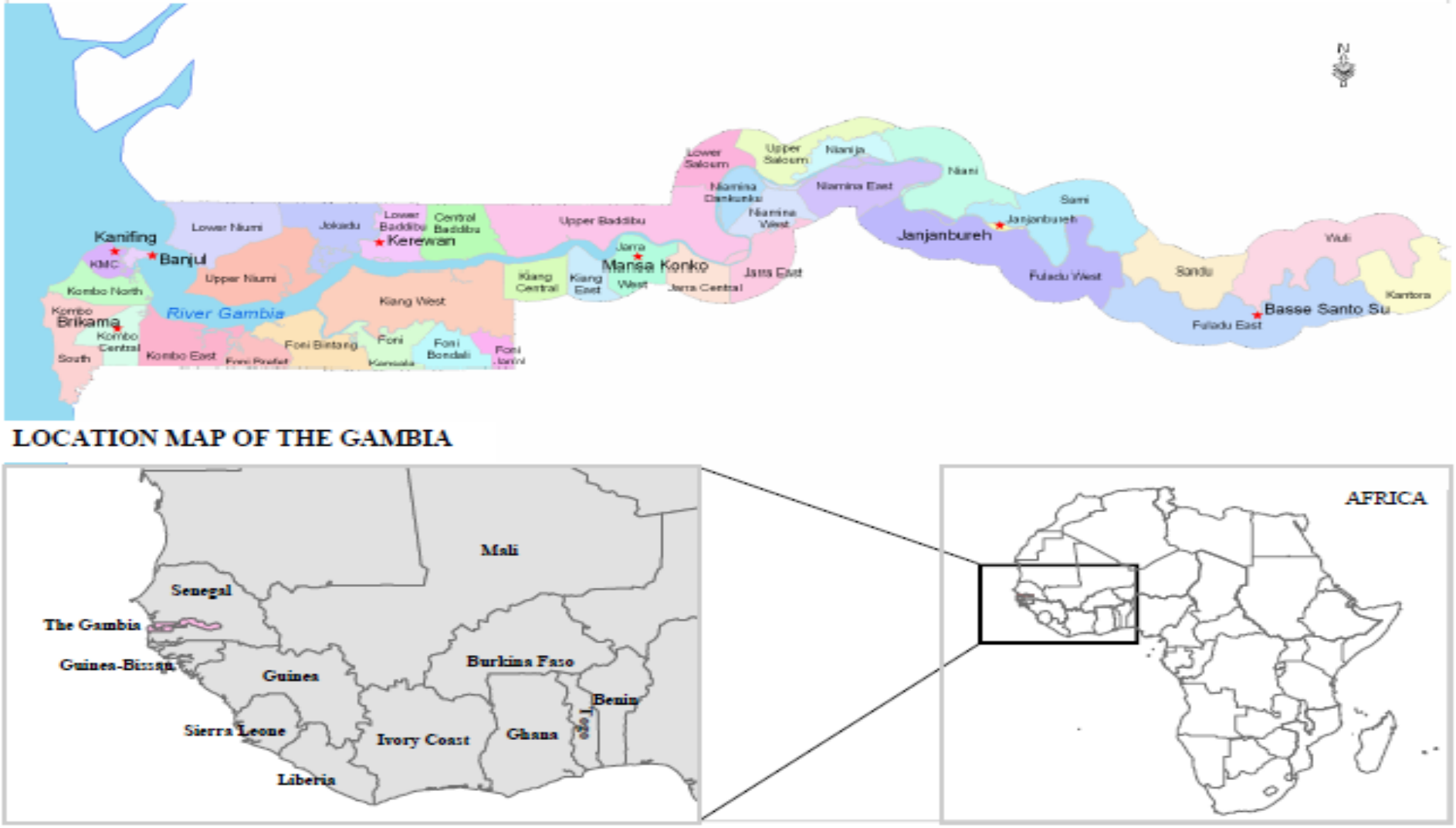

LOCATION MAP OF THE GAMBIA

THE GAMBIA GHGI/ MITIGATION LANDSCAPE MARCH 2024

Peer To Peer Learning Exchange Workshop Pretoria

South Africa

DEMOGRAPHY/ CLIMATE

- The Republic of The Gambia is the smallest country in Mainland Africa with a land mass of about 10,689 km2.
- It has a population of 2.487 million (2021 estimate, World Bank), giving it a population density of about 233 people per km2.
- Its GDP in 2021 was estimated at USD2.078 billion (World Bank, 2022).
- The Gambia has a tropical Savannah climate, with two distinct seasons: a dry season (November to May) and a rainy season (June to October).

DEMOGRAPHY/ CLIMATE

- Average temperatures range from 18°C to 30°C during the dry season and 23°C to 33°C during the wet season.
- In La Niña years, temperatures tend to be cooler than average throughout the year.
- By the end of the 21st century the country would experience an increase in the numbers of “hot” days and nights and longer heat waves.
- Average rainfall in a year varies from 1,000 mm in the South and Southeast to 700 mm in the most northern part of the country (World Bank, 2021).

INTERNATIONAL COMMITMENTS

The Gambia is a signatory to the 3 Rio conventions

- United Nations Framework Convention on Climate Change (UNFCCC)
- United Nation Convention to Combat Desertification (UNCCD)
- United Nation convention on Biological Diversity (UNCBD)
- Kyoto Protocol as a Non-Annex I Party member.

Although not a significant contributor to global warming and climate change (0.01%), it is among the countries most at risk from the projected adverse impacts of climate change.

The Gambia is an LDC. Under the Lima Call for Action, LDCs are not required to set quantified or quantifiable targets. However, The Gambia's NDC2 includes quantified and quantifiable commitments that exceed The Gambia's fair share.

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NATIONAL CIRCUMSTANCES/ COMMITMENTS

The country has made significant efforts to implement the convention through the development, submission and implementation of her

- First National Communication (FNC) developed in 2003, ,
- Building on the work from the FNC, the National Adaptation Programme of Action (NAPA) was developed in 2007.

NATIONAL CIRCUMSTANCES/ COMMITMENTS

- The Gambia's National Appropriate Mitigation Actions (NAMA) developed in 2008
- The Second National Communication (SNC) developed in 2012
- The Renewable Energy Act 2013, National Adaptation Plan (NAP) 2015

NATIONAL CIRCUMSTANCES/ COMMITMENTS

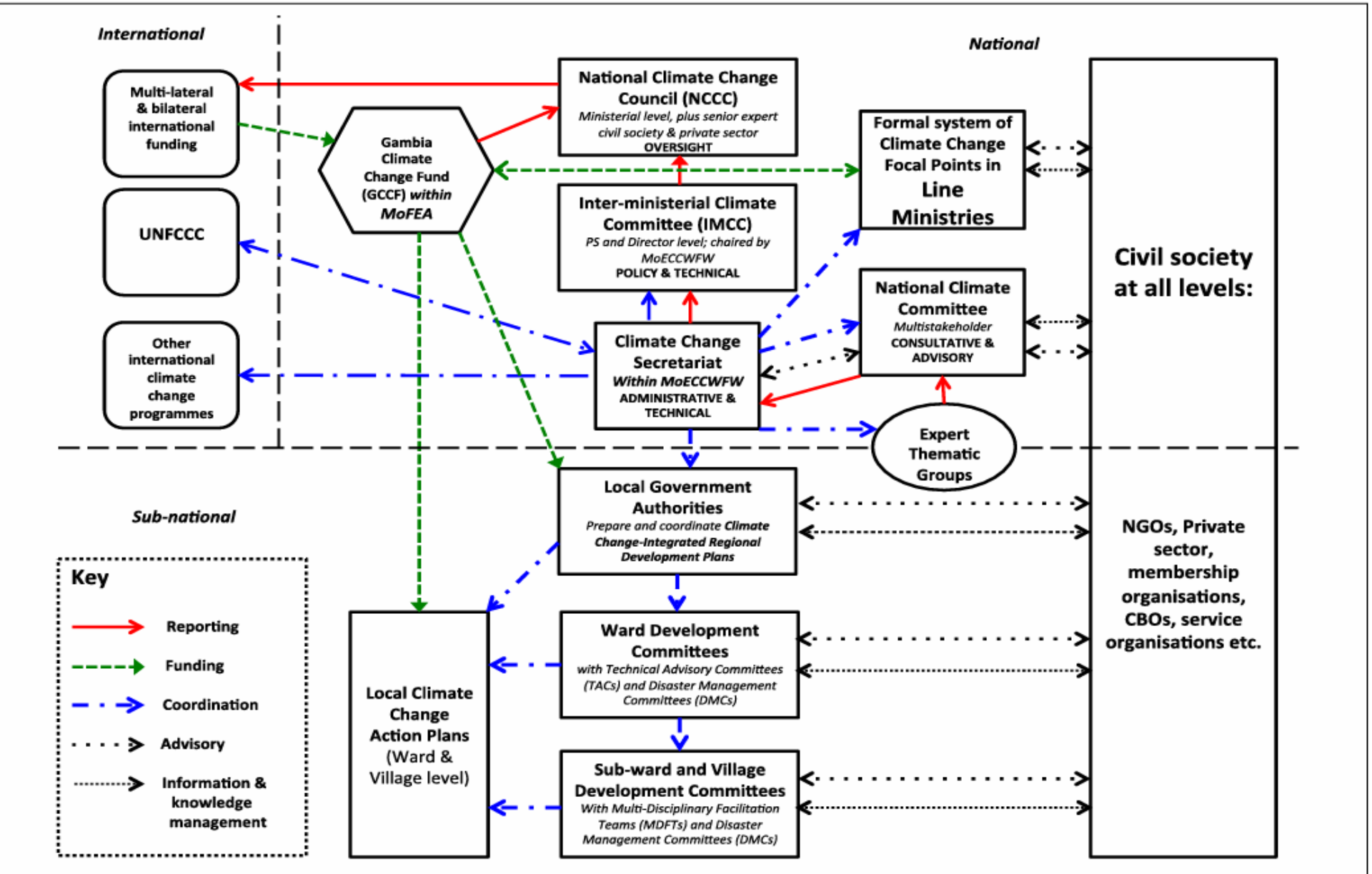
- the Intended Nationally Determined Contribution (INDC) in 2015(being considered ‘1.5°C Paris Agreement-compatible’ by the Climate Action Tracker (CAT)

- The formulation of the National Climate Change Policy (NCCP) in 2016 (a blueprint for climate change governance in the Gambia
- The NAP-Ag (National Adaptation Plan for Agriculture), was launched in 2016
- the Strategic Programme for Climate Resilience (SPCR) in 2017.

NATIONAL CIRCUMSTANCES/ COMMITMENTS

- The Gambia`s Long-Term Climate-Neutral Development Strategy 2050 (LTS)
- Low Emissions Climate Resilient Development Strategy Of The Gambia (Lecrds) 2018 – 2030
- National Capacity Self Assessment (NCSA)
- Formulated the 2nd Nationally Determine Contributions(NDC)
- The Gambia NDC implementation plan (Adaptation)
- The Gambia NDC partnership plan Narration
- Climate change mainstream in to sectoral policies

Organogram of revised institutional arrangements



GHG INVENTORY LANDSCAPE

The inventory of the GHG category was based on the guidelines provided by IPCC in estimating emission/ removal in the sectors. The method used is in consistence with the GHG accounting method as enshrined in the 2006 IPCC guideline. These sectors includes

- Energy (led by Department of Energy, NAWEC)
- Waste (led by Nation Environment Agency/ Local Councils)
- Agriculture (Led by Directorate of planning Agric services/ Livestock services
- FOLU(led by Department of Forestry
- IPPU(led by GBOS)

GHG INVENTORY LANDSCAPE (FOLU)

- The inventory of the GHG in the FOLU category was based on the guidelines provided by IPCC in estimating emission/ removal in the FOLU sector
- The method used is in consistence with the GHG accounting method as enshrined in the 2006 IPCC guideline
- The emissions and removal were estimated according to land based and non-land base activities or CO2 and non CO2 activities.
- The calculations of CO_2 were based on the changes in these land representations through conversions

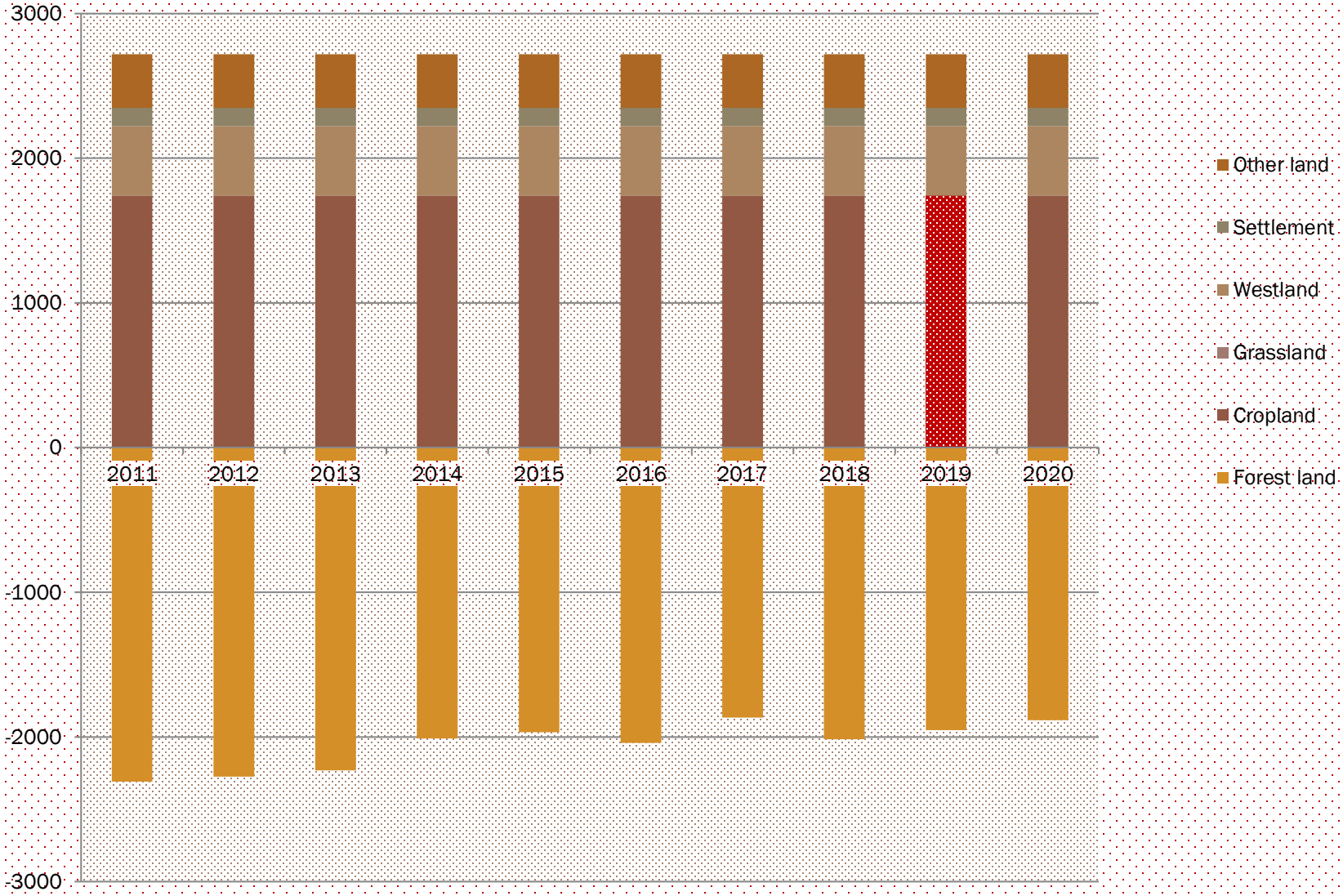
GHG INVENTORY LANDSCAPE (FOLU)

- As provided in the 2006 IPCC guideline, the six land representations were used to conduct or estimated GHG emissions/ removals.
- These land representations includes Forest land, cropland, Grassland, Wetland, Settlement and Other land.
- For each sub categories, CO2 emissions/ removals were estimated based on land remaining the same land type over a 10years period and land converted to other land use type over a 10 years period.

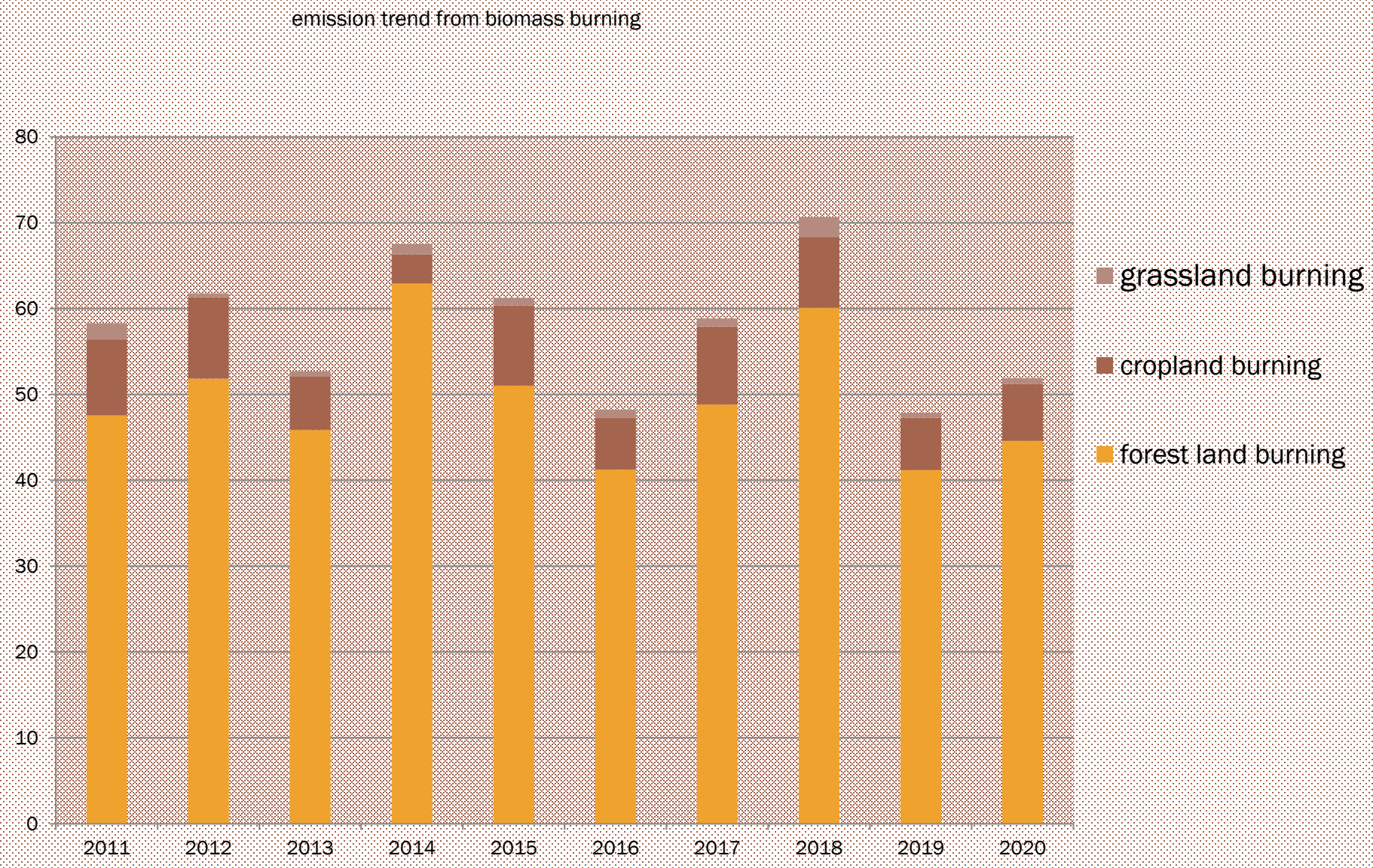
DATA SOURCES FOR FOLU

- The data used for the land estimations are:
  - Activity Data/ Land use change matrix
  - Annual wood removal data
  - Annual firewood removal data
  - Annual forest fire data/ areas affected by fires
  - Harvested wood products including charcoals.
  - Default values were also used for the EFs and other variables.

EMISSION TRENDS FROM IAND



EMISSION OF non CO_2



COMPLETENESS

IPCC Category	CO2	CH4	N2O	NOx	CO
3.B.1 Forest land					
3.B.1a Forest land remaining forest land					
3.B.1b Other land converted to forest land	E				
3.B.2 Cropland					
3.B.2a Cropland remaining cropland	E				
3.B.2b Other land converted to cropland	E				
3.B.3 Grassland					
3.B.3a Grassland remaining Grassland	*E*				
3.B.3b Other land converted to Grassland	*E*				
3.B.4 Wetland					
3.B.4a Wetland Remaining Wetland					
3.B.4b Other land converted to Wetland	E				
3.B.5 Settlement					
3.B.5a Settlement remaining Settlement					

IPCC Category	CO2	CH4	N2O	NOx	CO
3.B.6 Other land					
3.B.6a Other land remaining Other land					
3.B.6b Other land converted to Other land	E				
3.C.1 Emissions from biomass burning					
3.C.1a Burning in Forest land	NO	E	E	E	E
3.C.1b Burning in Cropland	NO	E	E	E	E
3.C.1c Burning in Grassland	NO	E	E	E	E
3.D Others					
3.D.1 Harvested Wood products	E				

GHG INVENTORY LANDSCAPE (AGRICULTURE)

- Agricultural activities contribute directly to emissions of greenhouse gases through a variety of different processes. These include methane emissions from enteric fermentation in
- domestic animals,
- animal waste management,
- rice production,
- and non-CO2 emissions from savannah burning and field burning of agricultural wastes. Enteric fermentation in ruminants is a major source of methane emission.

GHG INVENTORY LANDSCAPE (AGRICULTURE)

- Methane is also produced in soil during microbial decomposition of organic matter under anaerobic conditions. Crop fields, which are submerged under water are the potential source of methane production. Nitrous oxide is produced in soils through the processes of nitrification and denitrification.

Data sources

Categories	Sub-categories	Data type	Data source	Main data providers
Livestock	Enteric Fermentation	Animal population (cattle, goats, sheep, swine, horse)	National Agricultural Sample Survey Reports, National Livestock Census Report	Ministry of Agriculture - Department of Planning and Department of Livestock Services
	Manure Management	Animal population (cattle, goats, sheep, swine, poultry, horse)	National Agricultural Sample Survey Reports, National Livestock Census Report	Ministry of Agriculture - Department of Planning and Department of Livestock Services
Aggregated and non-CO2 emissions on land	Liming	Lime production in metric tons	Communities involved in lime production	Department of Planning, Ministry of Agriculture
	Urea Application	Annual urea importation figures	Annual Import Fact Sheet	Ministry of Trade - Statistics Department, FAO, GGC and the Ministry of Agriculture
	Direct N2O emissions from managed soils			

Data sources

Categories	Sub-categories	Data type	Data source	Main data providers
Aggregated and non-CO2 emissions on land	Indirect N2O emissions from managed soils	Annual crop production in tons per annum	National Agricultural Sample Survey Reports	Ministry of Agriculture - Department of Planning
	Indirect N2O emissions from manure management	Animal population (cattle, goats, sheep, swine, poultry, horse)	National Agricultural Sample Survey Reports, National Livestock Census Report	Ministry of Agriculture - Department of Planning and Department of Livestock Services
	Rice cultivation	Annual rice production areas in hectares per annum	National Agricultural Sample Survey Reports	Ministry of Agriculture - Department of Planning

Overview of the General Methodology applied in the Agriculture Categories in the inventory

Sub-Sector	Sub-category	Kind of data	Type of emission	Methodology	EF	Source of data
Livestock	3.A1. Enteric fermentation	Livestock number per type (Other cattle, Sheep, Goat, swine, horses)	CH_4	Tier 1 /IPCC 2006	D	Agricultural Statistical Yearbooks (2011-2020), National Livestock Census Report 2016
	3.A2. Manure management	Manure production per livestock type (Other cattle, Sheep, Goat, swine, horses, chicken)	CH_4	Tier 1/IPCC 2006	D	Agricultural Statistical Yearbooks (2011-2020), National Livestock Census Reports 2016
			N_20	Tier 1/IPCC 2006		Agricultural Statistical Yearbooks (2011-2020), National Livestock Census Reports 2016 Expert judgment

Overview of the General Methodology applied in the Agriculture Categories in the inventory

Sub-Sector	Sub-category	Kind of data	Type of emission	Methodology	EF	Source of data
3.C Aggregated and non-CO2 emissions on land	3.C.2. Liming	Lime production in metric tons	CO2	Tier 1/IPCC 2006	D	Department of Planning, Ministry of Agriculture
	3.C.3. Urea Application	Annual urea importation figures	CO2	Tier 1/IPCC 2006	D	Statistics Department - Ministry of Trade , FAO, GGC and the Ministry of Agriculture
	3.C.7. Rice	Annual rice production areas in hectares per annum	CH4	Tier 1/IPCC 2006	D	Agricultural Statistical Yearbooks (2011-2020), Department of Planning, Ministry of Agriculture

Figure 5:Total Quantities of GHG Emissions from Agriculture (GgCO2) in 2020

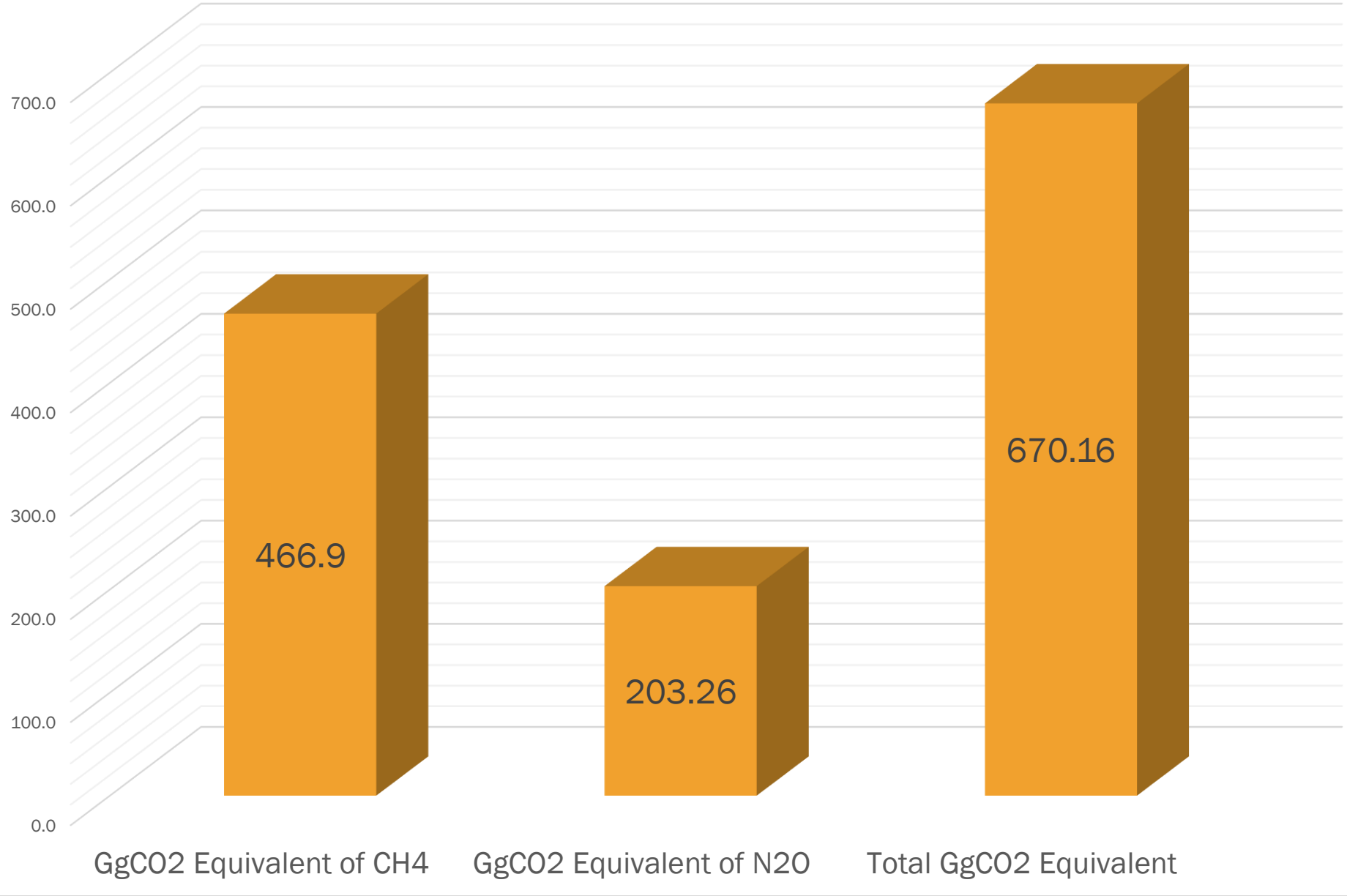
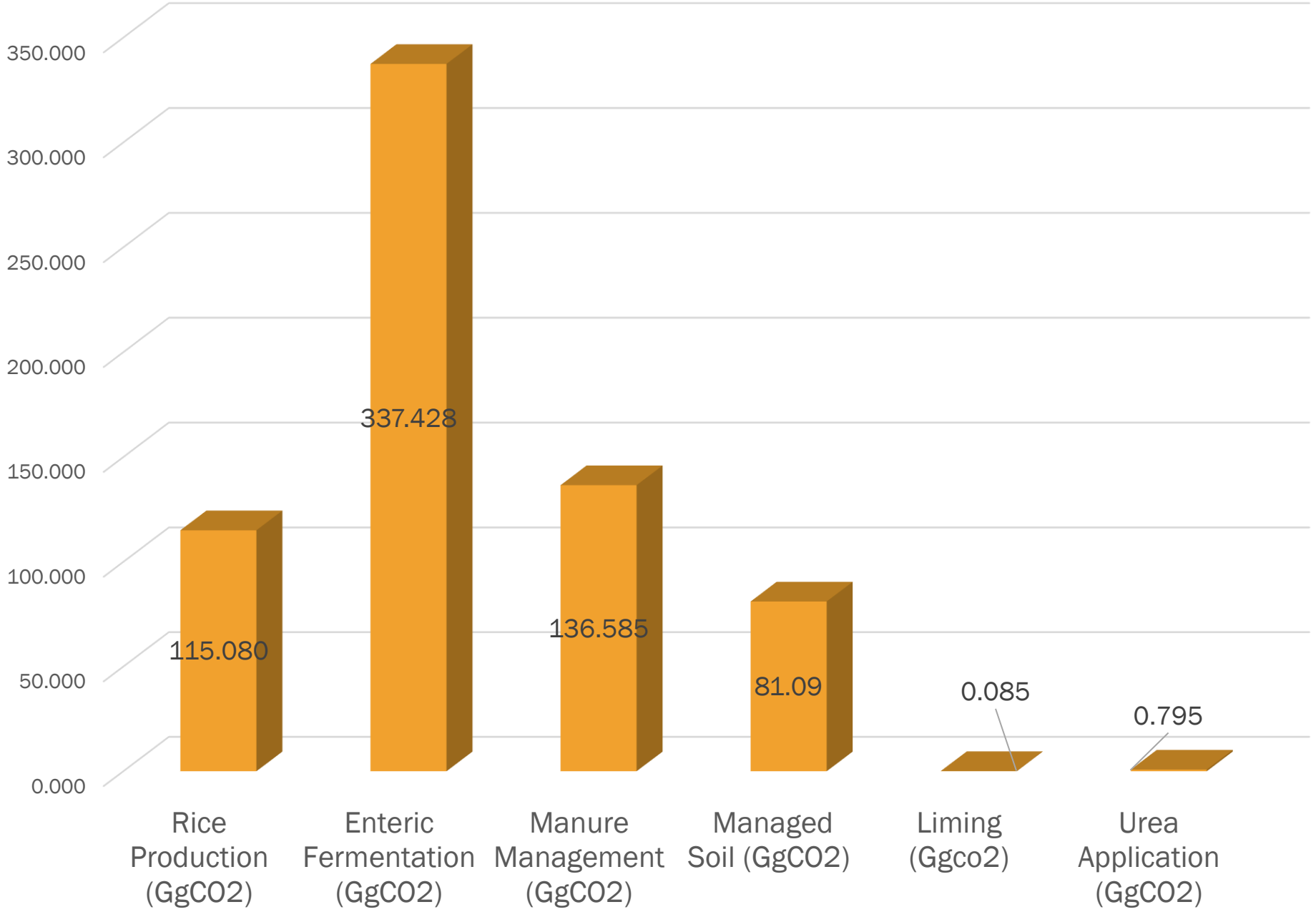


Figure 6: Quantities of GHG Emissions from Sub- Categories of Agriculture (GgCO2) in 2020



Overview of the General Methodology applied in the Agriculture Categories in the inventory

IPCC 2006 Category	CO2	CH4	N2O
3.A.1 Enteric Fermentation	NO	E	NO
3.A.2 Manure Management	NO	E	E
3.C.2 Liming	E	NO	NO
3.C.3 Urea Application	E	NO	NO
3.C.7 Rice Cultivation	NO	E	NO

GHG INVENTORY LANDSCAPE (ENERGY)

Energy systems are for most economies largely driven by the combustion of fossil fuels. During combustion the carbon and hydrogen of the fossil fuels are converted mainly into carbon dioxide (CO2) and water (H2O), thus releasing the chemical energy in the fuel as heat The Energy sector contributes greatly to National GHG Emissions which comprises of the following:

i. Exploration and exploitation of primary energy sources,
ii. Conversion of primary energy sources into more useable energy forms in refineries and power plants
iii. Use of fuels in stationary and mobile applications.

GHG INVENTORY LANDSCAPE (IPPU)

As The Gambia is a non-industrialize and least developed country, this assessment covers greenhouse gas emissions from selected Industrial Processes and Product Use (IPPU) sub-categories applicable in The Gambia. It covers selected gases which are released in certain industrial processes and also gases which are released during the usage of certain industrial products

2 Industrial Processes and Product Use	Gas category
2A MINERAL INDUSTRY	
2A2: Lime Production	**CO_2 CH_4**
2A4b: Other Uses of Soda Ash *(Soaps and Others)*	**CO_2 CH_4**
2A4d: Other (Soft Drinks)	**CO_2 CH_4**
2C METAL INDUSTRY	
2C1: Iron and Steel Production Direct Reduced Iron Production	**CO_2 CH_4 N_2O**

2 Industrial Processes and Product Use	Gas category
2D NON-ENERGY PRODUCTS FROM FUELS AND SOLVENT USE (NOTE 7)	
2D1: Lubricant Use	CO_2 CH_4
2D2: Paraffin Wax Use	CO_2 CH_4 N_2O
2D4: Other (Asphalt)	CO_2 CH_4 N_2O
2F PRODUCT USES AS SUBSTITUTES FOR OZONE DEPLETING SUBSTANCES	
2F1a: Refrigeration and Stationary Air Conditioning	CO_2 HFCs PFCs
2F1b: Mobile Air Conditioning	CO_2 HFCs PFCs
2F2: Foam Blowing Agents	CO_2 HFCs PFCs
2F3: Fire Protection	CO_2 HFCs PFCs
2F4: Aerosols	CO_2 HFCs PFCs
2G1: Electrical Equipment	
2G1b: Use of Electrical Equipment	PFCs SF_6

GHG EMISSION TRENDS

According to the Third National Communication of The Gambia submitted to the UNFCCC in July 2020:

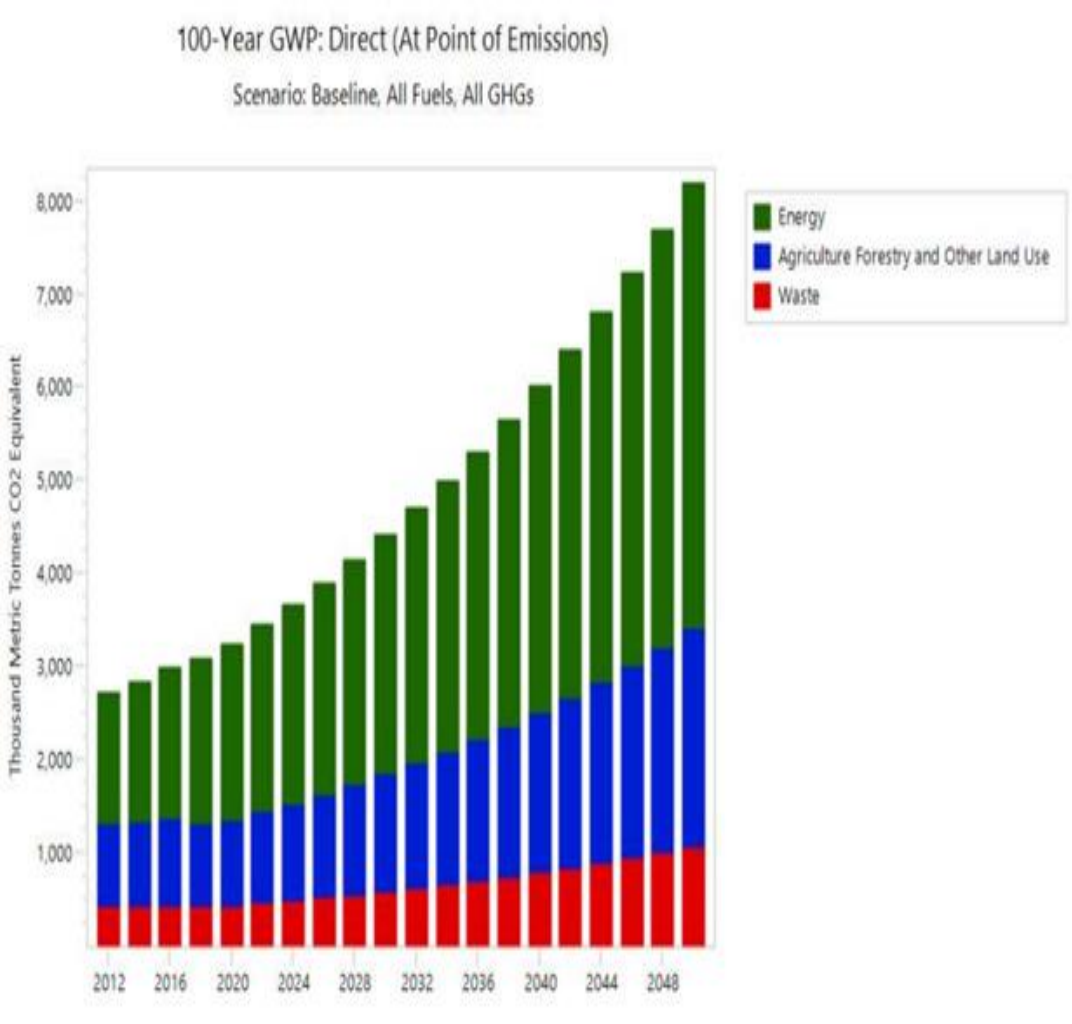
- • *Emissions of direct GHG, that is, CO2, CH4 and N2O, add up to 3,332GgCO2, or 83% of the 2010 inventory total.*
- • *CO2 emissions (1,090 GgCO2 eq) account for 26% of national emissions, and 32% of emissions excluding GHGs controlled under the Montreal Protocol. Energy and Agriculture, Forestry, and Other Land Use (AFOLU) source categories, including the transport and electricity sectors of the Gambian economy, as well as CO2 fluxes from agricultural soils in particular, are the main sources of CO2 emissions.*

GHG EMISSION TRENDS

- *• CH4 emissions (1,914GgCO2 eq) in 2010 represent 47% of national emissions, and 57% of emissions excluding GHGs controlled under the Montreal Protocol. The AFOLU sector,*
- *accounting for (1,584GgCO2 eq), or 83% of national emissions, is by far the single largest source of CH4.*
- *• The 2010 GHGI of the Gambia puts N2O emissions (338GgCO2 eq) representing 8% of national total emissions, which increases to 10% if GHGs controlled under the Montreal Protocol are excluded from the inventory total*

- *HFC emissions (705GgCO2 eq) in 2010 represent 17% of the national total. HFCs are generated almost exclusively from substitutes for ozone depleting substances (ODSs) used in refrigeration, air conditioning (311GgCO2 eq), and in aerosols (308GgCO2 eq).*
- *• SF6 emissions (1.1GgCO2 eq) in 2010 represent 0.03% the national total.*
- *• Energy industries were responsible for 70% (1.2 Gg) of SO2 emissions, whilst road transport accounted for 34% of NO2 emissions (1.11Gg).*

OVERALL GHG EMISSION

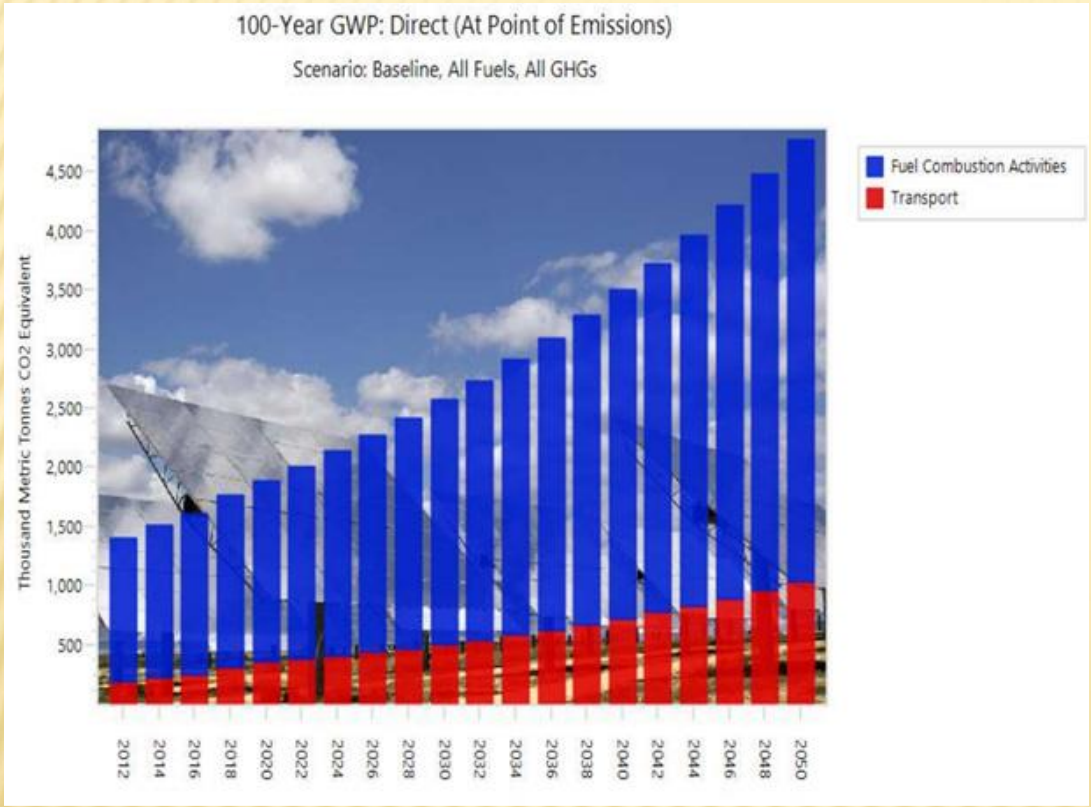


The emission from the energy sector is estimated at 1,377 GgCO2e in 2011 which increased to 1,888 GgCO2e in 2020. Projection of emission revealed a total estimate of 4,771 GgCO2e in 2050

The historical data shows an emission estimate of GgCO2 1,003 for the AFOLU sub-sector in 2011. This figure fluctuated up and down to 926 GgCO2e in 2020 This figure is projected to increase to 2,338 GgCO2e in 2050.

The waste sub-sector emissions were estimated at 427 GgCO2e in 2020. This is projected to 1,027 GgCO2e in 2050

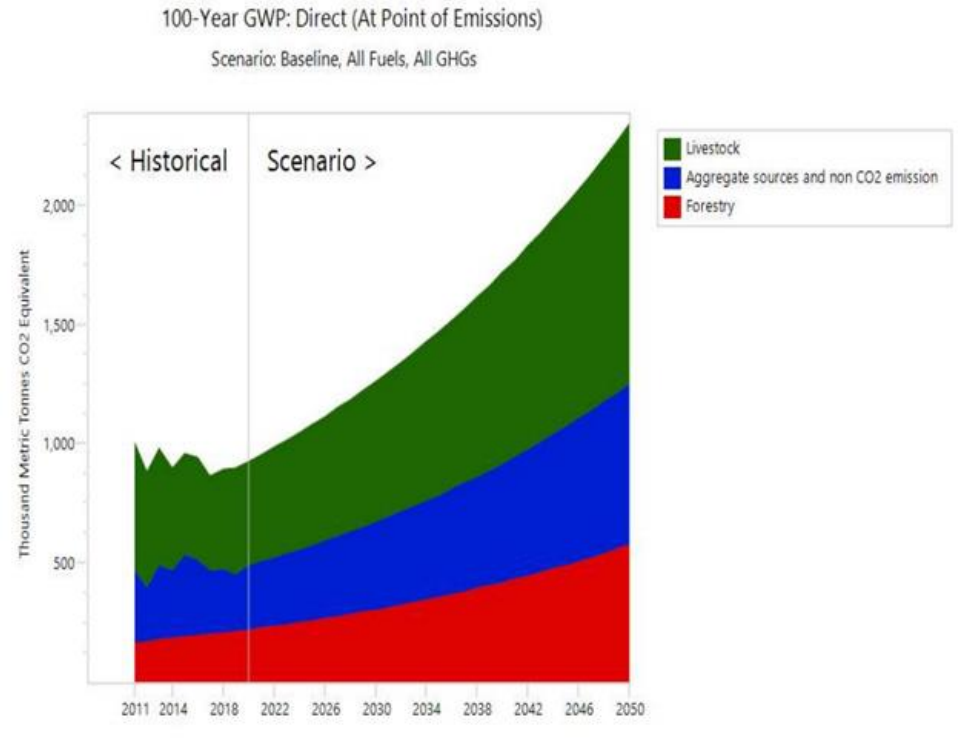
ENERGY SECTOR EMISSIONS



the transport sector is responsible for 1,026 GgCO2e of the GHG emissions under the energy sector

In 2020, this sub-sector emitted 345 GgCO2e which has being projected to increase to 1,026 GgCO2e in 2050.

AGRICULTURE, FORESTRY AND LAND USE EMISSIONS

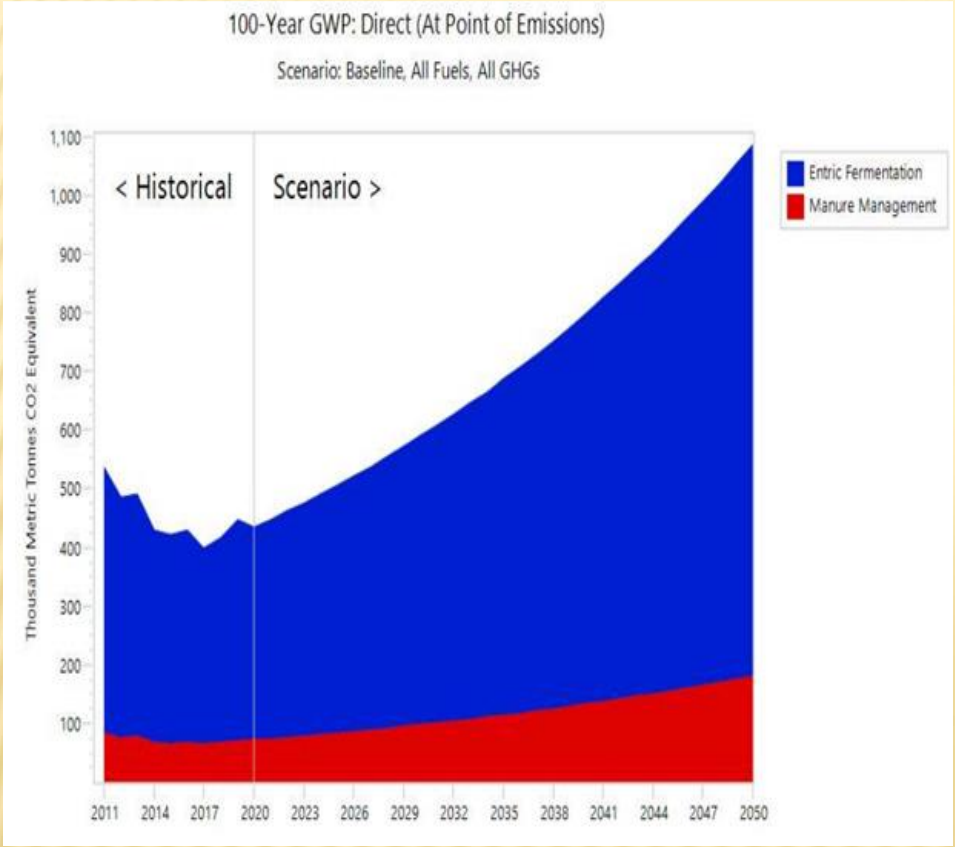


The emissions are recorded under livestock, aggregate sources, and forestry. GHG emissions from livestock stood at 434 GgCO2e in 2020, which is projected to increase to 1,085 GgCO2e in 2050.

The emissions from aggregate sources is estimated at 270 GgCO2e in 2020 and projected to rise to 674 GgCO2e in 2050.

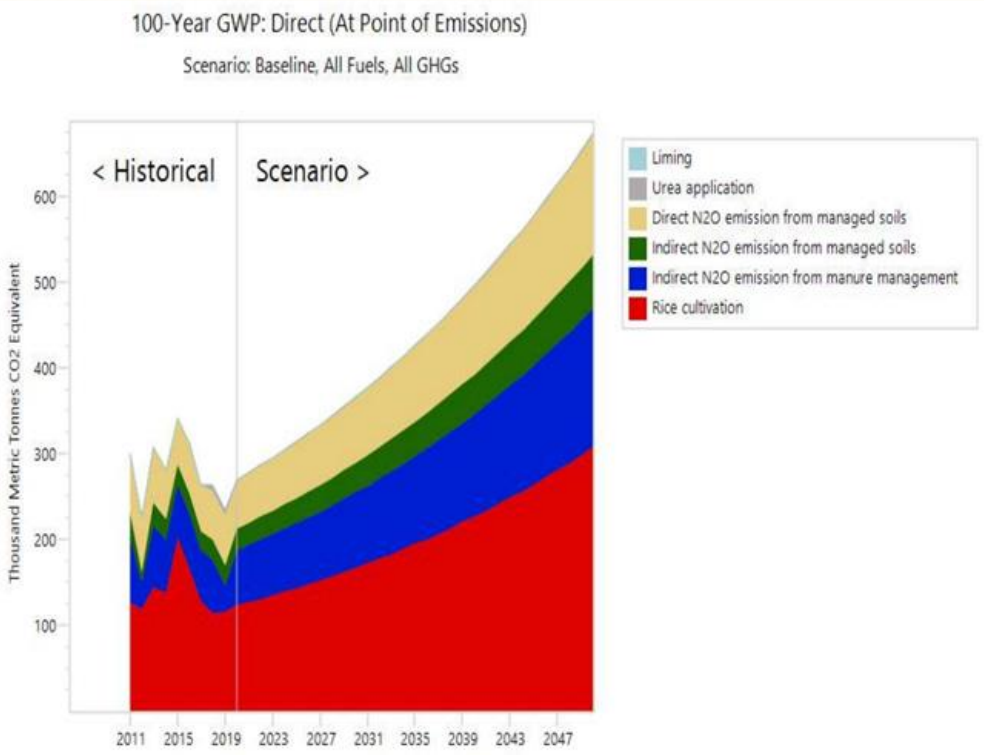
The estimates for forestry were placed at 232 GgCO2e in 2020 and a projected value of 578 GgCO2e in 2050.

GHG EMISSION FROM AGGREGATE SOURCES



The historical data places the emission from enteric fermentation at 452 GgCO2e in 2011, which increased to 362 GgCO2e in 2020. A projection of emissions show an estimate of 903 GgCO2 in 2050. The estimates of emissions from manure management shows a similar trend. The emissions in 2020 stood at 73 GgCO2e, which is projected to be 182 GgCO2e in 2050.

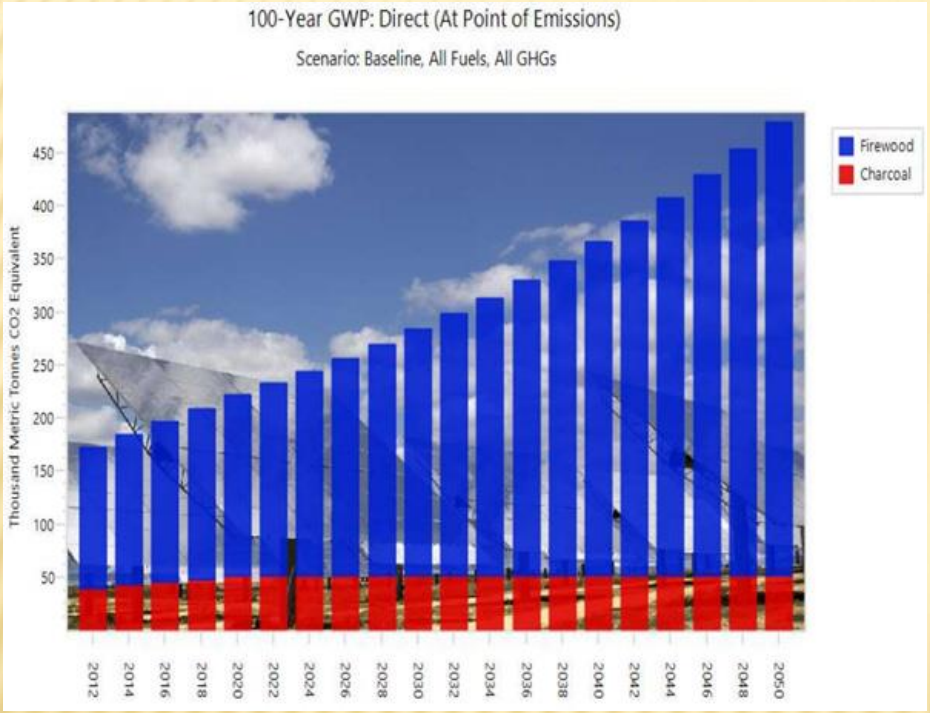
GHG EMISSIONS FROM AGGREGATE SOURCES



estimates of the GHG emitted from soils under the aggregate source, lime application and rice cultivation category. The highest GHG emission is estimated from flooded rice cultivation practices, which produce 126 GgCO2e in 2020 and are projected to increase to 308 GgCO2e in 2050.

The direct and indirect emissions of N20 account for a cumulative total 170 GgCO2 in 2020, which is projected to increase to 363 GgCO2e in 2050.

GHG EMISSIONS FROM FIREWOOD AND CHARCOAL



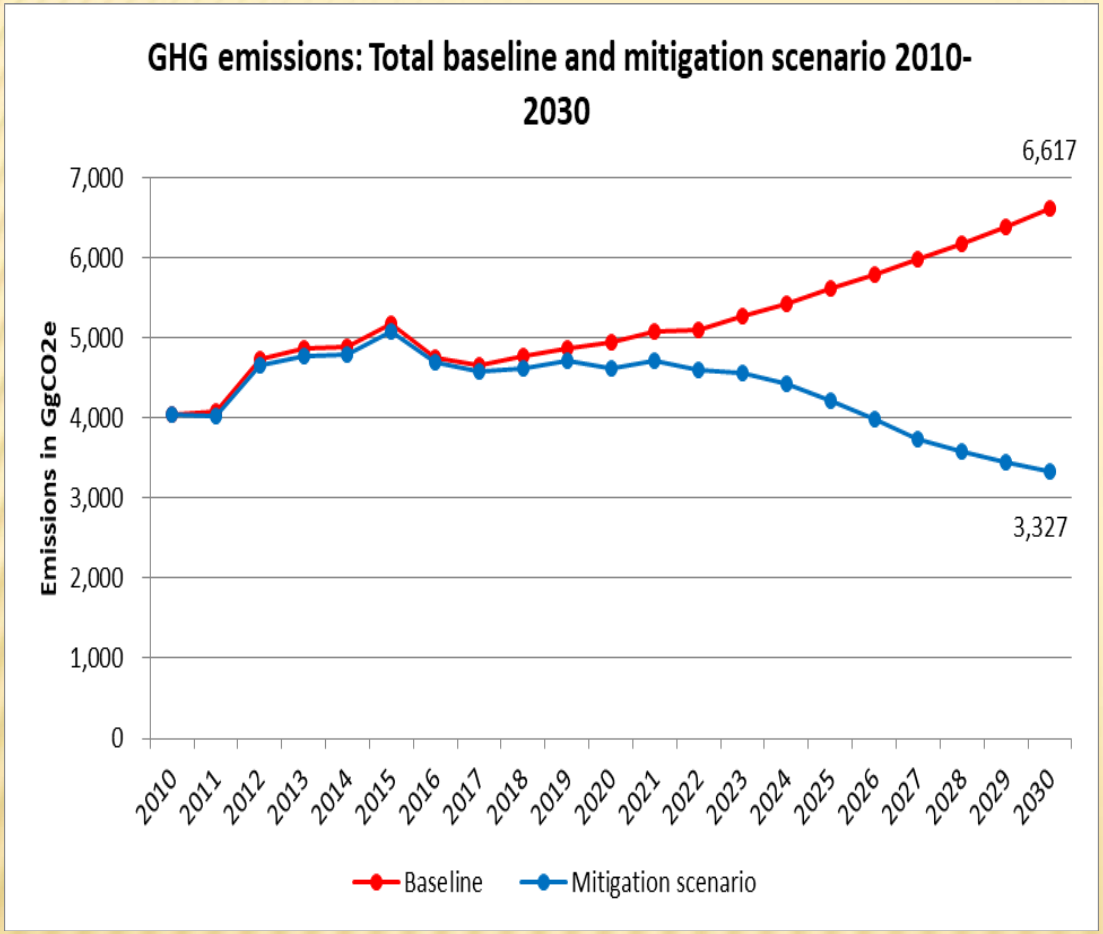
The emissions from firewood is estimated at 128 GgCO2e in 2011, which increased steadily to 172 GgCO2e in 2020. A projection of the emission revealed an estimate of 428 GgCO2e in 2050. On the other hand, the emissions from charcoal production stood at 38 GgCO2e in 2011, which increased to 50 GgCO2e in 2020 and later projected to 150 GgCO2e in 2050.

GHG INVENTORY CHALLENGES

- Data acquisition from institutions proved difficult.

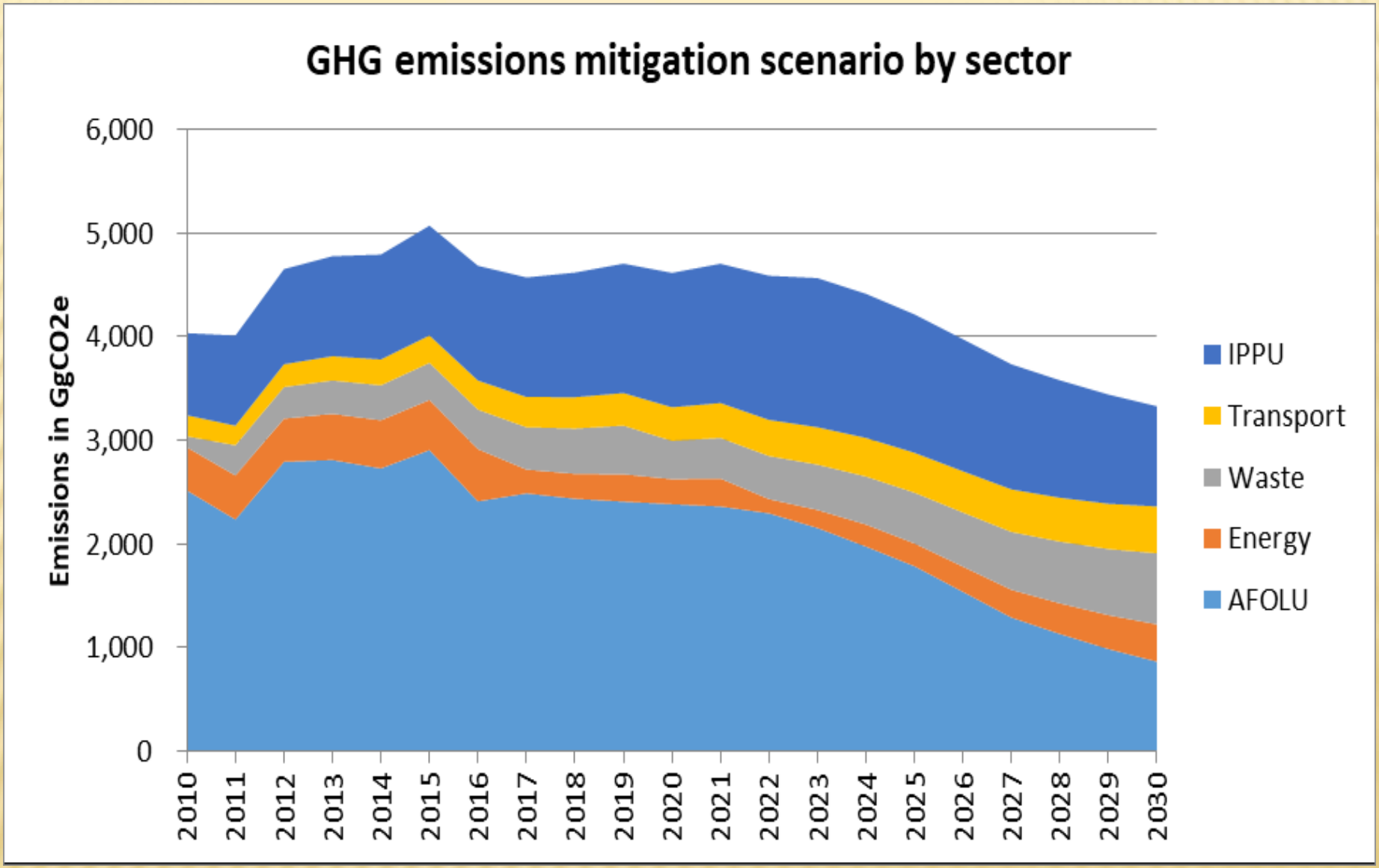
- No specific National GHG inventory framework
- Inadequate data management and system for GHG inventories
- Institutional capacity in terms of technical and financial for GHG inventories

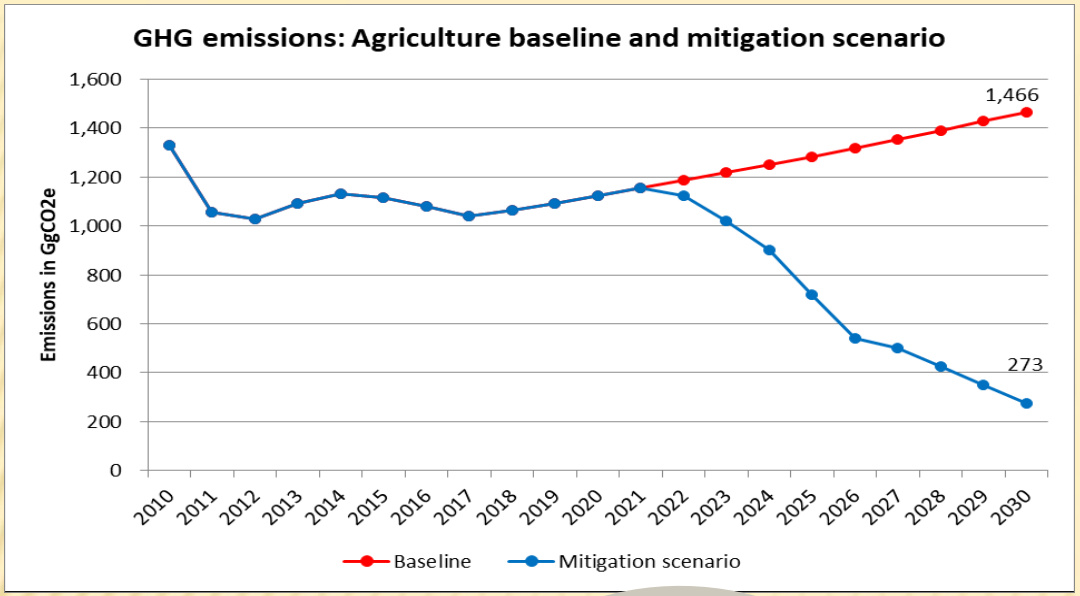
Mitigation actions Overall reductions (2nd NDC)



GHG emissions mitigation scenario by sector 2010-2030

GHG emissions in The Gambia are expected to increase from 4,935 GgCO2e in 2020 to 6,617 GgCO2e in 2030 (34.1 percent). Based on the mitigation measures outlined in this 2nd NDC, GHG emissions in 2030 will be 3,327 GgCO2e. This is a 49.7 percent reduction compared to the expected baseline level in 2030. In absolute figures, the mitigation measures will reduce the Gambia's GHG emissions by 3,290 GgCO2e.


GHG emissions mitigation scenario by sector
Emissions in GgCO2e
6,000
5,000
4,000
3,000
2,000
1,000
0
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
2027
2028
2029
2030
IPPU
Transport
Waste
Energy
AFOLU



GHG emissions in the agriculture sector are expected to rise from 1,124 GgCO2e in 2020 to 1,466 GgCO2e in 2030 (a 30.4 percent increase). Based on the mitigation measures listed above, GHG emissions in 2030 will be 273 GgCO2e. This is a 75.7percent decrease compared to the 2020 level and 81.3 percent compared to the expected baseline level in 2030.

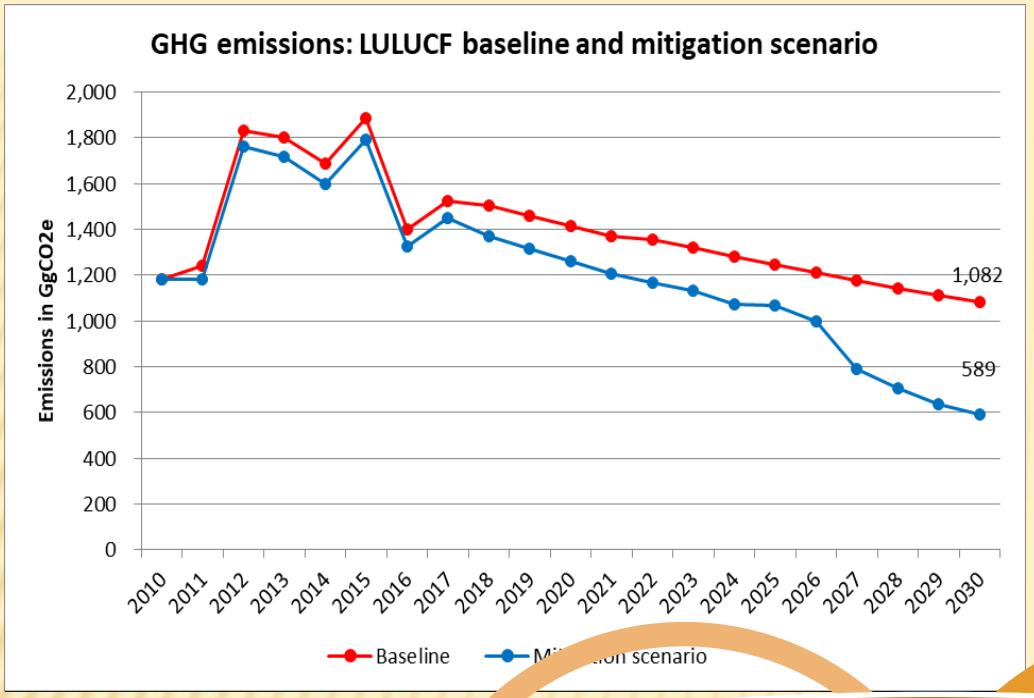
MA1 – GHG reduction from different rice ecologies in the Gambia

MA4– Reducing food losses

Mitigation actions (Agriculture)

MA2 – Improving agricultural resilience by implementing climate-smart agriculture

MA3 – Improving livestock productivity



GHG emissions in the LULUCF sector are expected to decrease from 1,415 GgCO2e in 2020 to 1,082 GgCO2e in 2030 (a decrease of 23.5 percent). Based on the mitigation measures listed above, GHG emissions in 2030 will be 589 GgCO2e. This is a 58.4 percent decrease compared to the 2020 level and a 45.6 percent compared to the expected baseline level in 2030.

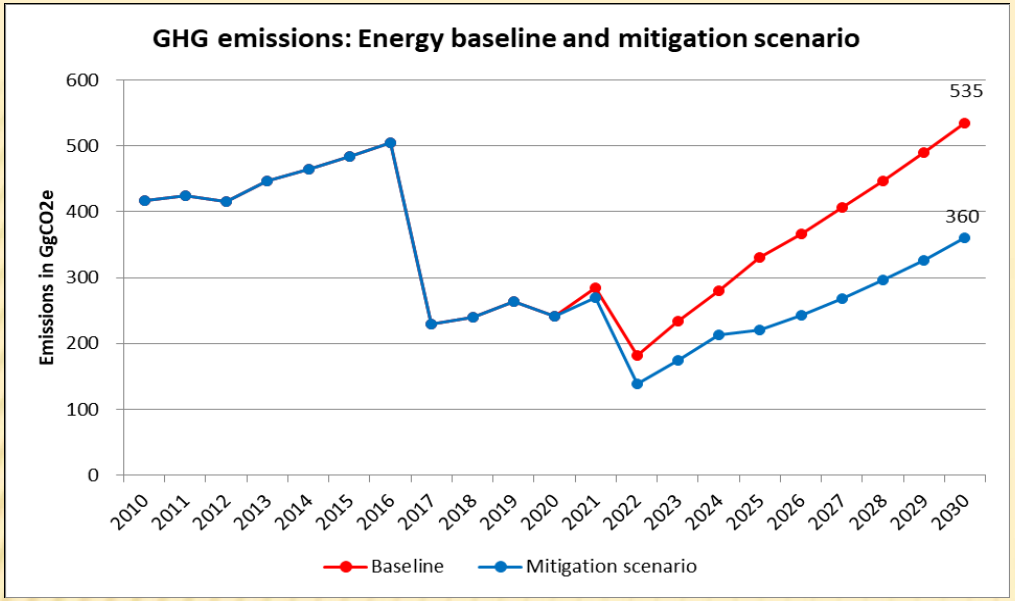
MA1- Re-greening degraded landscapes (including protected forests)

MA4– MA4 – Firewood from agroforestry

Mitigation actions (LULUCF)

MA2 – Upscaling deployment of fuel-efficient biomass combustion stoves

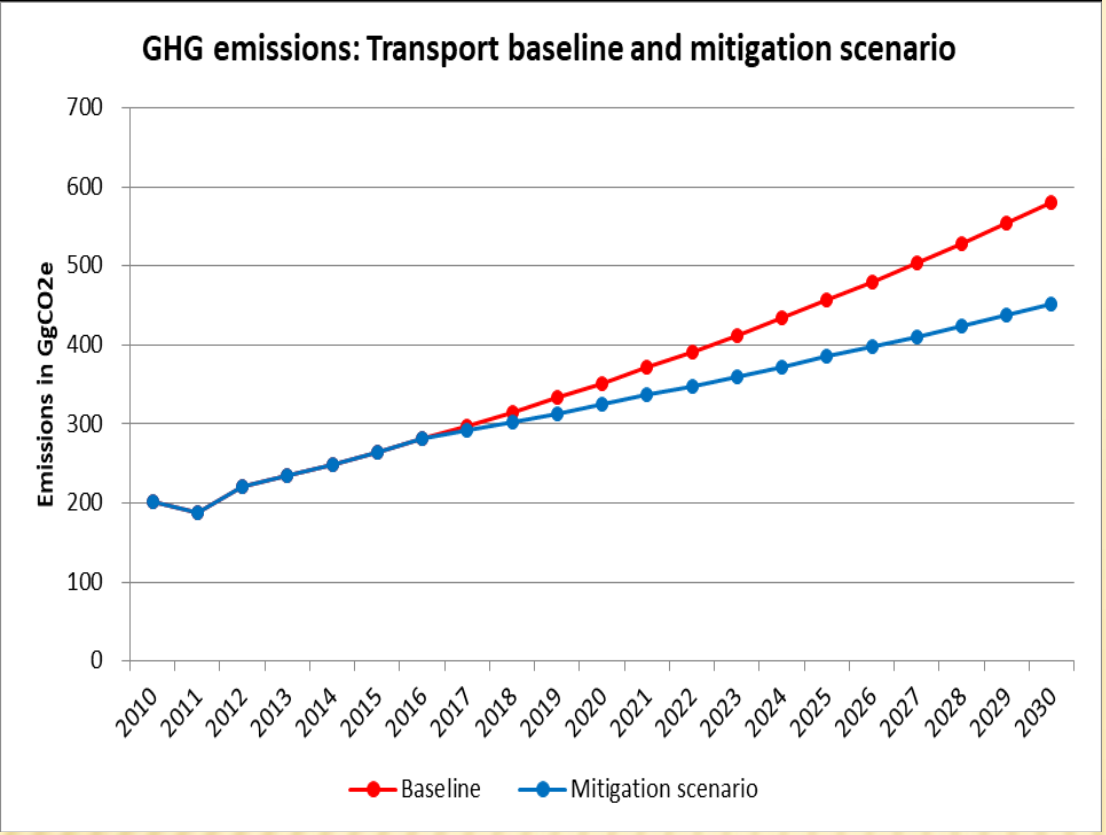
MA3 – Multistrata agroforestry



GHG emissions in the electricity sector are expected to increase from 241 GgCO2e in 2020 to 535 GgCO2e in 2030 (122.0percent). Based on the mitigation measures listed above, GHG emissions in 2030 will be 360 GgCO2e. This is a 49.4 percent increase compared to the 2020 level and a decrease of 32.7 percent compared to the expected baseline level in 2030.

Mitigation Actions (ENERGY)

- E1 – 89 MW of utility-scale solar PV capacity
- E2 – 3.6 MW of utility-scale wind capacity
- E3 – Reduction of transmission and distribution losses to 17%
- E4 – Full replacement of diesel mini-grids with solar PV and battery storage systems
- E5 – Solar home systems to supply off-grid consumption
- E6 – Substitution of incandescent light bulbs
- E7 – Solar water heating facilities to supply 10% of demand by 2030

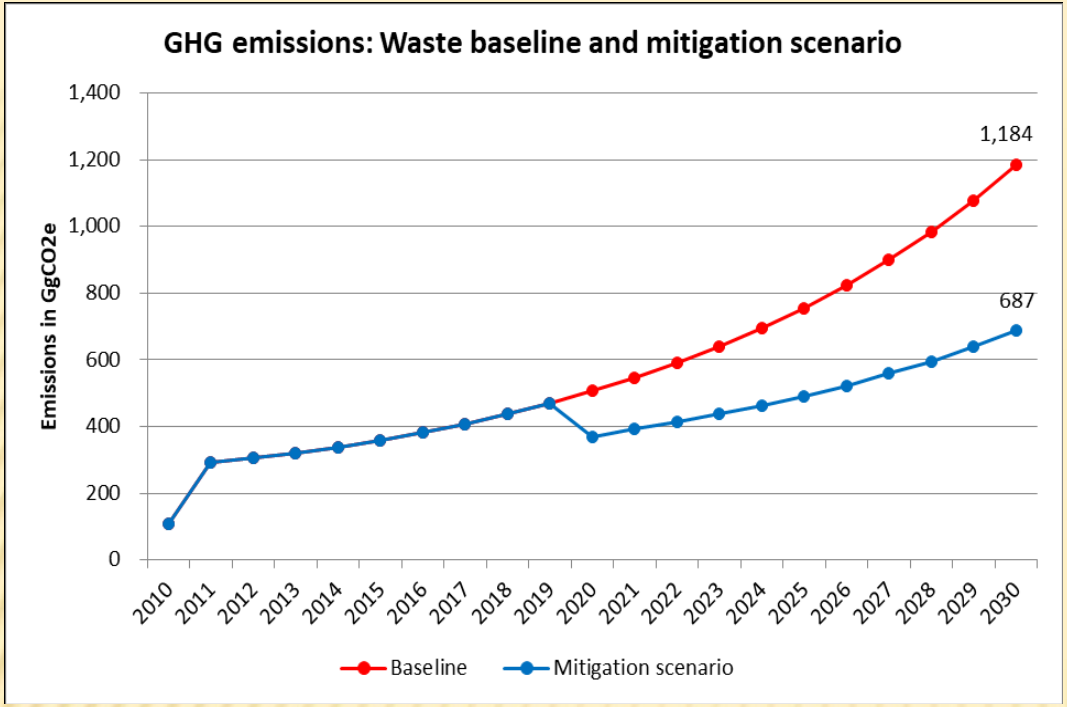


GHG emissions in the transport sector are expected to increase from 352 GgCO2e in 2020 to 580 GgCO2e in 2030 (64.8 percent). Based on the mitigation measures listed above, GHG emissions in 2030 will be 451 GgCO2e. This is a 28.1 percent increase compared to the 2020 level and a 22.2 percent decrease compared to the expected baseline level in 2030.

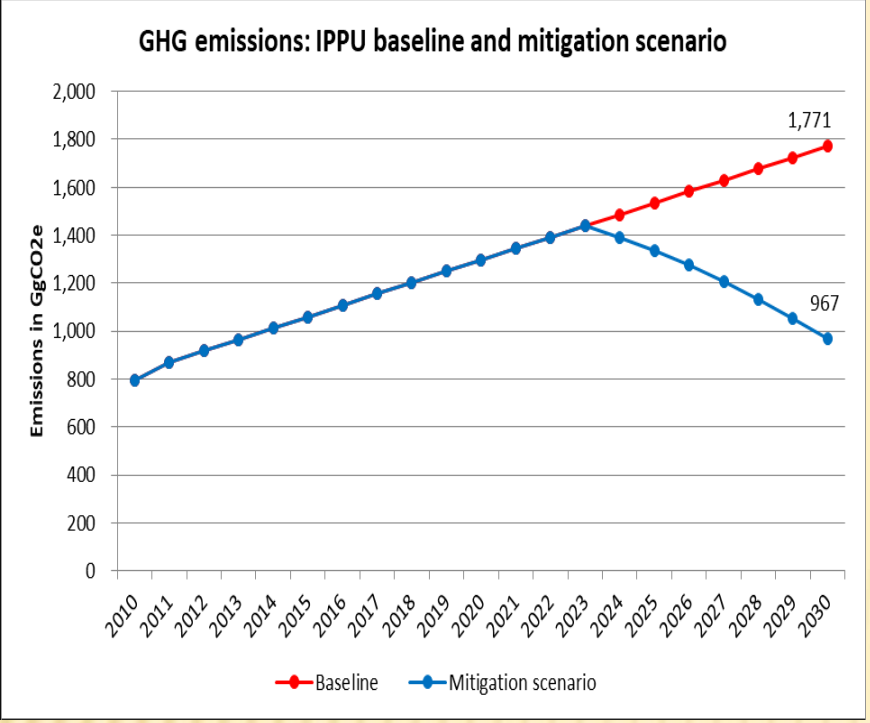
Mitigation Actions (Transport)

Downsizing the Gambia's transport sector carbon footprint

Measures	Mitigation potential
4 – Downsizing the Gambia's transport sector carbon footprint Component 1: Implementation of vehicle fuel efficiency standards Component 2: Strengthening public transport systems Component 3: Increasing use of blended fuel in road transport	129 GgCO2e in 2030



Based on the assumptions in the baseline section, GHG emissions from the waste sector are expected to increase from 506 GgCO2e in 2020 to 1,184 GgCO2e in 2030 (134.0 percent). Based on the mitigation measures , GHG emissions in 2030 will be 687 GgCO2e. This is a 35.8 percent increase compared to the 2020 level and a 42.0 percent decrease compared to the expected baseline level in 2030.



GHG emissions in the IPPU sector are expected to increase from 1,297 GgCO2e in 2020 to 1,771 GgCO2e in 2030 (36.5 percent). Based on the mitigation measures listed above, GHG emissions in 2030 will be 967 19

GgCO2e. This is a 25.4 percent decrease compared to the 2020 level and a 45.4 percent decrease compared to the expected baseline level in 2030.

MA1– Substituting HFCs in production and manufacturing processes

Mitigation Actions

(IPPU)

MA2-Substituting HFC

MITIGATION OPTIONS

The following mitigation options are identified to achieve a net-zero scenario in the electricity generation sub-sector by 2050:

- MA1: Solar energy
- MA2: Wind energy
- MA3: Improved cook stoves
- MA4: Power saving devices and appliances
- MA5: Hydro Energy Power Plant (Sambangalou hydro-electricity Dam)

MITIGATION OPTIONS ENERGY/ TRANSPORT

- MA6: Capacity Building programmes and public sensitization in renewable energy development
- MA7: Biomass
- MA8: Vehicle Fuel Efficiency Standards
- MA9: Vehicle emission Testing
- MA10: Strengthening public transport system
- MA11: Roads designed with designated lanes for public transport, bicycles and pedestrians
- MA12: Introduce in 2030 vehicle age limit

AFOLU SECTOR GHG MITIGATION

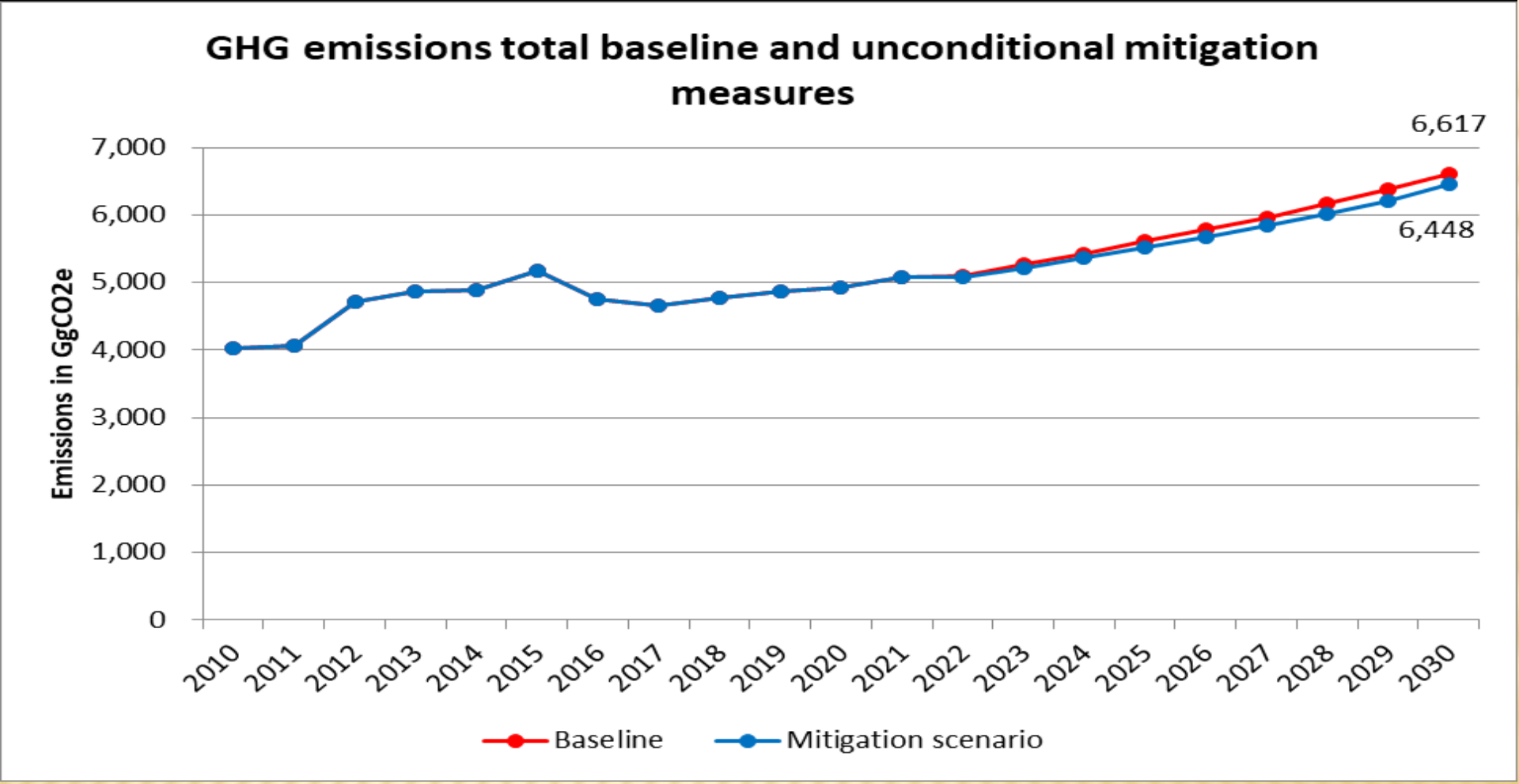
- MA13: Agro-ecological farming
- MA14: System of Rice Intensification
- MA15: Upland Rice Production
- MA16: Controlled timber harvesting
- Sustainable forest management
- Participatory/ community forest management

AFOLU SECTOR GHG MITIGATION CONT.

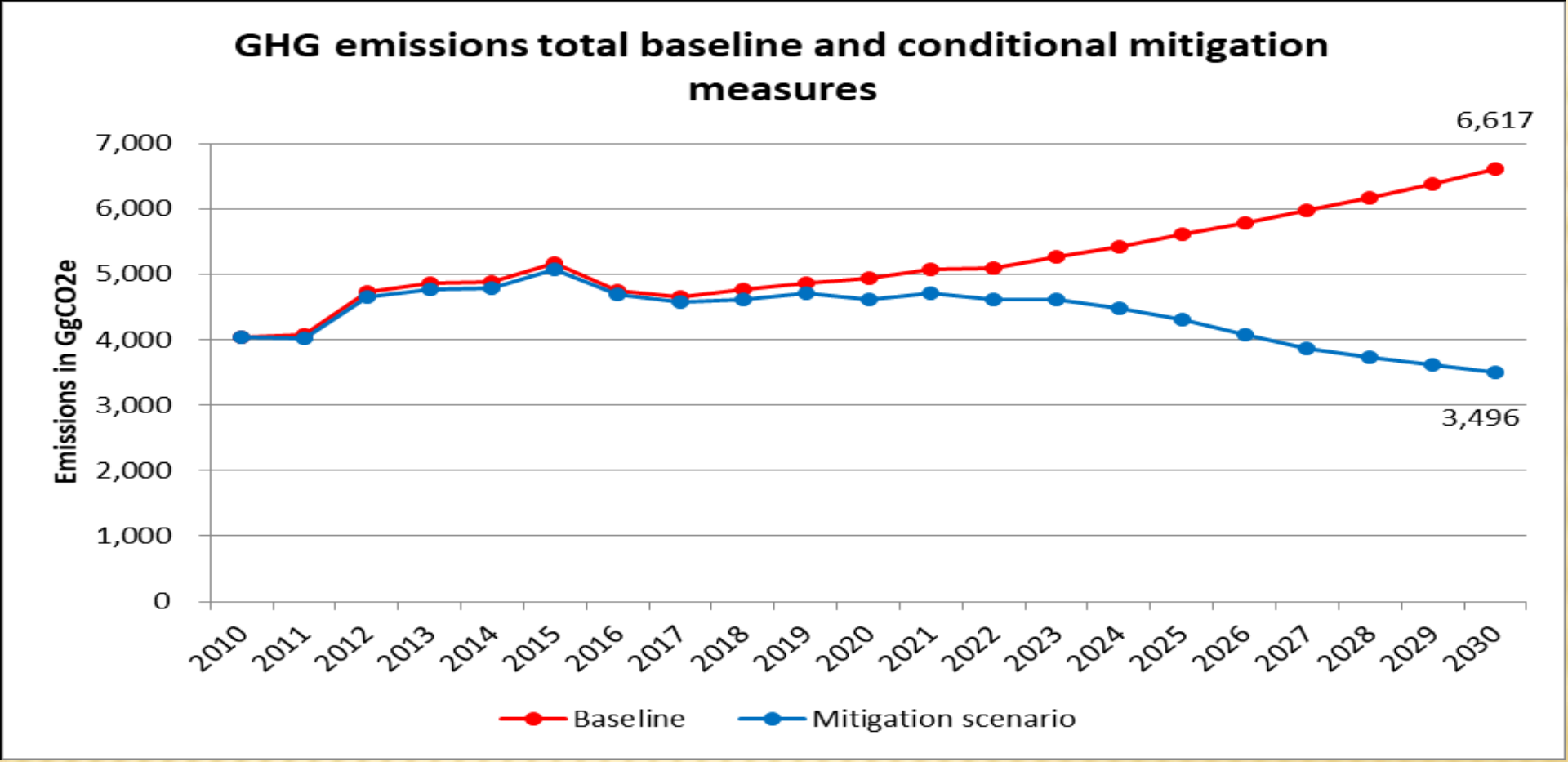
- MA17: Improved Manure Management
- MA18: Genetic improvement of livestock species
- MA19: Improved nitrogen-reduced animal feed
- MA20: Mangrove rehabilitation
- MA21: Afforestation and Reforestation

WASTE SECTOR MITIGATION

- MA22: Biogas from Organic Waste
- MA23: Organic Waste Recovery
- MA24: Waste recycling
- MA25: Waste separation and collection



The implementation of the 2 unconditional mitigation measures in the Forestry and Energy sector is going to reduce GHG emissions by 169 GgCO2e in 2030. This is a decrease by 2.6% compared to the expected baseline level in 2030.



The implementation of the conditional mitigation measures across all sectors would reduce GHG emissions by 3,121 GgCO2e in 2030. This is a decrease by 47.2%% compared to the expected baseline level in 2030.

Thank you