

**Republic of Senegal**

One People - One Goal - One Faith



**Ministry of environment and ecological Transition**

**Directorate of climate change, ecological transition and green financing**

**DCCETGF**

**République du Sénégal**

Un Peuple - Un But - Une Foi



**Ministère de l'Environnement et de la Transition écologique**

**Direction du changement climatique, de la transition  
écologique et des financements verts**

**DCCTEFV**

**BUR**  
**Senegal**

## **Ministry of environment and ecological Transition**



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**PR Daouda NGOM**

# Ministry of environment and ecological Transition

## PR Daouda NGOM

### Préface

Le Sénégal, reconnu pour sa riche diversité géographique et sa position stratégique en Afrique de l'Ouest, fait face à des défis climatiques majeurs exacerbés par ses vulnérabilités écologique, économique et sociale. La combinaison de zones arides, semi-arides, et côtières, ainsi que la dépendance de l'économie du pays vis-à-vis des secteurs très sensibles comme l'agriculture, la pêche et l'énergie, rend cruciale l'intégration des considérations environnementales dans nos politiques de développement.

Ce premier Rapport Biennal Actualisé (BUR) du Sénégal, fruit de l'effort collectif du gouvernement et de ses partenaires, est élaboré conformément aux exigences de la CCNUCC notamment en ses articles 12 et 14 et aux lignes directrices contenues dans la décision 2/CP.17 de la conférence des parties. Il constitue une étape déterminante dans la poursuite des engagements internationaux, notamment dans le cadre de l'Accord de Paris.

Le rapport présente une évaluation rigoureuse des émissions de gaz à effet de serre à travers plusieurs secteurs clés de l'économie du Sénégal, offrant une vue d'ensemble des sources d'émissions et des efforts d'atténuation déjà mis en œuvre.

L'inventaire national des émissions par les sources et des absorptions par les puits de GES réalisé pour les années les plus récentes montre que le secteur de l'énergie reste le principal contributeur aux émissions nationales (en...%), en raison de la forte dépendance aux énergies fossiles. Ce constat renforce la politique du mix énergétique appliquée par le gouvernement.

Le secteur de l'agriculture, pilier de l'économie nationale et vecteur essentiel des moyens de subsistance et de la politique de souveraineté alimentaire, a également été identifié comme une source importante d'émissions, notamment en raison des pratiques agricoles traditionnelles et de l'expansion des terres cultivables. À cet égard, le BUR1 met en avant les efforts entrepris par le Sénégal pour promouvoir des pratiques agricoles plus durables, tout en renforçant la résilience des communautés face aux aléas climatiques.

Le secteur des transports, en pleine expansion dans le cadre de la politique d'infrastructures modernes, a également été analysé. Les émissions liées aux transports continuent de croître, principalement dues à l'augmentation du parc automobile et à la prédominance des véhicules à forte consommation énergétique. Ce rapport appelle donc à une modernisation rapide du parc automobile et à l'adoption de solutions de transport durable.

En outre, le BUR met en exergue les contributions importantes du secteur de l'assainissement, où les émissions sont principalement générées par la gestion

inadéquate des déchets solides et des eaux usées. La mise en œuvre de politiques plus strictes de gestion des déchets et l'amélioration des infrastructures de traitement sont des priorités identifiées pour réduire l'empreinte carbone de ce secteur.

Ce rapport biennal actualisé a été élaboré avec une démarche constante de rigueur scientifique et de pertinence nationale. Il offre non seulement un état des lieux précis des émissions, mais trace également la voie vers un avenir où le Sénégal peut atteindre ses objectifs climatiques tout en assurant un développement économique durable.

Ce document est un appel à l'action, à la fois pour le gouvernement, les entreprises, et la société civile, afin que tous ensemble, nous puissions bâtir un Sénégal résilient et prospère.

Je tiens à exprimer ma profonde gratitude à toutes les parties prenantes ayant contribué à la réalisation de ce rapport, qui reflète notre engagement collectif à faire face aux défis climatiques avec détermination et vision.



**Le Ministre**

**Le Ministre de l'Environnement  
de la Transition écologique**

**Pr Daouda NGOM**

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## List of abbreviations

| Abbreviations | Meanings                                                     |
|---------------|--------------------------------------------------------------|
| AEME          | Agency for the Economy and Energy Management                 |
| AFAT          | Agriculture, Forestry and Other Land Uses                    |
| AFD           | French Agency for Development                                |
| AGERROUTE     | Road Management Agency                                       |
| ANACIM        | National Agency of Civil Aviation and Meteorology            |
| ANAT          | National Agency for Regional Planning                        |
| ANCF          | National Agency for New Railways                             |
| AND           | Designated National Authority                                |
| ANER          | National Agency for Renewable Energy                         |
| ANSD          | National Agency for Statistics and Demography                |
| APIX          | Agency for the promotion of investments and major works      |
| APROSI        | Agency for the Development and Promotion of Industrial Sites |
| ASERGMV       | Senegalese Agency for Reforestation and the Great Green Wall |

|                |                                                                                                             |
|----------------|-------------------------------------------------------------------------------------------------------------|
| ASN            | Senegalese Association for Standardization                                                                  |
| BAU            | Business As Usual                                                                                           |
| BMN            | Business Upgrade Office                                                                                     |
| Construction   | Building and Public Works                                                                                   |
| BUR            | Biennial Update Report                                                                                      |
| CCASA          | The Science-Politics Dialogue Platform on the Adaptation of Agriculture and Food Security to Climate Change |
| UNFCCC         | United Nations Framework Convention on Climate Change                                                       |
| CDN            | Nationally Determined Contribution                                                                          |
| CEP            | Study and Planning Unit                                                                                     |
| CEPOD          | Center for Development Policy Studies                                                                       |
| CERES-LOCUSTOX | Regional Center for Research in Ecotoxicology and Environmental Safety                                      |
| CETUD          | Executive Council of Urban Transport of Dakar                                                               |
| CIMEL          | Livestock Modernization and Impulse Centers                                                                 |
| COMNACC        | National Committee on Climate Change                                                                        |
| COMRECC        | Regional Committees on Climate Change                                                                       |
| COVNM          | Non-Methane Volatile Organic Compounds                                                                      |
| CPDN           | Nationally Determined Contributions                                                                         |
| CRH            | Habitat Research Center                                                                                     |
| CRSE           | Energy Sector Regulatory Commission                                                                         |
| CRTC           | Climate Technology Center and Network                                                                       |
| CRZ            | Zootechnical Research Center                                                                                |
| CSE            | Ecological Monitoring Center                                                                                |
| CTCN           | Climate Technology Center and Network                                                                       |
| DAMCP          | Directorate of Protected Community Marine Areas                                                             |
| DAPSA          | Department of Agricultural Analysis, Forecasting and Statistics                                             |
| DCC            | Climate Change Division                                                                                     |
| DDD            | Dakar Dem Dikk                                                                                              |
| DCCTEFV        | Directorate of Climate Change, Ecological Transition and Green Financing                                    |
| DEEC           | Departments of the Environment and Classified Establishments                                                |
| DEFCCS         | Directorate of Water, Forests, Hunting and Soil Conservation                                                |

|         |                                                                     |
|---------|---------------------------------------------------------------------|
| DEL     | Livestock Management                                                |
| DH      | Hydrocarbons Directorate                                            |
| DIRE    | Livestock Management                                                |
| DMER    | Rural Materials and Equipment Department                            |
| DMS     | Special Household Waste                                             |
| DPEE    | Department of Forecasting and Economic Studies                      |
| DPN     | National Parks Directorate                                          |
| DPV     | Plant Protection Directorate                                        |
| DPVE    | Department of Planning and Environmental Monitoring                 |
| DREEC   | Regional Divisions of the Environment and Classified Establishments |
| ENSA    | National Higher School of Agriculture                               |
| FAOSTAT | Food and Agriculture Organization Corporate Statistical Database    |
| FDTU    | Urban Transport Development Fund                                    |
| FE      | Emission factors                                                    |
| FONGIP  | Priority Investment Guarantee Fund                                  |
| FONSIS  | Sovereign Strategic Investment Fund                                 |
| FRA/FAO | Global Forest Resources Assessment (FRA)                            |
| FVC     | Green Climate Fund                                                  |
| GCF     | Green Climate Fund                                                  |
| GEF     | Global Environment Facility                                         |
| IPCC    | Intergovernmental Panel on Climate Change                           |
| GMV     | Great Green Wall                                                    |
| GPL     | Liquefied Petroleum Gas                                             |
| GPS     | Global Positioning System                                           |
| GW      | Gigawatt                                                            |
| GWP     | Global Warming Potential                                            |
| ICAT    | Initiative for Climate Action Transparency                          |
| ICPE    | Classified Installations for Environmental Protection               |
| IGES    | Greenhouse Gas Inventory                                            |
| IHPI    | Harmonized index of industrial production                           |
| INP     | National Institute of Pedology                                      |
| IPCC    | Intergovernmental Panel on Climate Change                           |

|          |                                                                            |
|----------|----------------------------------------------------------------------------|
| IPPI     | Industrial Production Price Index                                          |
| IRD      | Research Institute for Development                                         |
| ISRA     | Senegalese Institute of Agricultural Research                              |
| LNERV    | National Laboratory of Livestock and Veterinary Research                   |
| LNRPV    | National Laboratory for Research on Plant Production                       |
| LPDSE    | Energy Sector Development Policy Letter                                    |
| LULUCF   | Land use, land-use change, and forestry                                    |
| MAER     | Ministry of Agriculture and Rural Equipment                                |
| MAST     | Animal Mass Type                                                           |
| MDP      | Clean Development Mechanism                                                |
| MEA      | Ministry of Water and Sanitation                                           |
| METE     | Ministry of the Environment and Ecological Transition                      |
| MEP      | Ministry of Petroleum and Energy                                           |
| MEPA     | Ministry of Livestock and Animal Production                                |
| MID      | Ministry of Industry                                                       |
| MNV      | Measure-Report-Verify                                                      |
| MRV      | Measuring, Reporting and Verification                                      |
| MUHPCV   | Ministry of Urban Planning, Housing, Public Hygiene and Living Environment |
| MULHP    | Ministry of Urban Planning, Housing and Public Hygiene of Senegal          |
| MW       | Megawatt                                                                   |
| N/A      | Not applicable                                                             |
| NE       | Not Estimate                                                               |
| NDF      | Neutral Detergent Fiber                                                    |
| OCB      | Community Based Organizations                                              |
| ODD      | Sustainable Development Goal                                               |
| ONAS     | National Sanitation Office of Senegal                                      |
| NGO      | Non-Governmental Organizations                                             |
| PDIDAS   | Inclusive and Sustainable Agribusiness Development Project in Senegal      |
| PDVCR    | Rice Value Chain Development Project                                       |
| PETROSEN | Senegalese Petroleum Company                                               |
| GDP      | Gross Domestic Product                                                     |

|           |                                                                                           |
|-----------|-------------------------------------------------------------------------------------------|
| PIUP      | Industrial Processes and Product Use                                                      |
| SME       | Small and Medium Enterprises                                                              |
| PNAR      | National Rice Self-Sufficiency Program                                                    |
| PNGDS     | National Waste Management Program                                                         |
| PRACAS    | Program to Accelerate the Pace of Senegalese Agriculture                                  |
| PRESA     | Promoting the Resilience of Economies in Semi-Arid Areas                                  |
| PRG       | Global Warming Potential                                                                  |
| PROGEDE   | Sustainable and participatory management project for traditional and alternative energies |
| PRP       | Global Warming Potential                                                                  |
| PSE       | Emerging Senegal Plan                                                                     |
| PTB       | Little Suburban Train                                                                     |
| RBA       | Biennial Updated Report                                                                   |
| RBT       | Biennial Transparency Report                                                              |
| RNA       | Assisted Natural Regeneration                                                             |
| RSP       | Sylvo Pastoral Reserves                                                                   |
| SAED      | Senegal River Delta Land Development and Exploitation Company                             |
| SAR       | African Refining Company                                                                  |
| SENELEC   | National Electricity Company of Senegal                                                   |
| SG        | General Secretariat                                                                       |
| SIE       | Energy Information System                                                                 |
| SIEF      | Forest and Pastoral Ecological Information System                                         |
| SMCADY    | Aviation Fuel Handling Company Dakar Yoff                                                 |
| SNTR      | National Rural Transport Strategy                                                         |
| SOCOCIM   | Cement Trading Company                                                                    |
| SODAGRI   | Agricultural and Industrial Development Company                                           |
| SODEFITEX | Textile Fibers and Development Company                                                    |
| SONAGED   | National Integrated Waste Management Company                                              |
| TFT       | Thin film transistor                                                                      |
| TIC       | Information and communication technologies                                                |
| UCG       | Waste Management Coordination Unit                                                        |
| UTCATF    | Land Use, Land Use Change and Forestry                                                    |

ZIC

Hunting areas of interest

## General introduction

Senegal joined the United Nations Framework Convention on Climate Change (UNFCCC), having signed it in 1992 and ratified it in 1994. In December 2015, it was one of the signatory countries of the Paris Agreement, which aims to contain the increase in the average temperature of the planet well below 2 ° C compared to pre-industrial levels and to pursue efforts to limit this increase in temperature to 1.5 ° C compared to pre-industrial levels. However, in accordance with the rules of the Convention, the Parties are required to submit every 04 years a national communication (CN) report on the inventory of GHGs and the measures taken or planned to mitigate emissions and / or adapt to climate change. Since 2010, developing countries have been required, in addition to the National Communication (NC), to submit Biennial Update Reports (BURs) containing an update of national GHG inventories, including a national inventory report and information on mitigation measures taken, needs identified and support received with a view to providing a better overview of national mitigation efforts.

It is within this framework that the development of this first Biennial Updated Report (BUR) of Senegal is situated in accordance with decision 1/CP.16 and the related directives (decision 2/CP.17). The BUR provides more regular and reliable information, in a continuity that increases transparency in terms of actions, needs and support to combat the adverse effects of climate change. It updates the data of national communications submitted in different sectors and the actions underway within the framework of the implementation of the UNFCCC. Its main objective is to report on the progress made and the results achieved in terms of reducing emissions.

This BUR presents information on available inventory data and mitigation measures. The inventories were developed based on the methodological documents of the Intergovernmental Panel on Climate Change (IPCC), in accordance with the decisions of the Conference of the Parties to the Convention, for the sectors of energy, industrial processes, agriculture, forestry and other land use (FAT) and waste.

In its first part, the document presents the national circumstances. In its second and third parts, the results of the national GHG inventory and the GHG Mitigation and their effects are presented respectively. The fourth and fifth parts outline the funding received and the needs necessary in the future and the information on the National MRV.

## **CHAPTER I: National circumstances**

## CHAPTER I: National circumstances

National circumstances<sup>1</sup> of the country have, like the other chapters of this document, been the subject of sectoral studies entrusted to experts who have produced sectoral documents. From these documents, elements are extracted that are consistent with an overall structure taking into account all the other contributions, in particular the IGES<sup>2</sup>; analysis of mitigation across sectors<sup>3</sup>; acquired funding and future needs<sup>4</sup> but also the MRV<sup>5</sup>.

### Senegal in brief

The Republic of Senegal is a democracy that gained its independence on April 4, 1960. It is governed by an executive headed by the President of the Republic, the keystone of the institutions among which there is a National Assembly, a High Council of Territorial Communities and an Economic, Social and Environmental Council.

Covering an area of 196,722 km<sup>2</sup>, the country is located between 12°8 and 16°09 north latitude and 12° and 17° west longitude. With a 700 km coastline along the Atlantic Ocean, the country is bordered to the east by the Republic of Mali, to the south by the Republic of Guinea Bissau and the Republic of Guinea and to the north by the Islamic Republic of Mauritania. The Gambia forms an enclave facing the Ocean between the regions of Fatick, Kaolack, Tambacounda, Kolda, Sédhiou and Ziguinchor.

According to the report of the last census carried out in 2023, the resident population in Senegal, recorded, is 18,032,473 inhabitants, including 8,900,614 women (49.4%) and 9,131,859 men (50.6%). It stood at 13,508,715 inhabitants in 2013, representing an average annual intercensal growth rate of 2.9% which remained constant between the two periods. With a population of 4,958,085 in 1976 and 6,881,919 in 1988, the intercensal growth rates were 2.7% and 2.5% respectively for 1976-1988 and 1988-2002.

Senegal's Gross Domestic Product stood at \$28 billion in 2021 with a PPP GDP of \$59.69 billion with an estimated growth of 7.2%. From a sectoral point of view, agriculture represented 17.2%, industry 23.7% and tertiary 59% in 2016. The population below the poverty line stood at 44%. The main industries are in the agri-food, phosphates, oil refining, zircon, construction materials and shipbuilding sectors.

The latest greenhouse gas inventory carried out in 2018 places total emissions at 24,403.13 Gg Eq-CO<sub>2</sub> of which 9,618.33 Gg Eq-CO<sub>2</sub> for the energy sector; 5,832.55 Gg Eq-CO<sub>2</sub> for livestock; 4,097.38 Gg Eq-CO<sub>2</sub> for aggregated sources; 3,173.67 Gg Eq-CO<sub>2</sub> for PIUP and 1,681.20 for waste. For absorption, Senegal is at 24,144,90 Gg Eq-CO<sub>2</sub> in 2018.

<sup>1</sup>Excerpts from the national report on national circumstances.

<sup>2</sup>Excerpt from the compilation report of IGES Senegal from 1994 to 2028.

<sup>3</sup>Extract from the compilations of sectoral mitigation reports (Energy, Industries, AFAT and Waste).

<sup>4</sup>Excerpt from the study: Djigo, SA; National strategy for mobilizing climate finance for the public and private sectors; Jan. 2022.

<sup>5</sup>Excerpt from the study: Diagne, EHM et al; General report of the MRV study of the CDN of Senegal; Jan 2021.

From the point of view of the distribution of emissions by gas, CO<sub>2</sub> represents 97%, CH<sub>4</sub> 2.7% and N<sub>2</sub>O 0.3%.

## Geography

Senegal covers an area of 196,722 km<sup>2</sup> and is located between 12°8 and 16°09 north latitude and 12° and 17° west longitude. It is bordered to the north by the Islamic Republic of Mauritania, to the east by the Republic of Mali, to the south by the Republic of Guinea Bissau and the Republic of Guinea and to the west by the Atlantic Ocean on a coastline of 700 km. Gambia forms an enclave in Senegal.

Thanks to its 1,700 km long river, the natural border between Senegal and Mauritania is clearly marked. Coming from Guinea where it has its source, it also crosses Mali. The second river in the country is the Gambia River, which crosses the Bassari country before joining Gambia. Also worth mentioning are the Casamance River and the Sine-Saloum, both in their respective regions.

The territory is fairly flat, except for a few strategic locations such as the Ferlo desert in the center and the Senegal River basin in the north. Also worth mentioning are Les Mamelles in Dakar, two hills about a hundred meters high, or the Bassari country in Eastern Senegal, which announces the first slopes of the Fouta Djallon massif.

Vegetation is highly dependent on rainfall and highlights three major biogeographic domains (CSE, 2010): the Sahelian domain dominated by acacias and annual grasses, the Sudanian domain with wooded or shrubby savannah and the Guinean domain characterized by a dense semi-dry forest. The importance of vegetation is a determining factor in the presence of fauna that has almost completely disappeared outside the parks and reserves.

Senegal has a coastline of about 700 km, which offers appreciable fishery resources but which are constantly declining due to irrational exploitation. Indeed, most ecosystems are deteriorating and resources are becoming scarce.

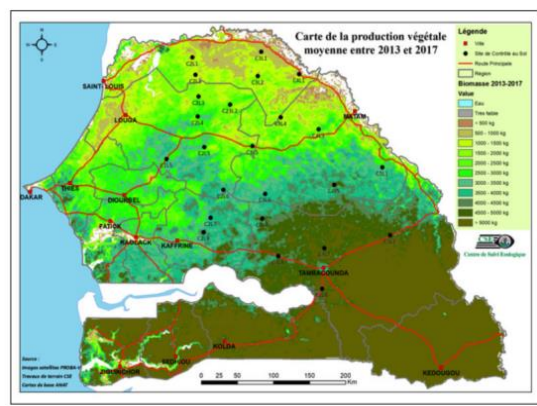


Figure2: Average plant production between 2013 and 2017 (CSE, 2018)



Figure1: Location of Senegal in the sub-region

## Climate profile

The climate of Senegal is tropical, with a long dry season (roughly from mid-October to mid-June in the north, and from early November to mid-May in the south), and a rainy season (roughly from late June to early October in the north, and from late May to late October in the south), due to the African monsoon that rises from the south in summer. As a result, the south receives abundant rainfall, reaching up to 1,500 millimeters, while the north-central part of the Sahel, receives scant rainfall, less than 600 mm per year.

In the dry season there can be a dry wind blowing from the northeast (the Harmattan) everywhere, capable of filling the air with desert dust. In the cooler months, December and January, daytime temperatures are between 32 and 35 °C in the interior, while they are a little cooler on the coast, and much cooler in Dakar, around 26 °C. Sometimes it can be a little cool at night throughout the country, below 15 °C, or it can be very hot during the day, around 35 °C in Dakar and 40 °C in the interior.

From February onwards, the temperature begins to rise, reaching a maximum from April to early June, before the arrival of the monsoon. In the interior regions, temperatures of 38 °C in the south and 43/44 °C in the north are the norm, while the coast remains on much more acceptable values. In Dakar, the maximums are still only 26 °C in May. The heat peaks are remarkable (47/48 °C in the interior regions of the centre-north).

The rainy season runs from approximately June to October and is called wintering, but despite the name, it is a hot and sultry period, especially in the south, while in the north there are humid and rainy periods alternating with others in which there is the return of the torrid heat conditions typical of the region. Compared to the previous period, the temperature decreases, but at the same time the humidity level increases. The rains occur in the form of downpours in the center-north, and are more insistent in the south, where the sky is often cloudy.

At the end of the rainy season, between October and November, temperatures start to rise again, reaching high levels again, around 38/39 °C in the centre-north, while the phenomenon is much less evident in the south. In Dakar, which is a world apart from the rest of the country, the evolution is very different: the temperature increases gradually, reaching 31/31.5 °C in the hottest months, which are September and October.

### **Climatic areas in Senegal**

The five climatic domains of Senegal are:

- the Sahelian region to the north;
- the northern Sudanese domain which is below the Sahelian domain;
- the Sudanese domain to the south;
- the Atlantic Sudanian domain on the northwest coast;
- the domain of the stable maritime trade wind to the southwest.



Figure3: Major climatic areas of Senegal (IRD)

### Main climate trends in Senegal

Climate trends in Senegal were assessed based on two key parameters, namely temperatures and rainfall. Information on climate trends is presented in the table below:

*Painting1: Current trends in key climate parameters*

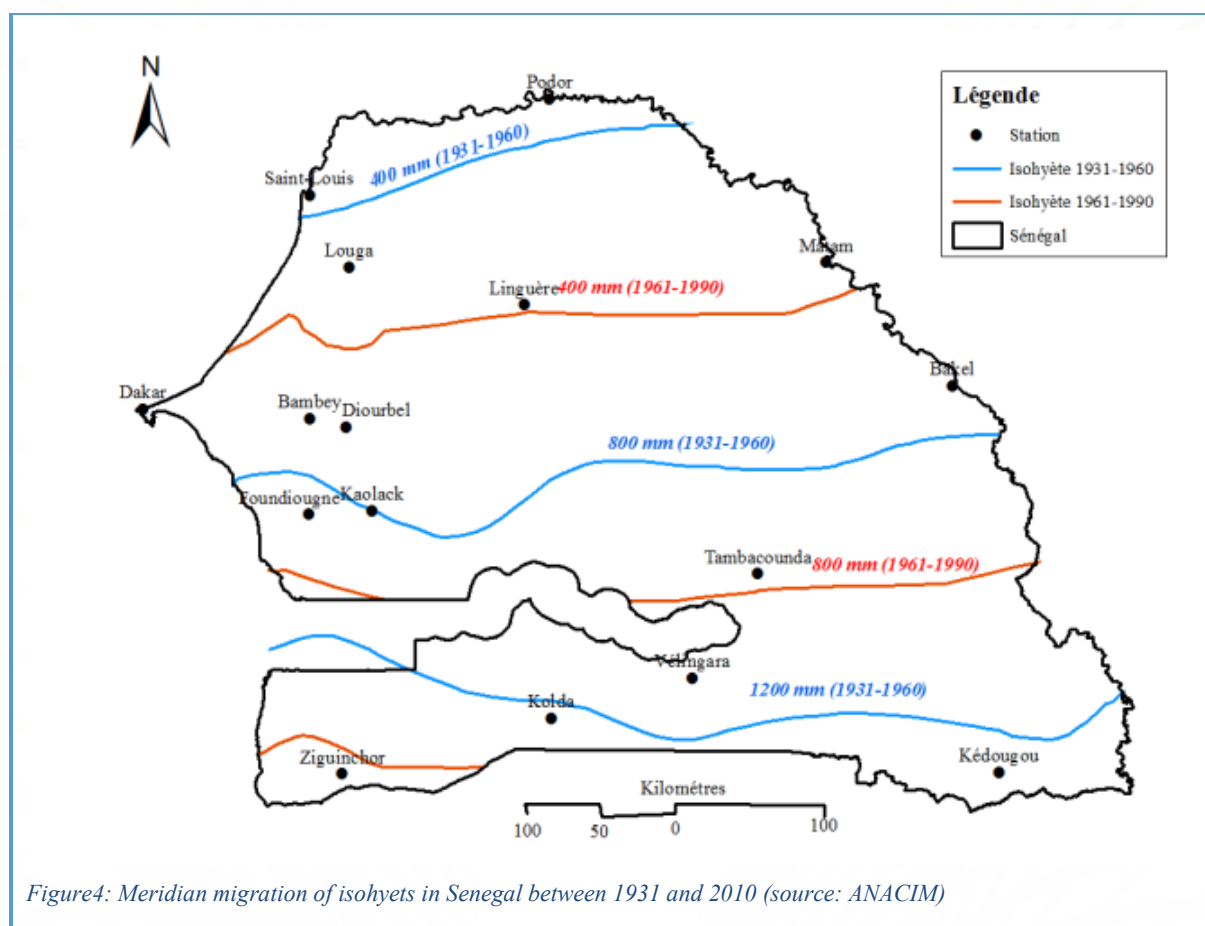
| Climate parameters | Current trends                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Temperature        | <ul style="list-style-type: none"> <li>✓ Spatial and temporal irregularity</li> <li>✓ Average temperature increase for all stations in the country, with an average increase of 1.9°C with regional variations according to the climatic zones between 1990 and 2010</li> <li>✓ Average temperature increase of 0.9°C between 1975 and 2012, see beyond</li> <li>✓ Lower minimum temperatures in boreal winter in the coastal zone under oceanic influence</li> </ul> |
| Rainfall           | <ul style="list-style-type: none"> <li>✓ <b>Very strong spatial and temporal heterogeneity associated with a north-south gradient</b></li> <li>✓ <b>Long periods of drought from 1968 to the end of the 1990s</b></li> <li>✓ <b>Displacement of the 400 mm isohyet towards the south by almost 100 km</b></li> <li>✓ <b>Displacement of the peanut basin towards the South due to the translation of the 800 mm isohyet</b></li> </ul>                                |

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Source of information:

1 Gaye AT, Lo HM, Djimbira SS, Fall MS, Ndiaye I., (2015). “Senegal: Review of the socioeconomic, political and environmental context”, study report, research program of the project Promoting the Resilience of Economies in Semi-Arid Zones (PRESA), 87 pages

2 CDN, 2020. Nationally Determined Contribution. Senegal



## Economy

Since the implementation of the PSE, Senegal has been part of a growth dynamic of more than 6% on average, placing it among the fastest growing economies in sub-Saharan Africa. This situation broadly reflects the continued dynamism of agriculture, extractive activities and chemical industries, mines, construction and the ICT sub-sector, but also thanks to the sustained reforms in the business environment, the growth recorded is driven by the primary (9.2%), secondary (6.3%) and, to a lesser extent, tertiary (5.5%) sectors.

*Painting2: Evolution of growth rates (DPEE, 2018)*

|                  | 2015 | 2016 | 2017  | 2018 | Average |
|------------------|------|------|-------|------|---------|
| Primary sector   | 10.6 | 5.4% | 12.9% | 7.7% | 9.2%    |
| Secondary sector | 9.8% | 4.9% | 4.5%  | 6.0% | 6.3%    |

|                 |      |      |      |      |      |
|-----------------|------|------|------|------|------|
| Tertiary sector | 2.6% | 5.9% | 6.7% | 6.6% | 5.5% |
| Real GDP        | 6.4% | 6.2% | 7.2% | 6.8% | 6.6% |

**The primary sector**, with very volatile growth linked to climatic hazards, still contributes only slightly to added value (15.4% of GDP over the period 2015 - 2018). In this sector, activity recorded an average growth of 9.2% between 2015-2018. This situation is attributable to the acceleration of the agricultural sub-sector, which increased by 11.5%. The performances recorded in this sub-sector are the result of good implementation of PRACAS (Program for the Acceleration of the Pace of Senegalese Agriculture).

Thanks to a proactive policy of developing agricultural production levels, Senegal has already achieved its production targets (particularly for onions and peanuts) and its fruit and vegetable export targets. These improvements have already begun to have an impact on exports, with new exported products, particularly horticultural products, which contributes to the diversification of the export base. Furthermore, the livestock and hunting sub-sector posted an increase of 5.8% over the period 2015-2018. Forestry and fishing activity have experienced contrasting trends, averaging 3.2% and 6.1% respectively.

In the secondary sector, activity has remained vigorous since 2015 with an average growth of 6.3%. This dynamism is explained, in particular, by the good performance of the sub-sectors of extractives (8.7%), chemicals (23.4%), oil refining (12.0%), construction materials (12.5%), electricity (9.4%) and construction (9.4%). The improvement in the energy situation during the period contributed greatly to the recovery of the sector.

As for the tertiary sector, activity was quite favorable with an average growth of 5.5%. This dynamism is, essentially, driven by the good orientation of financial services (10.2%) and by the improvement of real estate activities (7.2%). Activity, in the field of services, weighs nearly 46% of the total added value over the period 2014 - 2018.

On the GDP employment side, growth was driven by consumption, increased investment in economic and social infrastructure (energy, education, construction) and to a lesser extent by exports. Investment is mainly oriented towards agriculture, housing and the renewal or development of certain industrial equipment (textiles, agri-food industries).

Regarding trade with the rest of the world, it is marked by a gradual reduction in the current account deficit, particularly thanks to the development of exports. Imports and exports of goods and services increased by 6.9% and 7.4% respectively between 2015 and 2018.

## Sectoral dependence on natural energy resources

### 1. Energy

The energy sector, due to its cross-cutting nature and its essential nature for modern economic activities (mechanized agriculture, industrial activities, service activities, etc.), is one of the main foundations of the economic and social development policy of any country committed to the path of emergence, like Senegal through the Emerging Senegal Plan.

The energy subsector represents 2.4% of GDP over the entire period from 2014 to 2018. The sector has been very dynamic in recent years, and investments have helped to absorb the strong demand for electricity linked to the dynamism of real estate and industrial development.

The State of Senegal, through the PSE, continues and develops the orientations of the Energy Sector Development Policy Letter (LPDSE, 2012-2017) relating to electricity, hydrocarbons and accessibility to Energy in rural areas.

The PSE aims to ensure the rapid development of access to electricity, and more generally to energy, to converge towards full coverage of the rural population with an objective of exceeding 60% of the rural electrification rate since 2016. Thus, the actions that have been implemented relate to:

- the development of new energy sources: solar, wind, biomass;
- strengthening the use of clean energy by households (butane, biogas);
- the redefinition of the model and the perimeters of the concessions;
- the densification and extension of the electricity network for connection to the interconnected network, fully benefiting from the development of the transport and distribution network;
- the creation of new economic activities and the increase in productivity of existing ones;
- the exploitation of fossil fuels, particularly recently discovered gas; etc.

## 2. Energy consumption

The country's total energy consumption is increasing rapidly (+3.6%/year on average since 2000). Indeed, 90% of Senegal's energy (excluding biomass) comes from imported heavy fuels. This is why the country wants to move from diesel-based electricity production to cheaper energy sources.

In Senegal, households mainly use energy for cooking, lighting, refrigeration and thermal comfort. Wood is the main energy resource used in Senegalese households (450 ktep/year since 2000), followed by charcoal which exceeds 200 ktep.

**The residential sector** is the first final consumer before the transport and industry sectors, which characterizes both the low level of industrialization of the country and the prevalence of biomass in household consumption.

**The transport sector** is the second largest in energy consumption (30% of final energy consumed in 2013). The calculated average weighted energy efficiency of the transport sector is around 14.70%, mainly due to the obsolete nature of the vehicles in circulation (cars, trucks, etc.). Indeed, the average age of most transport vehicles (taxis and public transport vans) exceeds 10 years (see Figure 5). The age limit for importing used vehicles is 8 years.

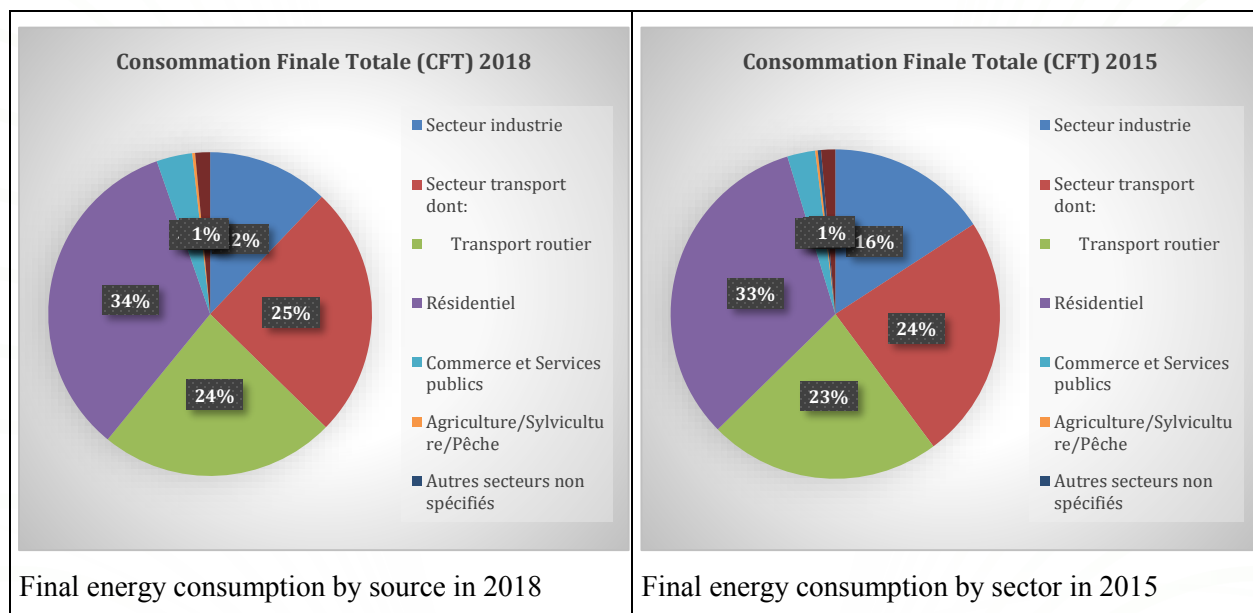


Figure 5: Final energy consumption by source and by sector in 2015 and 2018

Source: SIE, 2018

### 3. Renewable energies

Based on the projects installed and under installation, the share of renewable energy in the total electricity generation capacity will increase from 10% hydro, 0.4% solar photovoltaic and 0% wind in 2015 to 13% hydro, 13% solar photovoltaic and 8% wind in 2020, reaching 600 MW of renewable energy, while the total installed capacity will have increased by 2.3 to 2 GW over the same period (BA, 2018).

## Transportation

In Senegal, transport is at the heart of development strategies, with the development of sectoral policies underpinned by massive investments in infrastructure and services.

The vision and orientations in the transport sector in Senegal are contained in the following instruments:

- the second Transport Sector Policy Letter adopted in 1998 aimed at better planning and coordination of actions and investments. It also aimed to modernize management, strengthen human and institutional capacities and mitigate the negative impacts of transport on the environment. The ultimate goal was to support efforts to combat poverty through better access throughout the national territory;
- the Urban Transport Sub-sector Policy Letter which introduced a reform of the institutional and legal framework of urban transport with the creation of the Dakar Urban Transport Executive Council (CETUD), the strengthening of the financial framework with the establishment of an Urban Transport Development Fund (FDTU), the restructuring of public transport (buses, rapid coaches and trains) and the development of human resources;
- the National Rural Transport Strategy (SNTR) adopted in 2002 and which is based, among other things, on the need to satisfy social demand for the most disadvantaged groups and to establish a

decentralized and participatory management system in the sub-sector. The SNTR also had the objectives of ensuring coherence and synergy of actions, promoting intermediate means of transport to reduce costs and taking into account ecological aspects in this sub-sector.

The contribution of transport services to GDP is estimated at 3.6% in 2016. This share has remained constant compared to 2015. In 2014, it was 3.8% in connection with the major investments that have been made in infrastructure to improve mobility in urban and rural areas.

Transport services mainly come from economic units in the form of production at 91.9%. Imports constitute 37.2% of the supply of transport services.

## Industry

Senegal aims to make the industrial sector one of the pillars of sustainable development. Indeed, among the objectives of the Emerging Senegal Plan (PSE), is the integrated industrial bet which aimed at creating a high value-added manufacturing hub. This was achieved with the construction of the Diamniadio International Industrial Park with an area of 13 hectares, which was put into service in February 2018.

Industrial activity in 2018 was marked by a continuation of the dynamic bullish started since 2014. Production came out at +1.1% compared to that of 2017. This result is mainly attributable to good activity in the extractive industries (+14.5%), construction materials (+4.1%), energy production (+3.8%) and chemicals (+0.5%).

However, this increase is curbed by a drop in production activity in the textile and leather industries (-27.0%), other manufacturing industries (-11.8%), mechanical industries (-8.4%), paper and cardboard (-8.2%) and food industries (-4.1%).

In terms of industrial production prices, the upward trend that began in 2016 continued. They increased by 2.4% between 2017 and 2018. This increase is the result of price increases in almost all industries, particularly the chemical industry (+10.4%), energy production (+5.5%), textiles and leather (+2.4%), construction materials (+2.0%), and extractive industries (+1.2%). However, there was a decrease in prices in the food industry (-1.6%), and mechanical engineering (-0.2%). Production prices in the paper and cardboard industries did not experience any significant changes over the period 2017-2018.

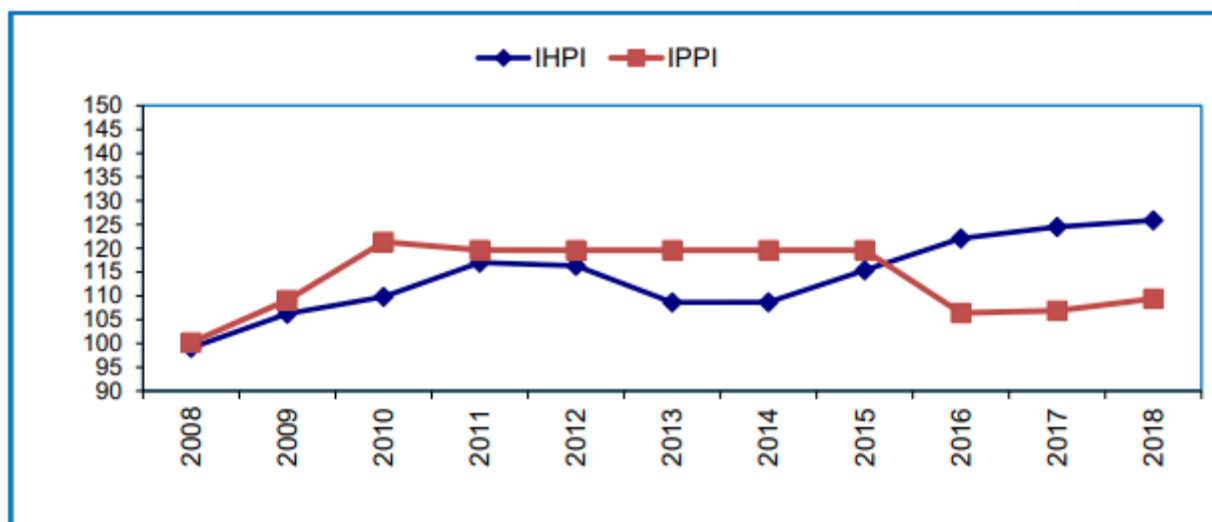


Figure6: Evolution of the IHPI and the IPPI between 2008 and 2018 (Source: ANSD, 2018)

IHPI: Harmonized Industrial Production Index IPPI: Industrial Producer Price Index

## Waste

In Senegal, the waste subsector includes solid waste, domestic and commercial wastewater, industrial wastewater and human waste.

The State of Senegal has included waste management in its priorities for development, the fight against poverty and the improvement of the living conditions of the population. It is in this context that the National Waste Management Program (PNGDS) was developed and implemented by the Government of Senegal for integrated and sustainable waste management with the aim of: (i) ultimately enabling all local authorities in the country to equip themselves with a formal, sustainable and modern household waste management system, (ii) promoting solid waste trades and industry in all regions of the national territory and (iii) simultaneously and in a balanced manner creating jobs in all localities of the country.

The examination of the results of the national campaign for the characterization of household and similar waste carried out by the UCG in 2014 and 2015 showed that the trash of Senegalese households is composed mainly of fine elements (sand, small organic elements for 53%) and putrescibles (food leftovers, any perishable product for 12%), followed by plastics (9%) and complexes (product composed of several materials) (5%). Special Household Waste (DMS), hazardous household waste remains the least represented category with 0.84% of the total flow of waste produced in the country (UCG 2016).

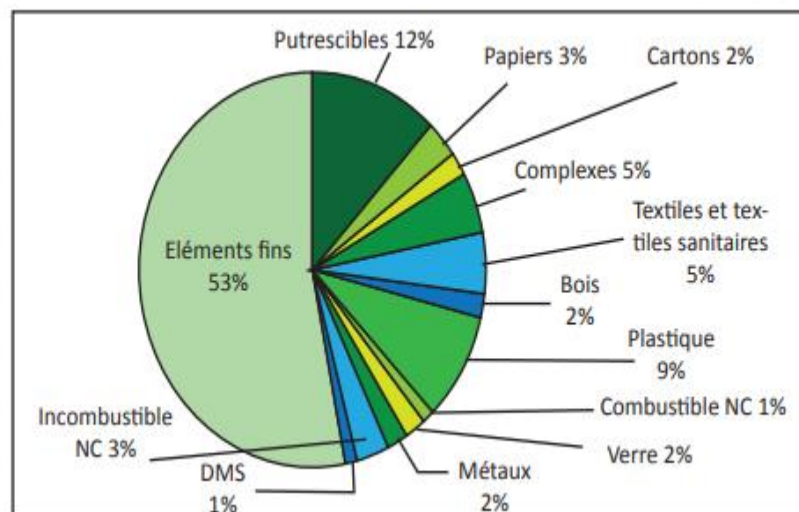


Figure7: Characterization of household and similar waste - annual average (UCG, 2016)

Plastic waste accounts for 9% of total household waste. The collection of this waste is problematic, especially thin plastic bags that easily evaporate and end up in landfills, trees and in the open air.

## Agriculture

The agricultural sub-sector has recorded over the last five years a high annual growth rate of added value estimated at more than 10%, thanks in particular to the Program for Accelerating the Pace of Senegalese Agriculture (PRACAS).

The Senegalese Agricultural Pace Acceleration Program (PRACAS) aimed to satisfy three aspirations set out in axis 1 on the "structural transformation of the economy and growth" of the PSE: (i) by strengthening Senegal's food security and rebalancing a trade balance degraded by food imports, (ii) by developing integrated, competitive and high value-added sectors, (iii) by preserving socio-economic balances and the dynamics of the rural economy. As part of its implementation, the PRACAS focused primarily on the rice, onion, peanut, and off-season fruit and vegetable sectors. The second year of implementation (2015) produced convincing results.

Agriculture still has the lowest productivity levels in the Senegalese economy, even though it employs around half of the working population (CEPOD, 2011).

Yield levels of major crops, including peanuts and cereals, remain low. Peanuts remain the main crop, accounting for nearly 40% of the sown areas and rice, the main consumer product, whose production remains in deficit compared to domestic needs.

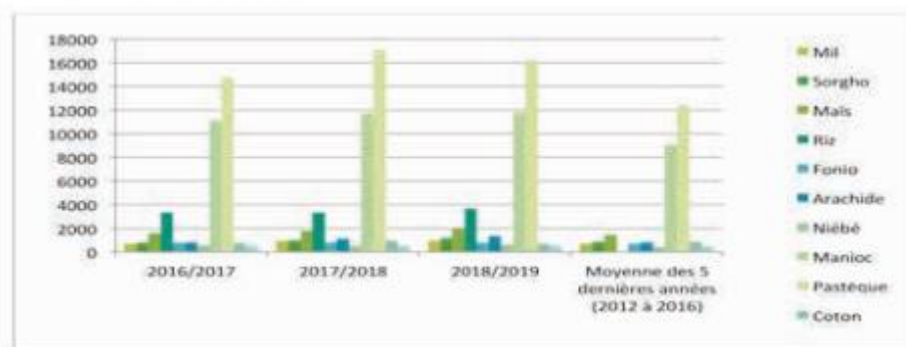


Figure8: Agricultural statistics (DAPSA, 2019)

Agriculture plays an important role in socio-economic life in Senegal with a contribution to GDP of 8.5% in 2018. Thus, it remains the basis of productive activities and the main source of income for nearly 54% of the population.

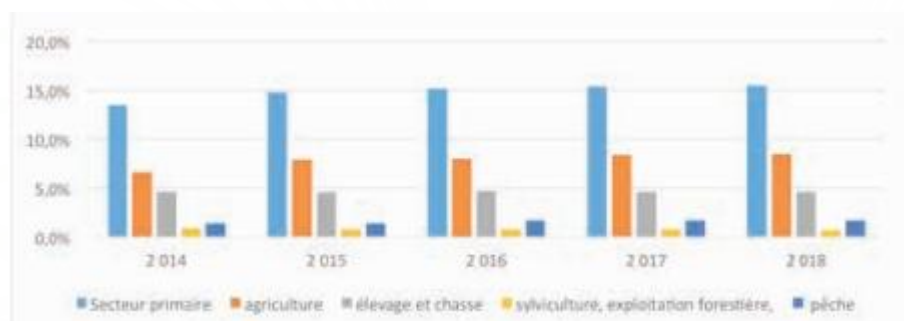


Figure9: Contribution of the primary sector to GDP (DPEE, 2018)

In the area of temporary crops, the current situation is characterized by land degradation that affects two-thirds of arable land, or 2.5 million hectares and 34% of the country's surface area. This situation is partly explained by the predominance of peanut cultivation in terms of sown areas (38% over the last five years), followed by millet with 32.4% of cultivated areas.

The two agricultural products (peanuts and millet) alone represent 70% of the sown areas. It is therefore necessary to pay particular attention to these two crops. Furthermore, rice, the country's main foodstuff, only occupies 6.9% of the sown areas, at the same level as corn. The good yields of rice production are justified by the fact that it is mainly irrigated in the dedicated developed areas (Senegal River Delta and the southern fringe of the country, particularly in Anambé with the Gambia River).

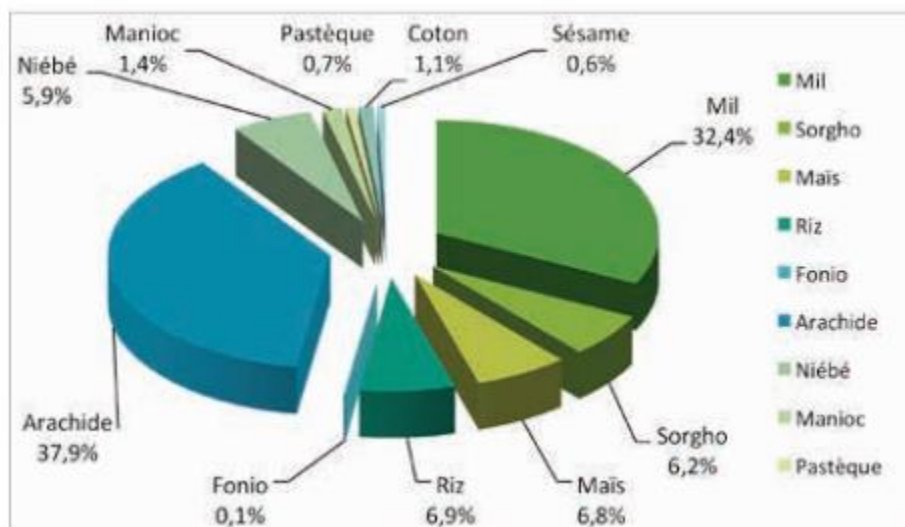


Figure10: Area occupied by the main crops over the period 2012-2018 (DAPSA, 2018)

As for livestock farming, which occupies nearly 60% of agricultural households, it represented 4.6% of the gross domestic product over the period 2014-2018. It constitutes, along with agriculture, the main activities of rural populations providing food and monetary income.

National milk production is estimated at 231.5 million liters in 2016 compared to 220 million liters in 2012. Similarly, controlled meat slaughterings are estimated at 25,915.2 tons in 2018 compared to 22,506 tons in 2013 according to the Livestock Directorate.

Furthermore, the poultry sector has been the most dynamic in recent years, thanks to the successful establishment of the value chain with the development of all production segments and disease control. Thus, egg production increased to 719 million units in 2017 compared to 548 million in 2012.

It is characterized by the predominance of extensive livestock farming methods that are often plagued, among other things, by watering and feeding difficulties and recurring conflicts between livestock farmers and farmers, faced with land pressure resulting from galloping urbanization. Added to this is a high incidence of animal diseases, due in particular to insufficient health coverage, and especially to deficient vaccination coverage.

Thus, livestock farming records low productivity which results in insufficient coverage of national demand for animal products (dairy products, Tabaski sheep, etc.), low incomes for producers and a negative impact on the trade balance, with the outflow of foreign currency for imports.

A rainfall deficit combined with rising temperatures and possibly the occurrence of extreme weather events (strong winds, heat or cold waves, downpours causing flooding) could lead to advanced degradation of the resource base and lead to a reduction in agricultural and pastoral production. This would negatively affect the self-consumption of rural households (lengthening of lean periods, famine and malnutrition), lower the incomes of the rural world, increase its poverty and accentuate the rural exodus (MEDD, 2015).

For crops, the spatial and/or temporal variability of the climate introduces changes in the onset of the rainy season, in particular the dates of the start of sowing and the end of the season, which could disrupt the crop calendar and negatively impact harvests and the constitution of a good

quality seed capital. The increase in temperatures and the decrease in precipitation could lead, among other effects:

- the reduction of plant cover following a significant water deficit and high evapotranspiration, which risks decimating the plant species least resistant to drought;
- a process of water and wind erosion leading to crusting and degradation of bare soils;
- salinization linked to the invasion of salt water, high evaporation and a lack of land drainage;
- a loss of soil fertility, and more specifically a loss of nutrients.

## Forestry

Forestry represents 0.8% of GDP over the period 2012-2018. This weight is relatively low and does not reflect the importance of the sector on the socio-economic level. It could be improved by greater control of information, particularly on non-timber forest products (wild fruits, leaves, roots) as well as by reclassifying certain products such as honey or palm oil in the forestry branch.

However, the main contribution of forestry is not direct. It consists of the ecosystem services provided and essential to the survival of humanity.

In this regard, we distinguish the four ecosystem services provided by the forest:

- Provisioning services: consist of the material benefits that people derive from ecosystems, such as the provision of food, water, fiber, wood, and fuel. The GDP calculation only includes this service and ignores the following three other services.
- Regulating services: These are the benefits derived from the regulation of ecosystem processes, for example the regulation of air quality and soil fertility, flood and disease control, or crop pollination and carbon sequestration.
- Supporting services: These are necessary for the production of all other ecosystem services; for example, providing living spaces for plants and animals, enabling species diversity and preserving genetic diversity.
- Cultural services: are non-material benefits that people derive from ecosystems, such as aesthetic and engineering inspiration, cultural identity, and spiritual well-being.

Forest resources play an important role in the country's economy, particularly in rural areas and for poor people. Firewood is the main source of energy for rural households (92%).

Many materials used in housing and crafts come from forest resources. This results in strong pressure on these resources due to excessive exploitation. If Add to this the clearing of land for agricultural needs, which results in a decline in plant cover and, more generally, a deterioration of the environment.

The reduction in forest potential is the result of several combined factors, including physical causes (bush fires, erosion, etc.) and the abusive and illegal nature of the pressure exerted on natural formations for energy purposes (firewood, charcoal).

## Fishing

Fishing contributed 1.7% of GDP in 2018 (ANSD, 2018) compared to an average of 2.1% of GDP over the period 1990-2000. This situation reflects the difficulties of the sector following the scarcity of fishery resources.

The wealth created by fishing is not limited to catches. It also takes into account processing activities as well as services such as catering, repairs, trade, canoe manufacturing, transport of fish products, etc.

Overexploitation and deterioration of fish habitat are the main reasons for the scarcity of resources.

The sector also remains highly vulnerable to climate change. Indeed, the warming of sea temperatures and the resulting increase in salinity will cause a decrease and/or migration of fish stocks. This situation could lead to massive job losses (the activity being no longer profitable) and difficulties in ensuring protein security for populations. Similarly, the increase in the frequency and strength of extreme events (storms, strong winds, etc.) and the acceleration of coastal erosion could lead to an increase in accidents at sea and the destruction of equipment and infrastructure related to fishing (CPDN, 2015).

Currently, the fisheries sector is facing an environmental and socio-economic crisis, which threatens the survival of fishing communities, risks compromising the supply of fish to populations and the fishing industry and, more generally, the contribution of the sector to economic growth and the fight against poverty.

## Climate governance

Institutionally, the issue of climate change is handled in Senegal by the Ministry of the Environment, Sustainable Development and Ecological Transition (METE). Its mandate is to implement the government's policy on ecology, environmental monitoring, environmental protection, and also to take charge of the country's prerogatives within the framework of the 3 RIO conventions. In this context, it is responsible for the management of pollution, waste, national parks and other protected areas. It prepares and applies legislation and regulations on hunting. It ensures the development of aquaculture in conjunction with the ministries of fisheries and agriculture. It works on the development of ecotourism. It is responsible for the fight against desertification and the development of environmental education. It manages the mechanism for monitoring and tracking climate change trends and changes in the state of the environment. Finally, it represents Senegal at international meetings devoted to environmental protection, sustainable development, climate and biodiversity.

Aware of the multi-sectoral dimension of the climate problem, the Senegalese State launched the idea of a coordination body in 1994, by creating the National Committee on Climate Change (COMNACC). It was created in 1994 and instituted in 2003 following a decree<sup>6</sup> of the Ministry of the Environment and Nature Protection at the time. But it was necessary to wait for the decree of 2011<sup>7</sup> to see a real institutional framework for this committee emerge. Placed under the aegis of the Ministry of the Environment and Nature Protection, the COMNACC's mission is to coordinate, consult, train, raise awareness and monitor the various activities identified within the framework of the implementation of the United Nations Framework Convention on Climate Change (UNFCCC). It brings together representatives of all state ministries, representatives of all sectors of activity, universities and research centers, associations, local elected officials, etc. It is composed

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<sup>6</sup>Order No. 1,220 of March 7, 2003.

<sup>7</sup>Decree No. 2011-1689 of October 3, 2011

of six (6) thematic groups: mitigation, adaptation, technology transfer, capacity building, financing and article 6 and finally the group responsible for legal issues.

Furthermore, a Climate Change Division (DCC) was created during the 2000s within the Environment and Classified Establishments Department (DEEC) of the Ministry of Environment and Sustainable Development. This division, made up of a team of experts, shares in particular the adaptation, mitigation and finance aspects of climate action. It should be noted that the DCCTEFV is the Designated National Authority (DNA) of the Clean Development Mechanism (CDM), the Adaptation Fund (AF) and the Green Climate Fund (GCF).

Thus, another structure is to be taken into consideration, it is the National Agency of Civil Aviation and Meteorology (ANACIM). ANACIM is the focal point of the Intergovernmental Panel on Climate Change (IPCC). It is responsible for the production of climate information: weather forecasts but also medium and long-term climate projections.

## **Institutional arrangements**

This part briefly outlines the legal (A) and institutional (B) framework for measuring and reporting GHG emissions.

### **1. On the legal level**

The legal framework for combating climate change in Senegal is based on a set of provisions, particularly legal ones.

These legal provisions are:

- **Law No. 2001-03 of January 22, 2001 establishing the Constitution**

The Constitution guarantees citizens rights and freedoms such as the right to a healthy environment. Better, by the constitutional reform of April 5, 2016<sup>8</sup>, a deepening of these rights has been carried out, at the same time, the duties of the citizen in environmental matters have been enshrined.

Indeed, under the provisions of Article 25-2 of the aforementioned reform, “the defense, preservation and improvement of the environment are the responsibility of the public authorities.”

The Constitution also states that "every citizen has the duty to preserve the country's natural resources and environment and to work for sustainable development for the benefit of present and future generations."

- **Law No. 2016-19 of July 6, 2016 authorizing the President of the Republic of Senegal to ratify the Paris Agreement under the UNFCCC, adopted on December 12, 2015,**

By Law No. 2016-19 of July 6, 2016, Senegal demonstrated its commitment to be bound by the Paris Agreement under the UNFCCC. Such a commitment demonstrates the Government's express desire to contribute significantly to the response effort against climate change.

The adopted CDN, part of this dynamic, sets itself the objective of reducing emissions by 7%. In the case of an external contribution, this reduction objective is raised to 29.5% by 2030.

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<sup>8</sup>Constitutional Law No. 2016-10 of April 5, 2016 revising the Constitution

- **Law No. 2001-01 of January 15, 2001 relating to the Environmental Code**(legislative part)

Backed by a set of regulations, in particular its implementing decree No. 2001-282 of April 12, 2001, Law No. 2001-01 of January 15, 2001 relating to the Environmental Code, constitutes one of the elements of the national legal system for implementing environmental policy in addition to the international conventions and agreements on the environment and climate change to which Senegal is a Party.

According to the provisions of the said law, any human activity likely to harm the environment is subject to a prior environmental assessment. This assessment makes it possible to determine the potential impacts of the planned activity on the health of populations, the natural environment, etc. in order to define measures for their elimination or reduction. However, by impact, Article R39 of the aforementioned Decree No. 2001-282 means, among other things, "the effects on the climate and the atmosphere, the effects of recycling and the elimination of residues and waste".

## 2. At the institutional level

The Minister responsible for the Environment, in consideration of the provisions of Decree No. 2022-1801 of September 26, 2022, prepares and implements, under the authority of the President of the Republic, the national policy on environmental monitoring, the fight against pollution and the protection of nature.

The ministerial authority responsible for the Environment is also responsible for combating desertification on the one hand, and bush fires on the other. It also manages a mechanism for monitoring and tracking climate change trends, or even changes in the state of the environment. Under the responsibilities set out in Decree No. 2022-1801 mentioned above, the Minister responsible for the Environment represents Senegal in international technical meetings relating, among other things, to the climate. In addition, the Ministry responsible for the Environment appears to be the national mechanism that reports data on the implementation of climate-related policies. Such data provide information on the evolution of key indicators in Senegal's socio-economic sectors. They also reflect the level of implementation of programs and projects contributing to achieving the goal of the NDC.

The DCCTEFV for its part, is responsible for implementing national policy on the environment, protecting nature and people against pollution and nuisances and combating climate change through strategic mitigation and adaptation actions in economic development sectors that emit GHGs and those vulnerable to the effects of climate change.

To this end, it is the focal point for international agreements on climate change. It provides the secretariat for the National Committee on Climate Change (COMNACC) and the subcommittees referred to in Article 6 of Decree No. 2011-1689 of 3 October 2011 to ensure the coordination and synergy of national actions for the implementation of the aforementioned Convention.

The DCCTEFV houses, among others, a division responsible for climate change. The latter is the technical unit of the DCCTEFV for the implementation of the objectives of the Convention on Climate Change at the national level. Any issue related to climate change is handled by the said service with the support of other structures (National Committee on Climate Change (COMNACC), National CDM Office, National Unit for the Clean Development Mechanism, etc.) for which it provides the secretariat.

COMNACC, created by decree no. 2011-1689 of October 3, 2011, plays a role of information, awareness, training, facilitation in the design, financing, implementation, validation and monitoring of national, sub-regional and regional programs and projects relating to the priority areas targeted.

It ensures the consistency of programs and projects with national climate change objectives, at the mitigation level. The aforementioned decree sets the composition of the members and specifies the areas of intervention including: the application of international and national texts in force relating to climate change, biodiversity, soil conservation, carbon sequestration, conservation of wetlands, management of waste and atmospheric emissions, carbon capture and storage, promotion of clean energy, particularly renewable energy, promotion of energy efficiency in all sectors, particularly industry, transport, buildings, agriculture and energy, etc.

Regional Committees on Climate Change (COMRECC) are created by decree of the Governor. They constitute the relays of the COMNACC at the regional level. They ensure in the regions the same mission as the National Committee, namely information, awareness, training, facilitation in the design, financing, implementation, validation and monitoring of projects relating to climate change.

The COMRECC is made up of decentralized authorities and services of the State, local authorities, the private sector, non-governmental organizations (NGOs), grassroots community organizations (CBOs), projects and programs.

The secretariat of the COMRECC is provided by the regional divisions of the environment and classified establishments (DREEC).

The Ecological Monitoring Center (CSE) is a public utility association that has existed since 1993, the first Senegalese entity accredited to the Green Climate Fund, it is the linchpin in the mobilization of climate financing. We have also LBA Bank accredited to the GCF.

The Sovereign Strategic Investment Fund (FONSIS) and the Priority Investment Guarantee Fund (FONGIP) as well as the Agricultural Bank Fund are also involved in order to channel financial flows for field projects and more centralized monitoring.

## **Senegal's approach to GHG emissions inventory**

The history of the GHG emissions inventory reveals a choice based on a sectoral approach which reveals a participatory process involving all segments of the State and covering target sectors.

### **1. The waste sector**

The waste sector, in view of its transversality, is closely aligned with Senegal's development trajectory, as outlined in the Emerging Senegal Plan (PSE). It constitutes, among other things, a means of reducing national GHG emissions compared to the emissions projected for the 2025 and 2030 horizons. Moreover, Senegal has made enormous efforts through the implementation of a National Solid Waste Management Program. This section analyzes the framework for developing GHG inventories in the solid waste and liquid waste sub-sectors constituting the waste sector.

#### **The solid waste subsector**

Senegal has recorded an estimated urbanization rate of 48%<sup>9</sup> in 2020. Such growth generates a significant production of waste, potential emitters of methane. Based on this observation, Senegal has set up a waste management system.

The process of inventorying GHG emissions from solid waste is based on a de facto arrangement. Indeed, the efficient preparation of the GHG inventory report for the solid waste sector motivated the selection of the Waste Management Coordination Unit (UCG). Created by Order No. 01048 of January 22, 2018, the UCG's main purpose is to support the territorial authorities responsible for waste management. It should be noted that the UCG has undergone an institutional change. By Law No. 2021-18 of May 23, 2022, the creation of a company called the National Waste Management Company (SONAGED.SA) is authorized. Such a reform would be justified by the socio-economic and environmental issues underlying sustainability.

The UCG has committed, through a protocol with the DCCTEFV, in particular:

- establish, around a focal point, an appropriate team for the development of the sectoral inventory and the evaluation of sectoral mitigation measures;
- collect, process and update all data on GHG emissions and other related data, in the solid waste sector;
- define the criteria on the basis of which the processed data will be selected for use in the inventory according to standards;
- estimate GHG emissions for all categories of the solid waste sector using appropriate global warming factors or potential;
- ensure that the procedures or assumptions used for the estimation are consistent with the guidelines of the Intergovernmental Panel on Climate Change (IPCC).

Better still, under the terms of letter No. 986 MULHP/UCG/SPITEC of July 15, 2020, a focal point was designated for the production of inventories of GHG emissions in the solid waste sector. It should also be noted that an ad hoc group has been set up for the proper implementation of the commitments made in the aforementioned protocol.

### **The liquid waste subsector**

Population growth inevitably goes hand in hand with the development of human activities (domestic activities, agriculture, industries), and consequently a greater production of liquid waste due to water pollution.

The efficient management of such discharges justified the creation of public structures such as a Ministry responsible for Sanitation and even a National Office for Sanitation in Senegal.<sup>10</sup> with the mission of carrying out any operation directly or indirectly related to its object, etc.

Described as an emissive sector, the waste sector, particularly liquid waste, is considered to be able to contribute to the national mitigation effort through improved management. To this end, with a view to inventorying anthropogenic greenhouse gas emissions, through sanitation, the involvement of the Sanitation Directorate is unequivocal. As proof, all data relating to liquid waste is provided by it. This motivated the signing of a protocol defining the conditions and framework of partnership

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<sup>9</sup>Source World Bank

<sup>10</sup>Cf. law n° 96-02 of February 22, 1996 authorizing the creation of the National Sanitation Office of Senegal

between parties for the establishment of an inventory of greenhouse gas emissions in the Sanitation sector.

Under the terms of the said protocol, the Sanitation Directorate:

- sets up, around the sectoral focal point, an appropriate team for the development of the inventory and the evaluation of sectoral mitigation measures;
- carries out a comprehensive assessment of the required data on emissions from the sanitation sector;
- identifies data sources;
- estimates greenhouse gas emissions for all categories and gases in the Sanitation sector;
- etc.

Following the protocol signed on October 21, 2021, between the Directorates responsible for the Environment and Sanitation respectively, a focal point and a substitute are appointed for the liquid waste sub-sector, within the framework of the updated biennial greenhouse gas emissions inventory report.

In order to produce the expected deliverables, the methodological approach mainly consisted of:

- develop a work plan;
- organize meetings with the consultant(s);
- collect the data to be entered into the software;
- stabilize inventory assumptions;
- provide raw data to the consultant(s);
- integrate the data into the IPCC 2006 software;
- compile data from software;
- prepare an inventory report with the consultant(s).

## 2. Forestry

Senegal has a strong potential for forests whose rate of degradation remains high. Linked to several factors, this degradation is more exacerbated by anthropogenic action such as human habitat, land clearing, overexploitation of woody forest products, bush fires. It would induce a clear regression in the CO<sub>2</sub> sequestration capacity of forest formations. Nevertheless, the forestry sector remains an important carbon sink considering the strong absorption potential it presents.

In this perspective, Senegal has defined a strategy to reduce environmental degradation and the effects of climate change. The precision of the data collected on forest formations correlated with an efficient use of certain factors and the application of IPCC guidelines has improved the national inventory of GHG emissions, particularly in forestry, within the framework of the third national communication.

The analysis of the institutional mechanism set up for reporting national anthropogenic GHG emissions and carbon sinks in the forestry sector reveals the designation of a focal point.

Similarly, for an effective inventory of GHG emissions in the forestry sector, a protocol was signed between the DCCTEFV and the Forestry Directorate. As such, all the tasks expected of the Forestry Directorate in all phases of the intervention are set out. These include:

- the comprehensive assessment of required data on GHG emissions from the forestry sector;
- identification of data sources;

- the collection, processing and updating of all data on GHG emissions and other related data;
- the submission of all processed data to the DCCTEFV;
- the estimation of GHG emissions for all categories under the forestry sector.

### 3. The energy sector

By letter No. 1057 MEP/SG/CEP/snd of August 11, 2022, the Minister of Petroleum and Energy appointed a coordinator of the energy information system (EIS). Such an appointment is part of the framework of collaboration between the competent services, linked in particular to the Measurement-Reporting-Verification mechanism otherwise known as MRV.

The designation of the focal point follows the creation, by decree No. 22608 of August 22, 2019, of the SIE. Under the terms of Article 2 of said regulation, the Energy Information System has the essential role of "collecting, analyzing and disseminating reports and technical notes on the evolution of the energy sector, on the one hand, and carrying out long-term planning work including all segments of the energy sector, on the other hand."

Specifically, the system erected has the following missions:

- collect energy statistics;
- analyze industry data;
- prepare the national energy balance sheet;
- carry out prospective analyses;
- monitor key energy sector indicators including those related to Sustainable Development Goal (SDG) 7;
- contribute to the development of energy policy;
- ensure the implementation of the Measurement-Notification-Verification system for the purposes of monitoring and calculating GHG emission indicators in the sector;
- integrate gender-sensitive indicator monitoring;
- ensure the role of focal point for the International Energy Agency and the African Energy Commission and all structures producing data on the energy sector;
- provide official data on the sector to all national and international stakeholders.

The establishment of the SIE is based on a desire to make the provision of data more reliable through the annual energy assessment, the analysis of the dynamics of the sector, and the production of projections capable of facilitating decision-making.

In this respect, the SIE is composed of a pool of duly appointed technical experts. Under the coordination of the Head of the Studies and Planning Unit, the SIE draws up an annual work plan validated by the Minister responsible for Energy and on which a validation committee meets at least once a quarter to analyze developments.

### 4. The livestock sector

Awareness of the livestock sector's strong potential to contribute to the response effort against the effects of climate change led to the designation, by letter No. 2517 MEPA/DIREL of December 21, 2021, of a focal point for the inventory of GHG emissions from said sector. Better still, a group of experts has been set up in the Ministry responsible for Livestock to support this inventory of GHG emissions. This group of experts results, in fact, from service note No. 2520 MEPA/DIREL dated December 21, 2021.

In this context, its main mission is to conduct a coherent and documented process of collecting, processing and archiving inventory data, in accordance with the principles for preparing updated biennial reports. Organized around the Director of Livestock, the team of experts records the representation of the various departments of the Ministry responsible for Livestock.

## 5. The Agriculture sector

Agriculture is a strategic sector of the national development policy. In 2021, it contributed 15.3% to the GDP<sup>11</sup>. With 49% of national greenhouse gas emissions, it appears to be the lever "for economic recovery". To this end, the objective of food security would find its basis in the requirement of sufficient and qualitative production generating a considerable level of income. The achievement of such an objective calls for taking into account the harmful effects of climate change. Based on this observation, the Department responsible for Agriculture shows a willingness to adapt it to climate change. In accordance with Order No. 2288 of December 15, 2015, the Minister responsible for Agriculture created, organized and established the operating procedures of the National Science-Policy Dialogue Platform for the adaptation of agriculture and food security to climate change (CCASA Platform). Said platform is placed under the supervision of the Directorate of Agriculture and represents the Ministry responsible for agriculture at the COMNACC level. It is responsible for:

- facilitate the sharing of agricultural and food security research results;
- improving agricultural practices and food and nutrition security in relation to climate change;
- provide vulnerable communities with knowledge and good practices for their adaptation to climate change;
- assist policy makers in integrating climate change into the development of agricultural and food security policies;
- integrate and harmonize research results into national planning documents;
- promote research funding by establishing a network of public and private partners.

Thus established, the CCASA Platform is the entry point of the Ministry of Agriculture for all aspects relating to climate change. It assists the Department of Agriculture in defining its sectoral policy, particularly in terms of taking climate change into account. As data collection was carried out, the Unit was split into two subgroups with the respective objectives of mitigation and adaptation.

The Mitigation subgroup is composed of the Directorate of Agriculture, the Directorate of Analysis, Forecasting and Agricultural Statistics (DAPSA), the Senegalese Institute of Agricultural Research (ISRA), the National Institute of Pedology (INP), the Directorate of Plant Protection (DPV), CERES-LOCUSTOX, the Directorate of Rural Materials and Equipment (DMER), the Directorate of Horticulture and a technical advisor from the Cabinet for steering. The various entities making up the Mitigation subgroup are responsible for collecting data on greenhouse gas emissions. As such, they have benefited from capacity-building sessions at the level of the Directorate of the Environment and Classified Establishments.

Thus, there is currently talk of integrating the indicators into the DAPSA database. As a reminder, the DAPSA collects data relating to the agricultural sector, but this collection did not include the

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<sup>11</sup>Source: World Bank

issue of greenhouse gas emissions. From now on, for each agricultural campaign, the DAPSA takes into consideration the greenhouse gas emission data of the fertilizers used, the assisted natural regeneration devices, etc.

## 6. The limits of the GHG inventory reporting system in Senegal

Senegal, a party to the UNFCCC and its related legal instruments, has always worked to honour its commitments, particularly through the establishment of a process aimed at protecting the environment for greater sustainability of development actions.

Indeed, a better response to the periodic reporting of national anthropogenic GHG emissions and carbon sinks relies on a clearly defined institutional mechanism.

However, it should be noted that the analysis of the institutional system for reporting GHGs highlights constraints, particularly legal ones. The national greenhouse gas inventory system suffers from its de facto existence. In other words, no regulated national system has been established for reporting on actions to combat climate change. The existence of such a system would contribute to improving the provision of climate data and information. While the absence of a permanent system negatively impacts the regularity of submitting reports within the allotted time.

The targeted sectors, although having designated focal points, have for the most part hardly been able to supervise the inventory process through regulatory acts.. Furthermore, the various focal points do not have a hierarchical link with the designated national authority for combating climate change. This represents a risk that could be detrimental to the efficiency of the GHG emissions inventory. In other words, the diversity of actors requires sufficiently structured coordination for a better understanding of the respective roles.

The requirement to set up an efficient reporting system is justified by this desire to submit reliable inventory reports regularly.

It must be said that the effectiveness of an emissions reporting system will meet the following realities:

- the system's failure to be anchored in sustainability;
- the absence of an audit and validation body for the process;

In view of the above, the following avenues for improvement are recommended.

This involves having a regular and reliable flow of information relating to reporting and communications, the effects of policies and measures, climate risks, opportunities and actions to reduce GHG emissions, and the support required and received for climate action.

This information supports evidence-based national decision-making and the timely submission of quality national reports.

The collection and reporting of climate information every two years, or at a higher frequency in the case of other national requirements, implies the possibility of relying on appropriate institutional arrangements. Thus, the proposed institutional arrangements should:

- be flexible and durable;
- contribute to a coherent and continuous flow of data;
- involve national and subnational expertise;
- enable good coordination between institutions;
- result in recurring, engaging and constantly improving results.

Their implementation should:

- build on existing national provisions by restructuring them in a way that serves efficiency.
- facilitate large data flows;
- ensuring the availability of expertise in preparing reports and informing stakeholders, including a wide range of organisations as shown in the graph below.

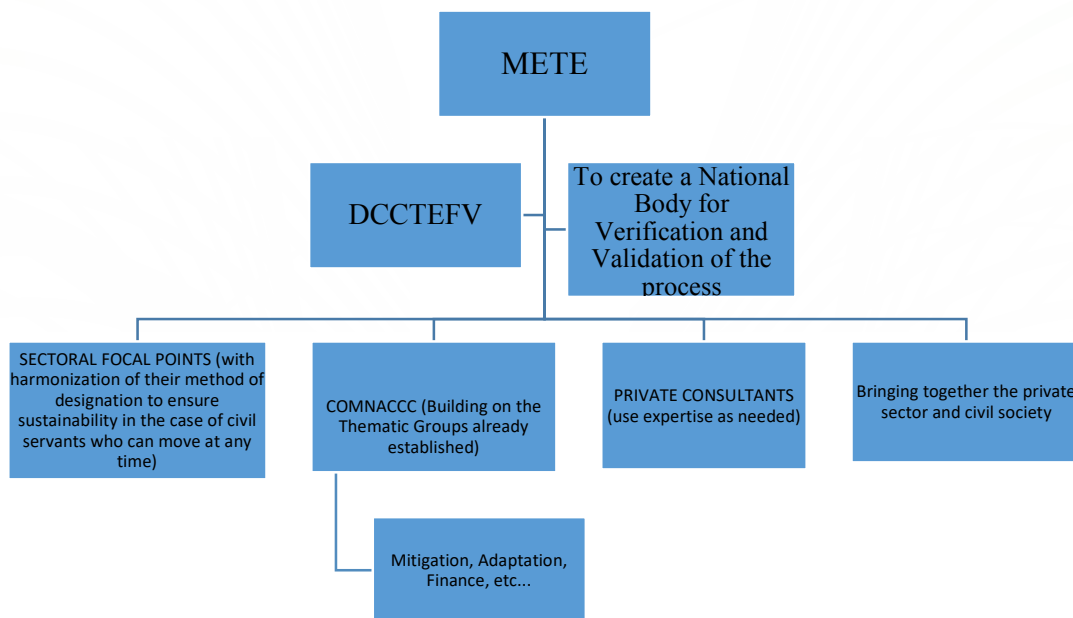


*Figure11: Provisional device of the national MRV framework*

Adopt legal texts of a very high level (decree) in order to formalize the institutional arrangements of the national MRV framework for a transition from the classic system of the convention to the transparency system resulting from the Paris Agreement.

## **CHAPTER II: National GHG inventory**

## CHAPTER II: National GHG inventory

### 1. Analysis of data collected by sector

The BUR1 inventories of Senegal were developed for the 1994–2018 time series by applying the 2006 Guidelines and the IPCC Software for National GHG Inventories. The activity data used were collected, as a priority, from institutions (Ministry of Energy, National Electricity Company SENELEC, UGC, National Communications, 8 sectoral structures, etc.) and in national databases and then supplemented by data available at the international level in situations where national data do not exist. The emission factors used are mostly default factors available in the IPCC guidelines. GHG emissions and removals were calculated for the Energy, Industrial Processes and Product Use (IPPU), Agriculture, Forestry and Other Land Use (AFAT) and Waste sectors and for the following gases: carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), substitutes for ozone-depleting substances (in particular HFC134a), carbon monoxide (CO), nitrogen oxides (NO<sub>x</sub>) and non-methane volatile organic compounds (NMVOCs).

### 2. Presentation of the methodology

This report covers the Energy, PIUP, AFAT and Waste sectors.

The emissions inventory was carried out through a series of steps and using a range of data from a variety of sources. The estimation of emissions and removals used a combination of:

- a) Country-specific activity data (in the absence of national statistics, data from international bodies on the country were used, e.g. FAO data to supplement the AFAT sector inventory);
- (b) IPCC 2006 methodologies (2006 guidelines and the 2006 IPCC tool)
- (c) Emission factors (EF) from the IPCC database.

#### **Choice of emission calculation level**

In accordance with the 2006 IPCC Guidelines and the 2006 IPCC software, for all source categories considered, the Tier 1 method is used for GHG emissions estimates except for the "mineral industry" category. The presence of activity data on clinker production and the national emission factor led to the use of the Tier 2 method. The general IPCC equation for estimating emissions is given in the box below.

$$\text{Emissions (E)} = \text{Activity Data (AD)} \times \text{Emission Factor (EF)}$$

#### **Global Warming Potential (GWP)**

In accordance with decision 5/CP.13 (annex relating to the assessment of the 4th IPCC Report), the global warming potentials by 100<sup>12</sup>used are: 1; 25 and 298 respectively for CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O.

*Painting3: GWPs in the 4th IPCC report*

| Ranking   | Designation    | Chemical Formula | PRG at 100 years old |
|-----------|----------------|------------------|----------------------|
| Main GHGs | Carbon dioxide | CO <sub>2</sub>  | 1                    |
|           | Methane        | CH <sub>4</sub>  | 25                   |
|           | Nitrous oxide  | N <sub>2</sub> O | 298                  |

### 3. Greenhouse Gas Inventory Results

Estimates of greenhouse gas emissions and removals are distributed across the following sectors:

- Energy ;
- Industrial Processes and Product Use (PIUP);
- Agriculture, Forestry and Other Land Use (AFAT); and
- Waste.

The gases concerned number eight (8), including four (4) direct gases and four (4) indirect gases.

For direct gases:

- CO<sub>2</sub>: carbon dioxide;
- CH<sub>4</sub>: methane;
- N<sub>2</sub>O: nitrous oxide or nitrous oxide.
- HFC: Hydrofluorocarbons

For indirect gases:

- NO<sub>x</sub>: nitrogen monoxide
- CO: carbon monoxide;
- COVNM: Non-Methane Volatile Organic Compounds;
- SO<sub>2</sub>: Sulfur dioxide.

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<sup>12</sup>AR4: The GWP of these gases are indicated in the GWPs 100 table

### 3.1. Distribution of GHG emissions for the year 2018

The overall net greenhouse gas emissions at the national level for the year 2018 are estimated at 24403.13 Gg eqCO<sub>2</sub>. The energy sector represents 9618,33 Gg CO<sub>2</sub> eq. all gases combined (CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O); Waste 1681.20 Gg CO<sub>2</sub> eq. and the PIUPs 3173.67 Gg Co<sub>2</sub> eq. (Figure 12). The graph below shows the distribution of emissions by sector excluding AFAT as a percentage of total gases emitted for the year 2018.

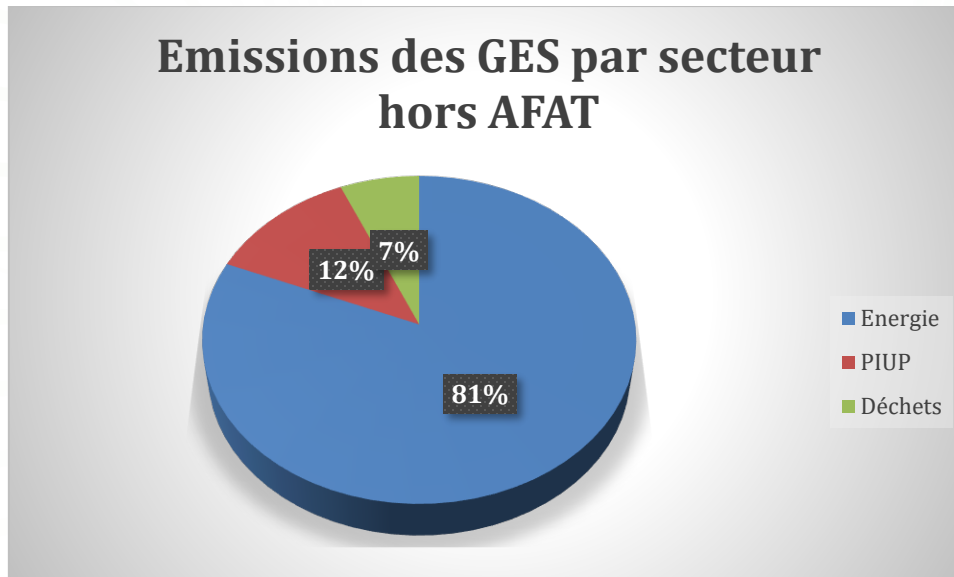


Figure12: Distribution of GHG emissions for the year 2018

### 3.2. National overall emissions/absorptions from 1994 to 2018

The overall emissions/removals from 1994 to 2018 by year and by sector are presented in the annex according to the simplified reporting framework contained in the 2006 Guidelines, Volume 1; Chapter 8 (Annex 1.1.). This table reports all the results over the period (1994-2018) with the IPCC2006 software. Slight differences may be noted concerning the inventories from 1994, 2000 and 2005, which were carried out with the IPCC software revised version 1996. This is normal given the tools and data collections that have evolved in the meantime.

### 3.3. Gas emission analyses

In 2018, CO<sub>2</sub> emissions are estimated for the Energy sector at 9618,33 Gg and include Energy Industries (32.37%), Manufacturing Industries (32.07%), Transport (28.75%) and the rest (06.80%).

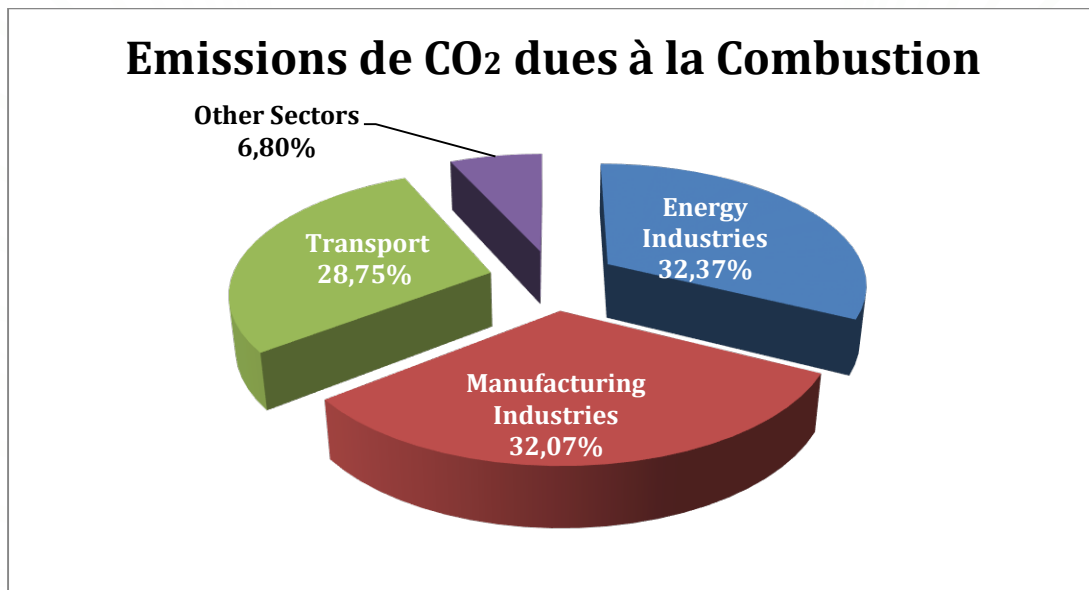


Figure13: Distribution of CO<sub>2</sub> emissions in the energy sector for the year 2018

For the same year, methane (CH<sub>4</sub>) emissions are estimated at 12.90 Gg CO<sub>2</sub> CH<sub>4</sub> distributed between the energy industries, manufacturing industries, transport and the rest as shown in the figure below.

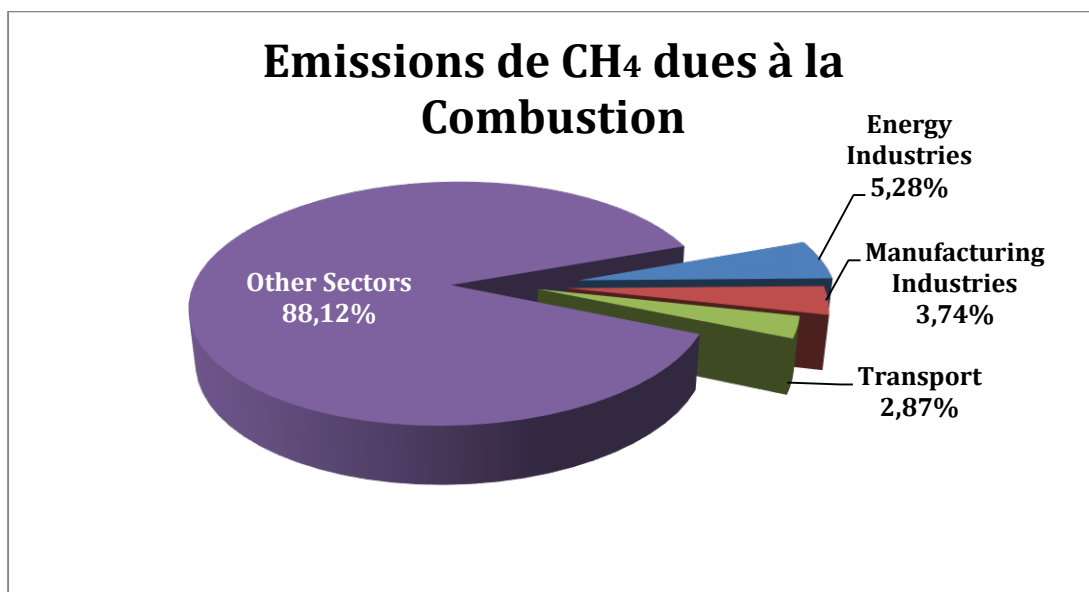


Figure14: Distribution of CH<sub>4</sub> emissions in the energy sector for the year 2018

Regarding N<sub>2</sub>O, in 2018 overall N<sub>2</sub>O emissions are estimated at 0.43 Gg N<sub>2</sub>O distributed between the sectors mentioned above as shown in the figure below.

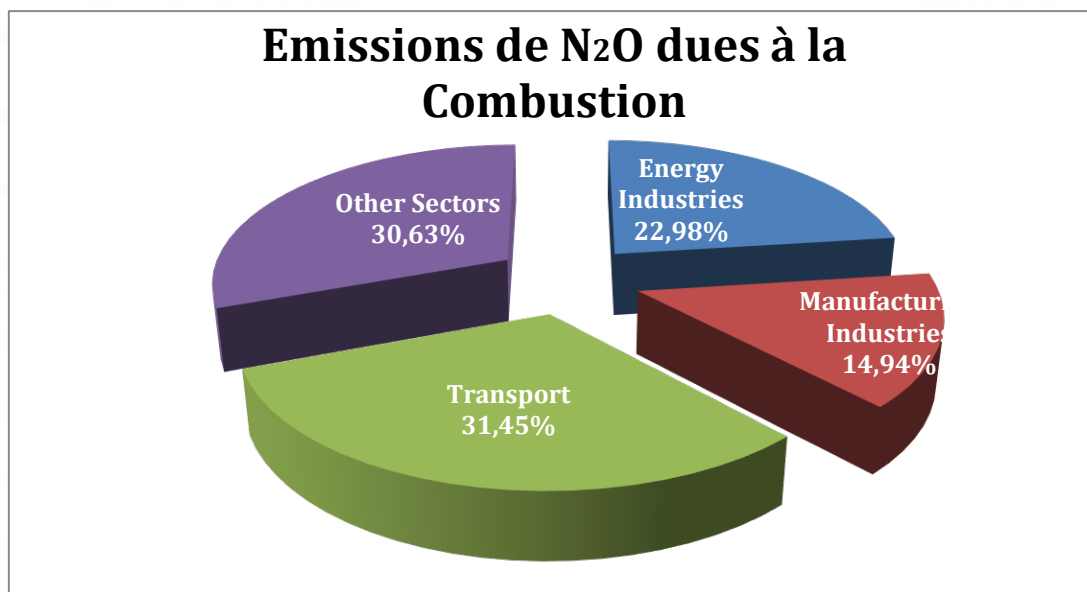


Figure15: Distribution of N<sub>2</sub>O emissions in the energy sector for the year 2018

### 3.4. Trend in emissions excluding emissions from forestry and other land use (FAT)

In 2018, overall emissions, without FAT but taking into account livestock, amount to 24,403.13 Gg Eq-CO<sub>2</sub> with 9,618.33 Gg Eq-CO<sub>2</sub> for the energy sector, 5,832.55 Gg Eq-CO<sub>2</sub> for livestock, 4,097.38 Gg Eq-CO<sub>2</sub> for aggregated sources, 3,173.67 Gg Eq-CO<sub>2</sub> for PIUP and 1,681.20 for waste, as shown in the figure below:

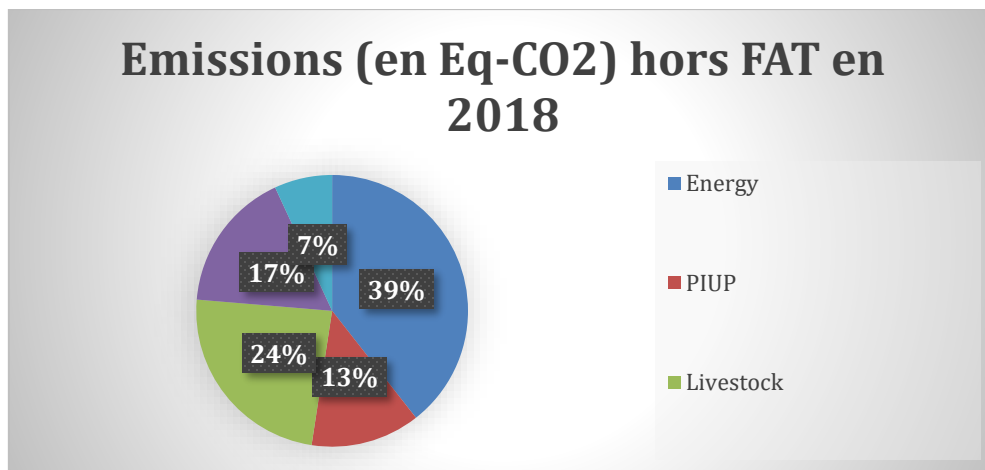


Figure16: Distribution of GHG emissions excluding FAT for the year 2018

### 3.5. Emissions trend by sector

#### 3.5.1 Energy

Figure 13 below shows the evolution of GHG emissions between 1994 and 2018 for the Energy sector. It can be seen that the dominant categories are the industry consumed in the energy sector, the manufacturing and construction industry and transport.

It is also generally observed that national emissions in the energy sector are increasing faster in the years after 2000, particularly for transport. This situation will probably change with the TER and the BRT. The manufacturing industry is in the same trend while waiting for the impact of the Diamniadio industrial park.

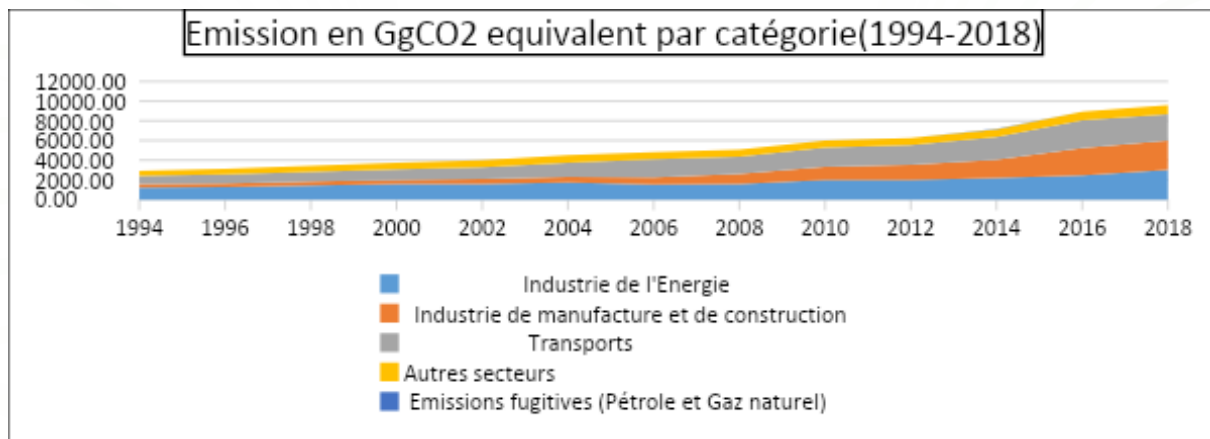


Figure17: Evolution of CO2 equivalent emissions between 1994 and 2018

### **Greenhouse gas emissions for the reference approach (according to the 2006 IPCC guidelines)**

The following table gives CO<sub>2</sub> emissions for the reference approach from 2010 to 2018.

CO<sub>2</sub> emissions are increasing with an average annual growth rate of 6.77% between 2010 and 2018.

*Painting4: CO<sub>2</sub> Emissions Reference Approach from 2010 to 2018*

| Fuel                      | Actual CO <sub>2</sub> Emissions (Gg CO <sub>2</sub> ) 2010 | Actual CO <sub>2</sub> Emissions (Gg CO <sub>2</sub> ) 2011 | Actual CO <sub>2</sub> Emissions (Gg CO <sub>2</sub> ) 2012 | Actual CO <sub>2</sub> Emissions (Gg CO <sub>2</sub> ) 2013 | Actual CO <sub>2</sub> Emissions (Gg CO <sub>2</sub> ) 2014 | Actual CO <sub>2</sub> Emissions (Gg CO <sub>2</sub> ) 2015 | Actual CO <sub>2</sub> Emissions (Gg CO <sub>2</sub> ) 2016 | Actual CO <sub>2</sub> Emissions (Gg CO <sub>2</sub> ) 2017 | Actual CO <sub>2</sub> Emissions (Gg CO <sub>2</sub> ) 2018 |
|---------------------------|-------------------------------------------------------------|-------------------------------------------------------------|-------------------------------------------------------------|-------------------------------------------------------------|-------------------------------------------------------------|-------------------------------------------------------------|-------------------------------------------------------------|-------------------------------------------------------------|-------------------------------------------------------------|
| Crude Oil                 | 1828,15                                                     | 2085,54                                                     | 2277,12                                                     | 2396,14                                                     | 1992,31                                                     | 3136,12                                                     | 3393,67                                                     | 3614,89                                                     | 3094,54                                                     |
| Motor Gasoline            | 83,19                                                       | 56,66                                                       | 148,69                                                      | 83,97                                                       | 263,77                                                      | 147,28                                                      | 135,70                                                      | 350,80                                                      | 408,42                                                      |
| Jet Kerosene              | -109,92                                                     | -172,37                                                     | -19,53                                                      | -6,03                                                       | -37,05                                                      | 124,00                                                      | 31,95                                                       | -237,60                                                     | 31,59                                                       |
| Gas/Diesel Oil            | 1114,94                                                     | 1315,51                                                     | 1024,20                                                     | 738,92                                                      | 1347,17                                                     | 1330,47                                                     | 583,21                                                      | 875,33                                                      | 1668,02                                                     |
| Residual Fuel Oil         | 1347,26                                                     | 934,94                                                      | 815,70                                                      | 988,70                                                      | 1561,79                                                     | 1618,28                                                     | 1763,85                                                     | 1709,95                                                     | 1854,67                                                     |
| Liquefied Petroleum Gases | 334,94                                                      | 296,93                                                      | 302,37                                                      | 285,32                                                      | 314,83                                                      | 350,50                                                      | 393,99                                                      | 529,24                                                      | 484,26                                                      |
| Naphtha                   | -92,89                                                      | -107,72                                                     | -180,66                                                     | -27,27                                                      | -219,54                                                     | -286,80                                                     | -316,24                                                     | -444,45                                                     | -284,53                                                     |
| Lubricants                | 166,34                                                      | 166,34                                                      | 166,34                                                      | 154,46                                                      | 155,49                                                      | 155,49                                                      | 155,49                                                      | 155,49                                                      | 155,49                                                      |
| Anthracite                | 753,06                                                      | 1053,59                                                     | 915,33                                                      | 917,21                                                      | 1263,62                                                     | 1589,75                                                     | 1933,82                                                     | 1912,10                                                     | 1819,61                                                     |
| Natural Gas (Dry)         | 56,22                                                       | 87,65                                                       | 89,57                                                       | 95,31                                                       | 80,96                                                       | 52,21                                                       | 48,50                                                       | 48,87                                                       | 25,47                                                       |
| Total                     | 5481,28                                                     | 5717,08                                                     | 5539,13                                                     | 5626,72                                                     | 6723,35                                                     | 8217,29                                                     | 8123,93                                                     | 8514,63                                                     | 9257,52                                                     |

### **Comparison of sectoral and reference approach emissions**

The table below shows the results of the comparison of CO<sub>2</sub> emissions between the reference approach and the sectoral approach, from 2010 to 2018.

Overall the percentage deviation is within the range of  $\pm 5\%$ .

*Painting5: Comparison of the benchmark approach and the sectoral approach from 2010 to 2018*

| Emissions GES(CO <sub>2</sub> ) | 2010    | 2011    | 2012    | 2013    | 2014    | 2015    | 2016    | 2017    | 2018    |
|---------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Approche par référence          | 5481,28 | 5717,08 | 5539,13 | 5626,72 | 6723,35 | 8217,29 | 8123,93 | 8514,63 | 9257,52 |
| Approche sectorielle            | 5633,12 | 5904,73 | 5837,73 | 5901,91 | 6691,35 | 7492,52 | 8480,03 | 8130,30 | 9163,06 |
| Ecart(%)                        | -2,70%  | -3,18%  | -5,11%  | -4,66%  | 0,48%   | 9,67%   | -4,20%  | 4,73%   | 1,03%   |

### **Analysis of the composition by type of gas and its evolution**

In 1994, the share of CO<sub>2</sub> was 90.56%, that of CH<sub>4</sub> 7.19% and that of N<sub>2</sub>O 2.25%, while for 2018, CO<sub>2</sub> represents 95.2%, that of CH<sub>4</sub> 3.38% and that of N<sub>2</sub>O 1.35%. We can thus see that CO<sub>2</sub> represents almost all emissions in the energy sector, with a share always higher than 90% overall over the period.

#### **3.5.2 Waste**

The results obtained from this inventory are quite exhaustive and concern all time series from 1994 to 2018. For the convenience of the presentation, we will focus much more on the results for the

year 2018 (Figure No. 18). The complete results of the entire series can be found in the mitigation chapter that follows.

### **GHG emissions from the waste sector (Gg eqCO<sub>2</sub>) in 2018**

Total GHG emissions from this waste sector (4) stabilize at 1681,20 Gg eqCO<sub>2</sub>, as shown in the following table. Solid waste disposal (4.A) produces the maximum with 809.26 Gg eqCO<sub>2</sub>, with the only GHG concerned being CH<sub>4</sub>.

Biological treatment of solid waste (4.B) produces 10,76 Gg eqCO<sub>2</sub>, mainly from CH<sub>4</sub> emissions (0,22 Gg eqCO<sub>2</sub>) and secondarily from NO<sub>2</sub> emissions (0,017 Gg eqCO<sub>2</sub>).

Waste incineration and open burning (4.C) provide a total of 170,99 Gg eqCO<sub>2</sub>, coming from the contribution of CO<sub>2</sub> (116,24 Gg eqCO<sub>2</sub>), CH<sub>4</sub> (1,24 Gg eqCO<sub>2</sub>) and N<sub>2</sub>O (0.029 Gg eqCO<sub>2</sub>).

Wastewater treatment and discharge (4.D) produces overall 690.19 Gg eqCO<sub>2</sub>

The following figure gives the relative proportions of emissions in 2018 according to subcategories and/or waste treatment methods.

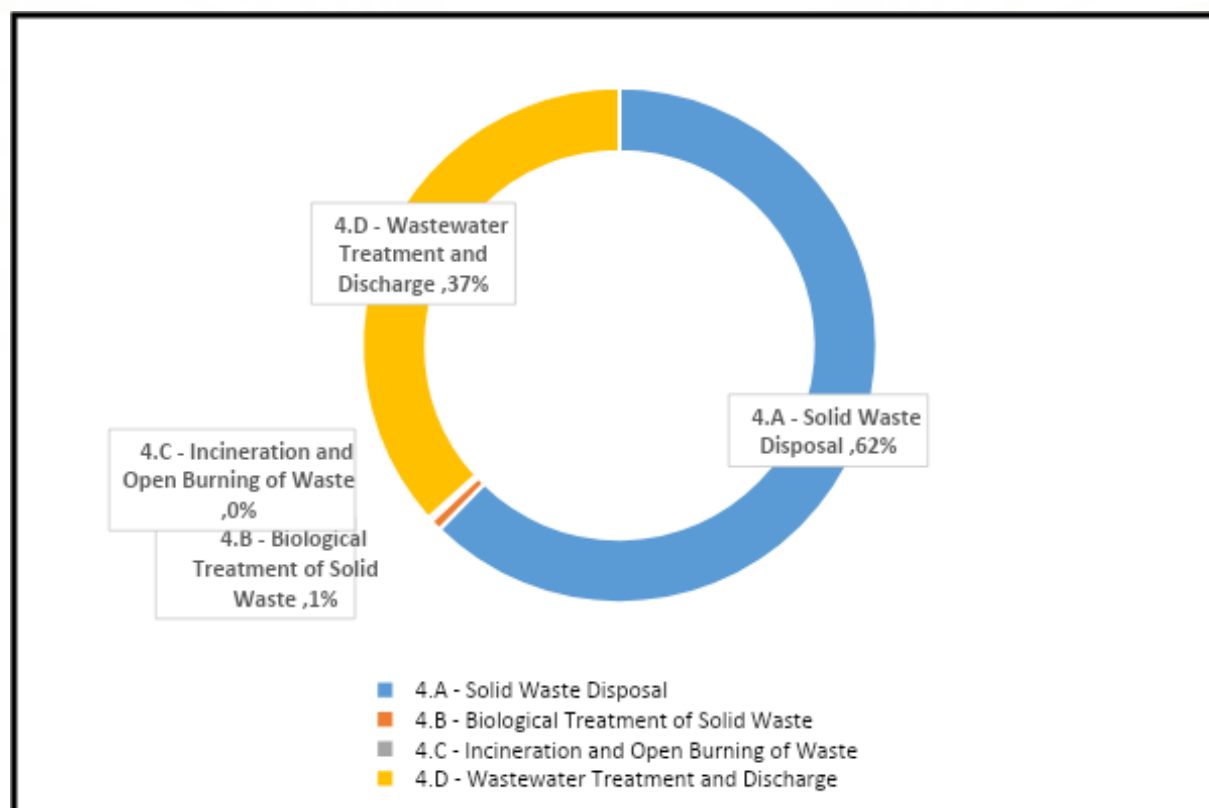


Figure18: GHG emissions (%) according to subcategories and/or treatment methods – 2018

## 3.5.3 Emissions in the Agriculture, Forestry and Other Land Use (AFAT) sector

### 3.5.3.1. Agriculture

In Senegal, greenhouse gas emissions from agriculture are estimated at 9926.97Gg Eq-CO<sub>2</sub> in 2018 (Table below) No. 6). These emissions have increased by more than 52.8% compared to 1994 (6493.09Gg Eq-CO<sub>2</sub>). This evolving trend in GHG emissions from the agricultural sector is mainly explained by the emission sources of enteric fermentation and the use of agricultural soils, which together contribute to more than 95% of the sector's total emissions.

We also note the evolution of emissions attributable to rice cultivation and the application of urea between 1994 and 2018. During this period, emissions from rice cultivation increased from 69.19 Gg Eq-CO<sub>2</sub> to 288.05 Gg Eq-CO<sub>2</sub>, or a relative variation of 316%. Emissions induced by the application of urea have increased significantly between 1994 and 2018. Indeed, they have increased from 2.13 Gg Eq-CO<sub>2</sub> to 46.57 Gg Eq-CO<sub>2</sub>. However, the absolute contribution of these emission categories to total emissions represents less than 2%.

*Painting6: Total Emission, n Gg CO<sub>2</sub> eq. (Agriculture)*

|                                                                                 | 1994           | 2000            | 2005            | 2010            | 2015           | 2018           |
|---------------------------------------------------------------------------------|----------------|-----------------|-----------------|-----------------|----------------|----------------|
| <b>3.A - Livestock</b>                                                          | <b>4031.59</b> | <b>4444.23</b>  | <b>4666.09</b>  | <b>5088.6</b>   | <b>5523.72</b> | <b>5832.55</b> |
| 3.A.1 - Enteric Fermentation                                                    | 3750.59        | 4113.97         | 4311.84         | 4694.47         | 5080.75        | 5355.05        |
| 3.A.2 - Manure Management                                                       | 280.99         | 330.26          | 354.24          | 394.13          | 442.97         | 477.5          |
| <b>3.C - Aggregate sources and non-CO<sub>2</sub> emissions sources on land</b> | <b>2463.11</b> | <b>6658.88</b>  | <b>5662.19</b>  | <b>5145.28</b>  | <b>4266.43</b> | <b>4097.38</b> |
| 3.C.1 - Emissions from biomass burning                                          | 647.12         | 4615.63         | 3462.43         | 2675.98         | 1431.33        | 993.97         |
| 3.C.2 - Liming                                                                  | NE             | NE              | NE              | NE              | NE             | NE             |
| 3.C.3 - Urea application                                                        | 2.13           | 3.47            | 24.01           | 24.93           | 41.77          | 46.57          |
| 3.C.4 - Direct N <sub>2</sub> O Emissions from managed soils                    | 1264.82        | 1410.22         | 1492.05         | 1643.53         | 1814.71        | 1934.74        |
| 3.C.5 - Indirect N <sub>2</sub> O Emissions from managed soils                  | 443.97         | 507.62          | 547.18          | 611.56          | 693.69         | 750.58         |
| 3.C.6 - Indirect N <sub>2</sub> O Emissions from manure management              | 35.89          | 45.18           | 49.48           | 58.26           | 73.72          | 83.47          |
| 3.C.7 - Rice cultivation                                                        | 69.19          | 76.77           | 87.03           | 131.02          | 211.21         | 288.05         |
| 3.C.8 - Other (please specify)                                                  | NA             | NA              | NA              | NA              | NA             | NA             |
| <b>3.D - Other</b>                                                              | <b>-1.61</b>   | <b>-1.86</b>    | <b>-2.1</b>     | <b>-2.41</b>    | <b>-2.73</b>   | <b>-2.96</b>   |
| 3.D.1 - Harvested Wood Products                                                 | -1.61          | -1.86           | -2.1            | -2.41           | -2.73          | -2.96          |
| <b>Total Emission (Agriculture)</b>                                             | <b>6493.09</b> | <b>11101.25</b> | <b>10326.18</b> | <b>10231.47</b> | <b>9787.42</b> | <b>9926.97</b> |

The predominant share of methane is mainly linked to livestock through enteric fermentation, which is a key emission category. Indeed, other sources such as manure management and rice cultivation produce very little methane compared to the biological activity of animals, particularly ruminants. Similarly, the weight of enteric methane in total emissions can be explained mainly by the number of livestock and animal feeding practices. Indeed, livestock farming in Senegal is characterized by a low rate of livestock exploitation. Regarding feeding, the diet of ruminants is largely based on the use of natural fodder and crop residues. Ruminants transform these types of fodder into proteins (milk, meat) and organic manure.

In Senegal, direct restitution of animal manure on the ground is the most common manure management system. Indeed, ruminant farming on rangelands dominates. In this livestock system where manure is directly deposited on the ground, methane emissions are lower (aerobically),

unlike nitrous oxide emissions which can be very significant. With the very high global warming potential of nitrous oxide and the high animal density, it is obvious that the contribution of direct manure to total emissions is significant. However, it may be premature to draw definitive conclusions regarding the actual contribution of this category to total GHG emissions from agriculture. Indeed, large variations in emissions can be noted and the production of FE to estimate direct nitrous oxide emissions, particularly for the sub-Saharan African region, remains very limited. Also, the restitution of animal manure in these systems is not homogeneous. Animals are mobile in space and time. This mobility of herds allows them to play a very important role for these territories. Indeed, agricultural productivity in Africa is limited by factors such as the availability of nutrients (especially nitrogen) in cultivated soils. With limited access to mineral inputs in cultivated land, the restoration of soil fertility is mainly ensured by animal droppings directly returned to the soil by the herds, through the practice of penning animals on agricultural fields that will be cultivated the following rainy season.

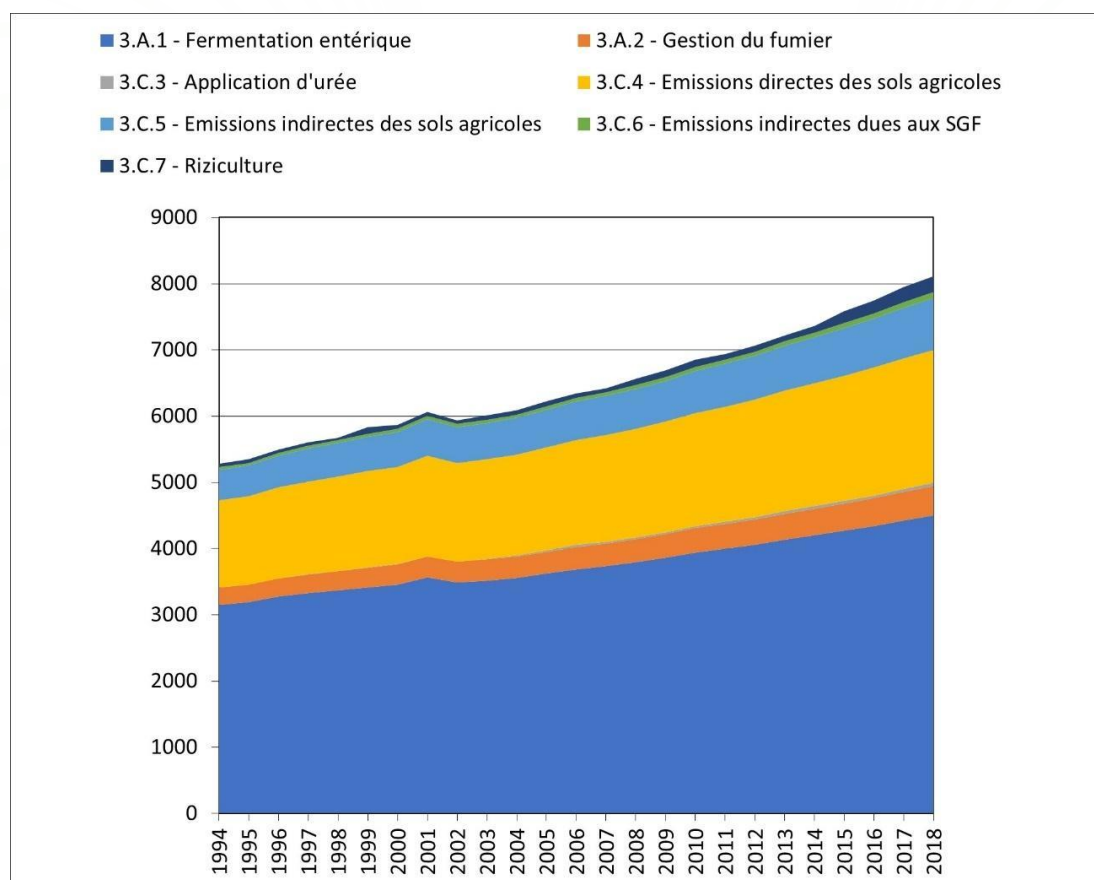


Figure19: Trend in national greenhouse gas emissions from agriculture (in Gg Eq. CO<sub>2</sub>)

Considering the main GHGs from agriculture, emissions from methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O) and carbon dioxide (CO<sub>2</sub>) increased from 3,347, 1,936 and 2 Gg Eq-CO<sub>2</sub> in 1994 to 4,960, 3,105 and 47 Gg Eq-CO<sub>2</sub> in 2018, respectively. However, the average contributions of gases to the total emission of the sector have varied very little over the same period. The low contribution of carbon dioxide is related to the fact that only emissions attributable to the application of urea were

accounted for. Other sources of CO<sub>2</sub> emissions are taken into account in the LULUCF sector, to avoid double accounting.

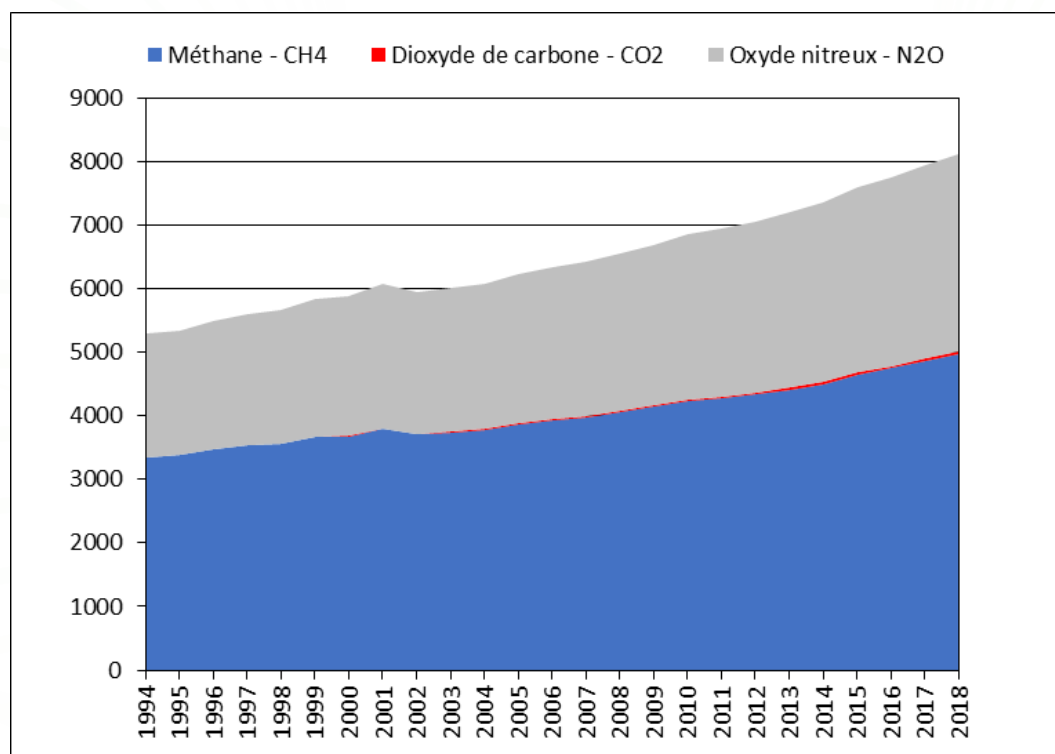


Figure20: Evolution of total greenhouse gas emissions from agriculture (in Gg Eq. CO<sub>2</sub>)

### 3.5.3.2. Emissions from Forestry and other Land Uses

The analysis of emissions from the FAT sector (UTCATF according to the old 1996 version) continues to present a carbon sink profile that evolves in a sawtooth pattern (Table No. 7).

The table below shows the results obtained from the IGES for the 1994-2018 series. We can see a fairly constant evolution of the country's absorption from 2000. It is in the range 21000 Gg eqCO<sub>2</sub> to more than 24000 Gg eqCO<sub>2</sub>. Enough to absorb almost all of the country's emissions.

The table could be a little more detailed by including a line on emissions related to fires and seq.

Table 7: Evolution of FAT GHGs from 1994 to 2018

|                                             | 1994      | 2000      | 2005      | 2010      | 2015      | 2018      |
|---------------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| <b>3.B – FAT<br/>(Gg eq CO<sub>2</sub>)</b> | -28347.08 | -21762.24 | -22127.23 | -22103,07 | -21525.74 | -24141.94 |

### 3.5.4 Industrial Processes and other Product Uses

Emissions in the PIUP sector are largely dominated by the mineral industry, particularly cement production. For the year 2018, PIUP emissions are estimated at 3173. 67 Gg CO<sub>2</sub> Eq. The comprehensive table of results is in the appendix.

### 3.6. Analysis of key categories

A key source category is a priority category in the national inventory system because its estimation has a significant effect on a country's total direct greenhouse gas inventory in terms of the absolute level of emissions and removals, the trend in emissions and removals, or the uncertainties associated with emissions and removals. When the term "key source category" is used, it includes both source and sink categories.

- Where possible, key source categories should be subject to further examination with respect to three important aspects of the inventory.
- Identifying key source categories in national inventories helps to prioritize the limited resources available to conduct inventories. In line with good practice, available resources will focus on improving data and methods related to the categories identified as key.

Regarding the key categories (Table 12 below), level 1 was applied, i.e. the accumulation of 95%. Thus, among the 13 categories that could be classified, the category of 'Remaining Forests of Forests' appears as the first key category followed by the category 'Enteric Fermentation' and the category 'Cement Works' comes in 3rd position, closely followed by 'Energy Industries' and 'Road Transport'.

Table 8: Analysis of key categories

| IPCC Category code | IPCC Category                     | Greenhouse gas                    | 2018Ex,t(Gg CO <sub>2</sub> Eq) | Ex,t (Gg CO <sub>2</sub> Eq) | ann F  | Cumulative Total of Column F |
|--------------------|-----------------------------------|-----------------------------------|---------------------------------|------------------------------|--------|------------------------------|
| 3.B.1.a            | Forest land Remaining Forest land | CARBON DIOXIDE (CO <sub>2</sub> ) | -24077.53                       | 24077.53                     | 0.49   | 0.49                         |
| 3.A.1              | Enteric Fermentation              | METHANE (CH <sub>4</sub> )        | 5355.05                         | 5355.05                      | 0.11   | 0.60                         |
| 2.A.1              | Cement production                 | CARBON DIOXIDE (CO <sub>2</sub> ) | 3109.46                         | 3109.46                      | 0.063  | 0.66                         |
| 1.A.1              | Energy Industries - Liquid Fuels  | CARBON DIOXIDE (CO <sub>2</sub> ) | 2825.18                         | 2825.18                      | 0.0578 | 0.72                         |

|              |                                                                 |                                        |               |               |             |             |
|--------------|-----------------------------------------------------------------|----------------------------------------|---------------|---------------|-------------|-------------|
| 1.A.3.b      | Road Transportation                                             | CARBON DIOXIDE (CO <sub>2</sub> )      | 2632.63       | 2632.63       | 0.053       | 0.77        |
| 1.A.2        | Manufacturing Industries and Construction - Solid Fuels         | CARBON DIOXIDE (CO <sub>2</sub> )      | 2416.98       | 2416.98       | 0.05        | 0.82        |
| 3.C.4        | Direct N <sub>2</sub> O Emissions from managed soils            | NITROUS OXIDE (N <sub>2</sub> O)       | 1934.74       | 1934.74       | 0.04        | 0.86        |
| 4.A          | Solid Waste Disposal                                            | METHANE (CH <sub>4</sub> )             | 809.26        | 809.26        | 0.02        | 0.88        |
| 3.C.5        | Indirect N <sub>2</sub> O Emissions from managed soils          | NITROUS OXIDE (N <sub>2</sub> O)       | 750.58        | 750.58        | 0.02        | 0.89        |
| 3.C.1        | Emissions from biomass burning                                  | METHANE (CH <sub>4</sub> )             | 681.95        | 681.95        | 0.014       | 0.91        |
| 1.A.4        | Other Sectors - Liquid Fuels                                    | CARBON DIOXIDE (CO <sub>2</sub> )      | 622.93        | 622.93        | 0.01        | 0.92        |
| 2.F.1        | Refrigeration and Air Conditioning                              | HFCs, PFCs                             | 575.14        | 575.14        | 0.0         | 0.93        |
| 4.D          | Wastewater Treatment and Discharge                              | METHANE (CH <sub>4</sub> )             | 543.65        | 543.65        | 0.01        | 0.94        |
| <b>1.A.2</b> | <b>Manufacturing Industries and Construction - Liquid Fuels</b> | <b>CARBON DIOXIDE (CO<sub>2</sub>)</b> | <b>497.33</b> | <b>497.33</b> | <b>0.01</b> | <b>0.95</b> |

#### 4. The uncertainties

Uncertainty estimation is an essential element of a comprehensive inventory of greenhouse gas emissions and removals. It should be carried out at both the national and trend estimation levels, as well as for the different components of the estimate such as emission factors, activity data and other estimation parameters for each category. Indeed, an uncertainty analysis should be seen, first and foremost, as a means to prioritize national efforts to reduce uncertainties in inventories in the future, and to guide decisions on methodological choices. Therefore, uncertainty assessment methods should be practical, scientifically sound, sufficiently robust to be applied to a variety of source-emission and sink-removal categories, methods and national circumstances, and presented in a form that is understandable to inventory users.

In Senegal, the assessment of uncertainties of source categories by sector, for the inventory as a whole, was developed from a Level 1 analysis based on error propagation equations. Indeed, in the Level 1 analysis, the uncertainty of emissions or removals can be propagated from the uncertainties of activity data, emission factors and other estimation parameters by the error propagation equation (Mandel, 1984, Bevington and Robinson, 1992). Thus, the uncertainty is estimated in two steps:

- the approximation of IPCC Equation 3.1 (Volume 1 Chapter 3: Uncertainties) to combine the ranges of emission factors, activity data and other estimation parameters by category and greenhouse gas:

$$I_{\text{totale}} = \sqrt{I_1^2 + I_2^2 + \dots + I_n^2}$$

Or

I total = percentage uncertainty of the product of quantities (half of the 95% confidence interval divided by the total);

In = percentage of uncertainty associated with each quantity

- the approximation of IPCC Equation 3.2 (Volume 1 Chapter 3: Uncertainties) to obtain the general uncertainty of national emissions and the trend in national emissions between the base year (1994) and the reference year (2018).

$$I_{\text{totale}} = \frac{\sqrt{(I_1 \bullet x_1)^2 + (I_2 \bullet x_2)^2 + \dots + (I_n \bullet x_n)^2}}{|x_1 + x_2 + \dots + x_n|}$$

Where I total = percentage uncertainty of the sum of quantities (half of the 95% confidence interval divided by the total);

Xn and In = Uncertain quantities and their respective percentage of uncertainty

Table 9: Uncertainty analysis

|                                   |  |
|-----------------------------------|--|
| <b>Total Uncertainties by GHG</b> |  |
|-----------------------------------|--|

|                                      | by weight (in %) | by trend (in %) |
|--------------------------------------|------------------|-----------------|
| CO2                                  | <b>31.51</b>     | 44.86682663     |
| CH4                                  | <b>12.99</b>     | 16.08           |
| N2O                                  | <b>13.00</b>     | 15.79           |
| other GES                            | <b>0.70</b>      | 0.75            |
| <b>Total Uncertainties by Sector</b> |                  |                 |
|                                      | by weight (in %) | by trend (in %) |
| Energy                               | <b>13.34</b>     | 16.54           |
| PIUP                                 | <b>3.70</b>      | 4.05            |
| AFAT                                 | <b>33.64</b>     | 47.13           |
| Waste                                | <b>2.71</b>      | 3.27            |

## 5. Quality Control and Quality Assurance

The data collected in the holding structures were reviewed by the expert group to check consistency. Errors were corrected with the data provider structures. In this validation process, data sources, references and documentation were checked. Incomplete data were corrected by applying data gap filling techniques (e.g. interpolation, extrapolation) recommended by the IPCC. The aim of this quality assurance step was to ensure that the data collected were the best available data before proceeding to the calculation of GHG emissions and removals.

Working sessions led by national and international experts were organized by the implementation of the initial BUR of Senegal around the following points: assumptions and criteria for data selection; possible transcription errors in the entry of reference data; accuracy of parameters, units used, emission calculations; data consistency between categories; consistency of time series; verification of completeness and trends, etc.

Regarding quality control, the team of national experts has developed in collaboration with the coordination unit a manual of procedures for quality assurance and quality control covering:

1. Verification of activity data, applied directly at the end of the data collection phase.
2. Verification of the accuracy of the calculation of emissions,
3. Verification of emission parameters and units;
4. Verification of the uncertainty assessment,

The lack of national data on emission factors led to the use of default values from the IPCC 2006 methodology guidelines.

The involvement of sector partners and their technical teams in the process of preparing the current inventory has led to the improvement of activity data and even for some methodological choices

(FAT, PIUP and Waste). These improvements have led to recalculations that have led to the changes listed below:

- Filling gaps in time series particularly for the FAT sector;
- Introduction of changes in the use of activity data conversion factors and appropriate emission factors due to the involvement of data holding institutions;
- Adoption of a new methodology for the collection of new activity data and emission factors;
- Substitution of expert judgment by consensus of sector teams;

### **Planned improvements**

For the next inventory, data improvement must go through:

The census of all operators operating in the sectors, particularly the FAT sub-sector and the energy sector, from 2020, in which the activity data are listed;

Maintaining a permanent activity of collecting and managing statistical data on waste management, land use, energy sector data.

Digging deepening regularly update the analysis of the composition of waste on a reliable scientific basis.

### **GHG inventory preparation process improvement plan**

As the process of preparing GHG inventories is a continuous activity, the country needs to move from the current task (or project) system to the establishment of a group of experts responsible for the preparation of the inventory. This group of experts should have an anchor point at the level of the Ministry in charge of the environment, sustainable development and ecological transition (METE) so that it can ensure the national coordination of the IGES. This will allow the DCCTEFV to have a fixed and permanent group that could work in an unlimited way on the preparation and improvement of GHG inventories. These experts will have the mandate to regularly collect from other national institutions the data and information necessary for the production of a transparent, complete and accurate inventory. This last task requires the establishment of a system for the exchange of information and coordination between the different institutions producing data through a national network of sectoral focal points involving all institutions producing and using activity data and the results of the GHG inventory. This advice must be formalized at the highest level (decree or order, etc.) clarifying roles and responsibilities and moving from the data exchange system to the obligation in time and format through a regulatory framework for data collection.

In this context, the national coordination must be provided with a sufficient budget line to take into account GHG inventories, allowing for a fixed and permanent group that could work in an unlimited manner on the preparation and improvement of GHG inventories.

## **6. Comparative evolution of emissions**

A comparison of the emission results of the four (4) years of inventories (see graph below) shows an increasing trend for the energy, AFAT and PIUP sectors. On the other hand, emissions from waste seem to follow an opposite trend that can be explained by a faster population growth than the growth in waste production since the collection system has been greatly improved in recent years.

In total, Senegal's emissions (national totals) have increased over time from 9,317.9 Gg Eq. CO<sub>2</sub> in 1994 to 22,387.43 Gg Eq. CO<sub>2</sub>, a multiplication of almost two and a half times (2.5 times) in just 30 years. However, it should be noted that this comparison is very relative if we consider that many

elements of comparison are missing. Indeed, it should be noted that there are shortcomings in data collection (data collection has been improved both in quantity and quality from year to year). It should also be noted that the emission factors used have been revised from one version of the tool used to another (IPCC versions revised in 1996 for the IGES years 1994 to 2005 and IPCC2006 version in 2018). Finally, it should be noted that the GWPs used (GWPs of the second IPCC report for the years 1994, 2000 and 2005 and GWPs of the fourth IPCC report for the year 2018) are different.

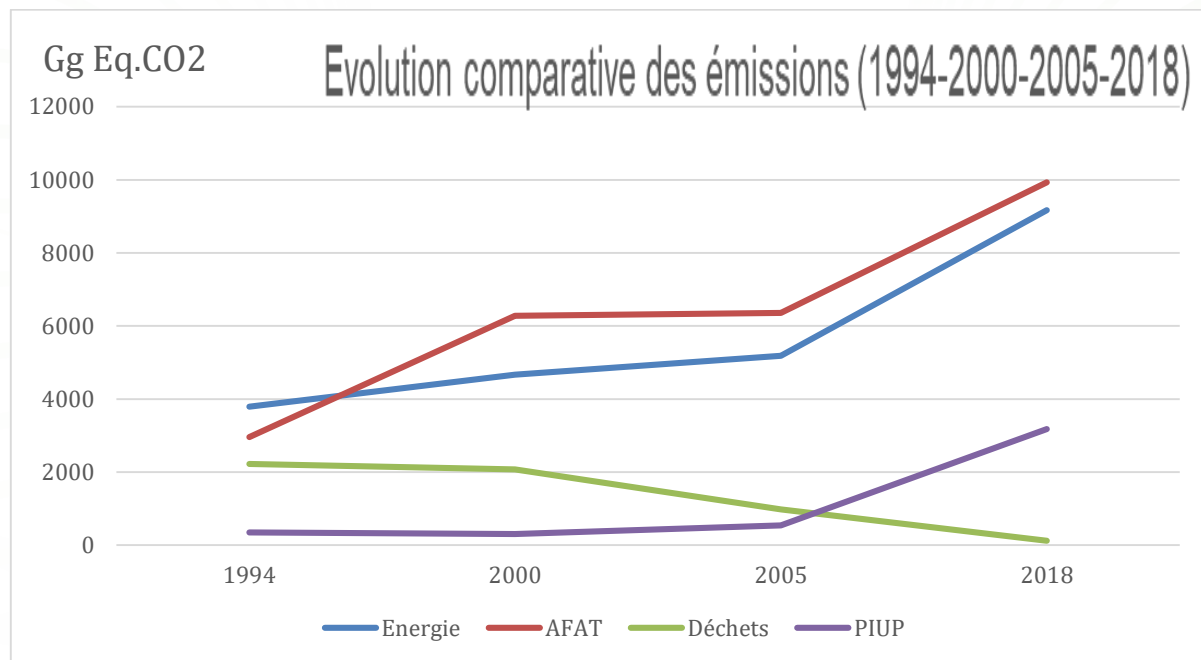


Figure21: Comparative evolution of emissions excluding absorption (1994-2000-2005-2018)

## **CHAPTER III: GHG Mitigation**

## **CHAPTER III: Mitigation of GHGs and their effects**

### **1. Introduction**

In the global effort to combat climate change, many of the mitigation measures implemented have a significant impact on the country's development with lasting impacts. These measures, which are mainly a combination of several policy measures, affect most of the country's different development sectors. In accordance with decision 2/CP.17, Annex III, Section IV, Para.12 a – e, Senegal has identified, planned or is implementing a series of mitigation measures in the energy, agricultural, forestry, industrial and waste sectors.

Following a mitigation analysis approach, this chapter presents the results of technical work and collaboration with key structures and actors in the process at the national level. The said methodological approach includes, among other things, an analysis of the context of the sector in question, the choice of mitigation measures, the definition of the approach for estimating emission reductions and their effects.

### **2. Mitigation measures and their effects in the energy sector**

In 2018, net overall emissions at the national level and for the reference year 2018 are estimated at 28,688.207 Gg CO<sub>2</sub>eq corresponding to an increase of around 41.40% compared to emissions in 2010 estimated at 16,752 Gg CO<sub>2</sub>eq. Emissions from the Energy sector represent 33.53% in 2018. Similarly, The emission reduction targets for the energy sector are estimated at 10% in 2030 for the CDN (Unconditional) and 41.2% for the CDN+ (Conditional).

In this perspective, a series of measures are proposed and targeted to reduce this upward trend and contribute to the operationalization of the CDN. The contribution will be implemented mainly through the energy transition with the integration of renewable energies and the strengthening of energy efficiency in electricity production, in the industrial, transport and residential/tertiary sectors.

The public electricity production fleet is mainly thermal, representing 93% of installed capacity and the dominant fuel is fuel oil, at 75%. Furthermore, the recent assessment of the LPDSE 2019-2023 highlights the progress made in terms of access to electricity in the environment, increasing from 42.40% (2018) to 60.84% (2022). Consequently, additional efforts are more than necessary to achieve the intermediate objective of 75% access that was expected in 2022.

The tables present the targeted measures as well as information on the stage of implementation, the execution/planned duration and the quantitative GHG reduction targets. The detailed presentation of each measure can be found in Annex 2.

A national strategy for the sector has been developed and broken down around the following points:

- The development of the offer with new production capacities of up to 1,000 MW;
- Universal access to electricity for rural areas by 2025;
- Upgrading and developing the transport and distribution network

Table 10: Status of implementation of CDN measures for electricity production

| Commitment                                                                                   | Component     | Objective | Due date | Achievements |        |        |        |
|----------------------------------------------------------------------------------------------|---------------|-----------|----------|--------------|--------|--------|--------|
|                                                                                              |               |           |          | 2018         | 2019   | 2020   | 2021   |
| Total installed capacity in Senegal (excluding power plants decommissioned in 2020 and 2021) |               |           |          | 1179         | 1278   | 1222   | 1,335  |
| Installed Solar Capacity (MWc)                                                               | Unconditional | 235       | 2030     | 143          | 166    | 166    | 226    |
| Installed Wind Capacity (MW)                                                                 | Unconditional | 150       | 2030     | 0            | 51     | 158    | 158    |
| Installed Hydro capacity (MW)                                                                | Unconditional | 314       | 2030     | 75           | 75     | 75     | 75     |
| Total power injected into RI in EnR (MW)                                                     | Unconditional | 699       | 2030     | 218          | 292    | 399    | 459    |
| Penetration rate in renewable energy sources excluding hydro (%)                             | Unconditional | 13.68%    | 2019     | 12.1 %       | 17.0 % | 26.5 % | 28.8 % |
| Total installed power in SPV. Isolated excluding RI (MW)                                     | Unconditional | 6.18      | 2030     | 1.8          |        | 13.4   | 14.8   |
| Installed Solar Capacity (MWc)                                                               | Conditional   | 335       | 2030     |              |        |        |        |
| Installed Wind Capacity (MW)                                                                 | Conditional   | 250       | 2030     |              |        |        |        |
| Installed capacity in Biomass (MW)                                                           | Conditional   | 50        | 2030     |              |        |        |        |
| Installed capacity in CSP (MW)                                                               | Conditional   | 50        | 2030     |              |        |        |        |
| Total power injected into RI in EnR (MW)                                                     | Conditional   | 999       | 2030     |              |        |        |        |
| Replacement /Gas in thermal power stations (Fuel and Coal) (MW)                              | Conditional   | 600       | 2030     |              |        |        |        |
| Penetration rate in renewable energy sources excluding hydro (%)                             | Conditional   | 18%       | 2022     |              |        |        |        |
| Rural electrification by solar mini-grids (villages)                                         | Conditional   | 2292      | 2030     |              |        |        |        |
| Rural electrification by solar means SHS (Villages)                                          | Conditional   | 4353      | 2030     |              |        |        |        |

Source: Status of the implementation of the energy component of Senegal's NDC (UNDP & OFSARR, 2022)

In addition to these commitments, several projects have been initiated and are planned to strengthen universal access to electricity, in particular through:

- the development of off-grid renewable energies supported by ASER, ANER, IPPs, etc.

- projects to convert coal (425MW) and fuel oil (1302MW) to natural gas and new natural gas power plants

Annex No. 3 presents the list of projects initiated to strengthen universal access to electricity.

Domestic fuels (mainly charcoal and firewood) accounted for nearly 35% of household final energy consumption in 2016. Firewood and charcoal constituted more than 75% of household cooking energy sources.

The PSE, through the LPDSE, sets itself the objective of diversifying energy sources and promoting the use of wood and charcoal substitute products.

Measures for domestic fuels contribute to the preservation of forest resources, with the substitution of firewood and charcoal by sustainable sources and efficient cooking equipment.

Concerning the energy efficiency sub-sector, the national energy saving pool can be mobilized across all sectors, including in particular the establishment of an operational legislative and regulatory framework, actions to generalize efficient lamps (LBC and LED), the standardization and labeling of household and office appliances, and the sustainable management of public lighting. It will also involve making the program resulting from the Energy Management Strategy operational by 2030.

Painting7: Measuring the electricity, domestic fuels and energy efficiency subsectors

| Title of the mitigation measure                                                                         | Implementation stage<br>[Conceptual, planning phase, in execution, etc.] | Duration (20XX-20YY) / Phases (Phase 1, Phase 2, etc.) | Quantitative objectives (GHG-related or non-GHG impacts, as applicable)                                                                                                                       |
|---------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|--------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Electricity sub-sector</b>                                                                           |                                                                          |                                                        |                                                                                                                                                                                               |
| <b>CDN Options (EnR, Clean Cooking and Energy Efficiency)</b>                                           | Planned and implemented (unconditional)                                  | 2030                                                   | Energy sector: reduction of 10% (Unconditional) and 41.2% for the CDN+ (Conditional) compared to the BAU                                                                                      |
| <b>Other electricity production initiatives (Renewable Energy) supported by ANER, ASER, IPP, etc.)</b>  | Planned and in progress                                                  | 2030                                                   | 6,324,317 tCO <sub>2</sub> eq<br>2 2272363 tCO <sub>2</sub> eq<br>675 tCO <sub>2</sub> eq                                                                                                     |
| <b>new gas power plant projects and conversion of coal (425MW) and fuel oil (1302MW) to natural gas</b> | Planned and in progress                                                  | 2030                                                   | Coal conversion: reduction of 4,305,636 tCO <sub>2</sub> eq<br>Fuel oil conversion: Reduction of 2,441,076 tCO <sub>2</sub> eq<br>New Gas Natural power plants: 2,708,591 tCO <sub>2</sub> eq |
| <b>Domestic fuels subsector</b>                                                                         |                                                                          |                                                        |                                                                                                                                                                                               |
| <b>Diffusion of improved stoves (CDN)</b>                                                               | Under implementation                                                     | 2020-2030                                              | 800,000 improved stoves (IS) by 2030 (CDN) and 1,500,000 IS per year (CDN+)                                                                                                                   |
| Construction of a biodigester                                                                           | Under implementation                                                     | 2020-2030                                              | 27,000 biodigesters (CDN) and 48,000 (CDN+) in 2030                                                                                                                                           |
| <b>Energy efficiency sub-sector</b>                                                                     |                                                                          |                                                        |                                                                                                                                                                                               |
| <b>Energy saving and reduction</b>                                                                      | Implementation                                                           | 2020 -2030                                             | Reduction of 328,325 tCO <sub>2</sub> eq. per year<br>-rational energy consumption (672,028 GWh (CDN) and 3,402 GWh (CDN+) in 2030)<br>-Demand decrease of 126.8 MW (CDN) and                 |

|  |  |  |                         |
|--|--|--|-------------------------|
|  |  |  | 687.9 MW (CDN+) in 2030 |
|--|--|--|-------------------------|

As part of the monitoring of the implementation of the CDN's energy efficiency measures, several achievements have already been noted (Table No. 12).

*Table 12: Status of implementation of energy efficiency programs*

| <b>Current or planned activities</b>                                                                                     | <b>Status</b>             | <b>2021</b> | <b>Potential</b> | <b>Due date</b> |
|--------------------------------------------------------------------------------------------------------------------------|---------------------------|-------------|------------------|-----------------|
| Energy labeling of household appliances:<br>- ECOFRIDGES project which aims to replace existing cooling equipment (AEME) | 20,000 Pilot in progress, | Startup     | Nd               | 2030            |
| Energy savings on efficient general lighting (GWh) (AEME)                                                                | Pilots made               | 50,624      | Nd               | 2030            |
| Energy Efficiency Program in Buildings (eco-construction and equipment (effective) (Private Sector)                      | Pilots made               | Nd          | Nd               | 2030            |
| Energy Upgrade Program for Public Buildings and Stadiums (AEME)                                                          | Pilots made               | Nd          | Nd               | 2030            |
| Efficient Public Lighting Program (replacement of existing) (AEME)                                                       | Drivers                   | Nd          | Nd               | 2030            |
| Senelec MDE Program                                                                                                      |                           | Nd          | Nd               | 2030            |
| Cogeneration Projects (Private)                                                                                          | Current Pilots            | Nd          | Nd               | 2030            |
| PRODERE II Project (ANER-ANME)                                                                                           | In Preparation            | Nd          | Nd               | 2030            |

Source: Status of the implementation of the energy component of Senegal's NDC (UNDP & OFSARR, 2022)

### 3. Mitigation measures in the industrial sector

Senegal has just adopted an industrialization policy and strategy for 2021-2035, setting out a vision in line with the PSE and defined as follows: "A diversified and competitive industrial sector, providing jobs and making a full contribution to the inclusive and sustainable development of the country, for an emerging Senegal by 2035."

The contribution of industry to the total GDP in Senegal has fluctuated between 20 and 23% since Senegal's independence. Hence the PSE which emphasizes industrialization with in particular strategic choices which are directed towards:

- The development of platforms and industrial parks which should enable the upgrading of agricultural value chains and the development of a high-performance manufacturing industry;
- Better valuation of mining resources and the exploitation of new phosphate deposits, zircon, iron and gold.

In terms of mitigation potential, the industrial sector could record a reduction of 29% in 2030 (estimated at 2,387 Gg CO<sub>2</sub>) with the implementation of planned and ongoing measures.

*Painting8: Industrial sector mitigation measures*

| Title of the mitigation measure                               | Status                   | GHG<br>Avoided Gg CO <sub>2</sub> |
|---------------------------------------------------------------|--------------------------|-----------------------------------|
| <b>Regulations (Appro Studies, Periodic Audits, Controls)</b> | Immediate implementation | 324                               |
| <b>Put has LevelEnvironmental /Energy for businesses</b>      | Immediate implementation | 221                               |
| <b>Waste recovery in the agro-industry</b>                    | From 2020                | 457                               |
| <b>Energy Efficiency of Cement Plants</b>                     | From 2020                | 152                               |
| <b>Natural gas</b>                                            | From 2020                | 926                               |
| <b>Clinker Substitution</b>                                   | From 2020                | 415                               |
| <b>Total</b>                                                  | 222.2                    | 2,387                             |

*Source: NDC Implementation and Financing Strategy for the Industry Sector (2022)*

## 4. Mitigation measures in the transport sector

The “transport, post and telecommunications” sub-sector represented 22 to 23% of the tertiary sector between 2008 and 2012. The ten-year strategy 2014-2023 of the PSE under its Pillar 1 is based on “an efficient transport sector to support the transformation of production and growth”

The options proposed within the framework of the CDN contribute to strengthening the ambitious actions underway. They will allow:

- A global and lasting improvement in the conditions of population movement;
- A better contribution of the sub-sector to the growth and productivity of the national economy;
- A significant reduction in pollution and its negative impact on economic growth;
- A diversification of modes of transport with the use of rail and maritime transport.

Painting9: Transport mitigation measures

| Title of the mitigation measure                                                                                                                                      | Implementation stage<br>[Conceptual, planning phase, in execution, etc.] | Duration (20XX-20YY)/Phases<br>(Phase 1, Phase 2, etc.)                                                                                                                                                                                                                                                                         |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Tarin Regional Express (TER)</b>                                                                                                                                  | Implementation                                                           | - Reduction of 8500 tCO <sub>2</sub> /year<br>(sources: <a href="https://www.sec.gouv.sn/actions-et-realisations/infrastructures-tourisme-et-transport/train-express-regional-ter-dakar-aibd">https://www.sec.gouv.sn/actions-et-realisations/infrastructures-tourisme-et-transport/train-express-regional-ter-dakar-aibd</a> ) |
| <b>Bus Rapid Transit</b>                                                                                                                                             | Under implementation                                                     | -                                                                                                                                                                                                                                                                                                                               |
| <b>The renewal (replacement) of obsolete Ndiaga Ndiaye rapid and coach vehicles</b><br><b>public transport by new (rejuvenated) less energy-intensive minibuses.</b> |                                                                          | -                                                                                                                                                                                                                                                                                                                               |
| <b>The renovation of railway cars intended for public transport</b>                                                                                                  |                                                                          |                                                                                                                                                                                                                                                                                                                                 |

## 5. Mitigation measures and the effects of the agricultural sector

Several projects have been identified in the agricultural sector that could impact Senegal's carbon footprint. However, the major difficulty is that these projects have not been clearly documented in the sections used to inform the Ex-Act tool. Most of the projects are implemented by the MAER, but there is only the project data sheet on the ministry's website. Also, the reports are not always available on most project sites.

### Data

The data collection matrix was designed to be able to inform the Ex-Act tool and allow the calculation of emissions and sequestrations of each component. The types of data used depend on the project components and concern agricultural data, land use change (deforestation, afforestation, other land use changes), degradation and management (of forests), grazing and livestock, coastal wetlands, inputs and investments and finally fisheries and aquaculture. These data are used in one or more modules of the Ex-Act tool, depending on the project components. As part of this work, priority is given to project actions that have an impact on mitigation, in order to highlight the State's efforts in reducing greenhouse gas emissions.

Table No. 17 presents the targeted measures as well as information concerning the stage of implementation, the execution/planned duration and the quantitative GHG reduction objectives; the detailed presentation of each measure can be found in Annex 2 reserved for mitigation.

*Painting10: Summary of mitigation measures in the agricultural sector*

| <b>Title of the mitigation measure</b>                                                                                                                | <b>Implementation stage [Conceptual, planning phase, in execution, etc.]</b> | <b>Duration (20XX-20YY)/Phases (Phase 1, Phase 2, etc.)</b>                        | <b>Quantitative objectives (GHG-related or non-GHG impacts, as applicable)</b>                                       |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| <b>Development of rain-fed rice cultivation in combination with better management of agricultural practices, fertilizer use, water and manure use</b> | Running                                                                      | Phase 1: 2014- 2019<br>Phase 2: PDVCR, 2020-2024<br>with capitalization until 2035 | Reduction of 2,856,953 tCO <sub>2</sub> Eq over the period 2014-2035,<br>-Produce 1,600,000 tonnes of paddy per year |
| <b>Promotion of irrigation practices that promote efficient water use in annual crops</b>                                                             | End of execution                                                             | 2014-2021                                                                          | Sequestration of 319,747 t CO <sub>2</sub> eq                                                                        |
| <b>Management of meadows and pastures</b>                                                                                                             | End of execution                                                             | 2014-2021                                                                          | Sequestration of 3,065,153 t CO <sub>2</sub> eq                                                                      |
| <b>Reforestation and GDT</b>                                                                                                                          | End of execution                                                             | 2014-2021                                                                          | Sequestration of 3,897,147 t CO <sub>2</sub> eq                                                                      |
| <b>Assisted Natural Regeneration</b>                                                                                                                  | In progress                                                                  | 2015-2030                                                                          | 1186548 tCO <sub>2</sub> eq (59,327 tCO <sub>2</sub> eq avoided per year)                                            |
|                                                                                                                                                       |                                                                              |                                                                                    |                                                                                                                      |

In summary, it is important to emphasize that the measures presented in this table are mainly limited to the PDIDAS project (Sustainable and Inclusive Agri-Food Development Project of Senegal) because the calculation of the emission reduction potential is carried out only with the said project. Therefore, it seems appropriate to broaden the identification of other projects and measures but also and above all their mitigation potential to complete the BUR of this very important sector.

This represents a niche to be developed in the next report. In this sense, the supervisory ministry has developed and is implementing important programs and projects (PNIASAN, PARFA, PAFA, PIESAN, etc.) including relevant mitigation measures including agroforestry, solar pumping, RNA, etc. and multiple adaptation benefits (eg: short-cycle varieties, agroecological practices, etc.).

## 6. Mitigation measures in the forest sector

With extensive experience in natural resource management, Senegal has implemented a range of policies and measures to ensure the integrity and sustainable management of the national forest domain.

From 1994 to 2018, this policy was reinforced mainly through initiatives such as:

- Strengthening measures for the conservation of natural resources through protected areas (national parks, reserves, classified forests, community marine protected areas (AMCP), and community nature reserves (RNC), biodiversity nature reserves (RNB) and other related territories);
- **Conducting large-scale land defense and restoration/water and soil conservation operations (reforestation, land defense, physical soil restoration, etc.);**
- The domiciliation of forest exploitation in forest areas.
- The Great Wall of regional scope

Conducting early burning activities (management fires) in all vulnerable regions to limit the scale and intensity of late fires which have the particularity of being more devastating was put in place.

Table 18 presents the targeted measures as well as information regarding the stage of implementation, the execution/planned duration and the quantitative GHG reduction objectives.

*Painting 11: Summary of mitigation measures in the forestry sector and land use*

| <b>Title of the mitigation measure</b>                                                                                                                  | <b>Implementation stage<br/>[Conceptual, planning phase, in execution, etc.]</b> | <b>Duration (20XX-20YY)/Phases (Phase 1, Phase 2, etc.)</b> | <b>Quantitative objectives (GHG-related or non-GHG impacts, as applicable)</b>                                                                                                                    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|-------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Management policy for classified forests and other similar forest areas                                                                                 | Running                                                                          |                                                             |                                                                                                                                                                                                   |
| Conducting large-scale land defense and restoration operations/water and soil conservation (reforestation, protection, physical soil restoration, etc.) | In progress                                                                      | 2030                                                        | Create a long plant barrier between the 100 and 400 mm isohyets over a length of at least 7000 km along the Sahel and a width of approximately 15 km<br><br>100 million hectares of land restored |
| <b>Large-scale mangrove restoration project in Senegal</b>                                                                                              | Running                                                                          | 2030                                                        | Restore 7,920 ha of mangrove forest to store 500,000 tonnes of tCO <sub>2</sub> eq                                                                                                                |

|                                                                                                                                                                       |         |  |                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Sustainable development and management of forest resources (PROGEDE II)</b>                                                                                        | Running |  | Development of 300,000 ha of community forests in the Tamba and Kolda regions                                                                                                                                                                                                                                                                                                                                        |
| <b>Conducting early burning activities (management fires)</b>                                                                                                         | Running |  | <p>To reduce the potential impact of late fires by 2 to 3 times less.</p> <p>Over the period 1994 to 2018 (25 years), the statistics for bushfires and management fires (early fires) are as follows:</p> <ul style="list-style-type: none"> <li>- Bush fires: 4,058,824 ha (i.e. 162,353 ha/year on average);</li> <li>- Management fires (early fires): 16,450,659 ha (i.e. 658,026 ha/year on average)</li> </ul> |
| <b><i>Conducting large-scale land defense and restoration operations/water and soil conservation (reforestation, protection, physical soil restoration, etc.)</i></b> | Running |  | Create a long plant barrier between the 100 and 400 mm isohyets over a length of at least 7000 km along the Sahel and a width of approximately 15 km                                                                                                                                                                                                                                                                 |

Considering the importance of the achievements made by state services, an additional exercise of calculating emission reductions or avoidances will be necessary and will also make it possible to take into account the initiatives of community actors in terms of management, restoration and conservation of forest and terrestrial ecosystems.

## 7. Waste sector mitigation measures

Emissions estimated at 1,345.89 Gg CO<sub>2</sub>eq in 2018 will almost double in 2030 taking into account projections of population growth.

Detailed information on emissions projections up to 2030 is presented in the following table:

Painting12: Projection of GHG emissions in Gg Eq.CO<sub>2</sub> in the waste sector

| Years | 2010 | 2015 | 2020 | 2025 | 2030 |
|-------|------|------|------|------|------|
| Waste | 1820 | 2061 | 2081 | 2189 | 2575 |

As such, the NDC and other initiatives already provide information on the efforts already undertaken to mitigate or avoid GHG emissions from the sector in question. Table 10 presents the targeted measures as well as information on the stage of implementation, the execution/planned duration and the quantitative GHG reduction targets. The detailed presentation of each measure can be found in Annex 2.

Painting13: Summary of mitigation measures in the waste sector

| Mitigation measures                                                                     | Specific objectives                                                                                                                                                                                                                                                                                                                                                                                                            | Status (planned/in progress/implemented) | Effects                                                                                                                                                                                                             | Comments |
|-----------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| <b>1. Development of the organic waste recovery strategy in Senegal – biogas sector</b> | <ul style="list-style-type: none"> <li>- Mapping and quantifying the organic waste deposit</li> <li>- Identify and compare methanization technologies in Senegal</li> <li>- Propose an action plan for the development of the organic waste recovery sector in Senegal</li> <li>- Identify the technical and technological gaps in the sector</li> <li>- Propose a financing plan for the development of the sector</li> </ul> | executed                                 | Within the regulatory and institutional framework – the development of the strategy has enabled the identification of a portfolio of projects dedicated to the treatment and recovery of organic waste into biogas. |          |

|                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                    |                                                                                                                                                                                                              |  |
|-----------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <b>2. The creation of the national integrated waste management company (SONAGED SA)</b> | <ul style="list-style-type: none"> <li>- Merge the interventions of the Waste Management Coordination Unit (UCG) and all the projects and programs of the State of Senegal in the solid waste management sector</li> <li>- Creating an ecosystem for the industrialization of waste through the impetus of the circular economy</li> <li>- Involve the population and all stakeholders to adopt a new culture of cleanliness</li> </ul>                                                                        | <p>executed</p>    | <p>The creation of SONAGED has the effect of institutional stabilization of the solid waste management sector; a guarantee of all development of projects and structuring infrastructures in the sector.</p> |  |
| <b>3. The development of the orientation law for the waste management sector</b>        | <ul style="list-style-type: none"> <li>- Propose an appropriate regulatory framework for effective management of integrated solid waste management</li> <li>- Define the roles and responsibilities of all stakeholders in the solid waste management sector as well as all related functional relationships.</li> <li>- Define key technological directions for the collection, transport and treatment of solid waste</li> <li>- Define an information, communication and education framework for</li> </ul> | <p>In progress</p> | <p>The creation and promulgation of the framework law will make it possible to define and establish all GHG reduction interventions in the waste management sector.</p>                                      |  |

|                                                                                                                          |                                                                                                                                                                                                                                                |             |                                                                                                                                                                     |                                                                                                                                                              |
|--------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                          | <ul style="list-style-type: none"> <li>- the promotion of eco-citizenship</li> <li>- Drive innovation, development, wealth creation and jobs in the sector.</li> </ul>                                                                         |             |                                                                                                                                                                     |                                                                                                                                                              |
| <b>4. The construction of three CIVD (integrated waste recovery centres) and 34 PRN (standardised collection points)</b> | <ul style="list-style-type: none"> <li>- Building a technical landfill center in Touba</li> <li>- Building a technical landfill site in Kaolack</li> <li>- Building a technical landfill site in Tivaoune</li> </ul>                           | In progress | The operation of CETs reduces GHG emissions in relation to the reference scenario (fly-tipping)                                                                     | The centres have not yet been put into operation                                                                                                             |
| <b>5. Construction of a plastic waste treatment unit in Touba</b>                                                        | <ul style="list-style-type: none"> <li>- Collecting plastic waste in Touba</li> <li>- Treating plastic waste</li> <li>- Create a community dynamic for the collection and recovery of plastic waste</li> </ul>                                 | executed    | Reducing emissions from plastic waste burned in fly-tipping and the plastic hazard causing environmental problems                                                   | The processing unit is not yet in operation                                                                                                                  |
| <b>6. Development of the training plan for sector stakeholders</b>                                                       | <ul style="list-style-type: none"> <li>- Professionalizing the stakeholders involved in the solid waste management sector</li> <li>- Driving innovation through R&amp;D and the involvement of universities and research institutes</li> </ul> | executed    | The effective organization of the sector's players to create good synergy in the effective management of the role and responsibilities of the sector's stakeholders | This ensures that the sensitivity of issues relating to the implementation of mitigation measures across all initiatives is addressed from project planning. |

Source: Report on mitigation measures and support for the waste subsector (2023)

To improve the analysis of waste mitigation measures, more information is needed on their level of implementation and reduced emissions.

## **CHAPTER IV: Funding received and necessary requirements**

## Chapter IV: Funding received and necessary requirements

Senegal continues to mobilize the necessary resources from several donors to help meet the additional cost in the fight against climate change. The resources that the country has committed to raise include the needs for technology transfer, technical assistance, financial assistance in the country and at the sub-regional and international levels. Information on the financial and non-financial resources mobilized for the period 2018-2025 are presented in the tables below. The information has been presented in the form of components according to the pillars, axes and components by axis. Senegal also recognizes that its capacity to transparently monitor and report on financial and non-financial flows received from development partners will not only serve to report to the secretariat, but will also strengthen its development cooperation relations with its donors. This information especially highlights the additional resources that the country will need to effectively combat the adverse effects of climate change.

*Painting14: Needs 2018 – 2025*

|                                                                                                                                                         |                          |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| <b>PILIER I : ATTENUATION</b>                                                                                                                           |                          |
| <b>AXE 1 : ENERGIE ET INVESTISSEMENT SOBRE EN CARBONE</b>                                                                                               |                          |
| <b>Composante 1.1. : production et accès à l'énergie à faible émission</b>                                                                              |                          |
| <b>Total composante 1.1.</b>                                                                                                                            | <b>1 360 281 528 USD</b> |
| <b>Composante 1.2. : Programme de Transports à faible émission</b>                                                                                      |                          |
| <b>Composante 1.2.</b>                                                                                                                                  | <b>186 300 000 USD</b>   |
| <b>Composante 1.3. : Promotion de l'efficacité énergétique</b>                                                                                          |                          |
| <b>Composante 1.3.</b>                                                                                                                                  | <b>195 886 419 USD</b>   |
| <b>AXE 2 : GESTION ET UTILISATION DURABLE DES TERRES ET DES FORETS (RENFORCEMENT DES STOCKS DE CARBONE)</b>                                             |                          |
| <b>Composante 2.1. : Gestion durable des forêts</b>                                                                                                     |                          |
| <b>Composante 2.1.</b>                                                                                                                                  | <b>270 749 760 USD</b>   |
| <b>PILIER II : ADAPTATION</b>                                                                                                                           |                          |
| <b>AXE 3 : RENFORCEMENT DE LA RESILIENCE DES COMMUNAUTES VULNERABLES ET PROTECTION SOCIALE</b>                                                          |                          |
| <b>Composante 3.1 : Renforcement de la sécurité alimentaire, sanitaire et de l'eau</b>                                                                  |                          |
| <b>Composante 3.1.</b>                                                                                                                                  | <b>599 192 748 USD</b>   |
| <b>Composante 3.2. : Protection des Moyens de subsistance des personnes et de résilience des couches vulnérables (Pertes et dommages/compensations)</b> |                          |
| <b>Composante 3.2.</b>                                                                                                                                  | <b>441 135 600 USD</b>   |
| <b>AXE 4 : RESILIENCE DES INFRASTRUCTURES, DES HABITATS ET DES ECOSYSTEMES NATURELS</b>                                                                 |                          |
| <b>Composante 4.1. : promotion d'un environnement durable de l'habitat et des infrastructures</b>                                                       |                          |
| <b>Composante 4.1.</b>                                                                                                                                  | <b>275 689 200 USD</b>   |
| <b>Composante 4.2. : Gestion et de restauration des Ecosystèmes et services éco systémiques</b>                                                         |                          |
| <b>Composante 4.2.</b>                                                                                                                                  | <b>106 903 245 USD</b>   |
| <b>PILIER III : GOUVERNANCE CLIMATIQUE INCLUSIVE</b>                                                                                                    |                          |
| <b>AXE 5 : RENFORCEMENT DE CAPACITES DU CADRE INSTITUTIONNEL</b>                                                                                        |                          |
| <b>Axe 5</b>                                                                                                                                            | <b>8 500 000 USD</b>     |
| <b>AXE 6 : GESTION DES CONNAISSANCES ET COMMUNICATION</b>                                                                                               |                          |
| <b>Axe 6</b>                                                                                                                                            | <b>2 400 000 USD</b>     |

Source: Diallo, SA; National Strategy for Mobilizing Climate Finance for the Public and Private Sectors; Jan. 2022

|                                                                                                                                                         |                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| <b>PILIER I : ATTENUATION</b>                                                                                                                           |                   |
| <b>AXE 1 : ENERGIE ET INVESTISSEMENT SOBRE EN CARBONE</b>                                                                                               |                   |
| <b>Composante 1.1. : production et accès à l'énergie à faible émission</b>                                                                              |                   |
| Composante 1.1.                                                                                                                                         | 1 360 281 528 USD |
| <b>Composante 1.2. : Programme de Transports à faible émission</b>                                                                                      |                   |
| Composante 1.2.                                                                                                                                         | 186 300 000 USD   |
| <b>Composante 1.3. : Promotion de l'efficacité énergétique</b>                                                                                          |                   |
| <b>Ligne d'action 1.3.1. : Développement et déploiement des équipements, matériaux et process à faible consommation carbone</b>                         |                   |
| Composante 1.3.                                                                                                                                         | 195 886 419 USD   |
| <b>AXE 2 : GESTION ET UTILISATION DURABLE DES TERRES ET DES FORETS (RENFORCEMENT DES STOCKS DE CARBONE)</b>                                             |                   |
| <b>Composante 2.1. : Gestion durable des forêts</b>                                                                                                     |                   |
| Composante 2.1.                                                                                                                                         | 270 749 760 USD   |
| <b>PILIER II : ADAPTATION</b>                                                                                                                           |                   |
| <b>AXE 3 : RENFORCEMENT DE LA RESILIENCE DES COMMUNAUTES VULNERABLES ET PROTECTION SOCIALE</b>                                                          |                   |
| <b>Composante 3.1 : Renforcement de la sécurité alimentaire, sanitaire et de l'eau</b>                                                                  |                   |
| Composante 3.1.                                                                                                                                         | 599 192 748 USD   |
| <b>Composante 3.2. : Protection des Moyens de subsistance des personnes et de résilience des couches vulnérables (Pertes et dommages/compensations)</b> |                   |
| Composante 3.2.                                                                                                                                         | 441 135 600 USD   |
| <b>AXE 4 : RESILIENCE DES INFRASTRUCTURES, DES HABITATS ET DES ECOSYSTEMES NATURELS</b>                                                                 |                   |
| <b>Composante 4.1. : promotion d'un environnement durable de l'habitat et des infrastructures</b>                                                       |                   |
| Composante 4.1.                                                                                                                                         | 225 689 200 USD   |
| <b>Composante 4.2. : Gestion et de restauration des Ecosystèmes et services éco systémiques</b>                                                         |                   |
| Composante 4.2.                                                                                                                                         | 106 903 245 USD   |
| <b>PILIER III : GOUVERNANCE CLIMATIQUE INCLUSIVE</b>                                                                                                    |                   |
| <b>AXE 5 : RENFORCEMENT DE CAPACITES DU CADRE INSTITUTIONNEL</b>                                                                                        |                   |
| AXE 5                                                                                                                                                   | 8 500 000         |
| <b>AXE 6 : GESTION DES CONNAISSANCES ET COMMUNICATION</b>                                                                                               |                   |
| AXE 6                                                                                                                                                   | 2 400 000 USD     |

Source: Diallo, SA; National Strategy for Mobilizing Climate Finance for the Public and Private Sectors; Jan..

So, overall, Senegal, in its strategy to combat the adverse effects of CC, will need more than 6billionsdollars as shown in the table below.

*Painting16: GCF country programme financing needs*

|                                                 |                          |
|-------------------------------------------------|--------------------------|
| <b>Total financement de la phase 2018- 2025</b> | 2 956 145 136 USD        |
| <b>Total financement de la phase 2026- 2030</b> | 3 447 038 500 USD        |
| <b>COÛT GLOBAL PROGRAMME PAYS</b>               | <b>6 403 183 636 USD</b> |

*Source: Diallo, SA; National Strategy for Mobilizing Climate Finance for the Public and Private Sectors; Jan. 2022*

We can add to these needs those expressed within the framework of the implementation of the CDN which can be summarized as follows:

*Painting17: CDN funding needs*

| <b>Résumé des objectifs de la CPDN /CDN</b> |                    | <b>Estimation des ressources en milliards USD</b> | <b>Ressources totales en milliards USD</b> |
|---------------------------------------------|--------------------|---------------------------------------------------|--------------------------------------------|
| <b>Conditionnel</b>                         | <b>Adaptation</b>  | <b>2,9</b>                                        | <b>8</b>                                   |
|                                             | <b>Atténuation</b> | <b>5,1</b>                                        |                                            |
| <b>Inconditionnel</b>                       | <b>Adaptation</b>  | <b>1,4</b>                                        | <b>4,8</b>                                 |
|                                             | <b>Atténuation</b> | <b>3,4</b>                                        |                                            |

*Source: Diallo, SA; National Strategy for Mobilizing Climate Finance for the Public and Private Sectors; Jan. 2022*

*Painting18: Mapping of total financing expressed in country programs (FVC) and*

|                                                                          |                           |
|--------------------------------------------------------------------------|---------------------------|
| <b>Financement CDN et Programme Pays</b>                                 | <b>Totaux</b>             |
| <b>Total financement du Programme Pays (partie intégrante de la CDN)</b> | <b>6 403 183 636 USD</b>  |
| <b>Total financement de la CDN</b>                                       | <b>13 000 000 000 USD</b> |
| <b>Coût global de la Stratégie</b>                                       | <b>13 000 000 000 USD</b> |

*Source: Diallo, SA; National Strategy for Mobilizing Climate Finance for the Public and Private Sectors; Jan. 2022*

## **CHAPTER V: Information on the National MRV**

## CHAPTER V: Information on the National MRV

### 1-Institutional context of the MRV system for mitigation and monitoring of the NDC

1.1-The institutional context of the MRV (Measurement, Reporting and Verification) system for mitigation and monitoring of the Nationally Determined Contribution (NDC) of Senegal is described as follows:

- International Frameworkl: The MRV system is established under the Paris Agreement to ensure transparency, accuracy, consistency, comparability and comprehensiveness of climate change actions and support. The Paris Agreement introduced an Enhanced Transparency Framework (ETF) for all parties, requiring a robust MRV system to track progress towards national greenhouse gas (GHG) emission reduction targets.
- National Framework: At the national level, Senegal has put in place various structures and policies to combat climate change, including the creation of the National Committee on Climate Change (COMNACC) and the development of its National Strategy for Economic and Social Development. These initiatives demonstrate Senegal's commitment to integrating climate issues into its national planning and management. The objective is to develop a national MRV system that integrates international requirements while being adapted to the specificities and needs of Senegal.
- Institutions Involved: Several government institutions are involved in the implementation and monitoring of the NDC and the MRV system in Senegal.

Thus, the institutional context of the MRV system for mitigation and monitoring of the NDC in Senegal is characterized by a commitment to meet international requirements while taking into account national specificities. This involves close collaboration between various government institutions, capacity building and the mobilization of international support to ensure the effective implementation of the MRV system.

#### 1.1.1 At the national level

An overview of institutions and sectors involved in mitigation efforts

- National and local governments: Play a crucial role in the development and implementation of policies and measures for climate change mitigation.
- Intergovernmental and regional organizations: Like the European Union, which is putting in place regulatory frameworks and initiatives to support mitigation at the regional level.
- Non-governmental organizations (NGOs): Play a role in awareness raising, research, and implementation of mitigation projects.
- Private sector and businesses: Engaged in the development and implementation of mitigation technologies and practices, often in response to political and economic incentives.
- Scientific community and research institutions: Provide data, analysis, and recommendations to inform mitigation policies and practices.
- Civil society and individuals: Participate through individual and collective actions aimed at reducing greenhouse gas emissions.

*Painting19: Institutional arrangement of the MRV system*

|                                  |                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------------------------|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Institutional Arrangement</b> | <b>Key institutions MNV Climate</b> | <ul style="list-style-type: none"> <li>● Ministry of Environment and Sustainable Development: in charge of the development of the national MRV Climate system through the Climate Change Division.</li> <li>● National Committee on Climate Change (COMNACC): created by decree 2011-1689 of 03.2011. Plays a role of information, awareness, training, facilitation in the design, financing, implementation, validation and monitoring of national, sub-regional and regional climate programs and projects.</li> </ul> |
|                                  | <b>Subnational Activities</b>       | <ul style="list-style-type: none"> <li>● COMRECC: Regional version of COMNACC (exists in the decree) and implemented in the 14 regions. COMRECC is the institution dedicated to the management of climate actions with local communicators at the subnational level.</li> <li>● Many actions are implemented by non-state actors. The national climate MRV system will attempt to ensure their mapping and monitoring of their implementation.</li> </ul>                                                                 |

### 1.1.2 At the sector level

The implementation of an MRV system at the sectoral level is still embryonic and the integration of the dimension of monitoring mitigation measures remains timid.

- **Energy sector:** Including energy production and consumption, the transition to renewable energy, energy efficiency, and energy demand management.

The institutional framework of the energy sector in Senegal is mainly defined and managed by the Ministry of Petroleum and Energy, in accordance with the powers conferred on it by decree.

The institutions involved in the framework are:

- Monitoring Evaluation Unit (Energy Information System)
- Electricity Department (DEL)
- Directorate of Renewable Energy Development
- Strategy and Regulation Department
- Hydrocarbons Department
- PETROSEN
- African Refining Company (SAR)
- COS Petrogaz
- National Biogas Program
- National Electricity Company of Senegal (SENELEC)
- Senegalese Rural Electrification Agency (ASER)
- National Agency for Renewable Energy (ANER)
- Agency for the Economy and Energy Management (AEME)
- Energy Sector Regulatory Commission (CRSE)

- **Industry:** Implementation of clean and efficient technologies, reduction of emissions from industrial processes, and recycling.

The institutional framework of the industrial sector in Senegal is mainly defined and managed by the Ministry in charge of industry

The institutions involved in the framework are:

- Planning, studies and monitoring and evaluation unit
- Industrial Development Strategies Department
- Industrial Redeployment Department
- Directorate of Small and Medium Industries (DPMI)
- Agency for the Development and Promotion of Industrial Sites (APROSI)

- Upgrade Desk
- Senegalese Association for Standardization (ASN)
- **Transports:** Promoting low-carbon modes of transport, improving efficiency, vehicle energy, and development of sustainable transport infrastructure.

The institutional framework of the transport sector in Senegal is mainly defined and managed by the Ministry in charge of land transport

The institutions involved in the framework are:

- Planning, monitoring and evaluation
- Roads Department
- Road Transport Directorate
- Railways Directorate
- Executive Council of Urban Transport of Dakar
- Dakar Dem Dikk (DDD)
- Association for Financing Urban Transport Professionals (AFTU)
- Road Works and Management Agency (AGEROUTE)
- National Agency for New Railways (ANCF)
- Technical Control Supervision Office

- **Building and construction:** Improving the energy efficiency of buildings, using sustainable building materials, and urban design aimed at reducing energy demand.

- **Agriculture and forestry:** Sustainable land management practices, reforestation, and reducing emissions from agriculture and deforestation.

The institutional framework of the agricultural sector in Senegal is mainly defined and managed by the Ministry in charge of agriculture

The institutions involved in the framework are:

- Planning and monitoring and evaluation unit
  - Directorate of Agriculture

- Directorate of Analysis, Forecasting and Agricultural Statistics (DAPSA)
- Directorate of Financing and Partnership with Organizations
- Regional Directorates for Rural Development (DRDR)

Directorate of Horticulture (DHort)

Directorate of Water, Forests, Hunting and Soil Conservation (Ministry of the Environment)

- **Waste management**: Reduction, reuse, recycling, and improved waste management to reduce methane emissions.

The institutional framework of the waste sector and supervised by the ministry responsible for public hygiene on the one hand; and with regard to liquid waste by the ministry responsible for sanitation

The institutions involved in this institutional framework are:

- National Integrated Waste Management Company (SONAGED SA)
- National Sanitation Office of Senegal
- Sanitation Department
- The planning, studies and monitoring-evaluation cells of the two aforementioned ministries

#### 1.1.3 At the national level:

- National Agency of Statistics and Demography (ANSD)
- Ministry of Finance (DPEE) for economic data

At the international level, we can rely on these mechanisms (ICAT) and Institutions (BOAD, Readiness FVC and AFD) among others.

#### ICAT

The significant challenges of establishing a strengthened transparency framework under the Paris Agreement have led to the creation of two major initiatives: the Capacity Building Initiative for Transparency (CBIT) and the Climate Action Transparency Initiative (CATI).

The ICAT programme aims to provide policy makers with tools and support to measure and evaluate the effects of their climate actions.

ICAT also provides recommendations, and supports capacity building and knowledge sharing.

In Senegal the following activities were carried out:

- Study on the MRV CDN sector strategy for energy and transport

- General study on the axes of the CDN MRV system
- Study on methodologies for data collection and policy monitoring in the transport sector;
- Roadmap study on the operationalization of a national MRV system.

## **BOAD**

The Ministry of Environment and Sustainable Development (MEDD), with the support of its Technical and Financial Partners (TFPs), has embarked on an inclusive and participatory process to set up a carbon pricing tool. This tool will support the efforts of the Government of Senegal to achieve the greenhouse gas (GHG) emission reduction targets set out in the Nationally Determined Contribution (NDC).

The first stage of this process led to the major conclusion on the possibility of implementing a carbon tax in the sectors of electricity production, the cement industry, oil and gas exploitation and waste management. The second stage made it possible to study the practical modalities of implementing the tax tool in the aforementioned sectors.

## **Readiness FVC/MRV Finances**

As part of the implementation of the said Program, Climate Analytics was selected for technical assistance, the objective of which is to develop and provide the AND with an operational and dynamic system for monitoring and verifying internal and external financing flows for climate projects, in support of the national strategy for mobilizing climate financing for the public and private sectors. The design of this system aims to facilitate reporting on climate financing flows mobilized/received by Senegal both in the context of strengthening its resilience to climate change and in the context of reducing greenhouse gas (GHG) emissions.

## **AFD/Adapt Action**

The French Development Agency (AFD), through its Adapt'Action Facility and in partnership with Expertise France, is supporting the State of Senegal in the operationalization of a national monitoring and evaluation system for the adaptation component of its NDC, the outlines of which were defined during the first phase, while simultaneously strengthening the capacities of sectoral ministries in the field of adaptation and its monitoring.

The general objective of the national ESS of the adaptation component of the CDN is threefold:

- Facilitate the proper management and coordination of plans, programs, projects (PPP) meeting the objectives of the CDN in terms of adaptation by setting up a steering tool;
- Enable aggregated synthetic reporting at the national level, and covering the priority sector hits of the adaptation component of the CDN, in particular for the annual high-level dialogue;
- enable international reporting to the UNFCCC on the adaptation component of the NDC

## **2-Proposal for a national and sectoral institutional mechanism for monitoring progress made in the implementation of the CDN**

As part of the implementation of a framework for monitoring the national reporting process and other reporting documents required in the transparency process, the establishment of a national MRV is essential and must be at the heart of the system. It is therefore important to identify gaps and work to find solutions. In this context, it can be said that the gaps identified for overall monitoring mainly lie in the fact that for priority sectors, the data required for monitoring policy performance do not primarily include those required for monitoring reports. This is mainly linked to the objectives of the monitoring and evaluation systems set up at the national and sectoral levels, namely a clear focus on performance measures for sectoral policies. Depending on the sectors concerned, the level of coverage in the production of data required for monitoring reports varies. An update of all sectors on the importance of reporting would be the starting point to encourage the different departments to take into account in their monitoring and evaluation system the progress made in the execution of actions.

However, sectoral reviews of reports will need to be systematized to encourage all stakeholders to report on implementation efforts. This exercise will need to be coordinated by the national authority responsible for overall monitoring of the reporting system, namely the Ministry of the Environment through the DCCTEFV. This requires the establishment of a system that integrates the one set up for monitoring the PES. We already know that this system is being set up at the international level as part of the ongoing transparency system.

To this end, it can be proposed, as was done in the report on the national MRV that was previously done, to institutionalize a service (or Office in charge of the coordination and monitoring of the national CDN) at the level of the DCCTEFV. This office, as recommended, will be provided with human, technical and financial resources to support the planning structures of the sectors concerned and will be responsible for producing annual progress monitoring reports. The results produced through these reports will be validated with all stakeholders and will feed into the joint annual review reports of economic and social policy.

The METE, like the mentioned report cited above, will have to take a circular note to request the designation within all planning services of focal points in charge of the coordination and monitoring of sectoral information. Also according to this report, the DCCTEFV monitoring office will provide all necessary support to the designated focal points in the execution of their tasks.

The main activities of such an office would be:

- Informing sectoral ministries on transparency requirements within the reporting system;
- Animation of a network of focal points who will act as relays within the ministries;
- Assistance in data collection and processing;
- Preparation of data validation committees;
- Monitoring of the overall IT system for monitoring the reporting system;
- Development of BTRs, BURs and inventories in the CNs.

### **3-Proposal of solutions to meet the requirements of transparency reports**

The diversity of IT tools for collecting and monitoring data does not allow for the immediate migration of all sectoral monitoring systems to a reporting monitoring system. For example, while the SIE offers a harmonized framework for monitoring the majority of data required for monitoring reports in the energy sector, the transport sector has a significant gap in monitoring the data required for monitoring but has a multitude of non-harmonized databases. Until now, it has been noted that the administrative management structures of the transport sector work in isolation and blame each other for the lack of harmony.

It is proposed as a first step to build a data collection system to provide an interface between the future coordination and monitoring service of the reporting system and the sectoral structures. This will allow, on the one hand, to fill the gaps between the necessary data and those actually collected at the sectoral level but also to strengthen the capacities of the focal points with simple tools that will facilitate the updating of the sectoral tools.

The current reporting was built on sectoral data and based on PSE projects. The first step in validating Senegal's efforts will therefore be to update the emissions forecasts based on the orientations and policies actually implemented. This update will be based mainly on existing or planned macroeconomic and sectoral data. The gap identified earlier in the collection of data specific to the calculation of gas emissions will have to be gradually filled with the assistance of the DCCTEFV.

It was noted that the report also mentions that the monitoring system to be set up must make it possible to identify all projects regardless of their size and the implementing body. It is obvious that projects implemented via financial mechanisms involving the climate change focal point will be easier to monitor, but the challenge lies mainly in tracking projects implemented by other ministries, the private sector or local authorities. The METE and its Climate Change Division will have to deploy all available networks and sources of information to track any project consistent with the reporting system in order to count it while avoiding double counting or omission.

Among the tracking tools, we can note (1) the ICPE files followed by the DCCTEFV and the DREEC; (2) the approval of the investment code (APIX); (3) the environmental assessments and (4) the active monitoring of the activities of other ministries and communities.

Finally, emphasis will be placed on the preparation and completion of specific data collection forms to be set up for the implementing institutions in order to have a precise status of the implementation of the projects on both the technical and financial aspects. The capitalization of all the forms will make it possible to measure annually the level of reduction of GHG emissions as well as the financial resources mobilized. All the data collected and validated can thus be made available on a database accessible online to all interested stakeholders.

In total, and to be effective, it will be necessary to move towards the establishment of a permanent secretariat that will have to deal with the national MRV. COMNACC could be a receptacle of this secretariat to the extent that it already has well-oiled mechanisms of interactions of experts who have already been used to working in the field of climate change and are able to come together as usual.

## Conclusions

By browsing the different chapters of this BUR study of Senegal, we can easily see the contribution of the basic documents of the sectoral studies. Indeed, from the first chapter on national circumstances, we were able to restore the contribution of the sectoral experts who first analyzed the different components of the Senegalese economy both from the geographical point of view in its physico-climatic aspects but also natural resources; then from the economic and social point of view with an analysis of short, medium and long term trends; but also an analytical review of policies, governance with a focus on institutional and legal aspects so that any partner will be able to obtain all the information necessary for any actions they wish to undertake in Senegal in relation to climate change. In the following chapter, which focuses in particular on the greenhouse gas inventory (IGES), a scan of the data over a long period of 24 years was carried out and made it possible to compare by correcting the IGES that had been done previously with the advantage of having done it with a single tool (IPCC2006) thus allowing a comparison over a very long period (1994 to 2018). This had never been done before. All the inventories that had been carried out before had focused on a single year of collection with a tool that was always different. This BUR study made it possible to highlight the evolutionary trend of GHG emissions in Senegal with an identification of key categories. Continuing the analysis of these key categories over the entire period can make it possible to identify their behavior over time and thus make it possible to define documented policies that can make it possible to control their evolution.

In the following chapter, the study highlighted in an analytical manner the different mitigation options on which Senegal can base itself to know the future trend of emissions and the policies to be implemented to reduce them. The results obtained in this chapter sufficiently show the importance of having good analysis tools to better explore the future. The chapter on financing was able to show the financing received but also the subsequent financing needs to face the adverse effects of climate change. The last chapter on MRV made it possible to recall the national context and the different bodies and structures that are in relation and which, for the moment, manage the national reporting system in relation to the different actors. It is also in this chapter that we were able to note the contribution of the different partners, through programs such as ICAT, for transparency of all climate processes as set out in the Paris Agreement.

Overall, we were able to obtain results and sometimes make recommendations for improvements to be made in the future reporting system to which Senegal will be subject and which will be even more demanding in terms of data, information, analyses (see the reinforced transparency framework in progress and resulting from the Paris Agreement) but also in terms of results to be valued, especially in the carbon market. It is therefore more than urgent to strengthen our structures with a view to improving the availability and access to data and information on the environment in general, and the climate in particular.

## ANNEXES

ANNEX 1: Emissions and absorptions

Annex 1.1. Global GHG emissions and removals per year and by sector from 1994 to 2018 (Gg CO2-eq.)

|                                                                  |                               |           |           |           |           |           |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |           |  |  |
|------------------------------------------------------------------|-------------------------------|-----------|-----------|-----------|-----------|-----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|--|--|
| Inventory Year: 2018                                             |                               |           |           |           |           |           |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |           |  |  |
|                                                                  | CO2 Equivalent Emissions (Gg) |           |           |           |           |           |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |           |  |  |
| Categories                                                       | 1994                          | 1995      | 1996      | 1997      | 1998      | 1999      | 2000     | 2001     | 2002     | 2003     | 2004     | 2005     | 2006     | 2007     | 2008     | 2009     | 2010     | 2011     | 2012     | 2013     | 2014     | 2015     | 2016     | 2017     | 2018      |  |  |
| Total National Emissions and Removals                            | -17841.74                     | -16581.43 | -15337.29 | -13854.66 | -12219.91 | -10131.55 | -5350.87 | -5375.30 | -5611.04 | -5725.44 | -5368.74 | -5213.36 | -5170.98 | -4483.87 | -4936.96 | -3873.01 | -3289.52 | -2853.41 | -2666.88 | -2308.77 | -1155.82 | 193.23   | -70.86   | -917.07  | 258.23    |  |  |
| 1 - Energy                                                       | 2932.60                       | 3000.83   | 3111.46   | 3304.33   | 3451.65   | 3612.37   | 3745.06  | 3855.68  | 3992.55  | 4096.86  | 4513.99  | 4731.06  | 4827.30  | 5549.25  | 5087.85  | 5845.84  | 6022.08  | 6326.64  | 6273.49  | 6350.00  | 7162.18  | 7947.32  | 8924.14  | 8579.47  | 9618.33   |  |  |
| 1.A - Fuel Combustion Activities                                 | 2932.16                       | 3000.37   | 3110.98   | 3303.83   | 3451.12   | 3611.82   | 3744.51  | 3855.08  | 3989.94  | 4088.34  | 4504.00  | 4720.63  | 4819.16  | 5542.44  | 5083.08  | 5843.35  | 6006.98  | 6302.73  | 6249.06  | 6323.99  | 7140.10  | 7932.68  | 8910.44  | 8565.66  | 9610.88   |  |  |
| 1.A.1 - Energy Industries                                        | 1207.06                       | 1218.29   | 1264.33   | 1372.91   | 1432.99   | 1492.46   | 1563.50  | 1638.77  | 1576.97  | 1499.25  | 1704.96  | 1866.60  | 1548.45  | 1734.16  | 1576.59  | 2112.90  | 2003.68  | 1842.27  | 2011.45  | 1827.12  | 2204.28  | 2391.28  | 2475.30  | 2775.24  | 3013.45   |  |  |
| 1.A.2 - Manufacturing Industries and Construction                | 360.77                        | 359.77    | 362.29    | 368.52    | 378.74    | 393.31    | 412.68   | 434.80   | 504.93   | 526.91   | 605.05   | 715.49   | 691.22   | 1187.48  | 1025.07  | 1117.81  | 1296.62  | 1615.96  | 1494.59  | 1535.53  | 1815.84  | 2130.69  | 2756.97  | 2472.62  | 2970.77   |  |  |
| 1.A.3 - Transport                                                | 817.50                        | 858.49    | 901.95    | 947.98    | 996.71    | 1048.28   | 1102.83  | 1090.05  | 1183.92  | 1318.64  | 1449.00  | 1409.02  | 1868.53  | 1927.94  | 1766.88  | 1882.02  | 1995.45  | 2134.50  | 2030.54  | 2232.41  | 2346.01  | 2605.74  | 2839.41  | 2413.91  | 2684.84   |  |  |
| 1.A.4 - Other Sectors                                            | 546.83                        | 563.82    | 582.42    | 614.42    | 642.67    | 677.76    | 665.50   | 691.47   | 724.12   | 743.54   | 744.99   | 729.52   | 710.97   | 692.87   | 714.54   | 730.62   | 711.23   | 709.99   | 712.48   | 728.93   | 773.97   | 804.97   | 838.75   | 903.89   | 941.82    |  |  |
| 1.B - Fugitive emissions from fuels                              | 0.44                          | 0.46      | 0.48      | 0.50      | 0.53      | 0.55      | 0.55     | 0.60     | 2.62     | 8.52     | 9.99     | 10.43    | 8.13     | 6.81     | 4.77     | 2.49     | 15.10    | 23.91    | 24.44    | 26.01    | 22.08    | 14.64    | 13.70    | 13.81    | 7.45      |  |  |
| 1.B.1 - Solid Fuels                                              | N/A                           | N/A       | N/A       | N/A       | N/A       | N/A       | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A       |  |  |
| 1.B.2 - Oil and Natural Gas                                      | 0.44                          | 0.46      | 0.48      | 0.50      | 0.53      | 0.55      | 0.55     | 0.60     | 2.62     | 8.52     | 9.99     | 10.43    | 8.13     | 6.81     | 4.77     | 2.49     | 15.10    | 23.91    | 24.44    | 26.01    | 22.08    | 14.64    | 13.70    | 13.81    | 7.45      |  |  |
| 1.C - Carbon dioxide Transport and Storage                       | N/A                           | N/A       | N/A       | N/A       | N/A       | N/A       | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A       |  |  |
| 2 - Industrial Processes and Product Use                         | 74.73                         | 126.90    | 179.23    | 231.57    | 283.90    | 336.23    | 396.88   | 459.12   | 521.36   | 483.37   | 577.22   | 577.18   | 581.38   | 622.41   | 609.88   | 873.47   | 1123.92  | 1382.59  | 1637.82  | 1894.90  | 2146.93  | 2402.33  | 2661.84  | 2915.05  | 3173.67   |  |  |
| 2.A - Mineral Industry                                           | 71.28                         | 123.44    | 175.61    | 227.78    | 279.94    | 332.11    | 384.28   | 436.44   | 488.61   | 451.83   | 545.22   | 545.01   | 560.03   | 593.69   | 579.77   | 833.31   | 1087.69  | 1340.63  | 1591.94  | 1846.39  | 2099.40  | 2353.51  | 2609.79  | 2862.05  | 3117.77   |  |  |
| 2.A.1 - Cement production                                        | 71.07                         | 123.20    | 175.33    | 227.46    | 279.59    | 331.72    | 383.85   | 435.98   | 488.12   | 451.32   | 544.51   | 539.56   | 554.49   | 586.38   | 573.58   | 827.17   | 1080.76  | 1334.35  | 1587.93  | 1841.52  | 2095.11  | 2348.70  | 2602.29  | 2855.88  | 3109.46   |  |  |
| 2.A.5 - Other (please specify)                                   | 0.21                          | 0.24      | 0.28      | 0.31      | 0.35      | 0.39      | 0.42     | 0.46     | 0.50     | 0.51     | 0.72     | 0.79     | 0.87     | 0.90     | 0.93     | 1.00     | 1.22     | 1.42     | 1.42     | 1.36     | 1.48     | 1.67     | 1.85     | 1.93     | 2.03      |  |  |
| 2.B - Chemical Industry                                          | N/A                           | N/A       | N/A       | N/A       | N/A       | N/A       | 8.31     | 18.22    | 28.13    | 26.77    | 27.53    | 23.94    | 8.57     | 11.57    | 8.29     | 13.91    | 5.56     | 6.87     | 6.36     | 4.56     | 3.47     | 4.61     | 7.54     | 8.19     | 10.36     |  |  |
| 2.B.10 - Other (Please specify)                                  | N/A                           | N/A       | N/A       | N/A       | N/A       | N/A       | 8.31     | 18.22    | 28.13    | 26.77    | 27.53    | 23.94    | 8.57     | 11.57    | 8.29     | 13.91    | 5.56     | 6.87     | 6.36     | 4.56     | 3.47     | 4.61     | 7.54     | 8.19     | 10.36     |  |  |
| 2.C - Metal Industry                                             | N/A                           | N/A       | N/A       | N/A       | N/A       | N/A       | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A       |  |  |
| 2.D - Non-Energy Products from Fuels and Solvent Use             | N/A                           | N/A       | N/A       | N/A       | N/A       | N/A       | N/A      | N/A      | N/A      | N/A      | N/A      | 3.28     | 7.62     | 11.96    | 16.30    | 20.64    | 24.98    | 29.32    | 33.65    | 37.99    | 38.01    | 38.03    | 38.05    | 38.07    | 38.09     |  |  |
| 2.D.4 - Other (please specify)                                   | N/A                           | N/A       | N/A       | N/A       | N/A       | N/A       | N/A      | N/A      | N/A      | N/A      | N/A      | 3.28     | 7.62     | 11.96    | 16.30    | 20.64    | 24.98    | 29.32    | 33.65    | 37.99    | 38.01    | 38.03    | 38.05    | 38.07    | 38.09     |  |  |
| 2.E - Electronics Industry                                       | N/A                           | N/A       | N/A       | N/A       | N/A       | N/A       | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A       |  |  |
| 2.F - Product Uses as Substitutes for Ozone Depleting Substances | N/A                           | N/A       | N/A       | N/A       | N/A       | N/A       | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A       |  |  |
| 2.G - Other Product Manufacture and Use                          | N/A                           | N/A       | N/A       | N/A       | N/A       | N/A       | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A       |  |  |
| 2.H - Other                                                      | 3.46                          | 3.46      | 3.62      | 3.79      | 3.95      | 4.12      | 4.28     | 4.45     | 4.62     | 4.77     | 4.46     | 4.96     | 5.16     | 5.19     | 5.52     | 5.61     | 5.69     | 5.78     | 5.87     | 5.95     | 6.05     | 6.18     | 6.46     | 6.74     | 7.46      |  |  |
| 2.H.1 - Pulp and Paper Industry                                  | N/A                           | N/A       | N/A       | N/A       | N/A       | N/A       | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A       |  |  |
| 2.H.2 - Food and Beverages Industry                              | 3.46                          | 3.46      | 3.62      | 3.79      | 3.95      | 4.12      | 4.28     | 4.45     | 4.62     | 4.77     | 4.46     | 4.96     | 5.16     | 5.19     | 5.52     | 5.61     | 5.69     | 5.78     | 5.87     | 5.95     | 6.05     | 6.18     | 6.46     | 6.74     | 7.46      |  |  |
| 2.H.3 - Other (please specify)                                   | N/A                           | N/A       | N/A       | N/A       | N/A       | N/A       | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A       |  |  |
| 3 - Agriculture, Forestry, and Other Land Use                    | 21853.99                      | 20732.40  | 19669.87  | 18458.11  | 17041.94  | 15188.99  | 10660.98 | 10879.19 | 11334.09 | 11539.66 | 11716.45 | 11801.06 | 11882.98 | 11983.34 | 11992.93 | 11971.54 | 11871.61 | 12026.82 | 12088.05 | 12074.54 | 12015.73 | 11738.31 | 13270.32 | 14058.21 | -14214.97 |  |  |

|                                                                             |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |           |
|-----------------------------------------------------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|
| 3.A - Livestock                                                             | 4031.59  | 4083.37  | 4194.53  | 4268.15  | 4325.97  | 4386.21  | 4444.23  | 4581.82  | 4488.01  | 4530.14  | 4579.62  | 4666.09  | 4748.52  | 4811.44  | 4896.34  | 4985.38  | 5088.60  | 5162.53  | 5242.93  | 5346.87  | 5431.31  | 5523.72  | 5624.70  | 5733.16  | 5832.55   |
| 3.A.1 - Enteric Fermentation                                                | 3750.59  | 3798.98  | 3902.29  | 3966.06  | 4014.27  | 4063.81  | 4113.97  | 4240.03  | 4149.77  | 4186.96  | 4233.07  | 4311.84  | 4386.67  | 4443.18  | 4521.35  | 4601.59  | 4694.47  | 4760.29  | 4832.75  | 4925.43  | 5000.74  | 5080.75  | 5170.02  | 5266.74  | 5355.05   |
| 3.A.2 - Manure Management                                                   | 280.99   | 284.39   | 292.24   | 302.09   | 311.70   | 322.40   | 330.26   | 341.79   | 338.24   | 343.18   | 346.55   | 354.24   | 361.85   | 368.26   | 374.99   | 383.79   | 394.13   | 402.24   | 410.18   | 421.43   | 430.57   | 442.97   | 454.68   | 466.42   | 477.50    |
| 3.B - Land                                                                  | -        | -        | -        | -        | -        | -        | -        | -        | -        | -        | -        | -        | -        | -        | -        | -        | -        | -        | -        | -        | -        | -        | -        | -        | -24141.94 |
| 3.B.1 - Forest land                                                         | 28347.08 | 27825.39 | 27213.37 | 26481.29 | 25593.60 | 24504.12 | 21762.24 | 21932.31 | 21998.82 | 22053.14 | 22095.85 | 22127.23 | 22148.09 | 22158.95 | 22160.29 | 22152.56 | 22103.07 | 22016.68 | 21931.66 | 21838.40 | 21734.26 | 21525.74 | 23062.37 | 23923.72 | -24141.97 |
| 3.B.2 - Cropland                                                            | 0.03     | 0.03     | 0.03     | 0.03     | 0.03     | 0.03     | 0.03     | 0.03     | 0.03     | 0.03     | 0.03     | 0.03     | 0.03     | 0.03     | 0.03     | 0.03     | 0.03     | 0.03     | 0.03     | 0.03     | 0.03     | 0.03     | 0.03     | 0.03     | 0.03      |
| 3.C - Aggregate sources and non-CO2 emissions sources on land               | 2463.11  | 3011.27  | 3350.67  | 3756.76  | 4227.46  | 4930.74  | 6658.88  | 6473.20  | 6178.67  | 5985.33  | 5801.83  | 5662.19  | 5518.75  | 5366.39  | 5273.30  | 5197.99  | 5145.28  | 4829.81  | 4603.22  | 4419.61  | 4289.88  | 4266.43  | 4170.16  | 4135.23  | 4097.38   |
| 3.C.1 - Emissions from biomass burning                                      | 647.12   | 1180.54  | 1464.40  | 1825.41  | 2284.83  | 2869.76  | 4615.63  | 4354.74  | 4109.90  | 3880.15  | 3664.61  | 3462.43  | 3272.82  | 3095.03  | 2928.38  | 2796.35  | 2675.98  | 2344.85  | 2060.64  | 1816.86  | 1607.92  | 1431.33  | 1257.71  | 1112.43  | 993.97    |
| 3.C.2 - Liming                                                              | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A       |
| 3.C.3 - Urea application                                                    | 2.13     | 1.47     | 2.57     | 2.35     | 1.17     | 2.30     | 3.47     | 5.55     | 6.43     | 10.32    | 21.39    | 24.01    | 38.23    | 30.38    | 22.00    | 23.47    | 24.93    | 30.80    | 35.65    | 41.31    | 46.57    | 41.77    | 35.65    | 41.31    | 46.57     |
| 3.C.4 - Direct N2O Emissions from managed soils                             | 1264.82  | 1281.75  | 1317.81  | 1346.22  | 1370.35  | 1396.27  | 1410.22  | 1458.92  | 1428.91  | 1444.01  | 1461.40  | 1492.05  | 1521.17  | 1545.08  | 1574.42  | 1604.84  | 1643.53  | 1671.36  | 1701.55  | 1741.57  | 1774.07  | 1814.71  | 1854.44  | 1896.35  | 1934.74   |
| 3.C.5 - Indirect N2O Emissions from managed soils                           | 443.97   | 449.65   | 463.11   | 477.20   | 489.38   | 502.62   | 507.62   | 529.53   | 519.42   | 525.90   | 534.13   | 547.18   | 559.66   | 570.96   | 582.81   | 594.10   | 611.56   | 625.10   | 638.76   | 657.49   | 673.03   | 693.69   | 712.92   | 732.45   | 750.58    |
| 3.C.6 - Indirect N2O Emissions from manure management                       | 35.89    | 36.48    | 37.09    | 39.10    | 41.31    | 44.08    | 45.18    | 46.83    | 46.34    | 46.80    | 47.77    | 49.48    | 51.19    | 53.45    | 54.15    | 55.18    | 58.26    | 60.53    | 61.84    | 65.76    | 68.16    | 73.72    | 77.35    | 80.39    | 83.47     |
| 3.C.7 - Rice cultivation                                                    | 69.19    | 61.38    | 65.70    | 66.48    | 40.41    | 115.71   | 76.77    | 77.64    | 67.67    | 78.16    | 72.53    | 87.03    | 75.69    | 71.48    | 111.55   | 124.06   | 131.02   | 97.17    | 104.78   | 96.61    | 120.13   | 211.21   | 232.09   | 272.30   | 288.05    |
| 3.C.8 - Other (please specify)                                              | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A       |
| 3.D - Other                                                                 | -1.61    | -1.65    | -1.69    | -1.73    | -1.77    | -1.81    | -1.86    | -1.90    | -1.95    | -2.00    | -2.05    | -2.10    | -2.16    | -2.22    | -2.28    | -2.34    | -2.41    | -2.48    | -2.55    | -2.62    | -2.66    | -2.73    | -2.80    | -2.88    | -2.96     |
| 3.D.1 - Harvested Wood Products                                             | -1.61    | -1.65    | -1.69    | -1.73    | -1.77    | -1.81    | -1.86    | -1.90    | -1.95    | -2.00    | -2.05    | -2.10    | -2.16    | -2.22    | -2.28    | -2.34    | -2.41    | -2.48    | -2.55    | -2.62    | -2.66    | -2.73    | -2.80    | -2.88    | -2.96     |
| 3.D.2 - Other (please specify)                                              | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A       |
| 4 - Waste                                                                   | 1004.92  | 1023.24  | 1041.88  | 1067.56  | 1086.49  | 1108.84  | 1168.17  | 1189.09  | 1209.15  | 1233.98  | 1256.50  | 1279.45  | 1303.32  | 1327.81  | 1358.23  | 1379.23  | 1436.09  | 1464.18  | 1509.86  | 1520.87  | 1550.80  | 1581.89  | 1613.48  | 1646.61  | 1681.20   |
| 4.A - Solid Waste Disposal                                                  | 410.49   | 422.85   | 435.63   | 448.52   | 461.59   | 475.07   | 489.00   | 503.20   | 517.75   | 532.22   | 547.24   | 562.76   | 578.76   | 595.05   | 611.74   | 628.93   | 646.60   | 664.81   | 683.28   | 702.46   | 722.12   | 742.84   | 763.78   | 785.84   | 809.26    |
| 4.B - Biological Treatment of Solid Waste                                   | 5.85     | 6.01     | 6.16     | 6.31     | 6.46     | 6.62     | 6.77     | 6.94     | 7.11     | 7.29     | 7.47     | 7.67     | 7.87     | 8.08     | 8.30     | 8.67     | 8.77     | 9.01     | 9.26     | 9.53     | 9.80     | 9.93     | 10.20    | 10.48    | 10.76     |
| 4.C - Incineration and Open Burning of Waste                                | 147.19   | 147.19   | 147.19   | 154.04   | 154.04   | 156.94   | 159.98   | 160.56   | 162.64   | 163.73   | 164.39   | 164.90   | 165.46   | 166.00   | 166.58   | 167.11   | 167.56   | 168.45   | 186.65   | 168.84   | 169.46   | 169.91   | 170.28   | 170.63   | 170.99    |
| 4.D - Wastewater Treatment and Discharge                                    | 441.39   | 447.19   | 452.89   | 458.69   | 464.39   | 470.21   | 512.41   | 518.40   | 521.65   | 530.74   | 537.40   | 544.13   | 551.24   | 558.68   | 571.61   | 574.51   | 613.16   | 621.91   | 630.66   | 640.04   | 649.42   | 659.22   | 669.23   | 679.66   | 690.19    |
| International Bunkers                                                       | 846.88   | 853.87   | 860.94   | 868.09   | 296.39   | 300.95   | 305.58   | 759.63   | 632.23   | 790.61   | 838.47   | 368.37   | 274.66   | 1038.38  | 204.58   | 804.78   | 828.67   | 233.11   | 227.82   | 987.91   | 966.78   | 383.11   | 979.07   | 1087.89  | 1037.96   |
| 1.A.3.ai - International Aviation (International Bunkers) (1)               | 572.90   | 575.62   | 578.35   | 581.10   | 4.93     | 4.95     | 4.97     | 501.62   | 408.95   | 521.63   | 575.82   | 4.87     | 4.89     | 799.65   | 6.85     | 638.03   | 650.05   | 5.55     | 5.15     | 771.68   | 689.02   | 4.67     | 548.22   | 604.26   | 641.66    |
| 1.A.3.di - International water-borne navigation (International bunkers) (1) | 273.98   | 278.25   | 282.59   | 286.99   | 291.46   | 296.00   | 300.61   | 258.00   | 223.28   | 268.98   | 262.65   | 363.50   | 269.78   | 238.73   | 197.74   | 166.75   | 178.63   | 227.57   | 222.68   | 216.23   | 277.76   | 378.44   | 430.84   | 483.63   | 396.30    |
| 1.A.5.c - Multilateral Operations (1)(2)                                    | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A       |

Annex 1.2: Overall emissions by sector and by gas for the reference year 2018

| Categories                                        | Emissions (Gg) |         |        | Emissions CO2 Equivalents (Gg) |      |     |                                                                    | Emissions (Gg)                                                        |       |         |        |     |
|---------------------------------------------------|----------------|---------|--------|--------------------------------|------|-----|--------------------------------------------------------------------|-----------------------------------------------------------------------|-------|---------|--------|-----|
|                                                   | Net CO2 (1)(2) | CH4     | N2O    | HFCs                           | PFCs | SF6 | Other halogenated gases with CO2 equivalent conversion factors (3) | Other halogenated gases without CO2 equivalent conversion factors (4) | NOx   | CO      | NMVOCs | SO2 |
| Total National Emissions and Removals             | -11637,28645   | 324,477 | 11,724 | 575,137                        | N/A  | N/A | N/A                                                                | N/A                                                                   | 0,862 | 303,294 | NE     | NE  |
| 1 - Energy                                        | 9167,585019    | 12,9084 | 0,4296 | N/A                            | N/A  | N/A | N/A                                                                | N/A                                                                   | NE    | NE      | NE     | NE  |
| 1.A - Fuel Combustion Activities                  | 9165,452759    | 12,6958 | 0,4296 | N/A                            | N/A  | N/A | N/A                                                                | N/A                                                                   | N/A   | N/A     | N/A    | N/A |
| 1.A.1 - Energy Industries                         | 2967,258496    | 0,67036 | 0,0988 |                                |      |     |                                                                    |                                                                       | N/A   | N/A     | N/A    | N/A |
| 1.A.2 - Manufacturing Industries and Construction | 2939,778017    | 0,47455 | 0,0642 |                                |      |     |                                                                    |                                                                       | N/A   | N/A     | N/A    | N/A |
| 1.A.3 - Transport                                 | 2635,488725    | 0,36376 | 0,1351 |                                |      |     |                                                                    |                                                                       | N/A   | N/A     | N/A    | N/A |
| 1.A.4 - Other Sectors                             | 622,9275219    | 11,1871 | 0,1316 |                                |      |     |                                                                    |                                                                       | N/A   | N/A     | N/A    | N/A |
| 1.A.5 - Non-Specified                             | N/A            | N/A     | N/A    |                                |      |     |                                                                    |                                                                       | N/A   | N/A     | N/A    | N/A |
| 1.B - Fugitive emissions from fuels               | 2,132260219    | 0,2126  | 2E-06  | N/A                            | N/A  | N/A | N/A                                                                | N/A                                                                   | N/A   | N/A     | N/A    | N/A |
| 1.B.1 - Solid Fuels                               | N/A            | N/A     | N/A    |                                |      |     |                                                                    |                                                                       | N/A   | N/A     | N/A    | N/A |
| 1.B.2 - Oil and Natural Gas                       | 2,132260219    | 0,2126  | 2E-06  |                                |      |     |                                                                    |                                                                       | N/A   | N/A     | N/A    | N/A |
| 1.B.3 - Other emissions from Energy Production    | N/A            | N/A     | N/A    |                                |      |     |                                                                    |                                                                       | N/A   | N/A     | N/A    | N/A |

|                                            |             |     |     |         |     |     |     |     |     |     |     |     |
|--------------------------------------------|-------------|-----|-----|---------|-----|-----|-----|-----|-----|-----|-----|-----|
| 1.C - Carbon dioxide Transport and Storage | N/A         | N/A | N/A | N/A     | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 1.C.1 - Transport of CO2                   | N/A         |     |     |         |     |     |     |     | N/A | N/A | N/A | N/A |
| 1.C.2 - Injection and Storage              | N/A         |     |     |         |     |     |     |     | N/A | N/A | N/A | N/A |
| 1.C.3 - Other                              | N/A         |     |     |         |     |     |     |     | N/A | N/A | N/A | N/A |
| 2 - Industrial Processes and Product Use   | 3173,674252 | N/A | N/A | 575,137 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 2.A - Mineral Industry                     | 3117,765255 | N/A | N/A | N/A     | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 2.A.1 - Cement production                  | 3109,4648   |     |     |         |     |     |     |     | N/A | N/A | N/A | N/A |
| 2.A.2 - Lime production                    | N/A         |     |     |         |     |     |     |     | N/A | N/A | N/A | N/A |
| 2.A.3 - Glass Production                   | N/A         |     |     |         |     |     |     |     | N/A | N/A | N/A | N/A |
| 2.A.4 - Other Process Uses of Carbonates   | 6,26570692  |     |     |         |     |     |     |     | N/A | N/A | N/A | N/A |
| 2.A.5 - Other (please specify)             | 2,0347479   | N/A | N/A |         |     |     |     |     | N/A | N/A | N/A | N/A |
| 2.B - Chemical Industry                    | 10,35912    | N/A | N/A | N/A     | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 2.B.1 - Ammonia Production                 | N/A         |     |     |         |     |     |     |     | N/A | N/A | N/A | N/A |
| 2.B.2 - Nitric Acid Production             |             |     | N/A |         |     |     |     |     | N/A | N/A | N/A | N/A |
| 2.B.3 - Adipic Acid Production             |             |     | N/A |         |     |     |     |     | N/A | N/A | N/A | N/A |

|                                                            |          |     |     |     |     |     |     |     |     |     |     |     |
|------------------------------------------------------------|----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 2.B.4 - Caprolactam, Glyoxal and Glyoxylic Acid Production |          |     | N/A |     |     |     |     |     | N/A | N/A | N/A | N/A |
| 2.B.5 - Carbide Production                                 | N/A      | N/A |     |     |     |     |     |     | N/A | N/A | N/A | N/A |
| 2.B.6 - Titanium Dioxide Production                        | N/A      |     |     |     |     |     |     |     | N/A | N/A | N/A | N/A |
| 2.B.7 - Soda Ash Production                                | N/A      |     |     |     |     |     |     |     | N/A | N/A | N/A | N/A |
| 2.B.8 - Petrochemical and Carbon Black Production          | N/A      | N/A |     |     |     |     |     |     | N/A | N/A | N/A | N/A |
| 2.B.9 - Fluorochemical Production                          |          |     |     | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 2.B.10 - Other (Please specify)                            | 10,35912 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 2.C - Metal Industry                                       | N/A      | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 2.C.1 - Iron and Steel Production                          | N/A      | N/A |     |     |     |     |     |     | N/A | N/A | N/A | N/A |
| 2.C.2 - Ferroalloys Production                             | N/A      | N/A |     |     |     |     |     |     | N/A | N/A | N/A | N/A |
| 2.C.3 - Aluminium production                               | N/A      |     |     |     | N/A |     |     | N/A | N/A | N/A | N/A | N/A |
| 2.C.4 - Magnesium production                               | N/A      |     |     |     |     | N/A |     | N/A | N/A | N/A | N/A | N/A |
| 2.C.5 - Lead Production                                    | N/A      |     |     |     |     |     |     |     | N/A | N/A | N/A | N/A |
| 2.C.6 - Zinc Production                                    | N/A      |     |     |     |     |     |     |     | N/A | N/A | N/A | N/A |

|                                                                  |          |     |     |         |     |     |     |     |     |     |     |     |
|------------------------------------------------------------------|----------|-----|-----|---------|-----|-----|-----|-----|-----|-----|-----|-----|
| 2.C.7 - Other (please specify)                                   | N/A      | N/A | N/A | N/A     | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 2.D - Non-Energy Products from Fuels and Solvent Use             | 38,08704 | N/A | N/A | N/A     | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 2.D.1 - Lubricant Use                                            | 0        |     |     |         |     |     |     |     | N/A | N/A | N/A | N/A |
| 2.D.2 - Paraffin Wax Use                                         | 0        |     |     |         |     |     |     |     | N/A | N/A | N/A | N/A |
| 2.D.3 - Solvent Use                                              |          |     |     |         |     |     |     |     | N/A | N/A | N/A | N/A |
| 2.D.4 - Other (please specify)                                   | 38,08704 | N/A | N/A |         |     |     |     |     | N/A | N/A | N/A | N/A |
| 2.E - Electronics Industry                                       | N/A      | N/A | N/A | N/A     | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 2.E.1 - Integrated Circuit or Semiconductor                      |          |     |     | N/A     | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 2.E.2 - TFT Flat Panel Display                                   |          |     |     |         | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 2.E.3 - Photovoltaics                                            |          |     |     |         | N/A |     |     | N/A | N/A | N/A | N/A | N/A |
| 2.E.4 - Heat Transfer Fluid                                      |          |     |     |         | N/A |     |     | N/A | N/A | N/A | N/A | N/A |
| 2.E.5 - Other (please specify)                                   | N/A      | N/A | N/A | N/A     | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 2.F - Product Uses as Substitutes for Ozone Depleting Substances | N/A      | N/A | N/A | 575,137 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 2.F.1 - Refrigeration and Air Conditioning                       |          |     |     | 575,137 |     |     |     | N/A | N/A | N/A | N/A | N/A |

|                                                     |              |         |        |     |     |     |     |     |       |         |     |     |
|-----------------------------------------------------|--------------|---------|--------|-----|-----|-----|-----|-----|-------|---------|-----|-----|
| 2.F.2 -<br>Foam Blowing<br>Agents                   |              |         |        | N/A |     |     |     | N/A | N/A   | N/A     | N/A | N/A |
| 2.F.3 - Fire<br>Protection                          |              |         |        | N/A | N/A |     |     | N/A | N/A   | N/A     | N/A | N/A |
| 2.F.4 -<br>Aerosols                                 |              |         |        | N/A |     |     |     | N/A | N/A   | N/A     | N/A | N/A |
| 2.F.5 -<br>Solvents                                 |              |         |        | N/A | N/A |     |     | N/A | N/A   | N/A     | N/A | N/A |
| 2.F.6 -<br>Other Applications<br>(please specify)   |              |         |        | N/A | N/A |     |     | N/A | N/A   | N/A     | N/A | N/A |
| 2.G - Other Product<br>Manufacture and Use          | N/A          | N/A     | N/A    | N/A | N/A | N/A | N/A | N/A | N/A   | N/A     | N/A | N/A |
| 2.G.1 -<br>Electrical Equipment                     |              |         |        |     | N/A | N/A |     | N/A | N/A   | N/A     | N/A | N/A |
| 2.G.2 - SF6<br>and PFCs from Other<br>Product Uses  |              |         |        |     | N/A | N/A |     | N/A | N/A   | N/A     | N/A | N/A |
| 2.G.3 -<br>N2O from Product<br>Uses                 |              |         | N/A    |     |     |     |     | N/A | N/A   | N/A     | N/A | N/A |
| 2.G.4 -<br>Other (Please<br>specify)                | N/A          | N/A     | N/A    | N/A | N/A | N/A | N/A | N/A | N/A   | N/A     | N/A | N/A |
| 2.H - Other                                         | 7,4628368    | N/A     | N/A    | N/A | N/A | N/A | N/A | N/A | N/A   | N/A     | N/A | N/A |
| N/A                                                 | N/A          | N/A     |        |     |     |     |     |     | N/A   | N/A     | N/A | N/A |
| 2.H.2 -<br>Food and Beverages<br>Industry           | 7,4628368    | N/A     |        |     |     |     |     |     | N/A   | N/A     | N/A | N/A |
| 2.H.3 -<br>Other (please<br>specify)                | N/A          | N/A     | N/A    |     |     |     |     |     | N/A   | N/A     | N/A | N/A |
| 3 - Agriculture,<br>Forestry, and Other<br>Land Use | -24094,78953 | 255,38  | 10,756 | N/A | N/A | N/A | N/A | N/A | 0,862 | 303,294 | N/A | N/A |
| 3.A - Livestock                                     | 0            | 224,645 | 0,7263 | N/A | N/A | N/A | N/A | N/A | N/A   | N/A     | N/A | N/A |

|                                                                        |             |         |        |     |     |     |     |     |       |         |     |     |
|------------------------------------------------------------------------|-------------|---------|--------|-----|-----|-----|-----|-----|-------|---------|-----|-----|
| 3.A.1 -<br>Enteric Fermentation                                        |             | 214,202 |        |     |     |     |     |     | N/A   | N/A     | N/A | N/A |
| 3.A.2 -<br>Manure Management                                           |             | 10,4425 | 0,7263 |     |     |     |     |     | N/A   | N/A     | N/A | N/A |
| 3.B - Land                                                             | -24138,3973 | N/A     | N/A    | N/A | N/A | N/A | N/A | N/A | N/A   | N/A     | N/A | N/A |
| 3.B.1 -<br>Forest land                                                 | -24138,4237 |         |        |     |     |     |     |     | N/A   | N/A     | N/A | N/A |
| 3.B.2 -<br>Cropland                                                    | 0,0264      |         |        |     |     |     |     |     | N/A   | N/A     | N/A | N/A |
| 3.B.3 -<br>Grassland                                                   | N/A         |         |        |     |     |     |     |     | N/A   | N/A     | N/A | N/A |
| 3.B.4 -<br>Wetlands                                                    | N/A         |         | N/A    |     |     |     |     |     | N/A   | N/A     | N/A | N/A |
| 3.B.5 -<br>Settlements                                                 | N/A         |         |        |     |     |     |     |     | N/A   | N/A     | N/A | N/A |
| 3.B.6 -<br>Other Land                                                  | N/A         |         |        |     |     |     |     |     | N/A   | N/A     | N/A | N/A |
| 3.C - Aggregate<br>sources and non-CO2<br>emissions sources on<br>land | 46,56666667 | 30,7357 | 10,03  | N/A | N/A | N/A | N/A | N/A | 0,862 | 303,294 | N/A | N/A |
| 3.C.1 -<br>Emissions from<br>biomass burning                           |             | 19,2137 | 0,7387 |     |     |     |     |     | 0,862 | 303,294 | N/A | N/A |
| 3.C.2 -<br>Liming                                                      | N/A         |         |        |     |     |     |     |     | N/A   | N/A     | N/A | N/A |
| 3.C.3 -<br>Urea application                                            | 46,56666667 |         |        |     |     |     |     |     | N/A   | N/A     | N/A | N/A |
| 3.C.4 -<br>Direct Emissions<br>N2O from<br>managed soils               |             |         | 6,4924 |     |     |     |     |     | N/A   | N/A     | N/A | N/A |
| 3.C.5 -<br>Indirect Emissions<br>N2O from<br>managed soils             |             |         | 2,5187 |     |     |     |     |     | N/A   | N/A     | N/A | N/A |
| 3.C.6 -<br>Indirect N2O                                                |             |         | 0,2801 |     |     |     |     |     | N/A   | N/A     | N/A | N/A |

|                                                                                         |             |         |        |     |     |     |     |     |     |     |     |     |
|-----------------------------------------------------------------------------------------|-------------|---------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Emissions from manure management                                                        |             |         |        |     |     |     |     |     |     |     |     |     |
| 3.C.7 - Rice cultivation                                                                |             | 11,522  |        |     |     |     |     |     | N/A | N/A | N/A | N/A |
| 3.C.8 - Other (please specify)                                                          |             | N/A     | N/A    |     |     |     |     |     | N/A | N/A | N/A | N/A |
| 3.D - Other                                                                             | -2,9588944  | N/A     | N/A    | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 3.D.1 - Harvested Wood Products                                                         | -2,9588944  |         |        |     |     |     |     |     | N/A | N/A | N/A | N/A |
| 3.D.2 - Other (please specify)                                                          | N/A         | N/A     | N/A    |     |     |     |     |     | N/A | N/A | N/A | N/A |
| 4 - Waste                                                                               | 116,2438133 | 56,1879 | 0,5378 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 4.A - Solid Waste Disposal                                                              | N/A         | 32,3705 | N/A    | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 4.B - Biological Treatment of Solid Waste                                               | N/A         | 0,22732 | 0,017  | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 4.C - Incineration and Open Burning of Waste                                            | 116,2438133 | 1,84392 | 0,029  | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 4.D - Wastewater Treatment and Discharge                                                | N/A         | 21,7462 | 0,4917 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 4.E - Other (please specify)                                                            | N/A         | N/A     | N/A    | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 5 - Other                                                                               | N/A         | N/A     | N/A    | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 5.A - Indirect N2O emissions from the atmospheric deposition of nitrogen in NOx and NH3 | N/A         | N/A     | N/A    | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 5.B - Other (please specify)                                                            | N/A         | N/A     | N/A    | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
|                                                                                         |             |         |        |     |     |     |     |     |     |     |     |     |

|                                                                              |             |         |        |     |     |     |     |     |     |     |     |     |
|------------------------------------------------------------------------------|-------------|---------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Memo Items (5)                                                               |             |         |        |     |     |     |     |     |     |     |     |     |
| International Bunkers                                                        | 1028,468481 | 0,0415  | 0,0284 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 1.A.3.a.i - International Aviation (International Bunkers) (1)               | 636,247652  | 0,00445 | 0,0178 |     |     |     |     |     | N/A | N/A | N/A | N/A |
| 1.A.3.d.i - International water-borne navigation (International bunkers) (1) | 392,2208294 | 0,03705 | 0,0106 |     |     |     |     |     | N/A | N/A | N/A | N/A |
| 1.A.5.c - Multilateral Operations (1)(2)                                     | N/A         | N/A     | N/A    | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

Annex 1.3: Emissions (Waste)

Annex 1.3.2. GHG emissions from the waste sector (Gg) in 2018

Inventory Year: 2018

| Categories                                   | Emissions [Gg] |       |      |     |     |        |     |
|----------------------------------------------|----------------|-------|------|-----|-----|--------|-----|
|                                              | CO2            | CH4   | N2O  | NOx | CO  | NMVOCs | SO2 |
| 4 - Waste                                    | 0.51           | 46.28 | 0.57 | N/A | N/A | N/A    | N/A |
| 4.A - Solid Waste Disposal                   | 0.00           | 32.87 | N/A  | N/A | N/A | N/A    | N/A |
| 4.A.1 - Managed Waste Disposal Sites         |                |       |      | N/A | N/A | N/A    | N/A |
| 4.A.2 - Unmanaged Waste Disposal Sites       |                |       |      | N/A | N/A | N/A    | N/A |
| 4.A.3 - Uncategorized Waste Disposal Sites   |                |       |      | N/A | N/A | N/A    | N/A |
| 4.B - Biological Treatment of Solid Waste    |                | 0.22  | 0.01 | N/A | N/A | N/A    | N/A |
| 4.C - Incineration and Open Burning of Waste | 0.51           | 0.09  | 0.00 | N/A | N/A | N/A    | N/A |
| 4.C.1 - Waste Incineration                   | 0.29           | N/A   | N/A  | N/A | N/A | N/A    | N/A |
| 4.C.2 - Open Burning of Waste                | 0.22           | N/A   | N/A  | N/A | N/A | N/A    | N/A |
| 4.D - Wastewater Treatment and Discharge     | 0.00           | 13.09 | 0.55 | N/A | N/A | N/A    | N/A |

|                                                       |  |       |      |     |     |     |     |
|-------------------------------------------------------|--|-------|------|-----|-----|-----|-----|
| 4.D.1 - Domestic Wastewater Treatment and Discharge   |  | 12.73 | 0.55 | N/A | N/A | N/A | N/A |
| 4.D.2 - Industrial Wastewater Treatment and Discharge |  | 0.37  |      | N/A | N/A | N/A | N/A |
| 4.E - Other (please specify)                          |  |       |      | N/A | N/A | N/A | N/A |



| The categories                                    | 1994          | 2000          | 2005          | 2010          | 2015          | 2018          |
|---------------------------------------------------|---------------|---------------|---------------|---------------|---------------|---------------|
| <b>3.B - Land</b>                                 | -28347.08     | -21762.24     | -22127.23     | -22103,072    | - 21525.74145 | - 24141.94014 |
| 3.B.1 - Forest land                               | - 28347,10683 | - 21762.26215 | - 22127,25419 | - 22103.09835 | - 21525.76785 | - 24141.96654 |
| 3.B.1.a - Forest land Remaining Forest land       | - 28296,23224 | - 21762.26215 | - 22119.74089 | - 21932,01153 | - 21525.76785 | - 24077.52736 |
| 3.B.1.b - Land Converted to Forest land           | - 50.87458926 | 0             | - 7.513299618 | - 171.0868229 | 0             | - 64.43918567 |
| 3.B.1.bi - Cropland converted to Forest Land      | - 50.87458926 | 0             | - 7.513299618 | - 171.0868229 | 0             | - 64.43918567 |
| 3.B.1.b.ii - Grassland converted to Forest Land   | N/A           | N/A           | N/A           | N/A           | N/A           | N/A           |
| 3.B.1.b.iii - Wetlands converted to Forest Land   | N/A           | N/A           | N/A           | N/A           | N/A           | N/A           |
| 3.B.1.b.iv - Settlements converted to Forest Land | N/A           | N/A           | N/A           | N/A           | N/A           | N/A           |
| 3.B.1.bv - Other Land converted to Forest Land    | N/A           | N/A           | N/A           | N/A           | N/A           | N/A           |
| 3.B.2 - Cropland                                  | 0.0264        | 0.0264        | 0.0264        | 0.0264        | 0.0264        | 0.0264        |
| 3.B.2.a - Cropland Remaining Cropland             | 0.0264        | 0.0264        | 0.0264        | 0.0264        | 0.0264        | 0.0264        |
| 3.B.2.b - Land Converted to Cropland              | N/A           | N/A           | N/A           | N/A           | N/A           | N/A           |
| 3.B.2.bi - Forest Land converted to Cropland      | N/A           | N/A           | N/A           | N/A           | N/A           | N/A           |
| 3.B.2.b.ii - Grassland converted to Cropland      | N/A           | N/A           | N/A           | N/A           | N/A           | N/A           |
| 3.B.2.b.iii - Wetlands converted to Cropland      | N/A           | N/A           | N/A           | N/A           | N/A           | N/A           |
| 3.B.2.b.iv - Settlements converted to Cropland    | N/A           | N/A           | N/A           | N/A           | N/A           | N/A           |
| 3.B.2.bv - Other Land converted to Cropland       | N/A           | N/A           | N/A           | N/A           | N/A           | N/A           |
| 3.B.3 - Grassland                                 | N/A           | N/A           | N/A           | N/A           | N/A           | N/A           |
| 3.B.3.a - Grassland Remaining Grassland           | N/A           | N/A           | N/A           | N/A           | N/A           | N/A           |
| 3.B.3.b - Land Converted to Grassland             | N/A           | N/A           | N/A           | N/A           | N/A           | N/A           |
| 3.B.3.bi - Forest Land converted to Grassland     | N/A           | N/A           | N/A           | N/A           | N/A           | N/A           |
| 3.B.3.b.ii - Cropland converted to Grassland      | N/A           | N/A           | N/A           | N/A           | N/A           | N/A           |
| 3.B.3.b.iii - Wetlands converted to Grassland     | N/A           | N/A           | N/A           | N/A           | N/A           | N/A           |
| 3.B.3.b.iv - Settlements converted to Grassland   | N/A           | N/A           | N/A           | N/A           | N/A           | N/A           |
| 3.B.3.bv - Other Land converted to Grassland      | N/A           | N/A           | N/A           | N/A           | N/A           | N/A           |
| 3.B.4 - Wetlands                                  | N/A           | N/A           | N/A           | N/A           | N/A           | N/A           |
| 3.B.4.a - Wetlands Remaining Wetlands             | N/A           | N/A           | N/A           | N/A           | N/A           | N/A           |
| 3.B.4.ai - Peatlands remaining peatlands          | N/A           | N/A           | N/A           | N/A           | N/A           | N/A           |
| 3.B.4.a.ii - Flooded land remaining flooded land  | N/A           | N/A           | N/A           | N/A           | N/A           | N/A           |
| 3.B.4.b - Land Converted to Wetlands              | N/A           | N/A           | N/A           | N/A           | N/A           | N/A           |
| 3.B.4.bi - Land converted for peat extraction     | N/A           | N/A           | N/A           | N/A           | N/A           | N/A           |

|                                                  |     |     |     |     |     |     |
|--------------------------------------------------|-----|-----|-----|-----|-----|-----|
| 3.B.4.b.ii - Land converted to flooded land      | N/A | N/A | N/A | N/A | N/A | N/A |
| 3.B.4.b.iii - Land converted to other wetlands   | N/A | N/A | N/A | N/A | N/A | N/A |
| 3.B.5 - Settlements                              | N/A | N/A | N/A | N/A | N/A | N/A |
| 3.B.5.a - Settlements Remaining Settlements      | N/A | N/A | N/A | N/A | N/A | N/A |
| 3.B.5.b - Land Converted to Settlements          | N/A | N/A | N/A | N/A | N/A | N/A |
| 3.B.5.bi - Forest Land converted to Settlements  | N/A | N/A | N/A | N/A | N/A | N/A |
| 3.B.5.b.ii - Cropland converted to Settlements   | N/A | N/A | N/A | N/A | N/A | N/A |
| 3.B.5.b.iii - Grassland converted to Settlements | N/A | N/A | N/A | N/A | N/A | N/A |
| 3.B.5.b.iv - Wetlands converted to Settlements   | N/A | N/A | N/A | N/A | N/A | N/A |
| 3.B.5.bv - Other Land converted to Settlements   | N/A | N/A | N/A | N/A | N/A | N/A |
| 3.B.6 - Other Land                               | N/A | N/A | N/A | N/A | N/A | N/A |
| 3.B.6.a - Other land Remaining Other land        | N/A | N/A | N/A | N/A | N/A | N/A |
| 3.B.6.b - Land Converted to Other land           | N/A | N/A | N/A | N/A | N/A | N/A |
| 3.B.6.bi - Forest Land converted to Other Land   | N/A | N/A | N/A | N/A | N/A | N/A |
| 3.B.6.b.ii - Cropland converted to Other Land    | N/A | N/A | N/A | N/A | N/A | N/A |
| 3.B.6.b.iii - Grassland converted to Other Land  | N/A | N/A | N/A | N/A | N/A | N/A |
| 3.B.6.b.iv - Wetlands converted to Other Land    | N/A | N/A | N/A | N/A | N/A | N/A |
| 3.B.6.bv - Settlements converted to Other Land   | N/A | N/A | N/A | N/A | N/A | N/A |

Inventory year 2018 (Emission in Gg Eq CO<sub>2</sub>)

*Annex I.5: Emissions from the industrial process sector and product uses*

| Categories                                                 | CO2 Equivalents (Gg) |             |             |             |             |            |
|------------------------------------------------------------|----------------------|-------------|-------------|-------------|-------------|------------|
|                                                            | 1994                 | 2000        | 2005        | 2010        | 2015        | 2018       |
| <b>2 - Industrial Processes and Product Use</b>            | 117.8807666          | 654.9548813 | 1112,408819 | 1853.581855 | 3064.991267 | 3748.82    |
| <b>2.A - Mineral Industry</b>                              | 71,2768              | 384,27754   | 545,00691   | 1087.686188 | 2353.507095 | 3117.77    |
| 2.A.1 - Cement production                                  | 71,071               | 383.85412   | 539,56396   | 1080,7576   | 2348,6996   | 3109,4648  |
| 2.A.2 - Lime production                                    | N/A                  | N/A         | N/A         | N/A         | N/A         | N/A        |
| 2.A.3 - Glass Production                                   | N/A                  | N/A         | N/A         | N/A         | N/A         | N/A        |
| 2.A.4 - Other Process Uses of Carbonates                   | N/A                  | N/A         | 4,65596     | 5,70556     | 3.13445     | 6,26570692 |
| 2.A.4.a - Ceramics                                         | N/A                  | N/A         | N/A         | N/A         | N/A         | N/A        |
| 2.A.4.b - Other Uses of Soda Ash                           | N/A                  | N/A         | 4,65596     | 5,70556     | 3.13445     | 6,26570692 |
| 2.A.4.c - Non Metallurgical Magnesite Production           | N/A                  | N/A         | N/A         | N/A         | N/A         | N/A        |
| 2.A.4.d - Other (please specify) (3)                       | N/A                  | N/A         | N/A         | N/A         | N/A         | N/A        |
| 2.A.5 - Other (please specify) (3)                         | 0.2058               | 0.42342     | 0.78699     | 1,2230283   | 1,6730448   | 2,0347479  |
| <b>2.B - Chemical Industry</b>                             | N/A                  | 8,3147925   | 23,93601    | 5.5634775   | 4.6061575   | 10,35912   |
| 2.B.1 - Ammonia Production                                 | N/A                  | N/A         | N/A         | N/A         | N/A         | N/A        |
| 2.B.2 - Nitric Acid Production                             | N/A                  | N/A         | N/A         | N/A         | N/A         | N/A        |
| 2.B.3 - Adipic Acid Production                             | N/A                  | N/A         | N/A         | N/A         | N/A         | N/A        |
| 2.B.4 - Caprolactam, Glyoxal and Glyoxylic Acid Production | N/A                  | N/A         | N/A         | N/A         | N/A         | N/A        |
| 2.B.5 - Carbide Production                                 | N/A                  | N/A         | N/A         | N/A         | N/A         | N/A        |
| 2.B.6 - Titanium Dioxide Production                        | N/A                  | N/A         | N/A         | N/A         | N/A         | N/A        |
| 2.B.7 - Soda Ash Production                                | N/A                  | N/A         | N/A         | N/A         | N/A         | N/A        |
| 2.B.8 - Petrochemical and Carbon Black Production          | N/A                  | N/A         | N/A         | N/A         | N/A         | N/A        |
| 2.B.8.a - Methanol                                         | N/A                  | N/A         | N/A         | N/A         | N/A         | N/A        |
| 2.B.8.b - Ethylene                                         | N/A                  | N/A         | N/A         | N/A         | N/A         | N/A        |
| 2.B.8.c - Ethylene Dichloride and Vinyl Chloride Monomer   | N/A                  | N/A         | N/A         | N/A         | N/A         | N/A        |
| 2.B.8.d - Ethylene Oxide                                   | N/A                  | N/A         | N/A         | N/A         | N/A         | N/A        |
| 2.B.8.e - Acrylonitrile                                    | N/A                  | N/A         | N/A         | N/A         | N/A         | N/A        |

|                                                                         |             |             |             |             |             |             |
|-------------------------------------------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 2.B.8.f - Carbon Black                                                  | N/A         | N/A         | N/A         | N/A         | N/A         | N/A         |
| 2.B.9 - Fluorochemical Production                                       | N/A         | N/A         | N/A         | N/A         | N/A         | N/A         |
| 2.B.9.a - By-product emissions (4)                                      | N/A         | N/A         | N/A         | N/A         | N/A         | N/A         |
| 2.B.9.b - Fugitive Emissions (4)                                        | N/A         | N/A         | N/A         | N/A         | N/A         | N/A         |
| 2.B.10 - Other (Please specify) (3)                                     | N/A         | 8,3147925   | 23,93601    | 5.5634775   | 4.6061575   | 10,35912    |
| <b>2.C - Metal Industry</b>                                             | N/A         | N/A         | N/A         | N/A         | N/A         | N/A         |
| 2.C.1 - Iron and Steel Production                                       | N/A         | N/A         | N/A         | N/A         | N/A         | N/A         |
| 2.C.2 - Ferroalloys Production                                          | N/A         | N/A         | N/A         | N/A         | N/A         | N/A         |
| 2.C.3 - Aluminum production                                             | N/A         | N/A         | N/A         | N/A         | N/A         | N/A         |
| 2.C.4 - Magnesium production (5)                                        | N/A         | N/A         | N/A         | N/A         | N/A         | N/A         |
| 2.C.5 - Lead Production                                                 | N/A         | N/A         | N/A         | N/A         | N/A         | N/A         |
| 2.C.6 - Zinc Production                                                 | N/A         | N/A         | N/A         | N/A         | N/A         | N/A         |
| 2.C.7 - Other (please specify) (3)                                      | N/A         | N/A         | N/A         | N/A         | N/A         | N/A         |
| <b>2.D - Non-Energy Products from Fuels and Solvent Use (6)</b>         | N/A         | N/A         | 3,2832      | 24,97664    | 38,0304     | 38,08704    |
| 2.D.1 - Lubricant Use                                                   | N/A         | N/A         | N/A         | N/A         | N/A         | N/A         |
| 2.D.2 - Paraffin Wax Use                                                | N/A         | N/A         | N/A         | N/A         | N/A         | N/A         |
| 2.D.3 - Solvent Use (7)                                                 | N/A         | N/A         | N/A         | N/A         | N/A         | N/A         |
| 2.D.4 - Other (please specify) (3), (8)                                 | N/A         | N/A         | 3,2832      | 24,97664    | 38,0304     | 38,08704    |
| <b>2.E - Electronics Industry</b>                                       | N/A         | N/A         | N/A         | N/A         | N/A         | N/A         |
| 2.E.1 - Integrated Circuit or Semiconductor (9)                         | N/A         | N/A         | N/A         | N/A         | N/A         | N/A         |
| 2.E.2 - TFT Flat Panel Display (9)                                      | N/A         | N/A         | N/A         | N/A         | N/A         | N/A         |
| 2.E.3 - Photovoltaics (9)                                               | N/A         | N/A         | N/A         | N/A         | N/A         | N/A         |
| 2.E.4 - Heat Transfer Fluid (10)                                        | N/A         | N/A         | N/A         | N/A         | N/A         | N/A         |
| 2.E.5 - Other (please specify) (3)                                      | N/A         | N/A         | N/A         | N/A         | N/A         | N/A         |
| <b>2.F - Product Uses as Substitutes for Ozone Depleting Substances</b> | 43.14663746 | 258,0781772 | 535.2266117 | 729.6612645 | 662,6636267 | 575,1371123 |
| 2.F.1 - Refrigeration and Air Conditioning                              | 43.14663746 | 258,0781772 | 535.2266117 | 729.6612645 | 662,6636267 | 575,1371123 |
| 2.F.1.a - Refrigeration and Stationary Air Conditioning                 | 43.14663746 | 258,0781772 | 535.2266117 | 729.6612645 | 662,6636267 | 575,1371123 |

|                                                        |            |            |             |            |             |           |
|--------------------------------------------------------|------------|------------|-------------|------------|-------------|-----------|
| 2.F.1.b - Mobile Air Conditioning                      | N/A        | N/A        | N/A         | N/A        | N/A         | N/A       |
| 2.F.2 - Foam Blowing Agents                            | N/A        | N/A        | N/A         | N/A        | N/A         | N/A       |
| 2.F.3 - Fire Protection                                | N/A        | N/A        | N/A         | N/A        | N/A         | N/A       |
| 2.F.4 - Aerosols                                       | N/A        | N/A        | N/A         | N/A        | N/A         | N/A       |
| 2.F.5 - Solvents                                       | N/A        | N/A        | N/A         | N/A        | N/A         | N/A       |
| 2.F.6 - Other Applications (please specify) (3)        | N/A        | N/A        | N/A         | N/A        | N/A         | N/A       |
| <b>2.G - Other Product Manufacture and Use</b>         | N/A        | N/A        | N/A         | N/A        | N/A         | N/A       |
| 2.G.1 - Electrical Equipment                           | N/A        | N/A        | N/A         | N/A        | N/A         | N/A       |
| 2.G.1.a - Manufacture of Electrical Equipment          | N/A        | N/A        | N/A         | N/A        | N/A         | N/A       |
| 2.G.1.b - Use of Electrical Equipment                  | N/A        | N/A        | N/A         | N/A        | N/A         | N/A       |
| 2.G.1.c - Disposal of Electrical Equipment             | N/A        | N/A        | N/A         | N/A        | N/A         | N/A       |
| 2.G.2 - SF6 and PFCs from Other Product Uses           | N/A        | N/A        | N/A         | N/A        | N/A         | N/A       |
| 2.G.2.a - Military Applications                        | N/A        | N/A        | N/A         | N/A        | N/A         | N/A       |
| 2.G.2.b - Accelerators                                 | N/A        | N/A        | N/A         | N/A        | N/A         | N/A       |
| 2.G.2.c - Other (please specify) (3)                   | N/A        | N/A        | N/A         | N/A        | N/A         | N/A       |
| 2.G.3 - N2O from Product Uses                          | N/A        | N/A        | N/A         | N/A        | N/A         | N/A       |
| 2.G.3.a - Medical Applications                         | N/A        | N/A        | N/A         | N/A        | N/A         | N/A       |
| 2.G.3.b - Propellant for pressure and aerosol products | N/A        | N/A        | N/A         | N/A        | N/A         | N/A       |
| 2.G.3.c - Other (Please specify) (3)                   | N/A        | N/A        | N/A         | N/A        | N/A         | N/A       |
| 2.G.4 - Other (Please specify) (3)                     | N/A        | N/A        | N/A         | N/A        | N/A         | N/A       |
| <b>2.H - Other</b>                                     | 3.45732916 | 4.28437163 | 4.956086915 | 5.69428461 | 6,183987855 | 7,4628368 |
| 2.H.1 - Pulp and Paper Industry                        | N/A        | N/A        | N/A         | N/A        | N/A         | N/A       |
| 2.H.2 - Food and Beverages Industry                    | 3.45732916 | 4.28437163 | 4.956086915 | 5.69428461 | 6,183987855 | 7,4628368 |
| 2.H.3 - Other (please specify) (3)                     | N/A        | N/A        | N/A         | N/A        | N/A         | N/A       |

## ANNEX 2: Detailed presentation of mitigation measures

### Annex 2.1. Energy sector

#### - Annex 2.1.1. Electricity production (CDN)

##### Mitigation measure 1: Installation of solar PV power plant

| Title of the mitigation measure                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Implementation stage<br>[Conceptual, planning phase, in execution, etc.] | Institution responsible for implementation | Duration (20XX-20YY)/Phase s (Phase 1, Phase 2, etc.) | Sector I and sub-sector (if applicable) | Fields of intervention<br>[eg national, regional, etc.] | Quantitative objectives (GHG-related or non-GHG impacts, as applicable) | GHGs concerned  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|--------------------------------------------|-------------------------------------------------------|-----------------------------------------|---------------------------------------------------------|-------------------------------------------------------------------------|-----------------|
| Installation of PV solar power plant                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Implementation                                                           | Ministry of Petroleum and Energy           | 2014 - 2020                                           | Energy supply, Renewable energy         | National                                                | Reduction of 328 325 t.eq.CO <sub>2</sub> p per year                    | CO <sub>2</sub> |
| Objective of the mitigation measure                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                          |                                            |                                                       |                                         |                                                         |                                                                         |                 |
| <p>The installation of photovoltaic solar power plants contributes to:</p> <ul style="list-style-type: none"> <li>- achieve universal access to electricity</li> <li>- strengthen the penetration of renewable energies in the electricity production park</li> <li>- reduce GHG emissions from the energy sector.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                          |                                            |                                                       |                                         |                                                         |                                                                         |                 |
| Brief description and activities planned under the mitigation measure                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                          |                                            |                                                       |                                         |                                                         |                                                                         |                 |
| <p>This action is part of the measures of the mitigation component of the unconditional CDN which aims at an injection of a total power in additional renewable energies of 699 MW, bringing the total (CDN and CDN+) to 999 MW in renewable energies. In addition, it makes it possible to increase the penetration rate of renewable energies to 28.4% in 2021 with an enormous potential for reducing GHGs in the energy sector. <i>Cumulative installed renewable energy capacity in 2030: Solar 235.56 MW</i></p> <p>These solar photovoltaic power plant projects (Bokhol – Senergy 2 / 20 MW, Diass – Aggreko / 23 MW, Malicounda / 20 MW, Ten Merina / 29 MW - Scaling Solar, Sakhal – Innovent Senegal SA/ 20 MW, Kael – ENGI Meridien / 35 MW - Scaling Solar, Santhiou Mekhe – Senergy PV SA / 30 MW, Diamniadio CICAD / 1.56 MW, APR CDB / 2 MW, Kahone - Energy Res. Senegal SA / 20 MW, Kahone - ENGI Meridien / 35 MW, Scaling Solar) are implemented through a public-private partnership where construction and operation are often managed by private companies. The production from these power plants is sold to the national electricity company which holds the monopoly on electricity transmission and distribution.</p> <p>Ultimately, they contribute to achieving universal electricity and reducing GHGs in the energy sector.</p> |                                                                          |                                            |                                                       |                                         |                                                         |                                                                         |                 |
| Estimated results and estimated emission reductions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                          |                                            |                                                       |                                         |                                                         |                                                                         |                 |
| <p>The measure contributes to:</p> <ul style="list-style-type: none"> <li>- The country's energy sobriety</li> <li>- Reducing GHGs</li> <li>- Diversification of energy sources</li> <li>- Energy sovereignty</li> <li>- To the socio-economic development of the territories</li> <li>- Job creation</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                          |                                            |                                                       |                                         |                                                         |                                                                         |                 |
| Methodologies and hypotheses                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                          |                                            |                                                       |                                         |                                                         |                                                                         |                 |
| <p>Based on a defined reference year (Business As Usual), projections have been defined with a GHG reduction level expected in 2030 based on the penetration of energy sector sobriety measures. The planned renewable energy installation capacities in 2030 correspond to a GHG reduction defined according to the IPCC 2006 methodology (activity data * emission factor).</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                          |                                            |                                                       |                                         |                                                         |                                                                         |                 |

|                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |             |                                                                                |
|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------------------------------------------------------------------------------|
|                                   | <p><i>For the energy sector (CDN, 2020):</i></p> <p><b>BAU:</b></p> <ul style="list-style-type: none"> <li>- 2010 = 6165 Gg CO<sub>2</sub>e</li> <li>- 2025 = 19512 Gg CO<sub>2</sub>e</li> <li>- 2030 = 23927 Gg CO<sub>2</sub>e</li> </ul> <p><b>CDN (Energy)</b></p> <ul style="list-style-type: none"> <li>- 2010 = 6155 Gg CO<sub>2</sub>e</li> <li>- 2025 = 18022 Gg CO<sub>2</sub>e (7.6% decrease)</li> <li>- 2030 = 21523 Gg CO<sub>2</sub>e (10% decrease)</li> </ul> |             |                                                                                |
|                                   | Main indicators used                                                                                                                                                                                                                                                                                                                                                                                                                                                            |             |                                                                                |
|                                   | Unit                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Target year | Target value                                                                   |
| Indicators related to GHG impacts | TCo <sub>2</sub> eq/year                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 2030        | 3611575 teq CO <sub>2</sub><br>(328 325t.eq.CO <sub>2</sub> per year*11 years) |

### Mitigation measure 2: installation of wind power plant

| Title of the mitigation measure                     | Implementation stage<br>[Conceptual, planning phase, in execution, etc.]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Institution responsible for implementation | Duration (20XX-20YY)/Phases (Phase 1, Phase 2, etc.) | Sector1 and sub-sector (if applicable) | Fields of intervention<br>[eg national, regional, etc.] | Quantitative objectives (GHG-related or non-GHG impacts, as applicable) | GHGs concerned  |
|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|------------------------------------------------------|----------------------------------------|---------------------------------------------------------|-------------------------------------------------------------------------|-----------------|
| Wind production 150 MW / Taïba Ndiaye power station | Implementation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Ministry of Petroleum and Energy           | 2020                                                 | Energy supply, Renewable energy        | National                                                | Reduction of 257,000 t.eq.CO <sub>2</sub> per year                      | CO <sub>2</sub> |
|                                                     | Objective of the mitigation measure                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                            |                                                      |                                        |                                                         |                                                                         |                 |
|                                                     | <p>The installation of photovoltaic solar power plants contributes to:</p> <ul style="list-style-type: none"> <li>- achieve universal access to electricity</li> <li>- strengthen the penetration of renewable energies in the electricity production park</li> <li>- reduce GHG emissions from the energy sector.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                            |                                                      |                                        |                                                         |                                                                         |                 |
|                                                     | Brief description and activities planned under the mitigation measure                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                            |                                                      |                                        |                                                         |                                                                         |                 |
|                                                     | <p>This action is part of the measures of the mitigation component of the unconditional CDN which aims at an injection of a total power in additional renewable energies of 699 MW, bringing the total (CDN and CDN+) to 999 MW in renewable energies. In addition, it makes it possible to increase the penetration rate of renewable energies to 28.4% in 2021 with an enormous potential for reducing GHGs in the energy sector.</p> <p>This Taïba Ndiaye solar wind power plant project is implemented through a public-private partnership where construction and operation are often managed by private companies. The electricity production from this plant is sold to the national electricity company which holds the monopoly on the transmission and distribution of electricity.</p> <p>Ultimately, they contribute to achieving universal electricity and reducing GHGs in the energy sector.</p> |                                            |                                                      |                                        |                                                         |                                                                         |                 |
|                                                     | Estimated results and estimated emission reductions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                            |                                                      |                                        |                                                         |                                                                         |                 |
|                                                     | <p>The measure contributes to:</p> <ul style="list-style-type: none"> <li>- The country's energy sobriety</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                            |                                                      |                                        |                                                         |                                                                         |                 |

|                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |             |                             |
|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-----------------------------|
|                                   | <ul style="list-style-type: none"> <li>- Reducing GHGs</li> <li>- Diversification of energy sources</li> <li>- Energy sovereignty</li> <li>- To the socio-economic development of the territories</li> <li>- Job creation.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |             |                             |
|                                   | Methodologies and hypotheses                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |             |                             |
|                                   | <p>Based on a defined reference year (Business As Usual), projections have been defined with a GHG reduction level expected in 2030 based on the penetration of energy sector sobriety measures. The planned renewable energy installation capacities in 2030 correspond to a GHG reduction defined according to the IPCC 2006 methodology (activity data*emission factor).</p> <p>For the energy sector (CDN, 2020):</p> <p>BAU:</p> <ul style="list-style-type: none"> <li>- 2010 = 6165 Gg CO<sub>2</sub>e</li> <li>- 2025 = 19512 Gg CO<sub>2</sub>e</li> <li>- 2030 = 23927 Gg CO<sub>2</sub>e</li> </ul> <p><b>CDN (Energy)</b></p> <ul style="list-style-type: none"> <li>- 2010 = 6155 Gg CO<sub>2</sub>e</li> <li>- 2025 = 18022 Gg CO<sub>2</sub>e (7.6% decrease)</li> </ul> <p>2030 = 21523 Gg CO<sub>2</sub>e (10% decrease)</p> |             |                             |
|                                   | Main indicators used                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |             |                             |
|                                   | Unit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Target year | Target value                |
| Indicators related to GHG impacts | TCo <sub>2</sub> eq/year                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 2030        | 2827000 teq CO <sub>2</sub> |

### Mitigation measure 3: installation of hydroelectric power plant

| Title of the mitigation measure                                        | Implementation stage<br>[Conceptual, planning phase, in execution, etc.]                                                                                                                                                                                                                                                      | Institution responsible for implementation | Duration (20XX-20YY)/Phases (Phase 1, Phase 2, etc.) | Sector and sub-sector (if applicable) | Fields of intervention<br>[eg national, regional, etc.] | Quantitative objectives (GHG-related or non-GHG impacts, as applicable) | GHGs concerned  |
|------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|------------------------------------------------------|---------------------------------------|---------------------------------------------------------|-------------------------------------------------------------------------|-----------------|
| Hydro production 314 MW (CDN)<br>OMVS Manatali (60MW) and Felou (15MW) | Implementation                                                                                                                                                                                                                                                                                                                | Ministry of Petroleum and Energy           | Under implementation                                 | Energy supply, Renewable energy       | National                                                | Reduction of 205,630 t.eq.CO <sub>2</sub> per year                      | CO <sub>2</sub> |
|                                                                        | Objective of the mitigation measure                                                                                                                                                                                                                                                                                           |                                            |                                                      |                                       |                                                         |                                                                         |                 |
|                                                                        | <p>The installation of photovoltaic solar power plants contributes to:</p> <ul style="list-style-type: none"> <li>- achieve universal access to electricity</li> <li>- strengthen the penetration of renewable energies in the electricity production park</li> <li>- reduce GHG emissions from the energy sector.</li> </ul> |                                            |                                                      |                                       |                                                         |                                                                         |                 |
|                                                                        | Brief description and activities planned under the mitigation measure                                                                                                                                                                                                                                                         |                                            |                                                      |                                       |                                                         |                                                                         |                 |

|                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |             |                                                                                                                    |
|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------------------------------------------------------------------------------------------------------------------|
|                                   | <p>These actions are part of the measures of the mitigation component of the unconditional CDN which aims at an injection of a total power in additional renewable energies of 699 MW, bringing the total (CDN and CDN+) to 999 MW in renewable energies. In addition, it makes it possible to increase the penetration rate of renewable energies to 28.4% in 2021 with an enormous potential for reducing GHGs in the energy sector.</p> <p>These hydroelectric power plant projects (Manantali - OMVS / 60 MW, Félou - OMVS / 15 MW) are implemented through a sub-regional partnership, within the framework of OMVS (Organisation for the Development of the Senegal River) and OMVG (Organisation for the Development of the Gambia River). The electricity production from this power plant is sold to the national electricity company which holds the monopoly on the transmission and distribution of electricity.</p> <p>Ultimately, they contribute to achieving universal electricity and reducing GHGs in the energy sector.</p> |             |                                                                                                                    |
|                                   | Estimated results and estimated emission reductions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |             |                                                                                                                    |
|                                   | <p>The measure contributes to:</p> <ul style="list-style-type: none"> <li>- The country's energy sobriety</li> <li>- Reducing GHGs</li> <li>- Diversification of energy sources</li> <li>- Energy sovereignty</li> <li>- To the socio-economic development of the territories</li> <li>- Job creation.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |             |                                                                                                                    |
|                                   | Methodologies and hypotheses                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |             |                                                                                                                    |
|                                   | <p><i>Based on a defined reference year (Business As Usual), projections have been defined with a GHG reduction level expected in 2030 based on the penetration of energy sector sobriety measures. The planned renewable energy installation capacities in 2030 correspond to a GHG reduction defined according to the IPCC 2006 methodology (activity data*emission factor).</i></p> <p><i>For the energy sector (CDN, 2020):</i></p> <p><b>BAU:</b></p> <ul style="list-style-type: none"> <li>- 2010 = 6165 Gg CO<sub>2</sub>e</li> <li>- 2025 = 19512 Gg CO<sub>2</sub>e</li> <li>- 2030 = 23927 Gg CO<sub>2</sub>e</li> </ul> <p><b>CDN (Energy)</b></p> <ul style="list-style-type: none"> <li>- 2010 = 6155 Gg CO<sub>2</sub>e</li> <li>- 2025 = 18022 Gg CO<sub>2</sub>e (7.6% decrease)</li> </ul> <p>2030 = 21523 Gg CO<sub>2</sub>e (10% decrease)</p>                                                                                                                                                                             |             |                                                                                                                    |
|                                   | Main indicators used                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |             |                                                                                                                    |
|                                   | Unit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Target year | Target value                                                                                                       |
| Indicators related to GHG impacts | TCO <sub>2</sub> eq/year                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 2030        | It is difficult to deduce the level of reduction, especially since the power stations are still being implemented. |

- *Mitigation measure 4:* Electricity production from renewable energy initiatives, coal and fuel oil conversion

| <b>Other activities of electricity production from renewable energies currently being implemented</b> | <b>Potential( MW) 2030</b> | <b>Potential (MWh/year )</b> | <b>Potential (tCO2) 2030</b> | <b>Accounting period (years)</b> |
|-------------------------------------------------------------------------------------------------------|----------------------------|------------------------------|------------------------------|----------------------------------|
| PAU 2025: Rural electrification for universal access in 2030 (MDP-PoA-ER ASER)                        | N / A                      | N / A                        | 400,000                      | 5                                |
| PAU 2025: Electrification of 1000 villages by mini solar networks (Sen-FVC ASER)                      | 32                         | N / A                        | 1,127,447                    | 10                               |
| 50 MW Solar Thermal Power Plant Project with Technology Transfer (IPP)                                | 50                         | 157,500                      | 451 238                      | 5                                |
| Installation of a cumulative capacity of 300 MW of solar power plants with Storage<br>(IPP)           | 300                        | 876,000                      | 3,011,688                    | 6                                |
| Installation of a cumulative power of 50 MW of biomass with transfer of technology (IPP)              | 50                         | 388,000                      | 1,333,944                    | 6                                |
| <b>TOTAL 1</b>                                                                                        | <b>432</b>                 |                              | <b>6,324,317</b>             |                                  |

| <b>Other off-grid renewable energy activities</b>                                                                                                           | <b>Project</b>                                                | <b>P. Inst (MWc)</b> | <b>Year of start</b> | <b>Potential (tCO2) 2030</b> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|----------------------|----------------------|------------------------------|
| National Public Lighting Program<br>Solar of 500,000 street lights (ANER)                                                                                   | PRODERE I: installation from 1835 Street lamps                | 0.27525              | 2015                 | 11,290                       |
|                                                                                                                                                             | 1st Phase 50,000 Street Lamps                                 | 13.25                | 2019                 | 307,790                      |
|                                                                                                                                                             | 2nd phase: 268,000 street lamps                               | 62.98                | 2022                 | 1,320,000                    |
|                                                                                                                                                             | <b>TOTAL 1</b>                                                | <b>77</b>            |                      | <b>1,639,080</b>             |
| Program for the empowerment of public buildings and infrastructures (Universities, Hospitals, Governments, Prefectures, Courts, Barracks, CRF, etc.) (ANER) | ESIPC I                                                       | 0.08838              | 2015                 | 4,436                        |
|                                                                                                                                                             | ESIPC II                                                      | 0.0793               | 2016                 | 3,980                        |
|                                                                                                                                                             | ESIPC III                                                     | 0.058                | 2018                 | 2,911                        |
|                                                                                                                                                             | ESIPC IV                                                      | 0.589                | 2022                 | 23,652                       |
|                                                                                                                                                             | PRODRE II                                                     | 0.744                | 2018                 | 37 345                       |
|                                                                                                                                                             | ORIO                                                          | 0.314                | 2017                 | 15,761                       |
|                                                                                                                                                             | Project for the electrical autonomy of other public buildings | 150                  | 2024                 | 3,764,610                    |
|                                                                                                                                                             | <b>TOTAL 2</b>                                                | <b>152</b>           |                      | <b>3,852,696</b>             |

|                                                                                                                                             |                                                   |             |      |                  |
|---------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|-------------|------|------------------|
| Renewable Energy Program for the promotion of rural productive uses (multifunctional platforms, pumping, cold rooms, transformation) (ANER) | Installation and generalization 516 PTFM solar    | 5.16        | 2022 | 578,400          |
|                                                                                                                                             | Driver of 2 TAMBA Banana Pumping Systems          | 0.11        | 2021 | 13,878           |
|                                                                                                                                             | Project 40 NIAYES pumps (GIZ/GBE)                 | 0.1511      | 2022 | 16,592           |
|                                                                                                                                             | Scaling up phase 4000 solar pumps                 | 15.1        | 2022 | 1,659,200        |
|                                                                                                                                             | Solar room pilot at the Fass Boye quays and Mbour | 0.034       | 2021 | 4,293            |
|                                                                                                                                             | <b>TOTAL 3</b>                                    | <b>21</b>   |      | <b>2,272,363</b> |
| Energy Autonomy Program for Private Infrastructures (SMEs/SMIs and Large Industries) (ANER)                                                 | Nd                                                | Nd          |      |                  |
|                                                                                                                                             | Nd                                                | Nd          |      |                  |
|                                                                                                                                             | <b>TOTAL 4</b>                                    |             |      |                  |
| Renewable Thermal Popularization Program for Productive and Sanitary Uses (ANER)                                                            | Nd                                                | Nd          |      |                  |
|                                                                                                                                             | Nd                                                | Nd          |      |                  |
| Installation of desalination units solar in the peanut basin                                                                                | GANDIAYE solar project                            | 0.015       | 2021 | 675              |
|                                                                                                                                             | Nd                                                | Nd          |      |                  |
|                                                                                                                                             | <b>TOTAL 5</b>                                    | <b>0.02</b> |      | <b>675</b>       |

**GRAND TOTAL      249 MWc**

*Summary of electricity production projects in progress and planned from from coal to natural gas conversion*  
**"GAS to Power Program")**

|   | <b>"GAS to Power"<br/>Program: Coal – Natural<br/>Gas Conversion Projects<br/>Underway or Planned</b> | <b>Potential(MW)<br/>2030</b> | <b>Potential<br/>(MWh/year)</b> | <b>Potential<br/>(TJ/year)</b> | <b>Potential<br/>(tCO2)<br/>2030</b> | <b>Accounting<br/>period<br/>(years)</b> |
|---|-------------------------------------------------------------------------------------------------------|-------------------------------|---------------------------------|--------------------------------|--------------------------------------|------------------------------------------|
| 1 | Sendou                                                                                                | 125                           | 970,000                         | 3492                           | 1,435,212                            | 6                                        |
| 2 | Mboro (Taiba) Africa Energy<br>SA                                                                     | 300                           | 2,328,000                       | 8380.8                         | 2,870,424                            | 5                                        |
|   | <b>TOTAL 2</b>                                                                                        | <b>425</b>                    |                                 |                                | <b>4,305,636</b>                     |                                          |

*Summary of electricity production projects in progress and planned from from the conversion of fuel oil to natural gas*  
**("GAS to Power")**

|   | <b>"GAS to Power"<br/>Program: Heavy Fuel Oil<br/>(HFO) – Natural Gas<br/>Conversion Projects</b> | <b>Potential(MW)<br/>2030</b> | <b>Potential<br/>(MWh/year)</b> | <b>Potential<br/>(TJ/year)</b> | <b>Potential<br/>(tCO2)<br/>2030</b> | <b>Accounting<br/>period<br/>(years)</b> |
|---|---------------------------------------------------------------------------------------------------|-------------------------------|---------------------------------|--------------------------------|--------------------------------------|------------------------------------------|
| 1 | Tobene (Tobene Power)                                                                             | 110                           | 853,600                         | 3,073                          | 408 704                              | 5                                        |
| 2 | Karpower                                                                                          | 220                           | 1,707,200                       | 6 146                          | 817 407                              | 5                                        |
| 3 | C6 Cap de Biches (Senelec)                                                                        | 90                            | 698,400                         | 2,514                          | 334 394                              | 5                                        |
| 4 | Malicounda Power                                                                                  | 120                           | 931 200                         | 3,352                          | 445 859                              | 5                                        |
| 5 | Cape of the Deer (Overall<br>Outline)                                                             | 87                            | 675 120                         | 2,430                          | 323 247                              | 5                                        |
| 6 | Cape of the Deer C4 (Senelec)                                                                     | 30                            | 232,800                         | 838                            | 111 465                              | 5                                        |
|   | <b>TOTAL 3</b>                                                                                    | <b>657</b>                    |                                 |                                | <b>2,441,076</b>                     |                                          |

- *Summary of electricity production projects in progress and planned from* **from the construction of new natural gas power plants (“GAS to Power”)**

|   | <b>GAZ to Power Program: New Natural Gas Power Plants</b>    | <b>Potential(MW)<br/>2030</b> | <b>Potential<br/>(MWh/year)</b> | <b>Potential<br/>(TJ/year)</b> | <b>Potential (tCO2)<br/>2030</b> | <b>Accounting<br/>period<br/>(years)</b> |
|---|--------------------------------------------------------------|-------------------------------|---------------------------------|--------------------------------|----------------------------------|------------------------------------------|
| 7 | EPC Cap des Biches (Rehabilitation ex GTI - GE&CALIK Enerji) | <b>120</b>                    | 931 200                         | 3,352                          | <b>535,030</b>                   | 6                                        |
| 8 | Cape of the Deer (West Africa Energy)                        | <b>300</b>                    | 2,328,000                       | 8,381                          | <b>1,337,576</b>                 | 6                                        |
| 9 | IPP Saint-Louis                                              | <b>225</b>                    | 1,746,000                       | 6,286                          | <b>835 985</b>                   | 5                                        |
|   | <b>TOTAL 4</b>                                               | <b>645</b>                    |                                 |                                | <b>2,708,591</b>                 |                                          |

Source: Status of the implementation of the energy component of Senegal's NDC (UNDP & OFSARR, 2022)

### *Annex 2.1.2.: Domestic fuels subsector*

*Mitigation measure: Dissemination of improved stoves and creation of bio digesters*

[illegible]

|                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |             |              |
|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------------|
|                                   | <p>The promotion of domestic fuels constitutes the flagship action for achieving the objective of ensuring the sustainable supply of cooking energy to households while ensuring the preservation of forest resources.</p> <p>The construction of biodigesters for the benefit of rural households provides them with a source of domestic fuel. In addition, the program contributes to the creation of a viable market for biodigesters, the production of organic fertilizer to fertilize degraded land, the increase in agricultural production and consequently the improvement of household living conditions.</p> <p>In terms of mitigation, these measures contribute to the forests which are carbon sinks. Given their efficiency compared to Malagasy and three-stone fireplaces, FAs call for lower fuel consumption and implicitly for the reduction of GHGs. As for biodigesters, they make it possible to recover animal waste which is a source of methane emissions.</p> |             |              |
|                                   | Estimated results and estimated emission reductions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |             |              |
|                                   | <p>The measure contributes to:</p> <p>The country's energy sobriety: 800,000 improved stoves (IS) per year by 2030 (CDN) and 1,500,000 IS per year (CDN+) and 27,000 biodigesters (CDN) and 48,000 (CDN+) in 2030</p> <p>The country's GHG reduction</p> <p>Promoting clean cooking</p> <p>Job creation</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |             |              |
|                                   | Methodologies and hypotheses                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |             |              |
|                                   | Describe here the methodology used to estimate emission reductions and the main assumptions made.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |             |              |
|                                   | Main indicators used                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |             |              |
|                                   | Unit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Target year | Target value |
| Indicators related to GHG impacts | TCo2eq/year                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 2030        | No data      |
|                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |             |              |

### Annex 2.1.3. Energy efficiency sub-sector

- *Mitigation measure: energy saving and reduction of demand for electrical energy*

| Title of the mitigation measure | Implementation stage<br>[Conceptual, planning phase, in execution, etc.] | Institution responsible for implementation | Duration (20XX-20YY)/Phases (Phase 1, Phase 2, etc.) | Sector1 and sub-sector (if applicable) | Fields of intervention<br>[eg national, regional, etc.] | Quantitative objectives (GHG-related or non-GHG impacts, as applicable) | GHGs concerned |
|---------------------------------|--------------------------------------------------------------------------|--------------------------------------------|------------------------------------------------------|----------------------------------------|---------------------------------------------------------|-------------------------------------------------------------------------|----------------|
|---------------------------------|--------------------------------------------------------------------------|--------------------------------------------|------------------------------------------------------|----------------------------------------|---------------------------------------------------------|-------------------------------------------------------------------------|----------------|

| Energy saving and reduction | Implementation                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Ministry of Petroleum and Energy | Under implementation<br>December 31, 2021 | Energy supply, Renewable energy | National | Reduction of 328 325t.eq.CO2tCO2 per year | CO2 |
|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|-------------------------------------------|---------------------------------|----------|-------------------------------------------|-----|
|                             | Objective of the mitigation measure                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                  |                                           |                                 |          |                                           |     |
|                             | <p>The mitigation measure through energy efficiency contributed to:</p> <p>Reducing GHGs</p> <p>Rational consumption of energy (672.028 GWh (CDN) and 3,402 GWh (CDN+) in 2030)</p> <p>The impetus for the energy transition.</p> <p>Decrease in demand 126.8 MW (CDN) and 687.9 MW (CDN+) in 2030</p>                                                                                                                                                                     |                                  |                                           |                                 |          |                                           |     |
|                             | Brief description and activities planned under the mitigation measure                                                                                                                                                                                                                                                                                                                                                                                                      |                                  |                                           |                                 |          |                                           |     |
|                             | <p>The planned measures are:</p> <p>An efficient lighting program</p> <p>Reducing the public electricity bill</p> <p>Definition and application of lighting regulations</p> <p>Promotion of energy management technologies</p> <p>Improving the energy performance of public buildings</p> <p>Promotion of good energy management practices</p> <p>Promotion of energy efficiency in production (electricity and other energy)</p> <p>Regulations on energy management</p> |                                  |                                           |                                 |          |                                           |     |
|                             | Estimated results and estimated emission reductions                                                                                                                                                                                                                                                                                                                                                                                                                        |                                  |                                           |                                 |          |                                           |     |
|                             | <p>The measure contributes to:</p> <p>The country's energy sobriety</p> <p>The country's GHG reduction</p> <p>Achieving financial savings for the public sector</p> <p>Accelerating universal access to electricity</p> <p>Job creation</p>                                                                                                                                                                                                                                |                                  |                                           |                                 |          |                                           |     |

|                                   |                                                                                                   |             |                                                                             |
|-----------------------------------|---------------------------------------------------------------------------------------------------|-------------|-----------------------------------------------------------------------------|
|                                   | Methodologies and hypotheses                                                                      |             |                                                                             |
|                                   | Describe here the methodology used to estimate emission reductions and the main assumptions made. |             |                                                                             |
|                                   | Main indicators used                                                                              |             |                                                                             |
|                                   | Unit                                                                                              | Target year | Target value                                                                |
| Indicators related to GHG impacts | TCo2eq/year                                                                                       | 2030        | No estimate is possible because the annual emission level is not available. |
|                                   |                                                                                                   |             |                                                                             |

## Annex 2. 2: Industrial sub-sector

| Project                | Regulation on energy efficiency                                                                                                                                                                                                                 | Environmental Upgrade                                                                                                                                                                                                        | Waste recovery in the agro-industry (biomass)                                                                                                       | Valorization waste in Agro-industry (biogas)                                                         | Energy Efficiency of Cement Plants                                                                                                                                           | Natural gas                                                                                                                                                                                                                                                                             | Capture and sequestration of CO <sub>2</sub>                                                      | Substitution Clinker                                                                                   |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| Calculation parameters | <p>- Mandatory Audits for large companies: 100 large companies then 10% of companies each year. 15 h/d are planned per company</p> <p>- Energy supply studies for new installations : 75 studies per year at a rate of 5 hours per company.</p> | <p>The objective is to support 50 per year with financial incentives in the form of investment bonuses. The investments enable a saving of 30% on the energy consumption of companies with payback of less than 3 years.</p> | <p>The objective is to valorize 4 million GJ of agricultural biomass, through Co/tri-generation systems. The installed power is 115 MW electric</p> | <p>And 100,000 GJ of biogas to power 20 small cogeneration units (70kW) for livestock industries</p> | <p>Reduction from 92 to 70 kWh/Tonne of cement produced by improving the energy efficiency of the installations. The production taken into account is 8.7 million tonnes</p> | <p>Substitution of 40% of coal dedicated to self-production of electricity, i.e. 22,000 TJ in 2030. That corresponds to an electrical power of 550 MW produced by Combined Cycle Turbines with an efficiency of 55%. The installations are subsidized at 1500 FCFA per MWh produced</p> | <p>Equip 50% of cement production units by 2030. The tonne of CO<sub>2</sub> is valued at €20</p> | <p>Substitute clinker to reach a maximum rate of 65%. The tonne of CO<sub>2</sub> is valued at 20€</p> |

| Project                                      |                        | Regulation on energy efficiency | Environmental Upgrade    | Waste recovery in the agro-industry (biomass) | Valorization waste in Agro-industry (biogas) | Energy Efficiency of Cement Plants | Natural gas | Capture and sequestration of CO <sub>2</sub> | Substitution Clinker |
|----------------------------------------------|------------------------|---------------------------------|--------------------------|-----------------------------------------------|----------------------------------------------|------------------------------------|-------------|----------------------------------------------|----------------------|
| Mitigation Impact                            | Electricity/year (kWh) |                                 | 108,750,000              | 342,500,000                                   | 8,400,000                                    | 191,400,000                        |             |                                              |                      |
|                                              | Fuel/year (MJ)         |                                 | 723,750,000              | 2,466,000,000                                 | 60,480,000                                   |                                    |             |                                              |                      |
|                                              | CO <sub>2</sub> (Gg)   | 648                             | 221                      | 457                                           | 11                                           | 152                                | 926         | 1682                                         | 415                  |
| Unconditional share                          |                        | 648                             | 66                       | 0                                             | 11                                           | 0                                  | 0           | 0                                            | 0                    |
| Conditional share                            |                        |                                 | 155                      | 457                                           | 0                                            | 152                                | 926         | 1682                                         | 415                  |
| Investments (M FCFA)                         |                        | 2 203                           | 150 670                  | 229 272                                       | 4,592                                        | 160 776                            | 247,500     |                                              |                      |
| Budget (M FCFA)                              |                        | 1,763                           | 45 201                   | 68,782                                        | 1,378                                        | 16,078                             | 77,000      | 441 303                                      | 108,950              |
| Calendar                                     |                        | Implementation immediate        | Implementation immediate | From 2020                                     | Implementation immediate                     | From 2020                          | From 2020   | From 2030                                    | From 2020            |
| Average cost TCO <sub>2</sub> avoided (FCFA) |                        | 0                               | 682,950                  | 491 386                                       | 409 488                                      | 1,056,604                          | 267 231     |                                              |                      |

*Source: NDC Implementation and Financing Strategy for the Industry Sector (2022)*

## Annex 2.4. Mitigation measure for the transport subsector

[illegible]

|                                   |                                                                                                                                                                                                                                                                                                                                                         |             |                                              |
|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|----------------------------------------------|
|                                   | <p><i>The measure contributes to:</i></p> <p><i>Energy efficiency in transport</i></p> <p><i>The country's GHG reduction</i></p> <p><i>To sustainable mobility</i></p> <p><i>Job creation</i></p> <p><i>Reduction of economic losses due to traffic jams</i></p> <p><i>Improving the transport fleet</i></p> <p><i>Diversify means of transport</i></p> |             |                                              |
|                                   | Methodologies and hypotheses                                                                                                                                                                                                                                                                                                                            |             |                                              |
|                                   | Describe here the methodology used to estimate emission reductions and the main assumptions made.                                                                                                                                                                                                                                                       |             |                                              |
|                                   | Main indicators used                                                                                                                                                                                                                                                                                                                                    |             |                                              |
|                                   | Unit                                                                                                                                                                                                                                                                                                                                                    | Target year | Target value                                 |
| Indicators related to GHG impacts | TCo2eq/year                                                                                                                                                                                                                                                                                                                                             | 2030        | For the TER in 2030 (8500t * 10 = 85000tCO2) |
|                                   |                                                                                                                                                                                                                                                                                                                                                         |             |                                              |

## Annex 2.5. Agriculture sector

*Mitigation measure 1: Development of rainfed rice cultivation in combination with better management of agricultural practices, fertilizer use, water and manure use*

[illegible]

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |             |              |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------------|
|                   | <ul style="list-style-type: none"> <li>-Improved water mobilization and control at the plot level</li> <li>-Crossing of intensification and rice productivity by equipment</li> <li>-Strengthening knowledge on rain-fed rice cultivation</li> <li>-Use of certified seeds and adoption of good agronomic practices</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                           |             |              |
|                   | Estimated results and estimated emission reductions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |             |              |
|                   | <p>-Traditional rainfed rice (Conventional agronomic practices, Fertilizer management, plowing and no soil mulching, Water management, No manure management)</p> <p>: yield of 1t/ha/year, an area of 120,000 ha sown, emissions of 2,736,000 tCO<sub>2</sub>Eq without the program, and -273,600 tCO<sub>2</sub>Eq with the program.</p> <p>-Improved rainfed practice (Best agronomic practice, Good fertilizer management, soil mulching, no plowing, better water management, good manure management)</p> <p>: yield of 5t/ha/year, an area of 183,000 ha sown, sequestration of 5,319,353 tCO<sub>2</sub>Eq with the program</p> <p>The uncertainty level of the results is 33.6% for the net greenhouse gas balance, which is consistent with similar studies.</p> |             |              |
|                   | Methodologies and hypotheses                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             |              |
|                   | <p><i>Describe here the methodology used to estimate emission reductions and the main assumptions made.</i></p> <p><i>Carbon footprint assessment</i></p> <p>The Ex-Act tool, developed by FAO, was used to carry out the carbon assessment of the PNAR project</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |             |              |
|                   | Main indicators used                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |             |              |
|                   | Unit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Target year | Target value |
| Avoided emissions | tCo <sub>2</sub> eq                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 2035        | 2,856,953    |

*Mitigation measure 2: Irrigation and drainage systems for annual crops*

[illegible]

|                   |                                                                                                                                                                                                                                                                                                                |             |              |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------------|
|                   | -Management of annual onion and sweet potato crops with better agronomic practices, good fertilizer management, soil mulching, no tillage, better water management, good manure management<br>: yield of 14t/ha/year, an area of 14,500 ha sown, sequestration of 319,747 tCO <sub>2</sub> Eq with the program |             |              |
|                   | Methodologies and hypotheses                                                                                                                                                                                                                                                                                   |             |              |
|                   | <i>Carbon footprint assessment</i><br>The Ex-Act tool, developed by FAO, was used to carry out the ex-ante carbon assessment of PDIDAS.                                                                                                                                                                        |             |              |
|                   | Main indicators used                                                                                                                                                                                                                                                                                           |             |              |
|                   | Unit                                                                                                                                                                                                                                                                                                           | Target year | Target value |
| Avoided emissions | tCo <sub>2</sub> eq                                                                                                                                                                                                                                                                                            | 2035        | 319,747      |

*Mitigation measure 3: Management of meadows and pastures*

| Title of the mitigation measure    | Implementation stage | Institution responsible for implementation                                     | Duration / Phases | Sector 1 and sub-sector         | Fields of intervention | Quantitative objectives (impacts linked or not to GHGs) | GHGs concerned |
|------------------------------------|----------------------|--------------------------------------------------------------------------------|-------------------|---------------------------------|------------------------|---------------------------------------------------------|----------------|
| Management of meadows and pastures | End of execution     | PDIDAS (inclusive and sustainable agribusiness development project in Senegal) | 2014-2021         | Agriculture / Livestock farming | National               | -Sequester 3,065,153 t CO <sub>2</sub> eq               | N20            |

|                   |                                                                                                                                                                                                                                                                    |             |  |  |  |              |  |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--|--|--|--------------|--|
|                   |                                                                                                                                                                                                                                                                    |             |  |  |  |              |  |
|                   | Objective of the mitigation measure                                                                                                                                                                                                                                |             |  |  |  |              |  |
|                   |                                                                                                                                                                                                                                                                    |             |  |  |  |              |  |
|                   | Brief description and activities planned under the mitigation measure                                                                                                                                                                                              |             |  |  |  |              |  |
|                   | .                                                                                                                                                                                                                                                                  |             |  |  |  |              |  |
|                   | Estimated results and estimated emission reductions                                                                                                                                                                                                                |             |  |  |  |              |  |
|                   | The "meadow" systems within the framework of the project make it possible to reduce GHG emissions by 2,540,750 t CO <sub>2</sub> -eq, or 19.62 tCO <sub>2</sub> eq/ha, over 20 years over an area of 44,657 ha.                                                    |             |  |  |  |              |  |
|                   | Methodologies and hypotheses                                                                                                                                                                                                                                       |             |  |  |  |              |  |
|                   | <p><i>Describe here the methodology used to estimate emission reductions and the main assumptions made.</i></p> <p><i>Carbon footprint assessment</i></p> <p>The Ex-Act tool, developed by FAO, was used to carry out the ex-ante carbon assessment of PDIDAS.</p> |             |  |  |  |              |  |
|                   | Main indicators used                                                                                                                                                                                                                                               |             |  |  |  |              |  |
|                   | Unit                                                                                                                                                                                                                                                               | Target year |  |  |  | Target value |  |
| Avoided emissions | tCo <sub>2</sub> eq                                                                                                                                                                                                                                                | 2035        |  |  |  | 3,065,153    |  |

*Mitigation measure 4: Reforestation and SLM*

| Title of the mitigation measure | Implementation stage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Institution responsible for implementation                                     | Duration / Phases | Sector 1 and sub-sector | Fields of intervention | Quantitative objectives (impacts linked or not to GHGs) | GHGs concerned |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|-------------------|-------------------------|------------------------|---------------------------------------------------------|----------------|
| Reforestation and GDT           | End of execution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | PDIDAS (inclusive and sustainable agribusiness development project in Senegal) | 2014-2021         | Agriculture/Forestry    | National               | -Sequester 3,897,147 t CO <sub>2</sub> eq               |                |
|                                 | Objective of the mitigation measure                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                |                   |                         |                        |                                                         |                |
|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                |                   |                         |                        |                                                         |                |
|                                 | Brief description and activities planned under the mitigation measure                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                |                   |                         |                        |                                                         |                |
|                                 | .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                |                   |                         |                        |                                                         |                |
|                                 | Estimated results and estimated emission reductions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                |                   |                         |                        |                                                         |                |
|                                 | <p>Potential deforestation of forests without the implementation of the project would generate a source of 8,444 tCO<sub>2</sub>-eq over an area of 40 ha. As for the reforestation carried out by the project, it would increase the potential for forest sequestration, reaching 1,596,284 t CO<sub>2</sub>-eq over an area of 33,325 ha.</p> <p>Sustainable land management on an area of 50,000 ha increases the sequestration level to 3,578,438 tCO<sub>2</sub>-eq, corresponding to 114,621 tCO<sub>2</sub>-eq sequestered per year.</p> |                                                                                |                   |                         |                        |                                                         |                |
|                                 | Methodologies and hypotheses                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                |                   |                         |                        |                                                         |                |
|                                 | <p><i>Carbon footprint assessment</i></p> <p>The Ex-Act tool, developed by FAO, was used to carry out the ex-ante carbon assessment of PDIDAS.</p>                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                |                   |                         |                        |                                                         |                |
|                                 | Main indicators used                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                |                   |                         |                        |                                                         |                |
|                                 | Unit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                | Target year       |                         |                        | Target value                                            |                |



|                   |                                                                                                                                                                                                                                                                                                                                 |             |              |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------------|
|                   | Estimated results and estimated emission reductions                                                                                                                                                                                                                                                                             |             |              |
|                   | This project will sequester 1,186,548 tCO <sub>2</sub> eq, divided between biomass (986,391 tCO <sub>2</sub> eq) and soil (200,157 tCO <sub>2</sub> eq), compared to the situation without the project, i.e. 59,327 tCO <sub>2</sub> eq per year, over a period of 20 years, between 2015 and 2035, with an uncertainty of 37%. |             |              |
|                   | Methodologies and hypotheses                                                                                                                                                                                                                                                                                                    |             |              |
|                   | <i>Carbon footprint assessment</i><br>The Ex-Act tool, developed by FAO, was used to carry out the carbon assessment of the RNA project                                                                                                                                                                                         |             |              |
|                   | Main indicators used                                                                                                                                                                                                                                                                                                            |             |              |
|                   | Unit                                                                                                                                                                                                                                                                                                                            | Target year | Target value |
| Avoided emissions | tCo2eq/year                                                                                                                                                                                                                                                                                                                     | 2035        | 59 327       |

## Anne 2.6. Forestry sector

### Mitigation measure 1: Management policy for classified forests and other similar forest areas

| Title of the mitigation measure                                                | Implementation stage<br>[Conceptual, planning phase, in execution, etc.] | Institution responsible for implementation | Duration (20XX-20YY)/Phases (Phase 1, Phase 2, etc.) | Sector1 and sub-sector (if applicable)        | Fields of intervention<br>[eg national, regional, etc.] | Quantitative objectives (GHG-related or non-GHG impacts, as applicable) | GHGs concerned  |
|--------------------------------------------------------------------------------|--------------------------------------------------------------------------|--------------------------------------------|------------------------------------------------------|-----------------------------------------------|---------------------------------------------------------|-------------------------------------------------------------------------|-----------------|
| <b>Management policy for classified forests and other similar forest areas</b> | Running                                                                  | DEFCCS                                     |                                                      | Forestry and other land uses (FAT) sub-sector | National                                                |                                                                         | CO <sub>2</sub> |

|                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |             |              |
|-----------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------------|
|                                                                       | Objective of the mitigation measure                                                                                                                                                                                                                                                                                                                                                                                                                                                        |             |              |
|                                                                       | <i>Strengthen the policy of creation and management of classified forests and other similar forest areas</i>                                                                                                                                                                                                                                                                                                                                                                               |             |              |
|                                                                       | Brief description and activities planned under the mitigation measure                                                                                                                                                                                                                                                                                                                                                                                                                      |             |              |
|                                                                       | <p><i>Creation of:</i></p> <ul style="list-style-type: none"> <li>- 8 Hunting Interest Zones (ZIC): Niombato, Mbégué, Kayanga, Lac de Guier, Richard-Toll, Djeus, Guelewar and Baobolong;</li> <li>- 10 classified forests (Mouït, la Corniche, Djovol, Dolol, Kassel, Kharé (Todd Island), Lindé-Est, the mangrove, Nialor and Tendieme) and</li> <li>- 6 sylvopastoral reserves (RSP Six boreholes, RSP of Yonoféré, RSP Mbem-Mbem, RSP Sab-Sabré, RSP Sagobé, RSP of Saloum)</li> </ul> |             |              |
|                                                                       | Estimated results and estimated emission reductions                                                                                                                                                                                                                                                                                                                                                                                                                                        |             |              |
|                                                                       | <p><i>In 2019,</i></p> <ul style="list-style-type: none"> <li>- 5869746 ha Classified area</li> <li>- 63,421 ha of declassifications and</li> <li>- 296361 ha of enlargements</li> </ul>                                                                                                                                                                                                                                                                                                   |             |              |
|                                                                       | Methodologies and hypotheses                                                                                                                                                                                                                                                                                                                                                                                                                                                               |             |              |
|                                                                       | <p><i>Uses of the characteristics of the different types of woody plant formations used in the CDN forestry of Senegal</i></p> <p><i>Assessment of areas by remote sensing with a reclassification of subcategories in line with those of the IPCC 2006</i></p> <p><i>Use of table 2.3.5 of the UTCATF Good Practice Guide on the representation of land conversion</i></p>                                                                                                                |             |              |
|                                                                       | Main indicators used                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |             |              |
|                                                                       | Unit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Target year | Target value |
| CO2 absorptions for the subcategory Forest land remaining Forest land | Gg CO2 Eq                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 2018        | 24,077.53    |
| CO2 absorptions for the subcategory Agricultural land                 | Gg CO2 Eq                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 2018        | 60.90 Gg     |

converted to Forest  
land

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*Mitigation measure 2: Conducting large-scale land defense and restoration operations/water and soil conservation (reforestation, protection, physical soil restoration, etc.)*

[illegible]





|                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |             |              |
|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------------|
|                                   | <p><i>Contribute to the sustainable increase in the availability of diversified domestic fuels, as well as the income of the communities concerned, while preserving the forest ecosystem and taking into account gender. More specifically, this involves:</i></p> <p><i>-Implement a sustainable, participatory and integrated management system for the production of wood energy to supply the main urban centers of Senegal through the development of 300,000 ha of community forests in the Tamba and Kolda regions.</i></p> <p><i>- Control the demand for domestic fuels by promoting savings in wood energy and ensuring the promotion of alternative energy sources.</i></p> <p><i>- Increase sequestration and reduce CO2 emissions through energy saving, substitution of energy sources and sustainable forest management</i></p> |             |              |
|                                   | Brief description and activities planned under the mitigation measure                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |             |              |
|                                   | <p>COMPONENT 1: Institutional reform of the charcoal sector</p> <p>COMPONENT 2: Sustainable management of wood fuel supply</p> <p>COMPONENT 3: Promotion and diversification of modern domestic fuels</p> <p>COMPONENT 4: Institutional arrangement for project implementation</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |             |              |
|                                   | Estimated results and estimated emission reductions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             |              |
|                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |             |              |
|                                   | Methodologies and hypotheses                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |             |              |
|                                   | <p><i>The Forest and Pastoral Ecological Information System (SIEF) updated by PROGEDE is made up of a set of circular plots geo-referenced and randomly arranged in the forests of both the classified domain and the protected domain of the eco-geographic zones</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |             |              |
|                                   | Main indicators used                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |             |              |
|                                   | Unit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Target year | Target value |
| Indicators related to GHG impacts | TCO <sub>2</sub> eq                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             |              |

*Mitigation measure 5: Conducting early burning activities (management fires)*

[illegible]

|                                   |                                                                                                                                                                                                                                                                                                                                             |             |              |
|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------------|
|                                   | <p>Over the period 1994 to 2018 (25 years), the statistics for bushfires and management fires (early fires) are as follows:</p> <ul style="list-style-type: none"> <li>- Bush fires: 4,058,824 ha (i.e. 162,353 ha/year on average);</li> <li>- Management fires (early fires): 16,450,659 ha (i.e. 658,026 ha/year on average).</li> </ul> |             |              |
|                                   | Methodologies and hypotheses                                                                                                                                                                                                                                                                                                                |             |              |
|                                   | <i>Business as usual (BAU) scenario of the distribution of emissions from late forest fires in the 2010 forestry NDC base year</i>                                                                                                                                                                                                          |             |              |
|                                   | Main indicators used                                                                                                                                                                                                                                                                                                                        |             |              |
|                                   | Unit                                                                                                                                                                                                                                                                                                                                        | Target year | Target value |
| Indicators related to GHG impacts | TCo2eq/year                                                                                                                                                                                                                                                                                                                                 |             |              |

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