SOMALIA NATIONAL GREENHOUSE GAS INVENTORY REPORT

MAY 06, 2025



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ACRONYMS

BAU - Business-As-Usual
LULUCF - Land Use, Land-Use Change, and Forestry
IPPU - Industrial Processes and Product Use)
GHG - Greenhouse Gas
AFOLU - Agriculture, Forestry, and Other Land Use
EF - Emission Factors
MS - Method Statement

EXECUTIVE SUMMARY

Somalia's commitment to global climate action continues to strengthen, as evidenced by its active participation in the UNFCCC process, submission of updated Nationally Determined Contributions (NDCs), and recent preparation of this Greenhouse Gas (GHG) Inventory Baseline Report. This report provides a comprehensive overview of Somalia's greenhouse gas emissions and removals across key IPCC sectors—Agriculture, Forestry and Other Land Use (AFOLU), Energy, Waste, Transport, and Industrial Processes and Product Use (IPPU)—covering the period from 2016 to 2024, with projections up to 2035. This inventory serves as a critical tool and vital foundation for climate planning, NDC tracking, and mobilizing finance to advance Somalia's low-carbon development goals.
The inventory was developed in line with the 2006 IPCC Guidelines, applying Tier 1 methodologies and default emission factors due to current limitations in national data. Data sources included national agencies, international databases, remote sensing platforms, and expert assumptions. The Ministry of Environment and Climate Change (MoECC) led institutional coordination, with technical support from UNDP and the World Bank.

The inventory report reveals that Somalia's net GHG emissions rose from 15,697 $GtCO_2e$ in 2016 to 54,436 $GtCO_2e$ in 2024—over a threefold increase. AFOLU dominates, contributing 86% of emissions in 2024, primarily from agriculture (46%) and land use change (40%). Methane is the leading emitted gas (49%), followed by CO_2 (48%).

Other sectors, including Energy, Transport, Waste, and IPPU, have shown steady emissions growth, driven by fossil fuel use, urbanization, poor waste infrastructure, and industrial activity in a progressively stabilizing security environment. Under a business-as-usual scenario, emissions could reach 84,896 $MtCO_2e$ by 2035, emphasizing the urgent need for mitigation—especially in land use and energy.

Key recommendations include establishing a legally mandated MRV system, improving data quality, building institutional capacity, and prioritizing mitigation in AFOLU and energy sectors through sustainable practices and clean technologies.

1. INTRODUCTION

Somalia, a signatory to the UNFCCC since 2009, has progressively engaged in global climate efforts despite facing post-conflict institutional and capacity challenges. The Ministry of Environment and Climate Change (MoECC) has led key climate initiatives, including the submission of its Intended Nationally Determined Contribution (INDC) in 2015, emphasizing resilience and low-emission development in sectors like agriculture, forestry, energy, and water. Following ratification of the Paris Agreement in 2016, Somalia submitted its updated NDC in 2021, committing to a 30% emissions reduction by 2030 relative to a business-as-usual scenario.

In 2023, Somalia submitted its First Biennial Update Report (BUR1), featuring its inaugural national GHG inventory (2000–2018), prepared under the 2006 IPCC Guidelines and supported by UNDP and GEF. The inventory drew data from national agencies and international sources and marked a significant milestone in national climate reporting. A technical review in 2023 recognized progress, while highlighting areas for improved data quality and coordination.
To support NDC implementation, Somalia developed the 2020 National Climate Change Policy and is advancing its Green Climate Fund Country Readiness Programme. It also adopted a National Adaptation Plan (NAP) 2025, which will guide investment in strengthening resilience to climate impacts like droughts and floods.

1.1 Somalia's GHG Emission Assessment Summary

Somalia's baseline study for its Nationally Determined Contribution (NDC) establishes a reference point to track progress toward emission reduction goals. It defines key parameters, sets a base year, and aligns national inventory methodologies, ensuring consistency with data and methods used in the NDC. This first Somalia country GHG Inventory (Baseline Report 2025), covers emissions and removals from Energy, Industrial Processes and Product Use (IPPU), Agriculture, Forestry and Other Land Use (AFOLU), and Waste.

The inventory follows the 2006 IPCC Guidelines and uses the latest IPCC software (version 2.691). Due to limited national data, Tier 1 (default) emission factors were applied. Emissions are reported in Carbon Dioxide equivalents (CO_2e), using 100-year Global Warming Potential (GWP) values from the IPCC's Second Assessment Report (Table1). Covered gases include CO_2, CH_4, N_2O, hydrofluorocarbons (HFCs), and perfluorocarbons (PFCs).

The preparation of Somalia's GHG Inventory Report was led by the Ministry of Environment and Climate Change (MoECC), with support from UNDP and the World Bank. Three international consultants and five national consultants were engaged, covering thematic areas such as mitigation, adaptation, climate finance, just and equitable transition, capacity building, and technology transfer. They worked closely with government departments and agencies, federal member states, development partners, and other stakeholders to guide data collection. Capacity-building efforts targeted government institutions, academia, and professionals through sector-specific training and the use of IPCC-compliant tools.

To ensure regular updates and enable a future Monitoring, Reporting, and Verification (MRV) system, recommendations are underway to establish a formal, structured national data system. This will facilitate future studies on emissions, enable tracking of mitigation successes, and allow for an effective, accurate and timely MRV mechanism.

Table 1: Global Warming Potential (GWP) values of major greenhouse gases relevant to Somalia's GHG inventory, based on the IPCC Second Assessment Report (SAR) over a 100-year time horizon

Species	Chemical Formula	Lifetime (years)	GWP (100 years)
Carbon Dioxide	CO_2	Variable	1
Methane	CH_4	12 ± 3	21
Nitrous Oxide	N_2O	120	310
HFCs (average)	HFCs	1.4 – 270	140 – 11,700
PFCs (average)	PFCs	>2,600 – 50,000+	6,500 – 9,200

2. METHODOLOGY AND DATA SOURCES

2.1 AFOLU Methodology and Data Sources

Somalia's GHG emissions from the AFOLU sector are estimated using the IPCC 2006 Guidelines and software (version 2.691), which combines agriculture and forestry under a unified framework. This method ensures consistency across all land-use types and recognizes that carbon stocks and emissions occur throughout the landscape.

Guidance and methods for estimating greenhouse gas emissions and removals for the AFOLU Sector include:

- CO2 emissions and removals resulting from Carbon stock changes in biomass, dead organic matter and mineral soils, for all managed lands
- CO2 and non-CO2 emissions from fire on all managed land
- N2O emissions from all managed soils
- CO2 emissions associated with urea application to managed soils
- CO2 and N2O emissions from cultivated organic soils
- CO2 and N2O emissions from managed wetlands
- CH4 emission from livestock (enteric fermentation)
- CH4 and N O emissions from manure management systems; and
- C (carbon) stock change associated with harvested wood products

For Somalia, Tier 1 methodologies were applied across all AFOLU sub-sectors due to the limited availability of national data. The following summarizes the approach used for each key category:

2.1.1 Forests:

The Gain-Loss Method was used to estimate annual changes in biomass. This included calculations for forest land remaining forest land, categorized by eco-climatic zones. Biomass gains and losses were assessed based on wood removals, wood fuel harvesting, and disturbances such as fire or degradation. A default carbon fraction of 0.5, as recommended by the IPCC, was applied. Given Somalia's limited forest cover, the focus of analysis was placed on shrubland degradation, wood fuel use, and related biomass losses.

2.1.2 Livestock (Enteric Fermentation and Manure Management):

Greenhouse gas emissions from livestock were estimated for species common in Somalia's pastoral systems, including cattle, camels, goats, sheep, and donkeys. Population data were sourced from FAO Somalia, the National Bureau of Statistics, and regional datasets. Emission estimates were derived using IPCC Tier 1 default emission factors, with adaptations for Somalia's agro-ecological zones where applicable.

2.1.3 Cropland:

Emissions from cropland were calculated based on net biomass accumulation in perennial woody crops. Losses due to harvest or land-use disturbance were estimated using a carbon stock value multiplied by the area affected. The focus was placed on high-biomass systems, particularly banana, citrus, and date palm cultivation, which are prominent in specific regions of the country.

2.1.4 Grasslands:

Emissions and removals from grasslands were estimated using Tier 1 approaches. Minimal change was assumed for grassland that remains unchanged over time. While nomadic grazing is a key aspect of land use in Somalia, its specific emission impact was not quantified separately under Tier 1 constraints.

2.1.5 Wetlands:

This category included managed wetlands such as irrigated lowlands and seasonal water bodies. Emissions of methane (CH_4) and carbon dioxide (CO_2) were estimated using IPCC default values, adjusted for the region's hydrological conditions.

2.1.6 Settlements and Other Lands:

Carbon dioxide emissions from biomass loss and soil carbon changes were estimated for land converted to settlements. The "other lands" category included abandoned, arid, or otherwise degraded lands. Emissions from conversion of these lands into cropland or settlements were calculated based on the net change in carbon stocks.

2.1.7 Aggregate Sources and Non-CO_2 Emissions on Land:

Nitrous oxide (N_2O) emissions from managed soils were estimated using Tier 1 methods. These emissions were based on several input sources: the use of synthetic and organic fertilizers, animal manure deposition, the incorporation of crop residues and sewage sludge, as well as emissions arising from soil disturbance through cultivation and drainage of organic soils

Somalia faces significant data limitations that impact the accuracy of its GHG inventory, particularly due to the absence of a national land cadastre and limited data on forest volume, woodfuel use, and land degradation and changes in forestry sector like afforestation/forestation, forest improvement, forest species composition, forest fires and damages. There is also a need for a detailed study to assess the state of abandoned land across the country. There is lack of national cadastre to reflect all types of land use (agricultural land, forest, pastures, abandoned lands, water areas, urban area, etc.) and annual changes. Livestock data, while available from national and FAO sources, require further regional and species-specific disaggregation, especially for camels. Default emission factors may need adjustment to reflect Somalia's agro-ecological conditions and practices. Additionally, fire data are sparse and could be enhanced using satellite tools like EFFIS or NASA FIRMS. Improved, up-to-date land-use and emissions data are urgently needed to strengthen inventory accuracy.

Data used under this inventory is provided from the following sources:

Table 2: The data sources for AFOLU sector

Data type	Source of data
Livestock population	FAO (FAOSTAT: Agriculture and Livestock Data for Somalia), Somalia Bureau of Sta
Forest/land use change	Remote sensing (e.g. Global Forest Watch (Somalia Forest Cover Data and Land Us
Cropland area	Somalia Agricultural Development Reports
Fire & biomass burning	EFFIS reports, MODIS fire data
Emission factors	IPCC 2006 Software & Guidelines (IPCC (2006). Guidelines for National Greenhous

2.2 Energy Methodology and Data Sources

This GHG Inventory Report for energy has been compiled using data from a combination of international databases, the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, national reports, Somalia Customs import data, and expert assumptions where local data was unavailable (Author's estimates). Determination of GHG emissions based on the calorific values and carbon content (NCV) values indicated in the table below

Table 3: Net Calorific Values and Carbon Content of Selected Fuel Types for GHG Emission Estimation

Fuel Type	Fuel Name	Net Calorific Value (T	Carbon content (NCV) (k
Liquid Fuels	Aviation Gasoline	44.3	19.1
	Crude Oil	42.3	20
	Ethane	46.4	16.8
	Gas/Diesel Oil	43	20.2
	Jet Gasoline	44.3	19.1
	Jet Kerosene	44.1	19.5
	Liquefied Petroleum Gases	47.3	17.2
	Lubricants	40.2	20
	Motor Gasoline	44.3	18.9

Table 3: (Continued) Net Calorific Values and Carbon Content of Selected Fuel Types for GHG Emission Estimation

Fuel Type	Fuel Name	Net Calorific Value (	Carbon content (NCV) (
Liquid Fuels	Natural Gas Liquids	44.2	17.5
	Orimulsion	27.5	21
	Other Kerosene	43.8	19.6
	Other Petroleum Products	40.2	20
	Refinery Gas	49.5	15.7
	Residual Fuel Oil	40.4	21.1
Solid Fuels	Anthracite	26.7	26.8
	Coking Coal	28.2	25.8
	Lignite	11.9	27.6
	Oil Shale/Tar Sands	8.9	29.1
	Other Bituminous Coal	25.8	25.8
	Sub-Bituminous Coal	18.9	26.2
Gaseous Fuels	Natural Gas (Dry)	48	15.3
Other Fossil Fuels	Industrial Wastes		39
	Municipal Wastes (non-biomas	10	25
	Waste Oils	40.2	20
Peat	Peat	9.76	28.9
Biomass - solid	Charcoal	29.5	30.5
	Wood/Wood Waste	15.6	30.5

Based on the IPCC Guidelines, activity data for Somalia's energy sector are categorized under two broad groups: fuel combustion and fugitive emissions from fuels. Emissions estimates are derived from energy consumption patterns across key economic sectors, in line with Tier 1 and Tier 2 approaches, where applicable.

Activity data are primarily obtained from national and sectoral sources, including the Ministry of Energy and Water Resources (MoEWR), Somali Bureau of Statistics (SBS), the Somali Petroleum Authority (SPA), and technical reports developed by international development partners (e.g., World Bank, UNDP, GIZ, and SE4rALL). The table below summarizes the main categories and respective data sources.

Code	Main Category	Institutions & Data Sources
A	Fuel Combustion (elec	1. Energy data from MoEWR and SBS annual bulletins and electricity sector diagnost 2. Reports from development partners (e.g., SEforALL, World Bank, GIZ); 3. Somalia Energy Policy and Action Plans (draft and approved); 4. Data from utilities (e.g., ENEE, private off-grid operators). 5. TheGlobalEconomy.com 6. Somalia Ministry of Petroleum and Mineral Resources (MoPMR) 7. UNEP Fossil Fuel Report (2023), 8. World Bank Energy Trends in Fragile States (2023) 9. Somali ports authority/Somali Revenue Authority under the Ministry of Finance.
A.I	Energy Industries	1. MoEWR national energy statistics. 2. Utility reports on generation (fuel-based). 3. Off-grid solar and hybrid systems mapping (e.g., GIZ, REEEP, WB). 4. TheGlobalEconomy.com 5. Somalia Ministry of Petroleum and Mineral Resources (MoPMR) 6. UNEP Fossil Fuel Report (2023), 7. World Bank Energy Trends in Fragile States (2023) 8. Somali ports authority/Somali Revenue Authority under the Ministry of Finance
A.II	Manufacturing Industr	1. SBS household and enterprise surveys. 2. Sectoral studies (e.g., cement, light industry fuel use). 3. Reports from the Ministry of Commerce and Industry.
A.III	Transport	1. Ministry of Transport and Civil Aviation (MoTCA) vehicle registration data 2. Fuel import records from Customs and MoF 3. National infrastructure assessments 4. Somalia Ministry of Petroleum and Mineral Resources (MoPMR) 5. UNEP Fossil Fuel Report (2023), 6. World Bank Energy Trends in Fragile States (2023) 7. Somali ports authority/Somali Revenue Authority under the Ministry of Finance
A.IV	Residential & Commer	1. Household Energy Surveys (SBS, UNDP) 2. Urban energy consumption studies 3. Humanitarian energy access assessments (e.g., IOM, NRC, GIZ).
A.V	Other Sectors	1. Cross-sectoral assessments for agriculture, fisheries, and services 2. Data from Ministry of Agriculture and Irrigation.

A.VI	Traditional Biomass Us	1. Household energy use surveys 2. Wood fuel and charcoal market assessments 3. Forest degradation reports by MoECC and NGOs.
B	Fugitive Emissions fror	1. Somali Petroleum Authority (SPA) data on oil/gas operations. 2. Exploration and development reports. 3. UNDP and WB technical assistance outputs on extractives. 4. Somalia Ministry of Petroleum and Mineral Resources (MoPMR) 5. UNEP Fossil Fuel Report (2023), 6. World Bank Energy Trends in Fragile States (2023) 7. Somali ports authority/Somali Revenue Authority under the Ministry of Finance
B.I	Solid Fuels	Not applicable – no coal mining or use currently reported in Somalia.
B.II	Oil and Natural Gas	1. SPA reports on upstream activities. 2. Fuel import/export statistics (MoF, Port Authorities); 3. Development partner studies on fossil fuel infrastructure. 4. TheGlobalEconomy.com 5. Somalia Ministry of Petroleum and Mineral Resources (MoPMR) 6. UNEP Fossil Fuel Report (2023), 7. World Bank Energy Trends in Fragile States (2023) 8. Somali ports authority/Somali Revenue Authority under the Ministry of Finance
B.III	Venting & Flaring	1. Data from SPA and international contractors on flaring (if any); 2. Environmental audits and EIA reports for oil and gas activities.
	Other Data Sources an	1. Food and Agriculture Organization Statistics Database (FAOSTAT) 2. Energy Data for Somalia. 3. IPCC (2006) Guidelines for National Greenhouse Gas Inventories. Volume 2: Energ 4. Somalia Energy Profile Reports (UNDP). 5. Author's Estimates using Default Emission Factors from IPCC. 6. Global Petrol Prices - Somalia Fuel Consumption Patterns.

2.3 Transport Methodologies and Data Sources

This GHG Inventory Report for energy has been compiled using data from a combination of international databases, the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, national reports, Somalia Customs import data, and expert assumptions where local data was unavailable (Author's estimates). Determination of GHG emissions based on the calorific values and carbon content (NCV) values indicated in the table below

Table 5: Transport Data sources and references

Data sources and references
• IPCC (2006) Guidelines for National Greenhouse Gas Inventories. Volume 2: Energy.
• Somalia Energy Profile Reports (UNDP).
• Author's Estimates using Default Emission Factors from IPCC.
• Global Petrol Prices - Somalia Fuel Consumption Patterns.

2.4 Waste Methodology and Data Sources

This GHG Inventory Report for waste has been compiled using data from a combination of international databases, the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, national reports, Waste survey reports, and expert assumptions where local data was unavailable (Author's estimates). The key sources and documentation are as outlined below

Table 6: Waste Data sources and references

Data sources and references
• UN-Habitat (2021). Somalia Waste Management Strategy.
• MDPI - Evaluation of Methane Generation Rate Constant (k) of Municipal Solid Waste in Mogadishu.
• IPCC (2006). Guidelines for National Greenhouse Gas Inventories. Volume 5: Waste.
• Research Gates (2016) - Somalia Livestock Population.
• Author's Field Estimates based on waste generation rates and composition studies in Mogadishu.

2.5 IPPU Data sources and methodology

This GHG Inventory Baseline Report for Somalia has been compiled using data from a combination of international databases, the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (Volume 3: Industrial Processes and Product Use), national reports, field surveys, Somalia Customs import data, market research on refrigerant usage in Somalia, and expert assumptions where local data was unavailable (Author's estimates).

This GHG Inventory Baseline Report for Somalia has been compiled using data from a combination of international databases, IPCC Guidelines, national reports, field surveys, and expert assumptions where local data was unavailable. Tier 1 default values from IPCC Guidelines were applied, in line with best practices for countries with limited data availability. The key sources and documentation are as outlined below:

Table 7: IPPU Data sources and references

Data sources and references
• IPCC (2006). Guidelines for National Greenhouse Gas Inventories. Volume 3: Industrial Processes and Product Use.
• Somalia Customs Import Data.
• Market Research on Refrigerant Usage in Somalia - Author's Estimates.

2.6 Cross-Cutting Data Sources

Other reference data sources and documentation, not necessarily aligned to any sector, are as outlined below

Table 8: Cross-Cutting Data sources

Data sources and references
• Somalia National Bureau of Statistics
• Population and Demographic Data.
• World Bank Open Data
• Global Forest Watch
• IPCC (2006). Good Practice Guidance and Uncertainty Management.
• Population and Urbanization Trends.
• Land Use and Forestry Trends.

3. GHG EMISSION TRENDS

This section provides an overview of the trends in greenhouse gas (GHG) emissions and removals in Somalia. The GHG Inventory covers the time series from 2016 to 2024. It also includes projections under the Business-As-Usual (BAU) scenario over the years 2025-2035. The inventory includes the previously mentioned greenhouse gases: CO_2, CH_4, N_2O, HFCs, and PFCs.

3.1 Somalia's GHG emissions

The total net GHG emissions are estimated to have risen from 15,697 in 2016, to 54,436 GtCO2 in 2024 respectively. Table 2 and Figure 1 show the time series net-emissions (in GtCO2 eq.) from 2016 to 2024. Total emissions in Somalia more than tripled, rising by about 39,000 $GtCO_2$ eq over the period. This sharp increase was driven primarily by growth in the agriculture and Land Use, Land Use Change and Forestry (LULUCF) sectors. By 2024, AFOLU (Agriculture, Forestry, and Other Land Use) accounted for 86% of total emissions, with agriculture contributing 46% and LULUCF 40% (Figure 2). Other sectors, such as energy, transport, waste, and IPPU, contributed much lower levels, showing more gradual increases over time. Notably, the energy sector accounted for 8% of total emissions in 2024. The data underscores the dominant role of land-based activities in Somalia's emissions profile and highlights AFOLU and energy as the most significant sources of greenhouse gas emissions in the country.

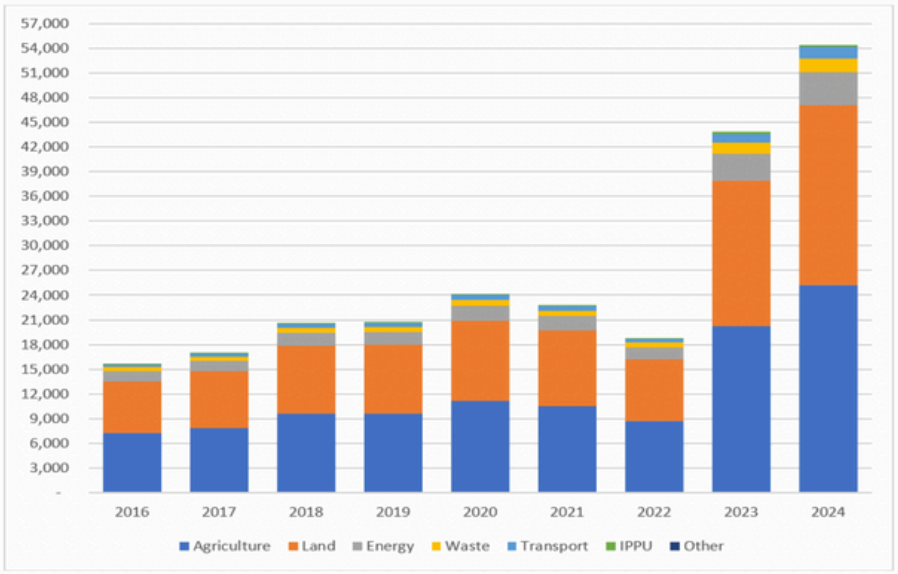


Figure 1: Net-emissions (Gt CO2 eq.) from all economic sectors (Gg)

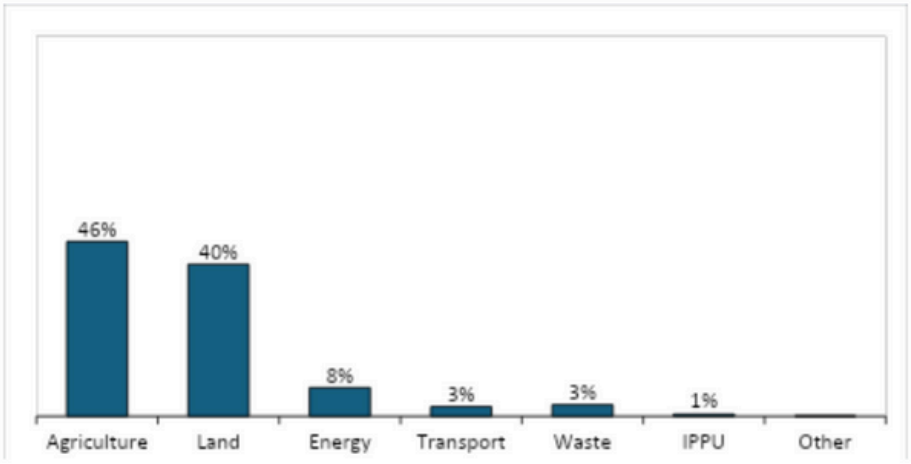


Figure 2: Contribution to GHG emissions by sector

3.1.1 GHG emissions by gas type

Table 3 and Figure 3 present the aggregate GHG emissions by gas. Methane is the largest contributor, accounting for 49% of total emissions, followed by CO_2 at 48%, and N_2O and HFCs/PFCs together making up the remaining 3%.

The primary drivers of GHG emissions are agriculture and land-use change, particularly CH_4 from livestock, and CO_2 from deforestation, vegetation firing, and land degradation. Methane emissions experienced a temporary decline in 2021–2022, attributed to the prolonged extreme La Nina drought of 2017 - 2020 which is reported as the most severe in 70 years, resulted in four consecutive failed rainfall seasons, and severely impacted livestock populations. However, emissions surged post 2020, driven largely by a rebound in livestock numbers and land-use pressures. While the HFCs and PFCs only form a small share in total emissions, they are associated emissions from product use in the IPPU sector for refrigeration and Air Conditioning, Foam Blowing Agents, Fire Protection.

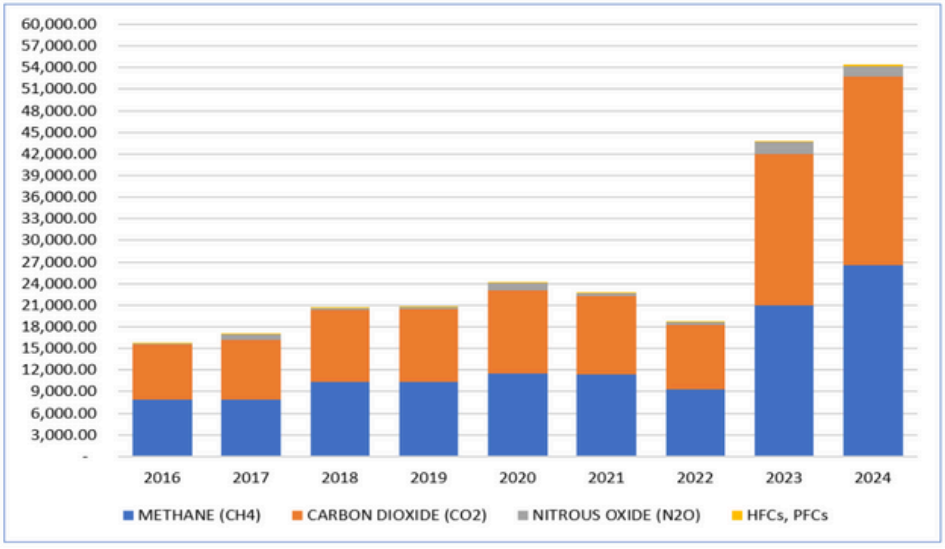


Figure 3: Total GHG emissions by gas (Gt CO2 eq.)

3.2 Emission Projection 2025- 2035

Figure 4 presents Somalia's estimated greenhouse gas (GHG) emissions trajectory from 2016 to 2035, highlighting both historical trends and future projections under a business-as-usual scenario. The year 2024 is the baseline, which underpins all the projections. The sharp rise in emissions is primarily driven by the agriculture and LULUCF (land use, land-use change, and forestry) sectors, reflecting intensifying land-use pressures such as deforestation, land degradation, and increased agricultural activity.

The graph shows a spike and peak in emissions in 2024, followed by a slight decline in 2025, likely due to early mitigation efforts and temporary changes in land-use practices. However, emissions are projected to rise steadily through 2035. Under the Business-As-Usual (BAU) scenario, Somalia's greenhouse gas emissions are projected to rise significantly between 2024 and 2035. In 2024, total emissions stood at 54,436 million tonnes of CO_2 equivalent, and by 2035, they are expected to reach 84,896 $MtCO_2e$ — an increase of over 56%.

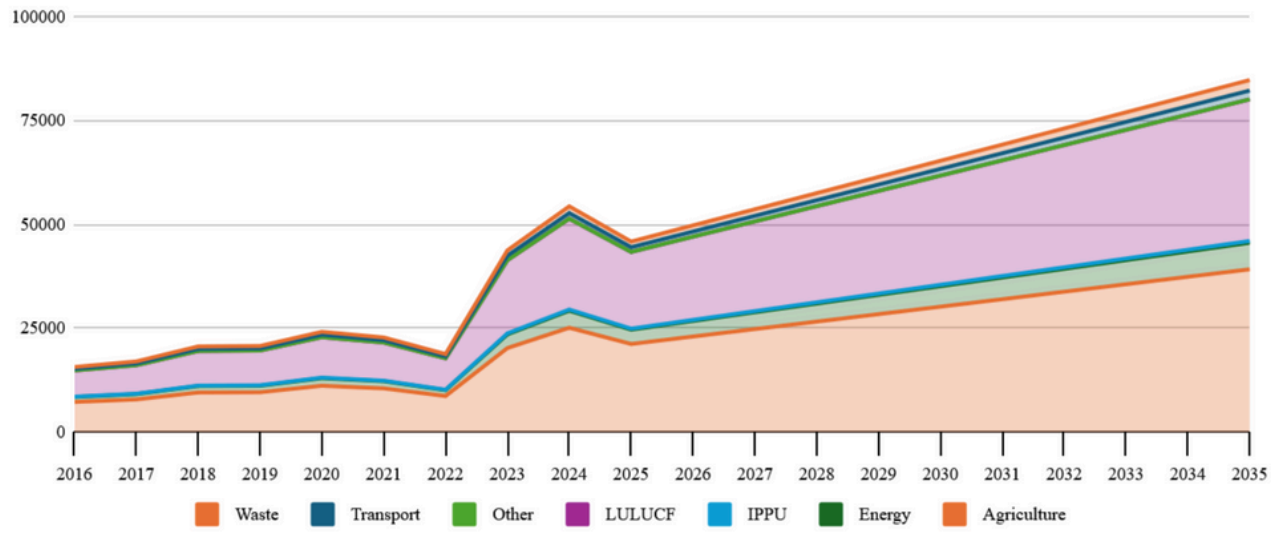


Figure 4: Somalia's GHG emissions by Sector

The upward trend in emissions is largely driven by continued growth in key emitting sectors such as agriculture, which increases from 25,166 $MtCO_2e$ to 39,248 $MtCO_2e$, and LULUCF (Land Use, Land-Use Change, and Forestry), which rises from 21,884 $MtCO_2e$ to 34,129 $MtCO_2e$. These represent 46% and 40% of total emissions coming from the agriculture and LULUCF sectors respectively.

The energy and transport sectors also show notable growth, reflecting increased energy consumption and motorized vehicle use. Emissions from waste and Industrial Processes and Product Use steadily increase as well, consistent with continued economic and population growth, expanding urbanization, and increased industrial activity. If no mitigation measures are implemented, the trajectory suggests a substantial escalation in Somalia's carbon footprint by 2035, underscoring the urgent need for climate action and sustainable development interventions.

4. GHG EMISSIONS BREAKDOWN BY SECTOR

4.1 Agriculture, Forestry, and Other Land Use (AFOLU)

4.1.1 Overview

The AFOLU sector in Somalia includes emission sources and sinks (emissions and removals) from (i) agriculture and livestock, and (ii) various land-use categories such as forest land, cropland, grassland, wetlands and settlements, and (iii) non-CO_2 emissions from land use. These categories further comprise land that remains in the same use and land converted into alternative uses.

A key challenge in Somalia's AFOLU sector is the lack of accurate, up-to-date data on land-use categories and forest cover, compounded by the absence of a national land cadastre to enable monitoring changes over time. Despite this, the sector remains a major source of GHG emissions — mainly from deforestation and agricultural activities but also holds significant mitigation potential through sustainable land management, reforestation, and improved farming practices.

GHG emissions from AFOLU in Somalia are mainly methane (CH_4) and carbon dioxide (CO_2). Table 4 outlines the major GHG sources and sink categories. The primary source and sink categories include: livestock—mainly CH_4 from enteric fermentation and manure management; and land—mainly CO_2 from forest land, cropland, wetlands, and settlements. Specific emissions by different sectors are detailed in subsequent sections

3 AFOLU Greenhouse	Gases Inclu	% Total Emis	Key Categori	Uncertainty	Tier/ NK	MS reference	Notes
A. Livestock							
1. Enteric Fermentation							
a. Cattle	CH4	20	Yes	50	T1	IPCC 2006	
c. Sheep	CH4	8	Yes	50			
d. Goats	CH4	5	Yes	50			
e. Camels	CH4	7	Yes	50			
2. Manure Management							
a.Cattle	CH4	10	Yes	50	T1	IPCC 2006	

3 AFOLU Greenhouse	Gases Inclu	% Total Emis	Key Categori	Uncertainty	Tier/ NK	MS reference	Notes
c. Sheep	CH4	4	Yes	50			
d. Goats	CH4	3	Yes	50	T1	IPCC 2006	
e. Camels	CH4	3	Yes	50			
B. Land							
1. Forest Land							
a. Forest lanc	CO2	10	Yes	50	T1	IPCC 2006	
2. Cropland							
a. Cropland F	CO2	15	Yes	50	T1	IPCC 2006	
3. Grassland							
a. Grassland	CO2	5	No	30	T1	IPCC 2006	
4. Wetlands							
a. Wetlands F	CO2	6	No	40	T1	IPCC 2006	
5. Settlements							
a. Settlement	CO2	4	No	30	T1	IPCC 2006	

4.1.2 Agriculture

Agriculture sector is the largest contributor to GHG emissions in Somalia emitting majorly methane and nitrous oxide. The livestock sector, with a current livestock population of roughly five million cattle, is a significant part with most of the population engaged in pastoralism or agro- pastoralism Table5 and Figure 5 displays trends in methane (CH_4) and nitrous oxide (N_2O) emissions in $GtCO_2$ eq from agriculture, along with the total CO_2 equivalent between 2016 – 2024. The GHG emissions from Somalia's agriculture sector, primarily driven by methane (CH_4) with smaller contributions from nitrous oxide (N_2O), show significant upward trend, rising from just over 7,000 $GtCO_2$ eq in 2016 to nearly 26,000 $GtCO_2$ eq by 2024. The trends show annual fluctuations in emissions, arising from external shocks, as Somalia experienced multiple consecutive seasons of below-average rainfall, leading to widespread water shortages, crop failures, and high levels of livestock migration and deaths.

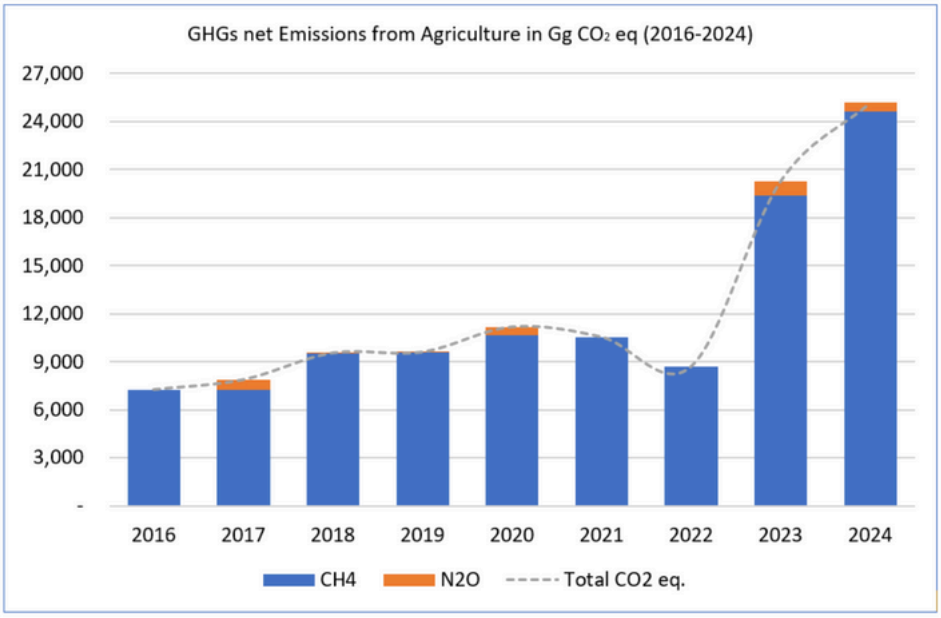


Figure 5: GHGs net emissions from Agriculture sector (Gg)

4.1.3 Land Use, land use change and Forestry (LULUCF)

The Land Use, Land-Use Change, and Forestry (LULUCF) sector is both a source and a potential sink of greenhouse gas (GHG) emissions. However, current trends show that it functions primarily as a net emitter due to widespread deforestation and land degradation. The main sources of GHG emissions within the LULUCF sector include deforestation, largely driven by the expansion of agricultural land, settlement development, and the extensive production of charcoal for household energy and export. Forest degradation also contributes significantly, as communities rely heavily on wood fuel, leading to a reduction in forest biomass and carbon storage. Additionally, the conversion of natural landscapes to cropland or pasture contributes to emissions by removing vegetation cover and disturbing soil carbon. Uncontrolled burning, whether intentional or accidental, further exacerbates emissions, releasing large quantities of carbon dioxide and other gases into the atmosphere.

Figure 6 presents the net greenhouse gas (GHG) emissions from the Land Use, Land-Use Change, and Forestry (LULUCF) sector between 2016 and 2024, comparing total emissions against removals, expressed in $GtCO_2$ equivalent. The figure highlights the balance (or imbalance) between carbon released into the atmosphere and carbon sequestered by land-based systems over this period.

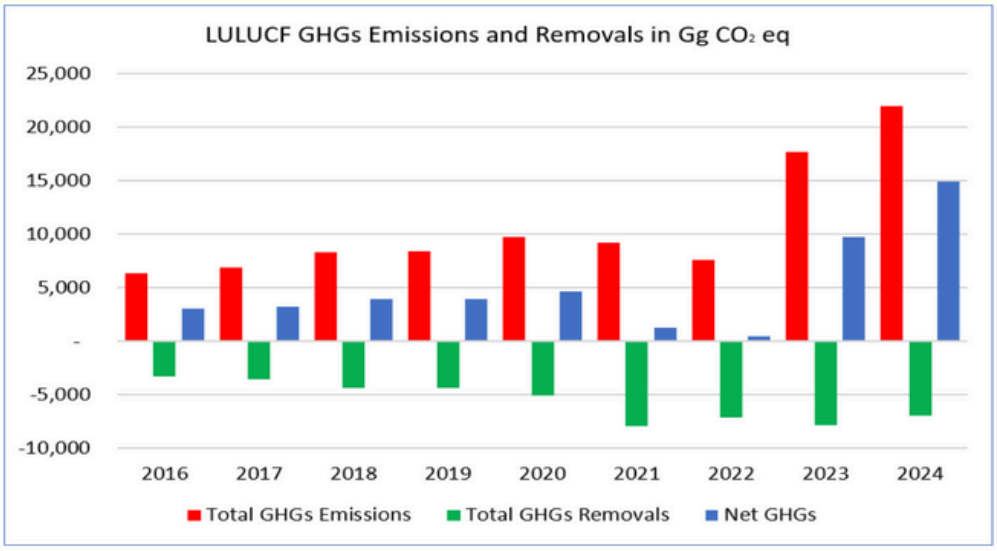


Figure 6: GHGs net Emissions from LULUCF Emissions vs Removals in Gt CO2 eq (2016-2024)

In 2024, the LULUCF sector emitted about 22,000 Gg CO_2 equivalent and removed around 7,000 $GtCO_2$, resulting in net emissions of approximately 15,000 Gg CO_2 equivalent (Figures 7). This shows the sector was a net source of greenhouse gas emissions.

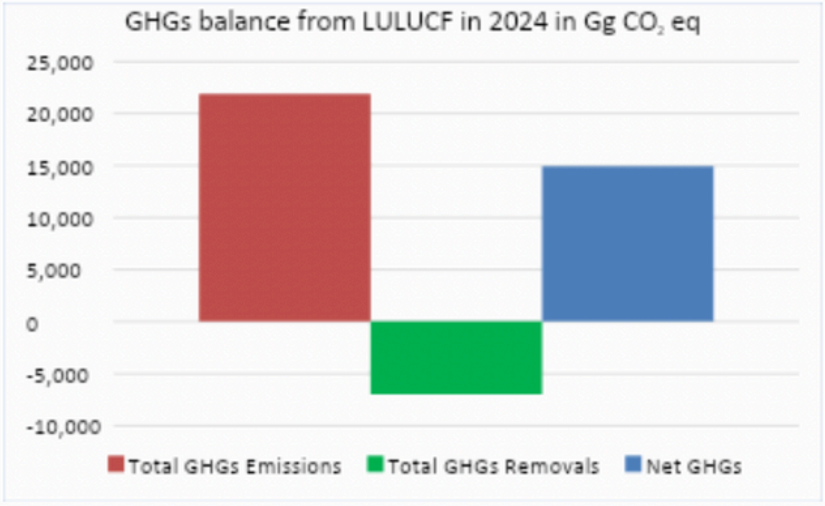


Figure 7: GHGs balances from LULUCF in 2024 in Gt CO2 eq

Overall, Somalia's LULUCF sector has unutilized capacity to function as a carbon sink, particularly through natural forest regeneration, agroforestry, wetlands and mangrove conservation, and rangeland rehabilitation efforts. The emissions from land-use change currently outweigh these benefits, however, and strengthening forest management, promoting sustainable land management practices, and investing in reforestation could enhance the carbon sequestration potential moving forward.

4.1.3. 1 GHG Emission Trends

Results in Table 6 and figure 9 show a general upward trend of CO2 emissions from LULUCF between 2016 and 2024 from an original figure of 6,310 Gt to 21,883 Gt. This is attributable to clearing land and cutting down trees for farmland, for charcoal which is widely used for domestic energy, and/or for settlements and other infrastructure. The exponential growth in emissions makes a strong case for climate action to mitigate the emission rate.

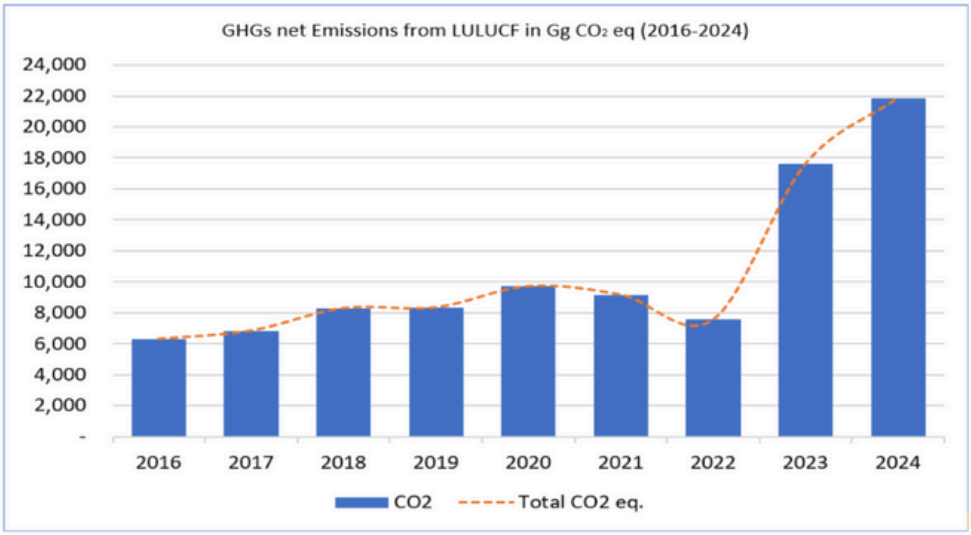


Figure 8: GHGs net Emissions from LULUCF in Gt CO2 eq (2016-2024)

4.2 Energy

4.2.1 Overview of the sector

Somalia's energy-related greenhouse gas (GHG) sources and sinks include emissions from fuel combustion in industries, electricity generation, the transport sector, commercial and residential activities, as well as fugitive emissions from fuels. The energy mix is largely biomass-based, with fuelwood and charcoal making up over 70% of the energy source. Diesel remains vital, contributing about 25% of total energy use, while renewable energy, mainly solar and wind, is gradually increasing.

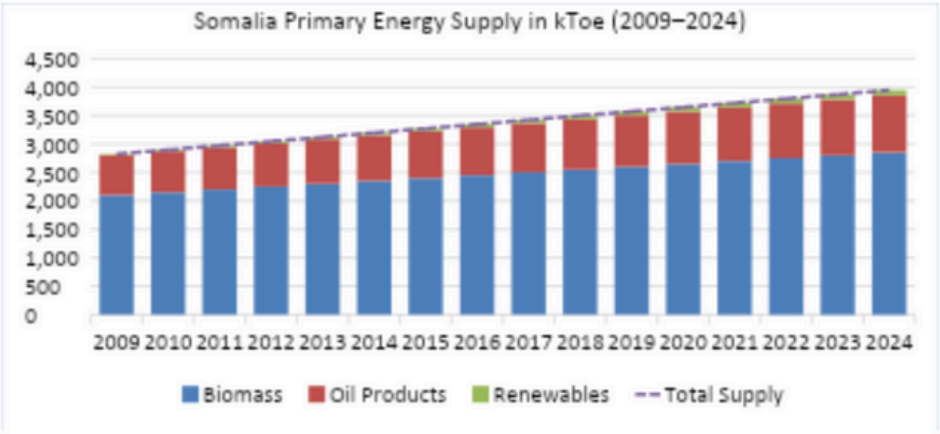


Figure 9: Energy supply in Somalia (2009-2024) sources. AFREC

Somalia's electricity sector is predominantly reliant on fossil fuels, especially diesel, which accounts for about 88% of the country's total installed electricity generation capacity of approximately 345 MW. Renewable energy sources, mainly solar and wind, make up the remaining 12%, with solar photovoltaic (PV) generation steadily increasing its share, reaching 8.2% in 2023. While oil and diesel still represented 91% of electricity generation in 2023, this marks a slight decline from 92% in 2022, suggesting the early stages of a shift toward cleaner energy alternatives.

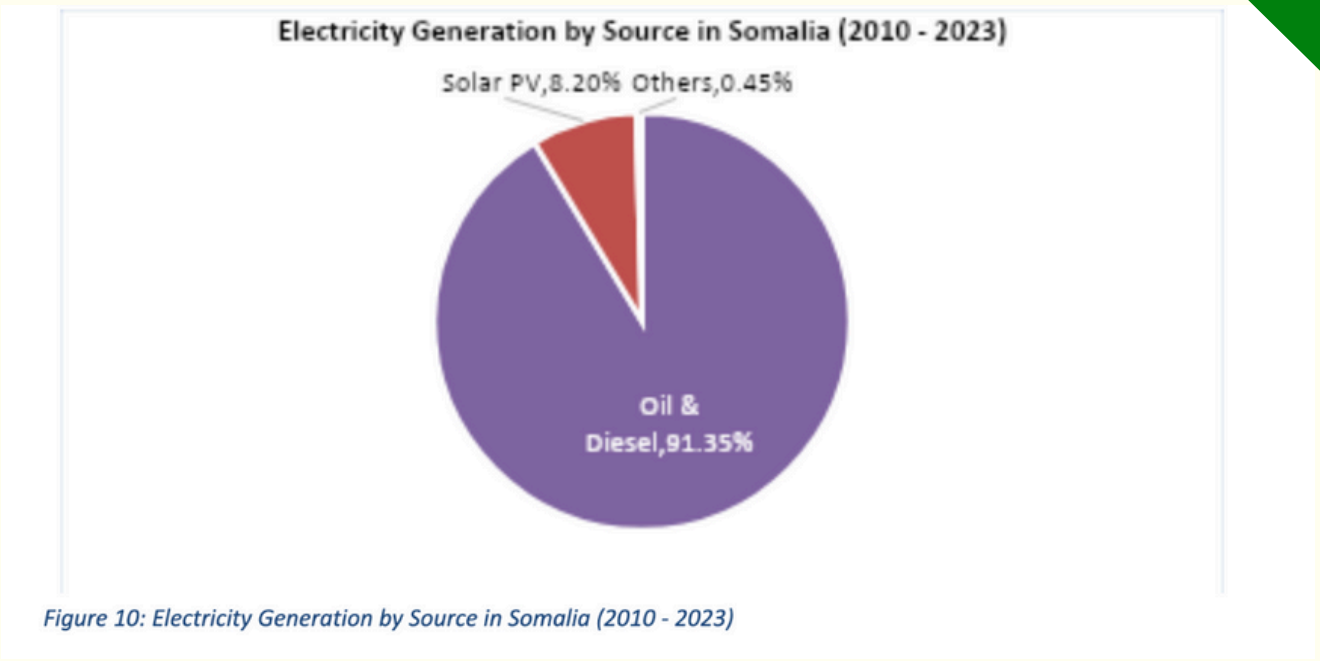


Figure 10: Electricity Generation by Source in Somalia (2010 - 2023)

Electricity consumption remains relatively low, with the country using about 397 GWh in 2023, translating to a per capita consumption of only 21.6 kWh. This is against a global per capita consumption of 3,300kWh and an African average of 500 - 600 kWh. This reflects the limited electricity access across Somalia, with just 17% of the population connected to any form of grid infrastructure. Despite this, demand for affordable and reliable electricity continues to grow, driven by increasing urbanization, improving incomes, and industrial growth. This is reflected in the expansion of independent power producers and microgrid networks in urban centers of the country. Key productive sectors such as dairy and fisheries, central to Somalia's economy, are increasingly dependent on reliable energy sources for processing, storage, and transportation.

Recognizing energy's central role in national development, the Somali government has made the sector a strategic priority in its 9th National Development Plan (2020–2024). The country's renewable energy potential is immense, with studies indicating possible onshore wind generation capacity of 30,000 – 45,000 MW, and abundant solar energy thanks to 3,000 hours of sunlight annually. Various national and donor-led initiatives are focused on improving infrastructure, enhancing grid efficiency, and scaling up off-grid solutions to increase energy access, reduce reliance on imported diesel, and support sustainable economic growth.

4.2.2 Emission trend analysis

Somalia's energy-related greenhouse gas (GHG) sources and sinks include emissions from fuel combustion in electricity generation, industry, the transport sector, commercial and residential activities, as well as fugitive emissions from fuels. Somalia's energy-related greenhouse gas emissions are dominated by combustion of fossil fuels, particularly from road transport, which accounts for over half (55.4%) of total emissions. Key contributors within this category include heavy-duty trucks, buses (25%), and cars (22%). Electricity and heating, along with residential and commercial sectors contribute around 5–6%. Emissions from civil aviation are minimal (1.1%), and fugitive emissions from fuels like coal are also negligible.

Table 10: GHG main emissions of the Energy sector (2024)

1 Energy	Gases Included	Total Emission	Key Category	Uncertainty %	Tier/ NK	Method sectior	Notes
Greenhouse Gas Source and Sink Categories							
A. Fuel Combustion Activities							
1. Energy Industries							
a. Main Activity E	CO2, CH4, N2O	5.20%	Yes	7.31	T1	IPCC 2006	
c. Manufacture c	CO2, CH4, N2O	0.10%	No	7.31	T1	IPCC 2006	
3. Transport							
a. Civil Aviation	CO2, CH4, N2O	1.10%	No	7.7872	T1	IPCC 2006	
b. Road Transpo	CO2, CH4, N2O	55.40%	Yes	0.7049	T1	IPCC 2006	
b. i. Cars	CO2, CH4, N2O	22.00%	Yes	0.7049	T1	IPCC 2006	
b. iii. Heavy duty	CO2, CH4, N2O	25.00%	Yes	0.7049	T1	IPCC 2006	
4. Other Sectors							
a. Commercial/Ir	CO2, CH4, N2O	6.00%	No	7.3101	T1	IPCC 2006	
b. Residential	CO2, CH4, N2O	5.20%	No	7.3101	T1	IPCC 2006	
B. Fugitive emissions from fuels							
1. Solid Fuels							
a. Coal mining ar	CH4	Negligible	No	5	T1	IPCC 2006	
b. Uncontrolled	CH4	Negligible	No	5	T1	IPCC 2006	
c. Fuel transform	CH4	Negligible	No	5	T1	IPCC 2006	

Greenhouse gas (GHG) emissions from Somalia's energy sector primarily comprise carbon dioxide (CO_2) and methane (CH_4), with notable amounts of nitrous oxide (N_2O) and other synthetic GHGs (Table 10, Figure 9). These emissions are driven by Somalia's heavy reliance on fossil fuels, especially diesel, which makes up around 90% of the electricity generation mix.

In 2016, total GHG emissions from the energy sector was 1,183 Gt. Since then, emissions have risen steadily over the years, reaching 4,103 Gt in 2024. This is attributed to economic recovery and increased energy demand. CO_2 has consistently accounted for the largest share of emissions, rising from 828 Gt in 2016, to 2,872 Gt in 2024. CH_4 emissions nearly tripled during this period, from 237 Gt to 821 Gt over the same period, while N_2O emissions grew from 118 Gt to 410 Gt. In 2024, CO_2 made up 70% of total emissions, CH_4 20%, and N_2O 10%, highlighting the growing impact of fossil fuel use on the country's overall emissions profile.

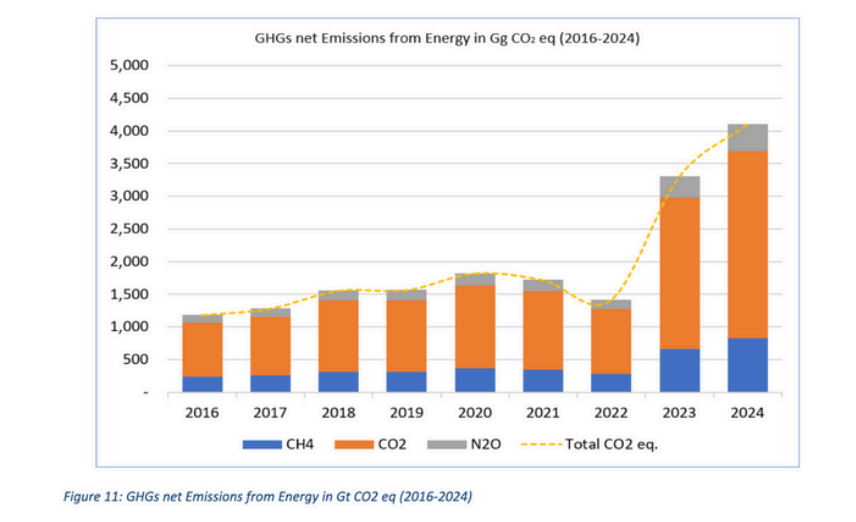


Figure 11: GHGs net Emissions from Energy in Gt CO2 eq (2016-2024)

4.2.2.1 Emission by energy Industries sub-sectors

Figure 10 presents energy emissions from the industrial sub-sectors in 2024. Electricity & Heat Production emitted more GHGs across all gas types than Solid Fuels & other industries, with CO_2 being the dominant gas emmited. Net emission across the three gases stood at 60% for the Electricity & Heat Production sub-sector, and 40% for Solid Fuels & Other Industries. The electricity generation sector is predominantly small-scale high-speed diesel generators (HSDGs) and is the largest contributor to GHGs in the sector and hence should be a critical focus for decarbonization efforts.

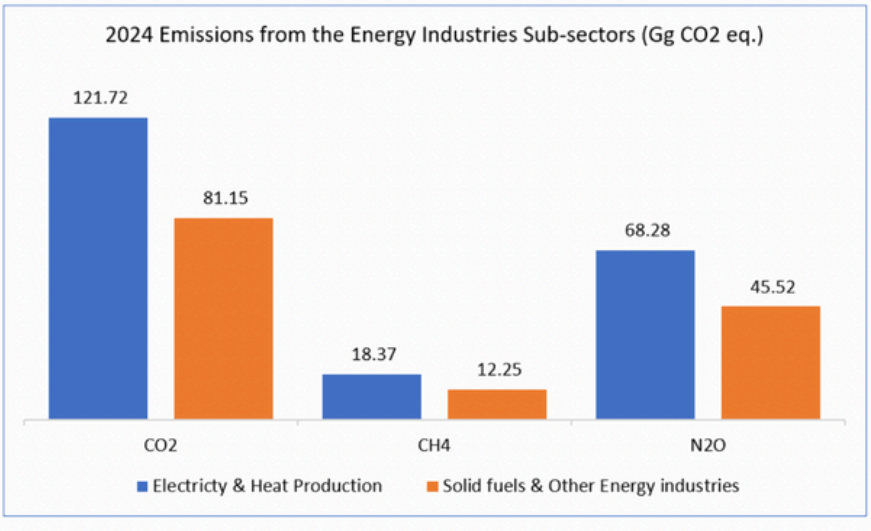


Figure 12: GHGs net Emissions from the Energy Industries Sub-sectors in 2024 (GtCO2 eq.)

4.2.2.2 Energy Emission from other sub-sectors

Figure 11 shows that in 2024, the Commercial/Institutional sub-sector emitted more GHGs than the Residential sector across all gases, with CO_2 being the dominant emission. Commercial sources accounted for around 55% of total emissions, highlighting their reliance on inefficient fossil fuel energy. Targeted action in this sector could lead to substantial GHG reductions.

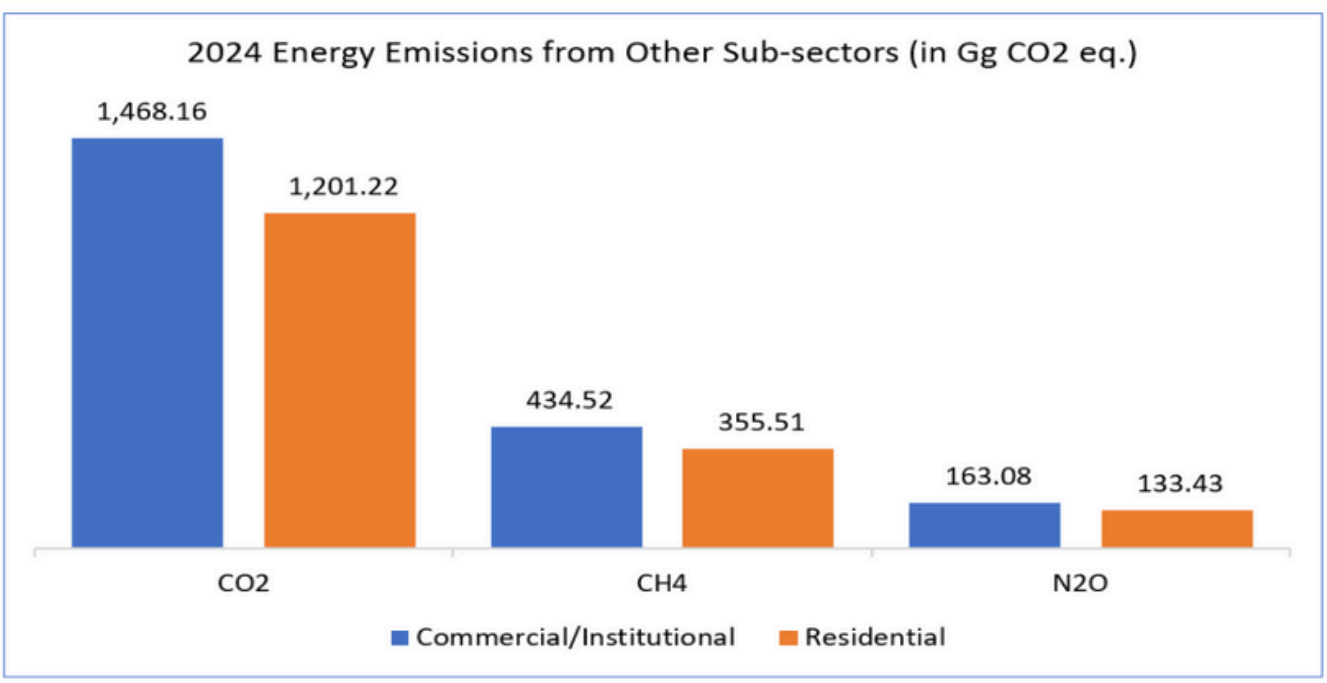


Figure 13: 2024 GHGs net Emissions from the Other Sub-sectors (Gt CO2 eq.)

4.3 Transport

4.3.1 Overview of the status

In tandem with other sectors, Transport has also significantly grown in its contribution from a total of 394 Gt in 2016 to 1367 Gt in 2024. The GHG emissions from the transport sector comprises mainly CO2, contributing 70% and N2O contributing 30% of total emissions in 2024.

4.3.2 Emission Trend analysis

The table presents Somalia's greenhouse gas (GHG) emissions from 2016 to 2024, highlighting carbon dioxide (CO_2), nitrous oxide (N_2O), and their combined totals in CO_2 equivalent (CO_2 eq.). CO_2 emissions rose steadily from 394.39 Gt in 2016 to a peak of 950.23 Gt in 2024. N_2O emissions from 2020 onwards show a consistent year-on-year increase from 257.82 Gt to 417.51 Gt by 2024. The total GHG emissions in CO_2 equivalent reflect these trends, increasing from 394.39 Gt in 2016 to 1,367.73 Gt in 2024.

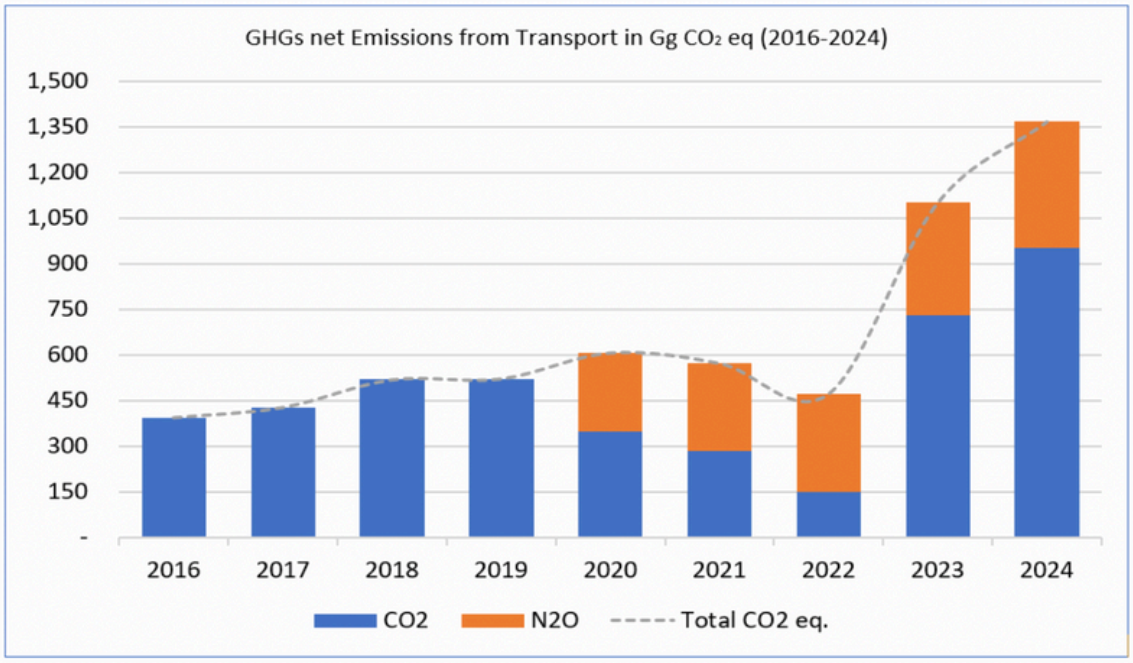


Figure 14: GHGs net Emissions from Transport in Gt CO2 eq (2016-2024)

4.4 Waste

4.4.1 Overview of the status

The waste sector contributes roughly 3% of total GHG emissions. This, just like the other sectors, has also had a significant jump from 473 Gt in 2016 to 1641 Gt in 2024, comprising 70% CH4 at 1148Gt, and 30% CO2 at 492 Gt.

Emissions from the waste sector can be attributed to the growing urban population, while the urban areas lack proper infrastructure and systems for waste collection and disposal. While there has been some efforts towards waste management, especially in construction of controlled landfills, more still needs to be done, especially with regard to management of plastics.

4.4.2 Emissions trend analysis

Table 12 outlines Somalia's greenhouse gas (GHG) emissions from waste in 2016 to 2024, focusing on methane (CH_4), carbon dioxide (CO_2). Methane emissions show a steady rise from 331.29 Gt in 2016 to a peak of 1,148.90 Gt in 2024. CO_2 emissions similarly increased over the period, from 141.98 Gt in 2016 to 492.38 Gt in 2024. As a result, total GHG emissions in CO_2 equivalent rose significantly, from 473.27 Gt in 2016 to 1,641.28 Gt in 2024, with a marked acceleration in emissions occurring in 2023 and 2024, driven mainly by surges in methane.

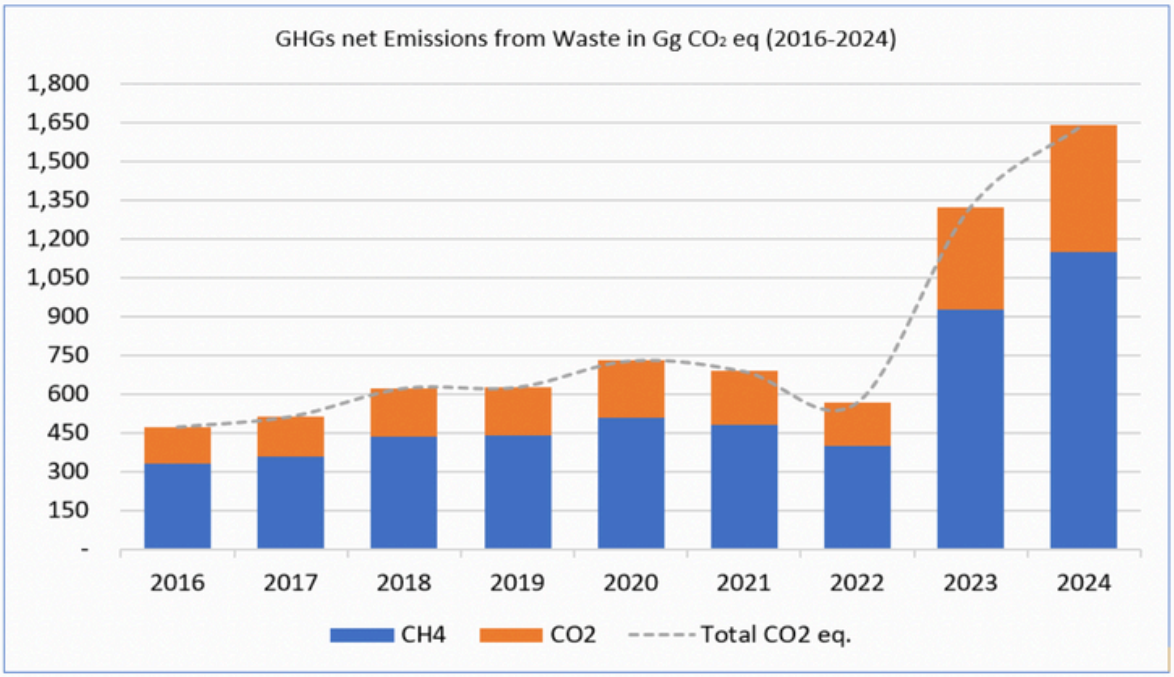


Figure 15: GHGs net Emissions from Waste in Gt CO2 eq (2016-2024)

4.5 IPPU

4.5.1 Overview of the status

The IPPU sector GHG emissions are largely from the manufacturing sector which is rather small in Somalia. In 2024, the sector contributed 285 Gg of emissions equivalent to 1% of total GHG emitted, comprising HFCs and PFCs.

4.5.2 Emission Trend

Table 9.1 and Figure 9.1 highlight a rising trend in GHG emissions from the IPPU sector, mainly due to increased industrial activity, especially in cement, lime, and metal production, as well as the growing use of high-GWP fluorinated gases. While some removals occur through chemical processes, they are not enough to offset overall emissions. Key mitigation measures should include energy efficiency improvements, adoption of low-carbon technologies, material substitution, phasedown of fluorinated gases, carbon capture and storage, and enhanced recycling.

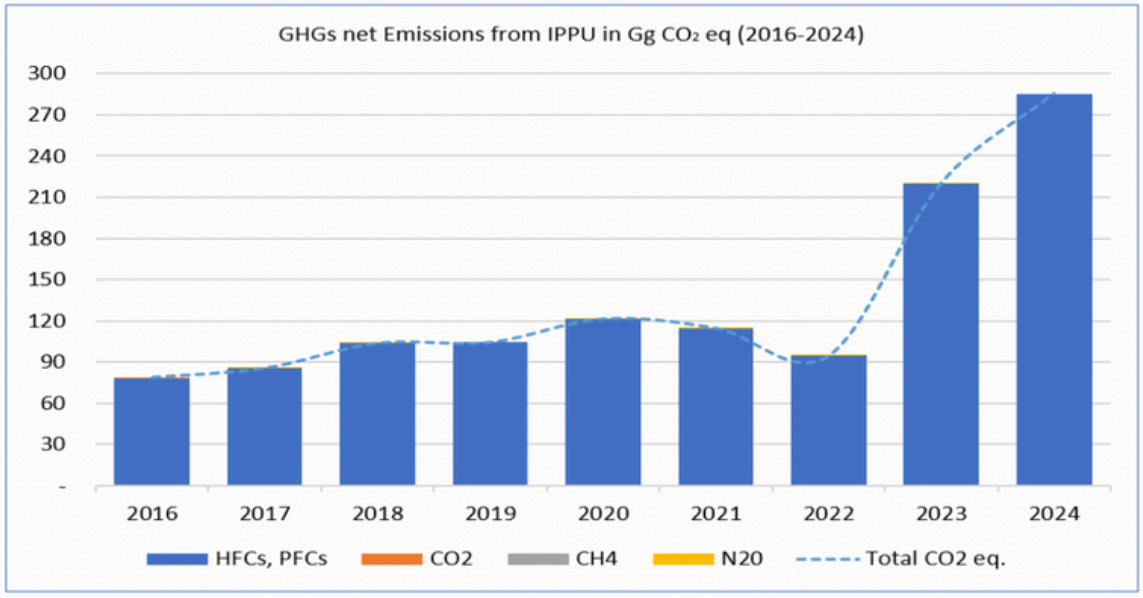


Figure 16: GHGs net Emissions from IPPU in Gt CO2 eq (2016-2024)

5. UNCERTAINTY ANALYSIS

GHG emission uncertainty refers to the variability or inaccuracy in estimating greenhouse gas emissions, often resulting from incomplete data, reliance on generic emission factors, or assumptions made during calculations. Assessing these uncertainties is essential for ensuring transparency, supporting sound decision-making, meeting compliance requirements, and managing risks. It also helps countries to pinpoint areas where data quality and measurement practices can be improved, leading to more reliable climate reporting.

In Somalia's GHG baseline study, uncertainty analysis played a critical role in evaluating the reliability and accuracy of emissions estimates. The primary objective was to assess the confidence level of the inventory results by identifying key sources of uncertainty, enhancing transparency, and guiding future efforts to improve data quality and methodological rigor.

The inventory followed the 2006 IPCC Guidelines, using a Tier 1 approach appropriate for countries with limited data. This involved identifying major sources of uncertainty—such as inconsistencies in activity data, reliance on default emission factors, and gaps in datasets across sectors. Quantitative estimates of uncertainty were calculated using percentage ranges, drawing on IPCC default values where local data were unavailable. These were then aggregated using error propagation methods to determine overall uncertainty at both sectoral and national levels.
A sensitivity analysis was also conducted to identify which sources had the greatest influence on total emissions, thereby helping to prioritize areas for improvement. The findings were clearly documented, with uncertainty ranges presented in both tabular and narrative formats, alongside recommendations for improving data collection systems, methodological approaches, and institutional capacity. Overall, this process strengthened the credibility of Somalia's GHG inventory and informed strategies for more accurate and robust climate reporting.
Table 14 provides an overview of uncertainty levels and emissions contributions across various IPCC categories, focusing on energy and industrial processes. The Energy sector (Category 1) generally shows low uncertainty for CO_2 emissions but extremely high uncertainty for CH_4 and N_2O emissions, particularly in transport and aviation. Despite this, their contribution to total variance is minimal, with most subsectors reporting no impact on national emissions trends. The Industrial Processes sector (Category 2) features high activity data uncertainty, especially in cement (78%), lime (54%), and other heavy industries, though these are also reported to have no significant trend impact. Across categories, many subcategories show no change in emissions trend and no uncertainty in trend estimation, suggesting either stable or unreported variation. In general, while some subsectors exhibit high combined uncertainties, their overall influence on national emissions trends remains negligible, indicating robustness in the overall inventory trend analysis.

Table 11: Uncertainty Analysis

2006 IPCC Categories	Gas	Activity Data Uncertainty (%)	Emission Factor Uncertainty (%)	Combined Uncertainty (%)	Contribution to Variance by Category in Year T	Inventory trend in national emissions for year t increase with respect to base year (% of base year)	Uncertainty introduce trend in total national e (%)
1 - Energy							
1.A.1 - Energy Industries - Liquid Fuels	CO2	5	6.136158302	7.91532935	0.00223345	0	0.004203004
1.A.1 - Energy Industries - Liquid Fuels	CH4	5	228.7878788	228.842508	2.40118E-06	0	3.23139E-06
1.A.1 - Energy Industries - Liquid Fuels	N2O	5	228.7878788	228.842508	8.60321E-06	0	1.15778E-05
1.A.1 - Energy Industries	CO2	5	5	7.071067812	0	100	0
1.A.1 - Energy Industries	CH4	5	5	7.071067812	0	100	0
1.A.1 - Energy Industries	N2O	5	5	7.071067812	0	100	0
1.A.3.a - Civil Aviation - Liquid Fuels	CO2	7.071067812	5.952600542	9.243021866	0	0	1.25308E-09
1.A.3.a - Civil Aviation - Liquid Fuels	CH4	7.071067812	141.4213562	141.5980226	0	0	2.71169E-14
1.A.3.a - Civil Aviation - Liquid Fuels	N2O	7.071067812	212.1320344	212.2498528	0	0	8.74415E-11
1.A.3.b - Road Transportation - Liquid Fuels	CO2	7.071067812	4.5910929	8.430784899	0.009583972	0	0.016577069
1.A.3.b - Road Transportation - Liquid Fuels	CH4	7.071067812	346.0478163	346.1200531	0.002008368	0	0.002687702
1.A.3.b - Road Transportation - Liquid Fuels	N2O	7.071067812	296.896579	296.9807715	0.001970661	0	0.001936333
1.A.3.b - Road Transportation	CO2	0	0	0	0	100	0
1.A.4 - Other Sectors - Liquid Fuels	CO2	7.071067812	8.677838292	11.19396612	0.256355619	512.3114603	0.355320922
1.A.4 - Other Sectors - Liquid Fuels	CH4	7.071067812	282.8427125	282.931087	0.00080809	314.8687657	0.000295117
1.A.4 - Other Sectors - Liquid Fuels	N2O	7.071067812	328.9554105	329.0313998	3.83213E-05	105.9615205	9.02477E-06
1.B.1.a - Coal mining and handling	CO2	0	0	0	0	100	0
1.B.1.a - Coal mining and handling	CH4	5	0	5	0	100	0
1.B.1.c - Fuel transformation	CO2	0	0	0	0	100	0
1.B.1.c - Fuel transformation	CH4	0	0	0	0	100	0
1.B.1.c - Fuel transformation	N2O	0	0	0	0	100	0
1.B.2.a - Oil	CO2	0	0	0	0	100	0
1.B.2.a - Oil	CH4	0	0	0	0	100	0
1.B.2.a - Oil	N2O	0	0	0	0	100	0
1.B.2.b - Natural Gas	CO2	0	0	0	0	100	0
1.B.2.b - Natural Gas	CH4	0	0	0	0	100	0
1.B.2.b - Natural Gas	N2O	0	0	0	0	100	0
1.B.3 - Other emissions from Energy Production	CO2	0	0	0	0	100	0
1.B.3 - Other emissions from Energy Production	CH4	0	0	0	0	100	0
1.B.3 - Other emissions from Energy Production	N2O	0	0	0	0	100	0
1.C - Carbon dioxide Transport and Storage	CO2	0	0	0	0	100	0
2 - Industrial Processes and Product Use							
2.A.1 - Cement production	CO2	78.26237921	0	78.26237921	0	100	0
2.A.2 - Lime production	CO2	53.85164807	0	53.85164807	0	100	0
2.A.3 - Glass Production	CO2	35.35533906	0	35.35533906	0	100	0
2.A.4 - Other Process Uses of Carbonates	CO2	0	0	0	0	100	0
2.A.5 - Other (please specify)	CO2	0	0	0	0	100	0
2.A.5 - Other (please specify)	CH4	0	0	0	0	100	0
2.A.5 - Other (please specify)	N2O	0	0	0	0	100	0
2.B.1 - Ammonia Production	CO2	5	0	5	0	100	0
2.B.2 - Nitric Acid Production	N2O	2	0	2	0	100	0
2.B.3 - Adipic Acid Production	N2O	2	0	2	0	100	0
2.B.4 - Caprolactam, Glyoxal and Glyoxylic Acid Production	N2O	10	0	10	0	100	0
2.B.5 - Carbide Production	CO2	0	0	0	0	100	0
2.B.5 - Carbide Production	CH4	0	0	0	0	100	0
2.B.6 - Titanium Dioxide Production	CO2	7.071067812	0	7.071067812	0	100	0
2.B.7 - Soda Ash Production	CO2	5	0	5	0	100	0
2.B.8 - Petrochemical and Carbon Black Production	CO2	34.64101615	0	34.64101615	0	100	0

2.B.8 - Petrochemical and Carbon Black Production	CH4	24.49489743	0	24.49489743	0	100	0
2.B.9 - Fluorochemical Production	CHF3	14.14213562	0	14.14213562	0	100	0
2.B.10 - Hydrogen Production	CO2	0	0	0	0	100	0
2.B.10 - Hydrogen Production	CH4	0	0	0	0	100	0
2.B.10 - Hydrogen Production	N2O	0	0	0	0	100	0
2.C.1 - Iron and Steel Production	CO2	26.45751311	0	26.45751311	0	100	0
2.C.1 - Iron and Steel Production	CH4	14.14213562	0	14.14213562	0	100	0
2.C.2 - Ferroalloys Production	CO2	26.45751311	0	26.45751311	0	100	0
2.C.2 - Ferroalloys Production	CH4	10	0	10	0	100	0
2.C.3 - Aluminium production	CO2	22.36067977	0	22.36067977	0	100	0
2.C.3 - Aluminium production	CF4	10.39230485	0	10.39230485	0	100	0
2.C.3 - Aluminium production	C2F6	10.39230485	0	10.39230485	0	100	0
2.C.4 - Magnesium production	CO2	14.14213562	0	14.14213562	0	100	0
2.C.5 - Lead Production	CO2	10	0	10	0	100	0
2.C.6 - Zinc Production	CO2	10	0	10	0	100	0
2.C.7 - Rare Earths Production	CO2	0	0	0	0	100	0
2.D - Non-Energy Products from Fuels and Solvent Use	CO2	14.14213562	0	14.14213562	0	0	0
2.D - Non-Energy Products from Fuels and Solvent Use	CH4	0	0	0	0	0	0
2.D - Non-Energy Products from Fuels and Solvent Use	N2O	0	0	0	0	100	0
2.E - Electronics Industry	N2O	0	0	0	0	100	0
2.E - Electronics Industry	CF4	0	0	0	0	100	0
2.E - Electronics Industry	SF6	0	0	0	0	100	0
2.F.1 - Refrigeration and Air Conditioning	CH2FCF3	5	0	5	1.05528E-05	0	2.83893E-05
2.F.1 - Refrigeration and Air Conditioning	CH2F2	5	0	5	0	100	0
2.F.1 - Refrigeration and Air Conditioning	CHF2CF3	5	0	5	0	100	0
2.F.1 - Refrigeration and Air Conditioning	CH3CF3	5	0	5	0	100	0
2.G - Other Product Manufacture and Use	SF6	0	0	0	0	100	0
2.G - Other Product Manufacture and Use	N2O	0	0	0	0	100	0
2.H - Other	CO2	0	0	0	0	100	0
2.H - Other	CH4	0	0	0	0	100	0
2.H - Other	N2O	0	0	0	0	100	0
3 - Agriculture, Forestry, and Other Land Use							
3.A.1 - Enteric Fermentation	CH4	0	0	0	0	153.6323052	0
3.A.2 - Manure Management	CH4	0	0	0	0	86.11410118	0
3.A.2 - Manure Management	N2O	0	0	0	0	100	0
3.B.1.a - Forest land Remaining Forest land	CO2	0	0	0	0	0	0
3.B.1.b - Land Converted to Forest land	CO2	0	0	0	0	100	0
3.B.2.a - Cropland Remaining Cropland	CO2	0	0	0	0	0	0
3.B.2.b - Land Converted to Cropland	CO2	0	0	0	0	100	0
3.B.3.a - Grassland Remaining Grassland	CO2	0	0	0	0	0	0
3.B.3.b - Land Converted to Grassland	CO2	0	0	0	0	100	0
3.B.4.a.i - Peat Extraction remaining Peat Extraction	CO2	0	0	0	0	100	0
3.B.4.a.iii - Other Wetlands Remaining Other Wetlands	CO2	0	0	0	0	0	0
3.B.4.b.i - Land converted for Peat Extraction	CO2	0	0	0	0	100	0
3.B.4.b.ii - Land converted to Flooded Land	CO2	0	0	0	0	100	0
3.B.4.b.iii - Land converted to Other Wetlands	CO2	0	0	0	0	100	0
3.B.5.a - Settlements Remaining Settlements	CO2	0	0	0	0	0	0
3.B.5.b - Land Converted to Settlements	CO2	0	0	0	0	100	0
3.B.6.b - Land Converted to Other land	CO2	0	0	0	0	100	0
3.C.1 - Burning	CO2	0	0	0	0	100	0
3.C.1 - Burning	CH4	0	0	0	0	100	0

3.C.1 - Burning	N2O	0	0	0	0	100	0
3.C.2 - Liming	CO2	0	0	0	0	100	0
3.C.3 - Urea application	CO2	0	0	0	0	100	0
3.C.4 - Direct N2O Emissions from managed soils	N2O	0	0	0	0	100	0
3.C.5 - Indirect N2O Emissions from managed soils	N2O	0	0	0	0	100	0
3.C.6 - Indirect N2O Emissions from manure management	N2O	0	0	0	0	100	0
3.C.7 - Rice cultivation	CH4	0	0	0	0	100	0
3.C.8 - CH4 from Drained Organic Soils	CH4	0	0	0	0	100	0
3.C.9 - CH4 from Drainage Ditches on Organic Soils	CH4	0	0	0	0	100	0
3.C.10 - CH4 from Rewetting of Organic Soils	CH4	0	0	0	0	100	0
3.C.11 - CH4 Emissions from Rewetting of Mangroves and Tidal Marshes	CH4	0	0	0	0	100	0
3.C.12 - N2O Emissions from Aquaculture	N2O	0	0	0	0	100	0
3.C.13 - CH4 Emissions from Rewetted and Created Wetlands on Inland Wetland Mineral Soils	CH4	0	0	0	0	100	0
3.C.14 - Other (please specify)	CO2	0	0	0	0	100	0
3.C.14 - Other (please specify)	CH4	0	0	0	0	100	0
3.C.14 - Other (please specify)	N2O	0	0	0	0	100	0
3.D.1 - Harvested Wood Products	CO2	0	0	0	0	100	0
3.D.2 - Other (please specify)	CO2	0	0	0	0	100	0
3.D.2 - Other (please specify)	CH4	0	0	0	0	100	0
3.D.2 - Other (please specify)	N2O	0	0	0	0	100	0
4 - Waste							
4.A - Solid Waste Disposal	CH4	0	0	0	0	144.0548957	0
4.B - Biological Treatment of Solid Waste	CH4	0	0	0	0	100	0
4.B - Biological Treatment of Solid Waste	N2O	0	0	0	0	100	0
4.C - Incineration and Open Burning of Waste	CO2	0	0	0	0	100	0
4.C - Incineration and Open Burning of Waste	CH4	0	0	0	0	100	0
4.C - Incineration and Open Burning of Waste	N2O	0	0	0	0	100	0
4.D - Wastewater Treatment and Discharge	CH4	0	0	0	0	100	0
4.D - Wastewater Treatment and Discharge	N2O	0	0	0	0	100	0
4.E - Other (please specify)	CO2	0	0	0	0	100	0
4.E - Other (please specify)	CH4	0	0	0	0	100	0
4.E - Other (please specify)	N2O	0	0	0	0	100	0
5 - Other							
5.A - Indirect N2O emissions from the atmospheric deposition of nitrogen in NOx and NH3	N2O	0	0	0	0	100	0
5.B - Indirect CO2 emissions from the atmospheric oxidation of CH4, CO and NMVOC	CO2	0	0	0	0	100	0

6. QUALITY ASSURANCE (QA)/QUALITY CONTROL (QC) AND VERIFICATION ACTIVITIES IN SOMALIA

Quality Assurance (QA) and Quality Control (QC) are complementary processes essential for maintaining high standards across various sectors. QA is a proactive approach focused on preventing errors through planned and systematic activities such as audits, checklists, and the development of sound methodologies. In contrast, QC is a reactive process aimed at identifying and correcting defects in final outputs through inspections, testing, and reviews. Together, QA and QC play a vital role in ensuring the accuracy, reliability, and consistency of data and outcomes—particularly in fields such as environmental monitoring, manufacturing, and research.

The implementation of QA/QC procedures is especially critical for the development of Somalia's National Greenhouse Gas (GHG) Inventory. Aligned with the 2006 IPCC Guidelines and international best practices, these procedures aim to ensure:

- Accuracy, transparency, completeness, consistency, comparability, and timeliness; and
- Continuous improvement of the national climate reporting systems.

6.1 Organizational Mandates in Somalia

The Ministry of Environment and Climate Change (MoECC) serves as the national focal point for climate change and is responsible for the completion, final approval, and submission of the GHG inventory report. This effort has been supported by partners including the World Bank, UNDP, and other development partners. The MoECC also oversees the progressive development of Somalia's National Communications and Biennial Update Reports (BURs).

To strengthen the national MRV system, 3 international experts and 5 national consultants were engaged to provide technical guidance, support sectoral data capture and analysis, and build capacity throughout the inventory process.

For effective coordination and long-term sustainability, it is recommended that a GHG Inventory Team be institutionalized within the MoECC, with designated leads for each IPCC sector (Energy, IPPU, AFOLU, Transport, Waste). The team's mandate, reporting lines, and responsibilities should be formalized through legal or executive instruments.

A key recommendation is the legal formalization of data collection and reporting processes. These instruments should define institutional roles and timelines, and mandate public and private data providers to deliver standardized information using harmonized templates.

6.2 Expertise and Capacity Development

The preparation of Somalia's GHG inventory was supported by both international and national experts, funded and coordinated by the NDC Partnership, World Bank, UNDP, and other partners. Their contributions included:

- Identification of data needs and coordination of collection by government and partner institutions
- Preparation of training manuals, including NDC 3.0
- Capacity building through training on the 2006 IPCC Guidelines and IPCC Software
- Mentoring MoECC staff and supporting data analysis and emission estimation
- Documentation of methodologies, assumptions, and data sources to ensure transparency and long-term knowledge retention

To strengthen the national system, a Capacity Development Plan is recommended and should include:

- National and regional training on the 2006 IPCC Guidelines and IPCC Software
- Peer exchanges with countries such as Kenya and Ethiopia
- Mentorship programs during inventory compilation
- Inclusion of Somali experts in international GHG review training and certification
- Continued training for local experts to document and transfer knowledge effectively

6.3 Data Flows

Current data availability in Somalia is fragmented and largely dependent on informal or ad hoc requests. Under the proposed MRV framework:

- Formal data-sharing agreements should be established with key institutions (e.g., Ministries of Energy, Agriculture, Fisheries, Urban Development, and the Somali Bureau of Statistics)
- Standardized templates and quality protocols should be developed for use by both federal and member state agencies
- Where data gaps exist, expert judgment and estimation methods (e.g., interpolation, extrapolation) should be used and transparently documented

6.4 Systems and Tools

All GHG data will be stored in a centralized repository maintained by the MoECC. The system will utilize the IPCC Inventory Software, spreadsheets, and a national MRV platform. A cloud-based storage system is recommended to improve data access, security, and continuity. Long-term plans include establishing a digital GHG/MRV management system hosted by the Ministry, with training and technical support extended to both national and Federal Member State (FMS) officers.

6.5 Stakeholder Engagement

Stakeholder participation is a vital part of the MRV process and will be facilitated through:

- A National Climate Change Steering Committee, comprising ministries, local governments, academia, civil society, and private sector actors
- Sectoral consultations to validate data and assumptions
- National workshops to present findings and gather stakeholder feedback
- Public outreach through a climate change website, infographics, and bilingual (Somali/English) policy briefs

7. RECOMMENDATIONS

Improving Somalia's GHG inventory will require strengthening MRV systems by establishing clear institutional roles, formalizing a GHG Inventory Team, enhancing inter-agency collaboration, and developing standardized data protocols. Centralized data systems, robust stakeholder engagement, capacity building, and supportive legal frameworks are also essential for effective implementation. Table 15 below outlines the key recommendations and their priority levels.

Element	Recommendation	Priority
Organizational Mand	Develop and adopt an MRV system to define institutional	High
	Formalize the GHG Inventory Team within MoECC	High
	Strengthen collaboration with the Somali Bureau of Statis	High
Data Collection & Sh	Develop national data templates and protocols	High
	Establish legal MoUs with key data providers	Medium
Data Management Sy	Set up centralized data storage and MRV tracking system	Medium
	Build a public-facing GHG inventory dashboard or portal	Low
Stakeholder Engager	Establish and strengthen a Climate Change Coordination (	High
	Engage public and media through simplified, visual climat	Medium
Expertise	Train MoECC staff and experts on data templates, IPCC 2(	High
	Involve Somali experts in international GHG reviews and c	Medium

8. ANNEX

Table 13: Greenhouse gas emissions by sector (Gt CO2 eq.)

Sector	2016	2017	2018	2019	2020	2021	2022	2023	2024	(%)
Agriculture	7,257	7,873	9,547	9,600	11,173	10,547	8,693	20,264	25,166	46
LULUCF	6,310	6,846	8,301	8,348	9,716	9,171	7,559	17,621	21,884	40
Energy	1,183	1,284	1,556	1,565	1,822	1,720	1,417	3,304	4,103	8
Waste	473	513	623	626	729	688	567	1,322	1,641	3
Transport	394	428	519	522	607	573	472	1,101	1,368	3
IPPU	79	86	104	104	121	115	94	220	274	1
Other	-	-	-	-	-	-	-	-	-	0
Total	15,697	17,029	20,650	20,766	24,168	22,814	18,803	43,832	54,436	100

Table 14: Anthropogenic greenhouse gas emissions by gas in Somalia (Gt CO2 eq.)

Greenhouse gas	Category	2016	2017	2018	2019	2020	2021	2022	2023	2024
CH_4	Agriculture	7,256.75	7,251.34	9,541.51	9,595.13	10,666.60	10,547.16	8,692.62	19,344.78	24,631.38
	Energy	236.63	256.71	311.30	313.05	364.34	343.93	283.45	660.78	820.64
	IPPU	0.00	0.01	0.01	0.00	0.01	0.01	0.05	0.01	-
	Transport	-	-	-	-	-	-	-	-	-
	Waste	331.29	359.40	435.82	438.27	510.07	481.50	396.84	925.10	1,148.90
	Total	**7,824.67**	**7,867.46**	**10,288.64**	**10,346.45**	**11,541.01**	**11,372.60**	**9,372.96**	**20,930.67**	**26,600.92**
CO_2	Agriculture	-	-	-	-	-	-	-	-	-
	Energy	828.22	898.49	1,089.55	1,095.67	1,275.18	1,203.75	992.09	2,312.74	2,872.24
	IPPU	1.33	0.01	0.01	0.00	0.01	0.01	0.05	0.01	-
	Land	6,310.22	6,845.66	8,301.33	8,347.95	9,715.63	9,171.45	7,558.80	17,620.87	21,883.74
	Other	-	-	-	-	-	-	-	-	-
	Transport	394.39	427.85	518.83	521.75	349.41	284.46	149.54	729.31	950.23
	Waste	141.98	154.03	186.78	187.83	218.60	206.36	170.07	396.47	492.38
	Total	**7,676.13**	**8,326.04**	**10,096.50**	**10,153.20**	**11,558.83**	**10,866.02**	**8,870.56**	**21,059.39**	**26,198.59**
N_2O	Agriculture	-	621.17	5.01	5.01	506.38	-	-	919.21	534.91
	Energy	118.32	128.36	155.65	156.52	182.17	171.96	141.73	330.39	410.32
	IPPU	-	0.01	0.01	0.00	0.01	0.01	0.05	0.01	-
	Other	-	-	-	-	-	-	-	-	-
	Transport	-	-	-	-	257.82	288.75	322.88	371.99	417.51
	Waste	-	-	-	-	-	-	-	-	-
	Total	**118.32**	**749.53**	**160.67**	**161.54**	**946.37**	**460.72**	**464.66**	**1,621.60**	**1,362.74**
HFCs, PFCs	IPPU	77.55	85.55	103.75	104.35	121.43	114.63	94.33	220.24	285.43
	Total	**77.55**	**85.55**	**103.75**	**104.35**	**121.43**	**114.63**	**94.33**	**220.24**	**285.43**
All gases	**Total**	**15,696.66**	**17,028.58**	**20,649.56**	**20,765.53**	**24,167.64**	**22,813.97**	**18,802.51**	**43,831.91**	**54,447.68**

Table 15: Emission factors used for AFOLU sector

Description	EF used	Unit	AFOLU Sub-category	Activity data
Other cattle	31	Kg CH_4 / head year	Livestock	Enteric fermentation
Camels	46	Kg CH_4 / head year	Livestock	Manure management

Description	EF used	Unit	AFOLU Sub-category	Activity data
Sheep	5	Kg CH_4 / head year	Livestock	Enteric fermentation
Goats	5	Kg CH_4 / head year	Livestock	Enteric fermentation
Other cattle	1	Kg CH_4 / head year	Livestock	Manure management
Camels	2.56	Kg CH_4 / head year	Livestock	Manure management
Sheep	0.2	Kg CH_4 / head year	Livestock	Manure management
Goats	0.22	Kg CH_4 / head year	Livestock	Manure management
Poultry	0.02	Kg CH_4 / head year	Livestock	Manure management
BEF	1	Ratio	Forestry	Forest management
Above ground biomass stock	120	td.m/ha	Forestry	Unmanaged dry forest/open woodlands/shrubland
Ratio of below ground biomass to above ground biomass	0.350	t root d.m/t shoot d.m	Forestry	Unmanaged dry forest/open woodlands/shrubland
Biomass carbo fraction	0.470	tCd.m/td.m	Forestry	Unmanaged dry forest/open woodlands/shrubland
Growing stock level (V)	121-200	M3/ha	Forestry	Unmanaged dry forest
Growing stock level (V)	21-40	M3/ha	Forestry	Unmanaged open woodlands
Growing stock level (V)	<10	M3/ha		Unmanaged Open shrubland
Biomass conversion expansion factor (BCEF) for standing forest	BEF2*D	Td.m/m3 wood volume	Forestry	Unmanaged dry forest
Biomass conversion expansion factor (BCEF) for standing forest	1.400	Td.m/m3 wood volume	Forestry	Unmanaged open woodlands/shrubland
Biomass conversion expansion factor (BCEF) for conversion of merchantable volume to above ground biomass (BEF2)	1.400		Forestry	Unmanaged dry forest/open woodlands/ shrubland
Reference soil organic carbon stock (SOCref)	20.000	tC/ha	Forestry	Unmanaged dry forest/open woodlands/ shrubland/annual cropland/natural vegetation mosaics/perennial cropland/grassland (managed/unmanaged)
Litter c stock at maturity	2.100	tC/ha	Forestry	Unmanaged dry forest/open woodlands/ shrubland
BCEF for coppice forest	0.61	t/m^3 volume	Forestry	Forest management
BCEF for high forest	0.8	t/m^3 volume	Forestry	Forest management
BCEF for shrubs	0.25	t/m^3 volume	Forestry	Forest management
Growing stock level	41-100	m^3/ha	Forestry	Forest management
Age classes	15	Years	Cropland	Perennial Cropland
Biomass accumulation rate (G)	3.00	Tonnes C/ha/yr	Cropland	Perennial Cropland
Harvest/maturity cycle (yr)	35.000	Years	Cropland	Perennial Cropland
Basic Wood density (D)	0.700	Td.m./m3 fresh volume	Forestry	unmanaged dry forest/ open woodlands
Basic Wood density (D)	0.550	td.m./m3 fresh volume	Forestry	Unmanaged shrubland
Carbon fraction	Number	0.5	Forestry	Forest management
Carbon fraction of woody	0.470	t. C/t.d.m	Grassland	Managed/unmanaged grassland

Description	EF used	Unit	AFOLU Sub-category	Activity data
biomass dry matter				
Herbacious biomass factor	2.500	tC/ha		Annual cropland /natural vegetation mosaics/perennial cropland
Herbacious biomass factor	2.500	t.d.m/ha	Grassland	Unmanaged grassland
Ration of Below ground herbaceous biomass to above ground herbaceous biomass(R)	2.800	Troot d.m/tshoot d.m	Grassland	Unmanaged grassland
Herbacious biomass factor	4.000	Td.m./ha	Grassland	Managed grassland
Ration of Below ground biomass to above ground biomass(R)	4.100	Troot d.m/tshoot d.m	Grassland	Managed grassland
Carbon fraction of Herbaceous biomass dry matter	0.470	tC/t.d.m	Grassland	Managed grassland
Carbon fraction of woody biomass dry matter	0.500	tC/t.d.m	Grassland	Unmanaged grassland
Woody bioomass	10.000	Td.m/ha	Grassland	Managed grassland
Woody bioomass	5.000	Td.m/ha	grassland	Unmanaged grassland
Ration of Below ground biomass to above ground biomass(R)	0.500	t.root d.m/t.shoot d.m	Grassland	Managed grassland/unmanaged grassland
Ration of Below ground biomass to above ground biomass(R)	0.300	trootC/t shootC		Annual cropland/natural vegetation mosaics/perennial cropland
Relative C stock change factors- Land use (FLU)	1.000		Grassland	Managed Grassland
Relative C stock change factors- Tillage (FMG)	1.000		Grassland	Managed Grassland
Relative C stock change factors- Tillage (FI)	1.000		Grassland	Managed Grassland
Relative C stock change factors- Land use (FLU)	1.100			Annual cropland/natural vegetation mosaics
Relative C stock change factors- Tillage (FMG)	1.000			Annual cropland/natural vegetation mosaics
Relative C stock change factors- Tillage (FI)	1.000			Annual cropland/natural vegetation mosaics
Relative C stock change factors- Land use (FLU)	0.580			perennial cropland
Relative C stock change factors- Tillage (FMG)	1.090			perennial cropland
Relative C stock change factors- Tillage (FI)	0.950			perennial cropland
Above ground biomass stock	200.000	t.d.m./ha	Wetland	Unmanaged wetland
Ration of Below ground biomass to above ground biomass(R)	2.500	t.root d.m/t.shoot d.m	Wetland	Unmanaged wetland
Carbon fraction of woody biomass dry matter	0.550	t.C/t.d.m	Wetland	Unmanaged wetland
Reference soil organic carbon stock (SOCref)	86.000	tC/ha	Wetland	Unmanaged wetland
Above ground biomass stock	10.000	t.d.m./ha	Settlement	Urban and built up land
Ration of Below ground biomass to above ground biomass(R)	0.400	t.root d.m/t.shoot d.m	Settlement	Urban and built up land

Description	EF used	Unit	AFOLU Sub-category	Activity data
Carbon fraction of biomass dry matter	0.470	t.C/t.d.m	Settlement	Urban and built up land
Active growing period (AGP)	20	Years	Settlement	Urban and built up land
Number of crown cover classes or individual woody plant classes	1		Settlement	Urban and built up land
Reference soil organic carbon stock (SOCref)	34.000	tC/ha	Settlement	Urban and built up land
Relative C stock change factors- Land use (FLU)	1.000		Settlement	Urban and built up land
Relative C stock change factors- Tillage (FMG)	1.000		Settlement	Urban and built up land
Relative C stock change factors- Tillage (FI)	1.000		Settlement	Urban and built up land
Above ground biomass stock	5.000	t.d.m./ha	Other settlements	Other settlements
Ration of Below ground biomass to above ground biomass(R)	0.350	t.root d.m/t.shoot d.m	Other settlements	Other settlements
Carbon fraction of biomass dry matter	0.500	t.C/t.d.m	Other settlements	Other settlements
Reference soil organic carbon stock (SOCref)	20.000	tC/ha	Other settlements	Other settlements
Proportion of the area cultivated	20.000	%	Other settlements	Other settlements
Relative C stock change factors- Land use (FLU)-cultivated	0.580		Other settlements	Other settlements
Relative C stock change factors- management (FMG)-cultivated	1.170		Other settlements	Other settlements
Relative C stock change factors- Input (FI)-cultivated	1.000		Other settlements	Other settlements
Proportion of the area covered by turf grass	15.000	%	Other settlements	Other settlements
Relative C stock change tors- Land use (FLU)- grass	1.000		Other settlements	Other settlements
tive C stock change ors- management G)- turf grass	1.000		Other settlements	Other settlements
tive C stock change ors- Input (FI)-turf grass	1.000		Other settlements	Other settlements
ortion of the area d	65.000	%	Other settlements	Other settlements
tive C stock change ors- Land use)-paved	0.800		Other settlements	Other settlements
tive C stock change ors- management G)-paved	0.800		Other settlements	Other settlements
tive C stock change ors- Input (FI)-paved	0.800		Other settlements	Other settlements
Combustion factor for croplands	0.9	Default value	A.S& non-CO2 emissions	Biomass burning

Description	EF used	Unit	AFOLU Sub-category	Activity data
Combustion factor for croplands	1	Default value	A.S& non-CO2 emissions	Biomass burning
Urea content in synthetic fertilizer	46	%	A.S& non-CO2 emissions	
CH_4	21	GWP	CO_2	CO_2 eq.
N_2O	310	GWP	CO_2	CO_2 eq.

Table 16: GHGs (emissions and removals) from Agriculture sector (Gg)

GHGs	GHGs by years (Gt)								
	2016	2017	2018	2019	2020	2021	2022	2023	2024
CH4	7,256.75	7,251.34	9,541.51	9,595.13	10,666.60	10,547.16	8,692.62	19,344.78	24,631.38
N2O	-	621.17	5.01	5.01	506.38	-	-	919.21	534.91
Total CO2 eq.	**7,256.75**	**7,872.51**	**9,546.53**	**9,600.15**	**11,172.98**	**10,547.16**	**8,692.62**	**20,264.00**	**25,166.30**

Table 17: GHGs emissions from LULUCF sector (Gg)

GHGs	GHGs by years, in Gg								
	2016	2017	2018	2019	2020	2021	2022	2023	2024
CO2	6,310.22	6,845.66	8,301.33	8,347.95	9,715.63	9,171.45	7,558.80	17,620.87	21,883.74
Total CO2 eq.	**6,310.22**	**6,845.66**	**8,301.33**	**8,347.95**	**9,715.63**	**9,171.45**	**7,558.80**	**17,620.87**	**21,883.74**

Table 18: GHGs emissions from Energy sector (Gt)

GHGs	GHGs by years, in Gt								
	2016	2017	2018	2019	2020	2021	2022	2023	2024
CH4	236.63	256.71	311.30	313.05	364.34	343.93	283.45	660.78	820.64
CO2	828.22	898.49	1,089.55	1,095.67	1,275.18	1,203.75	992.09	2,312.74	2,872.24
N2O	118.32	128.36	155.65	156.52	182.17	171.96	141.73	330.39	410.32
Total CO2 eq.	**1,183.17**	**1,283.56**	**1,556.50**	**1,565.24**	**1,821.68**	**1,719.65**	**1,417.27**	**3,303.91**	**4,103.20**

Table 19: GHGs emissions from Transport sector (Gg)

GHGs	GHGs by years, in Gg								
	2016	2017	2018	2019	2020	2021	2022	2023	2024
CO2	394.39	427.85	518.83	521.75	349.41	284.46	149.54	729.31	950.23
N2O	-	-	-	-	257.82	288.75	322.88	371.99	417.51
Total CO2 eq.	**394.39**	**427.85**	**518.83**	**521.75**	**607.23**	**573.22**	**472.42**	**1,101.30**	**1,367.73**

Table 20: GHGs emissions from Waste sector (Gg)

GHGs	GHGs by years, in Gg								
	2016	2017	2018	2019	2020	2021	2022	2023	2024
CH4	331.29	359.40	435.82	438.27	510.07	481.50	396.84	925.10	1,148.90
CO2	141.98	154.03	186.78	187.83	218.60	206.36	170.07	396.47	492.38
Total CO2 eq.	**473.27**	**513.42**	**622.60**	**626.10**	**728.67**	**687.86**	**566.91**	**1,321.57**	**1,641.28**

Table 21: GHGs emissions from IPPU sector (Gg)

GHGs	GHGs by years, in Gg								
	2016	2017	2018	2019	2020	2021	2022	2023	2024
HFCs, PFCs	77.55	85.55	103.75	104.35	121.43	114.63	94.33	220.24	285.43
CO2	1.33	0.01	0.01	0.00	0.01	0.01	0.05	0.01	-
CH4	0.00	0.01	0.01	0.00	0.01	0.01	0.05	0.01	-
N20	-	0.01	0.01	0.00	0.01	0.01	0.05	0.01	-
Total CO2 eq.	**78.88**	**85.57**	**103.77**	**104.35**	**121.45**	**114.64**	**94.48**	**220.26**	**285.43**