

Greenwheel Insights

Drilling Down: Understanding and assessing oil and gas companies' emissions data and targets



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Executive Summary

Companies are increasingly under pressure from regulators, investors, and consumers to report high-quality greenhouse gas emissions data, but the world of carbon accounting is opaque and confusing for investors.

While a number of oil and gas companies report emissions and have set reduction targets, their clarity and comparability varies widely. Reported data is not always in line with international standards and best practice, which themselves are often out of date or subjected to other limitations.

This complexity makes it difficult for investors to interpret companies' emissions data and targets, potentially limiting their ability to accurately value companies and meaningfully engage on climate-related topics.

This paper aims to **equip investors with the knowledge and tools necessary to better understand and assess companies' reported emissions data and targets.**

This report is for guidance only. It is correct as of July 2024, but investors should do their own research and due diligence on specific companies.

Over six sections (GHGs, Global Warming Potential, Organisational Boundaries, Defining and Estimating Scope 3 Emissions, Defining and Estimating Scope 2 Emissions, and Data Assurance Levels), this paper **defines terms, outlines best practices and industry standards, and identifies key questions for investors** (on the following page) to ask when interrogating emissions reporting and targets by oil and gas companies.

There are **three core principles for investors to consider** when interpreting emissions data:

-Be clear on what is reported: the emissions scopes, sources, and types reported under similar titles vary widely by company.

-Methods vary: emissions estimates between companies are rarely equivalent or comparable due to different methodologies and inclusion of different emissions sources.

-External assurance: receiving external assurance is an indicator of more reliable data, but different levels of assurance provide different levels of confidence.

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Key Questions for Investors

Section	Key Questions for Investors
Greenhouse Gases (GHGs) Included	<ul style="list-style-type: none"> - How does the company determine which gases are 'significant' enough to include in their reporting and targets? <ul style="list-style-type: none"> o <i>Does the company use a threshold based on total emissions or CO₂ equivalent (CO₂e) emissions? Is inclusion or exclusion in reported data based on data availability?</i> o <i>Does this differ between Scopes 1, 2, and 3 emissions?</i> - Does the company track their non-reported emissions? <ul style="list-style-type: none"> o <i>Does the company collect data on GHG emissions that they do not report?</i> o <i>Does this differ between Scopes 1, 2, and 3 emissions?</i>
Global Warming Potential (GWP) Factors Used	<ul style="list-style-type: none"> - Does the company use the same source for GWP factors for all non-CO₂ GHGs? <ul style="list-style-type: none"> o <i>If not, why not?</i> o <i>How would CO₂e emissions change if the same source was used across all GHGs?</i> - How would the company's reported emissions and targets change if the most recent GWP factors are applied? <ul style="list-style-type: none"> o <i>The most recent factors were published by the IPCC in 2021 (AR6), while current sector guidance recommends factors that predate this. Future guidance updates may include updates to recommended GWP factors.</i>
Organisational Boundaries	<ul style="list-style-type: none"> - Is there a significant difference between emissions reported using different organisational boundaries? <ul style="list-style-type: none"> o <i>If a company only reports against one organisational boundary definition, does it still estimate emissions using other boundaries?</i> o <i>If a company has set a target based on operational control boundaries, how much of its equity interests are excluded from its emissions reduction target?</i> - For any emissions target set using one boundary definition, what would be the implied target when viewed through an alternative boundary definition? <ul style="list-style-type: none"> o <i>For example, if a 20% emissions reduction target is set under an operational control boundary, what is the implied reduction under an equity share boundary?</i> - For any emissions targets set using one boundary definition, what actions would be required to achieve the same target applied to another boundary definition? <ul style="list-style-type: none"> o <i>For example, if a 20% emissions reduction target is set under an operational control boundary, what actions would be required to achieve a 20% emissions reduction under an equity control boundary?</i>

Defining and Estimating Scope 3 Emissions	<ul style="list-style-type: none"> - Which categories of Scope 3 emissions does the company report on, if any? <ul style="list-style-type: none"> o <i>How is that reflected in their emissions target(s)?</i> - If the company does not report or set targets using the 'sales' method, what is the reasoning? <ul style="list-style-type: none"> o <i>For example, is the 'production' method more appropriate because their sales of hydrocarbon products purchased from other companies is not significant? Is the 'throughput' method more appropriate because the company primarily processes and handles hydrocarbon products owned by other companies?</i> - Does the company's reported emissions and targets include emissions from non-energy products? <ul style="list-style-type: none"> o <i>Does this differ between emission scopes or targets?</i>
Defining and Estimating Scope 2 Emissions	<ul style="list-style-type: none"> - Does the company report location-based Scope 2 emissions? If not, why not? <ul style="list-style-type: none"> o <i>If not, do they collect this data internally?</i> - What is the difference between the company's location-based and market-based Scope 2 values? <ul style="list-style-type: none"> o <i>Does the company rely heavily on renewable energy certificates and similar instruments to bring down their market-based values?</i> - For companies with targets based on the market-based method, to what extent does this rely on measures that would also reduce location-based emissions? <ul style="list-style-type: none"> o <i>For example, would this target be met to some degree through building or contracting new renewable energy capacity on the same grids where the company will use electricity? Or does the company assume these grids will decarbonise significantly without their intervention? Or is it assumed that renewable energy certificates (or similar) will drive most progress toward a market-based Scope 2 target?</i>
Data Assurance Levels	<ul style="list-style-type: none"> - What form of assurance has the company sought for the data it collects and reports? - If the company has limited assurance for emissions data (Scope 1, 2 and/or 3), does it aim to seek reasonable assurance in future? <ul style="list-style-type: none"> o <i>If not, why not?</i> - If the company has no assurance for its Scope 3 emissions, does it aim to seek at least limited assurance in future? <ul style="list-style-type: none"> o <i>If not, why not?</i>

Introduction

Increasingly, **pressure from investors, consumers, and regulators is moving from *whether* companies should report on their emissions to *how best* to report.** This shift reflects the understanding that high-quality reporting is a key enabler for targeting and achieving emissions reductions. However, the world of emissions reporting and target-setting can be complex and opaque.

Several oil and gas companies report emissions and have set emission reduction targets, but their coverage and definition vary.

This paper aims to **equip investors with the knowledge and a simple framework to better understand and assess companies' reported emissions data and targets.** We provide evidence on the reporting and target-setting boundaries and definitions used by ten oil and gas majors (Shell, bp, Chevron, Aramco, Total, ExxonMobil, Eni, ConocoPhillips, Equinor and Petrobras) for key emissions metrics.

Over six sections (GHGs Included, Global Warming Potential Factors Used, Organisational Boundaries, Defining and Estimating Scope 3 Emissions, Defining and Estimating Scope 2 Emissions, and Data Assurance Levels), this paper **defines terms, outlines best practices and industry standards, and identifies key questions for investors** when interrogating emissions reporting and targets by oil and gas companies. This paper can be used to supplement the Excel-based **Greenwheel Transition Pathways Tool (GTPT)**. The GTPT compares reported data and relevant targets to key Net Zero transition scenarios, including the IEA's Net Zero by 2050 and the One Earth Climate Model (OECM) 1.5 Degree scenarios.

Emissions Reporting Standards and Frameworks for the Oil and Gas Sector

The Greenhouse Gas (GHG) Protocol is the most common set of accounting principles for companies to measure, manage, and report GHG emissions from their operations and value chains.ⁱ It is considered the international standard for GHG accounting and reporting, but is also **subject to limitations for companies with complex operations – such as integrated oil and gas companies – particularly around Scope 3** measurement and reporting.ⁱⁱ

The International Petroleum Industry Environmental Conservation Association (Ipieca), American Petroleum Institute (API), and the International Association of Oil and Gas Producers (IAOGP) work together to publish the **Petroleum Industry Guidelines for Reporting Greenhouse Gas Emissions** (henceforth, the Ipieca Guidelines or Ipieca) to provide **sector-specific guidance for measuring, managing, and reporting GHG emissions in line with the GHG Protocol.**ⁱⁱⁱ

Emission Scopes

Emissions are broken into three scopes for GHG reporting and target setting. As shown in Figure 1 below, the use of scopes separates direct and indirect emissions sources across a company's value chain to help classify and understand their emissions.^{iv} **Understanding this system helps investors interpret a company's reported emissions and targets, as well as assess their thoroughness, credibility, and rigor.**

- **Scope 1 emissions are the direct GHG emissions that occur from sources owned or controlled by the company.** They are the GHGs a company puts into the atmosphere from its owned or controlled property.^v
- **Scope 2 emissions are the indirect GHG emissions from the generation of purchased electricity consumed by the company.** They are considered "indirect" because the emissions occur at power plants outside of the company's ownership or control.^{vi}
- **Scope 3 emissions are the indirect GHG emissions not included in Scope 2.** They result from a company's activities – such as their supply chain or use of the products they sell - but occur from sources neither owned nor controlled by the company. See Appendix 1 for how scope 3 emissions can be further categorised.^{vii}

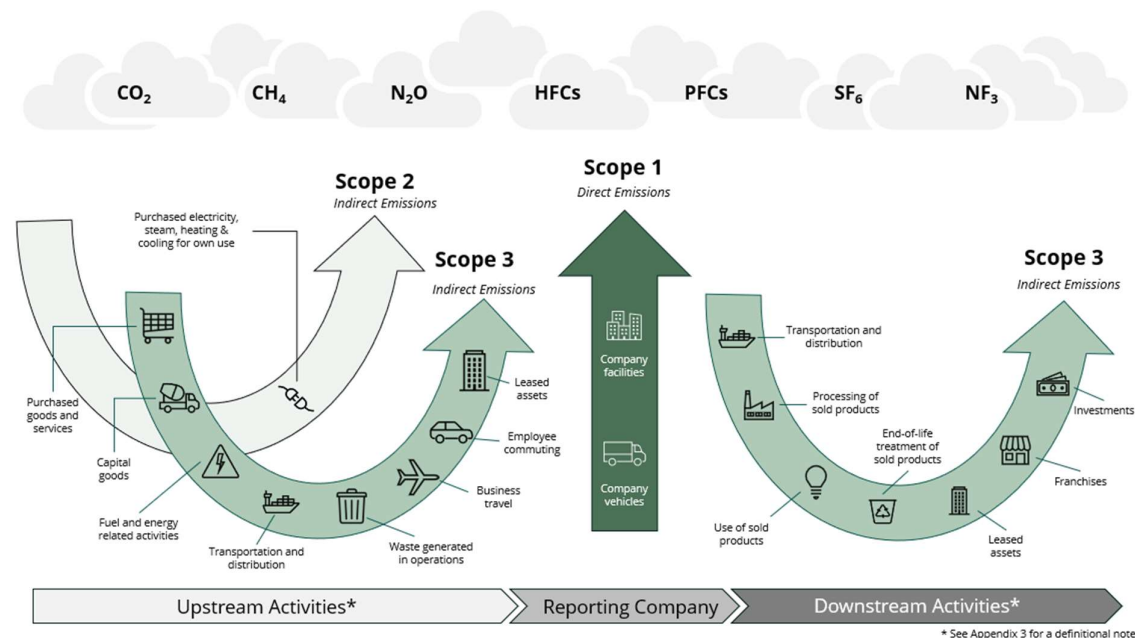


Figure 1: GHG Sources and Scopes Schematic (Source: *GHG Protocol*, n.d.). Graphic created by Greenwheel.

Greenhouse Gases (GHGs) Included

The Ipeica Guidelines recommend the inclusion of all seven greenhouse gases (GHGs) recognised by the Kyoto Protocol: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF₆), as well as nitrogen trifluoride (NF₃), **if they are significant.**^{viii}

The inclusion or exclusion of different GHGs should reflect their significance to the total GHG emissions of an oil and gas company based on its activities: generally, **CO₂ and CH₄ are the most material emissions sources.**¹ **Oil and gas companies vary on which emissions they include in their GHG reporting.** This reflects the ambiguity of the Guidelines: there is no definition of what makes a GHG “significant.”

All companies considered in this paper include CO₂ and CH₄, while some also include N₂O and other gases such as HFCs and SF₆. Figure 2 below summarises the GHGs included in emissions reporting and targets by company.

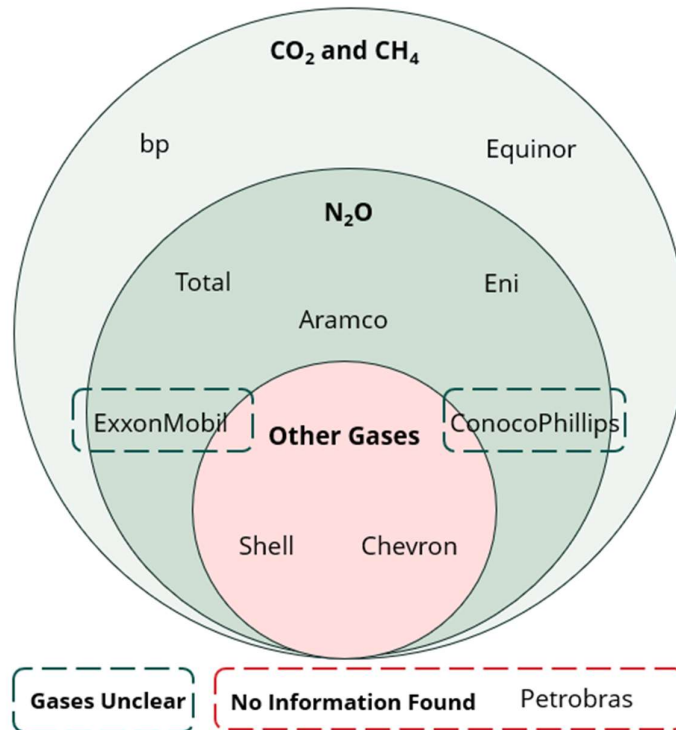


Figure 2: GHGs Included in Emissions Reporting and Targets. Other gases include PFCs, HFCs, SF₆, and NF₃. For ExxonMobil and ConocoPhillips, it seems that CO₂, CH₄, and N₂O are covered, but it is not clear from their reporting. Graphic created by Greenwheel. The information shown above is for illustrative purposes only and is not intended to be, and should not be interpreted as, recommendations or advice.

Key questions for investors on GHGs

- **How does the company determine which gases are ‘significant’ enough to include in their reporting and targets?**
 - o Does the company use a threshold based on total emissions or CO₂ equivalent (CO₂e) emissions? Is inclusion or exclusion based on data availability?
 - o Does this differ between Scopes 1, 2, and 3 emissions?

¹ N₂O is relatively insignificant, while HFCs, PFCs, and SF₆ may or may not be significant depending on operations. N₂O is emitted in small amounts from the combustion of fossil fuels. HFCs and PFCs may be used in refrigeration and solvents. SF₆ may be used in electrical equipment. NF₃ is usually associated with emissions from electronics manufacturing and is thus usually insignificant for oil and gas companies.

- **Does the company track their non-reported emissions?**
 - o Does the company collect data on GHG emissions that they do not report?
 - o Does this differ between Scopes 1, 2, and 3 emissions?

Global Warming Potential (GWP) Factors Used

Global Warming Potential (GWP) factors allow us to compare the global warming impacts of different gases relative to CO₂ by expressing them in a single unit: carbon dioxide *equivalents* (CO₂e). The larger the GWP, the greater the warming effect.

GWP factors are published and updated in each of the IPCC’s Assessment Reports (ARs), as scientific knowledge improves. The GHG Protocol recommends the use of GWP factors from the 2014 AR5 report, while Ipieca recommends the use of GWP factors from the 2007 AR4 report.^{ix} Despite being published more recently, Ipieca recommends the use of older GWP factors than the GHG Protocol. The most recent GWP factors were published in AR6 in 2021. **Both the GHG Protocol and the Ipieca Guidelines recommend the use of outdated GWP factors, which are likely to be updated in future iterations.** The GHG Protocol will be updated in 2025.^x

The choice of GWP factors can have significant impacts on estimated CO₂e emissions, as shown in Table 1. For oil and gas companies, **the choice of GWP factor for methane will likely have the largest impact on their total CO₂e calculation.**^{xi} Although the change in value between AR5 (GHG Protocol) and AR6 is small, the difference between AR4 (Ipieca) and AR6 is more significant.

	GWP Factors from AR4	GWP Factors from AR5	GWP Factors from AR6
Carbon Dioxide	1	1	1
Methane	25	28	27.9
Nitrous Oxide	298	265	273
HFCs²	124-14,800	4-12,400	4-14,600
PFCs²	7,390-12,200	6,630-11,100	7,380-12,400
Sulphur Hexafluoride	22,800	23,500	24,300
Nitrogen Trifluoride	17,200	16,100	17,400

Table 1: GWP Factors over 100 Years (Source: *GHG Protocol*, 2020; *IPCC AR6 WG1*, 2021; *IPCC AR6 WG1 Supplementary Materials*, 2021).

Figure 3 below demonstrates that the companies assessed in this paper use a variety of GWP factors when calculating their GHG emissions. Some companies use GWP factors from different ARs for different gases, but it is not always clear which iteration of factors were used for which gas.

² There are many HFCs and PFCs, each with their own GWP factors.

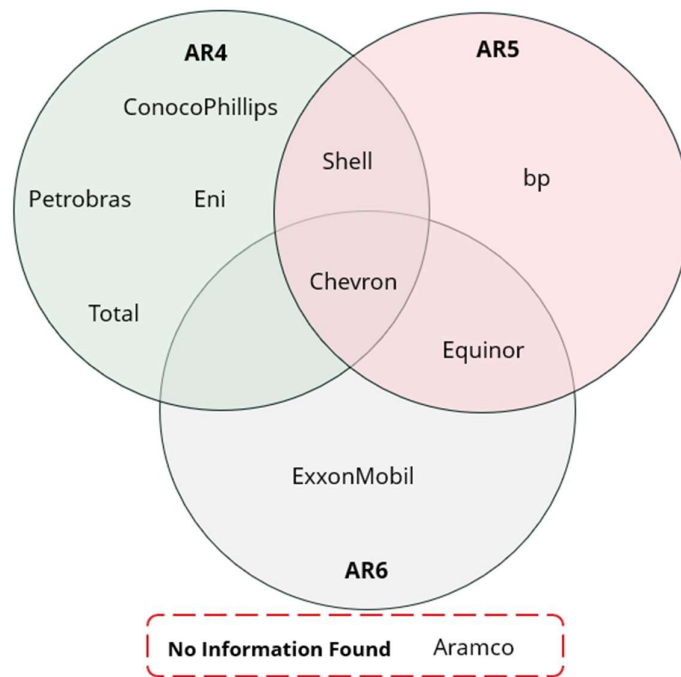


Figure 3: Oil and gas companies use GWP factors from different AR iterations. Some companies use GWP factors from multiple ARs for different gases. Graphic created by Greenwheel.

Key questions for investors on Global Warming Potential

- **Does the company use the same source for GWP factors for all non-CO₂ GHGs?**
 - o *If not, why not?*
 - o *How would CO₂e emissions change if the same source was used across all GHGs?*

- **How would the company's reported emissions and targets change if the most recent GWP factors are applied?**
 - o *The most recent factors were published by the IPCC in 2021 (AR6), while current sector guidance recommends factors that predate this. Future guidance updates may include updates to recommended GWP factors.*

Organisational Boundaries

Per the Ipieca Guidelines and the GHG Protocol, a company has three options for defining its organisational boundaries for Scope 1 and 2 emissions, as shown in Figure 4 below. The appropriate methodology depends on organisational structure: **the equity share approach tends to be most appropriate for complex organisations like integrated oil and gas companies**, while operational control is commonly used for companies with relatively simple operations and value chains. Complex organisations, regardless of sector, tend to have equity interest in many entities outside of their operational control.



Figure 4: Options for Defining Organisational Boundaries (Source: Ipieca, 2016; Corporate Accounting and Reporting Standard, 2004; US EPA, 2016). Graphic created by Greenwheel.

Equity share reflects economic interest, or the extent of rights an organisation has to the risks and rewards related to an operation. An organisation has **financial control** if it can direct the operation’s financial and operating policies. If using financial control to establish organisational boundaries, the organisation does not account for GHG emissions from operations it owns equity in but does not have financial control over. If using **operational control**, the organisation does not account for GHG emissions from operations it owns equity in but does not have operational control over.^{xii}

The **choice of organisational boundary has a significant influence on which emissions a company reports and how they are reported**, although the equity share and financial control approach are very similar. Table 2 below shows how different types of entities and assets would be considered in an emissions inventory under the three different approaches.

Entity or Asset	Equity Share	Financial Control	Operational Control
Wholly Owned Asset	100%	100%	100%
Group Company, Subsidiary, or Franchise	Equity Share	100% if controlled; 0% if not	100% if controlled; 0% if not
Joint Venture or Partnership	Equity Share	Equity Share	100% if controlled; 0% if not
Associated or Affiliated Company	Equity Share	100% if controlled; 0% if not	0%
Leased Asset – Finance or Capital Lease	100%	100%	100%
Leased Asset – Operating Lease	0%	0%	100% if controlled; 0% if not

Table 2: Organisational boundaries determine how emissions from entities and assets are included. (US EPA, 2023).

A company’s Scope 3 emissions are the emissions from the value chain of the entities included in Scopes 1 and 2, according to the organisational boundary selected. Emissions from entities that are excluded from Scopes 1 and 2 under the operational control boundary should be reported as Scope 3 emissions. However, most companies do not report the Scope 3 categories (14 and 15) that would cover these entities.

Therefore, **the emissions from certain types of operations and assets may be excluded when operational control boundaries are used.** This is due to ambiguity in guidance recommendations and the practical barriers to comprehensively estimating Scope 3 emissions across all categories. Thus, **the organisational boundary determines which value chain emissions are ultimately covered by Scope 3 or excluded from a company's emissions estimates altogether.**

While operational control is the most common because it is the easiest to estimate and best reflects the activities a company can control, industries with complex ownership structures may use the equity share approach to better align the reporting boundary with stakeholder interests and their financial reporting. **While many companies assessed in this paper report emissions under both operational and equity share boundaries, they tend to use operational control boundaries for their targets,** shown in Figure 5 and Figure 6 below.

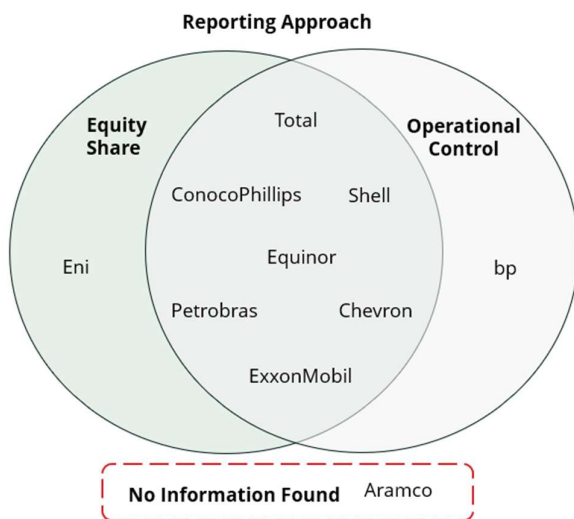


Figure 5: Reporting Approach to Organisational Boundaries. Please see Appendix 2 for more context on Shell, Petrobras, and Equinor. Graphic created by Greenwheel.

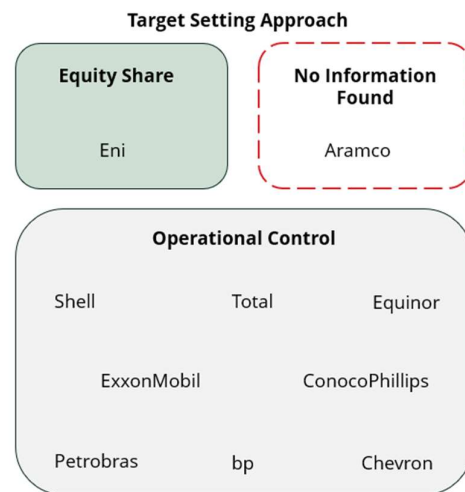


Figure 6: Target Setting Approach to Organisational Boundaries. Graphic created by Greenwheel.

Key questions for investors on organisational boundaries:

- **Is there a significant difference between emissions reported using different organisational boundaries?**
 - o If a company only reports against one organisational boundary definition, does it still estimate emissions using other boundaries?
 - o If a company has set a target based on operational control boundaries, how much of its equity interests are excluded from its emissions reduction target?

- **For any emissions target set using one boundary definition, what would be the implied target when viewed through an alternative boundary definition?**
 - o *For example, if a 20% emissions reduction target is set under an operational control boundary, what is the implied reduction under an equity share boundary?*

- **For any emissions targets set using one boundary definition, what actions would be required to achieve the same target applied to another boundary definition?**
 - o *For example, if a 20% emissions reduction target is set under an operational control boundary, what actions would be required to achieve a 20% emissions reduction under an equity control boundary?*

Defining and Estimating Scope 3 Emissions

Scope 3 emissions include all indirect emissions not included in Scope 2 that stem from an organisation’s upstream and downstream activities.³ The GHG Protocol categorises Scope 3 emissions into 15 categories, illustrated in Appendix 1. An oil and gas company’s **Scope 3 emissions will vary depending on the selected organisational boundary, as well as the company’s structure and operations.**^{xiii}

Scope 3 Category 11 (use of sold products) is usually the most significant source of emissions for oil and gas companies: for most, it will be larger than Scope 1 and Scope 2 emissions combined. It is also **generally the only Scope 3 category that oil and gas companies report on.** It is uniquely difficult to estimate this category for integrated oil and gas companies because its components could also be included in almost any other Scope 3 category.^{xiv}

To estimate emissions from the use of sold products, companies must first determine the quantity of products sold. For exploration and production companies, products sold include the total crude and natural gas produced. For refineries, it includes the refinery products sold. For retailers, it includes retail products sold. However, it is more **difficult to determine sold products for integrated oil and gas (IO&G) companies because they sell products at several points**, shown in Figure 7 below.

Ipieca and the CDP⁴ suggest that IO&G companies use **net volume accounting**, where they choose where in the value chain the largest total volume of hydrocarbons is transferred. The three points, as labelled in Figure 7 below are:^{xv}

1. Crude Produced⁵ (**Production Method**): a company may produce different quantities of product than it sells. **The production method can be used if the sale of hydrocarbon products purchased from other companies is not significant.**

³ See Appendix 3 for a definitional note on upstream and downstream.

⁴ The CDP, formerly the Carbon Disclosure Project, is an environmental disclosure regime.

⁵ Although the title is ‘crude’, it also includes natural gas.

2. Refinery Throughput (**Throughput Method**): the throughput method is recommended for companies which handle or process oil and gas products but do not own the products themselves.
3. Retail and Commercial Operations (**Sales Method**): **this is the preferred method**, per the Ipieca Guidelines and the CDP.^{xvi} A company may sell different quantities of product than it produces. **The sales method can be used if the sale of hydrocarbon products purchased from other companies is significant.**

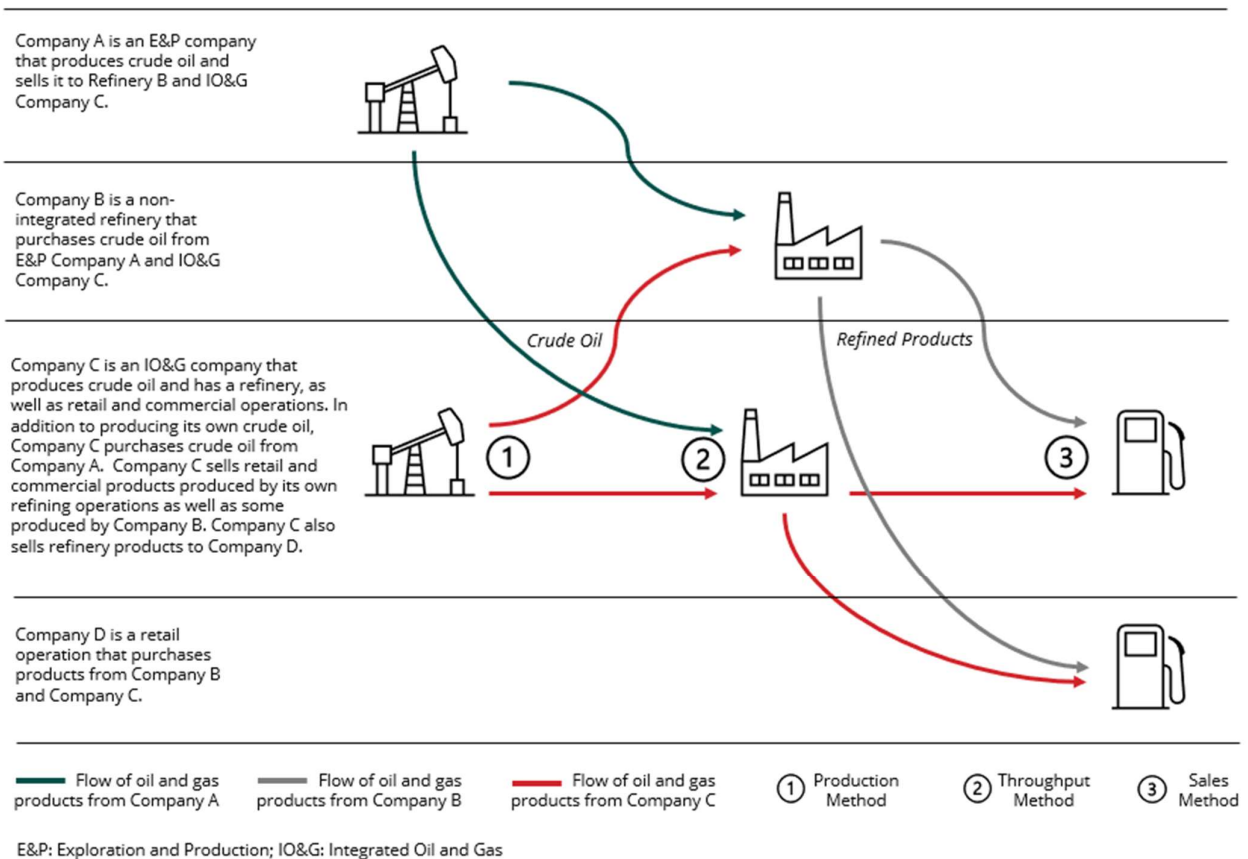


Figure 7: This simplified diagram demonstrates the complexities of IO&G company operations. (Source: [Ipieca, 2016](#)).

Companies assessed in this paper use a variety of methods, shown in Figure 8 below. While some companies have Scope 3 targets, no company in this paper has target that seeks to reduce Scope 3 emissions in absolute terms across the use of all sold products, as shown in Figure 9 below.

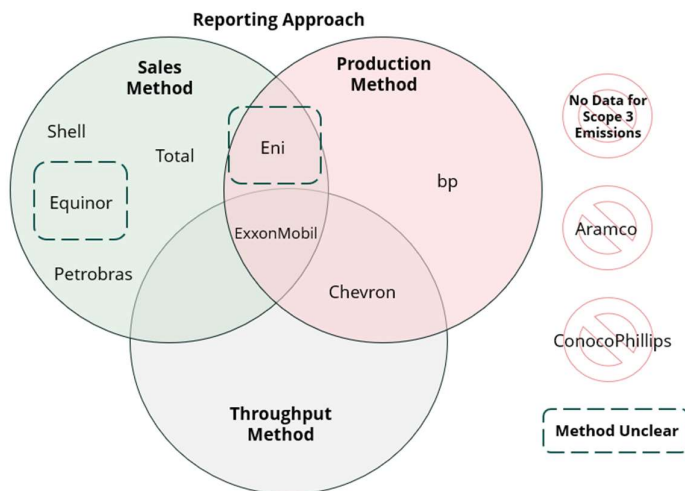


Figure 8: Reporting Approaches to Scope 3 Methodologies. For Eni and Equinor, their methods were not entirely clear from their reporting. It seems that Equinor reports using the sales method while Eni uses both the production and the sales method. Graphic created by Greenwheel.

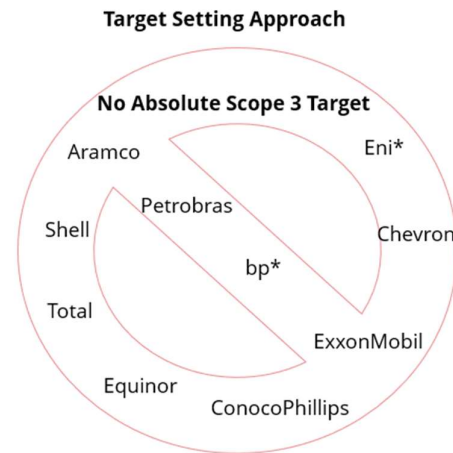


Figure 9: Absolute Scope 3 Target-Setting. Graphic created by Greenwheel.

Oil and gas products also have non-energy uses, for example as a feedstock for petrochemical production. Companies should include Scope 1 and 2 emissions associated with the production of non-energy products but can opt to exclude them from their Scope 3 Category 11 (use of sold products) emissions estimates. This approach is aligned with the Science-Based Targets Initiative and reflects the complexity and uncertainty around calculating Scope 3 emissions, as well as the likely minimal emissions from the use of non-combustible products. In practice, **it is often unclear if these exclusions only apply to Scope 3 Category 11 or are relevant across all reported emissions and targets.**^{xvii}

Key questions for investors on Scope 3:

- **Which categories of Scope 3 emissions does the company report on, if any?**
 - o How is that reflected in their emissions target(s)?
- **If the company does not report or set targets using the 'sales' method, what is the reasoning?**
 - o For example, is the 'production' method more appropriate because their sales of hydrocarbon products purchased from other companies is not significant? Is the 'throughput' method more appropriate because the company primarily processes and handles hydrocarbon products owned by other companies?
- **Does the company's reported emissions and targets include emissions from non-energy products?**
 - o Does this differ between emission scopes or targets?

Defining and Estimating Scope 2 Emissions

When reporting Scope 2 emissions, the GHG Protocol states that **companies must use a location-based method to allocate emissions from electricity generation to end users but can also include, in parallel, a market-based method.**

A **location-based method** reflects the average emissions intensity of the grids where companies consume electricity: it offers transparency on the physical emissions from a company's electricity consumption. A **market-based method** reflects the emissions from generating the electricity a company has purchased: it derives emissions factors from contractual instruments, such as energy attribute certificates (e.g., renewable energy certificates)⁶, and does not necessarily reflect the emissions intensity of the electricity a company actually consumes.^{xviii}

In other words, **a market-based approach allows companies to claim lower Scope 2 emissions than a location-based approach, because it accounts for any renewable energy certificates the company may buy, even if these certificates and contracts aren't directly attached to the power a company uses at any given time or place.**

As shown in Figure 10 and Figure 11 above, the **oil and gas companies assessed tend to report both market- and location-based Scope 2 emissions, but use the market-based approach to set Scope 2 targets.**

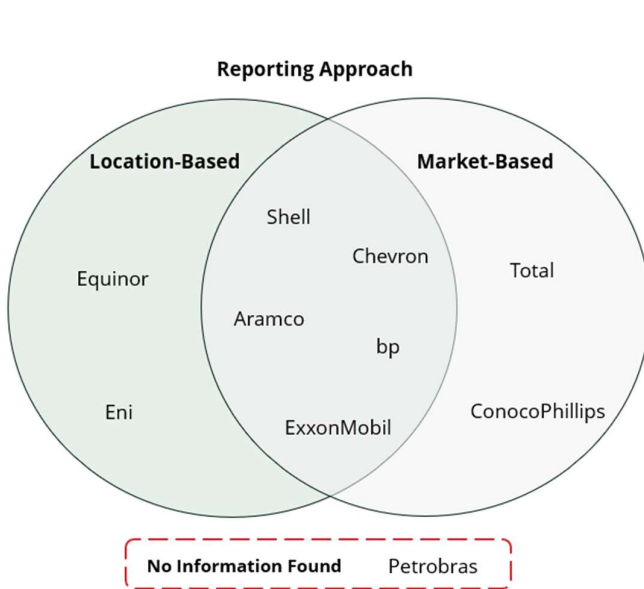


Figure 10: Location- and Market-Based Approaches for Reporting. Graphic created by Greenwheel.

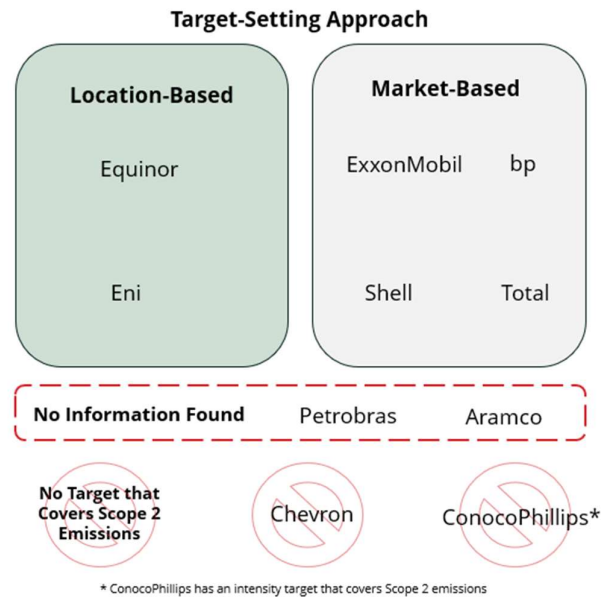


Figure 11: Location- and Market-Based Approaches for Target-Setting. Graphic created by Greenwheel.

⁶ Energy attribute certificates (EACs) are contractual instruments that are used to verify the energy and emissions associated with the production and use of a unit of energy. Renewable energy certificates (RECs) are an accounting mechanism used to assign generation from renewable generation to their holders, and are often traded entirely separately to the generation they were originally attached to. They are unlikely to add new renewable capacity and often do not translate to real emissions reductions.

Key questions for investors on Scope 2 emissions:

- **Does the company report location-based Scope 2 emissions? If not, why not?**
 - o *If not, do they collect this data internally?*

- **What is the difference between the company's location-based and market-based Scope 2 values?**
 - o *Does the company rely heavily on renewable energy certificates and similar instruments to bring down their market-based values?*

- **For companies with targets based on the market-based method, to what extent does this rely on measures that would also reduce location-based emissions?**
 - o *For example, would this target be met to some degree through building or contracting new renewable energy capacity on the same grids where the company will use electricity? Or does the company assume these grids will decarbonise significantly without their intervention? Or is it assumed that renewable energy certificates (or similar) will drive most progress toward a market-based Scope 2 target?*

Data Assurance Levels

Assurance is conducted by independent third parties and can include verifying that the company's reported data is accurate, assumptions are reasonable, and data processes are effective. Ultimately, the conclusion an assurance process reaches depends on the type of assurance conducted.^{xix} Investors should be aware of the differences between limited and reasonable assurance, shown in Table 3 below.

	Limited Assurance	Reasonable Assurance
Emissions Coverage	Audit emissions sources that cover 80-85% of total GHG emissions reported by the company	Audit emissions sources that cover 90-95% of total GHG emissions reported by the company
Positive or Negative Conclusion	Negative (i.e., no evidence has been found to suggest that the information is materially misstated or false)	Positive (i.e., the information is fairly stated or correct in all material respects)
Evidence	Less evidence required A small sample size is used and only certain emission sources within it are audited	More evidence required and pursued more in-depth A large sample size is used to audit the emissions sources
Data Scrutiny	Assumes that input data, collection and reporting processes are reliable	Assesses the existence, design, and effectiveness of the data control systems

Perception of Credibility	Low/Moderate: limited confidence in the conclusion	Moderate/High: high level of confidence in the conclusion
Comparability to Financial Reporting	Similar to an interim or limited review of financial statements	Similar to an audit opinion
Inaccuracy Risk	Higher risk of inaccuracy	Lower risk of inaccuracy

Table 3: Key Differences Between Limited and Reasonable Assurance (Source: [Saunders, 2023](#); [KPMG, 2024](#); [The Carbon Trust, n.d.](#); [Gruitt, 2024](#); [ICAEW, n.d.](#); [CFA Institute, 2024](#)). The information shown above is for illustrative purposes only and is not intended to be, and should not be interpreted as, recommendations or advice.

It may be helpful to compare emissions auditing to auditing of financial statements. **Reasonable assurance is similar to an audit opinion.** Much as an audit opinion lets an investor know that financial statements have been prepared correctly, are reasonably stated and materially correct, reasonable assurance offers confirmation that the **emissions data meets relevant criteria, is materially correct, and not materially misstated.**

Limited assurance is similar to an interim or limited review of financial statements. It expresses whether the provider is aware of any material modifications that should be made to align with disclosure requirements. It is **less rigorous than reasonable assurance**, but still provides some level of confidence in the emissions data.

Assurance helps companies better comply with sustainability-related regulations, standards, and frameworks, as shown in Table 4 below. **Assurance is not part of the GHG Protocol or Ipieca guidelines but is considered best practice.** It is particularly important for companies that fall under the Corporate Sustainability Reporting Directive (CSRD): **failure to comply reporting regulations is a significant source of potential risk.**

Mechanism	Type	Jurisdiction	Assurance Requirements
Taskforce on Climate Related Financial Disclosures (TCFD)	Framework/ regulation	Regulatory requirement in UK for large listed and financial companies; used globally as voluntary framework	Assurance is not required
CDP	Framework/ disclosure platform	Global	Assurance is not required to disclose using CDP, but assurance of emissions data is necessary to receive an 'A' score and be awarded Leadership Points
GHG Protocol	Standard	Global	Assurance is not required

Ipieca Guidelines	Standard	Global	Assurance is not required
ISSB	Standard	Global	Assurance requirement is based on the jurisdiction's requirements
Global Reporting Initiative (GRI)	Standard	Global	Assurance is encouraged but not required
Transition Plan Taskforce	Standard	TPT	Assurance is not required
Corporate Sustainability Reporting Directive (CSRD)	Regulation	EU	Limited assurance required, reasonable assurance may be required in the future
Security and Exchange Commissions (SEC) Rule	Regulation	US	Limited assurance on Scope 1 and 2 emissions required, reasonable assurance to be required in the future

Table 4: Assurance Requirements for Sustainability-Related Regulations, Standards, and Frameworks (Source: *The Carbon Trust, n.d.; SEC, 2024; Ipieca, 2011; GHG Protocol, 2004*).

Limited assurance is most appropriate for companies where the risk of a material misstatement is low and the cost of reasonable assurance is prohibitive, such as for small, office-based businesses. **Given the significance of emissions and size of oil and gas companies, obtaining a reasonable assurance is more appropriate.**

For Scope 1 and Scope 2 data, the oil and gas companies assessed in this paper use different types of assurance, as shown in Figure 12 below. **For Scope 3 data, these companies tend to have either limited assurance or no assurance**, as shown in Figure 13. **No assurance means that there has been no external verification that the company's data is accurate, assumptions are reasonable, and processes are effective.**

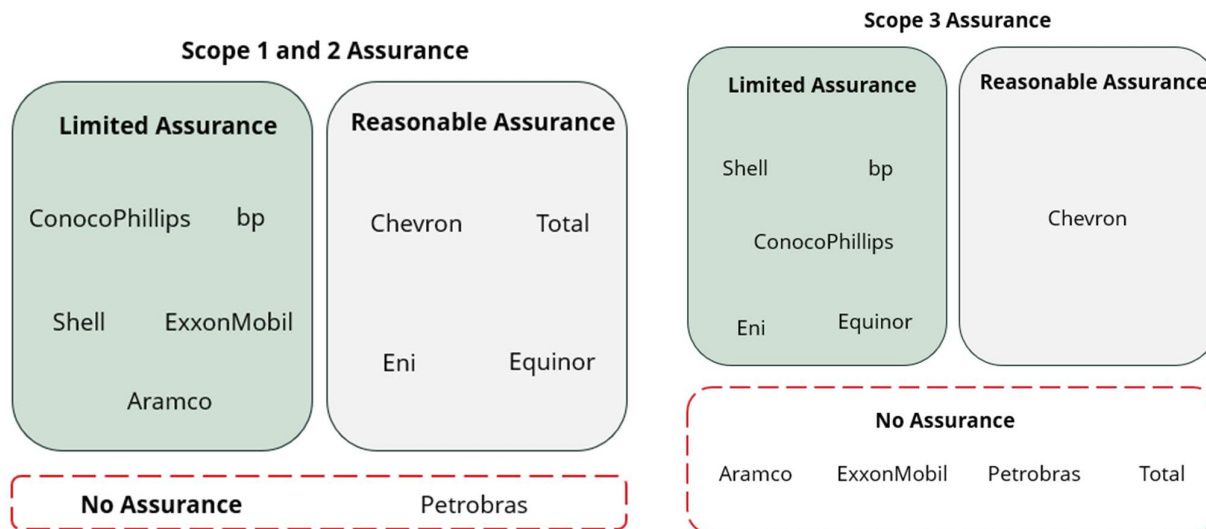


Figure 12: Assurance Levels for Scopes 1 and 2. Graphic created by Greenwheel.

Figure 13: Assurance Levels for Scope 3. Graphic Created by Greenwheel.

Key questions for investors on data assurance:

- **What form of assurance has the company sought for the data it collects and reports?**
- **If the company has limited assurance for emissions data (Scope 1, 2 and/or 3), does it aim to seek reasonable assurance in future?**
 - o *If not, why not?*
- **If the company has no assurance for its Scope 3 emissions, does it aim to seek at least limited assurance in future?**
 - o *If not, why not?*

Appendix

Appendix 1: Scope 3 Categories

Upstream or Downstream	Category	Description
Upstream	1: Purchased Goods and Services	Extraction, production, and transportation of goods and services purchased or acquired by the reporting company in the reporting year, not otherwise included in Categories 2-8
	2: Capital Goods	Extraction, production, and transportation of capital goods purchased or acquired by the reporting company in the reporting year
	3: Fuel- and Energy-Related Activities Not Included in Scopes 1 or 2	Extraction, production, and transportation of fuels and energy purchased or acquired in the reporting year, not already accounted for in Scopes 1 and 2, including: <ul style="list-style-type: none"> - Upstream emissions of purchased fuels (extraction, production, and transportation of fuels consumed by the reporting company) - Upstream emissions of purchased electricity (extraction, production, and transportation of fuels consumed in the generation of electricity, steam, heating, and cooling consumed by the reporting company) - Transmission and distribution (T&D) losses (generation of electricity, steam, heating and cooling that is consumed (i.e., lost) in a T&D system) – reported by end user - Generation of purchased electricity that is sold to end users (generation of electricity, steam, heating, and cooling that is purchased by the reporting company and sold to end users) – reported by utility company or energy retailer only
	4: Upstream Transportation and Distribution	Transportation and distribution of products purchased by the reporting company in the reporting year between a company's tier 1 suppliers and its own operations (in

		<p>vehicles and facilities not owned or controlled by the reporting company)</p> <p>Transportation and distribution services purchased by the reporting company in the reporting year, including inbound logistics, outbound logistics (i.e., of sold products), and transportation and distribution between a company's own facilities (in vehicles and facilities not owned or controlled by the reporting company)</p>
	5: Waste Generated in Operations	Disposal and treatment of waste generated in the reporting company's operations in the reporting year (in facilities not owned or controlled by the reporting company)
	6: Business Travel	Transportation of employees for business-related activities during the reporting year (in vehicles not owned or operated by the reporting company)
	7: Employee Commuting	Transportation of employees between their homes and their worksites during the reporting year (in vehicles not owned or operated by the reporting company)
	8: Upstream Leased Assets	Operation of assets leased by the reporting company (lessee) in the reporting year and not included in Scopes 1 and 2 reported by the lessee
Downstream	9: Downstream Transportation and Distribution	Transportation and distribution of products sold by the reporting company in the reporting year between the reporting company's operations and the end consumer (if not paid for by the reporting company), including retail and storage (in vehicles and facilities not owned or controlled by the reporting company)
	10: Processing of Sold Products	Processing of intermediate products sold in the reporting year by downstream companies (e.g., manufacturers)
	11: Use of Sold Products	End use of goods and services sold by the reporting company in the reporting year
	12: End-of-Life Treatment of Sold Products	Waste disposal and treatment of products sold by the reporting company in the reporting year at the end of their life
	12: Downstream Leased Assets	Operation of assets owned by the reporting company (lessor) and leased to other

		entities in the reporting year, not included in Scopes 1 and 2 – reported by the lessor
	14: Franchises	Operation of franchises in the reporting year, not included in Scopes 1 and 2 – reported by the franchisor
	15: Investments	Operation of investments (including equity and debt investments and project finance) in the reporting year, not included in Scopes 1 or 2

Appendix 2: Context on Equinor, Petrobras, and Shell

Equinor, Petrobras, and Shell estimate their Scope 3 emissions on an equity share basis. This is a unique approach to Scope 3 as typically equity share is used to define Scopes 1 and 2 organisational boundaries. After speaking with a carbon accounting professional, we give the following interpretation:

- Company A has a 20% stake in Company B. Company B will report its Scope 3 Category 11 emissions as the use of its sold products. When Company A reports on its own Scope 3 Category 11 emissions, it will include 20% of Company B's reported Scope 3 Category 11 emissions as its own.

Appendix 3: Upstream and Downstream Definitions

Term	Carbon Accounting Definition	Petroleum Industry Definition
Upstream	Indirect GHG emissions related to purchased or acquired products and services Scope 3 Categories 1-8	Activities and/or operations involving the exploration, development, and production of oil and gas
Downstream	Indirect GHG emissions related to sold products and services Scope 3 Categories 9-15	Operations involving the refining, processing, distribution, and marketing of products derived from oil and gas, including service stations

There are two sets of definitions for 'upstream' and 'downstream'. We use the carbon accounting definition to align to the GHG Protocol and Ipieca Guidelines, but it is not always clear which definition companies use (Source: [Ipieca](#), 2016).

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Endnotes

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- i [GHG Protocol](#), n.d.
 - ii [GHG Protocol](#), 2004; [Kaplan and Ramanna](#), 2021; [Kaplan and Ramanna](#), 2022
 - iii [Ipieca](#), 2016
 - iv [GHG Protocol](#), 2004
 - v [GHG Protocol](#), 2004; [Gregory and Krol](#), 2024
 - vi [GHG Protocol](#), 2004; [Gregory and Krol](#), 2024
 - vii [GHG Protocol](#), 2004; [Gregory and Krol](#), 2024
 - viii [Sustainability reporting guidance for the oil and gas industry](#), 2020; [Kyoto Protocol](#)
 - ix [PIECA Module 3](#), n.d.; [GHG Protocol](#), n.d.
 - x [GHG Protocol](#), 2023
 - xi [IEA](#), 2023; [Our World in Data](#), 2024
 - xii [Ipieca](#), 2016; [Corporate Accounting and Reporting Standard](#), 2004; [US EPA](#), 2016
 - xiii [Ipieca](#), 2016
 - xiv [Wood Mackenzie](#), 2022; [Ipieca](#), 2016; [IIGCC](#), 2024; [Farmer](#), 2021; [PwC](#), n.d.
 - xv [Ipieca](#), 2016; [CDP](#), n.d.
 - xvi [Ipieca](#), 2016; [CDP](#), n.d.
 - xvii [SBTI](#), 2020; [Total](#), 2024; [Exxon Mobil](#), 2024; [Eni](#), 2023
 - xviii [GHG Protocol](#), 2015
 - xix [The Carbon Trust](#), n.d.; [Gruitt](#), 2024; [Simic, Luo, and Datt](#), 2022

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