

CARBON FOOTPRINT REPORT

2021-2022

THIS REPORT HAS BEEN PREPARED BY DCARBON EGYPT AND THE INSTITUTE OF NATIONAL PLANNING (INP) TEAM

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FOREWORD



As part of Egypt's Preparations for the United Nations Climate Change Conference, known as the Conference of Parties COP27, Sharm El Sheikh 2022, I am pleased to introduce herewith the Institute of National Planning (INP) initiative contribution to these efforts. INP embarked on research work to measure the carbon footprint of its premises in 2021-22. This stems from the mandate of INP as a developmental research institution and from its conviction of the importance of environmental sustainability and community participation in facing the climate change issue and improving the environment at large.

This initiative was undertaken by INP's academic and administrative staff with the valuable assistance of DCarbon, a leading specialized company in this field in Egypt. INP's carbon footprint is an important indicator for measuring the greenhouse gas emissions of its research, educational, training, technical, administrative, and other activities. It is expressed in equivalent carbon dioxide tons annually. Although the research revealed that this emission is very low, INP endeavors to improve this indicator.

It is worth mentioning that this is the first attempt at this connection. It will set a frame to reduce carbon dioxide based on the fact that "what cannot be measured cannot be managed".

I would like to seize this opportunity to extend my appreciation to everyone who participated in the preparation of this report. Special recognition is due to DCarbon for identifying and analyzing the necessary data and the development of this report.

Prof. Dr. Ashraf El-Araby

President of the Institute of National Planning (INP)

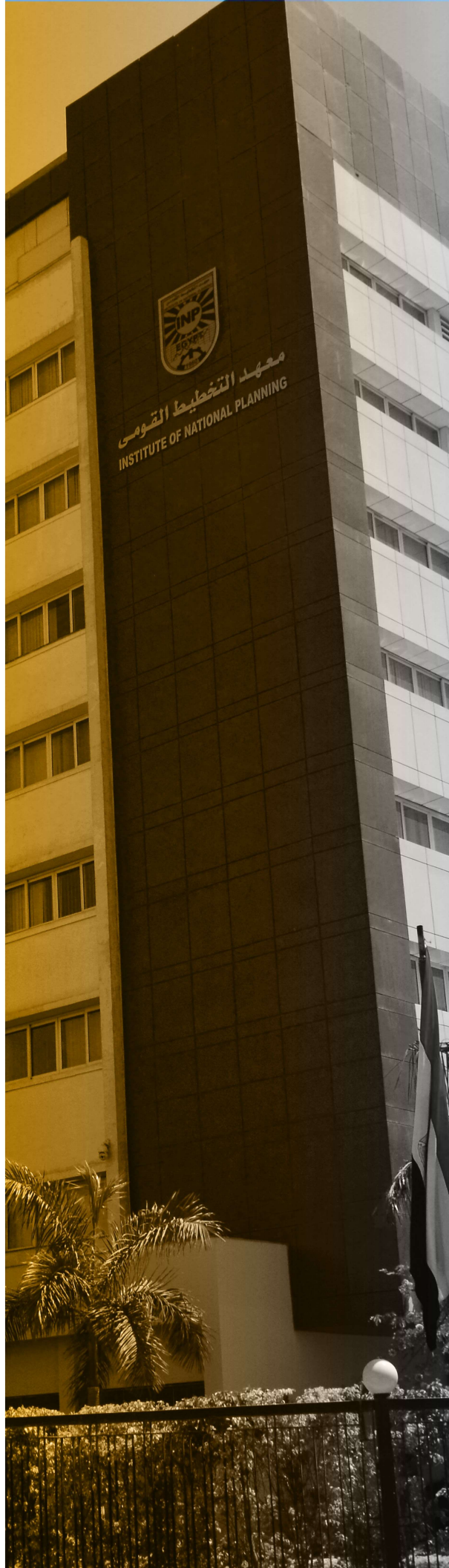
ABBREVIATIONS AND ACRONYMS

AC	Air Conditioning
CFP	Carbon Footprint
CH ₄	Methane
CO ₂	Carbon Dioxide
EF	Emission Factor
EPA	Environmental Protection Agency
GHG	Greenhouse Gas
GWP	Global Warming Potential
HFCs	Hydrofluorocarbons
INP	Institute of National Planning
IPCC	Intergovernmental Panel on Climate Change
ISO	International Organization for Standardization
Kg	Kilograms
KPIs	Key Performance Indicators
L	Liter
m ²	Square Meter
MT CO ₂ e	Metric Tonnes of Carbon Dioxide Equivalent.
N ₂ O	Nitrous Oxide
PFCs	Perfluorocarbons
SF ₆	Sulfur Hexafluoride
SI units	International System of Units
UNFCCC	United Nations Framework Convention on Climate Change

KEY DEFINITIONS

Activity Data	A quantitative measure of an institute's activity that results in a GHG emission or removal.
Assumed Parameter	A parameter that is not site-specific but based on best practices, global averages, etc. that is more or less representative of the actual value.
Base Year	A historical year used to compare the preceding year's emissions. It can be a calendar year or averaged over several years (Time Series).
Climate Change	Climate change refers to a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forcings such as modulations of the solar cycles, volcanic eruptions and persistent anthropogenic changes in the composition of the atmosphere or in land use.
Carbon Dioxide Equivalent	CO ₂ equivalent (CO ₂ -eq) emission The amount of carbon dioxide (CO ₂) emission that would cause the same integrated radiative forcing or temperature change, over a given time horizon, as an emitted amount of a greenhouse gas (GHG) or a mixture of GHG
Direct Emissions	Greenhouse gas emissions from facilities/sources owned or controlled by the institute.
Emission Factor	A factor allowing GHG emissions to be estimated from a unit of available activity data (e.g., tons of fuel consumed, etc.) and absolute GHG emissions.
Fugitive Emissions	Emissions that are not physically controlled but result from the intentional or unintentional releases of GHGs.
Greenhouse Gas (GHG)	A gas that absorbs and emits radiant energy within the thermal infrared range, causing the greenhouse effect.
GHG Emission / Removal Factors	The specific value used to convert activity data into greenhouse gas emission/reduction values.
GHG Inventory	List of emission sources and the associated emissions quantified using standardized methods.
Greenhouse Gas Emission	The total mass of a GHG released into the atmosphere over a specified period.
Greenhouse Gas Project	Activity(s) that alter the conditions identified in the baseline scenario, which cause GHG emission reductions or GHG removal enhancements.
Greenhouse Gas Report	Stand-alone document intended to communicate a institute's or project's GHG-related information to its intended users.
Greenhouse Gas Source	Physical unit or process that releases a GHG into the atmosphere.
Indirect Emissions	Greenhouse gas emissions from facilities/sources that are not owned or controlled by the institute but for which the activities of the institute are responsible (electricity purchase).

Inventory Boundary	An imaginary line encompasses the direct and indirect emissions included in the inventory. It results from the chosen organizational and operational boundaries.
IPCC	The Intergovernmental Panel on Climate Change is an intergovernmental body of the United Nations responsible for advancing knowledge on human-induced climate change.
Mobile Combustion	The burning of fuels by transportation devices such as cars and buses.
Operational Boundaries	The operational boundary determines the emissions associated with operations, classifies emissions as direct or indirect, and categorizes the different scopes of GHG emissions.
Organizational Boundaries	The boundaries that determine the operations owned or controlled by the reporting company, depending on the consolidation approach taken (equity or control approach).
Other Indirect Greenhouse Gas emissions	GHG emissions, other than energy indirect GHG emissions, which are a consequence of an organization's activities, arising from greenhouse gas sources that are owned or controlled by other organizations.
Scope 1 (Direct Emissions)	A reporting organization's direct greenhouse (GHG) emissions that occur from sources that are controlled or owned by the organization itself.
Scope 2 (Indirect Emissions)	A reporting organization's indirect GHG emissions associated with the purchase of electricity, steam, heat, or cooling.
Scope 3 (Other Indirect Emissions)	A reporting organization's indirect emissions other than those covered in Scope 2.
Stationary Combustion	Burning of fuels to generate electricity, steam, heat, or power in stationary equipment such as generators, etc.
Refrigerant	A refrigerant is a substance or mixture, usually, a fluid, used in a refrigeration cycle.



EXECUTIVE SUMMARY

Climate change is a real threat to humanity; its effects on society, the economy, and the environment are undeniable. It is predicted that the global temperature increases from human-made greenhouse gases (GHGs) will continue. The increase in GHG emissions will result in more climate extremes and widespread damaging effects across the planet. The effects that scientists predicted would occur in the future are observed now, such as sea level rise, droughts, and wildfires. However, the intensity of these effects depends on the amounts of GHGs emitted.

The Institute of National Planning (INP) started to act through its first Carbon Footprint report, which will be a base year for future reports. This report shows the Carbon Footprint estimates for INP located in Nasr City, Cairo, Egypt. The reporting period is between July 1st 2021 till June 30th, 2022. Scope 1 and Scope 2 GHG emissions were calculated using the standards and guidelines of the Intergovernmental Panel on Climate Change (IPCC), GHG Protocol Corporate Accounting and Reporting Standards, and met the requirements of ISO 14064-1:2018.

As INP is committed to transparency when it comes to reporting its emissions, the current report covers 4 essential greenhouse gases quantified during the calculation process of INP's greenhouse gas inventory. These GHGs are carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), and hydrofluorocarbons (HFCs). Other GHGs were excluded due to their negligible contribution to the total GHG emissions. Emissions for each GHG are reported in metric tons of CO₂ equivalent emissions (CO₂e).

The report concluded with recommendations in terms of

- (1) improving GHG inventory completeness and occurrence; and
- (2) decreasing the carbon footprint of INP.

The GHG report will work as a comprehensive guide for managing and mitigating GHG emissions within INP building.

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ABOUT


THE INSTITUTE OF NATIONAL PLANNING

The Institute of National Planning was established by Law No. 231 of 1960 as a public institution with an independent legal entity. INP is the first institute to support planning and development in the Arab region, and indeed in the Middle East and North Africa. The establishment of the institute is aimed at promoting research, development, and planning studies and the means of implementing them and assisting the concerned authorities in the country to implement them.

To cope with scientific developments in the world, the institute's law and executive regulation are developed with the passing of "Law No. 13 of 2015." Under this law, the mandates of the institute are defined as follows:

- Carry out research and studies in all fields that contribute to achieving the objectives. Develop planning cadres by organizing training programs in planning and development fields and awarding certificates of success.
- Grant scientific degrees (Diploma, Master, and Ph.D.) in fields of planning and development, whether individually or in cooperation with other similar scientific entities within the country or abroad.
- Allocate scholarships and remunerations to encourage research and studies.
- Delegate commissions and internal and external scientific missions.
- Hold scientific conferences, seminars, and meetings.
- Issue and publish research, studies, reports, and scientific journals, and translate and write books and references related to INP objectives.
- Evaluate drafts and decisions related to planning and development.
- Help in spreading the culture of planning and development in society.
- Provide consultation to private or public entities at the national or international level.

These tasks are carried out by the scientific staff. INP includes eight scientific research centers, namely, the Center for International Economic Relations, the Center for Macroeconomic Policies, the Center for Planning Methods, the Center for Regional Development, the Center for Planning and Environmental Development, the Center for Planning and Agricultural Development, and the Center for Planning and Industrial Development, and the Center for Social and Cultural Planning in addition to the administrative Department.



This law also includes a new organizational framework for the scientific centers and their departments. It also allows the establishment of special nature units that undertake specific tasks such as consultation and community service. The law has opened new horizons for the institute's work, as it can offer specialized diplomas, masters and doctoral degrees programs, in addition to various training programs. In parallel with the introduction of the amendment Act a major operation was carried out to renovate the institute's building and equipment. for the first time since it's inception:

- The building was provided with a central air conditioning network, advanced internet networks, both wired or wireless on all floors, and fire and alarm networks.
- The building was provided with cameras for internal and external surveillance, and fingerprint devices and the offices of all INP employees are equipped with computers and electronic printers.
- The water network was changed to reduce water waste resulting from the old dilapidated network. The electricity network was also changed to become more efficient, and LED bulbs were installed throughout the building to reduce electricity consumption.
- Many old electronic devices were replaced with modern ones that consume less electricity

- A modern electronic portal was developed that provides many services, such as the services of the Documentation and Publishing Center at the Institute as well as information on the Institute's activities and events. The portal also provides INP publications to the community of beneficiaries, including faculty members, university students, and researchers in scientific centers based in the country or abroad.
- A number of databases have also been established to serve the Institute's scientific and administrative activities.
- The conference room is equipped , with recording cameras, control rooms, and simultaneous interpretation facility. A VIP lounge was attached to it furnished with a screen projecting on going activities.
- Student facilities have been equipped with projectors and display screens.
- Added an e-learning and distance education hall, which can also be used as a media center if there are activities in the conference hall.
- Refurbished the institute's cafeteria, and provided a gymnasium to serve INP postgraduate students and staff.

INP SCIENTIFIC ACTIVITIES:

The institute's scientific activities include organizing conferences, seminars, symposiums, and expert meetings, these activities vary in regularity, periodicity, and in the topics and issues discussed.

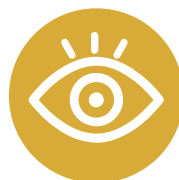
INP Publications:

The Institute's publications include scientific reports, collective research published within a series of planning and development issues, the Egyptian Journal of Development and Planning, policy pamphlets, policy papers, selected topics of planning and sustainable development, and reference books.



Certificates granted to INP:

- Certificate of Quality Management System ISO 9001 for the year 2015.
- Certificate of Management System for Educational and Research Institutions ISO 21001 for the year 2018.
- The institutional accreditation from the National Authority for Quality Assurance and Accreditation of Education (NAQAA) in 2022.



INP's Vision:

Active and sustainable role in planning and developmental issues on the national level, ensuring effective regional and international presence.



INP's Mission:

INP is a national think tank that offers assistance in development and planning fields for the decision makers and policymakers at all levels by providing competitive services in research, training, consultancy, and education. It applies the best scientific methods and practices and maintains local and global partnerships and promotes the objectives of sustainable development.



INP's Values:

- Institutional Loyalty and Affiliation.
- Adherence to the Academic Code of Ethics.
- Public sector Ethics.
- Teamwork.
- Governance, Transparency, and Accountability.
- Continuous Education.
- Creativity and Innovation.
- Intergenerational Communication.



INP's Strategic Goals:

- Strengthening INP's status locally and globally and putting greater emphasis on the risks affecting the development process.
- Developing activities, partnerships, research contributions, and activating the measurement of research impact.
- Improving the competitiveness, quality, and advertising of the training activity according to actual requirements.
- Diversifying and enhancing the quality and reliability of postgraduate studies programs according to the needs of sustainable development.
- Expanding and diversifying the areas of consulting services based on competitive advantages.
- Enhancing quality, governance, and digital transformation in INP's activities, systems, and processes.
- Enhancing financial sustainability and developing additional financial resources to support the expansion of the Institute's activities.
- Developing human capital and managing physical capital according to the best experiences and practices.
- Adopting innovative concepts, practices, and applications to activate INP's social responsibility roles.

INP CARBON FOOTPRINT KEY MESSAGES

A summary of the carbon footprint report basis and results are demonstrated in Table 1, Table 2, and Figure 1. The report provides detailed information on each of the mentioned emission sources.

Table (1): INP's Carbon Footprint Basis

Organizational Boundary	100% Operational Control
Operational Boundary	Scope 1 and Scope 2 of the only owned/controlled building
Location	Nasr City, Cairo, Egypt
Total Area of building	13,893 m ²
Total No. of Employees	163
Total No. of Academics	142
Total No. of Students	300
Reporting Period	01/07/2021 – 30/06/2022

Table (2): INP's Carbon Footprint Summary Results.

Emission Sources	Emissions Quantity	Unit	Share in Total GHG Emissions
Scope 1 - Direct Emissions			
Stationary Fuel Combustion	230.56	MT CO ₂ e	31.06%
Mobile Fuel Combustion	46.65	MT CO ₂ e	6.28%
Fugitive Emissions	28.38	MT CO ₂ e	3.82%
Scope 2 – Indirect Emissions			
Electricity Consumption	436.77	MT CO ₂ e	58.84%
Emissions Summary			
Scope 1 – Direct Emissions	305.59	MT CO ₂ e	41.16%
Scope 2 – Indirect Emissions	436.77	MT CO ₂ e	58.84%
Total Emissions	742.36	MT CO₂e	100%

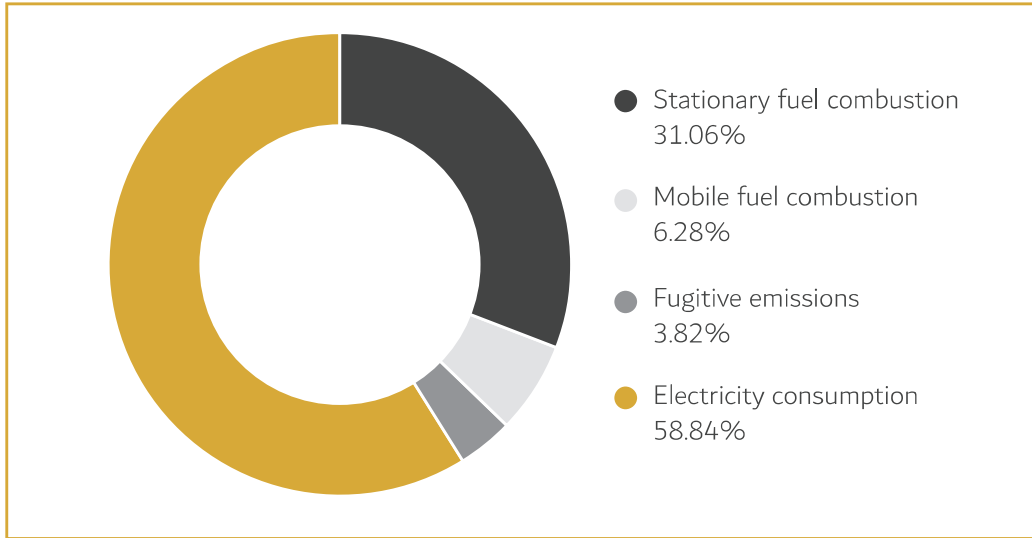


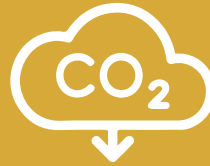
Table (1):Breakdown of GHG Emission Sources

INP

KEY PERFORMANCE INDICATORS



1.23
MT CO₂e/person



53.43
kg CO₂e/ m²



131
kWh/m²

INP

CARBON FOOTPRINT METHODOLOGY

The development of a thorough Carbon Footprint methodology is made during the initial phases of the INP's building greening project. The following process flow, Figure (2) demonstrates the project implementation phases undertaken to estimate the Carbon Footprint emissions of INP.

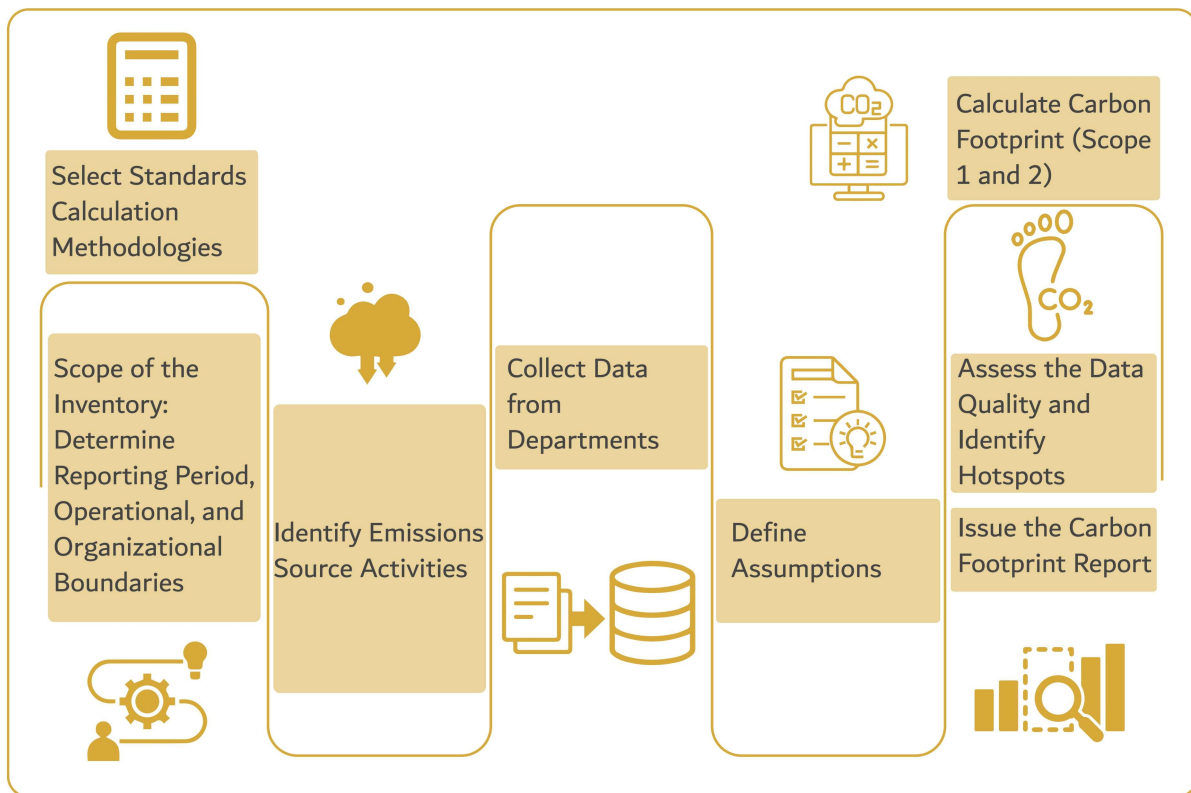
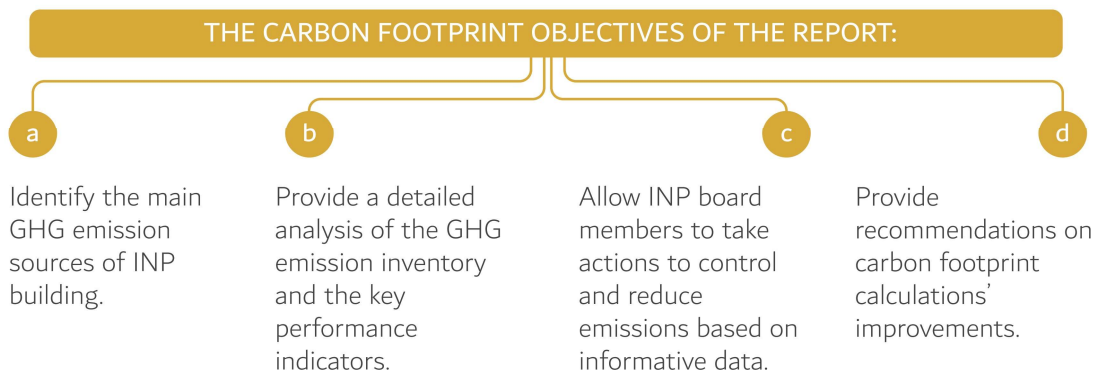


Figure (2): Methodology of Developing Carbon Footprint Report

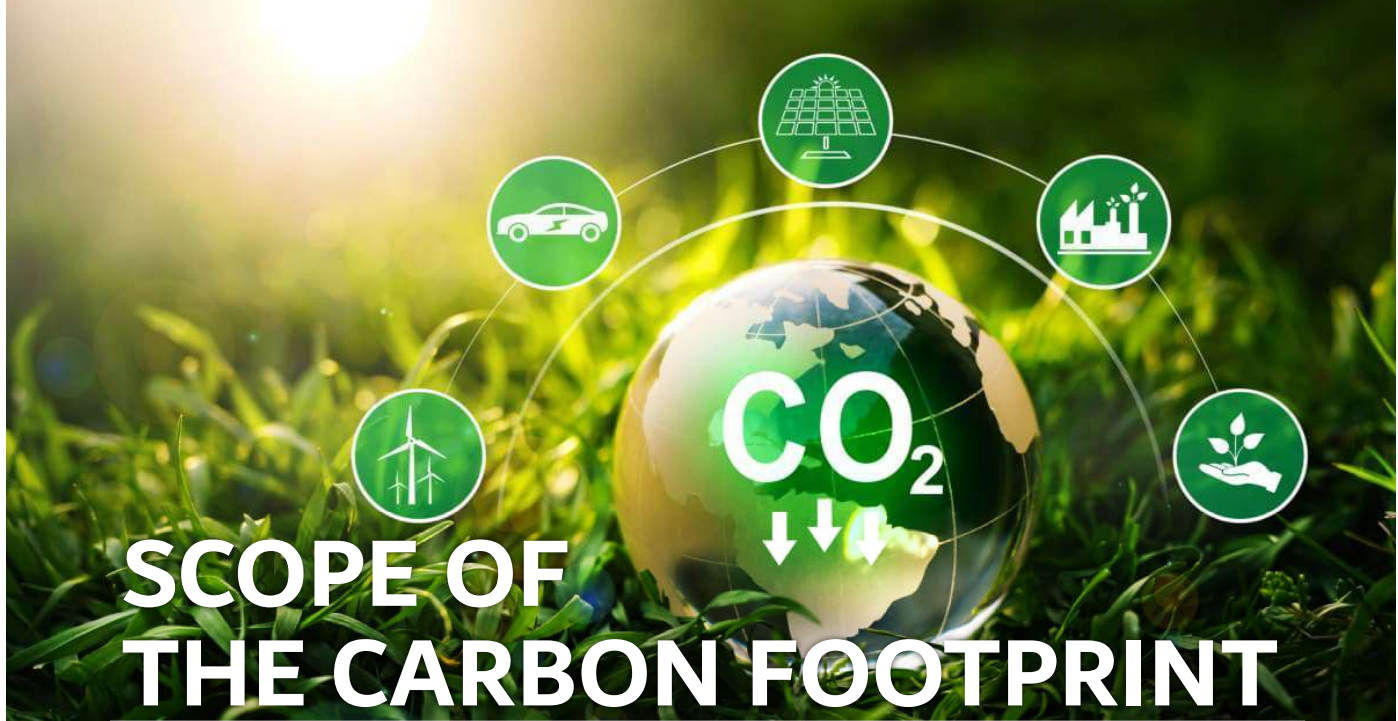




SELECTION OF STANDARD CALCULATION METHODOLOGIES

Currently, there are several internationally recognized methodologies and standards for calculating a carbon footprint according to their approach, scope, and orientation. INP Carbon Footprint analysis and calculations are based on:

- Inter-Governmental Panel on Climate Change (IPCC) Guidelines
- The GHG Protocol: Corporate accounting and reporting standard
- ISO 14064-1:2018 Greenhouse gases — Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals



REPORTING PERIOD

The base year is considered the starting point for assessing the change in emissions, if any, over the years. Since this is the first Carbon Footprint created by INP, the data collected between 1/7/2021 and 30/06/2022 is considered the base year for the Carbon Footprint Report.



ORGANIZATIONAL BOUNDARY

Organizational boundaries determine which operations to include or exclude from the Carbon Footprint calculations of INP. Several organizational structures define the degree of ownership or control they exert over different activities.

According to GHG Protocol, GHG emissions inventories are constructed to reflect three views of an organizational boundary: operational control, financial control, or equity share. Once these boundaries are defined, GHGs arising from the institute's operations are identified and assigned to two scopes.

In this assessment, the organizational boundaries are set to cover INP single building which is located in Nasr City. Moreover, the suitable approach would be 'operational control as INP is a public institution with an independent legal entity. In other words, INP is accountable for 100% of the GHG emissions produced during the reporting period.



OPERATIONAL BOUNDARIES

The operational boundaries determine the operations and classify emissions as direct or indirect and categorize the different scopes of GHG emissions. The operational boundaries considered in this report are bounded by INP's main office building and include the mandatory scopes according to GHG Protocol. The operational boundary for INP Carbon Footprint encompasses Scope 1 Direct emissions – stationary, mobile, and fugitive sources- and Scope 2 Indirect Emissions such as electricity consumption.

IDENTIFIED EMISSION SOURCES

The GHG Protocol defines Scope 1 emissions, calculated here, as the direct emissions from sources that are owned or controlled by INP, and Scope 2 emissions are indirect emissions from energy sources that are not owned or controlled by INP e.g., electricity. Hence, based on INP facilities:

- Scope 1 direct emissions are subdivided into the following main category emissions:

- a) Stationary Combustion Sources: Emissions due to fuel combustion to produce energy.

This includes emissions from chillers, kitchen equipment, and any equipment consuming fuel on-site.



- b) Mobile Source Emissions due to vehicles owned /controlled by INP.

This includes the buses used for employees' transportation, cars that run errands for INP daily work, cars used for managers' or board members' transportation, and INP ambulance car. All these vehicles are owned/controlled by INP.

- c) Fugitive Emissions: Emissions due to leaks and other irregular releases of gases or vapors.

For INP, this only includes the refrigerant leaks from the air conditioning/refrigeration equipment used in the main building and fire suppressants.



- Scope 2: Indirect Emissions. These are emissions due to electricity generation from the national electricity grid. Data was collected based on INP monthly consumption.



DATA COLLECTION

During the site visits, the maintenance personnel are assessed to identify emission sources and the type of data available. Accordingly, customized data collection spreadsheets are designed for each emission source considered in the GHG inventory.

Data collection sheets are communicated and reviewed simultaneously with the departments to ensure transparency and completeness in the data collection procedure. Data collected are categorized under Scope 1 direct and Scope 2 indirect emissions. Examples of data collection sheets for mobile combustion and electricity consumption are depicted in Tables 3 and 4, respectively.



Table (3): Examples of data collection sheets for mobile combustion

Vehicle Code Name	Vehicle Type	Fuel Type	Consumption (L/Month)	Annual Consumption (L/Year)
XXX	XXX	XXX	XXX	XXX

X = representing values

Table (4): Examples of data collection sheets for electricity consumption

Electricity Type	Month 1 (KWh)	Month 2 (KWh)	Month 12 (KWh)	Annual Consumption (KWh/Year)
XXX	XXX	XXX	XXX	XXX

X = representing values

GHG EMISSION CALCULATION

To calculate the GHG emissions, the main formula used to calculate GHG emissions is:

$$\text{GHG Emissions (MT CO}_2\text{e)} = \text{Activity Data (unit of activity)} \times \text{Emission Factor} \times \text{GWP.}$$

Where,

Activity data are those associated with the consumption of energy, electricity, or consumables of the organization and are obtained via customized data collection sheets.

Emission factors are representative values that relate a quantity of gas emitted to the atmosphere with an activity associated with the emission of said gas. Each emission factor is reported in metric tonnes of a GHG per unit of activity, where the unit of activity is expressed in either the International System of Units (SI units) or U.S. customary units. Since there are no emission factors released by Egypt, except for the national grid emission factor, all other emission factors are adapted from US EPA and IPCC Databases with priority given to the IPCC.

Global warming potential, or GWP, is the heat absorbed by any greenhouse gas in the atmosphere as a mixture of the heat that the same carbon dioxide would absorb. GWP is 1 for CO₂. The global warming potentials of the fifth IPCC report have been used.²

ASSUMPTIONS AND DATA GAPS

Part of following GHG Protocol Standard is to ensure fulfillment of the five accounting principles that set an implicit standard for the faithful representation of INP's GHG emission through its technical, accounting, and reporting efforts. These principles are transparency, accuracy, consistency, comparability, and completeness. Accordingly, all activity data relevant to fuel consumption and electricity consumption are collected from INP's annual invoices.

Assumptions made in this inventory:

The heating value of all fuels consumed in both stationary and mobile combustion sources is assumed based on the IPCC data

The densities of all fuels consumed in both stationary and mobile combustion sources are assumed based on the IPCC data

The number of LPG (propane) tanks consumed is an average per month

²(2006). IPCC Guidelines for National Greenhouse Gas Inventories. The Institute for Global Environmental Strategies (IGES) for the IPCC.

EXCLUDED SOURCES

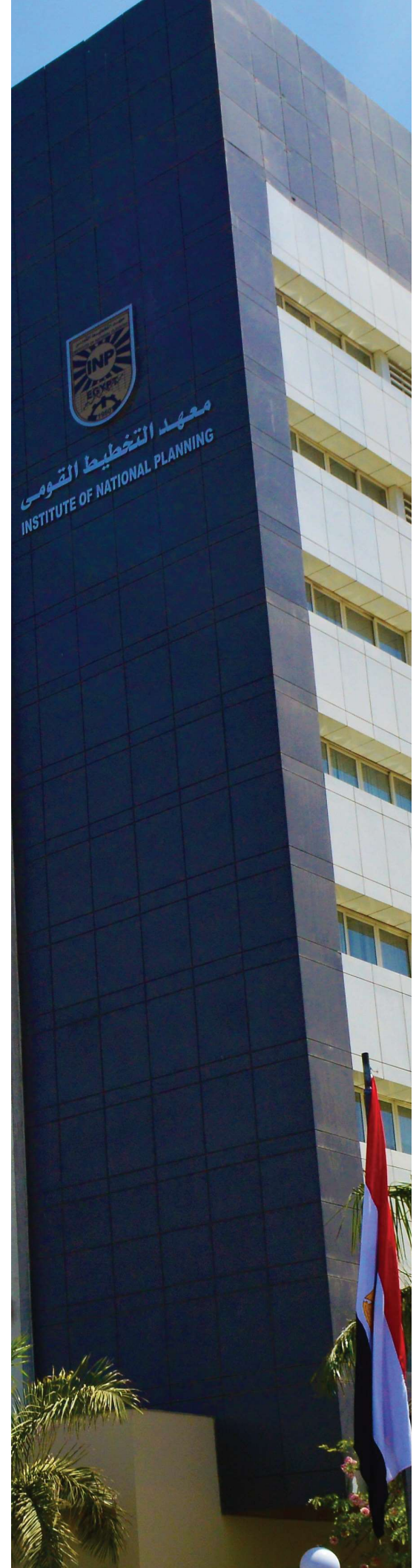
Based on the site visits and interviews with focal points at INP, the excluded emission source(s) are listed below, and their respective reason for exclusion. These are only excluded during the reporting period, so it is recommended to revisit these sources each year prior to deciding on their exclusion:

- **Excluded emission source(s)**

Fuel combusted from the on-site backup generators as they were not used during the reporting period.

- **Excluded Greenhouse Gases**

SF₆ and PF₆ are not captured for INP for Scope 1 due to the nature of activities at INP.



INP

CARBON FOOTPRINT REPORT RESULTS

Based on the methodology section, Table 5 summarizes the activity data collected during the reporting period from 1/7/2021 to 30/06/2022.

Table (5): Summary of activity data collected from INP

Scope	Emission source	Activity Data	Quantity	Unit
Scope 1	Stationary Combustion	LPG Fuel Consumption	1,320	Liters/year
		Natural Gas Consumption	126,880	m ³ /year
	Mobile combustion	Motor Gasoline Consumption	6,941	Liters/year
		Diesel Fuel Consumption	2,700	Liters/year
		Natural Gas Fuel Consumption	11,986	m ³ /year
	Fugitive emissions	Refrigerant (R-22)	16	kg
		Fire Suppressant (CO ₂)	222	Kg/year
Scope 2	Electricity	Electricity Consumption	820	MWh/year

CARBON FOOTPRINT AT INP

According to the main categories of emission types in Table 5, Table 6 shows the identified emission sources and their respective GHG emissions at INP. Scope 1 emissions are classified into stationary combustion sources, mobile sources, and fugitive emissions. Each source is discussed in detail in the following sections. Scope 2 emissions are only the electricity consumed by INP.

Table (6): Summary of Emission Sources at INP

Emission Source Type	Emission Source at INP	MT CO ₂ e/Year
Stationary Combustion Sources	Natural Gas	230.55
	LPG (Propane)	7.51 × 10 ⁻³
Mobile Sources	Ambulance and Buses	7.40
	Passenger Cars (Motor Gasoline)	16.22
	Passenger Cars (Natural Gas)	23.02
Fugitive Emissions	Refrigeration Equipment	28.38
	Fire Extinguisher	0.22
Scope 1 – Direct Emissions Total		305.59
Indirect Sources	Electricity Consumption from National Grid	436.77
Scope 2 – Indirect Emissions Total		436.77
Total GHG Emissions		742.36

As seen in Figure 3, Scope 1 direct emissions represent 41.16%, while in Scope 2, indirect emissions represent 58.84% of the total GHG emissions.

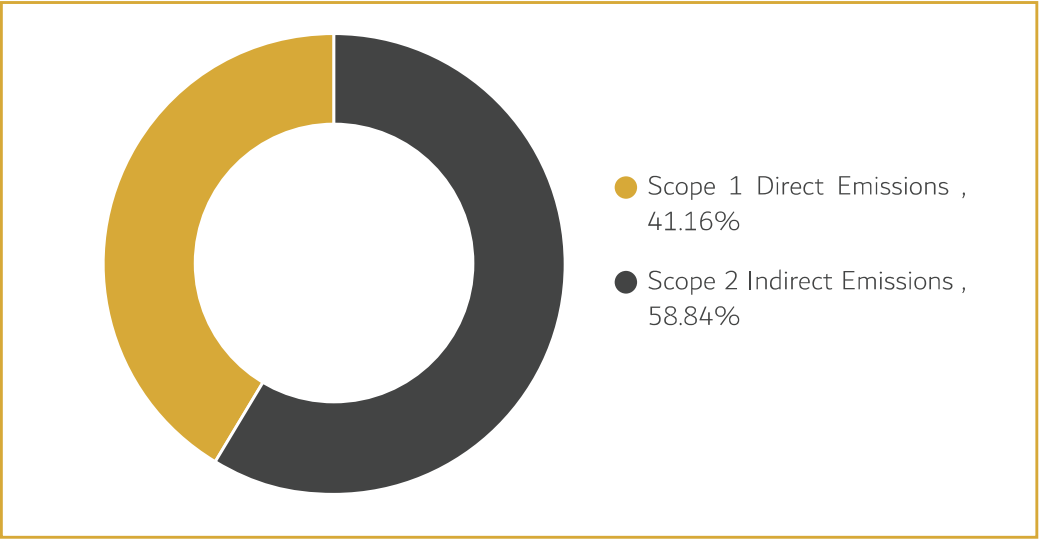


Figure (3): Scope 1 and Scope 2 GHG Contribution

Figure 4 depicts how much each identified emission source contributes to the total GHG emissions. Emissions due to electricity consumption contribute the most to INP's carbon footprint with 58.84% of the total GHG emissions, followed by emissions due to stationary combustion with 31.06%. The remaining sources, mobile combustion, and fugitive emissions contribute 6.28% and 3.82% to the total emissions, respectively.

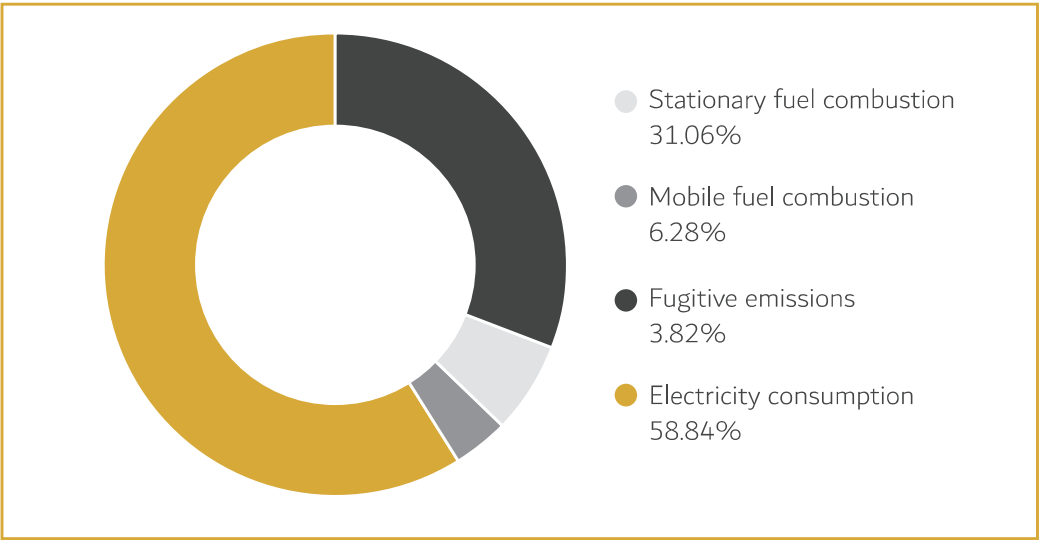


Figure (4): Breakdown of GHG Emission Sources at INP

KEY PERFORMANCE INDICATORS

AND BENCHMARKING AT INP

Key performance indicators (KPIs) are used to normalize the GHG Inventory results to the essential parameters of the organization's operations. The result of KPIs' is used for benchmarking INP against businesses with similar functions as well as tracking future performance.

INP has a total of 305 staff of which 163 are admin employees and 142 are scientists/researchers. Meanwhile, INP has around 300 students visiting the institute frequently all year round. INP building has 9 floors giving it a total area of 13,893 m². Accordingly, the estimated KPIs are presented in Table 7.

Table (7): Summary of Emission Sources at INP

Key Performance Indicator	Quantity	Unit
Total Emissions/person/year	1.23	MT CO ₂ e/person
Total Emissions/m ² /year	53.43	kg CO ₂ e/ m ²
Total Electricity consumption/m ² /year	59.01	KWh/m ²



To visualize these KPIs, comparisons are made as follows:



The average emissions per capita in Egypt in 2019, according to the World Bank Open Data portal was 2.5 MT CO₂e/capita which is double the emissions per capita (or person) at INP.



Since there are no similar businesses in Egypt as INP that issued a CFP, a comparison is made with the American University in Cairo (AUC) during 2019-2020 for the carbon footprint emission per area. AUC emissions per square meter are 122 kg CO₂e/ m² which is nearly double INP's. However, it should be stated that AUC activities are more energy intensive than INP such as engineering and science labs⁵.



The average electricity consumption in commercial buildings in Cairo, according to the World Bank, is 328.5 KWh/m² which is **more than** five times the electricity consumption intensity at INP⁶.

In conclusion, the comparisons help visualize the intensity of the emissions released by INP but tracking the performance of INP's emissions along the year should be made against the base year emissions.

³Person includes all academics, employees, and students at INP

⁴The World Bank. (2020). CO₂ emissions (metric tons per capita) - Egypt, Arab Rep. Retrieved from The World Bank Data: <https://data.worldbank.org/indicator/EN.ATM.CO2E.PC?locations=EG>

⁵Mansour, Y., El Ghandour, S., & Krisanda, S. (2021). **Carbon Footprint Report. The American University in Cairo**

⁶World Bank's Energy Sector Management Assistance Program. (2017). Arab Republic of Egypt Energy Efficiency Implementation Energy Efficiency and Rooftop Solar PV Opportunities: Report Summary.

GREENHOUSE GAS EMISSIONS

SCOPE 1

STATIONARY COMBUSTION SOURCES



Stationary combustion sources at INP emerge from the combustion of natural gas and LPG (propane). Natural gas is consumed by 2 chillers and 8 cookers. The readings for natural gas are collected from invoices. INP also consumed LPG (propane) in its kitchens at an assumed average rate of 4 tanks per month— with each tank having a capacity of 30 L of LPG.

Natural gas and LPG propane are combusted throughout the year except during the month of March during which the month of Ramadan was observed and hence all activities were suspended during the month. Figure 5 represents the consumption of natural gas at INP.

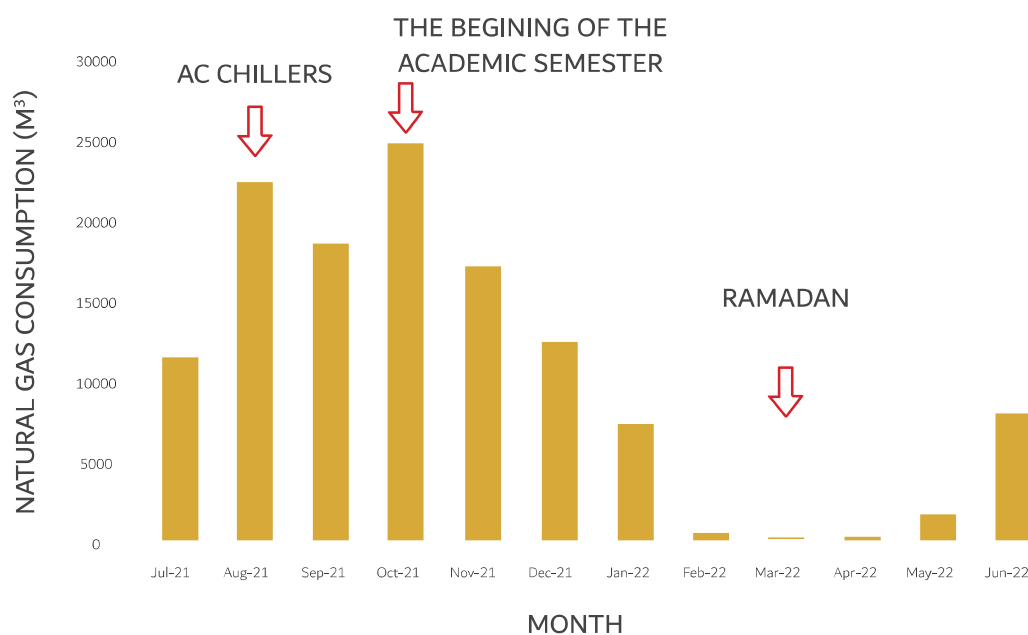


Figure (5): Natural Gas Monthly Consumption at INP

After data collection, the GHG emissions from Stationary Combustion sources are estimated based on the fuel consumed, fuel type, and respective default emission factors for CO₂, CH₄, and N₂O of LPG and natural gas from the IPCC guidelines.

Table 7, highlights the contribution of each fuel consumed to the carbon footprint of stationary fuel combustion. Stationary fuel combustion is the most contributing source in Scope 1 direct emissions with 75.45% while it's the second most contributing source with respect to the overall emissions at 31.06%.

Table (7): Stationary Combustion Sources at INP

Emission Source	Fuel Type	Total annual fuel consumption (m³)	GHG Emission (MT CO ₂ e/year)
Chillers and cookers	Natural Gas	126,880	230.553
Cookers	LPG (propane)	1.32	7.51 × 10 ⁻³
Total Stationary Combustion Emissions			230.56

SCOPE 1

MOBILE COMBUSTION

INP owns 13 passenger cars, 2 buses, and 1 ambulance vehicle. The passenger cars perform errands and provide commuting to INP managers. The buses offers transportation to off-premises events for INP staff. Most passenger cars run on natural gas and motor gasoline while buses and the ambulance run on diesel fuel.

INP carbon footprint estimates for mobile sources are simply based on the volume of fuel combusted, vehicle categorization, default heating values, and emission factors from the IPCC Guideline. As seen in Table 9, the total emissions from mobile sources are 46.65 MT CO₂e/year, representing 15.26% of the Scope 1 Direct Emissions and 6.28% of the total GHG emissions. Figure 6 represents the contribution of each vehicle type toward GHG emissions.

Accordingly, passenger cars contribute the most since they are for managers daily commute, and in running errands. Hence, passenger cars consume the most fuel followed by buses and ambulance vehicles which are only used for emergencies. However, natural gas consumption has far fewer adverse effects on the environment than motor gasoline in passenger cars.

Table (8): Mobile Sources Emission Breakdown

Type of Vehicle	Type of Fuel	Annual Consumption (m ³)	Total Emissions (MT CO ₂ e/year)
Passenger Cars	Natural Gas	11,986.3	23.02
Passenger Cars	Motor Gasoline	6.94	16.22
Buses	Diesel	2.55	6.99
Ambulance	Diesel	0.15	0.41
Total Mobile Combustion Emissions			46.65

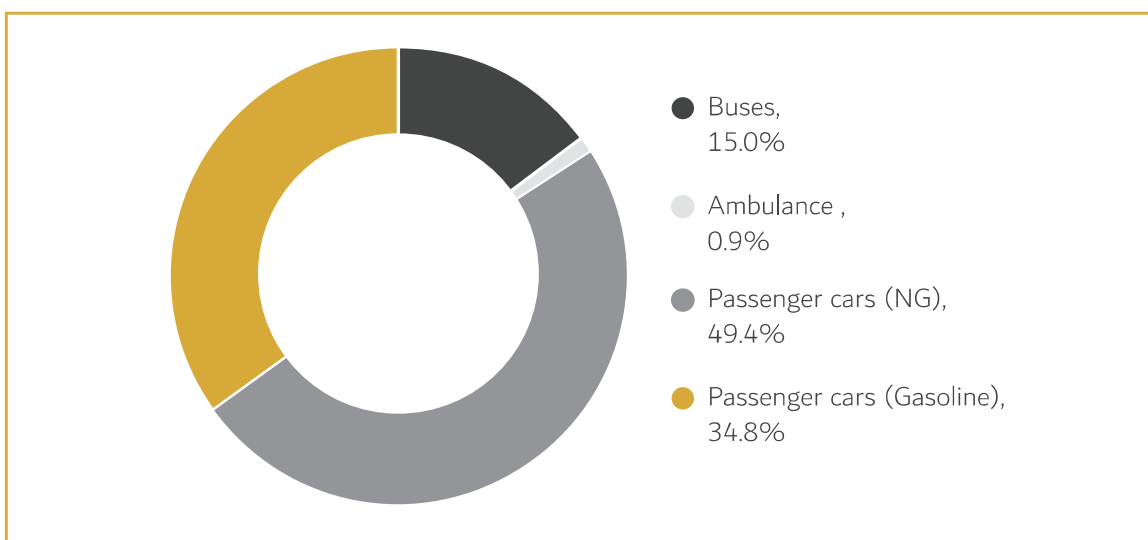


Figure (6): Mobile Sources Emission Breakdown

SCOPE 1

FUGITIVE EMISSIONS



Fugitive emissions are leaks and other irregular releases of gases or vapors. At INP, there are two potential sources for these fugitive emissions:

- (1) AC & Refrigerants; and
- (2) fire extinguishing equipment.

INP owns 62 AC split equipment. The split units are charged with R-22 to function. In the reporting period, the split units were charged a total of 16 kg of R-22 refrigerant. As for fire extinguishing equipment, INP owns 37 extinguishers that were each charged with 6 kg of CO₂ gas during the reporting period. Accordingly, the fugitive emissions amount to 28.38 MT CO₂e.

Table 10 represents the contribution of each of the fire suppressants and AC equipment. The most contribution comes from the charge of R-22 as they have a high GWP i.e., 1 kg of R-22 is equivalent to 1762 kg of CO₂. However, fugitive emission is the least contributing source of GHG emissions amounting to 3.82%.

Table (9): GHG Emission Summary by Fire Suppressant

Emission Source	Charge Type	GWP	CO ₂ Emission (MT CO ₂ e/year)
AC Split Unit	R-22	16	28.16
Fire Extinguisher	CO ₂	222	0.22
Total Fugitive Emissions			28.38

SCOPE 2

INDIRECT EMISSIONS

INP receives its electricity supply from the National Grid of Electricity. It is the primary energy source for the INP building. The total consumed electricity during the reporting period is 819.81 KWh.

The national grid average emission factor for the Arab Republic of Egypt is 0.533 MT CO₂e/MWh based on the Institute for Global Environmental Strategies, IGES, database.

Accordingly, Scope 2 emissions are estimated at 436.77 MT CO₂e/year, which represents 58.84% of the total GHG emissions of INP. The monthly consumption of the INP building is shown in Figure 7.

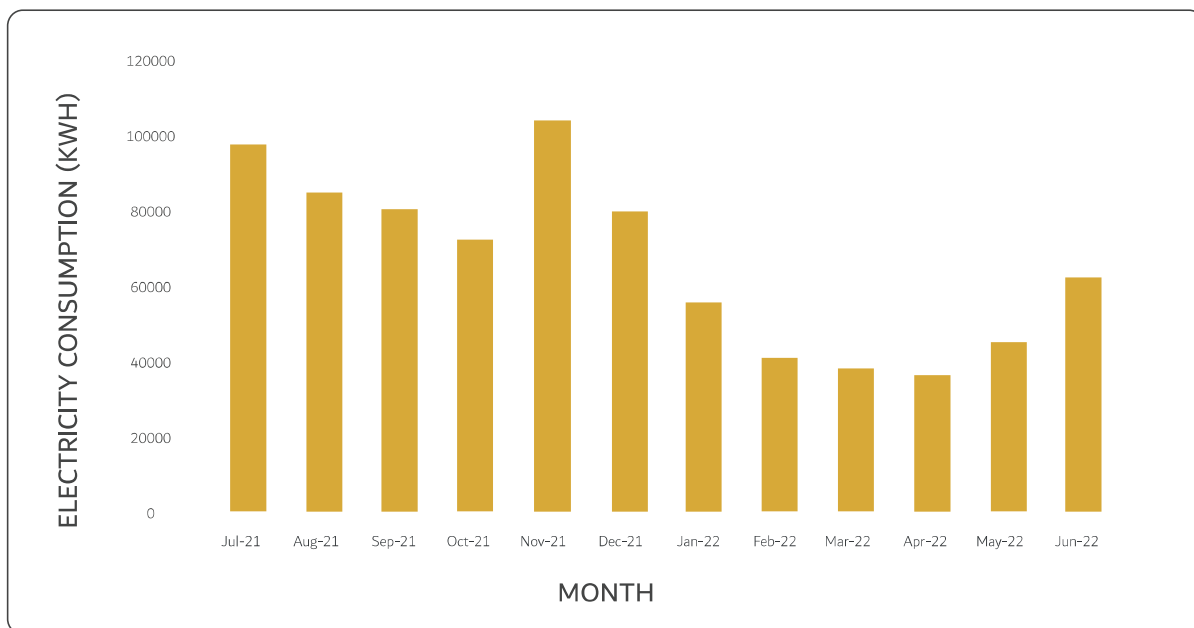


Figure (7): Monthly consumption of electricity in INP

DATA QUALITY AND COMPLETENESS

Assessing the data quality is a critical part of GHG reporting and accounting. Table 11 details the data quality in terms of five principles of reporting according to the GHG Protocol. In general, the data requires careful and continuous monitoring to ensure completeness. This is the case of the stationary combustion source where the recordings of the LPG (propane) monthly rate is assumed to be a monthly average.

The electricity consumption and natural gas consumption had third party invoices. Other activity data require third-party invoices to ensure complete transparency. Therefore, INP must commit to continually improving reported data quality wherever possible and continue refining its methodology to improve the coverage and transparency of disclosure.

Table (10): Data quality and assumptions by source

Scope	Emission source	Activity Data	Data quality	Assumptions made
Scope 1	Stationary combustion	NG fuel consumption	<div></div>	Heating value and density of fuel.
		LPG	<div></div>	Heating value of fuel. Consumption rate per month.
	Mobile combustion	Diesel fuel consumption	<div></div>	Heating value and density of fuels
		Motor gasoline fuel consumption	<div></div>	-
		Natural gas	<div></div>	-
	Fugitive emissions	Fire suppressant charge	<div></div>	-
		AC refrigerant charge	<div></div>	-
Scope 2	Electricity	Electricity consumption	<div></div>	-

<div></div> Good	<div></div> Satisfactory	<div></div> Poor
No change required	Could be improved in terms of completeness	Priority for improvement

CONCLUSION AND RECOMMENDATIONS

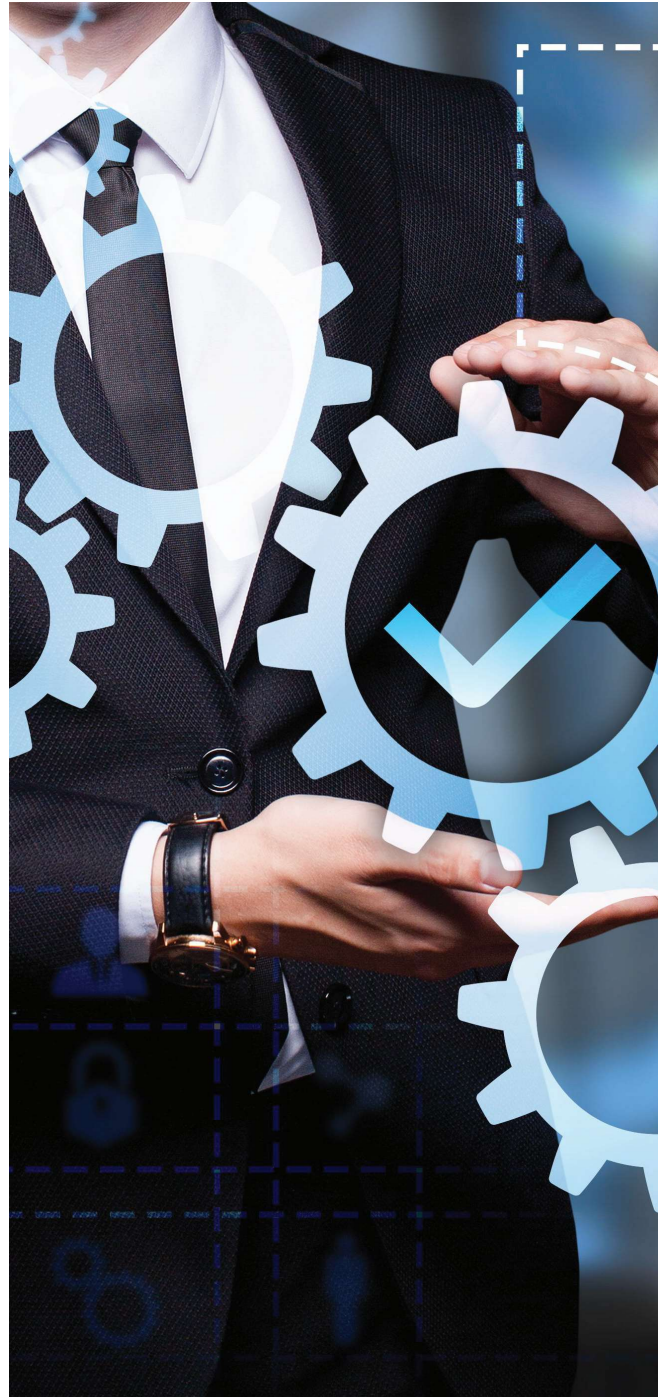
This report presents the base year emissions of the INP building. The report is prepared based on the GHG Protocol Corporate Accounting and Reporting Standard and IPCC Methodologies. The total GHG emissions during the reporting period between 1/7/2021 and 30/6/2022 are estimated to be 742.36 MT CO₂e/year, with Scope 1 direct emissions and Scope 2 representing 41.16% and 58.84% of these emissions, respectively.

The major sources contributing to GHG emissions are electricity consumption and stationary fuel combustion. Stationary combustion emissions are mostly from the combustion of natural gas to operate the chiller systems. However, the use of natural gas for the chillers has less impact on the environment than the use of electricity.

INP is taking a leading step in switching its mobile fuel sources from motor gasoline to natural gas in most vehicles which indeed has a less adverse impact on the environment. As for the data quality assessment, the data collected are satisfactory, with weakness displayed in the assumptions made to estimate the fuel consumption in a few months and the lack of third-party invoices/statements that verify the data collected.

Several recommendations can be made from the results and the process of reporting INP's Carbon Footprint, such as:

- Third party invoices/statements must be present for all data delivered by INP.
- Include Scope 3 emissions in the upcoming years to quantify the entire carbon footprint of INP organization.



CARBON FOOTPRINT REDUCTION PLAN

Following the development of the base year carbon footprint report, INP should strategize a plan to reduce its carbon footprint. This plan is referred to as the carbon footprint reduction plan. This plan shall detail how INP can reduce or offset its carbon footprint by enhancing its energy efficiency, consuming energy made from renewable origin, raising awareness, focusing on environmental projects, and implementing sustainable finance practices. Carbon reduction methods can be implemented in 4 different ways, starting with the most preferred approach to the least as seen in Figure 8:

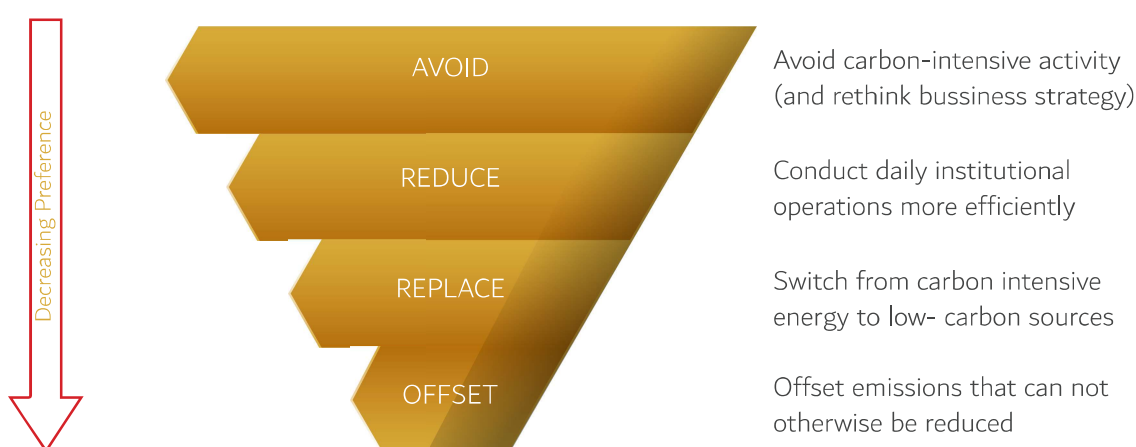


Figure (8): Carbon Footprint Management Hierarchy

Avoid	<p>Consider public transportation options when moving towards places nearby within the city and avoid using INP's owned passenger cars whenever possible to reduce fuel consumption.</p> <p>Avoid using electric water heaters during the summer period.</p> <p>Develop environmental strategies within the INP's main vision to avoid tapping into GHG-intensive practices across its lifecycle.</p>
Reduce	<p>With a large space on the rooftop, INP should consider installing solar panels on the rooftops. This practice is not new in Egypt, as many office buildings run on energy sourced from solar panels. Installing solar panels will reduce the consumption of electricity consumption which is the largest source of GHG emissions at INP.</p> <p>Invest in energy efficiency measures to reduce the amount of energy consumed while maintaining or improving the quality of services provided in the building.</p> <p>Provide monitors, projectors, and equipment with energy efficiency ratings, and reduce power consumption when not used.</p>

Replace

Replace electric water heaters with solar heaters.

Replace fire suppressants used with more environmentally friendly ones such as the ones equipped with dry chemicals.

Switch the dependence of any kitchen appliance on electricity and switch to natural gas to reduce electricity consumption.

Replace any old, energy-consuming appliances with efficient ones. For example, switch to energy-efficient lighting such as LEDs with dimmer options and implement motion sensors in less occupied areas. This can significantly impact electricity consumption, as lighting is a crucial part of the office's daily operations.

Perform periodic maintenance and inspections of all company vehicles and **replace** any old cars with new, fuel-efficient ones.

Offset⁷

Purchase carbon credits through reforestation and conservation projects that directly capture the carbon while also protecting eco-systems, wildlife, and social heritage.

⁷A carbon offset is a reduction or removal of emissions of carbon dioxide or other greenhouse gases made to compensate for emissions made elsewhere. Offsets are measured in tonnes of carbon dioxide equivalent (CO₂e).

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