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Carbon Footprint Report 2024

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ABOUT FACULTY OF ENGINEERING MANSOURA UNIVERSITY

The Faculty of Engineering at Mansoura is one of the first engineering colleges in the Delta region. It has undergone several stages of development until reaching its current state. Initially established as the Higher Industrial Institute in 1957, it aimed to graduate applied technicians in a four-year program, which later extended to five years in 1959. In 1961, the study was divided into two stages: the first stage was three years leading to a diploma in industrial higher institutes, while the second stage, lasting two years, allowed students who excelled in the first stage to obtain a bachelor's degree in engineering.

In 1974, Republic Decision No. 542 of 1974 transformed the Higher Industrial Institute in Mansoura into the Faculty of Engineering, equipped with the necessary scientific and human resources to upgrade its status. Since then, the faculty has undergone significant scientific development, expanding its facilities and laboratories to become a leading institution among engineering colleges in Egypt.

The faculty has introduced eight new programs with a credit hour system to keep pace with future job requirements and market demands. Notably, Mansoura University's Faculty of Engineering pioneered interdisciplinary bachelor's degree programs. In 2006, it launched the Communications and Information Engineering program as the first credit hour system program in Egyptian government universities. Subsequently, programs like Construction Engineering, Mechatronics Engineering, and Medical and Biological Engineering were introduced.

Continuing its development plan, the faculty established three new programs in 2020: New and Renewable Energy Engineering, Chemical and Environmental Engineering, and Infrastructure and Environmental Engineering. Based on international reports on future job trends, the faculty introduced five additional programs, including Artificial Intelligence Engineering, Sustainable Architecture Engineering, Sustainable Water Engineering, Materials and Advanced Applications Engineering, and Civil Engineering.

In 2020, the faculty also introduced three quality programs in postgraduate studies to integrate with undergraduate programs and meet future labour market needs and global research advancements in engineering sciences, leading to Master's and Ph.D. degrees in Environmental Engineering, Medical Engineering, and Mechatronics Engineering.

Furthermore, the faculty has initiated dual degree programs with several international universities for both undergraduate and postgraduate studies. In 2021, dual degree programs were established with the University of Louisville in the USA and Western Ontario University in Canada.

Since 2016, some of the faculty's laboratories have been accredited by the Egyptian Accreditation Council for Laboratories (EGAC), including Soil and Foundations Laboratory and Roads and Airports Laboratory, among others. Additionally, the faculty achieved first place among Egyptian government colleges and obtained nine ISO certificates covering quality management systems, environmental management, occupational health and safety, innovation management, organizational governance, anti-bribery management, business continuity management, information security management, and energy management in 2023. Moreover, eleven academic programs out of twelve at the undergraduate level have been accredited by the National Authority for Quality Assurance and Accreditation of Education. In 2022, seven programs were accredited under the semester system and four under the credit hour system.

THE PARIS AGREEMENT

Climate change is a global emergency that goes beyond national borders. It is an issue that requires international cooperation and coordinated solutions at all levels. To tackle climate change and its negative impacts, world leaders at the UN Climate Change Conference (COP21) in Paris reached a breakthrough on 12 December 2015: the historic Paris Agreement.

The Agreement sets long-term goals to guide all nations to:

substantially reduce global greenhouse gas emissions to hold global temperature increase to well below °2C above pre-industrial levels and pursue efforts to limit it to °1.5C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change.

periodically assess the collective progress towards achieving the purpose of this agreement and its long-term goals.

provide financing to developing countries to mitigate climate change, strengthen resilience and enhance abilities to adapt to climate impacts.

The Agreement is a legally binding international treaty. It entered into force on 4 November 2016 Today, 195 Parties (194 States plus the European Union) have joined the Paris Agreement.

The Paris Agreement provides a durable framework guiding the global effort for decades to come. It marks the beginning of a shift towards a net zero emissions world. Implementation of the Agreement is also essential for the achievement of the Sustainable Development Goals.

The Agreement includes commitments from all countries to reduce their emissions and work together to adapt to the impacts of climate change, and calls on countries to strengthen their commitments over time. The Agreement provides a pathway for developed nations to assist developing nations in their climate mitigation and adaptation efforts while creating a framework for the transparent monitoring and reporting of countries' climate goals.

From the opening Speech of
H.E President Abdelfatah Elsisi

EGYPT NATIONAL CLIMATE CHANGE STRATEGY (NCCS)2050

Today, what our world needs to overcome the current climate crisis and to reach what we have agreed on as goals in the Paris Agreement, surpasses slogans and words. Today, our peoples expect from us rapid, effective and equitable implementation. Our peoples expect us to take real and concrete steps towards reducing emissions, enhancing adaptation with the consequences of climate change, and providing the necessary financing for developing countries that suffer the most from the current climate crisis. Therefore, we have been keen to call this Conference: «Implementation Summit », which is the goal that all our efforts and endeavors must center around.

In Egypt, we have set ambitious goals expressed in Egypt's National Strategy to Address Climate Change. We are working diligently to accelerate the pace of green transformation by expanding reliance on renewable energy and clean transport. We have taken concrete steps towards the structural transformation of bills, legislation and government working mechanisms so as to contribute to the promotion of green investments.

P.M Mostafa Madboli

EGYPT NATIONAL CLIMATE CHANGE STRATEGY (NCCS)2050

In light of various scientific reports, particularly those from the Intergovernmental Panel on Climate Change, regarding the magnitude of climate change impacts and their projected scenarios, the Paris Agreement was adopted to advance global action to address climate change under the United Nations Framework Convention on Climate Change. The agreement entered into force on November 4th, 2016, and the Egyptian parliament ratified it in 2017. Egypt is committed to deliver its fair share of climate action as part of global action to address climate change. However, given Egypt's high vulnerability to climate change, adapting to the adverse impacts of climate change is an imperative necessity. From this standpoint, Egypt prepared its first National Strategy for Climate Change Adaptation and Disaster Risk Reduction in 2011, and a Low Emission Development Strategy (LEDS) was issued in 2018, which was prepared to be in line with the Sustainable Development Strategy SDS - Egypt Vision 2030. Despite this, there was still a gap to consolidate all aspects of climate change in one document to be a basic reference that ensures the integration of climate change dimension into general planning of all sectors in the country. Hence, the National Council for Climate Change (NCCC) has requested the development of the first comprehensive National Climate Change Strategy for Egypt until 2050.

CLIMATE CHANGE AND HIGHER EDUCATION (UNIVERSITIES)

Climate change, in its current usage, is a shorthand term that refers to those changes in the earth's climate attributable to human beings in the contemporary era, involving an overall increase in temperatures and other environmental effects.

Anthropogenic global warming is caused primarily by the emission of fossil fuels, most important among these carbon dioxides, which traps heat in the earth's atmosphere. This warming is problematic for humanity for a variety of reasons, including rising sea levels, disruption of agriculture, extreme weather, and loss of biodiversity.

Furthermore, climate change is urgent and time bound. Most commentators assert that radical action needs to be taken by governments and societies now, or we will reach the 'tipping point', at which climate change and its destructive impacts become rapid and irreversible, on account of the multiple feedback loops.

The IPCC stated in its special report (IPCC 2018) that the world needs to convert entirely to renewables by 2050 to avoid a catastrophic temperature rise of 2°C. Given the cumulative nature of the impact of greenhouse gases, the later that we leave mitigating action, the more difficult it will be to achieve.

The kinds of actions involved in mitigation and adaptation are likely to be very different. Mitigation involves lessening the direct contribution of universities to climate change (through greenhouse gas emissions, investments in fossil fuel companies, etc.), developing research and innovation in relation to fuel efficiency, carbon capture, etc., and changing the mindsets of students so as to encourage climate-friendly actions in their later lives.

Adaptation, which is connected to ideas of preparedness and resilience will involve the application of knowledge to address required changes in lifestyles, agriculture, housing, healthcare, and so forth, both in relation to capacity building and awareness raising, but also the generation of new ideas and technologies.

All universities have some responsibilities in relation to adaptation and mitigation, both in relation to themselves as institutions with their own communities, and in assisting communities in the society outside of them.

One key aspect of climate change in relation to the role of universities is its anthropogenic nature. While the movements of the climate are the result of the interaction of a number of factors.

The relevance for the university here is that understanding the causes and impacts of climate change involves not only the full range of life sciences, physical sciences, engineering, and technology, but also economics, social sciences, arts, and humanities.

The visual model representing the trajectories of impact contains four stages, starting with the university itself, divided into five modalities. It shows the general movement of the impact of the university on society and the natural environment from left to right of the diagram, as well as the feedback loops from right to left, indicating the effects of the environment on society, and of society on the university.

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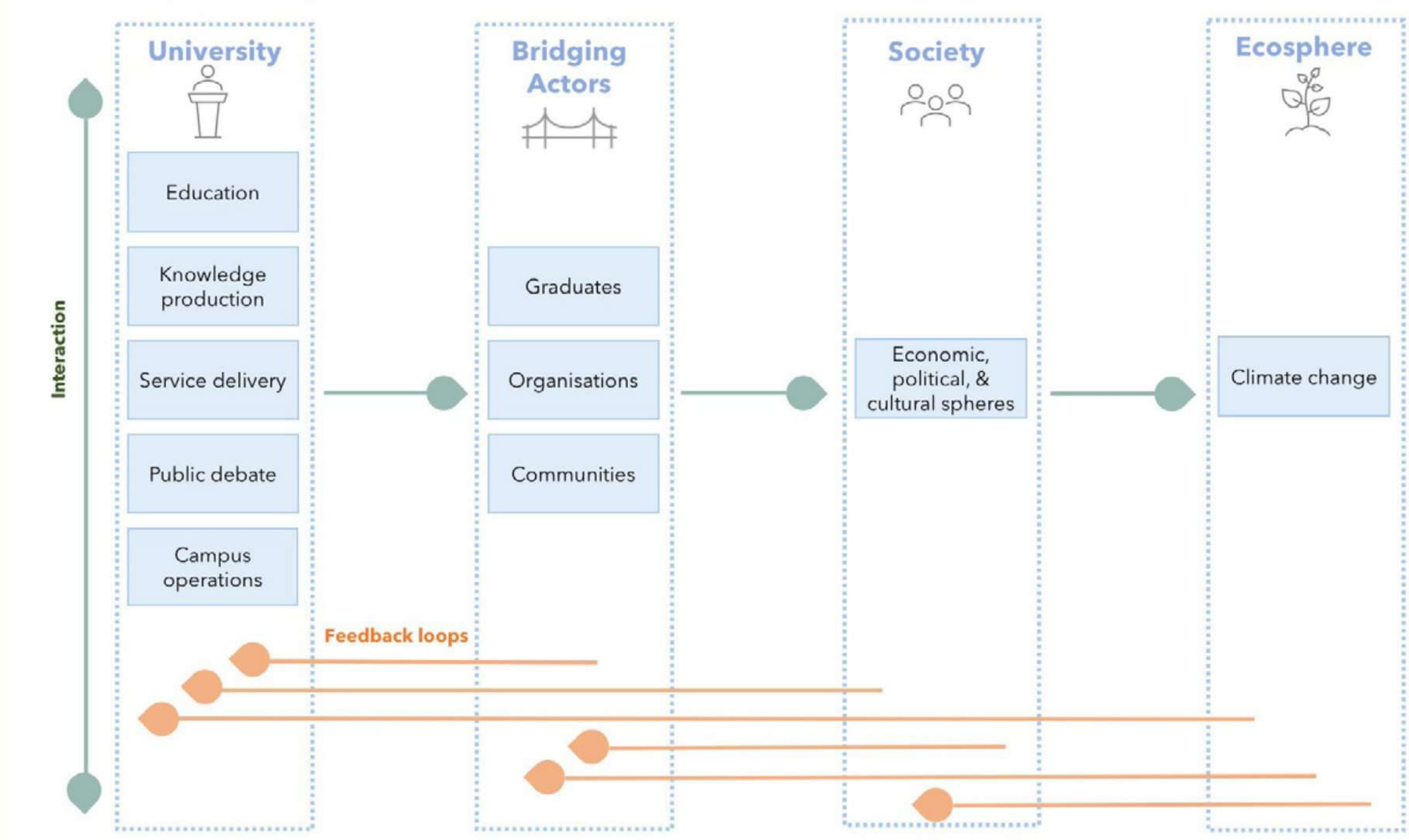
STAGES OF IMPACTS



Source: Working paper, final.pdf (ucl.ac.uk)

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EXAMPLES OF THE NEGATIVE IMPACTS OF UNIVERSITIES ON CLIMATE CHANGE:

- Students develop professional competencies that allow them to increase fossil fuel extraction.
- Students acquire attitudes privileging the maximization of profit over the protection of the natural environment.
- University develops new products and technologies that are dependent on fossil fuel usage.
- Universities develop new student accommodation buildings without environmentally friendly specifications.
- Community engagement project encourages a local community income-generation scheme that causes local environmental destruction.

EXAMPLES OF THE POSITIVE IMPACTS OF UNIVERSITIES ON CLIMATE CHANGE:

- University works with a housing association to make their energy usage more efficient and reduce fossil fuel emissions.
- An engineer applying principles of sustainability in her building designs.
- Graduate has acquired basic knowledge of the impact of greenhouse gases on the climate and makes moves towards the use of renewable energy sources in his own house and transport.
- Graduates have access to the latest research and advice around flood risks and adapt family homes accordingly.
- University provides training courses for local farmers in developing new crops that are appropriate for changing weather conditions.

EMISSION SUMMARY

Scope Definition

Greenhouse Gas **(GHG)** emissions are categorized into three scopes by the Greenhouse Gas Protocol, a widely used international accounting tool.

If you can't measure it, you can't manage it (Quote Peter Drucker).

Scope 1

emissions are direct emissions from owned or controlled sources. These could be emissions from combustion in owned or controlled boilers, furnaces, vehicles, etc., or emissions from chemical production in owned or controlled process equipment.

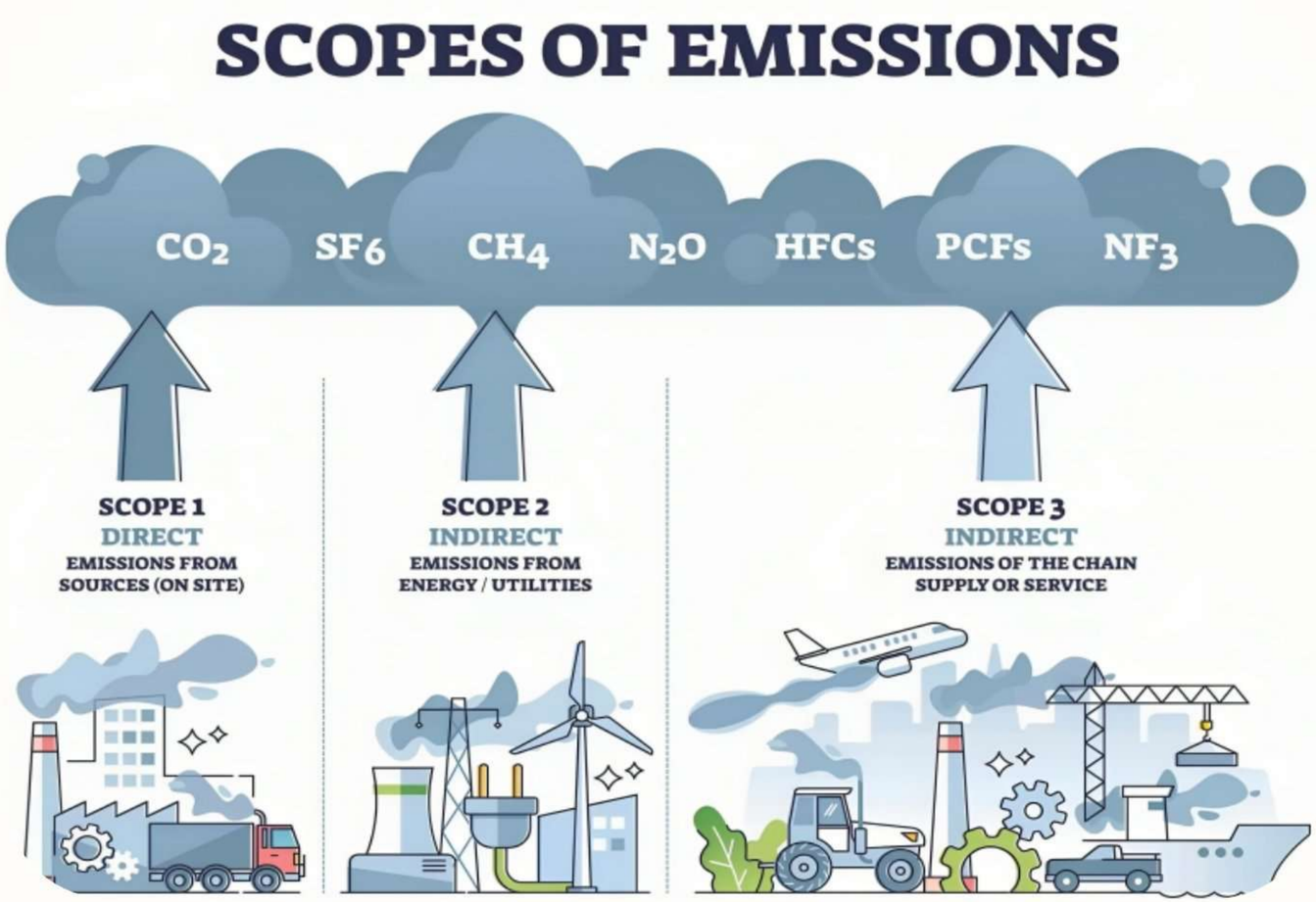
Scope 2

emissions are indirect emissions from the generation of purchased energy, primarily associated with the production of electricity, steam, heating, and cooling consumed by the reporting company.

Scope 3

emissions are all indirect emissions (not included in scope 2) that occur in the value chain of the reporting company, including both upstream and downstream emissions. This could include emissions from the extraction and production of purchased materials, transportation of purchased fuels, and use of sold products and services.

Understanding these scopes is crucial for a company to effectively manage and reduce its carbon footprint.



ORGANIZATIONAL BOUNDARIES

Organizational boundaries in greenhouse gas accounting refer to businesses and operations that are included in a company's GHG inventory.

The GHG Protocol suggests choosing one of two approaches to setting organizational boundaries: the Control Approach, or Equity Share Approach.

The Control Approach suggests you measure emissions for any operations over which you have practical control; whether at facilities that are owned or leased. Control can be defined in either operational terms or financial terms. Operational control refers to operations over which the company has the full authority to introduce and implement its operating policies. Financial control refers to operations over which the company has the ability to direct the financial and operating policies of the operation to gain economic benefits.

The Equity Share Approach suggests you measure emissions from facilities where you have some degree of ownership.
In this report, we have chosen the "Control Approach" for the Faculty of Engineering – Mansoura University

Reporting Period

The Reporting Period covers from **(1 January 2023) to (31 December 2023)**

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Methodology & Emissions

The Greenhouse Gas (GHG) Protocol Guidelines:

For the identification of emission sources and GHG, it should be measured and reported. They also set the boundaries for GHG emission accountability, based on geographical, organizational, and operational limits:

- Corporate Accounting and Reporting Standard: Guides for companies to prepare their corporate-level GHG emissions.
- Corporate Value Chain (Scope 3) Accounting and Reporting Standard.

ISO 1:2019-14064:

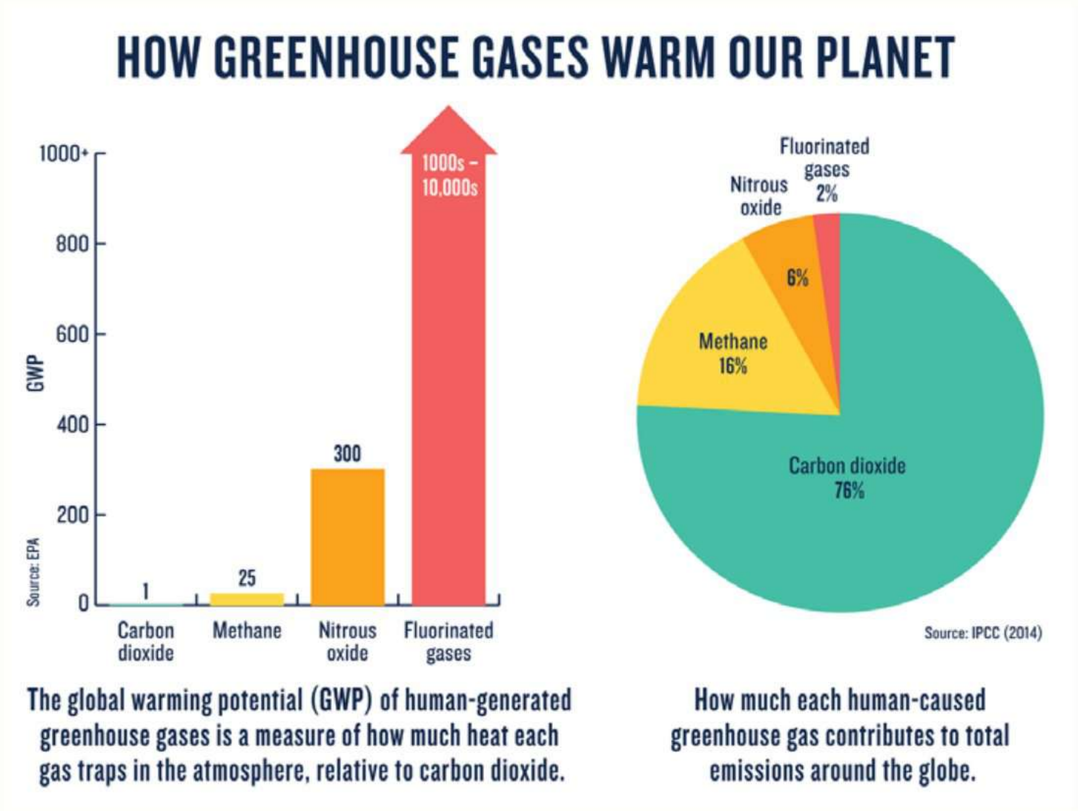
Specifies the principles, requirements, and guidelines for the quantification and reporting of GHG emissions and removals at the organizational level.

2006 Intergovernmental Panel on Climate Change (IPCC):

Guidelines for Greenhouse Gas Inventories (with 2019 Refinements).

Global Warming Potential

Some greenhouse gases are more effective than others at making the planet warmer and can remain in txxhere for different amounts of time, ranging from a few years to thousands of years.



For each greenhouse gas, a Global Warming Potential (GWP) has been calculated to reflect how long it remains in the atmosphere, on average, and how strongly it absorbs energy. The GWP of greenhouse gases is a measure of how much heat each gas traps in the atmosphere relative to Carbon Dioxide.

GHG	Atmospheric Concentration	Atmospheric Lifetime	Global Warming Potential (Over 100 years)
Carbon Dioxide (CO_2)	76%	1000's of years	1
Methane (CH_4)	16%	10 years	25
Nitrous Oxide (N_2O)	6%	> 100 years	298
Fluorinated Gases	2%	1,000 - 10,000 years	1,000 - 10,000

Source: Greenhouse Gases - CARO

Calculation Approach

The greenhouse gas (GHG) emission calculation approach involves multiplying the activity with its equivalent emission factor based on a unit analysis to convert the emissions into the $mtCO_2e$.

Activity (Unit)	x	Emission Factor [$mtCO_2e$/unit]	=	Emission [$mtCO_2e$/unit]

Further calculations and equations are provided in the Footprint Calculation Methodology section below.

Emission Factors

Emission factors (EF) represent the quantity of pollutants released into the atmosphere caused by a certain activity. The emission factor is usually expressed as the carbon dioxide equivalent (CO_2e) emissions generated by a unit weight, volume, distance, or duration of the activity, e.g., CO_2e/litter fuel consumed, CO_2e/km driven, CO_2e/kWh of purchased electricity, etc.

The emission factors were identified based on:

- **DEFRA:** Department for Environment, Food & Rural Affairs, UK 2020 and 2021.
- **IPCC:** Intergovernmental Panel on Climate Change.
- **Country-Specific Emission Factors:** Emission factors calculated specifically for Egypt.

Regarding the country-specific emission factor, the emission factor is reported monthly by Egypt›s Electricity Regulatory Authority (ERA), and an average value is calculated for each year. The emission factor is based on Egypt›s actual fuel consumption. The emission factor for water supply and wastewater treatment is calculated using a conversion formula, provided by the Holding Company for Water and Wastewater (HCWW). Based on the amount of energy consumed in each process, the corresponding emission factor could be obtained.