

CARBON ACCOUNTING IN THE CIRCULAR ECONOMY

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Abstract: Carbon accounting in the circular economy became a priority for the professional organisations because climate changes are an important issue on international level and carbon emissions are increasing across the globe.

Research on carbon accounting is a new area, but public or private entities must quantify their greenhouse gas emissions in order to reduce operational costs, and to improve operational efficiency.

Carbon accounting and professional organisations can provide leadership and explain what needs to change within organisations in order to achieve carbon emission reductions at the pace and scale that is required.

IASB (International Accounting Standards Board) is actively seeking to embed carbon accounting into current accounting practice and to develop standards for reporting on carbon emissions. Professional accountants will play a central role in helping managers to integrate climate and other environmental and social value into traditional reporting. The governments and professional organisations are working together in preparing for and delivering carbon reduction and net zero targets. The European Union has already set targets to reduce greenhouse gas emissions by 2050.

Keywords: *sustainability reporting; economy; carbon accounting; professional organisations*

JEL Classification: C88, E02, M41, I25

Introduction

Carbon accounting or greenhouse gas accounting is a framework of methods to measure how much greenhouse gas (GHG) an organization emits². Carbon accounting is a priority for managers, accountants, professional organisations, but also for public entities such governments or European Parliament. According to the International Business Machines Corporation (IBM)³, greenhouse gas accounting is the process of quantifying the amount of greenhouse gases (GHGs) produced directly and indirectly from a business's or organization's activities within a set of boundaries. Thus, access to accurate, granular GHG emissions data is essential for organizations looking to identify where to focus emissions reduction efforts, develop a strategy and track the impact of emissions reduction initiatives. Recently, IBM organization developed a specific emissions management software with accounting and reporting modules to follow progress towards emissions-reduction costs. With the recent increase in demand for net-zero targets and pathways, accurate carbon accounting will be needed to ensure a standardized, transparent, and auditable approach (Marlowe, J. and Clarke, A. 2021).

1. Greenhouse Gas Emissions and Carbon Accounting

Carbon accounting in the circular economy is used by researchers and professional accountants to understand the extent of an organization's carbon emissions – both direct and indirect⁴. Carbon accounting⁵ is a complex process that requires access to accurate, real-time and historical energy data and factor sets. Also, energy data must reflect the complexity and hierarchy of the organization so that emissions can be traced back to their source for reporting and compliance. Climate change indicators reflect how global greenhouse gas emissions increased since 1990 until today, threatening ecosystems and biodiversity:

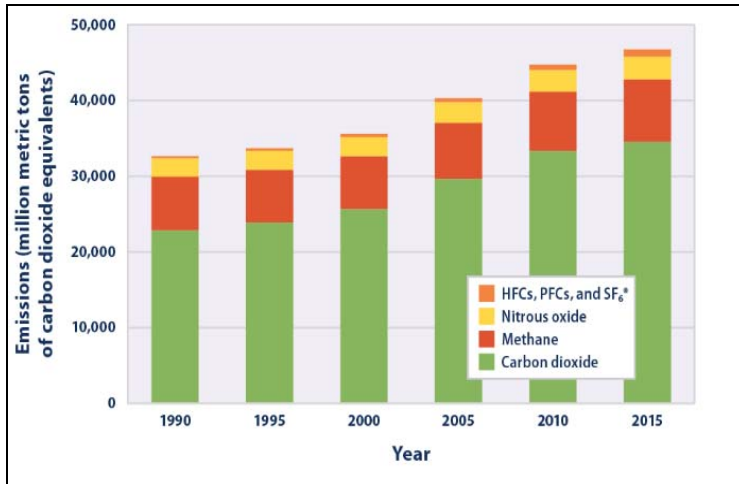
² <https://corporatefinanceinstitute.com/resources/esg/carbon-accounting/>

³ <https://www.ibm.com/topics/carbon-accounting>

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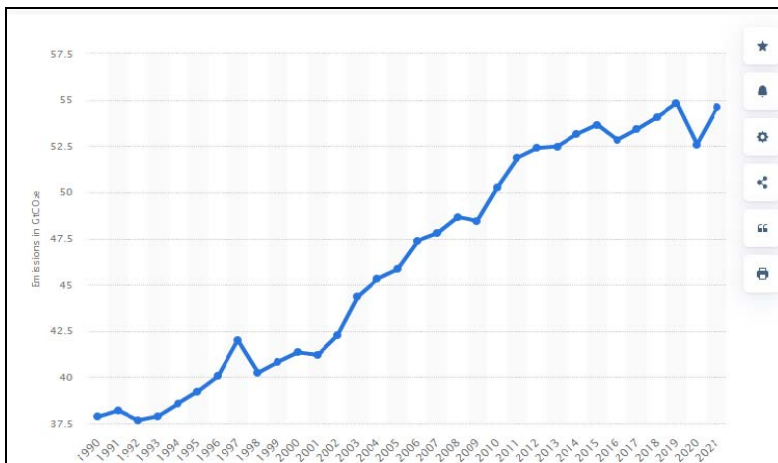
Figure 1. Global Greenhouse Gas Emissions by Gas, 1990–2015



Source: <https://www.epa.gov/climate-indicators/climate-change-indicators-global-greenhouse-gas-emissions>

Thus, the demand for robust greenhouse gas (GHG) accounting is rapidly growing as investors and businesses seek to demonstrate their commitment to decarbonization.

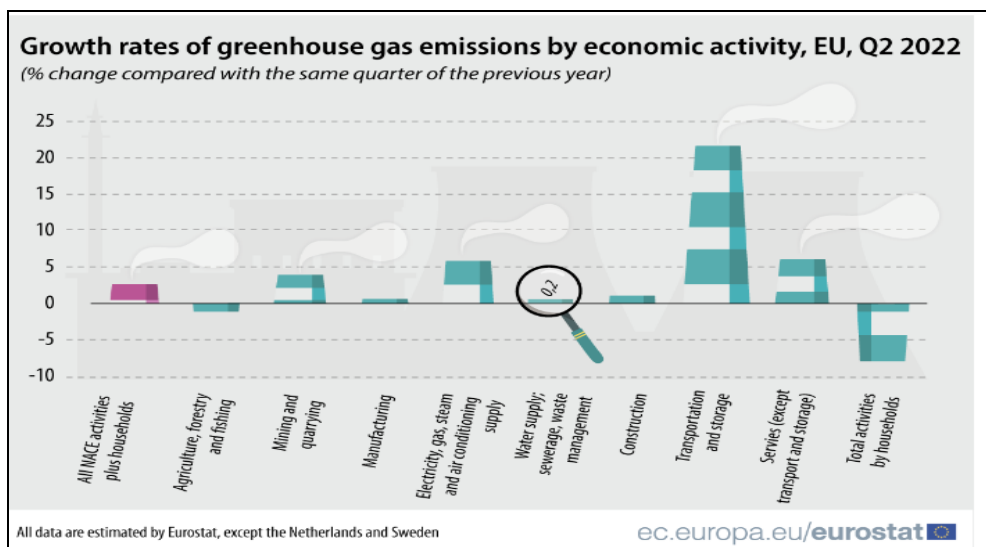
Figure 2. Annual greenhouse gas emissions worldwide 1990-2021 (billion metric tons of carbon dioxide equivalent)



Source: <https://www.statista.com/statistics/1285502/annual-global-greenhouse-gas-emissions/>

We could observed in the figure no. 2 how gas emissions have been declining in 2020 due to the COVID-19 pandemic and economic slowdown. To help fight climate change, the EU has set ambitious targets to reduce its greenhouse gas emissions. In the figure below, we could observe the growth rates of greenhouse gas emissions in EU by economic activity for second quarter of year 2022:

Figure 3. Growth rates of greenhouse gas emissions by economic activity, EU, Q2, 2022



Source: <https://ec.europa.eu/eurostat/web/products-eurostat-news/-/ddn-20221115-2>

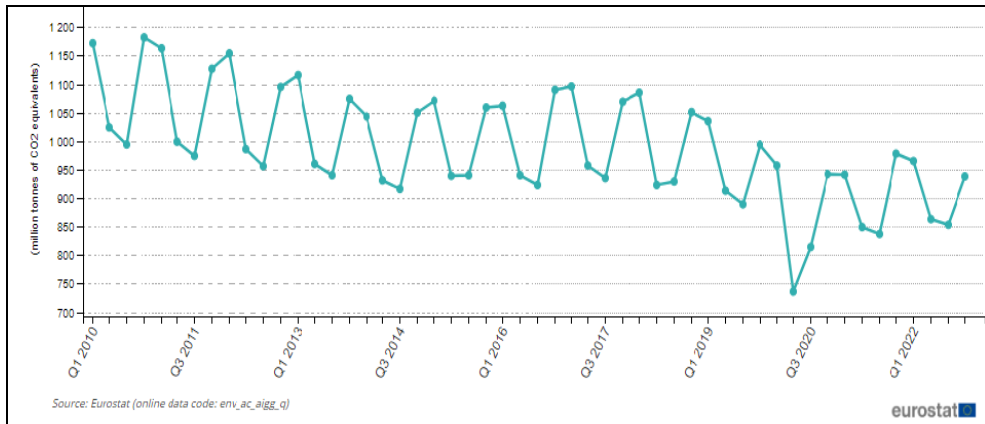
In the figure above, we could observe that greenhouse gas emissions increased in most sectors compared with the year 2021. There are two exception such as: *households* which decreased by 8% and *agriculture*, which decreased by 1%. The highest increases were recorded in the sector of *transportation and storage*, which increased by 22% , sector of *electricity or gas supply*, which increased by 6%, and sector of *services* which increased by 6%.

Eurostat statistics provide general economic information about the fourth quarter of 2022, when EU economy greenhouse gas emissions totalled 939 million tonnes of CO₂-equivalents, a 4 % decrease compared with the same quarter of

2021⁶. In order to achieve environmental sustainability, EU wants to reach climate neutrality by 2050 and this target, along with an interim target of 55% CO₂ emission reduction by 2030, are set in the European Climate Law⁷.

While climate change helped to spur the development of carbon accounting as an offshoot of environmental accounting, international discussions were fostering debates on related global concern – conservation through the valuation of biodiversity (Galvin S.S. and Garzon D.Z, 2023). Carbon accounting could help investors and managers to understand in a better way the greenhouse gas emissions for activities and households. In the figure below, we could observe the evolution of greenhouse gas emissions in EU for the period 2010-2022:

Figure 4. Greenhouse gas emissions for all activities and households in EU period 2010 - 2022



Source: <https://www.statista.com/statistics/1391510/eu-european-union-greenhouse-gas-emissions-by-quarter/>

Human emissions of carbon dioxide and other greenhouse gases are a primary driver of climate change. Particularly notable is the way that carbon accounting revolves around the production of data about GHG emissions, the reductions of

⁶ [https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Quarterly_greenhouse_gas_emissions_in_the_EU#:~:text=Greenhouse%20gas%20emissions,In%20the%20fourth%20quarter%20of%202022%2C%20EU%20economy%20greenhouse%20gas,tonnes%20of%20CO2%20equivalents\).](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Quarterly_greenhouse_gas_emissions_in_the_EU#:~:text=Greenhouse%20gas%20emissions,In%20the%20fourth%20quarter%20of%202022%2C%20EU%20economy%20greenhouse%20gas,tonnes%20of%20CO2%20equivalents).)

⁷ <https://www.europarl.europa.eu/news/en/headlines/society/20180208STO97442/cutting-eu-greenhouse-gas-emissions-national-targets-for-2030>

which can be monetized in carbon and agricultural markets (Galvin S.S. and Garzon D.Z, 2023).

2. Current Trends in Carbon Accounting

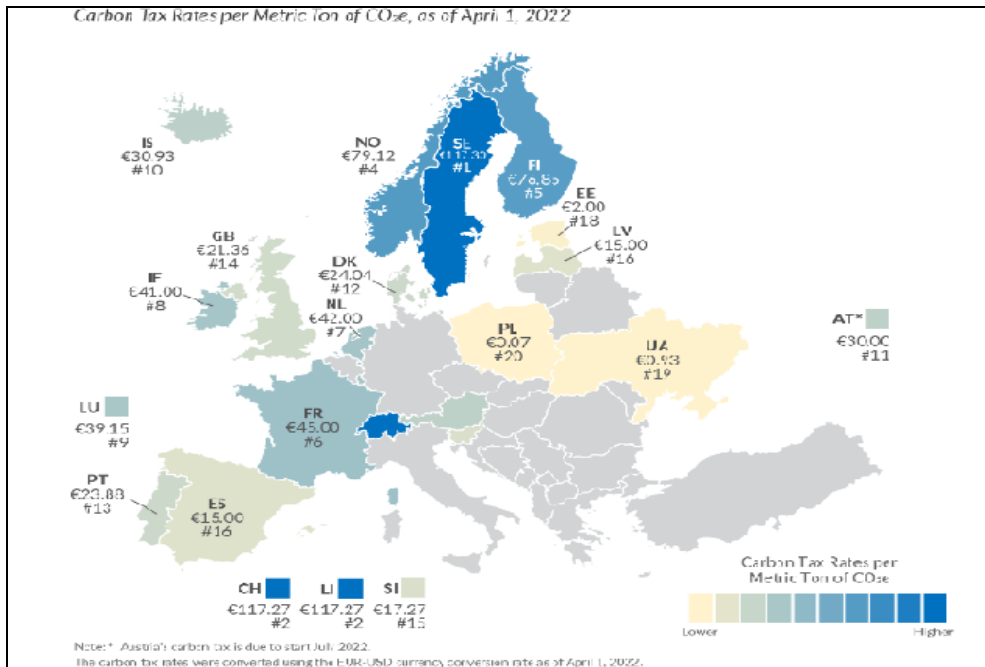
Carbon accounting is related to sustainability accounting and integrated reporting in the circular economy. The global nature of GHG emissions requires new financial reporting and accountability for public and private entities. Also, carbon accounting could help managers from public and private sector to adopt better decisions for production, distribution, procurement and supply chain management. In order to implement carbon accounting, public and private entities must gather comprehensive data on their emissions. As most major management decisions, a good information system is also crucial to design and measure GHG emissions (Schaltegger,S. and Csutora, M.,2012). Given that accounting conventionally provides the financial reporting, carbon management accounting can increasingly become a crucial tool for combatting climate change (Schaltegger,S. and Csutora, M.,2012).

A carbon tax may supply driving forces for economies (Lăzăroiu et al., 2020) to diminish their carbon emissions in a financially rewarding way. In the last decades, several countries have taken measures to reduce carbon emissions, including instituting environmental regulations, and carbon taxes (Ionescu L., 2020). Thus, Finland was the world's first country to introduce a carbon tax in 1990, followed by other countries with the same policy⁸. As a result of this strategy, all EU member states of the European Union became part of the EU Emissions Trading System (EU ETS), a market created to trade a capped number of greenhouse gas emission allowances⁹.

⁸ <https://taxfoundation.org/data/all/eu/carbon-taxes-in-europe-2022/>

⁹ <https://taxfoundation.org/data/all/eu/carbon-taxes-in-europe-2022/>

Figure 5. Carbon Taxes in Europe year 2022



Source: <https://carbonpricingdashboard.worldbank.org/>

Carbon tax and carbon accounting became important for professional organisations, such as IFAC (International Federation of Accountants). Thus, IFAC adopted the GHG Protocol Corporate Accounting and Reporting Standard in order to provide requirements and guidance for companies preparing a corporate-level GHG emissions inventory. As a result of this accounting protocol, new regulations were adopted for¹⁰:

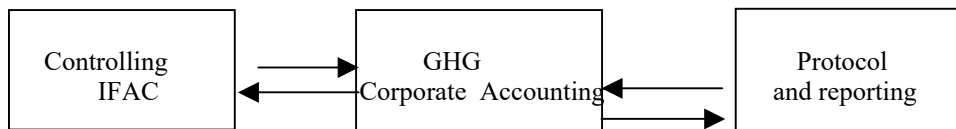
- GHG Accounting and Reporting Principles;
- Accounting for GHG Reduction;
- Reporting GHG Emissions;
- Verification of GHG Emissions;
- Setting GHG Targets;

¹⁰<https://ghgprotocol.org/sites/default/files/standards/ghg-protocol-revised.pdf>
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- Accounting for Indirect Emissions from Electricity;
- Accounting for Sequestered Atmospheric Carbon.

In this way, carbon accounting is implementing calculation tools and choosing activity data and emission factors. The carbon accounting system is auditable and the internal reporting system provides guidance on internal documentation to support emissions calculations for any company.

Figure 6. Relation between Corporate Accounting, controlling and reporting



Implementing carbon accounting can have substantial consequences for a company, such as: minimize risk, effective internal control, build brand equity, and reduce inefficiency.

Conclusion

Carbon tax is an important instrument for curbing GHG, with significant impact over prices of goods and services all over the world. Thus, greenhouse gas accounting is useful to measure impact of the carbon tax on business and profitability. Carbon accounting became important in the last few decades, because public and private entities must measure their GHG emissions in order to reduce operational costs, to develop a quality management plan and to improve operational efficiency. In order to achieve that, companies must perform generic quality checks, investigate activity data, review final inventory estimates and management reports for GHG emissions.

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