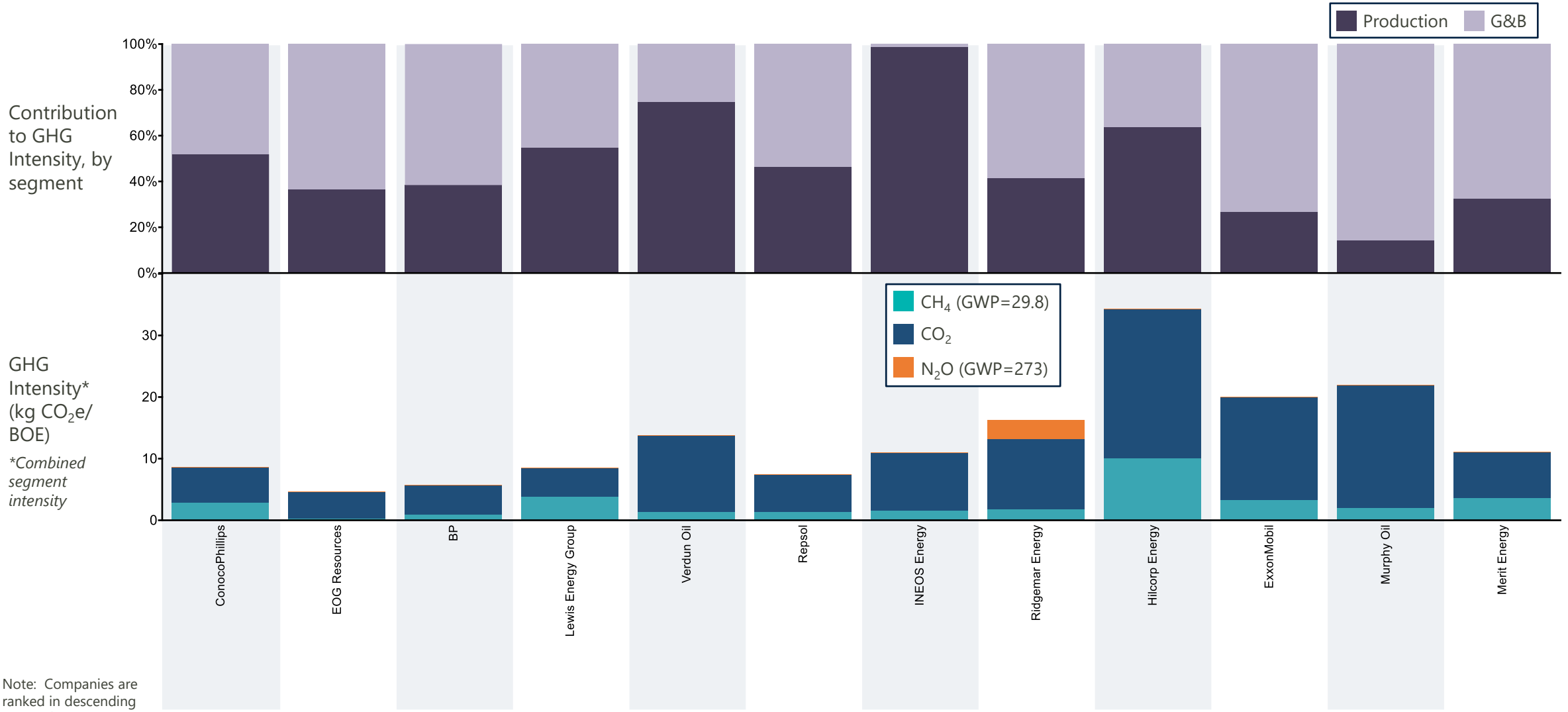


Note: Companies are ranked in descending order of hydrocarbon energy handled (BOE)

Gulf Coast Basin Companies

2024 Data

GHG Emissions Intensity (100-year GWP)



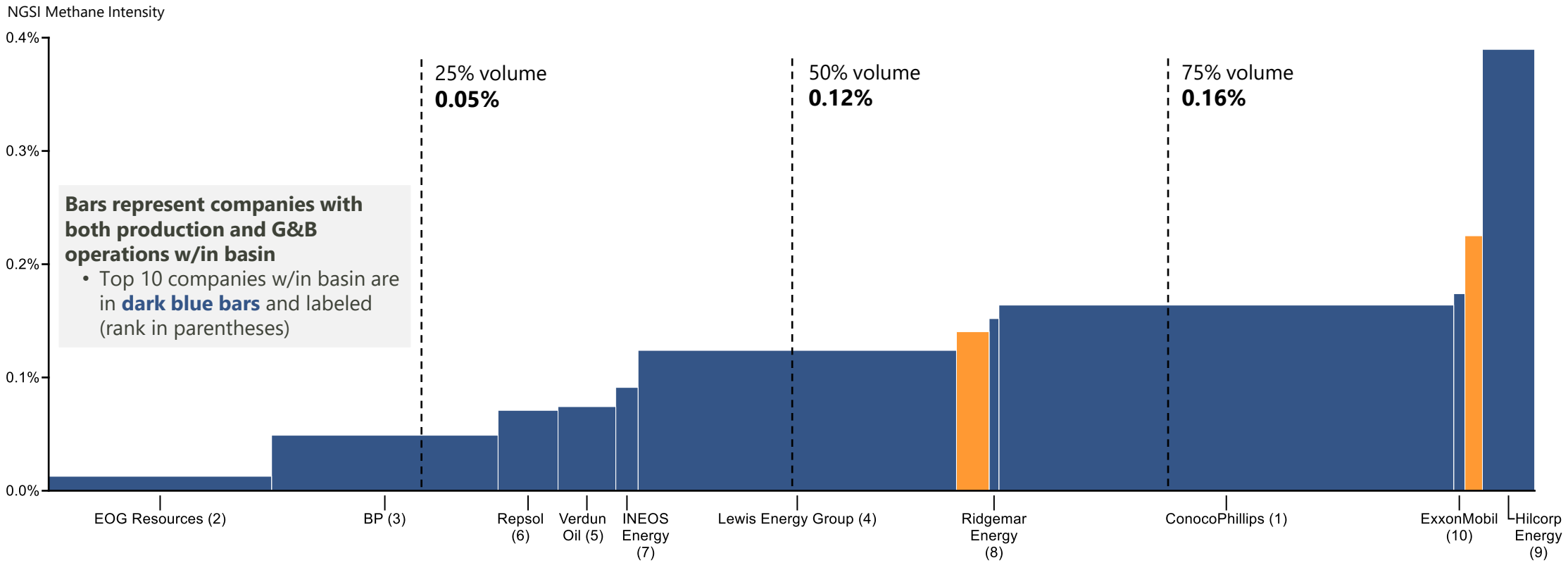
Note: Companies are ranked in descending order of hydrocarbon energy handled (BOE)

Gulf Coast Basin Companies

2024 Data

Total GHGRP Natural Gas Volume, by Methane Intensity

Natural Gas Associated with NGSI Methane Intensity



Natural Gas Volume ⟶

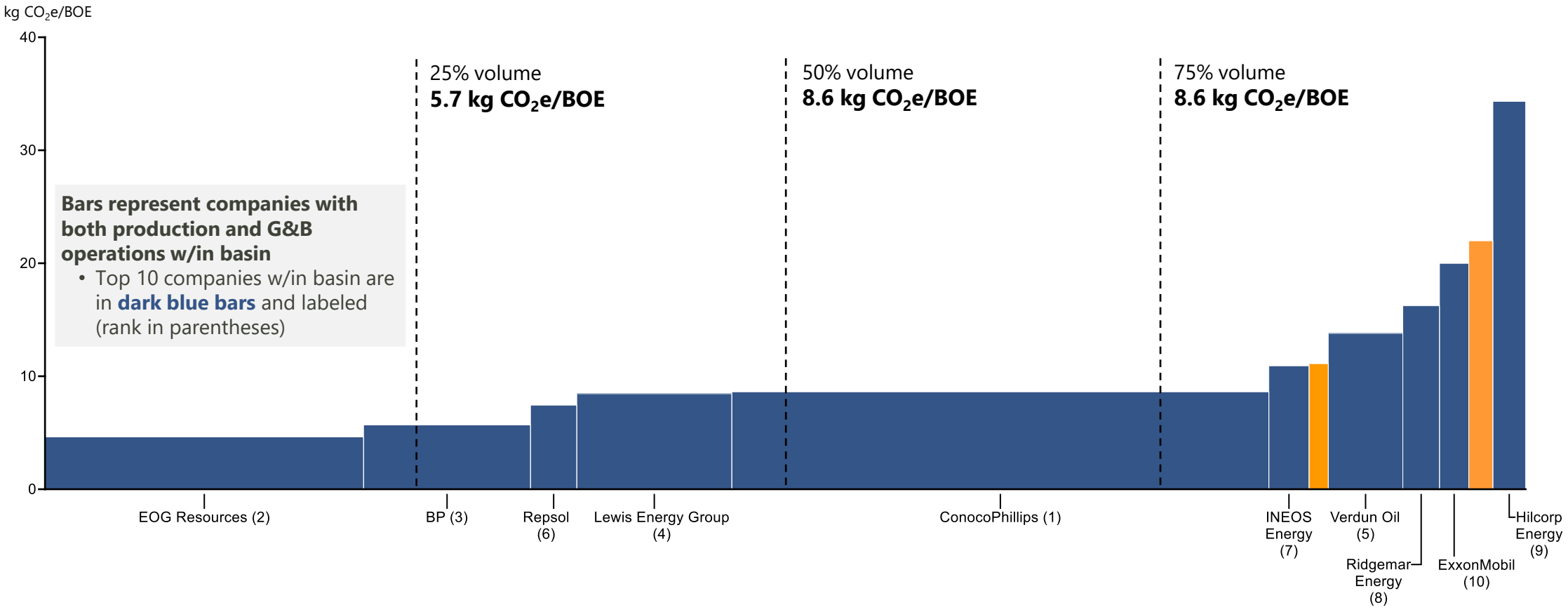
Total Gas Volume: 2.9 trillion cubic feet

Gulf Coast Basin Companies

2024 Data

Total GHGRP Hydrocarbon Energy, by GHG Intensity

Hydrocarbons Associated with GHG Intensity



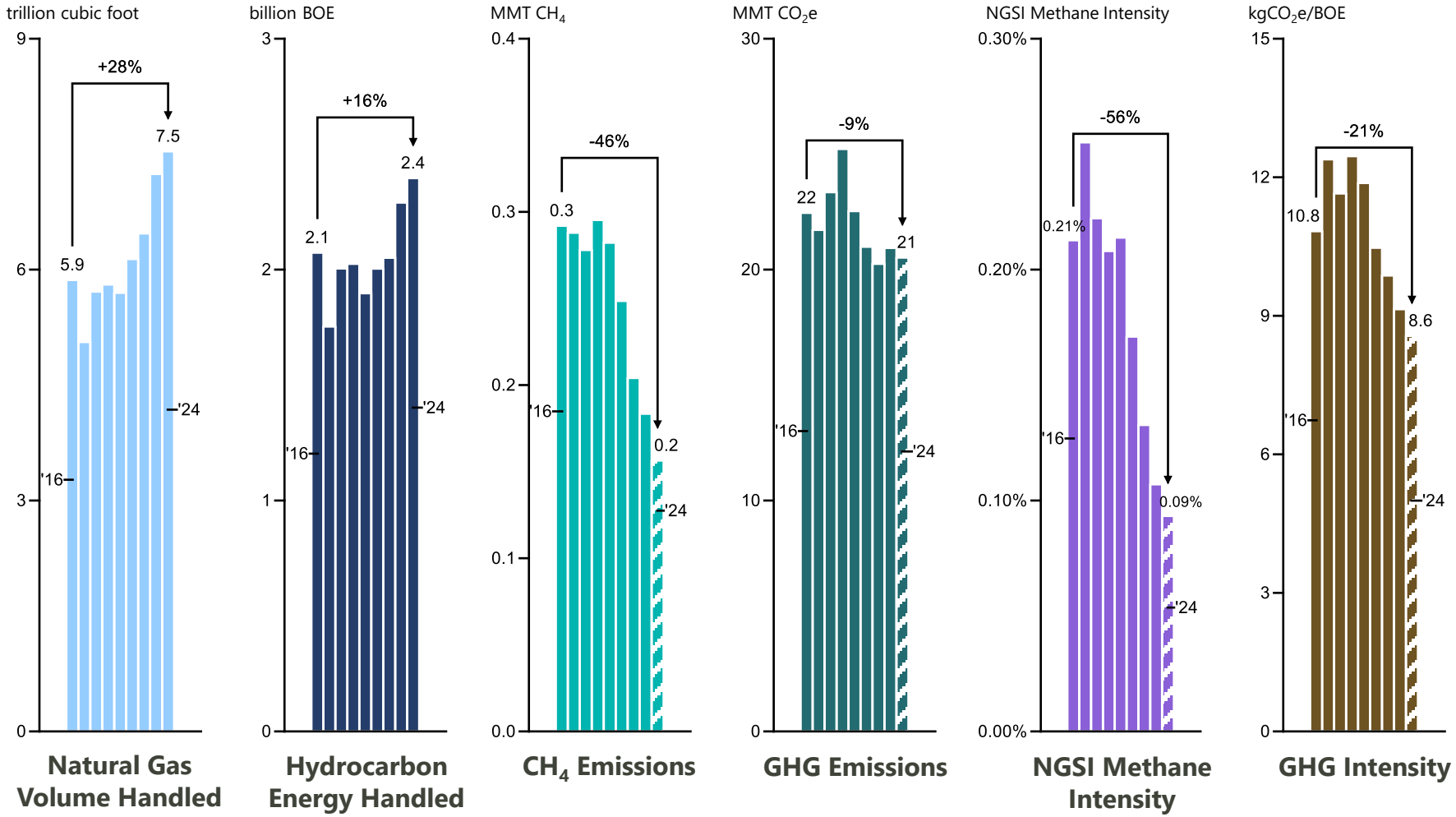
Hydrocarbon Energy →

Total Hydrocarbon Energy: 1.11 billion BOE

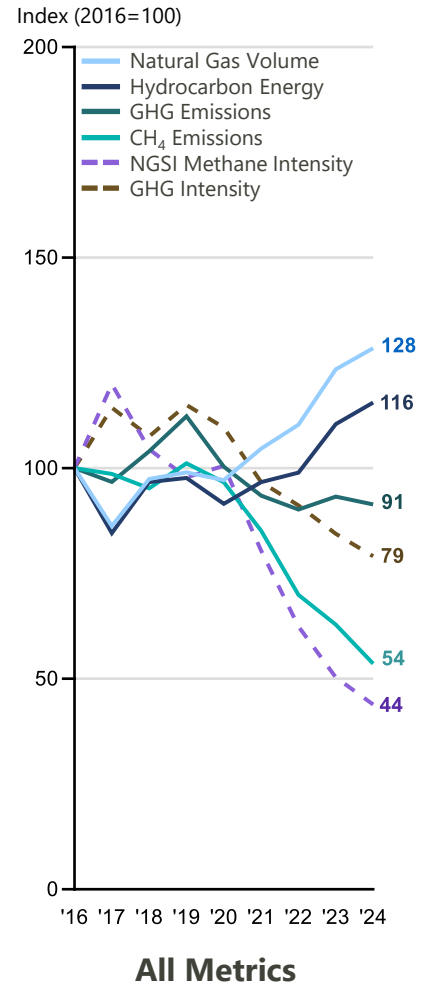
Gulf Coast Basin Companies

2016-2024 Trends Analysis: Throughput & Emissions Metrics

GHGRP Data Trends, 2016-2024
Gulf Coast Basin



Combined Data Metrics
Indexed; 2016 = 100

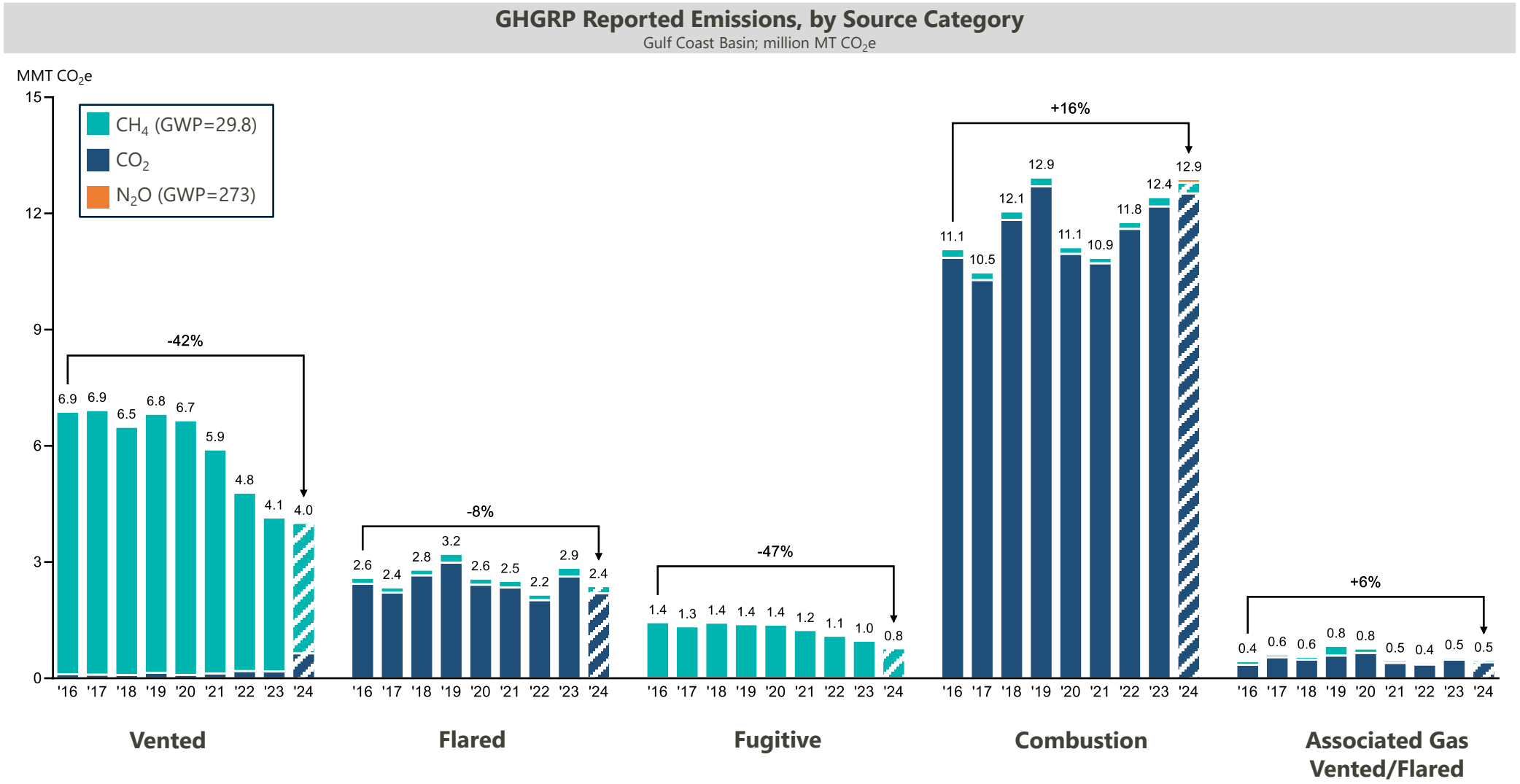


Gulf Coast Basin Companies

2016-2024 Trends Analysis: Emissions Sources

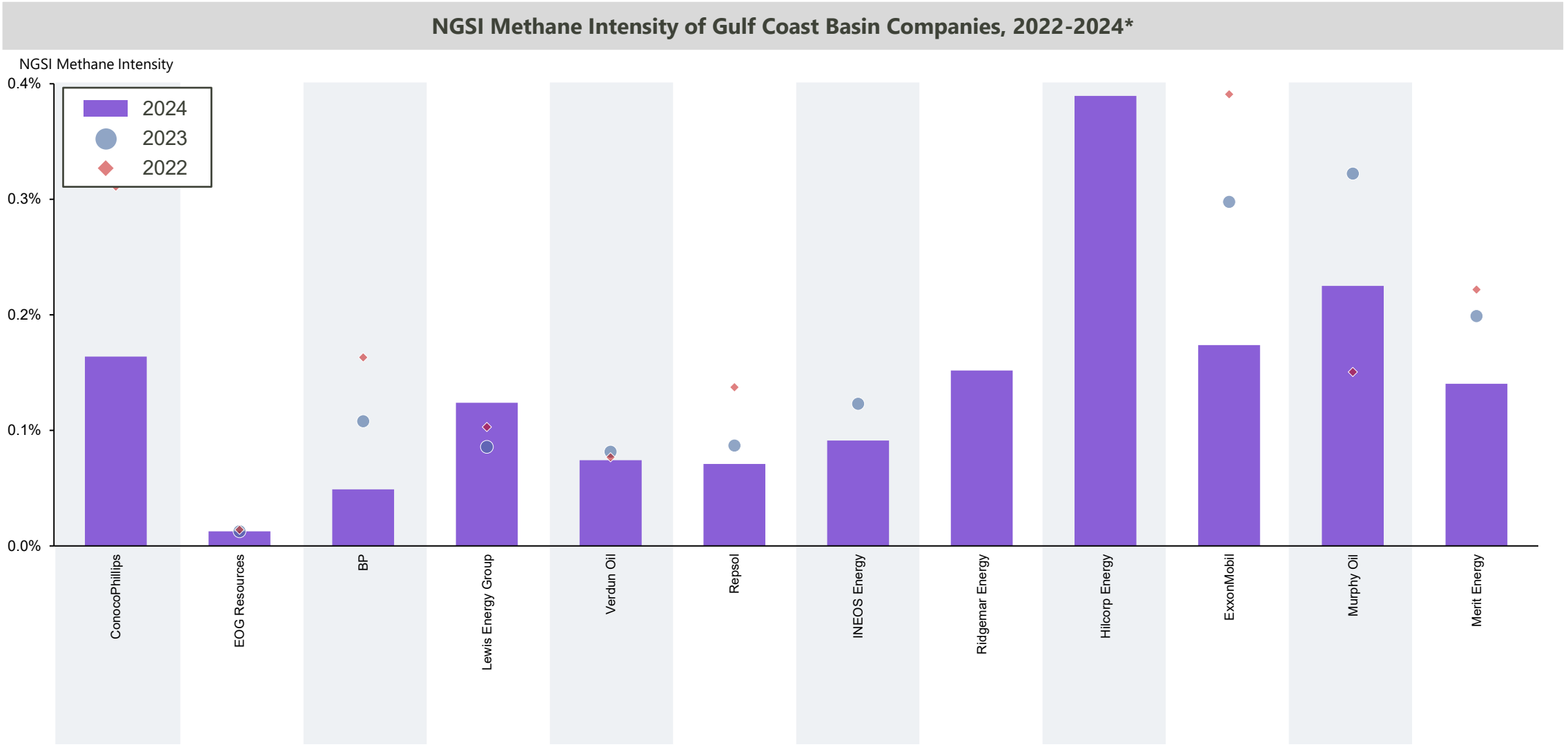
GHG Emissions* (MMT CO_2e)

**Production+G&B emissions*



Gulf Coast Basin Companies

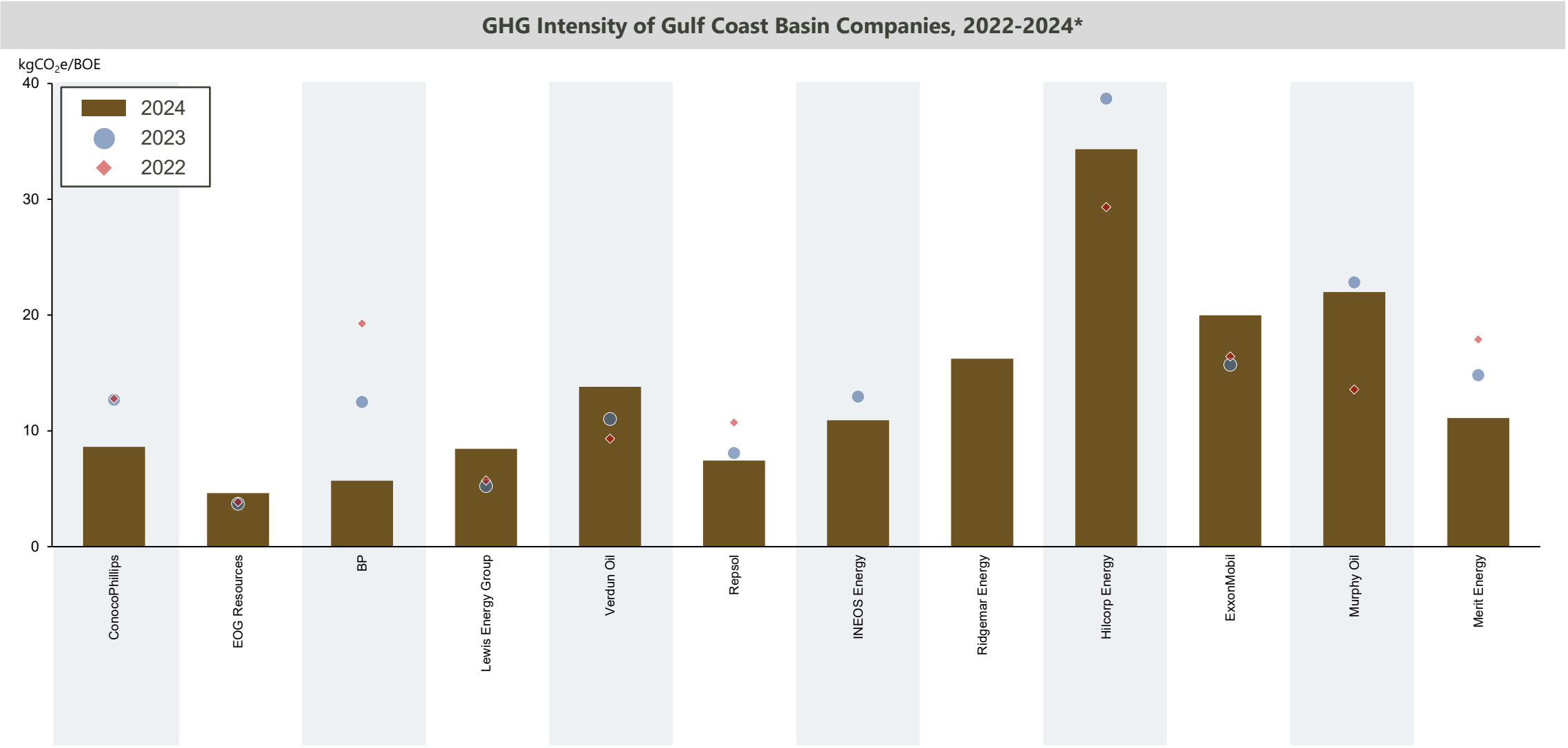
2022-2024 Trends Analysis: Change in Methane Intensity



*Note that some companies in 2024 were not in the EPA database for all three years and may not have data for 2022 and/or 2023.

Gulf Coast Basin Companies

2022-2024 Trends Analysis: Change in GHG Intensity



*Note that some companies in 2024 were not in the EPA database for all three years and may not have data for 2022 and/or 2023.

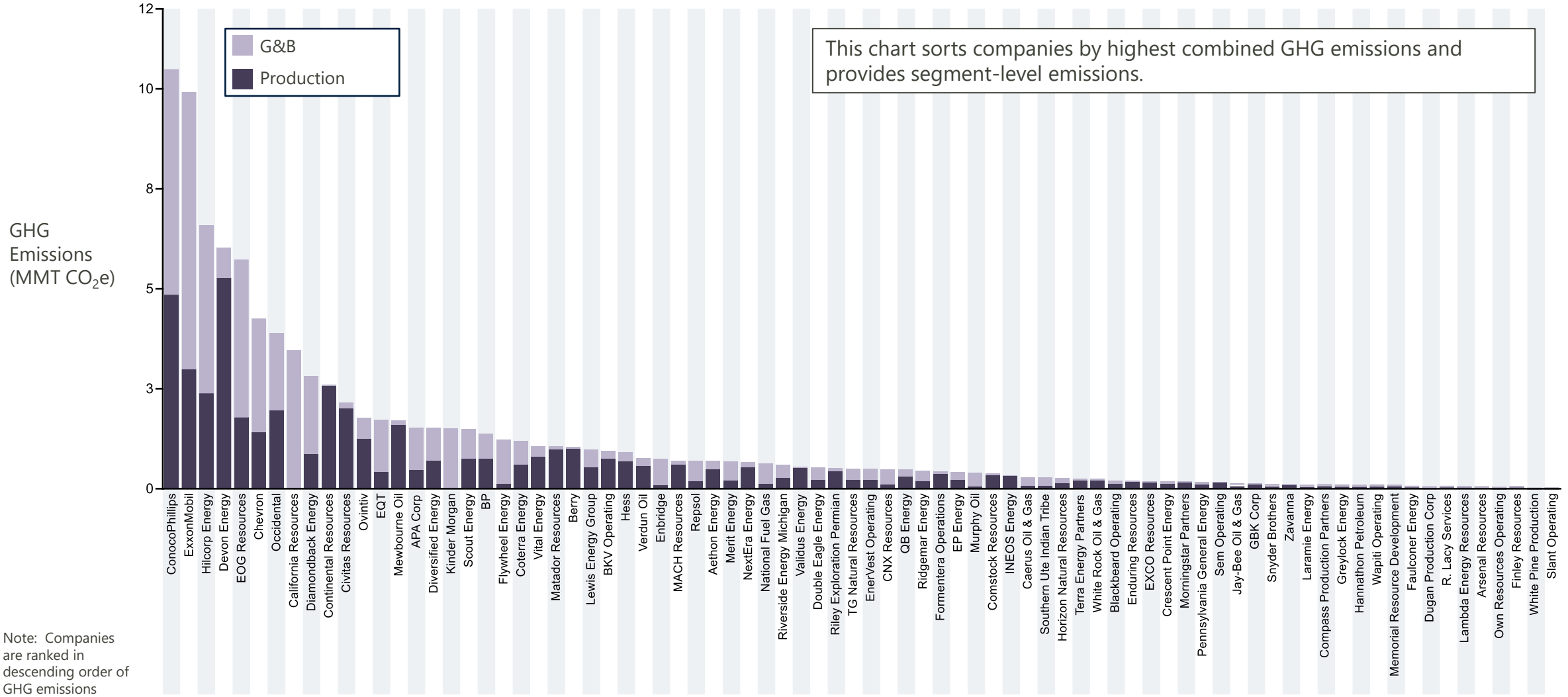
Additional Combined Production and G&B Segment Data

The following charts present additional data associated with key metrics. They capture all 80 companies that reported both onshore production and G&B operations in 2024.

Upstream Companies: Top GHG Emitters

2024 Data

GHG Emissions (100-year GWP)

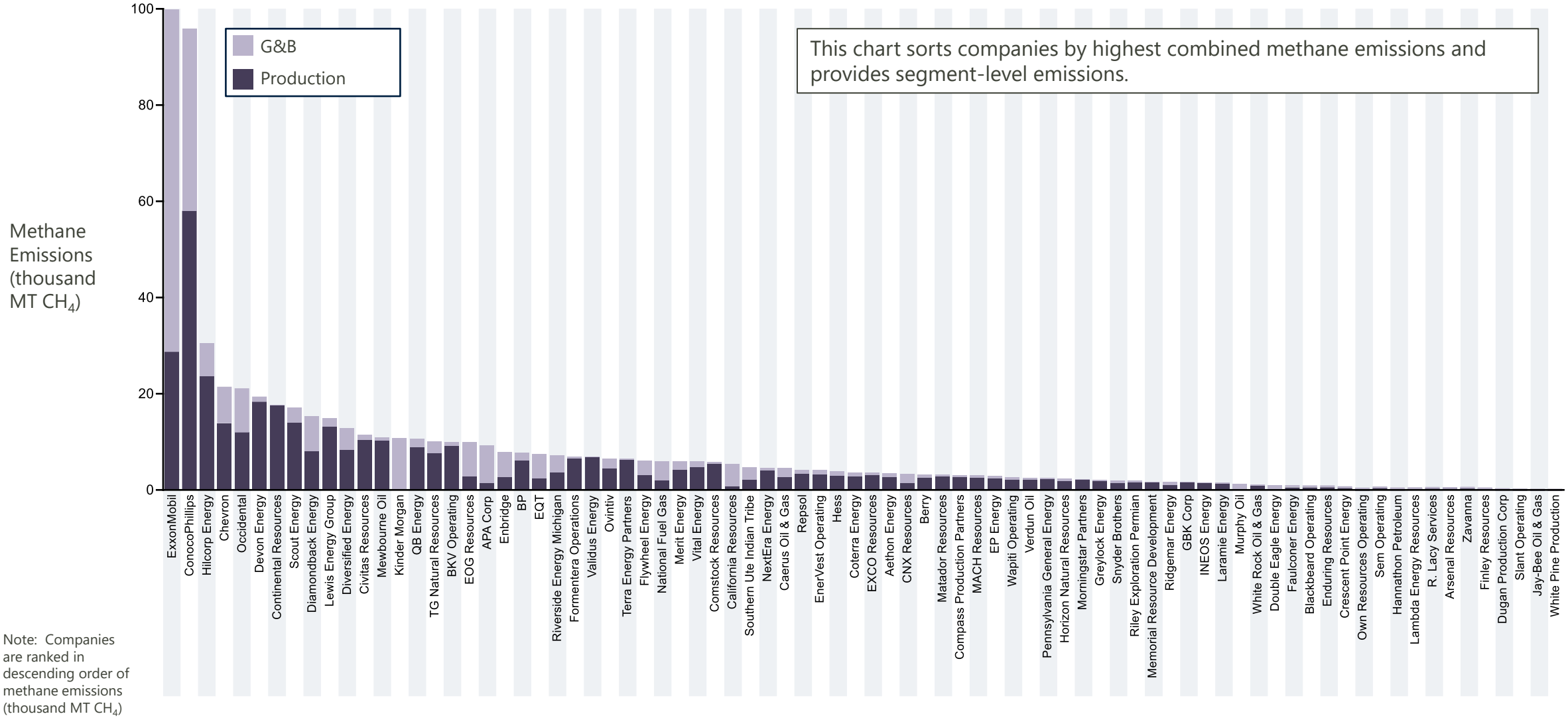


Note: Companies are ranked in descending order of GHG emissions (MMT CO_2e)

Upstream Companies: Top Methane Emitters

2024 Data

Methane Emissions

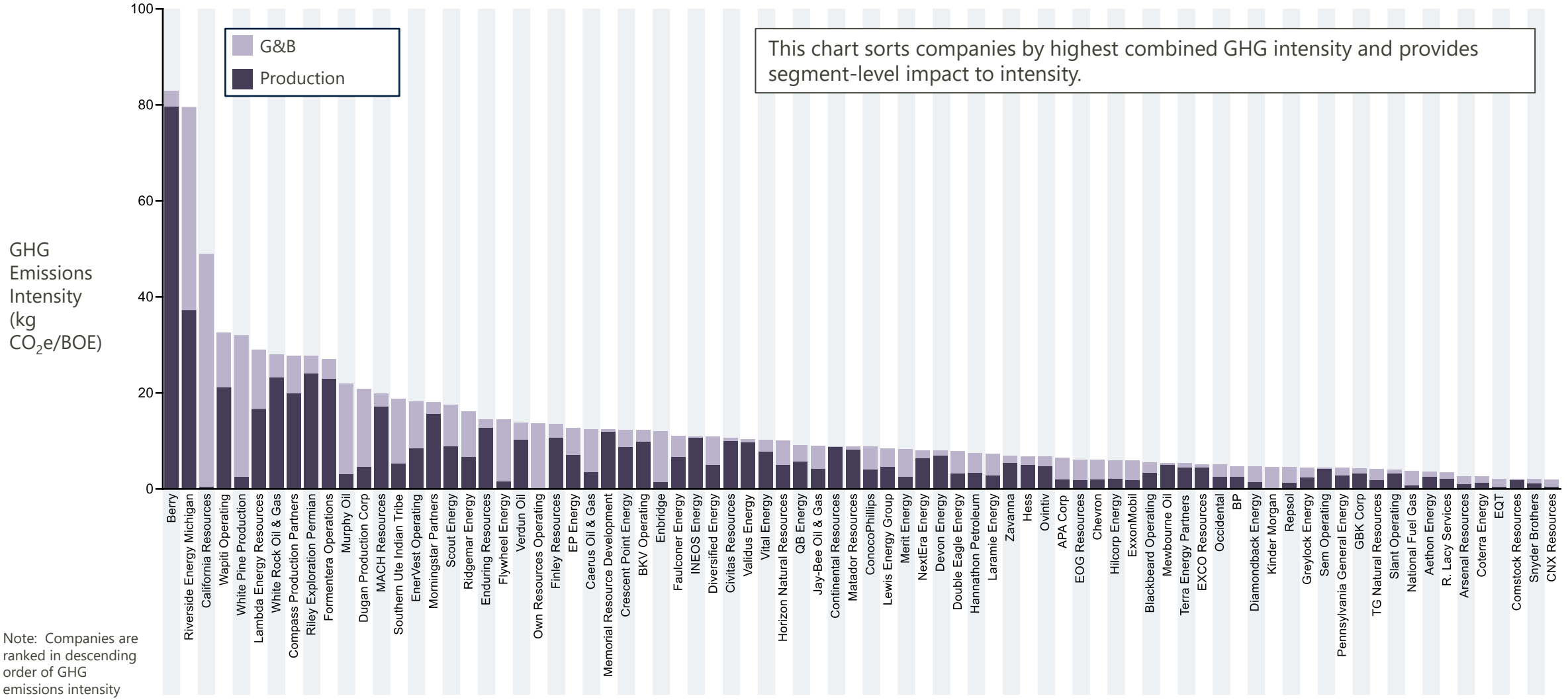


Note: Companies are ranked in descending order of methane emissions (thousand MT CH_4)

Upstream Companies: Highest GHG Emissions Intensities

2024 Data

GHG Emissions Intensity

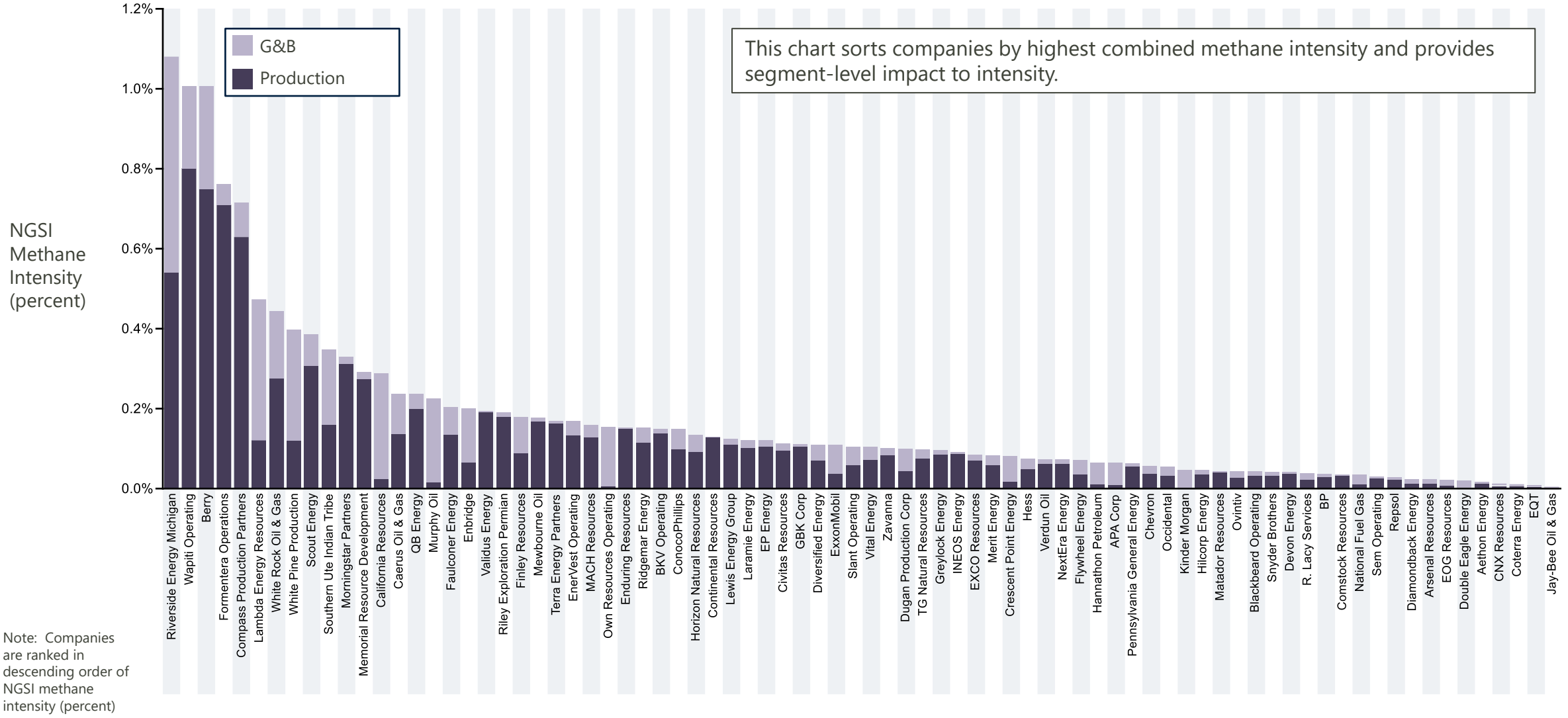


Note: Companies are ranked in descending order of GHG emissions intensity (kg CO_2e/BOE)

Upstream Companies: Highest NGSI Methane Intensities

2024 Data

Methane Intensity

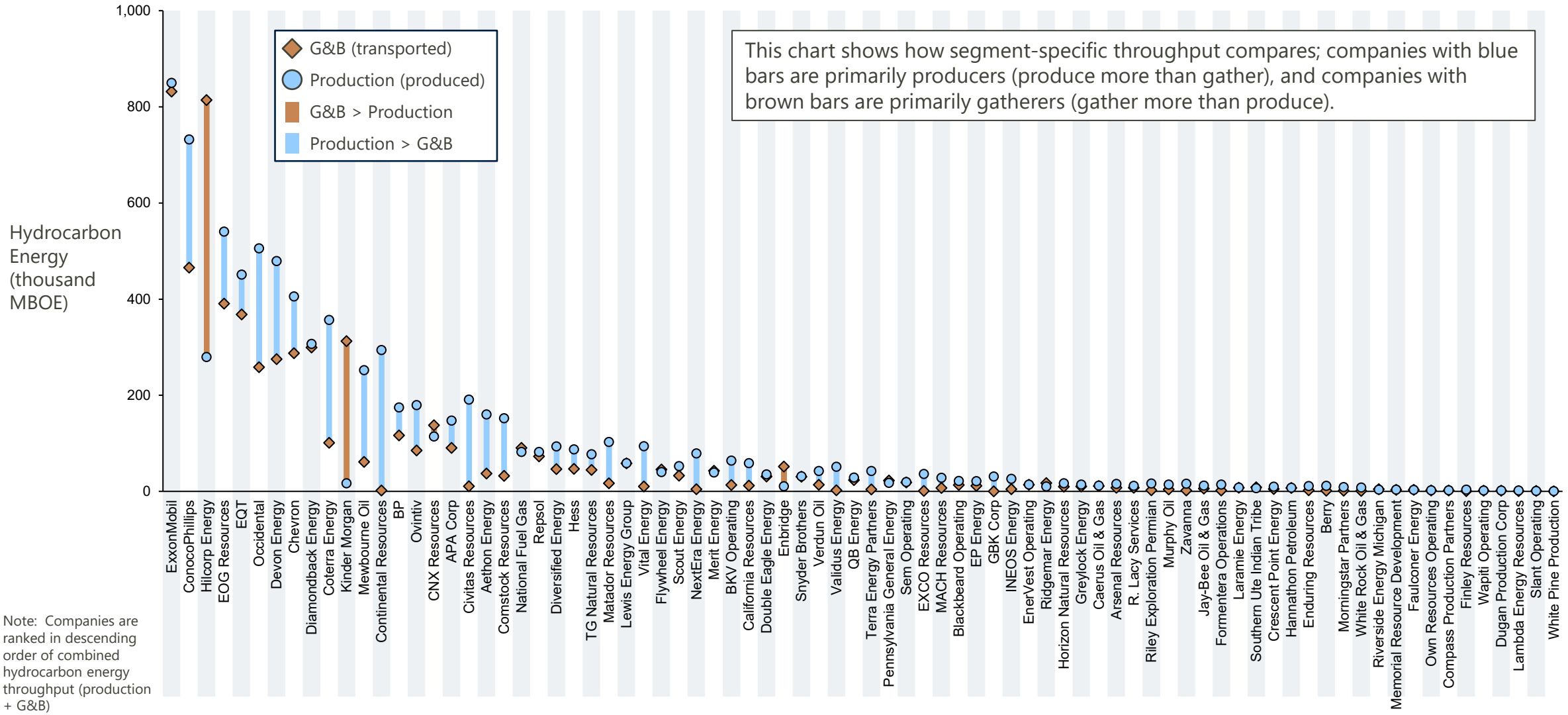


Note: Companies are ranked in descending order of NGSI methane intensity (percent)

Upstream Companies

2024 Data

Hydrocarbon Energy Throughput

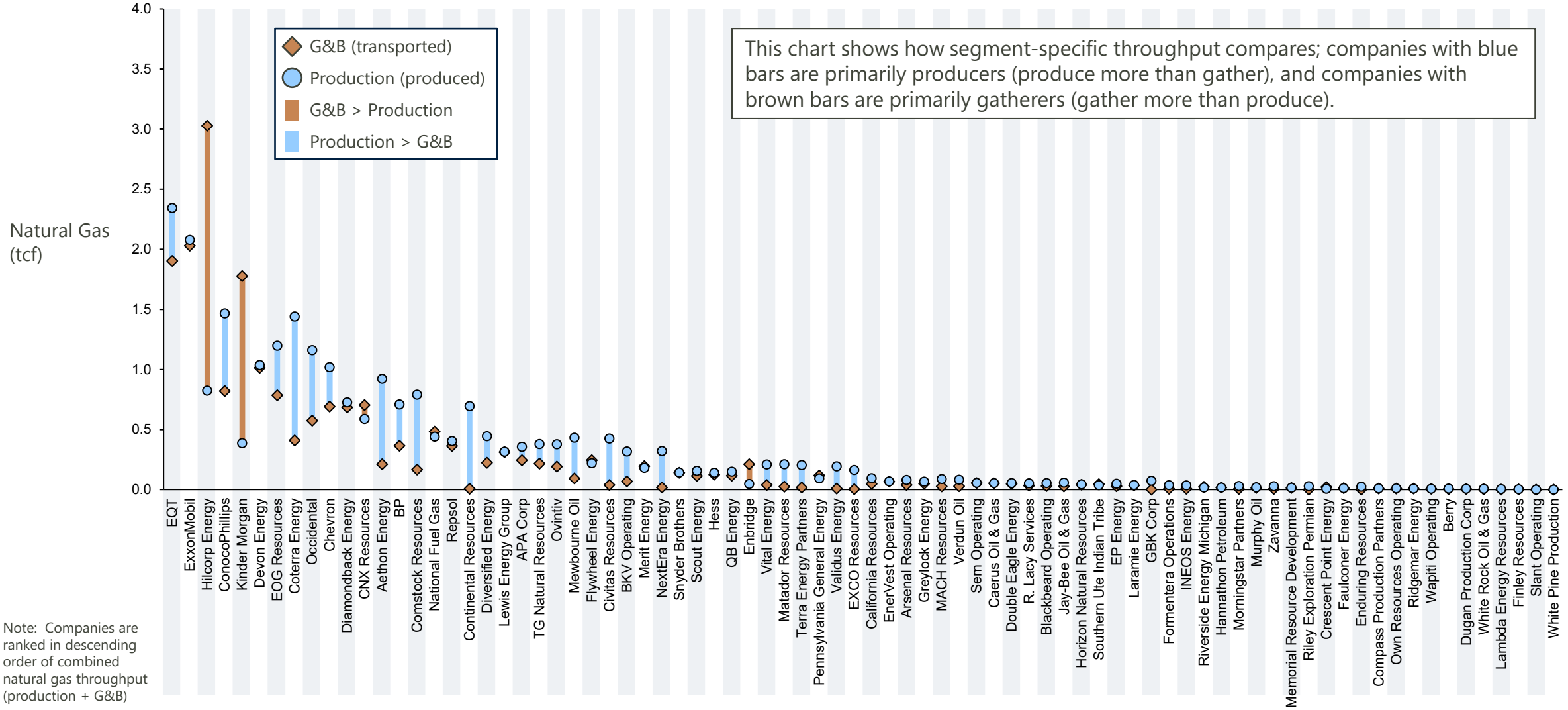


Note: Companies are ranked in descending order of combined hydrocarbon energy throughput (production + G&B)

Upstream Companies

2024 Data

Natural Gas Throughput



Note: Companies are ranked in descending order of combined natural gas throughput (production + G&B)

Upstream Companies

2024 Data

NGSI and GHG Intensity, by calculation approach*

Rank	Company	NGSI Intensity		GHG Intensity	
		Report	*Production-normalized*	Report	*Production-normalized*
1	ExxonMobil	**0.11%**	*0.22%*	**5.90**	*11.67*
2	ConocoPhillips	**0.15%**	*0.23%*	**8.76**	*14.33*
3	Hilcorp Energy	**0.05%**	*0.21%*	**6.02**	*23.54*
4	EOG Resources	**0.02%**	*0.03%*	**6.16**	*10.61*
5	EQT	**0.01%**	*0.02%*	**2.11**	*3.83*
6	Occidental	**0.05%**	*0.08%*	**5.10**	*7.71*
7	Devon Energy	**0.04%**	*0.08%*	**7.99**	*12.58*
8	Chevron	**0.06%**	*0.10%*	**6.14**	*10.50*
9	Diamondback Energy	**0.02%**	*0.05%*	**4.64**	*9.16*
10	Coterra Energy	**0.01%**	*0.01%*	**2.59**	*3.33*
11	Kinder Morgan	**0.05%**	*2.58%*	**4.58**	*89.49*
12	Mew bourne Oil	**0.18%**	*0.21%*	**5.43**	*6.75*
13	Continental Resources	**0.13%**	*0.13%*	**8.80**	*8.85*
14	BP	**0.04%**	*0.05%*	**4.73**	*7.89*
15	Ovintiv	**0.04%**	*0.07%*	**6.71**	*9.89*
16	CNX Resources	**0.01%**	*0.03%*	**1.95**	*4.30*
17	APA Corp	**0.06%**	*0.11%*	**6.44**	*10.39*
18	Civitas Resources	**0.11%**	*0.12%*	**10.66**	*11.25*
19	Aethon Energy	**0.02%**	*0.02%*	**3.53**	*4.35*
20	Comstock Resources	**0.04%**	*0.04%*	**2.04**	*2.47*
21	National Fuel Gas	**0.03%**	*0.07%*	**3.71**	*7.80*
22	Repsol	**0.03%**	*0.05%*	**4.53**	*8.55*
23	Diversified Energy	**0.11%**	*0.17%*	**10.88**	*16.25*
24	Hess	**0.07%**	*0.14%*	**6.79**	*10.43*
25	TG Natural Resources	**0.10%**	*0.15%*	**4.15**	*6.53*
26	Matador Resources	**0.04%**	*0.05%*	**8.77**	*10.22*
27	Lew is Energy Group	**0.12%**	*0.25%*	**8.45**	*16.84*
28	Vital Energy	**0.10%**	*0.12%*	**10.22**	*11.30*
29	Flyw heel Energy	**0.07%**	*0.15%*	**14.44**	*30.82*
30	Scout Energy	**0.39%**	*0.66%*	**17.52**	*28.39*
31	NextEra Energy	**0.07%**	*0.08%*	**8.05**	*8.51*
32	Merit Energy	**0.08%**	*0.17%*	**8.25**	*17.24*
33	BKV Operating	**0.15%**	*0.18%*	**12.24**	*14.79*
34	California Resources	**0.29%**	*0.43%*	**48.98**	*59.04*
35	Double Eagle Energy	**0.02%**	*0.04%*	**7.91**	*14.83*
36	Enbridge	**0.20%**	*0.95%*	**12.05**	*70.83*
37	Snyder Brothers	**0.04%**	*0.08%*	**2.02**	*3.99*
38	Verdun Oil	**0.07%**	*0.10%*	**13.79**	*18.17*
39	Validus Energy	**0.19%**	*0.20%*	**10.39**	*10.88*
40	QB Energy	**0.24%**	*0.42%*	**9.15**	*16.62*

Rank	Company	NGSI Intensity		GHG Intensity	
		Report	*Production-normalized*	Report	*Production-normalized*
41	Terra Energy Partners	**0.17%**	*0.18%*	**5.35**	*5.84*
42	Pennsylvania General Energy	**0.06%**	*0.14%*	**4.36**	*9.94*
43	Sem Operating	**0.03%**	*0.06%*	**4.42**	*8.65*
44	EXCO Resources	**0.09%**	*0.09%*	**5.14**	*5.24*
45	MACH Resources	**0.16%**	*0.21%*	**19.88**	*25.01*
46	Blackbeard Operating	**0.04%**	*0.07%*	**5.59**	*8.99*
47	EP Energy	**0.12%**	*0.19%*	**12.76**	*19.64*
48	GBK Corp	**0.11%**	*0.11%*	**4.20**	*4.23*
49	INEOS Energy	**0.09%**	*0.11%*	**10.92**	*12.72*
50	EnerVest Operating	**0.17%**	*0.33%*	**18.22**	*35.79*
51	Ridgemar Energy	**0.15%**	*0.28%*	**16.23**	*43.29*
52	Horizon Natural Resources	**0.13%**	*0.26%*	**10.08**	*15.97*
53	Greylock Energy	**0.10%**	*0.17%*	**4.49**	*7.75*
54	Caerus Oil & Gas	**0.24%**	*0.46%*	**12.42**	*24.04*
55	Arsenal Resources	**0.02%**	*0.03%*	**2.60**	*3.84*
56	R. Lacy Services	**0.04%**	*0.06%*	**3.45**	*5.71*
57	Riley Exploration Permian	**0.19%**	*0.20%*	**27.73**	*31.49*
58	Murphy Oil	**0.23%**	*0.40%*	**21.98**	*27.85*
59	Zavanna	**0.10%**	*0.12%*	**6.83**	*7.60*
60	Jay-Bee Oil & Gas	**0.00%**	*0.01%*	**9.06**	*13.19*
61	Formentera Operations	**0.76%**	*0.91%*	**27.06**	*30.67*
62	Laramie Energy	**0.12%**	*0.23%*	**7.35**	*14.04*
63	Southern Ute Indian Tribe	**0.35%**	*0.77%*	**18.81**	*42.67*
64	Crescent Point Energy	**0.08%**	*0.32%*	**12.36**	*18.41*
65	Hannathon Petroleum	**0.06%**	*0.13%*	**7.38**	*14.55*
66	Enduring Resources	**0.15%**	*0.16%*	**14.51**	*17.13*
67	Berry	**1.01%**	*1.69%*	**82.94**	*92.51*
68	Morningstar Partners	**0.33%**	*0.39%*	**18.15**	*20.60*
69	White Rock Oil & Gas	**0.44%**	*0.56%*	**27.95**	*30.61*
70	Riverside Energy Michigan	**1.08%**	*2.39%*	**79.55**	*179.31*
71	Memorial Resource Development	**0.29%**	*0.56%*	**12.38**	*23.55*
72	Faulconer Energy	**0.20%**	*0.39%*	**11.02**	*21.27*
73	Ow n Resources Operating	**0.15%**	*0.30%*	**13.65**	*26.30*
74	Compass Production Partners	**0.72%**	*1.34%*	**27.78**	*48.83*
75	Finley Resources	**0.18%**	*0.25%*	**13.49**	*15.10*
76	Wapiti Operating	**1.01%**	*1.91%*	**32.57**	*61.40*
77	Dugan Production Corp	**0.10%**	*0.19%*	**20.81**	*37.95*
78	Lambda Energy Resources	**0.47%**	*0.60%*	**29.03**	*34.63*
79	Slant Operating	**0.10%**	*0.19%*	**4.04**	*7.88*
80	White Pine Production	**0.40%**	*0.49%*	**32.03**	*35.72*

*These tables show emissions intensities for companies with operations in both the production and G&B segments using two calculation approaches, the methodology used in this report (throughput-weighted average) and a production-normalized approach.

Data Sources & Methodology

This section describes the data sources and methodology used in this study. The methodology was developed by ERM with support from Ceres and CATF as part of a scoping study in 2019. The scoping study included the development of a framework and methodology for using publicly available data, including GHG emissions data reported to and published by the U.S. EPA, to benchmark the production-segment methane and GHG emissions intensity of U.S. oil and natural gas producers. This 2026 report uses the same methodology as the 2024 report; the additional analysis of the G&B segment and combined onshore production and G&B operations in this report follow the same general methodology used in 2024.

As part of the scoping study, ERM engaged with and sought feedback from a Producer Review Panel composed of leading oil and gas companies with operations in the U.S. In addition to verifying the approaches and metrics used in the analysis, the Producer Review Panel provided valuable context on the data reported to EPA and recommendations on approaches for presenting the data in clear and meaningful ways. Final decisions on the methodology and the presentation of data in this report were made by ERM.

Data Sources Used in this Analysis

U.S. EPA Greenhouse Gas Reporting Program (GHGRP)

EPA's GHGRP is the primary data source for this analysis. The GHGRP requires facilities with GHG emissions greater than 25,000 metric tons CO_2e per year to report these emissions and other data to EPA annually. Subpart W of the GHGRP covers most segments of the oil and natural gas supply chains and requires reporting of methane, carbon dioxide, and nitrous oxide. Most emissions are calculated under subpart W by multiplying company activity data by default emissions factors that are applied to all companies; some emissions are based on engineering calculations as well as direct measurements or company-specific emissions factors derived from direct measurements.

This report includes emissions reported to EPA under subpart W from facilities in the oil and gas onshore production segment and onshore gathering & boosting segment. Onshore production and gathering & boosting segment facilities are defined by EPA at the basin level for the purposes of GHGRP. All equipment on or associated with well pads (for production) or with a gathering system (for gathering & boosting) within a production basin that are under common control by a company are considered a single facility.

Subpart W data reported by EPA's Envirofacts database accounts for all of the production and throughput data analyzed in this report, around 99 percent of the methane data, effectively all CO_2 data, and all of the N_2O data. The remainder is based on sources not included in the GHGRP but estimated based on the GHG Inventory, as described on page 230. This report uses the following 2023/2024 subpart W Envirofacts files:

- "EF_W_EMISSIONS_SOURCE_GHG"
- "EF_W_FACILITY_OVERVIEW"
- "EF_W_EQUIP_LEAKS_ONSHORE"
- "EF_W_ACIDGASREMOVAL_UNITS"
- "EF_W_CENTRIF_COMP_ONSHORE"
- "EF_W_RECIP_COMP_ONSHORE"

Data Sources Used in this Analysis (continued)

U.S. EPA Greenhouse Gas Inventory

EPA's GHG Inventory is an annual report that estimates total GHG emissions from the U.S. economy. The GHG Inventory is not a reporting program and does not estimate emissions from individual companies. Instead, it estimates emissions from major industries, including the oil and natural gas sectors. EPA calculates GHG Inventory estimates using national activity data and default emissions factors.

The GHG Inventory estimates emissions from a number of sources that are not included in subpart W reporting. This analysis calculates company emissions from these sources and adds them to emissions reported under subpart W using activity data from subpart W and emissions factors from the GHG Inventory. Not all of the GHG Inventory emissions sources that are additional to subpart W can be included due to lack of corresponding activity data in subpart W (e.g., the GHG Inventory has a produced water emissions factor, but subpart W does not require reporting of the applicable activity factor).

For some of these sources, the GHG Inventory lists different emissions factors for natural gas and oil wells. Subpart W does not distinguish between natural gas and oil wells. This report uses the natural gas emissions factor for these sources. The GHG Inventory emissions factors are used in conjunction with activity data reported under subpart W to calculate approximately 1 percent of the methane emissions and <0.005 percent of the CO_2 emissions analyzed in this report. The GHG Inventory data used in this report are available in the natural gas and petroleum systems methodology annex files:

https://www.epa.gov/system/files/documents/2024-02/2024_ghgi_petroleum_systems_annex35_tables.xlsx
https://www.epa.gov/system/files/documents/2024-02/2024_ghgi_natural_gas_systems_annex36_tables.xlsx

EIA Data

As described on page 231, EIA data on regional natural gas liquid (NGL) production is used to estimate the non-methane and non-CO_2 composition of reported natural gas production. The ratio of NGL production for each region reported to EIA is applied to the unknown component of gas composition for gas produced in corresponding regions. EIA Natural Gas Plant Field Production file is the source of these data:

https://www.eia.gov/dnav/pet/pet_pnp_gp_dc_r10_mbbl_m.htm

Where available or provided, company-specific data were used to estimate the non-methane and non-CO_2 composition of reported natural gas production.

EIA natural gas and oil production data are used in this report to compare hydrocarbon production reported under subpart W to total U.S. production:

https://www.eia.gov/dnav/ng/ng_prod_sum_a_EPG0_FGW_mmcf_m.htm
https://www.eia.gov/dnav/pet/pet_crd_crpdn_adc_mbbl_a.htm

Methodology

Greenhouse Gas Reporting Program Data

This report assigns production and emissions data to individual companies based on the facility owner/operator listed in the GHGRP's "Reported Parent Companies" database. These data are reported at the basin level; the national level data in this report are calculated by summing basin level data across basins using parent companies listed in the GHGRP. For production facilities with multiple owners/operators, production and emissions are allocated based on each company's reported percent ownership of the facility.

GHGRP data are based on facility ownership or operating control, not ownership of hydrocarbons. A company's equity share of emissions and hydrocarbons may therefore be higher or lower than reported to EPA and calculated in this analysis. Although most companies report equity production and a growing number report equity GHG emissions, publicly available data do not allow for the application of a uniform equity-based methodology to all of the producers in the GHGRP data set.

Production and G&B Segment Sources and GHGs Covered by Subpart W

Source*	CH_4	CO_2	N_2O
Acid Gas Removal Units		✓	
Associated Gas Venting/Flaring	✓	✓	✓
Atmospheric Storage Tanks	✓	✓	✓
Centrifugal Compressors	✓	✓	
Combustion Equipment	✓	✓	✓
Completions/Workovers w/ Hydraulic Fracturing	✓	✓	✓
Completions/Workovers w/o Hydraulic Fracturing	✓	✓	✓
Dehydrators	✓	✓	✓
EOR Hydrocarbon Liquids		✓	
EOR Injection Pumps		✓	
Equipment Leak Surveys/Population Counts**	✓	✓	
Flare Stacks	✓	✓	✓
NG Pneumatic Devices	✓	✓	
NG-Driven Pneumatic Pumps	✓	✓	
Reciprocating Compressors	✓	✓	
Well Testing	✓	✓	✓
Well Venting (Liquids Unloading)	✓	✓	

*Not all sources are applicable to both segments (e.g., well testing is relevant for production segment only)
**Equipment leaks from gathering pipelines are grouped with all other equipment leaks in this report

Methodology (continued)

GHG Inventory Data

The table at right provides details on the assumptions for calculating emissions from sources using GHG Inventory emissions factors, which were used for sources not reported to GHGRP. For compressor blowdowns, compressor starts, pressure release valve upsets, well drilling, and acid gas removal units, emissions are calculated by multiplying the GHG Inventory emissions factor by the activity count reported under subpart W. Only methane emissions are calculated for acid gas removal units as CO_2 emissions are captured in subpart W.

The number of vessels is not reported under subpart W. To calculate emissions from vessel blowdowns, the GHG Inventory assumption on the number of vessels located at each well is first applied. This number is multiplied by the reported well count to estimate the number of vessels and this product is then multiplied by the GHG Inventory emissions factor to estimate emissions. Emissions from sources calculated using GHG Inventory emissions factors are small and generally account for a small percentage of total emissions from a company or basin.

Emissions factors for historic years may be updated in each annual GHG Inventory. This report uses the emissions factors published in the most recent GHG Inventory (2024 release) each respective year.

Emissions Source1.6	GHG Inventory CH_4 Emissions Factor					GHG Inventory CO_2 Emissions Factor					Activity Factor (unit)
	2018	2019	2020	2021	2022-2024*	2018	2019	2020	2021	2022-2024*	
Vessel Blowdowns (applies to separators, heater-treaters, dehydrators, and in-line heaters)	1.6	1.6	1.6	1.6	1.6	0.2	0.2	0.2	0.2	0.2	Well count from GHGRP; 0.87 vessels/well as per GHG Inventory (kg/vessel)
Compressor Blowdowns	76.7	76.7	76.8	76.9	76.8	8.5	8.6	8.6	8.6	8.7	Compressor count from GHGRP (kg/compressor)
Compressor Starts	171.6	171.5	171.9	172.0	171.8	19.1	19.1	19.3	19.3	19.4	Compressor count from GHGRP (kg/compressor)
Pressure Relief Valve Upsets	0.7	0.7	0.7	0.7	0.7	0.1	0.1	0.1	0.1	0.1	Valve count from GHGRP (kg/valve)
Well Drilling	52.2	52.5	51.2	51.2	51.1	5.7	5.5	6.3	6.3	6.3	Gas wells completed from GHGRP (kg/well)
Acid Gas Removal Units	598.3	598.3	598.3	598.3	598.3	Captured in GHGRP					AGRU count from GHGRP (kg/AGRU)

*Note that EPA stopped publishing the GHG Inventory after 2024; 2022 factors from the 2024 GHG Inventory are applied in this report

Methodology (continued)

EIA Natural Gas Liquids Data

Companies in the oil and gas sector produce oil and natural gas as well as NGLs. NGLs include ethane, propane, butane, isobutane, and natural gasoline. These hydrocarbons are separated from oil and natural gas after production during processing and refining. In the production stage, NGLs are entrained with oil and natural gas and can impact the energy content of the produced hydrocarbons, as they have an energy content that is higher than natural gas but lower than oil.

For the purposes of the calculations in this report, the energy content of the reported natural gas production is adjusted to include the energy content of produced NGLs. The natural gas production data reported under subpart W includes information on the methane and CO_2 molar content of produced gas but does not include information on other components of the gas. Because the percentage of methane and CO_2 does not add up to 100 percent, a portion of the gas content is unknown. NGLs are commonly coproduced with natural gas and oil and in most cases represent some of the unknown gas composition. This analysis assumes the unknown portion of gas composition is made up of NGLs and allocates it to five individual NGLs based on EIA regional NGL production data. Each NGL is allocated a share of the unknown percentage based on its regional production share. This approach recognizes the energy content of non-oil and non-methane hydrocarbons; because methane emissions are allocated to the natural gas value chain using an energy-weighted gas ratio, the allocation of NGLs affects company methane emissions and methane intensity. This impact is minor for most companies and only significantly impacts companies that report low methane and CO_2 molar fractions.

The regional NGL percentages applied to the unknown gas component are shown in the table to the right (2024 data). Company-specific data were used where available or provided. It is important to note that nitrogen is also a common component of natural gas and represents a portion of the unknown gas component. However, little public data is available on the nitrogen molar fraction of natural gas produced across the U.S. This analysis assumes that produced gas contains no nitrogen and fills the missing gas component entirely with NGLs. This conservative approach slightly increases the amount methane emissions allocated to the natural gas value chain and methane intensity for most companies.

Region	Area	Ethane	Propane	Butane	Isobutane	Natural Gasoline (pentane plus)
PADD 1	East Coast	0%	34%	66%	0%	0%
	Appalachian	44%	32%	10%	4%	10%
PADD 2	IN, IL, & KY	38%	38%	9%	7%	8%
	MN, WI, ND, & SD	25%	38%	16%	5%	16%
	OK, KS, & MO	41%	31%	10%	5%	13%
PADD 3	LA (Gulf)	39%	34%	12%	6%	10%
	N. LA & AR	15%	29%	13%	11%	33%
	NM	43%	29%	11%	5%	12%
	TX (Inland)	44%	30%	11%	4%	11%
PADD 4 (Rocky Mountain)		30%	34%	13%	6%	16%
PADD 5 (West Coast)		0%	11%	29%	9%	52%

Methodology (continued)

Global Warming Potentials

Global warming potential (GWP) is used to quantify the climate impact of individual GHGs relative to CO_2 to allow for the comparison of different gases over different timescales. After conversion using GWPs, emissions are expressed using a standard metric, carbon dioxide equivalent (CO_2e).

This report uses the 100-year GWPs for methane and N_2O emissions from the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (AR6), which reflect the most recent scientific understanding of the climate impacts of individual GHGs. Both 100-year GWPs include the impact of climate-carbon feedbacks, and the methane GWP includes the impact of CO_2 from methane oxidation.

This report's online database allows users to select IPCC AR6 20- and 100-year GWPs for GHG emissions calculations.

Note that the updated IPCC GWPs in AR6 were released in August 2021. The 2021 version of this benchmarking report, published in June 2021, used GWPs from AR5. While all 2015-2024 data in this report and the accompanying online dashboard use the AR6 GWPs, the methane and CO_2e data in this written report cannot be directly compared to data in the 2021 written report.

GHG	Additional Mechanisms	20-year GWP	100-year GWP
Methane (CH_4)	**With climate-carbon feedbacks and methane oxidation**	**82.5**	**29.8**
Nitrous oxide (N_2O)	**With climate-carbon feedbacks**	**273**	**273**

Source: https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_Full_Report_smaller.pdf

Methodology (continued)

Emissions Source Categories

Emissions sources in this report are grouped into five categories: process and equipment vented ("vented"), process and equipment flared ("flared"), associated gas vented and flared, fugitive, and other combustion. The table to the right shows the assignment of individual emissions sources to source categories.

Emissions data on individual sources and their relative contribution to total emissions, by both individual GHG and total CO_2e, are available at the national, basin, and company level on the Oil and Gas Benchmarking interactive data website.

Source	CH_4 & N_2O Emissions Category	CO_2 Emissions Category
Acid Gas Removal Units	Vented	Vented
Associated Gas Venting/Flaring	Associated Gas Vented/Flared	Associated Gas Vented/Flared
Atmospheric Storage Tanks	Vented	Flared
Centrifugal Compressors	Vented	Flared
Combustion Equipment	Combustion	Combustion
Completions/Workovers w/ Hydraulic Fracturing	Vented	Flared
Completions/Workovers w/o Hydraulic Fracturing	Vented	Flared
Dehydrators	Vented	Flared
EOR Hydrocarbon Liquids	NA	Vented
EOR Injection Pumps	NA	Vented
Equipment Leak Surveys/Population Counts*	Fugitive	Fugitive
Flare Stacks	Flared	Flared
NG Pneumatic Devices	Vented	Vented
NG-Driven Pneumatic Pumps	Vented	Vented
Reciprocating Compressors	Vented	Flared
Well Testing	Vented	Flared
Well Venting (Liquids Unloading)	Vented	Vented
Vessel Blowdowns	Vented	Flared
Compressor Blowdowns	Vented	Vented
Compressor Starts	Vented	Vented
PRV Upsets	Vented	Vented
Well Drilling	Vented	Flared

*Includes equipment leaks from gathering pipelines

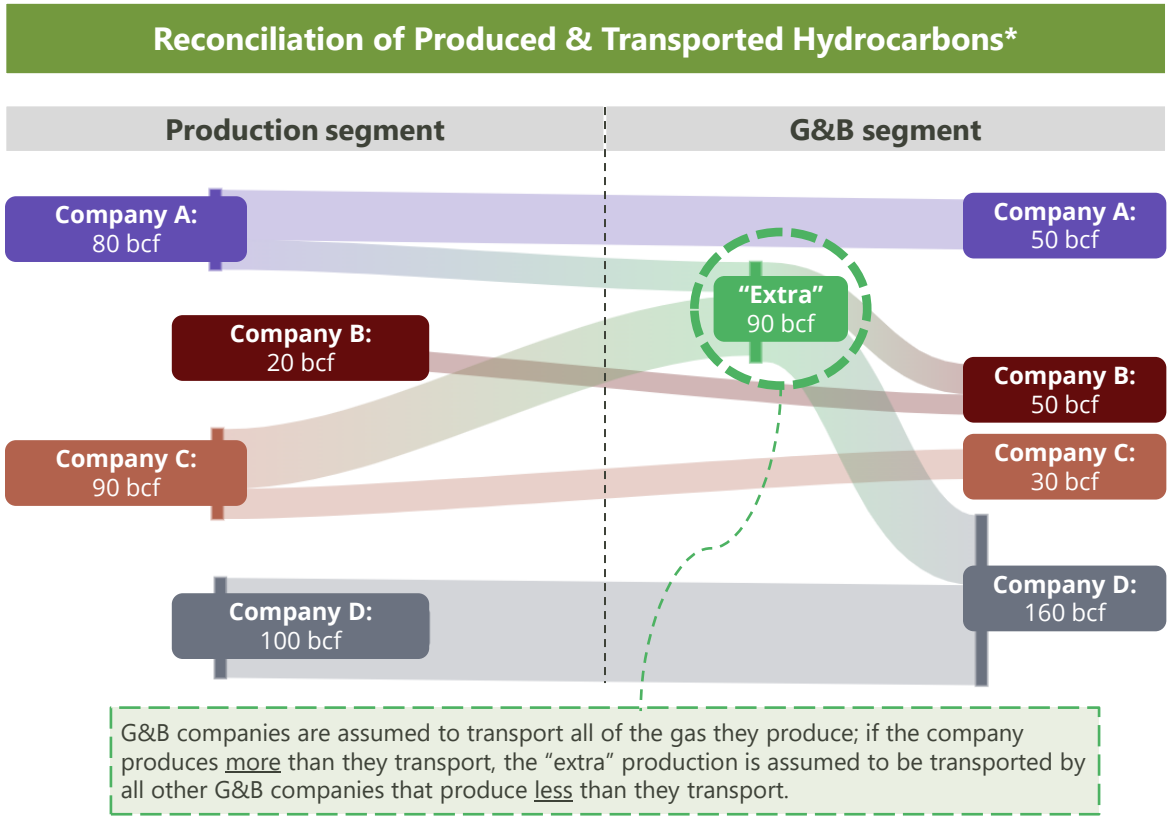
Methodology (continued)

Treatment of transported gas and hydrocarbon liquids of combined companies

This report profiles combined companies that report both production and G&B segment data to the GHGRP. However, these combined companies do not always have production and G&B assets located in the same basin and may not transport the same hydrocarbon volume or energy that they produced in a given basin. To reconcile G&B segment throughput with production, ERM performed basin-level analysis with the following assumptions:

- A company's G&B throughput is produced by the same company
  - If a company's G&B throughput is less than the company's production, the "extra" production is assumed to be transported by other companies
  - If a company's G&B throughput is greater than the company's production, the "extra" throughput is assumed to be produced by other companies
- All transported gas that is produced by the same company retains the methane and heat contents of that company's in-basin produced gas (properties of oil are not assumed to vary by basin or company)
- All transported gas that is not produced by the same company is assumed to have the properties of the cumulative "extra" in-basin gas production
  - Basin-level average methane and heat contents are calculated by combining all "extra" gas production (production that is not transported by the same company)

Using this approach, it is common for combined companies to transport both gas they produce and gas produced by others. In this situation, the properties of a company's G&B throughput is dependent on the characteristics of its own production and the basin-level "extra" production, as well as the magnitude of throughput deriving from each category of production.



*Representative visual with example data; for illustrative purposes only

Methodology (continued)

Company Data Revisions

During the development of this report, ERM contacted companies in the GHGRP data set and asked them to confirm their facility-specific data. ERM received responses from several companies stating that the EPA database set does not reflect their 2024 data. There are two reasons for these discrepancies: 1) The company has resubmitted or plans to resubmit updated data to EPA, or 2) the listed facility parent company does not match actual 2024 facility ownership. Updated data provided to ERM by companies have been included in this report under the condition of company commitments to resubmit the revised data to EPA, if it has not already been resubmitted. The subpart W data in this year's report is based on the information released by the Environmental Integrity Project's (EIP) Freedom of Information Act (FOIA) request. Company- and facility-specific data in this report may differ from the data released by EIP in cases where operators submitted revisions to EPA after EPA downloaded the data responsive to EIP's FOIA request, and those operators subsequently shared their resubmitted data with ERM.

EPA has historically accepted data resubmissions for previous reporting years at any time, but these changes are not incorporated into the public database until the annual release of new data each year. The revised data included in this report should therefore align with the EPA database if 2024 reporting year data are released by EPA. All facility ownership changes were noted by companies whose divested assets were still allocated to them in the current EPA database. ERM independently confirmed that these transactions occurred in the associated reporting year before reassigning facility ownership in this report. Reporting of ownership changes is the responsibility of the new asset owner and it is uncertain if all new owners will resubmit data to reflect actual ownership. If they do not, the data in this report will continue to be different from the EPA data set for certain companies.

Because EPA may eliminate or suspend the GHGRP, it is unknown if EPA will incorporate resubmitted 2024 subpart W data, including the resubmitted data provided by companies to ERM for this report, into the subpart W database, or if EPA will make the 2024 data publicly available.

Oil and gas producers that would like to review their company-specific data prior to the release of future versions of this report are asked to contact the report authors.

Using Public Data to Compare Producer Performance

Despite the challenges of estimating emissions from oil and gas sources, the application of a uniform emissions calculation methodology across the industry allows for direct comparison of reported company-level data. Within the **production segment**, normalizing these emissions by reported **production** data allows for calculation of emissions intensities that can be used to directly compare company methane and GHG emissions performance per unit of **energy produced**. While intensity metrics provide a straightforward way to compare the performance of operators of different sizes, it is important to note that absolute emissions can increase even as emissions intensity declines. Users are encouraged to consider total GHG emissions as well as emissions intensity when reviewing company data.

This report uses two emissions intensity metrics to compare **producer** performance. The first is the Edison Electric Institute and American Gas Association Natural Gas Sustainability Initiative (NGSI) protocol for calculating methane emissions intensity. This approach focuses on the natural gas value chain and calculates intensity as methane emissions assigned to natural gas on an energy basis divided by the total methane mass of **produced** natural gas. This metric provides insight to investors and gas purchasers interested in evaluating the methane performance of the natural gas value chain separate from the oil value chain. The NGSI methane emissions intensity is expressed as a percent (%).*

The second metric, total GHG emissions intensity, is calculated as total **production-segment** GHG emissions in kilograms of carbon dioxide equivalent (CO_2e) divided by total hydrocarbon production in barrel of oil equivalent (BOE). The GHG emissions intensity is expressed as kilograms CO_2e per BOE.

*Note that the NGSI intensity is not a methane leak rate (total methane emissions divided by total produced methane) because of its allocation of emissions based on the gas ratio (energy content of produced gas vs. total hydrocarbons).

NGSI Version 3.0 was released in January 2026 to align with the 2024 subpart W rule revisions, which went into effect for the 2025 reporting year. While this report continues to use the NGSI equation and approach to calculate methane intensity, because this report focuses on 2024 data, the additional sources and methodologies in the updated NGSI protocol do not apply to this report.

NGSI Methane Emissions Intensity

$$\frac{CH_4 \text{ Emissions (MT)} * \text{Gas Ratio}}{\text{Produced Gas (mcf)} * \text{Methane Content} * (0.0192 \text{ MT/mcf})}$$

where:

Gas Ratio = Energy content of produced gas / Energy content of total hydrocarbons
Methane Content = Molar fraction of methane in produced gas

Greenhouse Gas Emissions Intensity

$$\frac{CH_4 \text{ Emissions (kg } CO_2e) + CO_2 \text{ Emissions (kg } CO_2e) + N_2O \text{ Emissions (kg } CO_2e)}{\text{Produced Gas (BOE)} + \text{Oil Sales (BOE)}}$$

where:

CO_2e = CO_2-equivalent of gases adjusted by GWP
Produced Gas (BOE) + Oil Sales (BOE) = Hydrocarbons as barrel oil equivalent

Note that the NGSI methane intensities in this report may differ slightly from those calculated by companies due to assumptions made in this analysis and its use of publicly reported data.

Using Public Data to Compare G&B Company Performance

Despite the challenges of estimating emissions from oil and gas sources, the application of a uniform emissions calculation methodology across the industry allows for direct comparison of reported company-level data. Within the **G&B segment**, normalizing these emissions by reported **transported energy** allows for calculation of emissions intensities that can be used to directly compare company methane and GHG emissions performance per unit of energy **transported**. While intensity metrics provide a straightforward way to compare the performance of operators of different sizes, it is important to note that absolute emissions can increase even as emissions intensity declines. Users are encouraged to consider total GHG emissions as well as emissions intensity when reviewing company data.

This report uses two emissions intensity metrics to compare **G&B company** performance. The first is the Edison Electric Institute and American Gas Association Natural Gas Sustainability Initiative (NGSI) protocol for calculating methane emissions intensity. This approach focuses on the natural gas value chain and calculates intensity as methane emissions assigned to natural gas on an energy basis divided by the total methane mass of **transported** natural gas. This metric provides insight to investors and gas purchasers interested in evaluating the methane performance of the natural gas value chain separate from the oil value chain. The NGSI methane emissions intensity is expressed as a percent (%).*

The second metric, total GHG emissions intensity, is calculated as total **G&B-segment** GHG emissions in kilograms of carbon dioxide equivalent (CO_2e) divided by total hydrocarbons transported in barrel of oil equivalent (BOE). The GHG emissions intensity is expressed as kilograms CO_2e per BOE.

*Note that the NGSI intensity is not a methane leak rate (total methane emissions divided by total transported methane) because of its allocation of emissions based on the gas ratio (energy content of transported gas vs. total hydrocarbons).

NGSI Version 3.0 was released in January 2026 to align with the 2024 subpart W rule revisions, which went into effect for the 2025 reporting year. While this report continues to use the NGSI equation and approach to calculate methane intensity, because this report focuses on 2024 data, the additional sources and methodologies in the updated NGSI protocol do not apply to this report.

NGSI Methane Emissions Intensity

$$\frac{CH_4 \text{ Emissions (MT)} * \text{Gas Ratio}}{\text{Transported Gas (mcf)} * \text{Methane Content} * (0.0192 \text{ MT/mcf})}$$

where:

Gas Ratio = Energy content of transported gas / Energy content of total hydrocarbons
Methane Content = Molar fraction of methane in produced gas

Greenhouse Gas Emissions Intensity

$$\frac{CH_4 \text{ Emissions (kg } CO_2e) + CO_2 \text{ Emissions (kg } CO_2e) + N_2O \text{ Emissions (kg } CO_2e)}{\text{Transported Gas (BOE)} + \text{Transported Hydrocarbon Liquids (BOE)}}$$

where:

CO_2e = CO_2-equivalent of gases adjusted by GWP
Transported Gas (BOE) + Transported Hydrocarbon Liquids (BOE) = Hydrocarbons as barrel oil equivalent

Note that the NGSI methane intensities in this report may differ slightly from those calculated by companies due to assumptions made in this analysis and its use of publicly reported data.

Using Public Data to Compare Combined Company Performance

Despite the challenges of estimating emissions from oil and gas sources, the application of a uniform emissions calculation methodology across the industry allows for direct comparison of reported company-level data. Within the **production and G&B segments**, normalizing these emissions by reported **production and transported energy, respectively,** allows for calculation of emissions intensities that can be used to directly compare company methane and GHG emissions performance per unit of **energy (produced or transported)**. However, this approach only enables comparison within each segment. To characterize the emissions performance of companies that own assets in **both** segments – in other words, to develop emission intensity metrics that comprehensively capture the **combined assets of a company (production and G&B)** – an alternative methodology must account for segment-level variability in a company's operational profile. It is not accurate to simply add the production emission intensity and G&B emission intensity of a single company together to calculate their combined performance across both segments because it does not account for the relative "weight" of production and throughput that is the denominator of each segment's respective intensity equation.

To calculate combined intensity metrics that consider segment-level performance, this report sums emissions from both segments and divides that value by the sum of production and transported volumes from each segment. This yields a weighted average intensity value for combined production and G&B operations that is mathematically equivalent to multiplying each segment's individual intensity by the ratio of the segment's throughput (produced or transported) to total combined throughput (produced+transported) and summing the two results.

Combined Emissions Intensity Calculations	NGSI Intensity	GHG Intensity
1. Methane allocated to natural gas (NGSI intensity numerator) and total methane, CO_2, and N_2O (GHG intensity numerator) are summed across segments	$\sum_{Pro} CH_4\ emissions\ allocated\ to\ gas + \sum_{G\&B} CH_4\ emissions\ allocated\ to\ gas$	$\sum_{Pro} Total\ GHG\ emissions + \sum_{G\&B} Total\ GHG\ emissions$
2. Total methane content (NGSI intensity denominator) and hydrocarbon energy (GHG intensity denominator) are summed across segments to produce "handled" metrics	$\sum_{Pro} CH_4\ mass\ of\ produced\ gas + \sum_{G\&B} CH_4\ mass\ of\ transported\ gas$	$\sum_{Pro} Total\ produced\ hydrocarbon\ energy + \sum_{G\&B} Total\ transported\ hydrocarbon\ energy$
3. NGSI intensity and GHG intensity numerators from step 1 are divided by the respective denominators in step 2 to calculate "handled" intensities for the combined production and G&B segments	$\textbf{Combined NGSI} = \frac{CH_4\ emissions_{pro+G\&B}}{CH_4\ mass_{pro+G\&B}}$	$\textbf{Combined GHG intensity} = \frac{GHG\ Emissionss_{pro+G\&B}}{Hydrocarbon\ energy_{pro+G\&B}}$