

UNDERSTANDING CARBON FOOTPRINT AND GHG EMISSIONS

WHITEPAPER



Abstract

Mankind is the primary source of CO₂ emissions since the industrial revolution. Individuals, companies, and societies are mainly responsible for the accumulation of carbon dioxide released into the atmosphere, which in turn produces a large amount of greenhouse gases. "Greenhouse gases" refer to gases that contribute to global warming. The six regulated gases are carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and Sulphur hexafluoride (SHF) (SF₆). The most important greenhouse gas for climate change is carbon dioxide (CO₂). This ecological discussion gave rise to the term "carbon footprint". A GHG emissions assessment can be used to determine an individual's, nation's, or organization's carbon footprint. The purpose of this paper is to understand carbon footprint, GHG protocol and its standard framework to measure GHG emissions from corporate and public sectors.

Key takeaways

Introduction

A company's carbon footprint

Scope 1: Direct Emissions

Scope 2: Indirect Emissions

Scope 3: Other Indirect Emissions

Benefits of identifying scopes and calculation

Conclusion

Introduction

Carbon footprints exist for every single entity. An individual's footprint is made up of emissions arising from the food you eat, the clothes you buy and your waste. The higher the footprint, the greater the impact. The Greenhouse Gas Protocol Initiative was conceived by the World Resources Institute (WRI) a US-based environmental NGO with the purpose of creating and promoting worldwide agreed upon GHG accounting and reporting standards for enterprises. ^[1]

A company's carbon footprint: Scope 1, 2 and 3

There are three types of emissions, and each organization can pick which ones to offset. According to the leading GHG Protocol corporate standard, a company's greenhouse gas emissions are divided into three categories. Reporting is obligatory for scopes 1 and 2, however scope 3 is optional and the most difficult to monitor. Companies who succeed in reporting all three scopes, on the other hand, will acquire a long-term competitive edge. ^[1]

Scope 1: Direct Emissions

Direct emissions from the company's operations and resources that they own, and control are included in Scope 1. This category includes emissions from the company's internal facilities and automobiles. To put it differently, emissions are emitted into the environment as a direct outcome of a series of processes at a corporate level. It's split into four categories: ^[4]



Stationary Combustion

Boilers for heating buildings, gas furnaces, and gas-fired combined heat and power (CHP) facilities are all potential sources. Natural gas, liquefied petroleum gas (LPG), gas oil, and burning oil are the most prevalent fuels (aka kerosene). Scope 1 calculations must include all fuels that create greenhouse gas emissions covered by the Kyoto Protocol. They're also covered under the Streamlined Energy and Carbon Reporting regulations. ^[4]

Mobile Combustion

Any vehicles owned or leased by an organization that consume fuels that emit greenhouse emissions fall into scope 1. Usually, these will be petrol or diesel-powered automobiles, vans, lorries, and motorcycles. Usage of alternative fuels like LPG and LNG as well as biofuels such as bio-diesel and bio-ethanol are getting transportation evolved. Plug-in hybrids (PHEVs) and full electric vehicles (EVs) are also more popular. As electric vehicles become more common, portions of an organization's fleet may be subject to Scope 2 emissions. ^[4]

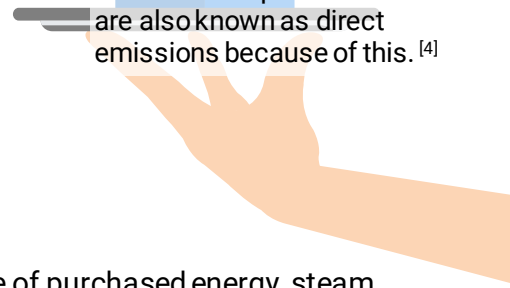
Fugitive Emissions

Refrigeration and air conditioning emit greenhouse gases which are known as fugitive emissions. The majority of refrigerant gases are extremely potent greenhouse gases, with some being thousands of times more harmful than carbon dioxide (CO₂). Large unquoted firms and large LLPs are urged to report these emissions, even if they are not obligated to do so. ^[4]

Process Emissions

Process emissions are the last type of emissions. As the name implies, they are emissions produced during industrial processes and on-site manufacturing. Consider the CO₂ emissions produced during cement production or chemical processing and manufacturing. ^[4]

As an enterprise, controlling scope 1 emissions is by far the easiest. This is because they are direct emissions from your company. To put it another way, they are released into the environment as a direct result of a firm's action or activities. Scope 1 emissions are also known as direct emissions because of this. ^[4]



Scope 2: Indirect Emissions

They are greenhouse gases emitted into the atmosphere because of the usage of purchased energy, steam, heat, and air conditioning. Although CO₂e emissions are caused by an organization's operations, they are produced by sources that the organization does not own or control. As a result, the emissions are indirect. The Streamlined Energy and Carbon Emissions Reporting standards will include them. ^[2]

We need to determine the emissions associated with electricity consumption to calculate scope 2 emissions.

It is categorized into two methods: location-based and market-based. In brief, the market-based method takes into account emissions from electricity that corporations have consciously chosen, whereas the location-based method takes into account the average emissions intensity of grids where energy is consumed.

Location based method

It is a method for computing scope 2 GHG emissions for defined geographic regions, such as local, subnational, or national borders, using average energy generation emission factors. The average emission factors for the power systems that provide electricity are taken into account in this procedure. ^[2]

Market based method

The GHG emissions associated with a consumer's choice of electricity source or product are reflected in the market-based technique. These options are communicated through agreements between the purchaser and the provider, such as selecting a retail power supplier, a specific generator or acquiring unbundled energy attribute certificates. Contractual arrangements in which the organization acquires energy from specific resources, such as renewables, are regarded in this approach. ^[2]



Calculation of scope 2 emissions:

Step 1: The amount of electricity purchased is the activity data necessary to calculate scope 2 emissions. Companies can identify these energy uses based on utility bills or metered energy consumption at facilities within the inventory boundary. ^[2]

Step 2: Activity data for scope 2 calculation comprises of any energy purchased or acquired and consumed from a third party or an energy generation facility with energy attributes (for example, certifications) have been sold. Metered electricity or utility bills can give precise activity data. In other circumstances this data may not be available since consumption can take place in shared space without energy meters. In these cases, estimates can be obtained by allocating total amount of electricity used by all the tenants in the building based on the square footage of the reporter and occupancy rate of the building. (also called the area method). ^[2]

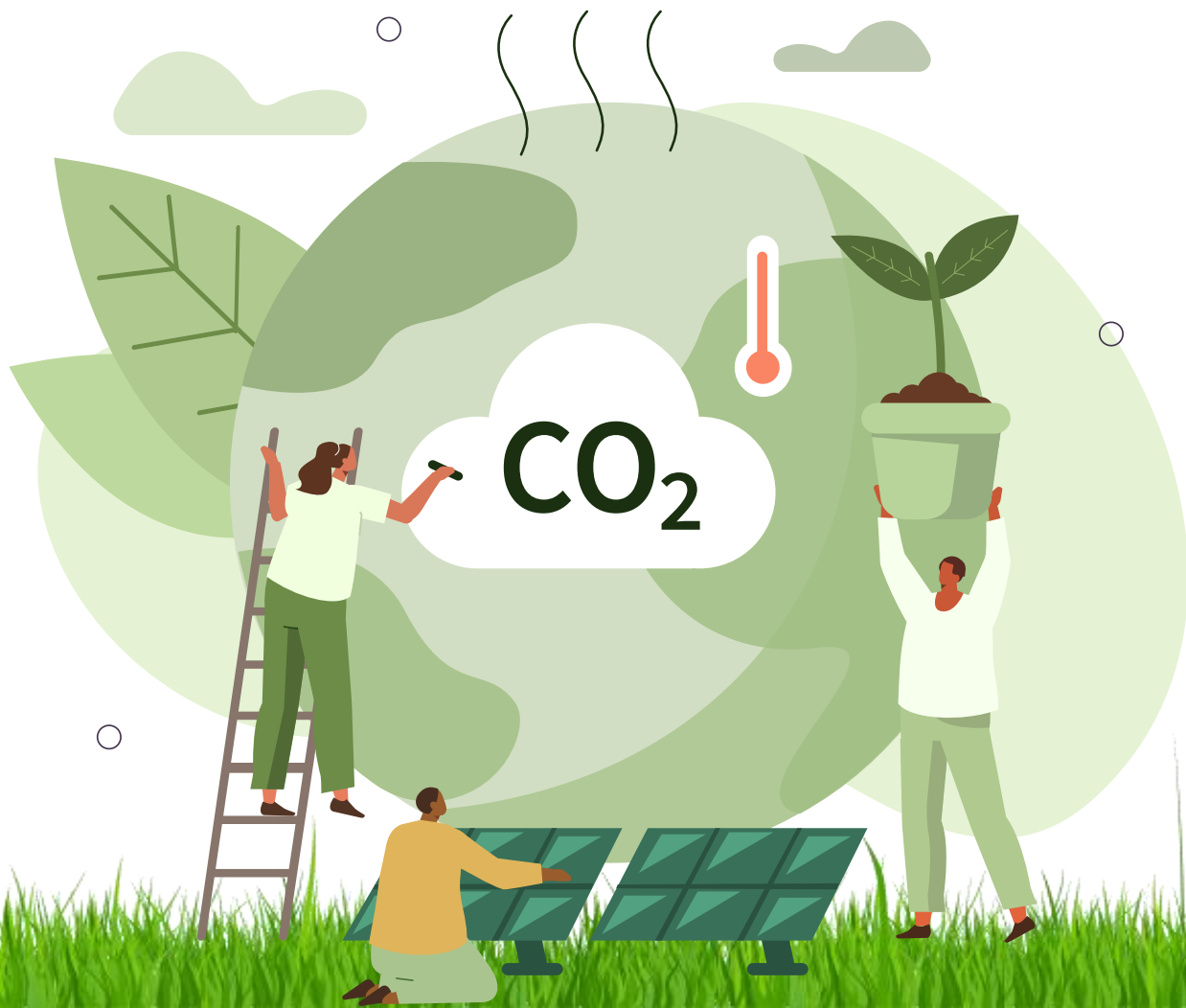
Step 3: The following equation is used to calculate emissions:

$$\text{Emissions} = \text{Electricity} \times \text{EF}$$

Multiply each activity data by the emission factor (EF) [for CO₂, CH₄ and N₂O]

Multiply global warming potential (GWP) values by the GHG emissions totals to calculate total emissions in CO₂e

Report final scope 2 in metric tons of each GHG in metric tons of CO₂e. ^[2]



Scope 3: Other indirect emissions

Scope 3 Emissions are those that come from sources that the reporting company does not directly own or control but are linked to its operations. This is commonly believed of as the company's supply chain, which includes emissions from supply chain vendors, outsourced activities, and staff travel and commute.

The majority of GHG emissions in several industries fall under Scope 3. This is because many functions are outsourced in today's economy, and few corporations hold the complete value chain of their products.

Calculation of scope 3 emissions:

Step 1: Identify scope 3 categories with significant emissions.

Scope 3 is categorized into upstream and downstream emissions based upon the financial operations of the organization



Upstream emissions

Purchased goods and services: It includes emissions from manufacturing of goods that the company has acquired during the reporting year. ^[3]

Capital goods: Capital goods are final products with a long-life cycle that are employed by a corporation to make products or offer services. ^[3]

Fuel and energy related activities: Emissions from the extraction, manufacturing, and transport of fuels and energy acquired by the corporate entity during the reporting year are included in this category. ^[3]

Upstream transportation and distribution: It comprise the transportation and distribution of products acquired by the corporate entity in automobiles not owned or managed by the reporting company. ^[3]

Waste generated in operations: Includes emissions from the company's own or controlled operations, as well as emissions from third-party waste disposal and treatment. ^[3]

Business travel: Personnel transportation for business purposes in vehicles owned or operated by other parties (i.e., planes, trains, cars, any other automobile used for commute) ^[3]

Employee commuting: Emissions from employee transit between their residences and their workplaces. ^[3]

Upstream leased assets: This category includes emissions from the company's leased assets that aren't already included in its scope 1 or scope 2 inventory. ^[3]





Downstream emissions

Downstream transportations and distribution: Include emissions from transportation and distribution of products sold by the reporting firm between its operation and the end customer in vehicles and facilities not owned or controlled by the reporting company, if not paid for by the reporting company. ^[3]

Processing of sold products: This includes emissions post sale of products by third party vendors like suppliers, manufacturers. ^[3]

Use of sold products: Includes emissions from the usage of the reporting company's goods and services throughout the reporting year. ^[3]

End of life treatment of sold products: This category includes emissions from waste disposal as well as the end-of-life treatment of all products sold by the reporting company during the reporting year. ^[3]

Downstream leased assets: Emissions from the operation of assets owned by the reporting entity, acting as lessor, and leased to other entities in the reporting year are included in this category. ^[3]

Franchises: A firm that operates under a license to sell or distribute the goods or services of another company in a specific location. ^[3]

Investments: This category includes emissions from the reporting company's investments during the reporting year that are not already covered by scope 1 or scope 2. This category is primarily for investors. ^[3]

Step 2: Deciding on the appropriate method

There are three basic approaches for calculating emissions:

Primary data method- This strategy entails obtaining cradle-to-gate GHG inventory data at the product level from value chain partners. If done correctly, it is the most precise way because it calculates an emissions factor for the individual product or service purchased or sold.

Secondary data methods- It calculates emissions by gathering activity data on the economic worth of products and services or the mass or other unit of measure (hours worked, or distance travelled) and multiplying by secondary emission factors.

Proxy data method- If a reporting company has a big enough number of product-level emissions variables from value chain partners, this reliable data can be utilized as a proxy for the same or related products.

Step 3: Select emissions factors and collect relevant data

Individual companies must choose emissions factors that are acceptable for their operations; nevertheless, the source of emissions factors must always be explicitly and transparently provided alongside the calculation of emissions.

Activity data collection: Internal company or value chain partners should be able to provide activity data such as expenses, amounts of goods sold and purchased. ^[3]

Step 4: Calculate GHG emissions

Once the source of emissions factor has been selected and activity data collected, we can calculate the emissions by using the below ^[3]

Total emissions (Tonnes CO₂e) = Emissions factors (KG CO₂e/(cost, unit of measurement)) X (amount of activity (unit of measurement could be kg, hours worked, distance)) / 1000



Benefits of identifying scopes and calculation

- Identify emission peaks in your company and supply chain. ^[6]
- Learn more about your company's carbon emissions and how you may minimize them. ^[6]
- Ensure that reporting complies with industry standards and regulatory obligations. ^[6]
- Understanding how you utilize energy can help you save money in the long run. ^[5]
- Demonstrate best business practices in carbon reduction and energy efficiency to set your company apart from the competition. ^[5]
- Establish regular monitoring of GHG emissions to demonstrate increased performance year after year. ^[5]
- Make your company a sustainability leader, and you'll be a more appealing investment for customers, stakeholders, and future staff talent. ^[6]
- Contribute to attaining zero carbon emissions, positive environmental change, and investment to improve your company's reputation. ^[6]

Conclusion

Carbon transparency refers to firms and other organizations publicly disclosing how much greenhouse gas (GHG) emissions they are responsible for, and it is now a key component of green finance, ESG, impact investing, and sustainable finance. Investors and analysts will be able to decide if a firm is following its climate goals and commitments by being able to quickly assess a company's greenhouse gas emissions. Scopes 1 and 2 are straightforward ideas with clear definitions: direct emissions from assets under the company's control or ownership, and indirect emissions from energy acquisition. Scope 3 emissions, on the other hand, are more complex but also have the potential to be more powerful. Taken together, scope 1, 2, and 3 emissions is a useful force in the fight against climate change. The next step is to compile that information and make it available to a wider audience of politicians, investors, and consumers.



References

1. A corporate reporting and accounting standard. (2004, March 30). Retrieved from <https://www.wbcsd.org/Programs/Climate-and-Energy/Climate/Resources/A-corporate-reporting-and-accounting-standard>
2. Retrieved from [ghg-protocol-revised.pdf](https://www.ghgprotocol.org/docs/default-source/ghg-protocol-revised.pdf) (ghgprotocol.org)Scope 2 Guidance_Final_Sept26.pdf (ghgprotocol.org)
3. Retrieved from [Scope3_Calculation_Guidance_0.pdf](https://www.ghgprotocol.org/docs/default-source/ghg-protocol-revised.pdf) (ghgprotocol.org) 200908_bhpscope1and3emissionscalculationmethodology2020.pdf
4. What are Scope 1 Emissions? <https://www.ghginsight.com/>. (n.d.). Retrieved from <https://www.ghginsight.com/simplify-scope-1-and-scope-2-emissions-reporting/what-are-scope-1-emissions/#:~:text=Scope%201%20emissions%20are%20greenhouse,leased%20cars%2C%20vans%20%26%20lorries.>
5. Retrieved from <https://www.bhp.com/-/media/documents/investors/annual-reports/2019/bhpscope3emissionscalculationmethodology2019.pdf?la=en>
6. Tafazzulkhan. (n.d.). Scope 2 emissions. Retrieved from <https://docs.microsoft.com/en-us/industry/sustainability/calculate-scope2#:~:text=Scope%202%20emissions%20are%20in%20direct,steam%2C%20heat%2C%20and%20cooling>

**Tech
Mahindra**



www.youtube.com/user/techmahindra09
www.facebook.com/techmahindra
www.twitter.com/tech_mahindra
www.linkedin.com/company/tech-mahindra
www.techmahindra.com