



GREENHOUSE GAS EMISSION INVENTORY AND REPORTING GUIDELINES FOR FACILITIES

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Abbreviations

AFOLU	Agriculture, forestry, and other land use
BAU	Business as Usual
CC	Climate change
CH ₄	Methane
CO ₂	Carbon dioxide
COP 26	The 26th session of the Conference of the Parties
DCC	Department of Climate Change
GHG	Greenhouse gas
GWP	Global warming potential
IPCC	Intergovernmental Panel on Climate Change
IPPU	Industrial processes and product use
MONRE	Ministry of Natural Resources and Environment
N ₂ O	Nitrous oxide
NDC	Nationally Determined Contributions
PA	Paris Agreement
PCAF	Partnership for Carbon Accounting Financials
TCFD	Task Force on Climate-Related Financial Disclosures
TOE	Tonne of oil equivalent
UNFCCC	United Nations Framework Convention on Climate Change
WRI	World Resources Institute

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Foreword

The primary objective of this technical guidance document is to introduce Vietnamese enterprises to greenhouse gas (GHG) accounting and help them conduct GHG emissions inventories and reporting requirements. By understanding GHG accounting, businesses will be well prepared to meet regulatory requirements while strengthening their long-term sustainability plan.

To support the Government of Vietnam's efforts to strengthen private sector competitiveness, the US Agency for International Development (USAID) is collaborating with the Ministry of Industry and Trade (MOIT) to develop this guide on greenhouse gas emission inventory and reporting along with guides focused on other climate change reporting standards. To that end, USAID engaged a consortium led by RCEE-NIRAS to prepare the following document on how to navigate greenhouse gas reporting requirements and funded the work through the USAID INVEST project. RCEE-NIRAS consulted with Vietnamese business associations to understand priorities and information needs and based on these discussions prepared the following technical guidance document which is organized into 4 parts:

- Chapter 1: Introduction to greenhouse gas emissions
- Chapter 2: Legislation on greenhouse gas emissions management in Vietnam
- Chapter 3: Development and reporting of facility-level greenhouse gas inventories in Vietnam
- Chapter 4: The impact of GHG inventory requirements on Vietnamese businesses

Introduction

Greenhouse gas (GHG) emissions are a critical issue in climate change and pose a severe threat to the environment and the global population. The main GHGs consist of carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O) and other compounds, amplifying the greenhouse effect, trapping heat within Earth's atmosphere, and leading to global warming.

GHG emissions are rapidly rising from sources such as fossil fuel combustion, industrial production, agriculture, and shifts in daily lifestyles. Notably, the use of energy derived from coal, oil, and natural gas escalates CO₂ levels in the atmosphere, majorly contributing to global temperature increases. The greenhouse effect triggers numerous significant issues, including sea level rise, habitat alterations, and heightened weather extremes. These impacts affect not just the natural environment but also global resources, economies, and community health.

To mitigate the impact of GHG emissions, international collaboration and collective efforts are imperative. Numerous countries have pledged to achieve emission reduction targets, adopt new technologies, and raise community awareness on this issue. Furthermore, the development of renewable energy and the utilization of clean energy sources are emerging as pivotal approaches to minimize the impact of GHG emissions.

At the 26th United Nations Framework Convention on Climate Change (UNFCCC) Conference of Parties (COP 26), Vietnam pledged to develop and implement strong measures to reduce GHG emissions using its own resources, along with the cooperation and support of the international community. This particularly included developed nations, in terms of finance and technology transfer, including adherence to the Paris Agreement (PA) mechanisms, aiming to achieve net-zero emissions by 2050 and reduce methane emissions by 30% by 2030 compared to 2020. To fulfill these commitments, the Vietnamese Government has implemented various measures and regulations outlining the responsibilities of economic and social entities for developing and reporting GHG emissions inventories.

This *Greenhouse Gas Emission Inventory and Reporting Guidelines for Facilities* document is designed to help businesses conduct GHG emissions inventories and reporting. The document assists businesses in meeting legal regulations and requirements related to disclosing GHG information about customers and supply chains. Additionally, it serves as the foundational step in the process of developing a company's GHG management strategy. By monitoring and reducing GHG emissions, organizations can actively contribute to global environmental protection and sustainable development efforts. Moreover, this document aids organizations in identifying and evaluating risks associated with GHG emissions. Businesses can develop risk management strategies to minimize negative impacts while developing energy-saving solutions.

Chapter 1: Introduction to greenhouse gas emissions

1.1. Key concepts

- Greenhouse gasses (GHG)

According to the Law on Environmental Protection 2020,¹ a GHG is a gas in the atmosphere causing the greenhouse effect.

According to TCVN ISO 14064-1:2018², a GHG is a gaseous constituent of the atmosphere, both natural and anthropogenic, that absorbs and emits radiation at specific wavelengths within the spectrum of infrared radiation emitted by the Earth's surface, the atmosphere, and clouds. In essence, GHGs act as a thermal blanket in the atmosphere, leading to the warming of the Earth.

GHGs include CO₂, CH₄, N₂O, hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF₆), nitrogen trifluoride (NF₃), and other gasses (e.g., Montreal Protocol refrigerant gasses or medical gasses).

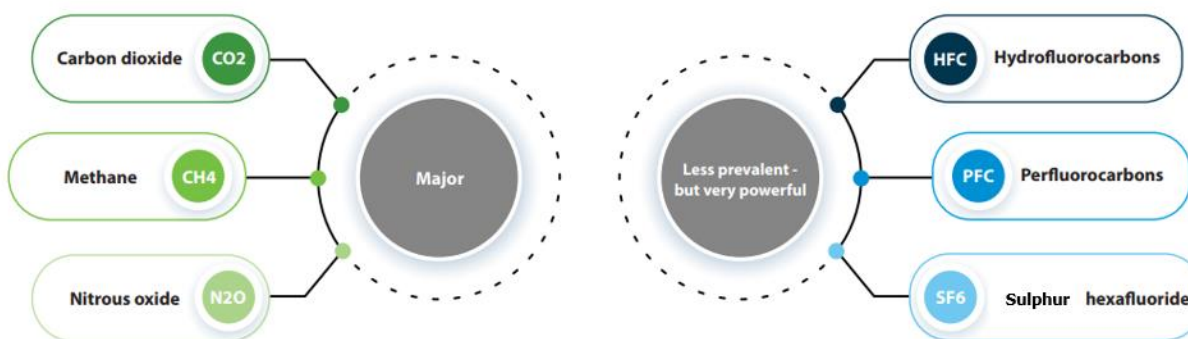


Figure 1. Six prevalent GHGs

Source: Adapted from Little book from State Securities Commission on GHG reporting: <https://ssc.gov.vnhttps://ssc.gov.vn › idcplg. Page 7>

GHG emissions originate from various sources across different industries. The energy sector is a prominent contributor, with emissions arising from the combustion of fossil fuels for electricity generation, heating, and transportation. Additionally, industrial processes such as cement production and steel manufacturing release CO₂ directly into the atmosphere. The waste sector also plays a role, with CH₄ and N₂O emissions from landfills, sewage treatment, and waste incineration. Agricultural practices, including livestock digestion, synthetic fertilizer use, and rice paddies also contribute to emissions. Table 1 illustrates sources of GHG emissions emitted from the energy, manufacturing, and chemical industries, agriculture, forestry and other land use (AFOLU), and waste.

¹ Law on Environmental Protection 2020: <https://vanban.chinhphu.vn/?pageid=27160&docid=202613&classid=1&typegroupid=3>

² ISO 14064 standard: <https://thuvienphapluat.vn/TCVN/Tai-nguyen-Moi-truong/TCVN-ISO-14064-3-2011-Khi-nha-kinh-Phan-3-tham-dinh-xac-nhan-khi-nha-kinh-912042.aspx>

Table 1: Key sources of GHG emissions³

Sources	GHG
Energy	
Energy industries	CO ₂ , N ₂ O, CH ₄
Manufacturing industries and construction	CO ₂ , N ₂ O, CH ₄
Fugitive emissions from fuels – oil and natural gas	CO ₂ , N ₂ O, CH ₄
Industrial processes and product use	
Mineral industry	CO ₂
Chemical industry	N ₂ O
Chemical industry – fluorochemical production	HFCs, PFCs, SF ₆ and other halogenated gases
Electronics industry	SF ₆ , PFCs, HCFs and other halogenated gases
Product uses as substitutes for ozone-depleting substances – refrigeration and air conditioning	HFCs, PFCs
Agriculture, forestry, and other land use	
Manure management	CH ₄ , N ₂ O
Land converted to forest land	CO ₂
Biomass burning	CH ₄ , N ₂ O
Waste	
Solid waste disposal	CH ₄
Biological treatment of solid waste	CH ₄ , N ₂ O
Incineration and open burning of waste	CO ₂ , N ₂ O, CH ₄
Wastewater treatment and discharge	CH ₄ , N ₂ O
Miscellaneous	
Indirect N ₂ O emissions from the atmospheric deposition of nitrogen in NO _x and NH ₃	Indirect N ₂ O
Other	CO ₂ , N ₂ O, CH ₄ , SF ₆ , PFCs, HCFs

³ 2006 IPCC Guidelines, Volume 1 General Guidance and Reporting, chapter 4 Methodological Choice and Identification of Key, Table 4.1

- Global Warming Potentials (GWP)

GWP is a metric to compare the ability of each GHG to trap heat in the atmosphere (relative to CO₂) over a given time. GHGs differ in their ability to absorb energy (their 'radiative efficiency') and how long they stay in the atmosphere (known as their 'atmospheric lifetime'). This difference is reflected in their GWP value. The larger the GWP, the more that a given gas warms the earth compared to CO₂ over a similar time period. GWP values are detailed in the Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report and summarized in Table 2.

Table 2: Global Warming Potential Values Relative to CO₂

Chemical formula	GWP values for 100-year time	Source
CO ₂	1	Sixth Assessment Report, IPCC, 2021 ⁴
CH ₄ – fossil fuel	29.8	
CH ₄ – non fossil fuel	27.0	
N ₂ O	273	
SF ₆	25,184	
NF ₃	17,423	
PFC	Fluctuates	
HFC	Fluctuates	

- Carbon dioxide equivalent (CO_{2e})

Carbon dioxide equivalent, abbreviated to CO_{2e}, is a metric used to compare the emissions from various GHGs on the basis of their GWP, by converting amounts of other gases to the equivalent amount of CO₂ with the same global warming potential.

One tonne of CO_{2e} means the mass of GHGs converted into tonnes of CO₂ according to the GWP of those GHGs (Decree No. 06/2022/ND-CP). For example, methane has a GWP value 29.8 (Sixth Assessment Report, AR6)⁵ meaning that a leak of a tonne of methane is equivalent to emitting 29.8 tonnes of carbon dioxide. CFCs, HFCs, PFCs, and SF₆ are high GWP gasses with GWP values in the thousands or tens of thousands.⁶

One tonne of CO_{2e} could be converted to the distance of traveling by different means and products as described in Figure 2.

⁴ Sixth Assessment Report: <https://www.ipcc.ch/report/sixth-assessment-report-cycle/>

⁵ Global Warming Potential value: [https://ghgprotocol.org/sites/default/files/Global-Warming-Potential-Values%20\(Feb%2016%202016\)_1.pdf](https://ghgprotocol.org/sites/default/files/Global-Warming-Potential-Values%20(Feb%2016%202016)_1.pdf)

⁶ Glossary: Carbon dioxide equivalent, Europa, EU, https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Carbon_dioxide_equivalent



Figure 2. One tonne of CO₂e

Source: Adapted from actioncarbhone, <https://www.planete-energies.com/en/media/article/mechanisms-putting-price-carbon>

- Vietnam's commitments to tackle climate change

Vietnam has targets to reduce GHG emissions by 15.8% compared to Business as Usual (BAU) (equivalent to 146.3 million tonnes of CO₂e (MtCO₂e) with domestic resources and 43.5% with international support by 2030 as per the Nationally Determined Contributions (NDC).⁷

Vietnam is committed to achieving net-zero carbon emissions by 2050. To reach this ambitious goal, Vietnam is taking proactive steps to transition to renewable energy sources, enhance energy efficiency across various sectors, and promote sustainable practices. Efforts are being made to reduce reliance on fossil fuels such as phasing out coal-fueled power generation by 2040, with a focus on investing in solar, wind, and hydroelectric power. Figure 3 shows Vietnam's commitment to tackling climate change and achieving net-zero carbon emissions.

⁷ <https://unfccc.int/documents/622541>

Vietnam's commitments to tackle climate change



Figure 3. Vietnam's commitments to tackle climate change

- Facility

According to decision No. 01/2022/QĐ-TTg dated January 18, 2022, issued by the Prime Minister of Vietnam, a 'facility' refers to the list of greenhouse gas-emitting facilities that are required to develop a greenhouse gas inventory under the industry and trade sector.

- Business as Usual

A Business as Usual (BAU) scenario is a scientifically grounded assumption regarding the levels of greenhouse gas emissions under typical economic and societal development conditions in the future, in the absence of any mitigation measures for GHG emissions. GHG reporting programs typically require companies to develop a BAU scenario against which companies can quantify the GHG benefits of their mitigation measures and establish GHG reduction targets.

1.2. Global standards related to GHG emissions accounting and reporting

International standards related to GHG emissions inventory and reporting play a crucial role in global efforts to mitigate climate change. These standards and protocols establish a common framework for measuring, reporting, and assessing national and entity-level efforts to address climate change. Commonly used standards for measuring and reporting GHG emissions are described in Table 3.

Table 3: International GHG emissions inventory standards

International standard	Description	Advantage	Disadvantage
ISO 14064-1:2018⁸	ISO 14064-1:2018 Part 1: Provides guidance for quantification, management, reporting, and verification of GHG emissions and removals at the organization level. Scope: All organizations, regardless of industry or scale.	Provides a broad framework for GHG accounting suitable for establishing consistency and transparency in GHG measurement practices. It emphasizes verification by third parties and includes guidance on setting up a structured GHG management system suitable for external validation.	Lacks the detailed GHG calculation tools. Expensive and complicated for medium and small organizations.
The GHG Protocol Corporate Accounting and Reporting Standard⁹	Provides detailed requirements and guidance for facilities and other organizations preparing GHG emissions inventories at the corporate level. Scope: Primarily for companies but also other organizations such as government agencies, NGOs, and universities.	Offers practical, easily understandable, and user-friendly guidance for measuring and reporting GHG emissions, adaptable to various organizational structures and businesses. It provides the GHG accounting platform for virtually every corporate GHG reporting program in the world.	The GHG Protocol does not include a standard for conducting verification of GHG estimates.
Intergovernmental Panel on Climate Change (IPCC) – 2006 IPCC Guidelines for National GHG Inventories and 2019 Refinement¹⁰	Provides methodologies for estimating national inventories of anthropogenic emissions by sources and removals by sinks of GHGs. Scope: Primarily for national GHG emissions reporting.	Provides credible, up to date, and comprehensive scientific information on climate change. The GHG emission factors provided by IPCC may in some cases be used as default emission factors in a corporate GHG inventory if there are data gaps.	The IPCC guidelines are for national-level GHG emission inventories and are too high-level for facility-level reporting. For example, they do not address how to avoid double counting of direct and indirect GHG emission sources by multiple companies.
The Partnership for Carbon Accounting Financials (PCAF)¹¹	A financial industry-led initiative, PCAF enables financial institutions to measure and disclose the GHG emissions of their loans and investments through GHG accounting.	Provides clear and consistent frameworks for measuring and reporting GHG emissions from loans, investments, and insurance thereby facilitating easy data comparison for financial organizations.	Only used by financial institutions. Still in the development stage, it may not be widely applied and lacks detailed guidance for all asset types.

⁸ <https://www.iso.org/standard/66453.html>

⁹ <https://ghgprotocol.org/corporate-standard>

¹⁰ <https://www.ipcc-nggip.iges.or.jp/>

¹¹ <https://carbonaccountingfinancials.com/standard>

	Scope: Financial sector, including insurance		
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1.3. GHG reporting principles

GHG emissions inventory development is guided by several essential principles. For example, when following the GHG Protocol, there are five fundamental principles to consider: completeness, consistency, transparency, accuracy, and relevance. Table 4 compares the reporting principles outlined in Vietnam’s Circular no. 38/2023/TT-BCT and the GHG Protocol.

Table 4: GHG reporting principles in Vietnam’s Circular and the GHG Protocol

Reporting principles	Vietnam Circular no. 38/2023/TT-BCT	GHG Protocol
Comparability	Results of the measurement of and report on reduction in GHG emissions and GHG inventory development shall satisfy requirements for data and similarity of methodologies to serve comparison.	There is no “Comparability” Principle in GHGP
Relevance	There is no “Relevance” Principle in GHGP	Ensure the GHG inventory appropriately reflects the GHG emissions of the company and serves the decision-making needs of users – both internal and external to the company.
Completeness	Account for and report on all GHG emission sources and activities within the chosen inventory boundary. Disclose and justify any specific exclusions. To ensure honesty in completing GHG inventories, we strive to deliver a comprehensive, accurate, and consistent record of emissions.	
Consistency	The measurement of and report on reduction in GHG emissions and GHG inventory development shall achieve uniformity in terms of calculated data, and methods for supervision, development of GHG inventory and calculation of GHG emission reductions; Comparative data is crucial for monitoring emissions over time.	
Transparency	Documents, databases, assumptions, activity data, applied factors and calculation methods shall be clearly specified, cited and stored, thereby ensuring high reliability and accuracy.	
Accuracy	The measurement of and report on reduction in GHG emissions and GHG inventory development shall ensure reliability according to the selected methodology and minimize deviations; To ensure accuracy, it's necessary to systematically quantify greenhouse gas emissions without exceeding or falling below the actual emission levels.	

1.4. GHG verification principles

Vietnamese companies should follow the principles stipulated in Circular No. 38/2023/TT-BCT when verifying greenhouse gas emission reductions. These are described in Figure 4.

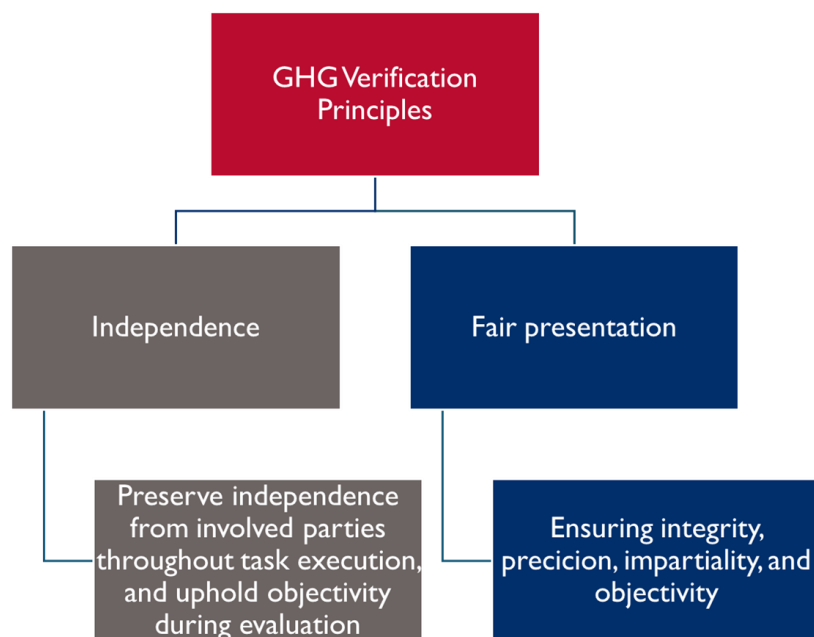


Figure 4. The principles for verifying greenhouse gas emission reductions under Circular No. 38/2023/TT-BCT

1.5. Sectors subject to mandatory GHG inventory and reporting

According to decision No. 01/2022/QĐ-TTg (January 18, 2022) on the list of sectors and facilities subject to GHG inventory, there are 1,912 facilities subject to mandatory GHG inventory and reporting. Before 30 March 2025, these facilities will need to prepare a report with GHG inventory results for the year 2023 and year 2024. The detailed guidelines for GHG inventory and reporting will be developed by different line ministries. The list of sectors is summarized in Figure 5.

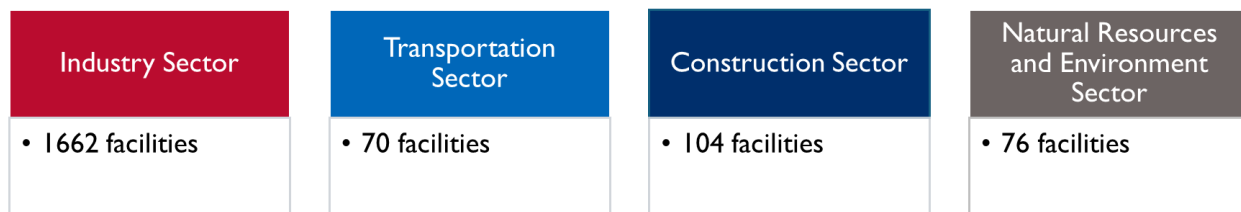


Figure 5. Sectors subject to GHG inventory

Article 6 of Decree No. 06/2022/NĐ-CP on regulations for GHG emissions reduction and protection of the ozone layer specifies the facilities which are required to conduct GHG inventories. Those facilities include (1) all entities having annual GHG emissions of 3,000 tonnes of CO_{2e} or higher; (2) companies engaged in freight transport by road with total annual fuel consumption of 1,000 tonnes of oil equivalent (TOE) or more; (3) solid waste treatment facilities with an annual operating capacity of 65,000 tonnes or more.

The list of sectors and facilities required to conduct GHG inventories will be updated by the Prime Minister of Vietnam every two years. The number of facilities included in the list and their respective sectors will change based on the review and compilation by the ministries managing energy, agriculture, land use and forestry, waste management, industrial processes, and the provincial People's Committee.

Chapter 2: Legislation on greenhouse gas emission management in Vietnam

Legislative documents play a crucial role in outlining strategies and actions to reduce GHG emissions. These documents, which are summarized below, provide a framework for policy development, regulatory enforcement, and collaborative efforts to reduce GHG emissions across sectors. Table 5 provides an overview of the GHG emission reduction targets underpinning this policy framework.

Decree No. 06/2022/ND-CP dated January 07, 2022, of the Government on GHG emission mitigation and ozone layer protection: This decree applies to organizations and individuals engaged in GHG emission activities, emissions reduction, and GHG absorption, as well as enterprises involved in developing the domestic carbon market and connecting it to international markets. Regarding GHG emission reduction, the decree stipulates mandatory and incentivized entities to conduct GHG inventories and mitigate GHG emissions.

Circular No. 01/2022/TT-BTNMT dated January 07, 2022, of the Ministry of Natural Resources and Environment on guidelines for implementation of Law on Environmental Protection regarding response to Climate Change: This Circular includes detailed regulations for the implementation of the Environmental Protection Law on climate change adaptation. Chapter III provides guidelines for assessing the results of greenhouse gas inventories and the results of GHG emissions mitigation.

Decision No. 01/2022/QD-TTg dated January 18, 2022, issued by the Prime Minister on the list of sectors and facilities subject to GHG inventory: This Decision lists 1,912 facilities that are subject to GHG inventory. Currently, ministries, agencies, and sectors are reviewing, updating, amending, and supplementing the list of sectors and facilities emitting GHGs required to conduct GHG inventories. The list is currently being updated and is likely to comprise 2,893 facilities per the draft circulated¹².

Decision No. 888/QD-TTg dated July 25, 2022, of the Prime Minister approves the plan on tasks and solutions for implementing the outcomes of COP26.

Decision No. 896/QD-TTg dated July 26, 2022, of the Prime Minister approves the National Strategy on Climate Change Adaptation by 2050.

Decision No. 942/QD-TTg dated August 5, 2022, approves the Action Plan for Methane Emission Reduction by 2035.

Circular No. 17/2022/TT-BTNMT dated November 15, 2022, of the Ministry of Natural Resources and Environment (MONRE) establishes methods for measurement, reporting, and verification (MRV) of GHG inventories and mitigation measures in the waste management sector.

¹² <https://chinhphu.vn/du-thao-vbqpl/du-thao-quyet-dinh-cua-thu-tuong-chinh-phu-ban-hanh-danh-muc-linh-vuc-co-so-phat-thai-khi-nha-ki-6097>

Circular No. 38/2023/TT-BCT dated December 27, 2023, on methods for measurement, reporting and verification of GHG inventories and mitigation measures in the industry and trade sector.

Table 5: GHG reduction targets in the current legal framework¹³

Ministry	Legal document	Target
MONRE	Decree No. 06/2022/ND-CP (GHG Emission Mitigation and Ozone Layer Protection)	<ul style="list-style-type: none"> - The total reduction of GHG emissions by 2030 is expected to reach a minimum of 563.8 million tonnes of CO_{2e}.
MONRE	Decision No. 888/QĐ-TTg (Tasks and Solutions for Implementing the Outcomes of the 26th Conference of the Parties to the United Nations Framework Convention on Climate Change)	<ul style="list-style-type: none"> - Enhance the harmonization of legal frameworks. - Review, update, and adjust national, sectoral, and local strategies, plans, and schemes to align with Vietnam's net-zero objectives. - Establish mechanisms for carbon credit exchange, offsetting, and trading within the country. By 2030, the domestic carbon market will be operational and interconnected with countries in the region and globally. - Engage in building partnerships for fair and equitable energy transition; participate in global adaptation alliances and international initiatives on GHG emission reduction and energy transition. - Advance climate diplomacy, promoting coherent development. - Invest in scientific research, innovation, and robust capacity-building, bolstering communication to facilitate low-carbon development and emission reduction. - Implement synchronized and efficient climate adaptation activities.

¹³ Nguyen Dinh Thao (GIZ), "Transport GHG Reduction in view of the net-zero emissions target in Viet Nam," 2023.

MONRE	Decision No. 896/QD-TTg (National Strategy on Climate Change Adaptation)	<ul style="list-style-type: none"> - By 2030, critical infrastructure projects geared towards climate adaptation will be completed with safety standards against natural disasters. - By 2030, ensure a national total GHG emission reduction of 43.5% compared to BAU. Specifically, the energy sector will reduce emissions by 32.6%. - By 2050, the economic and societal infrastructure system will be developed cohesively and modernized to efficiently adapt to climate change. - By 2050, ensure that the national total GHG emissions reach 'net zero', with emissions peaking in 2035. Specifically, the energy sector will reduce emissions by 91.6%, amounting to 101 million tonnes of CO_{2e}. Facilities emitting over 200 tonnes of CO_{2e} annually are subject to reducing their GHG emissions.
MONRE	Decision No. 942/QD-TTg (Action Plan for Methane Emission Reduction)	<ul style="list-style-type: none"> - By 2025, the total methane emissions amount to 96.4 million tonnes of CO_{2e}, marking a 13.34% reduction compared to 2020. - By 2030, the total methane emissions decrease to 77.9 million tonnes of CO_{2e}, representing a minimum reduction of 30% compared to 2020.

Chapter 3: Develop and report facility-level greenhouse gas inventories

Conducting GHG inventories at the facility level is necessary to identify and measure the quantity of GHG emissions associated with industrial processes and other business activities. Preparing a GHG emission inventory is not only about measuring GHG emissions but is also a step towards sustainable development and corporate social responsibility.

As described in Chapter 2, MOIT has issued technical standards for the measurement, reporting, and assessment of GHG emission reductions as well as guidelines for conducting a comprehensive GHG inventory through Circular No. 38/2023/TT-BCT dated December 27, 2023. According to this circular, the process of conducting a GHG inventory at the facility-level consists of eight steps and is applicable to both mandatory and voluntary GHG inventory and reporting.

1. Identification of the scope of the facility-level GHG inventory development.
2. Collection of activity data for facility-level GHG inventory development.
3. Selection of facility-level GHG emission factors.
4. Identification of the method for facility-level GHG inventory development.
5. Management of the quality of facility-level GHG inventory development.
6. Assessment of uncertainties of facility-level GHG inventory development.
7. Recalculation of facility-level GHG inventories.
8. Preparation of reports on facility-level GHG inventory development.

Each of these steps are described in more detail in the following subsections.

3.1. Scope of facility-level GHG inventory development

The Greenhouse Gas Protocol classifies facility-level GHG emissions into three scopes: direct emissions, indirect emissions, and other indirect emissions (see Figure 6).

- **Scope 1 – Direct GHG emissions** refer to emissions generated by burning fossil fuels, extracting minerals from underground or open-pit mines, or leaks from storage machinery and equipment.
- **Scope 2 – Indirect GHG emissions** refer to emissions generated by using purchased energy such as electricity, heat, or steam, produced from the burning of fossil fuels and other relevant fuels at sites not owned or controlled by the reporting entity.
- **Scope 3 – Other indirect GHG emissions** are the result of activities not owned or controlled by the reporting entity resulting from its upstream or downstream activities (except for the energy-related emissions reported as Scope 2). Also referred to as value chain emissions, these often represent a majority of an organization's total GHG emissions. As described in Figure 6, the GHG Protocol defines 15 categories of scope 3 emissions, though not every category will be relevant to all organizations.

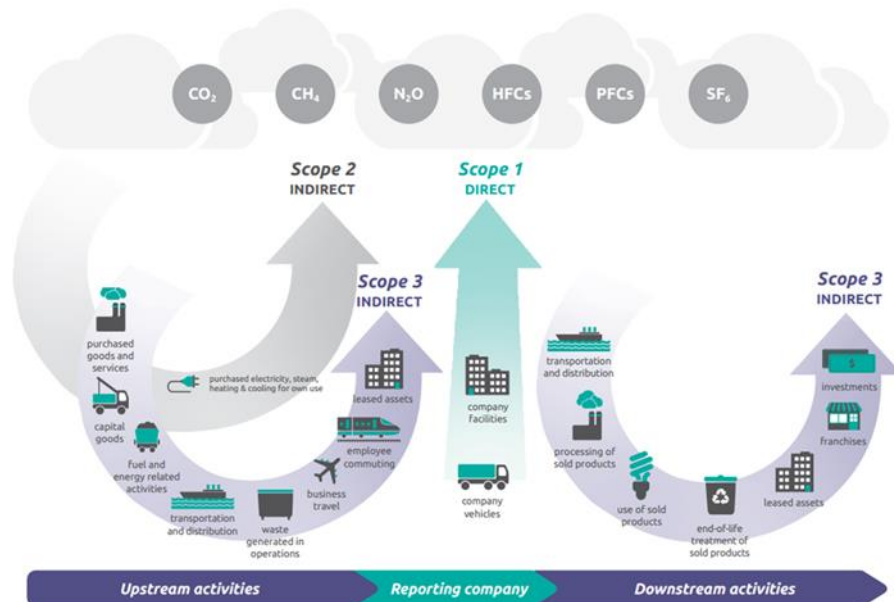


Figure 6. Overview of GHG Protocol scopes and emissions

Source: Adapted from Greenhouse Gas Protocol: Corporate Value Chain (Scope 3) Accounting and Reporting Standard, Page 5

When deciding on the scope, entities must also define the boundaries for their GHG inventory.

- **Operational boundaries** define the specific emission sources (e.g., natural gas boilers, onsite vehicles, or purchased electricity) that are included in an organization's scope 1 and scope 2 inventory.
- **Organizational boundaries** define which entities (e.g., subsidiaries, joint ventures, partnerships) and assets (e.g., facilities, vehicles) should be captured in the scope 1 and scope 2 GHG inventory. When setting organizational boundaries, a company must select an approach for consolidating GHG emissions and then consistently apply that approach to define the entities and assets it includes in scope 1 and scope 2. The GHG Protocol defines three consolidation approaches: equity share, financial control, and operational control (Table 6 below).

Table 6: Consolidation approaches for setting organizational boundaries¹⁴

Consolidation Approach	Description
Equity share	An organization accounts for GHG emissions from operations and assets according to its share of equity in the operation. The equity share reflects economic interest, which is the extent of rights an organization has to the risks and rewards flowing from an operation.
Financial control	<p>An organization accounts for 100 percent of the GHG emissions over which it has financial control. It does not account for GHG emissions from operations it owns equity in but does not have financial control over.</p> <p>The organization has financial control over the operation if it can direct the operation's financial and operating policies with a view to gaining economic benefits from the operation's activities.</p> <p>The organization may have financial control over the operation even if it has less than a 50 percent equity in that operation.</p>
Operational control	<p>An organization accounts for 100 percent of the GHG emissions over which it has operational control. It does not account for GHG emissions from operations it owns equity in but does not have operational control over.</p> <p>An organization accounts for 100 percent of emissions from operations over which it or one of its subsidiaries has operational control.</p> <p>Generally, if the organization is the operator of a facility, it will have the full authority to introduce and implement its operating policies and thus has operational control.</p>

MOIT applies an operational control-based approach to boundary setting in its guidance for enterprises. As such, a facility-level GHG inventory must include Scope 1 and Scope 2 emission sources under the facility's management control, as follows:

Scope 1. Direct emission sources:

- **Emissions from fixed sources.** Fossil fuel combustion in fixed equipment, including boilers, furnaces, burners, turbines, fireplaces, incinerators, etc.
- **Emissions from mobile sources.** Fossil fuel combustion in transportation equipment.
- **Emissions from industrial processes,** including physical and chemical processes that produce GHGs in the production line of the facility.
- **Fugitive emissions from operating machinery and equipment or mineral extraction and processing, etc.**
- **Emission of GHGs leaked from refrigerants,** produced by the process and equipment for production and trade in refrigerants.
- **Emissions from the collection, management and treatment of waste.**

Scope 2. Indirect emission sources:

- Emissions from **purchased electric energy.**

¹⁴ Greenhouse Gas Protocol <https://ghgprotocol.org/corporate-standard>

- Emissions from use of **purchased steam**.

3.2. Collection of activity data for facility-level GHG inventory development

The facility must collect, manage, and store the activity data related to emission sources under its management. The activity data to be collected for facility-level GHG inventory development is specified in Section 1 Appendix II issued together with the Circular No. 38/2023/TT-BCT:

- (1) Activity data for fuel combustion processes.
- (2) Activity data on fugitive emissions.
- (3) Activity data related to mining, manufacturing, and processing of minerals.
- (4) Activity data for electricity, heat, and steam usage.

Annex II of Circular No. 38/2023/TT-BCT includes data collection forms that companies can use to complete their GHG inventories. An example is provided in Figure 7.

I. Activity data for fuel combustion processes
I.1. Fuel for Stationary fuel combustion

No	Type of fuel	Consumption	Unit (litre/tonne/m ³ , BTU, ...)	Net Calorific value (TJ/unit)	Total (TJ)
1					
2					
3					

I.2. Fuel for Mobile fuel combustion

No	Type of vehicle (car/motorbike)	Vehicle information (brand, vehicle type, Vehicle registration plate, ...)	Type of fuel (gasoline, oil, and diesel fuel, ...)	Consumption (litre)	Total distance traveled per year (km)
1					
2					
3					

2. Activity data on fugitive emissions
2.1. Annual refrigerant recharge quantity

No	Type of Refrigerant	Quantity (kg)
1		
2		
3		

2.2. Refrigeration equipment usage

No	Type of equipment (brand, model)	Location	Date of starting usage (installation)	Refrigerant gas used (ex: R22, R410a, R134a, etc)	Cooling capacity (Cooling Cap.) (BTU/hour)	Quantity of refrigerant gas at full charge (kg)	Quantity (kg)	Year to be included
1								
2								
3								

3. Activity data related to mining, manufacturing, and processing of minerals

No	Type of mineral	Quantity (tonne or m ³)	Name, location, mining technology characteristics
1			
2			
3			

Figure 7. Data collection sample¹⁵

Selecting facility-level GHG emission factors

Facilities must calculate GHG emissions using emission factors that conform with the technologies and production procedures described in the 2006 IPCC Inventory Guidelines and obtain the consent from the competent authority. The competent authority will be appointed by the provincial people community. It could be the Department of Natural Resources and Environment (often the case), or the Department of Industry and Trade.

The company should use emission factors specified in the list provided in Decision No. 2626/QĐ-BTNMT. In cases where GHG emission factors are not specified in Decision No. 2626/QĐ-BTNMT, companies should use emission factors from the latest IPCC Inventory Guidelines. These Guidelines provide emissions factors and energy content values for national GHG accounting. However, many emission factors for activities that depend on site-specific technology characteristics are not provided by the IPCC Inventory Guideline. For instance, the IPCC does

¹⁵ Circular 38/2023/TT-BCT, Annex II

not have emission coefficients related to emissions from coal mining or abandoned mines. In such cases, companies must conduct additional research to fill relevant data gaps.

The grid emission factor is an important indicator used to calculate the amount of GHG emissions from electricity consumption. In Vietnam, this factor reflects the level of CO₂ emissions from various power sources, including coal-fired power, gas-fired power, hydropower, and renewable energy sources. The grid emission factor is published and updated by MONRE, based on actual data from electricity production activities. Table 7 depicts Vietnam's power grid emission coefficient, with 2022 being the latest year for which an emission factor is available.

Table 7: Vietnam's power grid emission coefficient¹⁶

Year	Vietnam's power grid emission coefficient (tCO ₂ /MWh)
2011	0.6244
2012	0.5603
2013	0.5657
2014	0.6612
2015	0.8154
2016	0.9185
2017	0.8649
2018	0.9130
2019	0.8458
2020	0.8041
2021	0.7221
2022	0.6766

Decision No. 2626/QD-BTNMT, issued by MONRE, stipulates the GHG emission factors to be applied in the calculation and reporting of GHG emissions in Vietnam. This decision provides detailed guidance on how to determine and use emission factors for various sectors, including energy, industry, agriculture, and waste management. Table 8 describes emission factors for diesel, natural gas, and liquefied petroleum gas (LPG).

Table 8: Fossil fuel emission factors¹⁷

Emission factor name	Type	Emission Source	Value	Unit
CO₂ emission factor of diesel fuel	CO ₂	Energy industries	74,100	Kg CO ₂ /TJ
CH₄ emission factor of diesel fuel	CH ₄	Energy industries	3	Kg CH ₄ /TJ
N₂O emission factor of diesel fuel	N ₂ O	Energy industries	0.6	Kg N ₂ O/TJ
CO₂ emission factor of natural gas	CO ₂	Energy industries	56,100	Kg CO ₂ /TJ
CH₄ emission factor of natural gas	CH ₄	Energy industries	1	Kg CH ₄ /TJ

¹⁶ Department of Climate Change, MONRE

¹⁷ Decision No. 2626/QD-BTNMT

N₂O emission factor of natural gas.	N ₂ O	Energy industries	0.1	Kg N ₂ O/TJ
CO₂ emission factor of LPG	CO ₂	Manufacturing industries and construction	63,100	Kg CO ₂ /TJ
CH₄ emission factor of LPG	CH ₄	Manufacturing industries and construction	1	Kg CH ₄ /TJ
N₂O emission factor of LPG	N ₂ O	Manufacturing industries and construction	0.1	Kg N ₂ O/TJ

3.3. Quantifying facility-level GHG emissions

GHG emission reporting programs typically require quantification and reporting of emissions on an annual basis. This is also the case for covered facilities in Vietnam. This means that enterprises should collect activity data for a full year of operating activities, starting with the 2022 calendar year, which is the first year that companies must report activity data (see Section 3.8).

Once enterprises have collected the necessary GHG emission factors and activity data they can begin to calculate GHG emissions, ensuring accuracy and transparency throughout the calculation process. According to Circular No. 38/2023-TT-BCT, the formula for calculating GHG emissions is:

$$KNK_i = AD_i * EF_i$$

Where:

- i: type of GHG;
- KNK_i : emission of GHG_i (tonne);
- AD_i : activity data of GHG_i;
- EF_i : emission factor of GHG_i.

The formula for calculating total GHG emissions of a facility:

$$TPT = \sum_i KNK_i * GWP_i$$

Where:

- TPT: Total GHG emissions of the facility (tonne of CO₂e);
- GWP_i : the global warming potential of GHG i applicable according to the latest IPCC guidelines

Many major global corporations, such as Samsung and Google, have taken the lead in conducting GHG inventories. Figure 12 provides an example of Apple's GHG inventory results.

		Fiscal year				
		2022	2021	2020	2019	2018
Corporate emissions (metric tons CO ₂ e) ¹	Gross emissions	324,100	166,380	334,430	573,730	586,170
	Scope 1	55,200	55,200	47,430	52,730	57,440
	Natural gas, diesel, propane	39,700	40,070	39,340	40,910	42,840
	Fleet vehicles	12,600	12,090	4,270	6,950	11,110
	Other emissions ²	2,900	3,040	3,830	4,870	3,490
	Scope 2 (market-based) ³	3,000	2,780	0	0	8,730
	Electricity	0	0	0	0	8,730
	Steam, heating, and cooling ⁴	3,000	2,780	0	0	0
	Scope 3	265,800	108,400	287,000	521,000	520,000
	Business travel	113,500	22,850	153,000	326,000	337,000
	Employee commute ⁵	134,200	85,570	134,000	195,000	183,000
	Upstream fuel	10,600	0	0	0	0
	Work from home (market-based)	7,500	0	0	0	0
	Transmission and distribution loss (market-based)	0	N/A	N/A	N/A	N/A
	Third-party cloud (market-based)	0	0	0	0	0
	Carbon removals					
	Corporate carbon offsets ⁷	-324,100	-167,000 ⁸	-70,000 ⁹	0	0
Product life cycle emissions (metric tons CO ₂ e) ¹⁰	Gross emissions (Scope 3)	20,280,000	23,020,000	22,260,000	24,460,000	24,550,000
	Manufacturing (purchased goods and services)	13,400,000	16,200,000	16,100,000	18,900,000	18,500,000
	Product transportation (upstream and downstream)	1,900,000	1,750,000	1,800,000	1,400,000	1,300,000
	Product use (use of sold products)	4,900,000	4,990,000	4,300,000	4,100,000	4,700,000
	End-of-life processing	80,000	80,000	60,000	60,000	50,000
	Carbon removals					
	Product carbon offsets	0	-500,000 ¹¹	0	0	0
	Total gross scope 3 emissions (corporate and product) (metric tons CO ₂ e)	20,550,000	23,128,400	22,547,000	24,980,000	25,070,000
	Total gross carbon footprint (without offsets) (metric tons CO ₂ e) ¹²	20,600,000	23,200,000	22,600,000	25,100,000	25,200,000
	Total net carbon footprint (after applying offsets) (metric tons CO ₂ e) ¹³	20,300,000	22,530,000	22,530,000	25,100,000	25,200,000

Figure 8. Apple's GHG emissions inventory for 2018-2022

Source: *Adapted from Apple, "Environmental Progress Report," 2023 – Page 77*

Apple calculates its GHG inventory by adhering to internationally recognized standards, including the Greenhouse Gas Protocol for corporate GHG inventories and ISO 14040/14044¹⁸ for life cycle assessments. Apple's inventory encompasses direct Scope 1 emissions; indirect Scope 2 emissions from purchased electricity, steam, heating, and cooling; and indirect Scope 3 emissions from purchased goods and services, transportation and distribution, business travel, employee commute, product use, and end-of-life disposal.¹⁹

Since April 2020, Apple has achieved carbon neutrality for its corporate emissions. Starting from the fiscal year 2022, the company has expanded its footprint boundary to include Scope 3 emissions related to remote work, third-party cloud services, electricity transmission and distribution losses, and the upstream impacts of Scope 1 fuels.²⁰

Apple avoids using any ozone-depleting substances (ODS) in the entire production process of product components and materials, as well as in packaging materials, in compliance with the Montreal Protocol on Substances that Deplete the Ozone Layer.²¹

¹⁸ <https://www.iso.org/obp/ui/#iso:std:iso:14044:ed-1:v1:en>

¹⁹ Apple, "Environmental Progress Report," 2023.

https://www.apple.com/environment/pdf/Apple_Environmental_Progress_Report_2023.pdf

²⁰ Apple, "Environmental Progress Report," 2023.

https://www.apple.com/environment/pdf/Apple_Environmental_Progress_Report_2023.pdf

²¹ Apple, "Environmental Progress Report," 2023.

https://www.apple.com/environment/pdf/Apple_Environmental_Progress_Report_2023.pdf

3.4. Quality management

A strong quality management system is essential to ensuring that an inventory meets the selected GHG reporting principles (such as those described in Table 4) and anticipates the requirements of current and future regulatory mandates. According to the Greenhouse Gas Protocol, a good GHG inventory quality management system consists of seven steps as described in Figure 9.

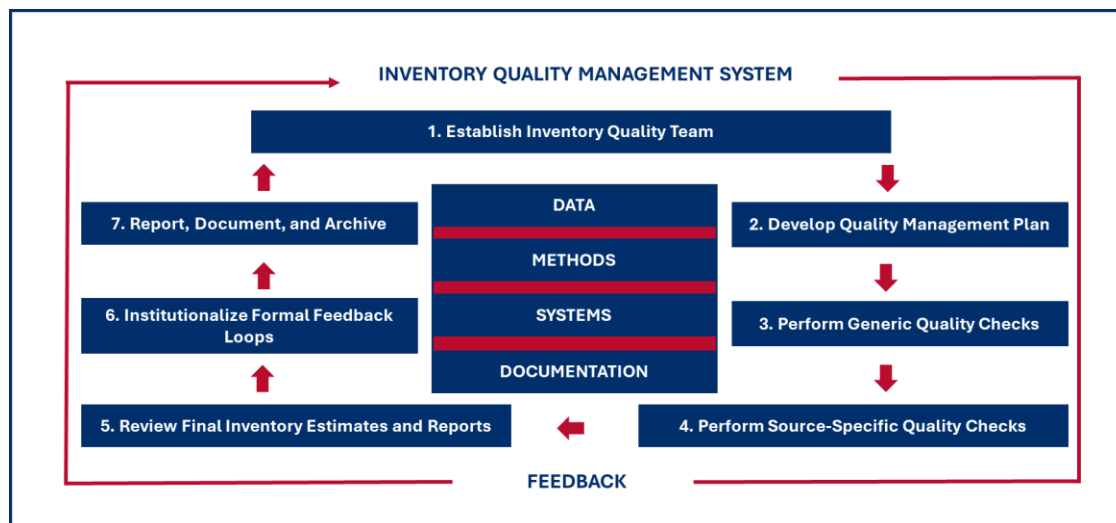


Figure 9. Inventory quality management system

According to MOIT guidance, the unit in charge of industry-level GHG inventory development must put in place a system for managing the quality of the GHG inventory, focusing on the following topics:

- Assumptions and methods for selecting activity data, emission factors, and conversion factors;
- Accuracy of data inputs;
- Results of GHG emission calculations;
- Transparency and uniformity of the data;
- Data continuity; and
- Review and assessment of the adequacy of internal documents.

A separate unit within the enterprise that is not involved in the GHG inventory development must ensure the quality of the GHG inventory focusing on the following topics:

- Calculation assumptions and standards for selecting activity data, emission factors and conversion factors;
- Methods and procedures used for the GHG inventory and quality of the data used during the calculation and processing of the inventory;
- Results of GHG emission calculations;
- Suitability of the conversion factors used in equations;
- Transparency of the data;
- Uniformity of the data;

- Data continuity;
- Errors of data input;
- Uncertainties of inventory reports;
- Review of the system for storing internal documents.

3.5. Assessment of uncertainties

Estimation uncertainty arises any time GHG emissions are quantified. Uncertainty can arise from mathematical equations as well as the parameters used as inputs into the equations (i.e., activity data, emission factors, or other parameters).²² Companies must assess the uncertainties associated with their GHG estimates focusing on the following contents:

- Completeness of the report;
- Suitability of the inventory model;
- Adequacy of the data used for calculation;
- Representativeness of the data;
- Abnormality of the data; and
- Lack of transparency and violations of inventory development.

The quantification of uncertainties of industry-level GHG inventory development should comply with the guidelines provided in Chapter 3, Book 1 of IPCC 2006 and IPCC 2019.

3.6. Recalculation of industry-level GHG inventories

To maintain the consistency between data sets, prior year emissions need to be recalculated when structural changes (such as acquisitions or divestments) occur that change the inventory boundary of the facility. MOIT requires recalculation of industry-level GHG inventories of previous periods in the following cases:

- There are changes to methods for GHG inventory development, thereby causing considerable changes to the results of the latest inventory; and
- There are changes to GHG emission sources and factors.

The facility in charge of industry-level GHG inventory development must add the recalculation results to its industry-level reports for the reporting period.

3.7. Reporting on facility-level GHG inventories

Facilities subject to GHG inventory reporting under Decision No. 01/2022/QĐ-TTg must report on their GHG inventories and GHG mitigation plans based on the timeline provided in Figure 10.

²² GHG Protocol guidance on uncertainty assessment in GHG inventories and calculating statistical parameter uncertainty <https://ghgprotocol.org/sites/default/files/2023-03/ghg-uncertainty.pdf>

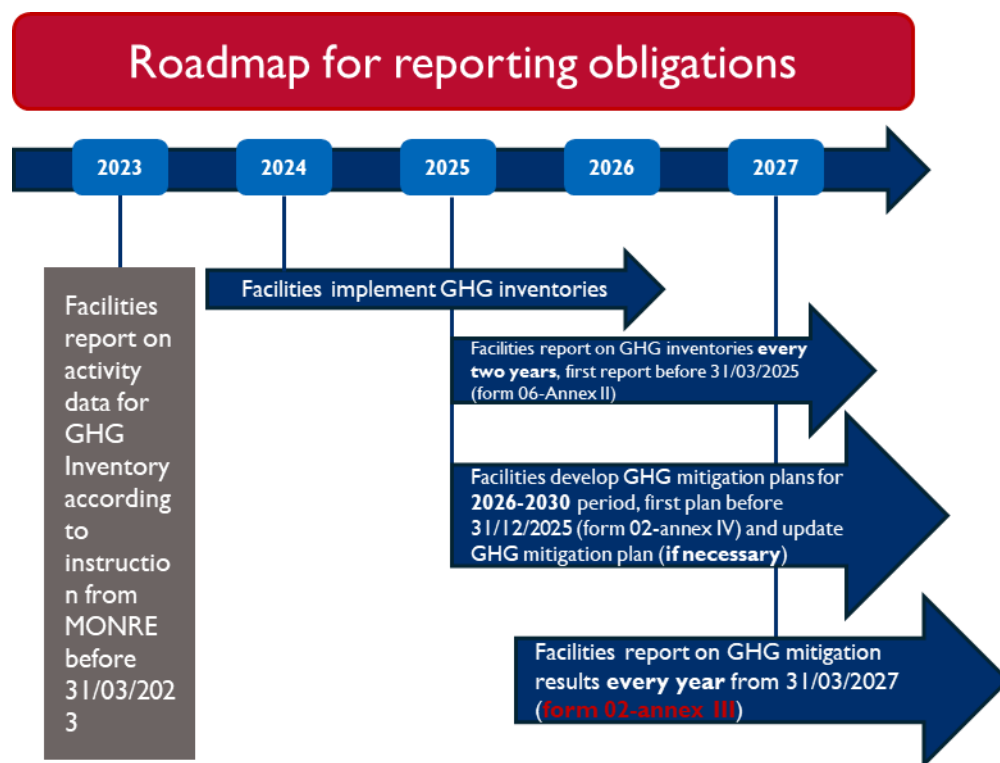


Figure 10. Timeline for reporting GHG emissions by large emitters

As described in Chapter 2, 1,192 facilities across six sectors, including energy, transportation, construction, industrial processes, agriculture, forestry and land use, and waste are required to submit reports. Starting in 2023, these facilities were required to report activity data and other relevant GHG information for the year 2022 and to continue reporting every year after that.

From 2024 onwards, enterprises are required to conduct GHG inventories at the facility level, prepare facility-level GHG inventory reports every two years, submit them to the provincial People's Committee for review, and then forward them to MONRE. The facility-level GHG inventory report must be prepared according to Form 06 in Appendix II issued with Decree No. 06/2022/NĐ-CP (See Figure 11).

Enterprises are also required to develop GHG emissions reduction plans for the period 2026-2030. Starting from 2027, enterprises must submit these plans to the competent authority and MONRE. The plans will serve as the basis for the government to allocate GHG emissions quotas under the upcoming GHG emissions trading scheme and adjust the list of major GHG emitters every two years.

REPORT

ON RESULT OF GREEN HOUSE GAS (GHG) INVENTORY FOR YEAR...

I. Introduction and background

1. Name, Address, business license, etc
2. Legal representative
3. Main activities

II. Main activities and activity data

1. Organizational Boundaries and Scope
2. Infrastructure, technology, and operations of the facility
3. Emission sources and removal within Organizational Boundaries
4. Data system on GHG emissions and Challenges on GHG inventory.

III. Inventory Results

1. Description of the methodology used to quantify GHG emissions (e.g., data collection method, emission factors).
2. Data activities related to GHG emissions.
3. Inventory Results
4. Completeness, transparency, uncertainty of data and inventory results.

REPRESENTATIVE
FROM FACILITY

Figure 11. Annex II, Form No.06, Decree No 06/2022/ND-CP

3.9. Verification

Third party verification of GHG inventories ensures that the reports are accurate and complete, and that reported data is consistent and transparent. Verification lends credibility to a GHG inventory by providing assurance that the emissions reports represent a faithful, true, and fair account of GHG emissions.

Independent verification of GHG inventory reports is mandatory for facilities covered by Decision No. 01/2022/QĐ-TTg as specified by Government Decree No. 06/2022/ND-CP. The verification will be managed by the line ministries responsible for each of the covered sectors as follows:

- 1,662 facilities fall under the management scope of MOIT
- 70 facilities fall under the management scope of the Ministry of Transport;
- 104 facilities fall under the management scope of the Ministry of Construction; and
- 76 facilities fall under the management scope of MONRE.

Facilities not listed in Decision No. 01/2022/QĐ-TTg can opt for voluntary assessments to enhance management and reduction of GHG emissions. Participation in carbon credit programs, carbon markets, or emission reduction commitments may require assessment to ensure compliance and acknowledge emission reduction efforts. Enterprises planning to publicly disclose their GHG inventory reports should undergo independent assessment to confirm accurate calculations, completed inventories, and the use of correct methodologies.

Some factors to consider when selecting a verifier for voluntary verification include:

- The previous experience and competence of the verifier in undertaking GHG verifications.
- The verifier's understanding of GHG issues, including quantification methodologies.
- The verifier's understanding of the company's operations and industry and reputation for objective, credible, and independent supply of verification services.

Facilities subject to mandatory GHG verification should use the following steps:

1. Within 05 business days from the receipt of the report on internal GHG inventory, the relevant provincial People's Committee shall allocate its affiliated specialized agency (hereinafter referred to as 'verification agency') to carry out verification of the GHG inventory information and results provided by the reporting enterprise.
2. The verification agency shall verify the GHG inventory results according to the following primary contents:
 - a. Adequacy of contents, information, and data in the GHG inventory report;
 - b. Conformity of the determination of emission sources and GHG sinks in the GHG inventory report;
 - c. Conformity of the GHG inventory methods, emission factors, and quality control of the GHG report; and
 - d. Quality assurance measures and the GHG emissions information/data system of the reporting enterprise.
3. Within 20 business days, the verification agency shall give notice of verification results, including required revisions (if any) to the GHG inventory report. In case revisions are required, the reporting enterprise must revise its GHG inventory reporting according to the notice of verification results.
4. The reporting enterprise must send its completed report on the GHG inventory to the verification agency and MONRE.
5. During verification, the verification agency is entitled to:
 - a. Invite organizations and/or individuals with appropriate professional qualifications, capacity and experience to participate in the verification process;
 - b. Request the enterprise owner to provide clarification, if needed; and
 - c. Request to carry out verification visits and take representative samples at the enterprise (if deemed necessary).
6. The verification agency must manage and retain verification documents and send the completed GHG inventory report to the managing line ministry for updating of the online GHG inventory database in their sector.

Chapter 4: The impact of GHG inventory requirements on facilities

4.1. Status of greenhouse gas emissions reporting in Vietnam

As described in Chapter 2, 1,912 facilities are covered by the Prime Minister's Decision No. 01/2023/QĐ-TTg, which means they must conduct GHG inventories for the 2024 calendar year and report on these by April 2025. The findings from the inventory reports will inform the allocation

of GHG emission allowances under the soon to be launched Emissions Trading Scheme. The allocation process will occur from 2026 to 2030 and continue into subsequent years.

Vietnam is projected to establish and operate an official carbon credit trading platform starting from 2028. Under this system, each enterprise will face limitations on emissions beyond a predetermined threshold and facilities will only be allowed to emit GHGs within their allocated emission allowances. If a facility exceeds its allocated allowance, it can purchase additional allowances from other entities through the domestic carbon market. Vietnam plans to conduct a trial operation of the carbon credit trading platform by 2025 before its official implementation in 2028. To avoid government penalties for exceeding emission allowances, which could involve fines or other punitive measures, facilities must enhance their auditing capabilities and devise plans to reduce GHG emissions.

However, Vietnamese companies are still behind in conducting GHG inventories. According to a survey conducted by MONRE in 2022²³ with 43 large emitters listed in Decision No. 01/2022/QĐ-TTg, only 19 facilities have engaged in GHG inventory reporting through their mother company or supply chains. However, the specific inventory methods employed by these facilities remain unclear. Some companies rely solely on emission factors provided by their parent companies, which may lack accuracy. Three-quarters of the 43 surveyed participants indicated having data on GHG emissions and energy. Among these, nearly half possess both types of data.

A majority of enterprises have taken proactive steps to increase energy efficiency and implement a range of other emission reduction measures, including using biomass fuel for boilers; employing heat recovery from boilers; utilizing variable frequency drives in production lines; optimizing machinery and equipment; enhancing energy management practices; recovering CO₂ from exhaust emissions; and establishing GHG management systems in accordance with the ISO 14064-1:2018 standards.

4.2. The impact of GHG emissions reporting

According to data compiled by MONRE, Vietnam's manufacturing facilities emitted a total of 662.6 million tonnes of CO₂e in 2022 which represents about 35% of Vietnam's GHG emissions. The cement industry contributed roughly 10% to the nation's GHG output, while the iron and steel sector made up approximately 8%. Emissions from road transportation comprised around 25% of Vietnam's overall GHG emissions.²⁴ Given the large contribution of these sectors to Vietnam's GHG emissions, the introduction of GHG reporting and mitigation planning are key steps in better managing these emissions and achieving Vietnam's net emission reduction commitments.

Concerned ministries and sectors are actively pursuing this endeavor. The Ministry of Construction's Action Plan for Climate Change Adaptation until 2030 has identified several priority tasks related to GHG inventory reporting. The Department of Climate Change (DCC) under MONRE has emphasized the need to reduce GHG emissions at large facilities. Specifically, annual emission thresholds are stipulated as follows:

- From 2022, facilities emitting 3,000 tonnes or more of CO₂e annually must take measures to reduce emissions.

²³ <https://monre.gov.vn/Pages/doanh-nghiep-truoc-lua-chon-giam-phat-thai.aspx>

²⁴ <https://www.monre.gov.vn>

- Starting in 2030, facilities emitting 2,000 tonnes or more of CO₂e annually must comply with emission reduction measures.
- From 2040 onwards, facilities emitting 500 tonnes or more of CO₂e annually must also participate in emission reduction efforts.
- From 2050, facilities emitting 200 tonnes or more of CO₂e annually will also be included in emission reduction initiatives.

The DCC is also developing a national GHG emission cap and organizing the allocation of emission allowances for facilities, expected to be implemented from 2026. The broader GHG management framework (See Table 5 in Chapter 2) includes other mechanisms to encourage enterprises to further reduce emissions in support of Vietnam's 2050 net-zero emissions target.

4.2.1. Opportunities

Conducting GHG inventories helps businesses identify and control emission sources, and in many cases reduce operational costs. At the same time, inventory reporting can enhance the brand reputation, ensure compliance with climate change regulations, and open up opportunities to participate in new carbon markets, generating additional revenue. GHG inventories are a tool to improve sustainable competitiveness for businesses.

- Conducting a GHG inventory helps businesses gain a thorough understanding of their operations through systematic surveying, selection, and compilation of information.
- Having an accurate GHG emissions database will also enhance the credibility of stakeholders and signal the effectiveness of a facility's resource and energy utilization.
- Transparent databases facilitate businesses in achieving GHG certification, a prerequisite for eco-label registration, thereby enhancing competitive advantages, especially for those involved in global supply chains.
- In cases where companies effectively invest in emissions reduction, engaging in carbon credit trading on the carbon market can yield a significant source of income.

4.2.2. Challenges

Vietnam's national-level capacity for GHG emissions reporting is significant compared to other developing nations. However, at the enterprise level, GHG inventory reporting remains a relatively nascent issue. With the exception of a handful of pioneering companies, most businesses encounter challenges when starting the GHG inventory process, including:

- A lack of specific guidelines from regulatory agencies on GHG inventory for all sectors of manufacturing, business, and services.
- A shortage of skilled personnel who can understand the regulations and technical requirements concerning GHG inventory.
- Complex supply chains makes Scope 3 reporting very challenging.