THE REPUBLIC OF SURINAME

FIRST BIENNIAL UPDATE REPORT (BUR1) TO THE UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE

NOVEMBER 2022

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LIMITING CONDITIONS

This document (Suriname's first Biennial Update Report (BUR)) was prepared by EY at the request of the Government of Suriname (GoS). All information included within this document has been reported according to quantitative and qualitative data shared by various ministries within the GoS, as well as other government approved stakeholders. This information has been accepted through discussions and consultations with technical teams and approved ministry representatives. Information and data that has been acquired independently has been referenced and sourced as such throughout the document.

Stakeholders consulted for the preparation of the BUR include:

- Spiral Strategic Consulting
- Ministry of Environment and Spatial Planning
- Foundation for Forest Management and Production Control, a technical working institute of the Ministry of the Land Policy and Forest Management
- Ministry of Transport, Communication and Tourism
- Ministry of Agriculture, Animal Husbandry and Fisheries
- Ministry of Public Works
- Ministry of Finance and Planning
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- Energy Authority Suriname
- Staatsolie Maatschappij Suriname

The Technical Annex for REDD+ was collated and prepared by the Coalition for Rainforest Nations (CfRN) in coordination with the Ministry of Spatial Planning and Environment and the Foundation for Forest Management and Production Control.

ACRONYMS

Acronym	Definition
ABS	General Bureau of Statistics (Algemeen Bureau voor de Statistiek)
AdeKUS	Anton de Kom Universiteit van Suriname
AFOLU	Agriculture, Forestry and Other Land Use
AOSIS	Alliance of Small Island States
BTR	Biennial Transparency Reports
BUR	Biennial Update Report
CCD	Climate Compatible Development
CCREEE	Caribbean Centre for Renewable Energy and Energy Efficiency
CREEBC	CARICOM Regional Efficiency Building Code
CELOS	The Centre of Agriculture and Research in Suriname
CSA	Climate Smart Agriculture
CSF	Climate Smart Forestry
COP	Conference of the Parties
CSNR	Central Suriname Nature Reserve
DEV	Rural Electrification Department (Dienst Electrificatie Voorziening)
DNA	Designated National Authority
EAS	Energy Authority of Suriname
EBS	Energie Bedrijven Suriname
EE	Energy Efficiency
ENSO	El Niño-Southern Oscillation
ESP	Electricity Sector Plan
ETF	Enhanced Transparency Framework
GBB	Land Policy and Forest Management (Grondbeleid en Bosbeheer)
GDP	Gross Domestic Product
GHG	Greenhouse gas
GNP	Gross National Product
GoS	Government of Suriname
HFLD	High Forest, Low Deforestation
HFO	Heavy Fuel Oil
IDB	Inter-American Development Bank
IPPU	Industrial Processes and Product Use
IRRP	Integrated Resource and Resilience Planning
ITCZ	Inter-Tropical Convergence Zone
ITPs	Indigenous and Tribal Peoples
JCCCP	Japan-Caribbean Climate Change Partnership
KCA	Key category analysis
LULC	Land Use Land Cover
LVV	Agriculture, Livestock and Fisheries (Landbouw, Veeteelt en Visserij)
MUMA's	Multiple Use Management Areas
NAMA	Nationally Appropriate Mitigation Action
NAP	National Adaptation Plan
NC	National Communication
NC2	Second National Communication to the UNFCCC
NCCPSAP	National Climate Change Policy, Strategy and Action Plan
NCCR	National Coordination Centre for Disaster Management
NDA	National Designated Authority
NDC2	Second Nationally Determined Contribution
NFI	National Forest Inventory
NFMS	National Forest Monitoring System
NG	Natural Gas
NGO	Non-Governmental Organisation

NIMOS	National Institute for Environment and Development in Suriname
NMA	National Environmental Authority (Nationale Milieu Autoriteit)
NOB	National Development Bank of Suriname
NTFP	Non-Timber Forest Products
OW	Public Works (Openbare Werken)
PA	Paris Agreement
PV	Photovoltaic
QA/QC	Quality Assurance and Quality Control
RE	Renewable Energy
ROM	Spatial Planning and Environment (Ruimtelijke Ordening en Milieu)
SBB	Foundation for Forest Management and Production Control
SFISS	Sustainable Forestry Information System Suriname
SFM	Sustainable Forest Management
SIDS	Small Island Developing States
SLMS	Satellite Land Monitoring System
SMIN	Suriname Environmental Information Network (Suriname Milieu Informatie Netwerk)
SPCS	Staatsolie Power Company Suriname
SRD	Surinamese Dollar
TNA	Technology Needs Assessment
TOR	Terms of Reference
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNFCCC	United Nations Framework Convention on Climate Change
USD	United States Dollar

FOREWORD

Ladies and Gentlemen,

First of all, I would like to thank all those who have contributed to the development of this Biennial Update Report to the United Nations Framework Convention on Climate Change. I am of course, thinking of the members of my government, led in this work by the Minister for the Environment and his technical teams, I am also making reference to the technicians from EY and the Coalition for Rainforest Nations.

The publication of this report is indeed much more than the only update of the 2016 National Communication (NC2), with the inventory of the qualitative and quantitative progress made by Suriname, in the implementation of its Nationally Determined Contribution. It is, first and foremost, the symbol of a nation that is getting back in working order, that a country that honors its commitments and respects an international calendar, and finally, a country that gives the best of itself to assume its part effort. in achieving the common goals of the Paris Agreement to keep global warming to a maximum of 1.5 degrees Celsius.

When I was elected on July 13, 2020, I inherited a country in a very worrying economic and social situation, with a constant deterioration of our macro-economic indicators and with room for maneuvering for a difficult choice which limited to three options:

- Increase the fiscal pressure on populations already in great suffering;
- Not honoring the repayment of our debt to the IMF and our creditors; and
- Sacrifice our biodiversity heritage and our centuries-old forest, which represents 93% of our territory, for the benefit of uncontrolled development, in particular our mining and oil activities which represent a significant financial windfall in this period of energy crisis for a large part of the country. world.

None of these choices was compatible with my medium and long-term strategic vision of Suriname, its people, and its nature.

I- Preserving the world's first basin of biodiversity in the Amazon

When your ancestors bequeath to you a share of the largest pool of biodiversity in the world with the forests of Amazonia, and probably the most virtuous share in terms of deforestation, you have a moral obligation to preserve it, especially when you are one of the countries most exposed to climate change and in particular to the phenomenon of rising sea levels. For the record, Suriname is at the zero level of the waterline, consequently, at the top of the exposed countries and populations. The fight against global warming is therefore, vital for the future of our country and at the heart of my policy, and nothing can make me deviate from it.

Moreover, Suriname belongs to the very small group of net carbon-absorbing countries. Each year, my country generates a net carbon balance of more than 40 million tons, thereby cleaning up some of the carbon emitted into the atmosphere by the developed world. The preservation of our carbon sinks - forests, mangroves, and peat lands - is therefore a vital lever for the global carbon balance of the planet. Nothing can take me away from this role of global net carbon cleaner.

This is why, from the first day of my mandate and for two years now, the main watchword addressed to the members of my cabinet, in the management of their ministerial portfolio, has been to maintain our virtuous carbon trajectory at all costs. And believe me, it would have been much easier to give in to certain temptations, by putting climate issues in the background of our priorities.

Ministries with a high impact on our carbon footprint, such as energy, transport, public works, or agriculture, have all been instructed to find solutions aimed at accelerating the level of development of the country and the standard of living of our people without ever compromising Suriname's climate commitments. I reiterated this strongly last June in front of the oil and gas business community who came to Paramaribo for the Suriname Energy, Oil & Gas Summit.

II- Access to climate financing and mechanisms for financing REDD+ results

This BUR is a formal opportunity to demonstrate our progress and our results. On the one hand, in the reduction effort, within the framework of the REDD+ system, under Article 5 of the Paris Agreement and, on the other part, in accordance with article 6, adopted last year at COP 26 in Glasgow, to count, for post-2020 credits, the net carbon result at the national level.

This will enable us to find the way forward, which consists of collecting the first dividends from our investments in our carbon sinks to fairly and transparently distributing the value created among the most vulnerable populations, to finance investments and structuring programs in service of growth, jobs creation and the standard of living of our population, and finally making our debt levels sustainable.

The approval of our carbon credits is, in this respect, a key step in the implementation of our economic, social, and environmental policies because it will mark the beginning of the long-awaited access to climate finance, and in particular to private capital in need of sovereign carbon to internationally comply with the Paris Agreement

In conclusion, as page after page this BUR 2022 demonstrates, Suriname, two years after my election, is now on track to meet the ambition and transparency framework of the Paris Agreement, with the publication of the progress of the implementation of its NDC in terms of adaptation and in terms of mitigation, through its carbon results.

This step opens the doors to Suriname to access climate finance which constitutes, as I indicated in New York before the 77th session of the United Nations General Assembly, the central issue, the main driver of the achievement collective effort and our common ambition in the fight against global warming.

By endorsing our carbon footprint, Suriname will see its role recognized in the global carbon footprint and achieve the paradigm of financing countries that clean up the carbon generated by net carbon emitting countries, as foreseen in article 6.2 of the Agreement from Paris. On the strength of these results, Suriname intends to fully exploit this status of net carbon de-polluter and the UNFCCC, in its role as coordinator-expert, will be the enlightened witness. This achievement will be our common legacy for the future generations.

With my renewed thanks to all the contributors, and in particular to the Minister of the Environment, for his effective governance of our climate policy, under my authority.

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Hon. Chandrikapersad Santokhi
President of the Republic of Suriname

EXECUTIVE SUMMARY

The Government of the Republic of Suriname submits Suriname's first Biennial Update Report (BUR1) under the United Nations Framework Convention on Climate Change (UNFCCC) following the guidance laid out by the UNFCCC in Decision 2/CP.17. The BUR provides an update to the contents as presented in Suriname's second Nationally Determined Contribution (NDC2) submitted in 2020. The BUR also includes a Technical Annex, as referred to in decision 14/CP.1, with contains the results achieved from REDD+ activities.

Suriname is vulnerable to the impacts of climate change, and given its status as a High Forest Low Deforestation (HFLD) country, is a crucial player in the global fight against global warming. The country is committed to implementing policies and projects that contribute to sustainable development and the conservation of its carbon sinks, in accordance with the global goals of the Paris Agreement, to do its part in limiting the increase in global temperatures to 1.5°C. As the BUR will show, Suriname has already begun to implement actions towards this end, with many projects in the planning and development phases. It should be noted that constraints on this process exist, especially with regards to awareness of climate change and reporting requirements, human resource capacity, and financial capacity. These concerns are duly noted and assessed within the BUR.

National Circumstances

Established in 2020, although not yet fully operational, the National Environmental Authority (Nationale Milieu Autoriteit (NMA)) will be the National Focal Point to the UNFCCC for Suriname. The NMA will be responsible for all climate issues including policy development and implementation, and compliance with environmental treaties ratified by the Government of Suriname (GoS). The Directorate of the Environment, within the Ministry of Spatial Planning and Environment, currently performs the responsibilities of the NMA and will continue to do so until the Authority is fully functional. Ultimately, the current climate change advisory body to the GoS, NIMOS, will formally become the NMA, taking over from the Directorate of the Environment.

The section focuses on Suriname's national development in the two years following the submission of NDC2 and is based around Suriname's development priorities as stated in the country's Policy Development Plan (2017-2021):

1. Strengthening Development Capacity
2. Economic Growth and Diversification
3. Social progress
4. Utilization and Protection of the Environment

Building on these priorities, the 'National Circumstances' section provides a comprehensive review of Suriname's geographic, economic, population, and climate profiles, as well as a snapshot of the current state of each of the country's key sectors, as outlined in NDC2. These include forestry, energy, agriculture, transport and urban infrastructure, and waste.

Greenhouse Gas Inventory

Suriname's GHG inventory spans the years 2000-2017 and uses a base year of 2008 from the second national communication (NC2) to reference changes in emissions levels. The inventory was compiled for the following sectors: Energy, Industrial Processes and Product Use (IPPU), Agriculture, Forestry, and Other Land Use (AFOLU), Transport, and Waste. Overall, the energy sector, specifically fuel combustibles, contributes the most to GHG emissions in Suriname, with transportation accounting for over half (52%) of total emissions within this category.

Guidelines from the Intergovernmental Panel on Climate Change (IPCC) were followed in the compilation of this inventory and in many instances, due to lack of country specific parameters, default IPCC values were used in calculations. The methodology applied to the inventory mainly falls under a Tier 1 (T1), however, the forestry sector utilised a tier 2 approach, meaning that their data is considered more accurate under the IPCC standards. A noted improvement plan with regards to GHG inventory methodology is to implement a more rigorous approach to data collection and analysis, utilising a combination of tier 2 and 3 approaches to replace the current combination of tiers 1 and 2.

Noted gaps and constraints include limitations around data and data collection. This came in the form of a lack of QA/QC processes in the agriculture sector, and a lack of available historical data within the energy and IPPU sectors, leading to estimates, surrogate data, and interpolation being used to fill in the blanks. Other constraints noted in the compilation of the inventory include a lack of stakeholder participation, resulting in delays in the data collection process, as well as inconsistencies in the same data when received from different sources, requiring additional consultation and verification exercises.

Many of these constraints are considered a direct result of lack of a centralised, national platform for to house and manage data, as well as a lack of technical capacity within the inventory compilation teams to complete robust uncertainty analyses and accurately use the IPCC software.

Mitigation Actions

Suriname's NDC2 presents mitigation actions for each of its key sectors. Each action describes a concerted effort on the behalf of the GoS to reduce emissions and enhance natural carbon sinks in Suriname. Section 3 provides the full breakdown of the individual project approaches, expected timeline, and implementation status of each action shown below:

1. FOLU
    - Support alternative livelihoods and diversification of the economy in the interior
    - Enforcement, control and monitoring forests
    - Promotion of Sustainable Forest Management
    - Promotion of sustainable practices in other land use sectors
    - Protected areas
2. Agriculture
    - Introduce national land use planning
    - Identify, trial and introduce more permanent agricultural systems to replace the traditional shifting cultivation
    - Define and implement a national research, development, and innovation program, and strengthen the agricultural research sector
3. Energy
    - Demonstrate sustainable business models
    - Creation of public-private partnerships (PPPs)
    - Enhanced policy and regulatory framework
    - Energy efficiency with regards to subsidies and fiscal reform
    - Creation and implementation of energy efficiency standards
    - Implement renewable energy projects
4. Transport
    - Improve public transport systems
    - Introduce emissions and age limits for vehicles
    - Improve traffic management, planning and infrastructure
    - Increase public green spaces
    - Improve road conditions

Additionally, the BUR outlines potential areas for emissions reductions, even outside of the key NDC sectors. These were identified as the following:

1. Energy – transportation and energy industries
2. IPPU – mineral industry
3. Waste – wastewater treatment and discharge, and solid waste disposal
4. Agriculture – rice cultivation and enteric fermentation
5. FOLU – settlements and forest land*

**Forest land is a carbon sink, not an emitter. Mitigation actions in the forestry sector will refer to actions taken to maintain this status.*

Measurement, Reporting and Verification (MRV) system

Suriname does not currently have a functional, domestic MRV system that covers all major sectors. It should be noted however, that an MRV tool, housed within Suriname's climate knowledge database Dondru, has been created to track and report on climate change indicators, adaptation and mitigation actions, support received, and GHG inventories. The tool is currently operational but there are elements which are still under development, including NDC action tracking, finance flow measurement, data submission into the portal. Additionally, Suriname's forestry sector has put considerable effort into developing a National Forest Monitoring System (NFMS), which is a key component of the country's national REDD+ strategy, providing data on land cover, unplanned logging activities, an estimate of national carbon stocks, community-based forest monitoring, and logging export and production statistics.

The key issue preventing Suriname from developing a robust, domestic MRV system is the lack of consistency across the public sector in the way that climate data is reported and the lack of a centralised database for this data to be fed into and managed by the UNFCCC focal point (Ministry of Spatial Planning and the Environment).

Support needed and received

Financial, technical, and capacity issues have created constraints on Suriname's ability to develop, implement, and adequately report on climate actions and projects. Priority areas for improvement have been identified within the BUR, including: the strengthening of institutional arrangements to create a permanent reporting body to the UNFCCC, capacity building through training to provide national experts and government resources the technical skills for climate data collection, management and reporting, the development of a robust QA/QC system to ensure data quality, and increased education and sensitisation programmes to enhance awareness around climate change and related issues within both the public and private sector, as well as civil society. Section 5, 'support needed and received,' provides a full breakdown of all support received from multilateral, bilateral, and national sources since the publication of NC2 in 2016.

1.NATIONAL CIRCUMSTANCES

1.1. Introduction

This section reviews and updates the national circumstances of the Republic of Suriname (referred to as "Suriname" for the purposes of this document) with respect to the United Nations Framework Convention of Climate Change (UNFCCC), highlighting development priorities, objectives, and circumstances and how these impact the country's abilities to mitigate and adapt to climate change and its adverse impacts. The UNFCCC was adopted in 1992 at the United Nations Conference on Environment and Development in Rio de Janeiro, Brazil. The Convention entered into force on 21 March 1994 and the Republic of Suriname ratified it on 14 October 1997 as a Non-Annex I party. Suriname ratified Kyoto Protocol on 25 September 2006 and deposited its instrument of ratification to the Paris Agreement on 13 February 2019.

Under Article 4.1 (a) of the Convention, each party is required to communicate information related to implementation to the Conference of the Parties (COP), in accordance with Article 12 in its national communication. Furthermore, as per Decisions 1/CP.16, developing countries, consistent with their capabilities and the level of support provided for reporting, should also submit Biennial Update Reports (BURs) containing updates of national greenhouse gas inventories, including a national inventory report and information on mitigation actions, needs and support received, according to the Guidelines provided in accordance with Decision 2/CP.17. Alternatively, in lieu of BURs to meet the Enhanced Transparency Framework (ETF) of the Paris Agreement (PA), developing countries are required under Decision 18/CMA.1 to prepare and submit Biennial Transparency Reports (BTRs) every two years. To date, Suriname has submitted two National Communications (NCs), the first in 2005 and the second in 2016. NCs are required to be submitted every four years, indicating that Suriname's third NC (NC3) should be submitted in 2020, however due to the COVID-19 pandemic disrupting the planned schedule, this process was delayed. Additionally, Suriname has prepared and submitted two Nationally Determined Contributions (NDCs), the first in 2015 and the second in 2020. As NDCs are required every 5 years, Suriname's third NDC is due in 2025. It should be noted that the GHG inventory and mitigation actions data used as an update to NDC2 in this BUR are consistent with the information that is currently being collected and collated as part of Suriname's NC3 preparation process. This is to ensure consistency across national reporting under both the Paris Agreement and the UNFCCC. NC3 is expected to be submitted in early 2023.

1.2. Institutional arrangements

ROM acts as the National Focal Point to the UNFCCC. Under the Environmental Framework Act, the NMA was established in 2020 to provide climate related data to the ROM, and coordinate all policies related to climate change within Suriname. It would be an independent administrative body under which both The Cabinet of the President – Coordination Environment and the National Institute for Environment and Development in Suriname (NIMOS), and the technical working arm for the coordination of environmental policy, would be incorporated. This institution is

mandated to deal with all environmental matters and policies including policy formulation, evaluation, implementation, and monitoring. Furthermore, the NMA is tasked with ensuring implementation of and compliance with obligations of all environmental-related treaties ratified by the Government of Suriname (GoS). It is also tasked with overseeing the preparation of reports for submission to the Convention, including NCs, NDCs and BURs.

Future plans include the further development of The Suriname Environmental Information Network (SMIN). This organisation is currently the body responsible for managing all environmental data in collaboration with key stakeholders and disseminating it to relevant institutions and authorities where needed. SMIN currently operates under NIMOS but will soon be under the responsibility of the NMA. The ultimate goal of the SMIN is to function as a clearing house, coordinating and standardising data across ministries in Suriname, and feeding the information to the ROM for reporting purposes.

Presently, The Ministry of Spatial Planning and the Environment, specifically the Directorate of the Environment, is taking on all the responsibilities outlined above of the NMA until it is fully operational. NIMOS currently acts as an advisory body to the government in relation to climate change and the Supervisory Board is charged with the supervision of the financial management and the management conducted by the Board of Directors of the NMA. Eventually, NIMOS will take on full responsibility and will become the NMA. The National Coordination Centre for Disaster Management (NCCR) is also an important information source for climate risk and vulnerability and is involved in the implementation of climate change adaptation (NC2, 2016).

While these bodies are specifically tasked with dealing with matters related to climate change, all ministries and governmental institutions take climate change mitigation and adaptation into consideration in their operations and function as key agencies with specific mandates relevant to the implementation of the UNFCCC, though sectoral laws do not typically address climate change (NDC2, 2020).

- The Ministry of Land Policy and Forest Management (GBB) oversees formulating national policies on land use planning, sustainable forest use and nature conservation and consists of multiple sub-divisions that are tasked with overseeing regulation, implementation, monitoring and control of the relevant sectors.
    - The Foundation for Forest Management and Production Control (SBB) is the technical work arm of the Ministry of Land Policy and Forest Management, is responsible to manage all forest of Suriname and in particular the forest designated for sustainable production and for the formulation of the FREL and the establishment and operationalization of the National Forest Management System (NFMS)
- The Ministry of Finance is responsible for preparing National Development Plans and previously had a sub-directorate, Environment and Spatial Planning, which was responsible for updating an inventory of data relating to land and soil, natural resources, existing infrastructure, and land allocation, however these responsibilities now fall under the jurisdiction of the NMA.
- The Ministry of Natural Resources controls the exploitation and management of the country's minerals, water, and energy, as well as regulates energy use in domestic, public, and commercial spheres.
- The Ministry of Agriculture, Animal Husbandry and Fisheries oversees the regulation of the agricultural production sector and the proper utilisation of agricultural lands and waters.
- The Ministry of Public Works controls the planning and implementation of civil infrastructural and technical works as well as water management and drainage, meteorological and hydrological services, and waste management. A master plan has been developed to improve the drainage of the capital Paramaribo, specifically incorporating climate change impacts and concerns in the plan.

Simultaneously, Suriname is pursuing a climate compatible development (CCD) approach, aiming to achieve low carbon development while attracting climate finance. Under the Environmental Framework Act (2020), the Government is required to set out its environmental policy in the environmental strategy as specified in the Development Plan of Suriname. The environmental strategy incorporated in the Development plan is then further developed by the NMA into a national environmental policy plan. The National Development Plan for 2012-2016, along with the 2016 NC2 to the UNFCCC and the 2012-2016 Environmental Policy Plan all recognise the consequences of the impacts of climate change on Suriname as well as the opportunities for low carbon emission

development. The National Climate Change Policy, Strategy and Action Plan (NCCPSAP), published in 2015, provides a clear roadmap for the country to respond to the challenges of climate change and seize opportunities for climate compatible development.

Under the NCCPSAP, the following have been developed:

1. A National Climate Change Policy that is consistent with Suriname's National Development Plan.
2. A National Climate Change Strategy that includes:
   - Suriname's climate compatible development roadmap.
   - Sector and cross-sector climate resilience and low carbon emission development approaches.
   - Capacity building needs and opportunities.
   - Areas where technology transfer is required.
   - Opportunities to attract investment and finance.
   - Monitoring, evaluation, reporting and verification requirements.
3. A National Climate Change Action Plan that describes programmes and actions to be implemented under each national development planning theme.

1.3. Geographic profile

1.3.1. Geography

Suriname is situated on the north-eastern coast of South America and lies between 2° and 6° North latitude and 54° and 58° West latitude (see Figure 1). The country covers a total land area of 163,820km2 (NDC2, 2020) and its coastline, approximately 370km in length, constitutes the northern border with the Atlantic Ocean. According to the Energy Authority of Suriname (EAS), approximately 80% of the population is concentrated along this coast, in the capital of Paramaribo, whose latitude and longitude denominations are 5°50 N and 55°10 W respectively, and its surrounding districts. The Republic of Guyana is located to the west of the country, with the Federative Republic of Brazil to the south and the French Département Guyane (French Guiana) to the east. The eastern border is historically established by the Marowijn River and the western by the Corantijn River whereas the southern border is defined by the mountain range consisting of the Acarai, Tumukhumak, and Grens Gebergte mountains. Suriname's land surface generally lies at a low elevation between 200-600m above sea level with the highest point reaching 1200m (NC1, 2005). 93% of the country's area is forested with 80% consisting of the Precambrian Guiana Shield, the rainforest-covered mountain that stretches to the east and south towards the Amazon River in Brazil and west to the Orinoco River in Venezuela.

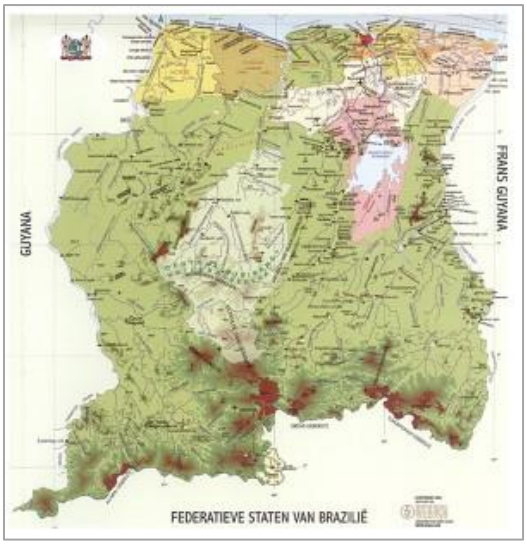


Figure 1: Suriname Map (Source: ABS)

1.3.2. Land use

Suriname is widely known for its high forest cover, with 93% of the country being forested as of 2020. Of that 93%, 88% is considered tropical rainforest that is not used or only marginally utilised by local communities for non-timber forest products (NTFP). Only 8% of Suriname's total land area is cultivated with the remaining 4% consisting of other non-forested natural areas such as savannahs, swamps and wetlands. The cultivated area is used for forestry (3.7% of the total land area), agriculture (3.2%) and settlements, mining and hydropower lakes (1.3%), with approximately 4.5 million ha designated for SFM and approximately 3 million ha granted as a timber license.

1.3.3. Ecosystems

The environment and ecology in Suriname are arguably the country's greatest natural resources. More than 80% of the country is made up of pure, undisturbed rain forests. This untouched hub of biodiversity is especially crucial considering the increasing challenges to biodiversity and ecosystems around the world brought on by pollution, climate change and land loss. Still highly underpopulated, Suriname will probably remain as a major natural carbon sink.

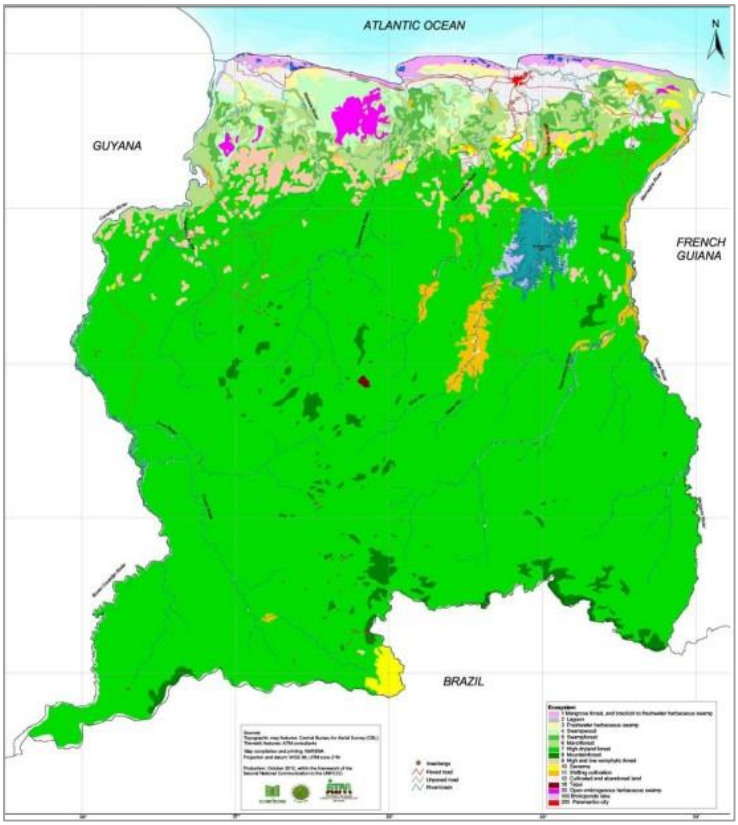


Figure 2: Ecosystems of Suriname (Source: NC2, 2016)

The terrestrial ecosystems of Suriname can be characterized into nine main categories:

Brackish water ecosystems, also known as estuarine zones, are made up of mangrove forests that are occasionally interspersed by salt to brackish lagoons and low vegetation consisting of succulent salt plants and brackish herbaceous swamps. These areas are impacted by tidal action and coastal changes. Mangrove trees encourage accretion and protect both the coastline and riverbanks by preventing erosion. They have a high level of biodiversity and serve as nursery grounds for numerous species of marine fish and shrimp. Suriname's estuary region is a wetland of international importance as it contains both feeding and nesting sites for migratory birds from North America as well as Caribbean coastal birds. Sand and shell beaches can be found along the coastline, primarily in the eastern part of the country. These beaches are of international importance as they are nesting places of four species of sea turtles.

Freshwater swamps or freshwater wetlands dominate the Young Coastal Plain and part of the Old Coastal Plain. These wetlands are important as they supply fresh water to estuarine zones, thus maintaining the brackish condition of these waters. These areas are inundated throughout the majority of the year, allowing a layer of peat, the initial stage of coalification and a major source of carbon, to accumulate on top of the mineral soil.

Low swamp forest, also referred to as swamp wood, includes palm swamp forests. Suriname's low swamp forests make up around 3% of the country, and if there are no forest fires, they grow into high swamp forests.

High swamp forest and creek forest occur in the shallow freshwater swamps of the coastal plain, where there are significant changes in surface water levels. In the natural succession of wet areas, this ecosystem represents the climax vegetation. Similar forests, often referred to as creek forests, are located alongside creeks and benefit from a variety of species from nearby high dry land forest.

High marsh forest (seasonal swamp forest) can be found on poorly drained soils. The soil may become completely submerged during the rainy seasons and during the dry seasons, does not desiccate fully. The species diversity of these forests is between that of high swamp forests and high dry land forests. Palms are typically abundant in marsh forests.

High dry land forest, which can be found from sea level to 400–600m above sea level, covers around 80% of Suriname. Emergent trees are typically 50–60m tall, while the canopy's height ranges from 25–45m. There is a vast range of tree species (between 100-300 species per hectare), large mammals and at least 500 distinct bird species that can be found in these high dry land forests.

Low dry land forests of highlands are found at higher elevations (above 400m). The average amount of sunshine hours is decreased in these forests since they are frequently shrouded in clouds. Additionally, temperatures are lower and average humidity is higher than in lowland high dry forest. Both in terms of quantity and species, epiphytes (including mosses, ferns, orchids, and bromeliads) are common. These highland woods have a very different flora and fauna than lowland forests.

Savannah forests, also known as xerophytic forests, are located in savannah areas. These forests often grow on extremely drained soils as well as on permeable soils which rest on impermeable subsoils, rocks, and hard pans. Consequently, water shortages occur in the soils during the dry seasons. Savannah forests can also be found in hilly or mountainous areas within the Interior, particularly where conglomerates, laterite caps, sandstones and dolerite, and granite rocks are covered in a thin layer of soil. In these areas, they are termed as mountain savannah forest.

Open savannahs are viewed as remnants of the extensive Pleistocene climate savannah, which historically almost entirely covered Suriname. These savannahs survived only where they were burnt continually. Most of these ecosystems are dispersed over the savannah belt. Presently, up to ten differing types of savannahs have been identified within Suriname. Savannah vegetation tends to develop into forest in the absence of fire.

Suriname has three different types of protected areas: 1) Multiple Use Management Areas (MUMA’s), where limited economic activity is permitted once certain protection objectives are not jeopardized, 2) Nature Parks, which are primarily used for recreation, and 3) Nature Reserves, which are used to protect specific species or ecosystems and allow only limited human activity. The majority of Suriname's coastline is protected by MUMAs in order to safeguard species like sea turtles and endangered shorebirds. Additionally, in nature reserves and nature parks across the nation, endangered species that exist in representative terrestrial and aquatic (fresh water) ecosystems, are safeguarded. A 1.6 million ha area of pristine rainforest known as the Central Suriname Nature Reserve (CSNR) is maintained and

included on the UNESCO World Heritage List. Along with the forest, the Coppename River Basin and its tributaries and creeks that supply high-quality freshwater are protected under the CSNR. Additionally, this Nature Reserve protects a significant number of biological species, both terrestrial and aquatic, including endangered species. Suriname's protected areas occupy roughly 13% of its total land area.

1.4. Economic profile

In 2021, Suriname's GDP was SR$58.8b (SR$58,798,713,000) at market price (ABS, 2022), which is the equivalent of US$2.14b. During the 1990s, GDP growth rates fluctuated between –7% and +6% but stabilised at a rate of approximately 4% in 2009 (NC2, 2016). In 2020, real GDP growth reached a peak of 16% but returned to a more stable rate of 2.7% in 2021 (ABS, 2022). As of 2017, the GDP per capita was US$4,428, equivalent to SR$124,978.83 (NDC2, 2020). The national income per capita in 2021 was SR$83,202.00 with the country being considered an upper-middle income economy with a high human development index score (NDC2, 2020). Suriname's Gini Coefficient was 0.5467 as of 2011, indicating there is still significant income inequality rates throughout the country (NC2, 2016).

Suriname's economy is heavily dependent on mining and agriculture. Of these primary subsectors, gold and oil contribute approximately 30% to GDP and agriculture contributes approximately 12%. In the tertiary or services sector, mainly trade and transport activities contribute 55% to GDP. Additionally, the commodities industry accounts for almost 90% of export revenues and 40% of government income, resulting in the country being vulnerable to international price volatility (NDC2, 2020).

Energy (mining, gold, and oil) is considered an important sector in Suriname's economy as it earns a significant amount of foreign exchange and government income. However, the country faces some economic challenges including a newly diversifying economy, bureaucratic procedures, state-owned or semi-governmental companies are making losses, there is little large-scale manufacturing, and the public sector functions inefficiently. More recently, financial services, construction, and tourism, along with their associated personal consumption, have assisted in the diversification of the economy so it is less reliant on the export of raw materials (NC2, 2016).

1.4.1. Economic history (1975 to present)

Suriname's economy since has fluctuated significantly since achieving Independence from the Netherlands in 1975. Its first main economic crisis, triggered by the political turmoil of the 1980s to early 1990s, saw persistent fiscal deficits, the inability to access international financing, and the suspension of aid from the Dutch government. The government resorted to the Central Bank of Suriname (CBvS) to draw down on its foreign exchange reserves, resulting in a severe impact on its balance of payments. GDP growth fluctuated, but the mid to late 1990s saw significant exchange rate volatility and soaring inflation rates, to which the CBvS responded by devaluing Suriname's currency. To tackle this, Suriname successfully secured the renewal of Dutch financial aid under the condition of the implementation of stringent policy measures focused on floating the exchange rate, eliminating subsidized rates, deregulating the economy and strengthening fiscal policy.

The economy, as a result, experienced strong economic growth from 2001 to 2014 as poverty rates declined and per capita income was on the rise. However, the country's heavy dependence on the mining industry created vulnerability

to external shocks. In 2014, the drop in global commodity prices and slowing down of global trade triggered a new economic crisis characterized by declining revenue, substantial economic contraction, fiscal and current account deficits and a run-down of foreign reserves. In response, the government engaged the International Monetary Fund (IMF) to enter into a 2-year Stand-By-Agreement (SBA) for US$ 478 million in 2016, which required strict macroeconomic and fiscal reform. However, in 2017, Suriname cancelled the SBA in order to pursue its own recovery plan, due to the heavy impact of the stringent restrictions on citizens.

Despite the discovery of new oil reserves in 2019 and 2020, the government's recovery and growth continued to struggle. This was exacerbated by the COVID-19 Pandemic, which impacted critical sectors including oil and mining, drove job losses, widened the inequality gap and placed new stress on government revenue and spending, triggering a balance of payments crisis. As of 2021, Suriname's unemployment rate stands at 10.1% with an annual inflation rate of 59.1%, and GDP per capita has fallen to $5,166 from its peak of US$9,350 in 2014. The poverty rate has significantly increased, with 26% of the population living on less than US$5.50 per day. Extreme poverty (less than US$1.90 per day) is estimated at 5% (World Bank, 2022). The current economic crisis motivated the government of Suriname to approach the IMF for financial and technical assistance in 2021.

1.4.2. IMF Extended Fund Facility (EFF)

In December 2021, the IMF approved a 3-year arrangement under the Extended Fund Facility (EFF) for Suriname for SR$472.8 million (US$688 million) to be disbursed in tranches. The first tranche to be released is about SR$39.4 million (US$55.1 million). The EFF is intended to support the Suriname government's economic recovery plan, which is centred on restoring macroeconomic stability and confidence while strengthening the social safety net to protect the vulnerable within the economy. This plan will be supported by technical assistance from development partners including the IMP, Inter-American Development Bank and the World Bank Group.

Fiscal reforms in the recovery plan include a discretionary reduction of the fiscal deficit by 10% of GDP between 2021-2024, eliminating costly and poorly designed electricity subsidies, introducing a value-added tax (VAT) and creating an efficient source of non-mineral revenue. In order to reduce public debt to a sustainable level, the government is negotiating debt relief from private and official creditors. To rebuild the country's foreign reserves, the economy has moved to a floating exchange rate, which domestic interest rates have increased. To reduce inflation to a single digit percentage, liquidity conditions will be tightened along with the adoption of a reserve money targeting framework, the roll-out of open market operations and addressing of rising banking sector risks.

1.5. Population profile

1.5.1. Total population, density, and distribution

In 2019, Suriname had an estimated total population of 598,000 (ABS, 2021), with more than half of its residents concentrated in and around the country's capital, Paramaribo, while the interior is sparsely inhabited. Suriname has a multilingual, multi-religious society with a diverse ethnic population due to its colonial history. Dutch is the official language however the lingua franca, Sranang Tongo, and English are also widely spoken. Christianity, Judaism, Hinduism, and Islam are all practiced alongside traditional religions. Until the abolition of slavery in 1863, enslaved people from the West Coast of Africa were brought to Suriname, after which, migrants from China, India and Indonesia were brought to the country to work on the plantations as indentured labourers. Presently, Suriname's population is made up of the following ethnic groups: Amerindians, the indigenous people of the country; Maroons who are the descendants of enslaved people; creoles who are of African or mixed descent; Hindustani, people from the Indian sub-continent; Javanese, people from Indonesia; Chinese; Lebanese; Brazilians; descendants of European settlers and mixes between these groups. The four distinct Indigenous Peoples, the Kalia, Lokono, Trio and associated peoples, and Wayana, make up around 5% of the population of Suriname. There are also six Maroon Tribal communities, including Aucaner or N'djuka, Saramaka, Paramaka, Aluku, Kwinti, and Matawai.

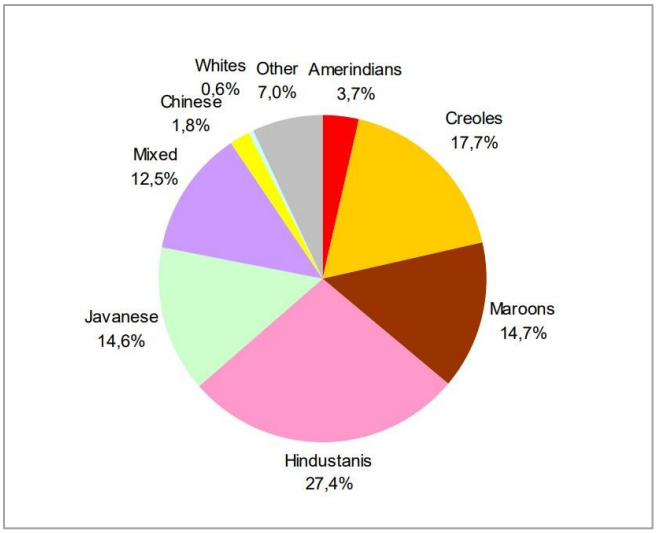


Figure 3: Ethnic diversity of Suriname's population (Source: NC2, 2016)

According to the ABS (2021) based on 2019 data, women outnumbered men with an estimated total of 299,700 and 298,300 respectively. Additionally, 9.1% of the population was under 5 years, 16.8% was between 5-14 years, 61.8% was between 15-59 years, and 12.2% above 60 years. Furthermore, 66.3% of the population was living in urban areas, 19.9% was living in rural areas and 13.8% was living in the interior. Based on these population estimates, Suriname had a population density of 3.65 people per square kilometre (9.4/mi 2). The population density of Suriname is calculated as the number of people who live there permanently divided by the nation's total land area.

More than 60,000 indigenous and tribal peoples (ITPs) live in Suriname´s forests and largely depend on them and their ecosystem services. In recent decades, the development of activities in the areas of these communities has threatened their traditional systems and led to the degradation of the ecosystem services they depend on.

Indicator	2017	2018	2019
Sex ratio totale bevolking / Sex Ratio Total Population	99.6	99.4	99.5
Geboorten per 1000 vrouwen 15-44 jaar/ Births per 1000 Women 15-44 years	74.23	73.84	75.87
Totaal vruchtbaarheidscijfer (voor vrouwen van 15-44 jaar)/ Total Fertility Rate (for women aged 15-44 years)	2.12	2.17	2.23
*Levensverwachting bij geboorte, man / Life Expectancy at Birth, Male	70.9		
*Levensverwachting bij geboorte,vrouw / Life Expectancy at Birth, Female	75.6		
Afhankelijkheidsratio kinderen / Child Dependency Ratio	42.28	42.20	42.01
Afhankelijkheidsratio ouderen / Aged Dependency Ratio	19.00	19.39	19.75
Afhankelijksheid ratio / Dependency Ratio	61.28	61.58	61.75
Mediale leeftijd / Median Age	29.79	29.95	30.17
Gemiddelde leeftijd / Mean Age	32.33	32.47	32.64

* : De Levensverwachting bij geboorte voor mannen en vrouwen is het gemiddelde cijfer van de jaren 2017-2019/ The Life Expectancy at Birth for Males and Females is the average number of the years 2017-2019

Table 1.Suriname Demographic Data 2017-2019

1.5.2. Gender policy and Climate Change

Evidence points to the relative vulnerability of women being higher in developing nations which is especially true in rural regions where women are more heavily dependent on agriculture and/or local as natural resources for their livelihoods. The Paris Agreement refers to gender-responsive strategies, gender equality goals, and women's empowerment and as such, gender equality must be prioritized as both a stand-alone goal and a cross-cutting issue across several other goals for the government to successfully achieve the Sustainable Development Goals by 2030.

The Bureau of Gender Affairs develops, coordinates, and assesses Suriname's gender policy, which is within the purview of the Ministry of Home Affairs (BGA). Establishing partnerships, evaluating data, creating and amending laws and regulations, and introducing and promoting gender awareness are the foundations for policy creation and execution. As evidence of its commitment to tackling gender equality, Suriname has dedicated policies addressing the significance of gender in its Policy Development Plan for the period of 2017–2021 as well as in the National Adaptation Plan (NAP) for the period of 2019–2029. These policy documents demonstrate the GoS's commitment to combating climate change by integration and mainstreaming in a coherent manner, into relevant new and existing policies, programs, activities and development planning processes and strategies, across multiple sectors and levels as appropriate.

Socioeconomic and political restrictions create unique challenges for women as cultural standards can prevent them from gaining the knowledge, abilities or support required to avoid hazards, making them vulnerable to adverse impacts of climate change. For this reason, they are also key voices to include in climate action. In Suriname, this becomes apparent in the fact that the management of natural resources, as well as other productive and reproductive activities at the family and communal levels, are crucially influenced by women, who account for approximately 50% of the country's agricultural labour force. They are effective actors and change agents because of their broad knowledge and expertise, which may be utilised in initiatives for disaster reduction, adaptation, and climate change mitigation. In Suriname, family farming is the most common type of farming, however it is an activity that does not generate high incomes. This type of farming is more likely to be undertaken by less educated people, and particularly women. As a result, many women in agriculture are vulnerable to the impacts of climate change as they receive less income and have less access to financial services to improve their production means or to protect themselves from the negative impacts of severe weather and other climate related events (IDB, 2021).

1.6. Climate profile

1.6.1. Precipitation distribution

Suriname has a tropical, semi-humid climate that is impacted by the shifting of the Inter-Tropical Convergence Zone (ITCZ) periodically. The country experiences two rainy and two dry seasons in the northern part and one rainy and dry season in the southern part (NC2, 2016). The major rainy season falls between May and July, resulting in 250-400mm per month of rainfall, with the minor season falling between November and January, resulting in 150-200mm per month. Rainfall is typically the highest in the central and eastern parts of the country (see Figure 4).

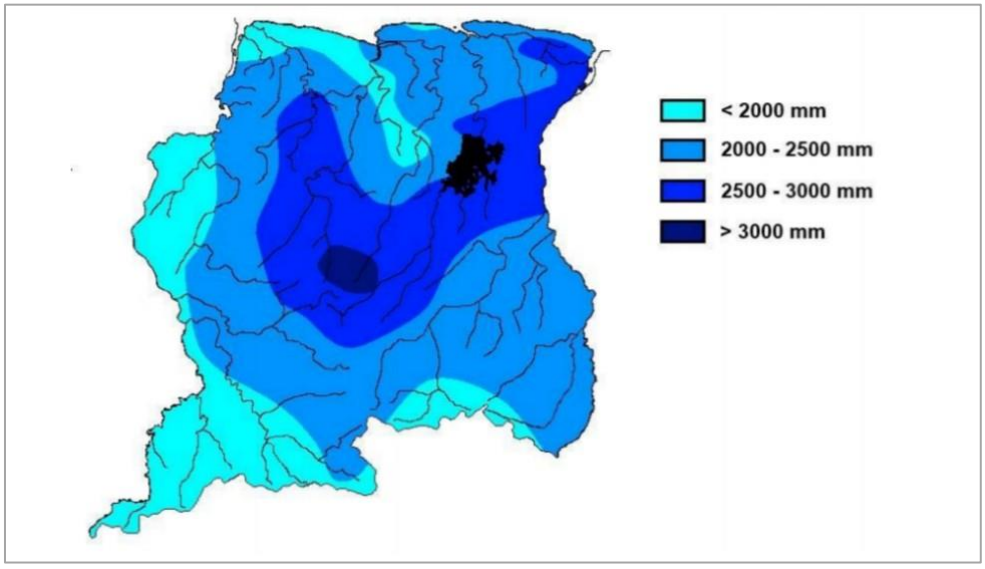


Figure 4: Average annual rainfall in Suriname across the Country (Source: NC2, 2016)

1.6.2. Temperature distribution

The average annual temperature ranges from 24.0 to 30.9°C and only varies 2.4°C between the warmest and coldest months as seen in Figure 5 (General Bureau of Statistics, 2018). The daily temperature in the coastal region has a variation of 5°C with an average temperature of 27.4°C and the interior has similar figures however the daily temperature can vary between 10-12°C.

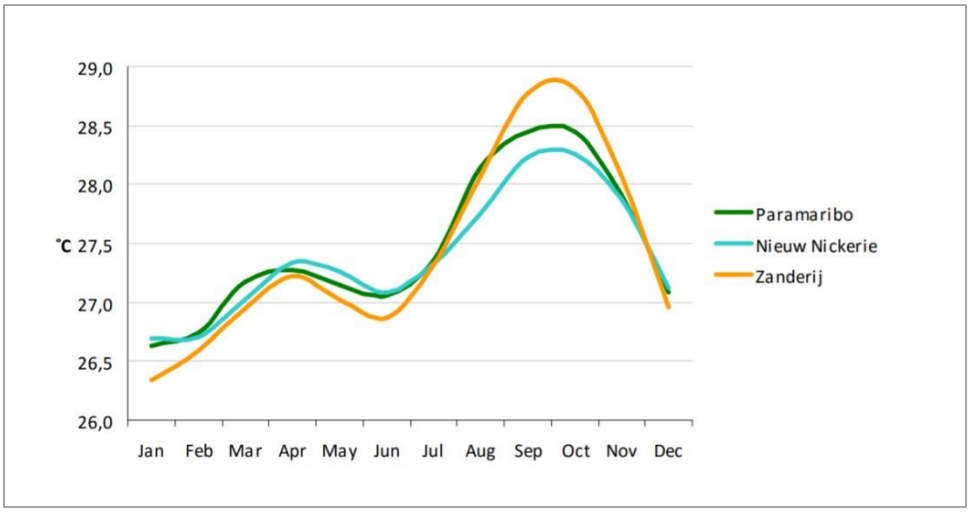


Figure 5: Average monthly temperature for three coastal locations (Source: NC2, 2016)

1.6.3. Climate variability

Suriname is typically subject to north-easterly winds with an average speed of 1.3 Beaufort, reaching a maximum of 1.6 Beaufort during dry seasons in February and again in September and October. Wind speeds along the coast are relatively higher than in the interior as well as higher during the day, with speeds of 3 to 4 Beaufort, and dropping significantly at night. The average daily air humidity ranges from 80-90% in coastal regions while in central and southern regions of the country, it is on average 75%. The penetration of sun radiation, among other factors, impacts the air humidity levels in forested areas resulting in humidity ranging between 70-100% versus 50-100% in open areas. Additionally, the El Niño-Southern Oscillation (ENSO) occurs every 2-7 years and impacts Suriname's climate as it can cause rainfall to be below or above normal levels. Typically, during El Niño years when there is above average rainfall on the Western coast of South America, Suriname receives less rainfall.

1.6.4. Extreme events

While Suriname is located outside of the hurricane belt, it is still affected by the tails of hurricanes as well as local gales which typically occur before storms at the end of the rainy season. These gales can impact the entire country and may destroy trees as well as houses and other infrastructure (NC2). During these gales, wind speeds have been recorded as reaching up to 20-30m/s.

1.7. National circumstances by sector

1.7.1. Forestry sector

1.7.1.1. Forest Types

Forests play an invaluable role to mitigating climate change and supporting society as they act as both a carbon sink and a home for biodiversity. Suriname's forests are particularly valuable as they span approximately 93% of its land area and make Suriname a net remover of carbon dioxide from the atmosphere. In fact, Suriname has the highest percentage of forest cover per land area in the world, and has a remarkably low deforestation rate, this giving it "high forest, low deforestation" (HFLD) status.

The existing types of forest in Suriname can be divided into four types: wet vegetation type, dry vegetation type, secondary and planted forest (forests planted between 2015-2019). The largest area of forest is that of the mesophytic forest type and corresponds to 84% of the total forest area in Suriname. The second largest is hydrophytic vegetation type and covers 15% of the total area (see Table 2).

Bostypen	2010-2015	2015-2019	Forest type
Vochtige vegetatie typen	**ha**		**Wet vegetation Types**
Mangrovebos	88,240	90,812	Mangrove forest
Zwampbos	241,560	241,560	Swamp forest
Drasbos	1,628,966	1,628,966	Marsh forest
Kreekbos	391,434	391,434	Creek forest
Totaal hydrofytische vegetatie	**2,291,544**	**2,352,772**	**Total hydrophytic vegetation**
Droge vegetatie vormen	**ha**		**Dry vegetation Types**
Savannebos	161,237	161,237	Savanna forest
Laag savannebos	150,191	150,191	Woodland savanna
Struik savanna	110,735	110,735	Bush savanna
Hoog droog landbos	12,464,427	12,464,427	High dry land forest
Bergbos	280,242	280,242	Mountain forest
Totaal mesofytisch/ xerofytische vegetatie	**13,166,382**	**13,166,382**	**Total mesophytic/ xerophytic vegetation**
Secundair bos	**110,333**	**110,333**	**Secondary Forest**
Aangeplant bos	**7,280**	**7,280**	**Planted Forest**

Bron: Stichting voor Bosbeheer en Bostoezicht /Source: Foundation for Forest Management and Production Control

Table 2: Existing Forest types in hectares (ha) (Source: Milieustatistieken. 2020)

1.7.1.2. Forest Biodiversity

Suriname's high forest cover as part of the Amazon biome and the Guiana Shield area make its lands rich with biodiversity. In 2012, it was reported to have 192 mammal species, 102 amphibian species, 175 reptile species, 730 bird species and 450 freshwater fish species. A more recent documentation of biodiversity in 2016 accounted for 6044 species of vascular plants and reported numerous threatened species, including 9 mammal species, 9 bird species, 6 reptile species, 1 amphibian specie, 30 fish species, 1 other invertebrate specie and 27 plant species.

Suriname's biodiversity serves many purposes for Suriname's people, including income and subsistence from timber and non-timber forest products and activities like agriculture (e.g., honey, nuts and oils, açai, etc.), medicinal applications of oils and seeds (e.g., bitterwood and others), eco-tourism and other cultural values for its indigenous and tribal peoples and local communities.

The largest direct threats to biodiversity in Suriname are from deforestation activities such as mining, infrastructure, agriculture, energy and housing, the first of which also contributes significantly to GDP. Other indirect drivers of biodiversity change are the presence of invasive alien species (IAS) and pests, illegal hunting, poaching and fisheries, overharvesting of ecosystems, forest degradation as a result of logging, and illegal flora and fauna trade.

1.7.1.3. Forest status and management practices

As of 2020, Suriname has 16 protected areas which span across 2,293,200 ha and consist of 11 nature reserves, four multiple use management areas and one nature park. Suriname aims to increase its protected land area by 2030 to at least 17% of terrestrial area from its 14% currently protected, though some areas have been identified for future

expansion. Suriname has previously begun drafting an update to the Nature Conservation Act of 1954, the 'Nature Conservation Law' but has since not made it to the revision phase by the national assembly. However, a revision of Environmental Law and a law on the protection of coastal areas are underway.

ITPs in Suriname depend on the forest for food, medicine, shelter, and fuel, but as in many countries, they are also large contributors to national forest management. In 2004 estimates, 14% of Suriname's population was concentrated in forest and river communities in the Interior with over 200 villages of Maroon and Amerindian peoples consisting of 100 to 5000 people in each. ITPs have a wealth of traditional knowledge of their ecosystems and practice sustainable forest management for their surrounding forests. Currently, a law on the collective rights for indigenous and tribal peoples (ITPs) is underway in preparation for the establishment of activities related to the reduced emissions from deforestation and forest degradation (REDD+).

Since 2012, the Forest Cover Monitoring Unit (FCMU) of the Foundation for Forest Management and Production Control (SBB) has been monitoring national deforestation and degradation levels. According to the SBB, and based on the Forest Reference Levels (2018, 2021) and REDD+ technical annex (2022), land use change matrices were created for the period 2000-2009, 2009-2013 and then annual matrices from 2013 to 2021, indicating the transformation of the forest and the LULC classes between the given years with the amount of area in ha.

During the period 2000-2015, it was identified that the main driver of deforestation was mining (mainly gold mining). Gold mining covered about 71% of the deforestation. The other drivers of deforestation were infrastructure (15%), urbanization (4%), agriculture (3%), pasture (1%), burned area (3%) and other deforestation (1%). Average area of conversion Forest to Non-forest (without Forest fire) was 5679 ha, with a minimum of 3,590 Ha and a maximum of 15,197 Ha in 2015. Average area of conversion of Forest to Non-forest with Forest fires was 168 ha, with a minimum of 36 Ha and a maximum of 457 Ha.

During the period 2016-2019, it was identified that the main driver of deforestation was still gold mining. Average area of conversion Forest to Non-forest (without Forest fire) was 8812 ha, with a minimum of 7,834 Ha and a maximum of 10,618 Ha in 2016. Average area of conversion of Forest to Non-forest with Forest fires was 231 ha, with a minimum of 7 Ha and a maximum of 596 Ha. These results indicate that deforestation has decreased in this period, reducing from 15,197 ha in 2015 to 8.000 ha in 2022.

These numbers indicate that deforestation between 2000 and 2009 was at 0.02%, rose to an average of 0.06% between 2009-2015, and between 2016 – 2019 reached an average of 0.07% with relatively high intensity deforestation in the Greenstone belt, where gold mining is most concentrated.

During the period 2000-2015, the main driver of forest degradation was selective logging, which takes place in ca. 30% of the country's area. Since only a few trees (1-5) per ha are removed during selective logging, it is unlikely that this activity will cause a tree crown cover of less than 30%.

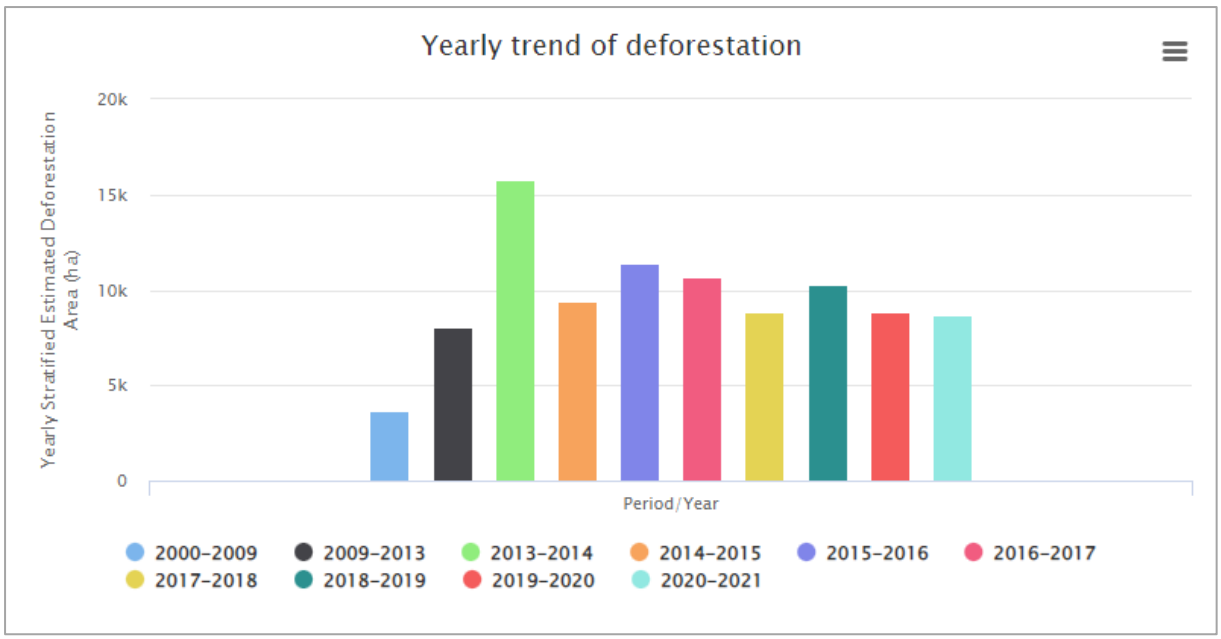


Figure 6: Yearly trend of deforestation (Source: SBB)

The overall goal for the forestry sector is to increase the contribution of the forests to Suriname´s economy and the welfare of both present and future generations, while maintaining and preserving its biodiversity (National Development Plan, 2017-2021). Consequently, there is a high focus on growing the income from timber production and simultaneously promoting and contributing to the increase of non-timber forest products.

In February 2019, Suriname united HFLD developing countries to establish a joint strategy for developing countries to gain global recognition of the importance of HFLD forests as key contributors to global carbon sequestration. The result was the adoption of the Joint Declaration, the "Krutu of Paramaribo," which mandated Suriname as the representative for HFLD countries to pursue increased access to international climate finance.

In Suriname's Policy Development Plan 2017-2021, under the Strategic Plan for Production Clusters, a policy is outlined for Forestry and Related Industry. This policy is aimed at:

1. Increasing the national timber production by increasing utilization and efficiency, promoting scientific research, and introducing new methods for forest use among other strategies.
2. Increasing the contribution of the production of non-timber forest products to boost the economy and to support the livelihoods of communities living in the interior.
3. Monetising the ecosystem services, the forest provides via the REDD+ mechanism.

Suriname has hence established an extensive National REDD+ Strategy outlining the main focus areas for forestry policy (Government of Suriname, 2019). There are four strategic areas the forestry strategy is focused on:

1. Continue being a High Forest, Low Deforestation (HFLD) country and receive compensation to invest in economic transition.
2. Forest governance.
3. Land use planning.
4. Conservation of forests and reforestation as well as research and education to support sustainable development.

Mitigation action plans in these strategic directions are outlined in the Section 3 Mitigation.

1.7.1.4. Exports of timber and other forests products and trends

According to the Policy Development Plan, 2017–2021, forest production now contributes 1.7% of GDP in 2017, with a total production of 624,000m^3 ha in 2021 (SBB). Approximately 40% of the installed input processing capacity of the timber processing industry, which is 850,000 m^3 annually, is being utilized. On the local market, the trading of timber and timber-related items generated an estimated SR$266m in revenue. About 5500 people are employed in the sector, which generates about SRD$31m in direct income for the state.

In order to evaluate the precise emissions contribution of the industry, Suriname submitted its Forest Reference Emission Level report to the UNFCCC in January 2018. The effective forest cover is 93% due to low historical deforestation (0.02%–0.05%) and forest degradation. With an estimated emission factor of 1.67 Mg C/m3, the period from 2000 to 2015 saw average yearly emissions of 6,557,441 Mg Co2. The FREL is expected to be 82,775,515 Mg CO2e from 2016 to 2020, which reflects the anticipated expansion in the development sector (NDC2, 2020).

Year	Emissions (t CO2e)
2016	14,627,465
2017	15,591,284
2018	16,555,103
2019	17,518,922
2020	18,482,741

Table 3: Emissions from deforestation and forest degradation from logging (tco_2e). (Source: FREL 2018)

The main exported timber type is round wood and constituted 96% of the overall timber exports in 2019. The second highest type is sawn wood making up 3.34% of the overall timber exports in the year 2019 (see table 4). The main region to where the timber gets exported is Asia and it amounts to approximately 96% of the overall exports. The main timber export products include doors, windows, frames, stair parts, furniture, sawdust, charcoal, brooms, and shingles (source: SBB).

Jaar / Year	Rondhout / *Roundwood*	Gezaagd hout / *SawnWood*	Letter hout / *Letterwood*	Triplex/ *Plywood*	Vierkant bekapte palen/ *Hewn square poles*	Gereed product/ *Finished product*	Totaal / *Total*
2015#	204,793	19,870	297	15	1,265	121	**226,361**
2016	265,223	25,581	115	-	1,525	733	**293,177**
2017	481,621	16,183	141	-	842	1,147	**499,934**
2018	531,867	16,494	16	-	2,048	365	**550,790**
2019	504,877	17,511	20	-	1,596	334	**524,338**

Bron: Stichting voor Bosbeheer en Bostoezicht /Source: Foundation for Forest Management and Production Control

Table 4: Timber Export by Assortment 2015-2019 (Source: SBB)

1.7.2. Energy sector

The Primary energy sources utilised in Suriname are: hydrocarbon fuels (oil, gasoline, kerosene, diesel), electricity (including solar and hydropower), liquified petroleum gas (LPG) and biomass. Fuel is mostly consumed by the transport sector, followed by industry and electricity generation. Electricity is mostly used by households and industry.

1.7.2.1. Energy Generation Market Structure

The Ministry of Natural Resources is responsible for the administration, regulation, monitoring and development of the energy policy in Suriname. Energy for the residential and private sector is generated primarily by the state-owned Surinamese Energy Company N.V. Energiebedrijven Suriname (EBS) and State Oil Company Suriname (Staatsolie).

Suriname's electricity generation mix is comprised of hydroelectric and thermal (diesel generated power). Approximately 50% of electricity production comes from low-carbon sources and 50% from fossil fuels. The largest alternative energy source is hydroelectricity, which accounts 40% of overall electricity generation (figure 8) and is produced primarily at the Afobaka dam. Suriname is the Caribbean nation with the lowest reliance on fossil fuels for electricity production.

The Suriname power sector consists of a number of individual power systems. Some of these systems are interconnected while others operate as electrical islands. In the Paramaribo area, electric power is supplied by means of hydroelectric power (a 180 MW power plant that supplies around 75% of the energy) and diesel generators (66 MW of diesel generation). The country relies on the generators of two state owned enterprises, Surinamese Energy Company (EBS) and Staatsolie Power Company Suriname (SPCS). These entities are responsible for approximately 30% and 70% of electricity generation respectively (EAS 2022). Energy generated by the bauxite sector is also added to the grid, in addition to generation for its own use, with Government receiving the largest share. EBS As of 2018, installed a 500kW solar generation system at Atjoni. The latter being integrated into the diesel plant already in existence there.

EBS is also responsible for the design, construction, operation and maintenance of the country's electric transmission and distribution network which serves the coastal area, whilst the Electricity Supply Service (DEV) - run by the Ministry of Natural Resources - provides electricity in large parts of the interior with via diesel generators. Hence Transmission and Distribution (T&D) is wholly state owned and operated.

In addition to the Bauxite sector generating energy along with the State enterprises, the Rosabel Gold mine installed a 5MW Solar Energy Plant solar plant in 2014 for its own use, while the Merian Gold mine utilises a 62.3 MW on-site Heavy Fuel Oil (HFO) power plant, and a small diesel power plant to supply its needs.

1.7.2.2. Energy consumption

Currently, Suriname’s generation capacity exceeds its demand, with most connections and electricity sales in the districts of Paramaribo, Wanica and Nickerie. As such, it is energy independent since no energy is imported to satisfy electricity demand. However, the demand for electricity in Suriname is continuously rising as a direct effect of economic development (demand was 1,428,870,001 kWh in 2019). The electricity access in the urban population is equal to 100%, while in the rural interior, 56.2% have access to electricity via interconnected grids, 30.1% off-grid and 13.7% have no access.

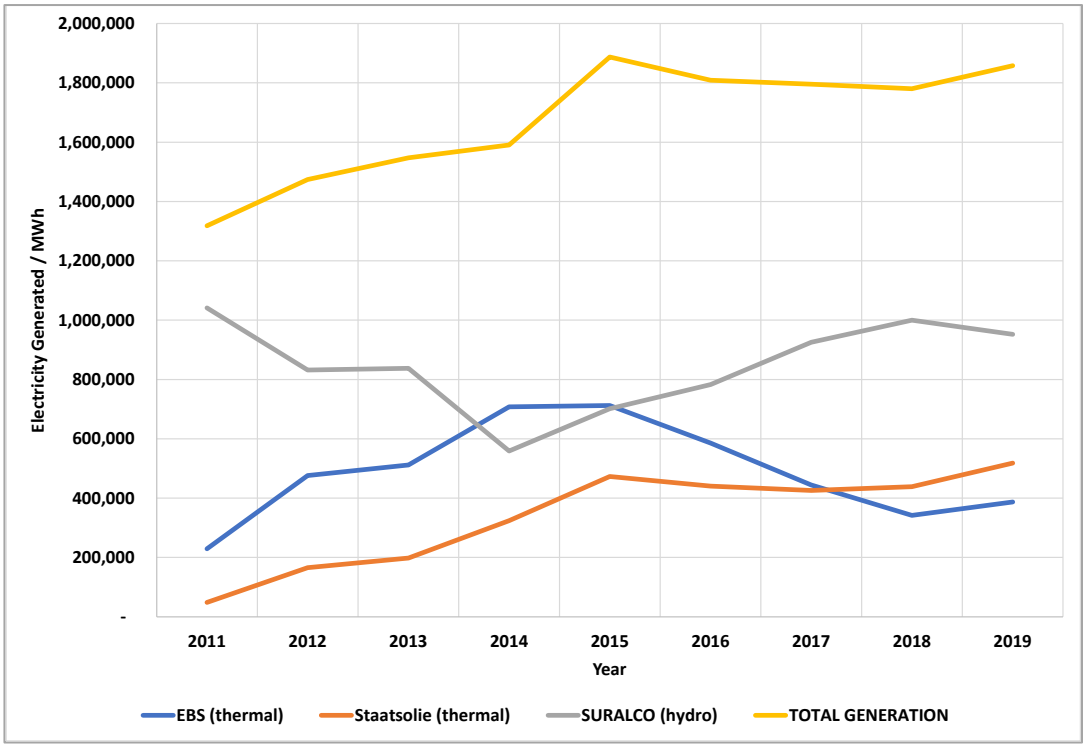


Figure 7: Electricity Generation by Provider (MWh) by producer, 2011-2019

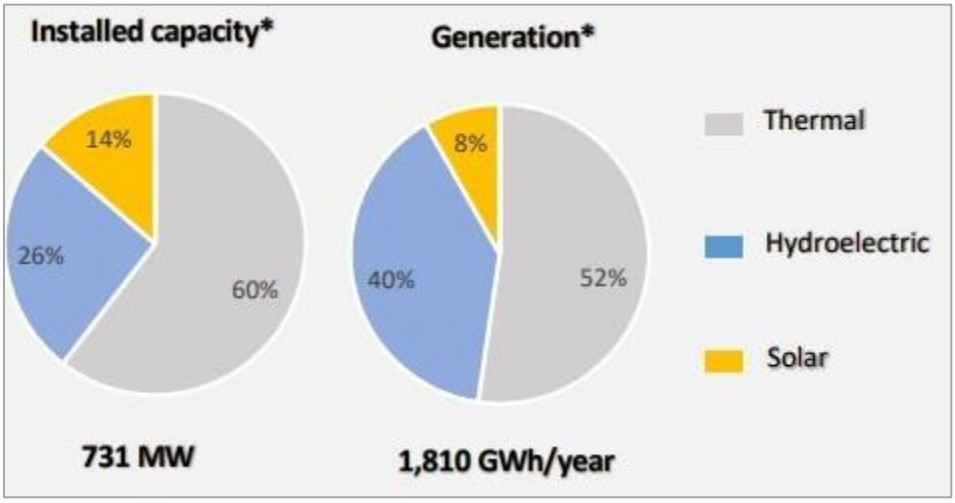


Figure 8: Suriname installed capacity and generation (Source: EAS 2022-2027 short plan)

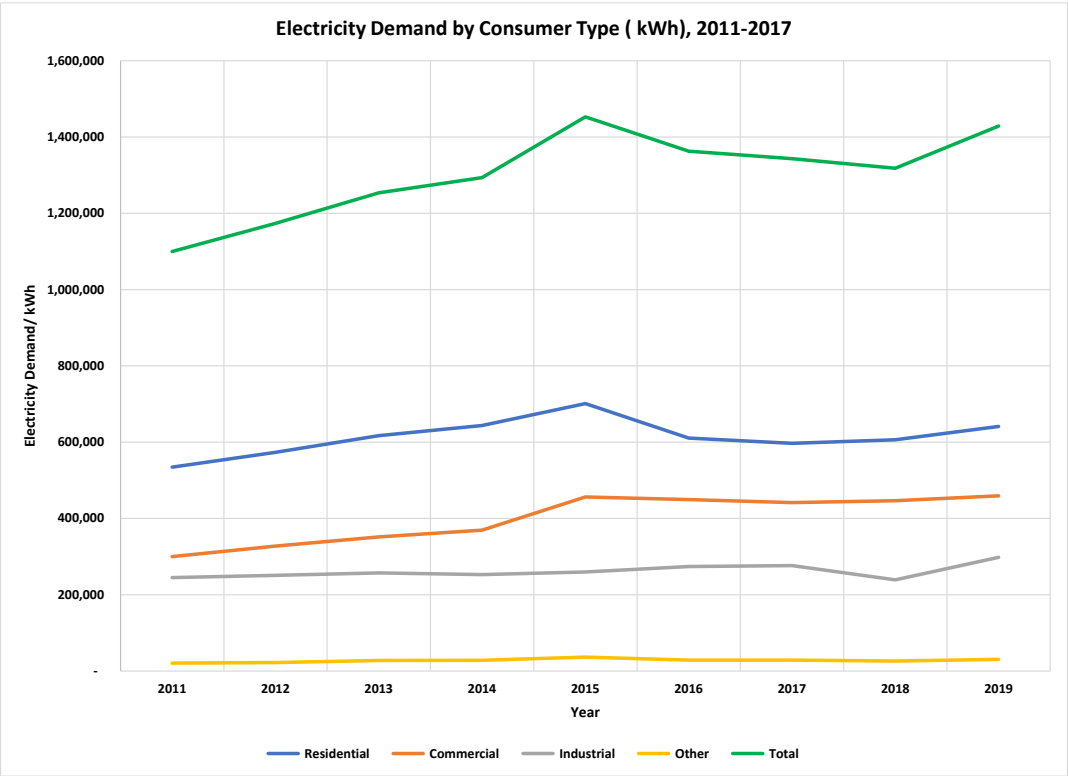


Figure 9: Electricity Demand by Consumer Type (kWh), 2011-2017

Note: The category "Other" contains social institutions, schools and places of worship

1.7.2.3. Electricity pricing

Suriname has amongst the lowest electricity rates globally, ranking 38 of 230 countries. Fiscal sustainability measures to promote energy efficiency form a key piece of Suriname's NDC commitments, however there is acknowledgement that current tariffs disincentivize the investment in more efficient technology (NDC2).

Between 2011-2016, SR$3.4b or US$880m was spent on electricity subsidies (3.3% GDP over the same time period). From 2020, a more cost-reflective tariff structure will be introduced that promotes energy efficiency and reduces GHG emissions (NDC2).

From 2015 to 2016, there were price increases in electricity for households (190%), commercial customers (19.2%) and industrial customers (113.8%). From 2016 – 2019, electricity prices remained the same, but electricity sales decreased over the period 2014 – 2019.

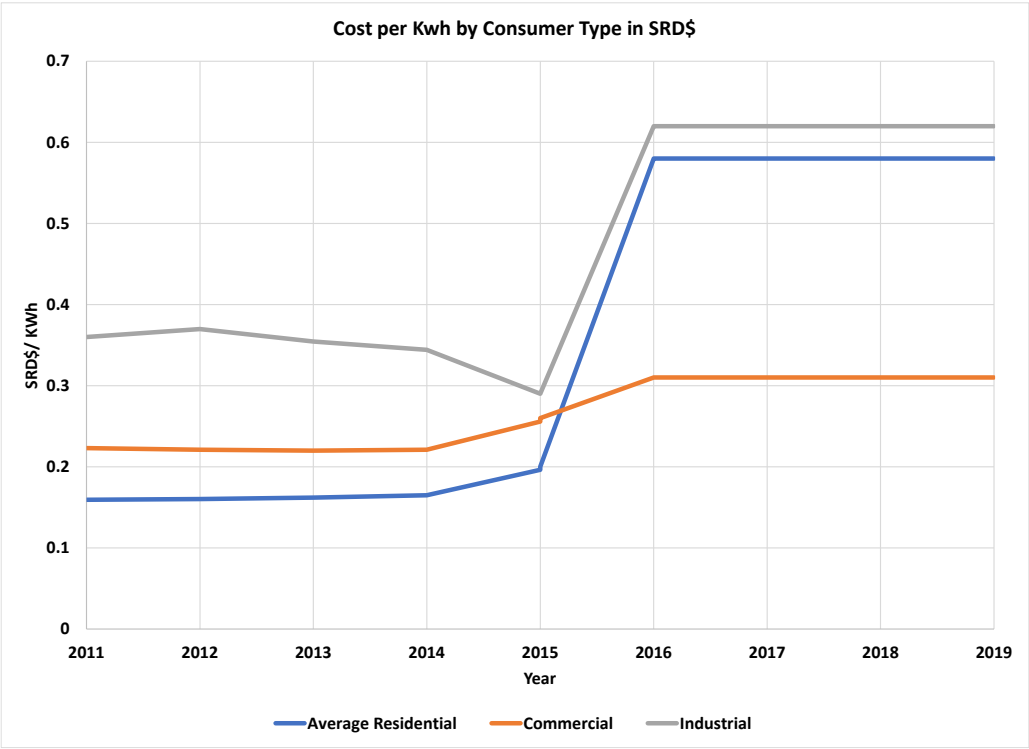


Figure 10: Cost per Kwh by consumer type in SRD$

1.7.2.4. Energy sources exploited for cooking

The Primary Energy Source for cooking is LPG, with its use steadily increasing over time. Note: Figures are Paramaribo and Nickerie only.

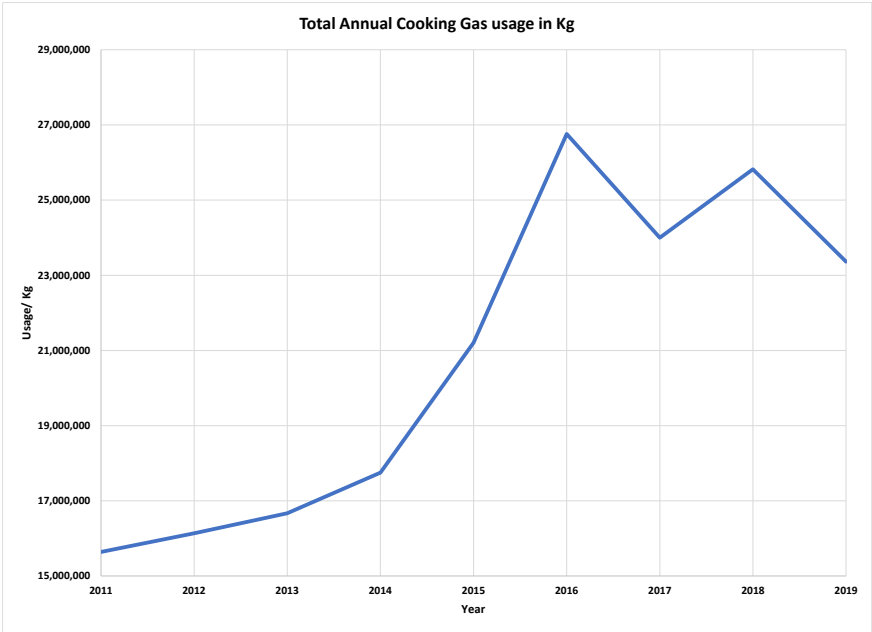


Figure 11: Total Annual Cooking Gas Usage in Kg

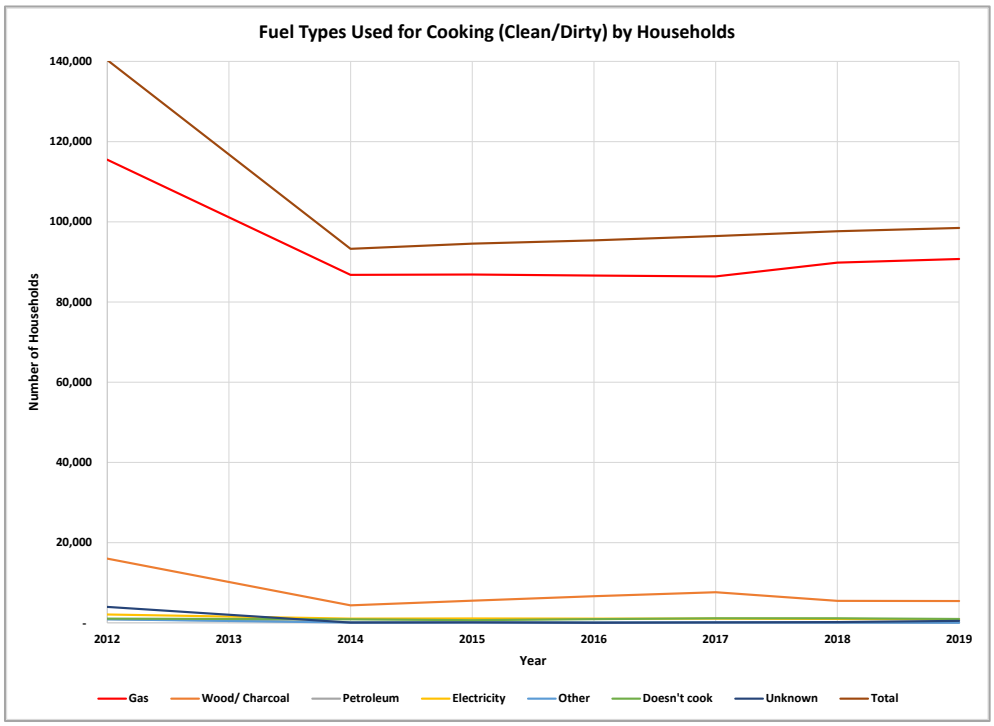


Figure 12: Fuel Types Used for Cooking (Clean/Dirty) by Households

1.7.2.5. The oil and gas upstream, midstream and downstream sectors

The State Oil Company Suriname (Staatsolie) is engaged in exploration, production, refining, marketing and transportation of oil products. In 2019 its refinery had a daily production of 15,000 and generated products such as: Premium diesel, Premium gasoline, State Oil diesel, Fuel oil, Bitumen (asphalt) and sulfuric acid from 'Saramacca' Crude. Additionally, it produces Natural Gas for its own use.

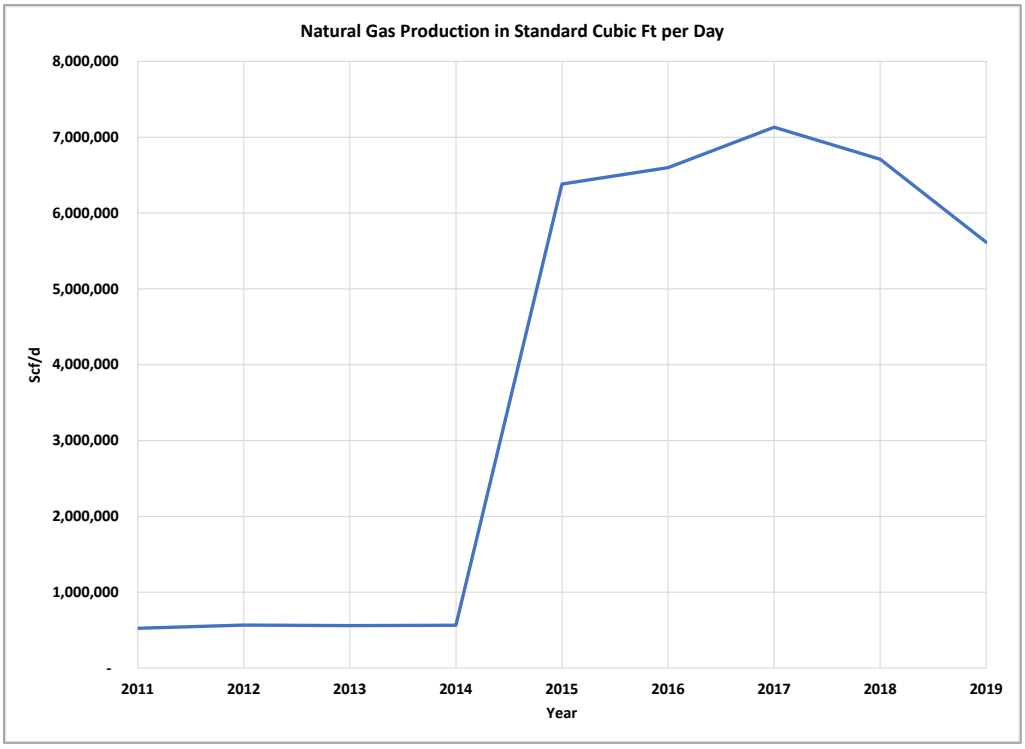


Figure 13: Natural Gas Production in Standard Cubic Ft per Day

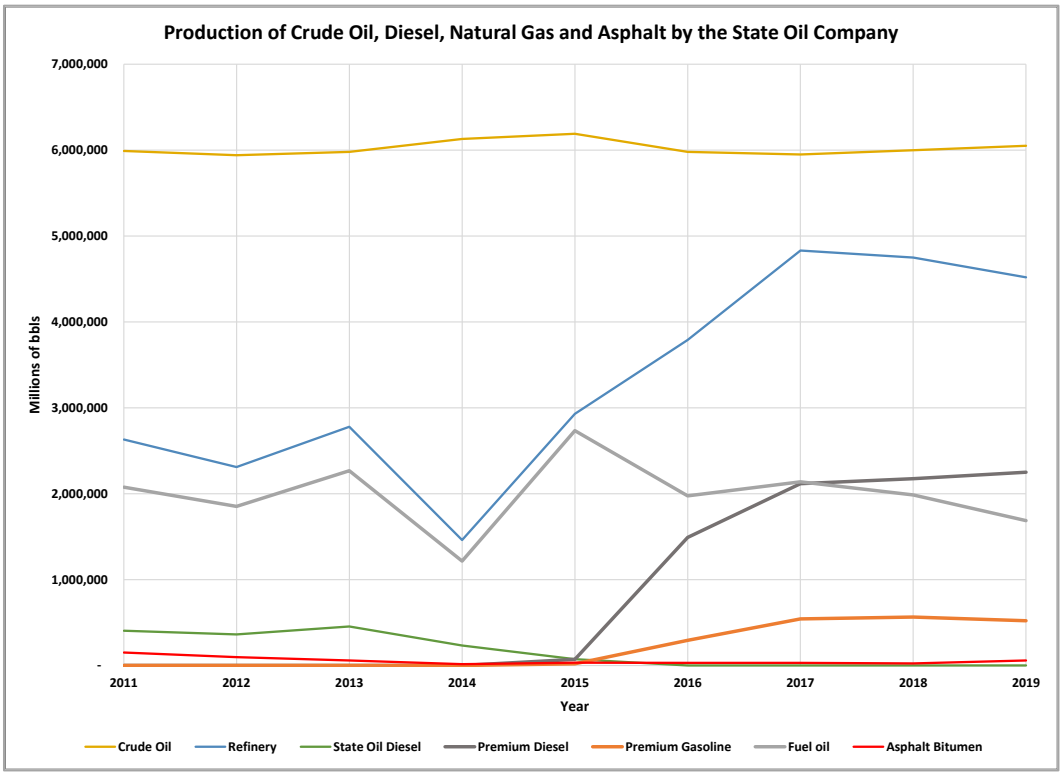


Figure 14: Production of Crude Oil, Diesel, Natural Gas and Asphalt by State Oil Company

However, Diesel is both imported into and exported from the country, while Gasoline , together with Kerosene, LPG and Lubricants are all imported. See figures 15 and 16.

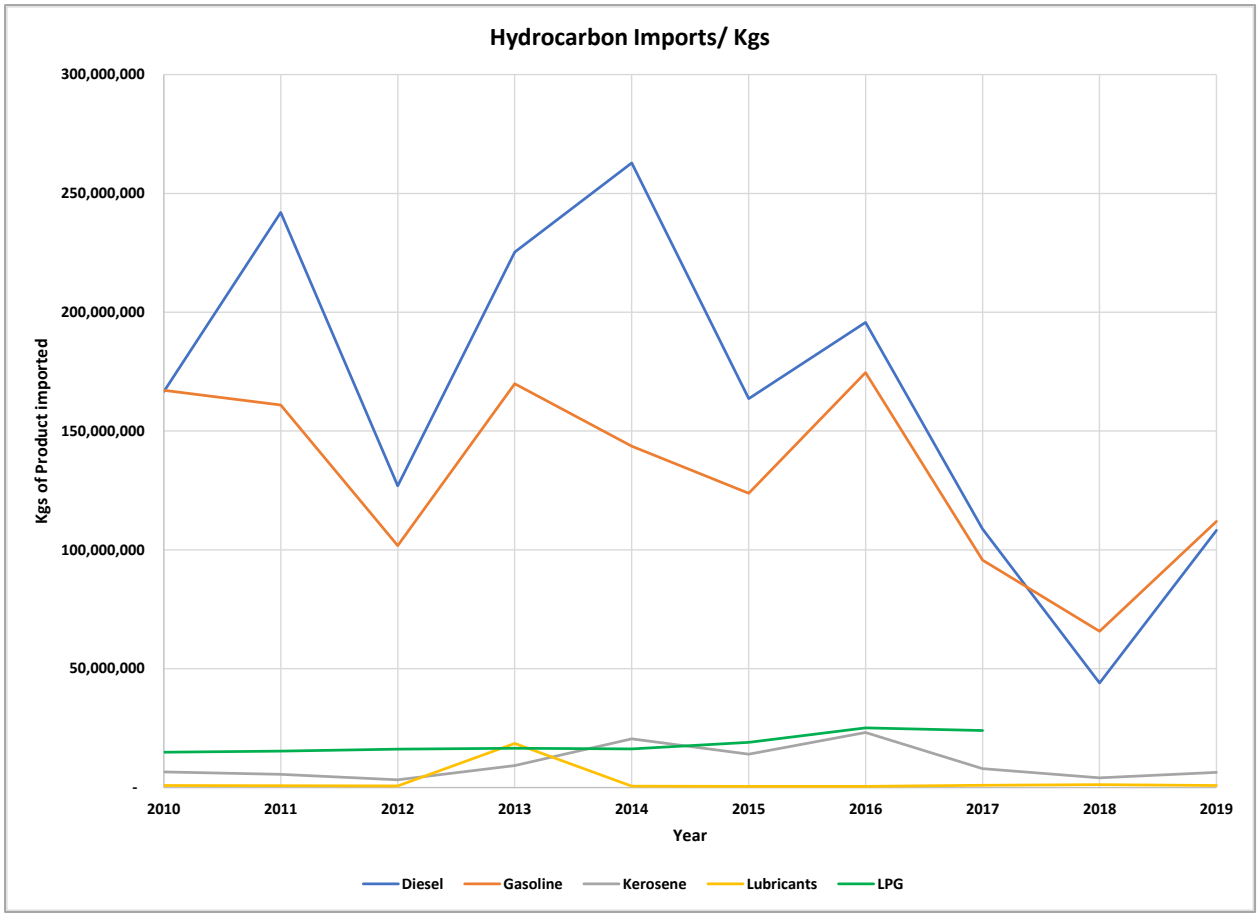


Figure 15: Hydrocarbon Imports/Kgs

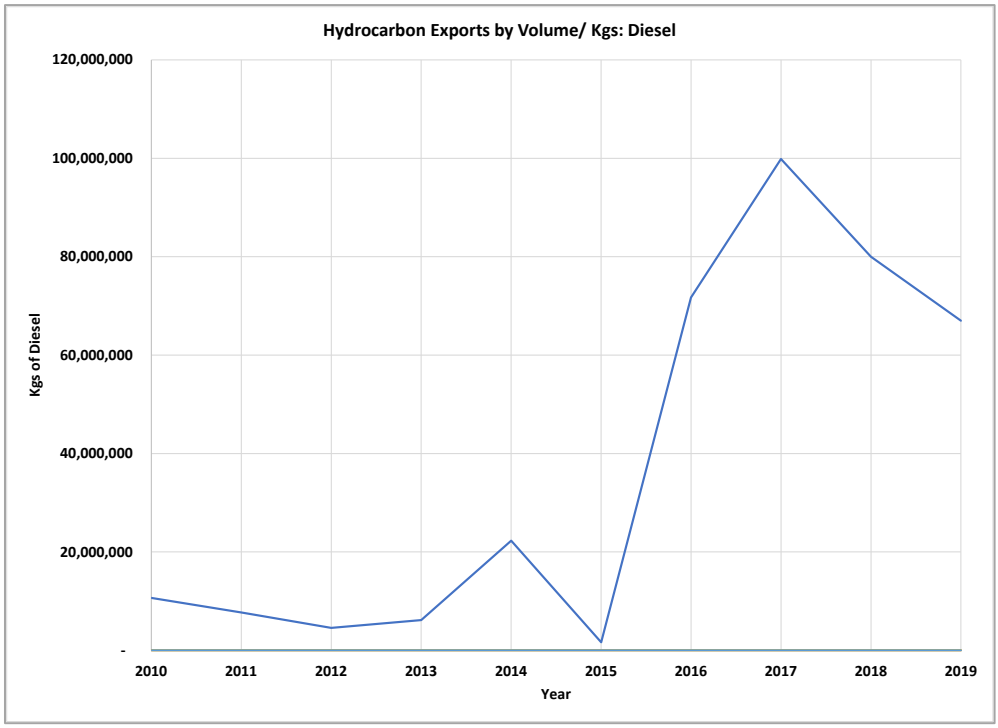


Figure 16: Hydrocarbon Exports by Volume/Kgs: Diesel

1.7.2.6. Sector development

To meet the growing demand due to economic development and the impending electrification of the transport sector by 2040, electricity production will have to increase by 500%. Suriname's proven oil and gas resources, and new exploration and exploitation will increase hydrocarbon resources available for electricity generation and other projects in the coming 20 years.

The challenge for the country is finding a good balance between the development of new gas and oil discoveries offshore and establishing an energy transition with an optimal generation matrix with respect to minimal Kwh cost and maximum emission reduction, under pre-determined reliability and sustainability criteria. Suriname's energy map plans to obtain and maintain the share of electricity from renewable sources above 35% by 2030.

In its 2020 NDC, Suriname committed to expansion of grid-connected and off-grid capacity, efficiency programs and mini-grids. Conditionally, the country committed to keeping the renewable energy (RE) share above 35% by 2030, the adoption of a RE act and fiscal sustainability measures to promote energy efficiency. National strategies and plans include partnering with the private sector to prioritizing technology and energy efficiency, grid digitalization, off-grid renewable energy projects in the interior, and the adoption of energy efficiency standards for buildings. Other key

developments in the energy sector are centered around the expected increase in oil and gas production as a result of new exploration and discoveries (EAS, 2022).

Exploitation of Hydro-electric potential continues to be expanded. Currently, there are several renewable generation expansion plans such as the Jai-Tapanahony Diversion (a complex of infrastructural projects whose main purpose is to develop extra hydropower capacity): the Kabalebo Hydro Power Project, and the Grankiki Hydro Project (identified as a possible site for small-scale hydro power development).

Furthermore, detailed studies are being carried out regarding the potential contribution of solar power for the generation matrix in Suriname. Although this energy source has a high potential for reducing GHG emissions, it is yet to be significantly deployed as a substitute for the hydrocarbon fuels. However, application of solar collectors and solar-cells (photovoltaic conversion) for electricity generation still has high potential. In 2025, the operational capacity was expected to be 5 MW and by 2018, the capacity was already more than 5MW. More projects are being developed by the government. As per February 2022, the implementation of 10 mini grids with solar energy in 10 villages has been started. By 2024, the government intends to provide a total of 100 villages in the interior with sustainable, and clean energy. The country also implemented a 90% reduction on the import taxes of solar PV panels (EAS 2022) to encourage the adoption of RE technology.

Wind energy (for electricity generation) could successfully be supplied in locations with relatively high wind velocities. Large scale application still seems only possible in the distant future. Biomass is not expected to form a significant part of the generation matrix in Suriname in the near future.

The Ministry of Natural Resources is responsible for the administration, regulation, monitoring and development of the energy policy in Suriname (Statistics Suriname, 2020). A key piece of legislation driving the energy sector is the Electricity Act (2016). This was implemented to prioritise the stabilisation of fiscal accounts and formalise the establishment of the Energy Authority of Suriname (EAS), an energy regulator that is legally responsible for renewable energy expansion plans and the enactment of such plans. Under this law, the incorporation of new large-scale renewable energy projects must be done by public energy auctions and net metering provisions are provided, allowing customers to generate their own electricity and exchange back to the grid. However, net metering is not yet operational in Suriname.

Suriname currently uses the Organisation of Eastern Caribbean States (OECS) Caribbean Uniform Building Code (CUBiC) to outline the minimum compliance required for building energy efficiency standards. The CARICOM Regional Energy Efficiency Building Code (CREEBC) is under review by the Suriname Standards Bureau for the adoption and implementation in Suriname.

1.7.3. Agriculture sector

The agriculture sector in the mid-1990s was approximately 18% of GDP and has since fallen to just 9% by 2018. Agriculture continues to face challenges as competition grows and poor infrastructure, low labour productivity and high costs prevail. Approximately 7% of Suriname's labour force, and particularly the poorer segments of the population, rely on agriculture as a source of income, including about 10,000 smallholder farms (State of the Climate, IDB 2021). Farms and agricultural lands in Suriname are small-scale and provide mainly part-time employment to its people. As a matter of fact, of the 4,273,095-ha land which is deemed applicable for the agrarian purposes in Suriname, only 280,620 ha has been cultivated (GoS, 2016). Though up to 85% of Suriname's arable agricultural land lies on its

coastal plains, only 8% of Suriname's total land area is cultivated for forestry, agriculture and settlements like mining and hydropower lakes (IDB, 2021). A total of 3.2% of Suriname's land area is used for agriculture.

Though the coastal plains provide fertile soils for large-scale agriculture, within Suriname's hilly and forested areas, small-scale shifting cultivation is the primary agricultural practice. Women are typically highly involved in this agricultural practice. This type of agriculture does not result in high deforestation because farms are usually small in size, and the same cleared area is used to re-harvest and replant the next crop.

The main agricultural products in Suriname are: (IDB, 2021)

1. Crops: Rice, banana, vegetables, plantains, citrus, fruits and cassava
2. Livestock: poultry, beef, pork, milk, eggs
3. Flowers: ornamentals and fruits (excluding banana)

Rice production alone contributes to USD 6 to 8 million in exports, while fish and fish products contribute to approximately 10 million annually, the latter accounting for 6% of all exports in Suriname (State of the Climate IDB 2021). Currently, the agricultural sector as a percentage of GNP is trending downward, such that in 2021 it was 20% of its historical maximum (IDB, 2021). This is due to an aging population, the migration of youths to urban areas and difficulties gaining financial credits for agriculture to support access to rice seeds, chemicals, fertilizers, equipment, and infrastructure.

Suriname's agriculture sector is highly susceptible to the effects of climate change like sea level rise, which would cause flooding in coastal regions and result in national food insecurity. Other climate change effects like extreme weather events, high winds, changes in ecosystems, changes in precipitation and storms could also put strain on Suriname's food systems, including its fishing and shellfish export industry. As a result of the 2006 floods in Suriname, 39% of the related monetary damage was reported to be from the agriculture sector, making it the second most impacted sector (State of the climate, IDB 2021). Suriname's four main agricultural activities are affected differently by each climate-related hazard listed above.

In response to climate change effects, Suriname's government, organizations, and local communities have begun various adaptation responses which are discussed further in Section 3: Mitigation. The most common themes for adaptation responses were:

1. Improving agricultural systems for farmers (i.e. yields, productivity, resistance to pests, etc.)
2. Improving access to financial support for farmers
3. Improving access of farmers to distribution points
4. Improving agricultural resilience to the effects of climate change

Agriculture management practices:

Suriname's National Vision for Agriculture according to the National Climate Change Policy, Strategy and Action Plan (NCCPSAP) is to ensure food security and food safety; establish Suriname as a leader in food security in the region; promote sustainable agricultural production; and establish Suriname as a food producer and food supplier of the Caribbean region.

The agriculture sector's climate change objective as outlined by the LVV is to maintain and expand food security, safety and export; implement more efficient production systems and utilize pre-exploited and abandoned fields; and attract climate finance through use of renewable energy in the sector.

While the agriculture sector is particularly vulnerable to climate change, it also contributes a significant proportion of Suriname's GHG emissions which was 480 Gg CO_2e in 2008 and 429 Gg CO_2e in 2017. The main sources of GHGs from agriculture are wetland rice cultivation and animal husbandry (NDC2).

Suriname's National Climate Change Policy, Strategy and Action Plan (2015) for agriculture outlines the following national vision and is based on three agricultural climate change outcomes. The last outcome outlines intention to implement GHG emission mitigation programmes and strategies in Suriname, which will be discussed in Section 3: Mitigation.

Table 5. Programmes to achieve Suriname´s agricultural objectives

Climate change outcomes	Programmes to achieve outcomes
Improved knowledge of how climate change will impact on Suriname's agriculture, livestock and fisheries sectors and development of climate resilient products/techniques	- Comprehensive national research programme on social, environmental, and economic baselines, climate science, vulnerability, impacts and risk management. - Integration of climate resilience into agricultural extension services (raising awareness of farmers, pastoralists and fisherfolk on the impacts of climate change, and building capacity on how to manage impacts).
Agricultural crops, livestock and fisheries are protected from water shortages, flooding and saltwater intrusion.	- Develop and implement law, policy and regulation to incorporate climate resilience into agriculture, livestock and fisheries management. - Infrastructure development to conserve water, provide irrigation and protect agriculture from saltwater intrusion. - Financial support to farmers, pastoralists and fisherfolk to build climate resilience.
Decreased GHG emissions from agriculture.	- Technological transfer programme on sustainable and environmentally friendly agricultural practices.

1.7.4. Transport and urban infrastructure sector

The majority of Suriname's infrastructure is concentrated in Paramaribo, the capital city, which serves as the nation's principal hub. It is where the majority of the country's roads, bridges, imports, and exports are concentrated.

Transportation is primarily accomplished by road in coastal areas and along the nearly 1,200 kilometers of rivers. The entire length of the highway and road system is 4,300 km, which is equivalent to 7.27 meters for each citizen in the nation. As a result, Suriname is in the 73rd in the global ranking. The nation has an extremely low population density of 4 people per square kilometer. It is usually necessary to travel long distances to get to the country's more isolated regions. Since the economy has improved, car ownership has almost doubled in the past decade, which has resulted in a heavily crowded road network in Paramaribo during rush hour. With a declining trend, barely 15% of individuals use public transportation.

The port system is crucial to the economy of Suriname. Ports can be found in Paramaribo, Paranam, and Nieuw-Nickerie. Since 1988, the amount of freight from Paranam has remained stable, Nieuw-Nickerie has decreased while Paramaribo has expanded dramatically. Paramaribo is responsible for 27 % of exports and 75 % of imports (by weight). Freight is also transported by air. There are plans and a current project to dredge and deepen the draft of the Paramaribo port to facilitate larger container ships.

Additionally, there is a vast network of airfields and numerous small airlines that offer small aircraft services to the interior.

Transportation and infrastructure are considered as being critical to the expansion of other sectors in the country's Policy Development Plan (2017-2021) with the long-term objective that transport activities, organizational and physical infrastructure will contribute in an efficient, safe and effective manner to increasing the economic growth and social development, and intensify the contact and the trade between Suriname, the region and the rest of the world.

However, transport is a large and growing source of emissions. With more than two-thirds of the population living in and around the capital, the combined challenge of increasing resilience of urban infrastructure and reducing transport emissions defines Suriname's approach to the sector. A key long-term climate change objective of the NCCPSAP to develop infrastructure and enhance the adaptability of Suriname's population. This will be achieved by increasing access to markets and social services, designing, building, and operating infrastructure with the goal of climate resilience and minimal GHG emissions, and finally, improving transport routes to encourage wider use of public transport.

1.7.5. Waste sector

Waste generated in Suriname typically consists of nine main types. These include household waste, agricultural waste, enterprise waste, expired foodstuff, dangerous waste materials, asbestos, glass, waste of fish and meat and tires (Dondru, 2022). Of these categories, household waste makes up the majority of waste produced, comprising approximately 92% of total waste production as of 2019, with enterprise waste accounting for the second largest portion at 5.9% (Dondru, 2022). There is a solid waste collection service in the country, but it does not service all households within urban areas. As such, many households resort to burning their waste or disposing of it in open spaces or rivers (NC2, 2016). Landfills within Suriname are also unlined and can hence pose a significant threat to groundwater reserves through pollution. Presently, there is only one wastewater treatment plant operational at the Fernandes Softdrinks bottling plant with the significant amounts of wastewater from households being directed into septic tanks in household's backyards and wastewater from downtown Paramaribo being discharged directly into the Suriname River (NC2, 2016). In the Interior, there are virtually no septic tanks and wastewater is hence discharged directly into rivers and creeks, along with all other household water produced (State of the Environment Report, 2020). Additionally, about 25% of the population living in the Interior defecates into the rivers which are simultaneously used for water supply as about 44% of the population has no access to any kind of sanitary facilities.

1.7.6. Water resources sector

Suriname's main freshwater source comes from the abundant annual rainfall which supplies the many streams and larger wetlands throughout the country (NC2, 2016). There are seven main rivers, originating in the Interior, that transport about 4,800m3/s of fresh water into the Atlantic Ocean annually. This accounts for approximately 30% of the annual rainfall of the country. The Marowijne and Corantijn Rivers give rise to 70% of the total discharge in the country and of the remaining rainfall, only a small part percolates to the aquifers to recharge ground water reserves with the largest part evaporating.

The Interior consists of a dense network of streams and the low-lying coastal areas have fewer streams but extensive swamps. These swamps can have salt or brackish water and surface water resources, including rivers, creeks and swamps, and are used for irrigation purposes as well as for the generation of hydropower. The country's groundwater is mainly used for potable water and as a result of excessive groundwater extraction, some areas have been impacted by increased saltwater intrusion.

It is crucial to note that Suriname´s sea level rise is of major concern, especially since Suriname is recognised by the UNFCCC as one out of ten countries with the most threatened rising sea levels (based on the percentage of the population living in an area threatened by flooding). Projections depict that approximately 73% of the overall population will be affected by a rise in sea level of a meter (National Development Plan 2017-2021). As a consequence, it is important to note down the mitigation actions with regards to the water management practices which are elaborated in Section 3: Mitigation.

1.8. Development priorities and objectives

Climate change is being mainstreamed into Suriname's National Development Plans. The sectors given priority for assistance are infrastructure, energy, forestry, agriculture, and disaster risk. The National Climate Change Policy, Strategy and Action Plan (NCCPSAP) for Suriname, prepared in 2015, and the Second National Communication to the UNFCCC are a few of the Government of Suriname's major national projects (2014). The other important national initiative to combat the negative consequences of climate change is the National Adaptation Plan (NAP) for Climate Change in Suriname.

Suriname has outlined its development priorities in the Policy Development Plan 2017-2021 (GoS, 2017). The Plan emphasizes the need for "diversification of our economic basis, using the many possibilities provided by our nature and at the same time protect the environment." It identifies utilization and protection of the environment as one of four priority pillars. The Plan is structured around the following pillars:

5. Strengthening Development Capacity
6. Economic Growth and Diversification
7. Social progress
8. Utilization and Protection of the Environment

The four pillars provide a solid basis for alignment between the second NDC and the 2017-2021 Policy Development Plan. This is important as NDC implementation will be more effective now that it is well integrated within the wider policy context. Furthermore, aligning the NDC2 with sectoral policies, plans and strategies makes it fit-for-purpose, credible with stakeholders and 'embedded' within sectors. The second NDC creates positive synergies and avoids conflicting policy signals. Doing so has improved buy-in among stakeholders and should mobilize international support for climate action by Suriname. Climate-resilience is key to sustainable development, and to achieving the UN Sustainable Development Goals (SDGs). The mutually supporting nature of the two agendas should be clear: delivering on its NDC will help Suriname achieve the SDGs and achieving the SDGs will facilitate Suriname's efforts to mitigate and adapt to climate change. The two most fundamental development challenges, which Suriname cannot really change are its small population and the openness of the economy. These two challenges are also closely related. Suriname is a member of CARICOM, joined the ranks of the Small Island Developing States (SIDS) in 1981 and aligns itself with the Alliance of Small Island States (AOSIS) in the context of the UNFCCC. Although Suriname geographically is not a small island, as a low-lying coastal country it faces similar development challenges, such as limited resources, environmental fragility, high costs of transportation, and vulnerability to climate change and natural disasters.

2. GREENHOUSE GAS INVENTORY

2.1. Introduction

Under Article 4.1 (a) of the UNFCCC, Parties are required to develop, periodically update, publish, and make available to the COP, national GHG emissions inventories. Article 12.1 (a) outlines the protocols with respect to the communication of GHG inventory information, stating that "emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol, to the extent its capacities permit, using comparable methodologies to be promoted and agreed upon by the Conference of the Parties" must be communicated by the Party to the COP through the secretariat.

Suriname has submitted GHG inventories covering the period of 2000-2008 and has now completed their inventory up to 2017, as part of the country's NC3 preparation process. As previously noted, this section presents data collected as part of the NC3 to ensure consistency across national reporting under both the UNFCCC and the Paris Agreement. According to the BUR guidelines, the calendar year of the GHG inventory referenced in the BUR must be no older than four years from the date of submission. However, due to limited capacity of technical resources to produce UNFCCC-compliant documents (NC, NDC, BUR, etc.) within Ministries and institutions, Suriname has reported GHG emissions for the years available, 2000-2017, in an effort to provide the most current data available on the status of emissions, and particularly land-based sinks in Suriname. As a small island developing state, Suriname has only recently received funding to enable the preparation of the required data but is in the process of institutional strengthening to enable more up to date data collection and transparency. It should be further noted that the attached Technical Annex for REDD+ covers data up to 2021 for the Forestry sector.

As a country with 93 percent of forest coverage, Suriname is a net remover of carbon dioxide from the atmosphere, and its ambition is to remain the same. However, Suriname's main industry is the energy and mining sector, it is therefore its national energy strategy to ensure that the growth of the sector is balanced with effective management of forest resources and investment in renewable energy. This BUR is an update to NC2 which was submitted in 2016 and will provide a summary of trends in key sectors up to September 2022. It is expected that NC3 will be submitted in January 2023. This BUR is being presented to allow Suriname to access payment-based carbon credits.

All data presented was compiled in accordance with the 2006 Intergovernmental Panel on Climate Change (IPCC) guidelines and covers the following sectors:

- Agriculture, Forestry and Other Land Use (AFOLU)
- Energy
- Industrial Processes and Product Use (IPPU)
- Waste

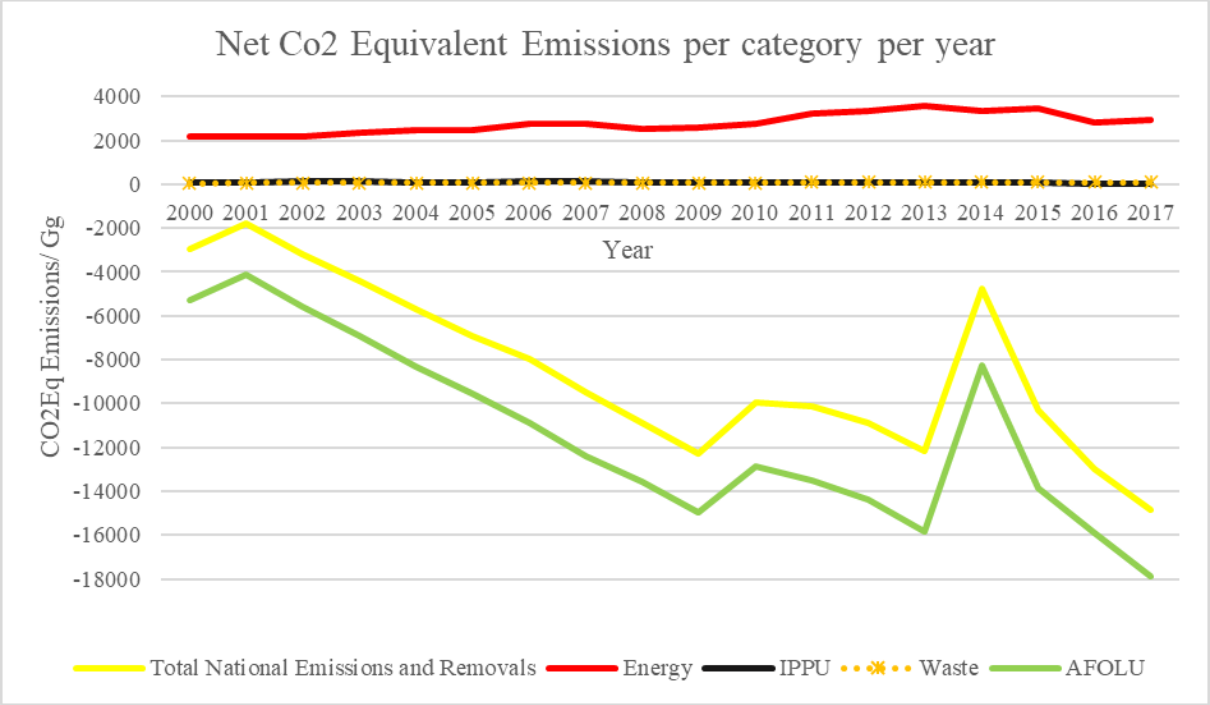


Figure 17: CO_2 equivalent in Gigagrams (Gg) per category per year from 2000-2017

2.2. GHG inventory overview

The 2019 Refinements to the 2006 IPCC guidelines were used to compile Suriname's emission estimates for carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O), and encompassed two approaches: reference and sector approaches. 'The Reference Approach' combines the emissions data from all sectors, whilst the 'Sector Approach' focuses on gathered data for each individual sector. Data for the inventory was obtained from governmental sources and private companies and processed with the IPCC 2006 software. For the FOLU sector, manual calculations were used in accordance with IPCC 2006 worksheets.

Default IPCC values where country-specific data was unavailable. For calculating CO_2 equivalents, the guidelines of the Global Warming Potentials (GWP) of the IPCC second assessment report were used in accordance with Decision 17/CP.8. It should be noted that estimations for activity data were unavoidable for those sectors, or parts of sectors, where data was incomplete or missing. The inventory was compiled for the following sectors: Energy, IPPU, AFOLU, and Waste. Emissions data from international bunkers and marine bunkers, reported separately, is given in accordance with the IPCC guidelines.

A base year of 2008 from the Second National Communication (NC2) was used to reference changes in emissions.

The general emissions equation uses activity data (AD) and emissions factors (EF).

Emissions = Activity Data x Emissions Factor

2.3. GHG inventory by sector

2.3.1. AFOLU sector

2.3.1.1. Institutional Arrangements

The Ministry of Spatial Planning and the Environment (ROM) coordinates the greenhouse gas inventory. Data from the GHG inventory are then compiled, and will be entered into the Dondru online database, managed by the National Institute for Environment and Development in Suriname (NIMOS), once the database is fully functional. Once operational, the SMIN will centralise and standardise this data in close collaboration with key stakeholders, and disseminate to the responsible institutions/authorities for reporting to the UNFCCC, UNCDB and UNCCD.

For estimation purposes, the AFOLU sector is evaluated based on three sub-sectors of Agriculture, Forestry and Other Land Use. Compilation of relevant input and emissions data of these sub-sectors required a joint collaborative approach between the SBB (within the GBB) and the Ministry of Agriculture, Fisheries and Livestock (LVV). As a result of capacity building exercises throughout the years, and the added experience of developing Suriname's two existing FRELs, SBB was well equipped to lead the GHG inventory of the AFOLU sector, especially in the data relating to FOLU. This in turn, further adds to capacity building within the GBB and positions SBB as a continued leader in the coordination and management of the AFOLU GHG inventory.

Despite a lack of funding and budget to institutionalise coordinated ministry and agency data, efforts have still been made to collect and verify data using available local capacity, and avoiding where possible, the involvement of external experts and consultants. This is done in an effort to strengthen national capacity and enhance national ownership and management of environmental data. With this national effort, the collection and verification of data can be done to provide adequate data for reporting and formulation policy documents. However, Suriname has seen the effects of climate change with increased flooding, particularly in coastal locations and areas of the Interior near to the Brokopondo Reservoir. As a result, the GoS is acting with new and dedicated urgency as they also see the process to fund climate change adaptation and mitigation through payment-based credits. A significant need exists in knowledge building and capacity at all levels in the public and private sector. It is envisaged that this education will be a key factor in driving policy decisions and change across the country.

2.3.1.2. Methodology

Data sources to develop the GHG inventory include national databases such as ABS, SBB Gonini Geoportal, SBB Kopi Statistics portal, ministries (LVV and GBB), and national institutions (CELOS, ADEKUS), multinational organisations, and the private sector. Other sources include expert research, consultations, dialogue and international statistics from the Food and Agriculture Organisation Statistics database (FAOSTAT) to fill in data gaps. For example, FAOSTAT was the source used to determine the nitrogen content from fertilizer in the absence of Suriname-specific import data.

Estimations of emissions and sinks for FOLU used a combination of tiers 1-3. Tier 1 where country data was unavailable, tier 2 for FOLU, and tier 3 for land use and land change (LULC). The agriculture sector primarily used Tier 1 to estimate emissions. It has been noted that improvements will be made in the future towards using a combination of Tier 2 and Tier 3 for a more rigorous approach to estimating GHG emissions.

Tier 2 considerations used in FOLU estimates:

1. Belowground biomass assessment
2. Above-ground biomass and deadwood assessment
3. Calculation of emissions from logging using Tier 2 emissions factors

Tier 3 considerations used in FOLU estimates:

1. Land-use and land-use change area estimations
2. Wall-to-wall monitoring of Activity Data (AD)
3. Disaggregation of drivers of deforestation by AD

The AFOLU sector was clustered into three parts that correspond to the IPCC Guidelines for emissions categorization. Notation keys used to indicate whether the IPCC category was available for use in emissions calculations are as follows:

E: Existent
NE: Non-existent
NO: Non-occurring

Emissions between 2000 – 2017 were estimated for enteric fermentation, manure management, rice cultivation, indirect N_2O Emissions from manure management, direct and indirect N_2O emissions from managed soils and urea application. Categories 3C2 liming and 3D1 harvest wood products were not included in the calculations, since liming is not a common agricultural practice in Suriname and there is a lack of data for both categories. Since NC2, improvements in data collection and processing have been made. For example, estimates on emissions from wetlands have since been included in the inventory.

IPCC Category	Category	Sub-category	Gases included	Use in analysis	Tier/Notation Key
3A. Livestock					
3A1. Enteric Fermentation	a. Dairy cattle b. Non-dairy cattle c. Buffalo d. Sheep e. Goats f. Horses g. Mules and asses h. Swine		CH4	E	T1
3A2. Manure Management	a. Dairy cattle b. Non-dairy cattle		CH4, N2O	E	T1
	c. Buffalo d. Sheep e. Goats f. Horses g. Mules and asses h. Swine		CH4	E	T1
3B. Land					
3B1. Forest Land	a. Forest land remaining forest land b. Land converted to forest land		CO_2	E	T2, Approach 3
3B2. Cropland	a. Cropland remaining cropland b. Land converted to cropland		CO_2	E	T2, Approach 3
3B3. Grassland	a. Grassland remaining grassland b. Land converted to grassland		CO_2	E	T2, Approach 3
3B4. Wetlands	a. Wetlands remaining wetlands b. Land converted to wetlands		CO_2	E	T2, Approach 3
3B5. Settlements	a. Settlements remaining settlements b. Land CO2converted to settlements		CO_2	E	T2, Approach 3
3B6. Other Land	a. Other land remaining other land b. Land converted to other land		CO_2	E	T2, Approach 3
3C. Aggregate sources and non-CO2 emissions on land					
3C1. Biomass burning	a. Forest land		CO_2, CH_4, N_2O	E	T2

	b. Cropland	CO_2, CH_4, N_2O	E	NE
	c. Grassland	CO_2, CH_4, N_2O	E	T2, Approach 3
	d. Wetland	CO_2, CH_4, N_2O	E	NE
	e. Settlements	CO_2, CH_4, N_2O	E	NE
	f. Other land	CO_2, CH_4, N_2O	E	NE
3C2. Liming		-	NO/NE	-
3C3. Urea application		CO_2	E	
3C4. Direct N20 emission from managed soils		N_2O	E	T1
3C5. Indirect N20 emission from managed soils		N_2O	E	T1
3C6. Indirect N20 emission from manure management			E	T1
3C7. Rice cultivation		CH_4, N_2O	E	T1
3D. Other				
3D1. Harvested wood products		-	NO/NE	-

Table 6: Key IPCC categories for emissions estimates in AFOLU sector

Agricultural Emissions

To estimate livestock-related emissions, basic livestock characterization, such as type of livestock and number of animals, was used to understand CH_4 and N_2O emissions volumes intestinal fermentation, manure management and agricultural soils. Specific equations used are shown in table 7.

- CH_4 emissions from enteric fermentation: Tier 1 considerations for EFs were weight, growth rate and milk production. Tier 2 methodology to determine EF included nutrient requirements, feed intake and CH_3 conversion rates for specific feed types. The equation used for enteric fermentation is shown in table 7.
- CH_4 emissions from manure management: Tier 2 considerations for EFs were the mass of volatile solids excreted by animals, CH_4-producing capacity for manure and the CH_4 conversion factor.
- N_2O emissions from manure management: Annual average nitrogen excretions per head of species per category and the manure management systems under operation were evaluated

Enteric fermentation	**EQUATION 10.19** **ENTERIC FERMENTATION EMISSIONS FROM A LIVESTOCK CATEGORY** $Emissions = EF_{(T)} \bullet \left(\frac{N_{(T)}}{10^6}\right)$ Where: Emissions = methane emissions from Enteric Fermentation, Gg CH_4 yr^{-1} $EF_{(T)}$ = emission factor for the defined livestock population, kg CH_4 $head^{-1}$ yr^{-1} $N_{(T)}$ = the number of head of livestock species / category T in the country T = species/category of livestock
N2O emissions from managed soils	$N_2O_{Direct}\text{-}N = N_2O\text{-}N_{Ninputs} + N_2O\text{-}N_{OS} + N_2O\text{-}N_{PRP}$ Where: N_2O_{Direct}-N = annual direct N_2O–N emissions produced from managed soils, kg N_2O–N yr^{-1} $N_2O\text{-}N_{Ninputs}$ = annual direct N_2O–N emissions from N inputs to managed soils, kg N_2O–N yr^{-1} $N_2O\text{-}N_{OS}$ = annual direct N_2O–N emissions from managed organic soils, kg N_2O–N yr^{-1} $N_2O\text{-}N_{PRP}$ = annual direct N_2O–N emissions from urine and dung inputs to grazed soils, kg N_2O–N yr^{-1}

Table 7: Equations for livestock-based emissions calculations (Source: Preparatory documents for NC3 Agriculture GHG inventory)

Calculating aggregate sources and non-CO_2 emissions sources on land

- Emissions from managed soils: Required data to calculate managed soils emissions were application of synthetic fertilizers, animal manure and crop residues, cultivation of N-fixing cops, soil nitrogen mineralization due to cultivation of organic soils and other sources, e.g., sewage sludge where data is available.
- Emissions from rice cultivation: Rice cultivation contributes largely to emissions. Key data required were climatic conditions, number and duration of crops growth, soil type and texture, ecosystem type, water management practice, e.g., flooding patterns, and the use of fertilizers and other organic and inorganic amendments, e.g., sulfate-containing amendments.

Forestry and Other Land Use Emissions

To determine changes in emissions, the National Forest Monitoring System (NFMS) and Satellite Land Monitoring System (SLMS) database and, land use land cover maps were used to look at deforestation, land use and land use change Emissions factors were calculated based on the SBB-NFI (National Forest Inventory) database and included EF for deforestation, forest and shifting cultivation and deforestation, including forest fires.

2.3.1.3. Quality Assurance and Quality Control (QA/QC)

Currently, whilst no defined quality assurance and quality control (QA/QC) protocols are in place specifically for GHG emissions collection and processing in the AFOLU sector outside of Forestry. Data quality is dependent on the existing protocols of the Ministry of GBB and LVV. Collaboration between the relevant ministries is essential to establishing standard protocols for quality assurance and control for future inventories.

However, the GHG inventory for forestry is largely comprised of data from the NFMS, thus any QA/QC protocols used here apply to the overall QA/QC of the GHG inventory. Currently, the NFMS provides quality control and transparency as it is comprised of multiple layers of information gathering, including satellite maps, real time monitoring and community-based monitoring (Figure 18). Specifically, the QA/QC being used by the NFMS is performed by the team responsible for the Satellite Land Monitoring System (SLMS) in generating deforestation maps and is based on procedures outlined by Olofsson et al. 2014; Olofsson et al. 2020) and GFOI (2017) and the tools developed by FAO (2016). Other products produced within the SLMS, such as the LULC maps, are validated with the input and feedback of relevant national stakeholders through technical workshops, validation sessions, and location (by district) consultations.

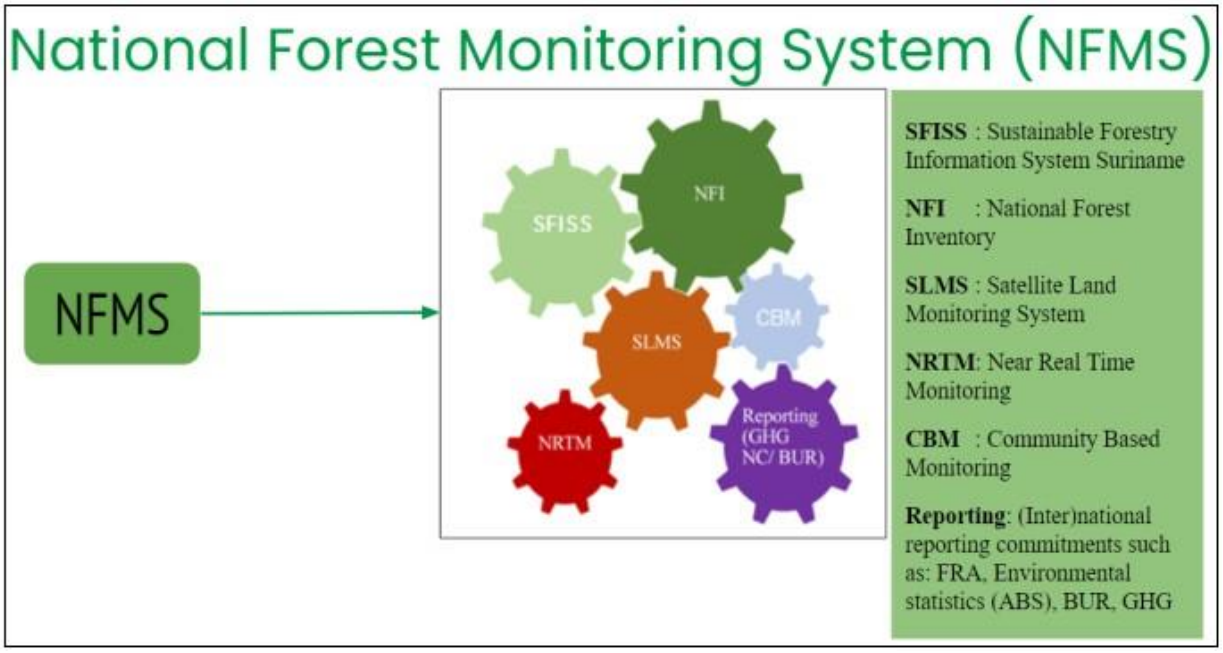


Figure 18: Components of the multi-layer National Forest Monitoring System used in GHG inventory data collection.

2.3.1.4. Uncertainty analysis

Uncertainty estimations are essential to GHG inventory estimations of emissions and removals. The IPCC provides approaches to estimating inventory uncertainty for various levels of data collection and processing. Current data collection methods in the agriculture sector do not factor in uncertainty considerations since historical uses for the data from the existing data sources did not require uncertainty considerations. Additionally, the skillsets required to collect and process this data to estimate uncertainty are lacking. Future data collection must incorporate uncertainty considerations to improve the accuracy of results and improve the inventory results.

In the forestry sector, limited uncertainty data exists. The existing uncertainty data from the FREL 2021 was applied to estimate uncertainty for activity data and emissions factors. Uncertainty calculations were done using equations 3.1 for multiplication, 3.2 for addition and subtraction and 3.2A for combining uncertainties from IPCC (2006) Volume 1 Chapter 3.

2.3.1.5. Recalculation

Since the last national GHG inventory reported in the Second National Communication (NC2), improvements in estimates from refined methodologies and better availability of data have been established in Suriname. For example, estimates for wetland emissions have been included, the EF used for the FREL2 has been incorporated to ensure consistency with FREL estimates, and a mangrove forest inventory project with the UNDP/GCCA+ has been carried out, establishing and measuring 11 sample plots. Additionally, the NFMS has been established and is operating, which provides consistent, verifiable data. The NFMS includes monitoring and data inputs from multiple sources, including satellite imagery, community-based monitoring, near-real time monitoring and other monitoring systems which continues to be improved and contribute to better data inputs for calculations and decision-making. Considering this, recalculations of previously published figures and data was done to increase the accuracy of Suriname's emissions profiles in the AFOLU sector. Emissions estimates of the baseline from NC2 has been improved upon to show more accurate emissions, including by sub-category due to the collection and analysis of more accurate data.

2.3.1.6. Time Series Consistency

The time series in the agriculture sector was calculated using the same method and data sources in all years to reduce bias. The IPCC 2006 guidelines and software with IPCC 2019 refinement was used to calculate emissions for all categories.

Data sources were from the Agriculture Statistics department of the Ministry of LVV, except for emissions data related to urea application and managed soils since national data was not disaggregated to determine necessary information required to calculate emissions from managed land. It should be noted that where data gaps were encountered, interpolation and extrapolation techniques were used to fill such gaps.

In the FOLU sector, all emissions categories used data from the National Forest Monitoring System (NFMS), and the same data used to develop the FREL2 (2021) was being used to develop the current GHG inventory. The preparation of the previous FREL1 (2018) thus relied on input from expert research, and available information and data collected by different institutions, and not Suriname-specific data, leading to insufficient data and inconsistencies between the FREL1, and the prior and current GHG inventories. To improve consistency, FREL2 was based on the now operational NFMS which provides regular and more accurate data, which is collected and processed using described national methodologies.

2.3.1.7. Constraints and needs

Constraints in the collection and processing of data for the GHG inventory were evident. The lack of uncertainty data available to report on errors related to the data collected is a key factor missing in the report. The sources of data which were used do not presently collect data with uncertainty considerations. Future data collection would require that data collection by all parties is enhanced to include uncertainty. To do this, upskilling of resources would be required such that those involved in data collection and processing can factor in uncertainty effectively.

Data limitations also existed in the aggregate sources and non-CO_2 emissions on land sub-sector 3D1 harvested wood products. Data on the inputs to evaluate this would need to be considered in future inventories. Moreover, the National Forest Inventory (NFI) does not cover the full country. Thus, carbon stock estimates have been made using other methods. Improvement of the coverage of the National Forest Inventory would increase accuracy and consistency of data and calculations. Better data availability and upskilling will also support the transition of emissions estimations using Tier 1 and 2 methodologies to Tier 2 and 3 methodologies to make more accurate estimates in the future.

Finally, there is an overarching need to elaborate on and strengthen the existing institutional arrangements between involved parties to ensure the execution and pursuit of improvements in future national GHG inventories. This would improve the classification of activities, data collection, data sharing, and processing of data related to activities and better the overall efficiency and accuracy of emissions estimations. That being said, the SMIN, which is implemented albeit not fully functional, but this is intended to be the central data collection system to gather and feed information to all ministries.

2.3.1.8. Agriculture sector emissions trends

Land use and land use change activities are the second highest sources of GHG emissions in Suriname, second only to the use of energy derived from the combustion of fossil fuels. However, Suriname's high forest cover and low cultivated land area sequesters more greenhouse gas emissions than Suriname emits. Thus, from 2000 to 2017, the AFOLU sector was a net remover of emissions when considering Suriname's forest sequestration against its sources of emissions, which were concentrated in livestock, aggregate sources, and non-CO_2 emissions sources on land.

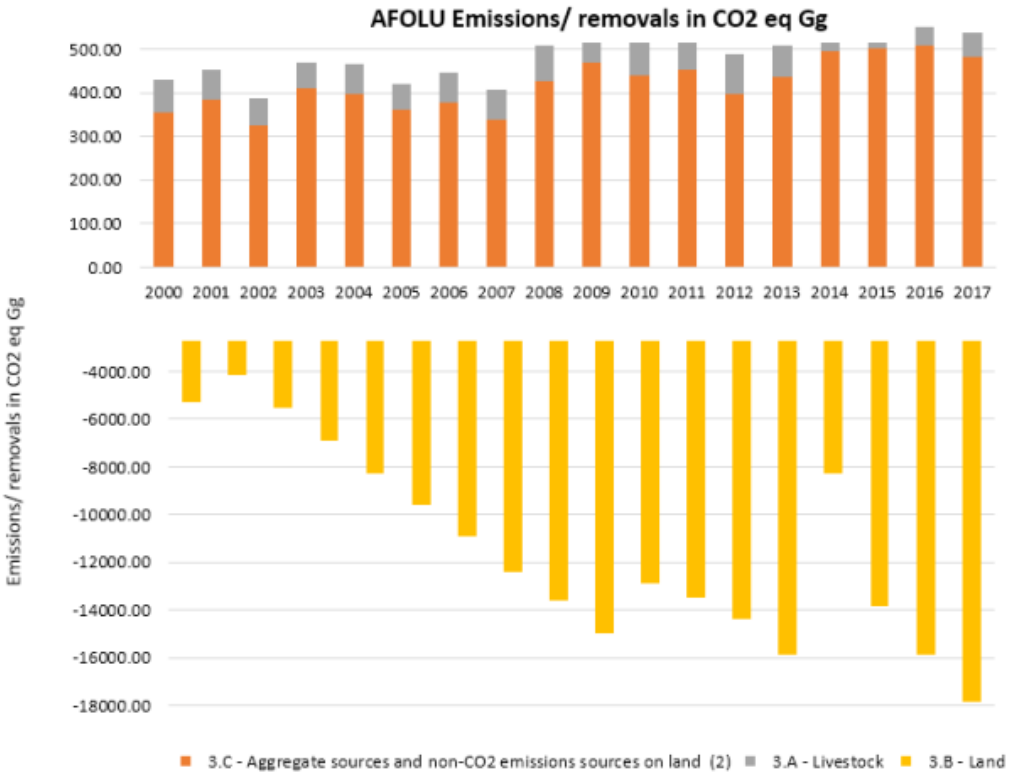
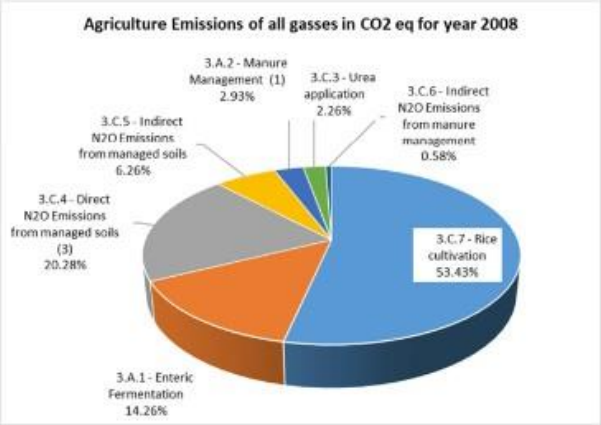


Figure 19: Overall AFOLU emissions and removal in CO2e (Source: NC3 Preparatory Documents)

Figure 19 shows that the land category accounts for nearly all the emissions or removals from the AFOLU sector, while the livestock category, aggregate sources, and non-CO_2 emissions on land account for the majority of emissions. According to AFOLU sector emissions and removals, CO_2 had the largest share at 96.45%, followed by CH_4 at 2.50% and N_2O at 1.05% on a gas-by-gas basis. Overall, the agriculture sector decreased emissions between 2008 and 2017 from 480 Gg CO_2e to 429 Gg CO_2e according to recalculated emissions from 2008. Based on the 2008 base year and the 2000-2017 GHG inventory, one of the largest CO_2- contributing activities in the agriculture sector is rice cultivation, which grew from 53% in 2008 to 66% in 2017. Overall, the methane emissions from rice cultivation contribute 88% of total CH_4 emissions in agriculture, which is expected to grow as the average annual increase in cultivated rice lands is 17% between 2000-2017. Other major sources of direct emissions in agriculture are from managed lands and enteric fermentation (Figure 20). Funding and/or revenue needs to be accessed to implement climate friendly methods for the rice farming industry so that methane levels can be reduced.

The second-greatest emissions source are from direct N_2O emissions from managed soils. Over the course of the time series, emissions generally fluctuated with the peak years being 2008 and 2009. Since the primary input data (N input) used for the computations was taken from the Food and Agriculture Statistical (FAOSTAT) database in the absence of fertilizer import data, there is insufficient data to conclude causes of the peaks.

Category	E/NE/NO	Tier level	Gt CO2 eq 2008
3A1 Enteric fermentation	E	T1	66.88
3A2 Manure management CH_4	E	T1	2.71
3A2 Manure management N_2O	E	T1	11.04
3C1 Biomass burning	E	T1	FOLU
3C3 Lime application (CO_2)	NO/NE		
3C3 Urea application (CO_2)	E	T1	10.60
3C4 Direct N_2O from managed soils	E	T1	95.15
3C5 Indirect N_2O from managed soils	E	T1	29.38
3C6 Indirect N_2O from manure management	E	T1	2.72
3C7 Rice cultivation	E	T1	250.6



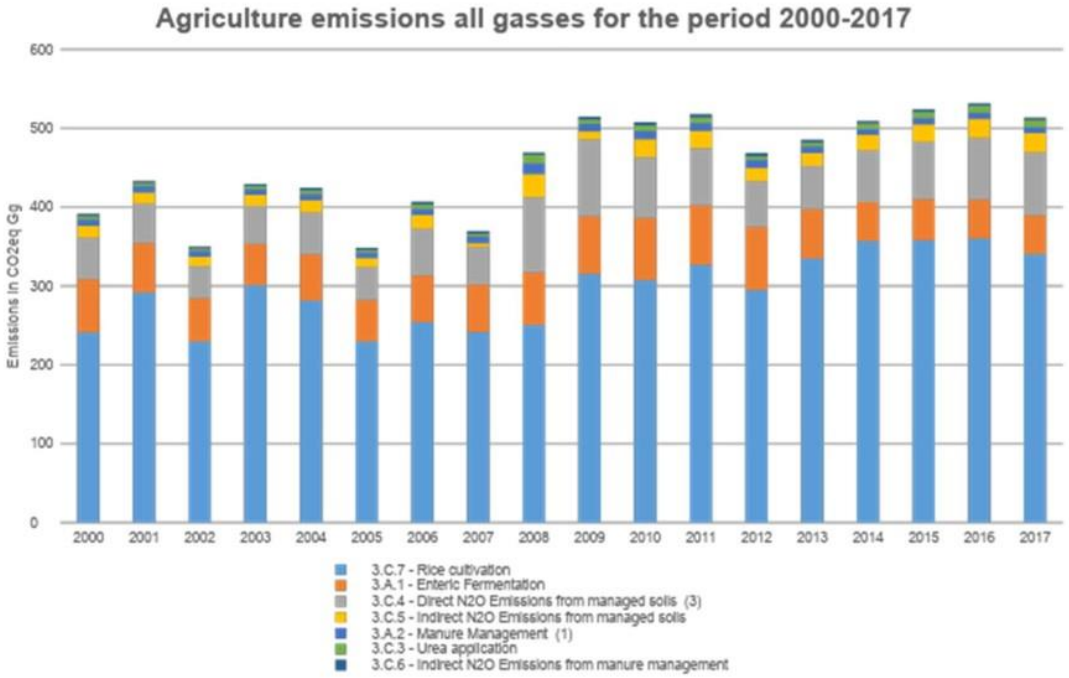


Figure 20: Agriculture emissions of all gases in CO2e for 2008 and the period 2000-2017 (Source: NC3 Preparatory Documents)

Sub-sector-related emissions

Livestock (3A):
Livestock-related emissions include subcategories enteric fermentation and manure management. Between 2012 and 2017, emissions from animals for enteric fermentation and manure management decreased (Figures 21-23). The decline is caused by a decrease in livestock production, particularly since 2012, as the population of dairy and other cattle has been declining as shown in Figure 23.

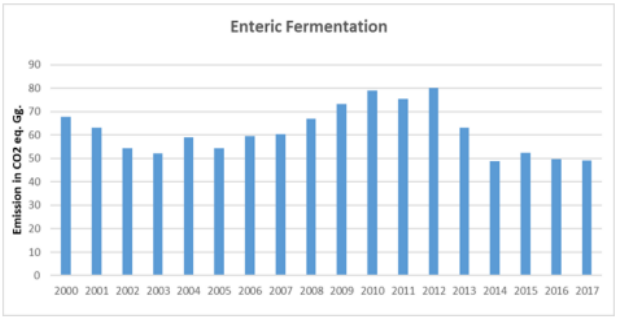


Figure 21. GHG trends for enteric fermentation

Figure 22. CO2e emissions from manure management

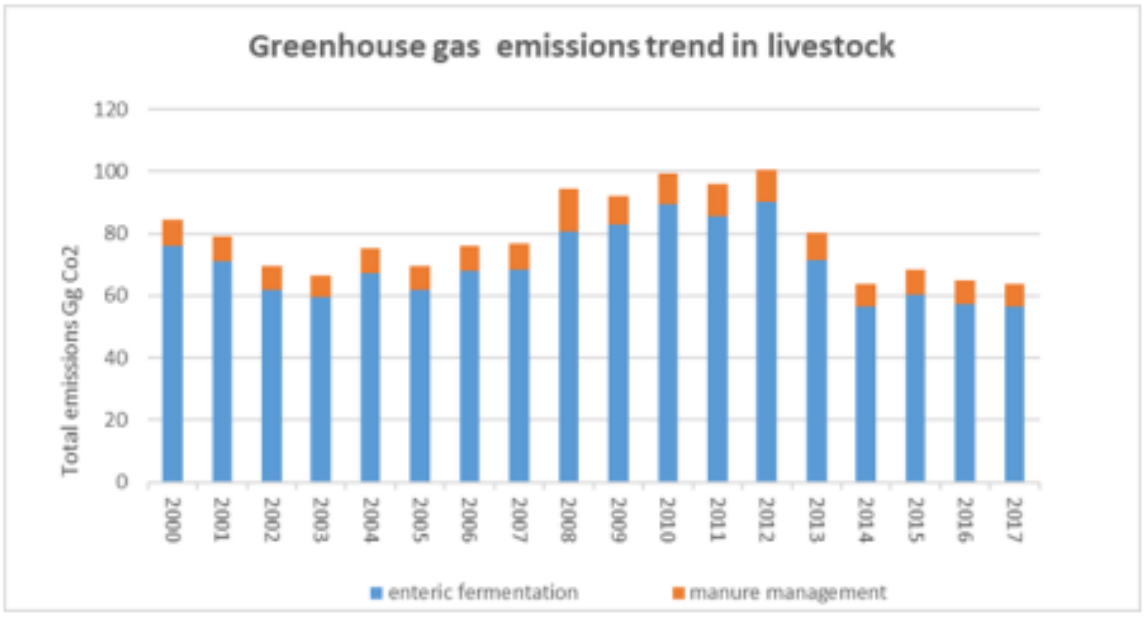


Figure 23: Overall GHG emissions trends in livestock

Land (3B)

Overall emissions in the FOLU sector vary and peak in 2014 before trending downwards to 2017 (figure 23). Of the FOLU sector, settlements make up most emissions. Approximately 76,927 ha of forest land was converted to settlements between 2000 and 2015. The 2014 peak in emissions from settlements could be explained by the increased goldmining activity that followed high gold prices. Between 2015 and 2019, mining and quarrying activities trended upwards in real GDP with an overall increase of approximately 27% (ABS, 2020). Land area used for mining also increased by 16% between 2015 and 2017 (ABS, 2020). A second contributor to the high emissions from settlements could also be from the creation of infrastructure in the Interior to support the gold industry, as well as logging activities that take place.

Considering the other land use change categories, overall land conversion from forest to others contributes to emissions, while conversion from other land types to forest land often reduces emissions. Key land categories evaluated were cropland (CL), forest land (FL), grassland (GL), other land (OL), settlement land (SL) and wetland

(WL). According to 2008 emissions data, settlements, wetlands and other lands were net emissions sources, while forest land, grassland and croplands are net sinks.

Details on land conversion trends and associated emissions between 2000-2015 are shown in figures 26-35. According to the data, a total area of 16,182,675.01 ha appears to be stable with no land-use change between 2000 and 2015. Data emissions from land use change for 2016 and 2017 was extrapolated from the land conversion in the period 2000-2015 and emissions from activity data. Land conversion data are indicated by the grey squares (CL-CL, FL-FL, GL-GL, OL-OL, SL-SL and WL-WL) figure 25. Land conversion took place for a total area of 184,145.15 ha between the following land use classes:

- CL-FL (11,460.52ha)
- GL-FL (32,105.88ha)
- CL-GL (35,009.16 ha)
- FL-SL (76,927.09 ha)

The largest emissions category for land use change was from forest land to settlements. Even so, emissions reductions associated with land conversion to lands with higher tendency to be carbon sinks from crop and grassland to forest land, or from cropland to grassland) outweigh the emissions increase associated with the transition from forest land to settlements. Thus, the improvement in removals from cropland, grasslands and forests can act as an "offsetting" mechanism for emissions released by settlements. As the mining industry exhibits growth, further land conversion to settlements is imminent. Thus, rehabilitation of degraded lands and conversion of more settlement land back to forest would be fundamental in maintaining this balance.

In 2000-2017, emissions associated with croplands, grasslands, and forest lands all either maintained or increased their emissions removal capacities. The emissions reductions associated with the conversion of grasslands and croplands to forest land is due to the regeneration of abandoned areas. Additionally, mitigation actions discussed in NC2 and NDC2 outline proposed changes in agricultural mechanisms, such as increased drainage periods, which are discussed in Section 3 Mitigation. However, many mitigation actions are not under their implementation phase and may not have contributed significantly enough to explain these emissions reductions nor increased removals.

Finally, wetlands are known for locking in large amounts of carbon in their carbon-rich soils. Wetland emissions increase when drainage, disturbance, warming, and destruction take place, which accelerate decomposition of their organic matter soils. The largest emissions from conversion to wetlands was from forest to wetland, between 2014-2017, which could initially occur due to the change in decomposition from aerobic to anaerobic, which results in high methane emissions, rather than CO_2, as well as due to changes to forest areas in costal zones as a result of flooding. However, further research would be required to understand the cause of increased emissions in order to curb future emissions.

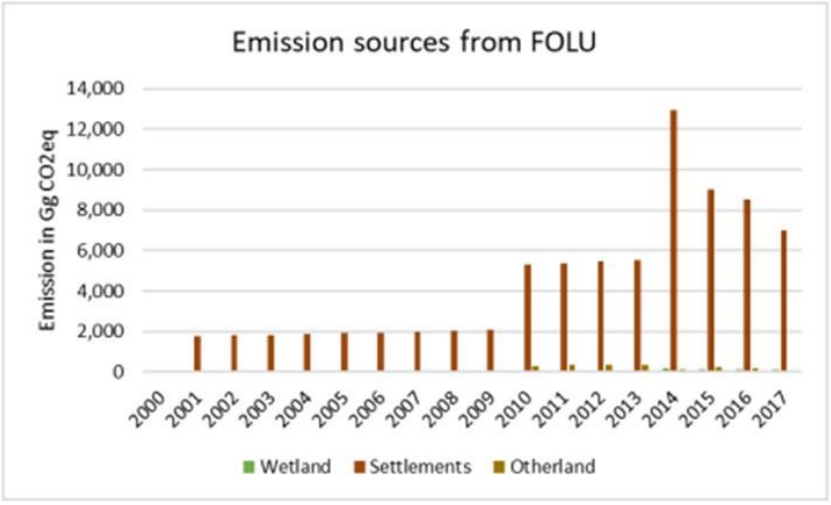


Figure 24. Emissions sources from FOLU sector (Source: NC3 Preparatory Documents)

All figures and tables below are taken from NC3 preparatory documents for the AFOLU sector

		Year 2015						
	Row Labels	**Cropland**	**Forest Land**	**Grassland**	**Other Land**	**Settlements**	**Wetland**	**Grand Total**
Year 2000	**Cropland**	98,164.16	11,460.52	35,099.16		24.46	1,719.29	**146,467.59**
	Forest Land	2,933.02	15,175,372.25	4,264.70	35.69	76,927.09	1,269.38	**15,260,802.13**
	Grassland	622.56	32,105.88	115,225.71	0.81	1,510.85	343.56	**149,809.37**
	Other Land		244.23	1,027.26	8,995.11		972.90	**11,239.50**
	Settlements	0.00	222.56	165.32	12.54	76,344.27	667.84	**77,412.53**
	Wetlands	1,424.05	2,691.39	8,240.25		159.84	708,573.51	**721,089.04**
	Grand Total	**103,143.79**	**15,222,096.83**	**164,022.40**	**9,044.15**	**154,966.51**	**713,546.48**	**16,366,820.16**

Figure 25: Conversion between land use categories between 2000-2015

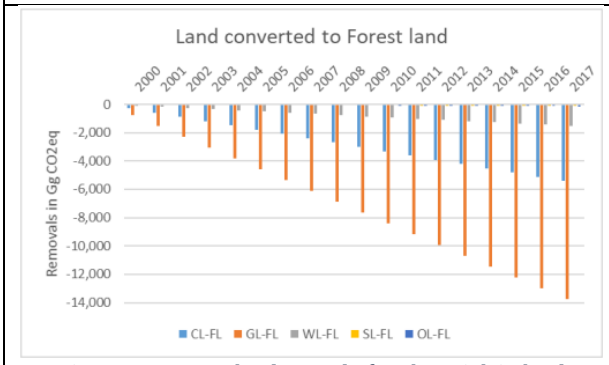


Figure 26: Forest land: Trend of carbon sink in land converted to forest land by land conversion type

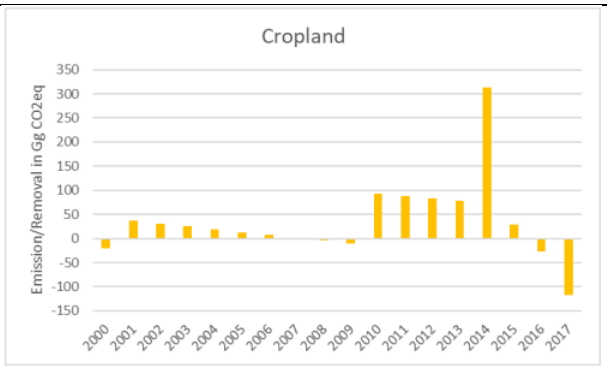


Figure 27: Cropland: trends of carbon emissions and removals

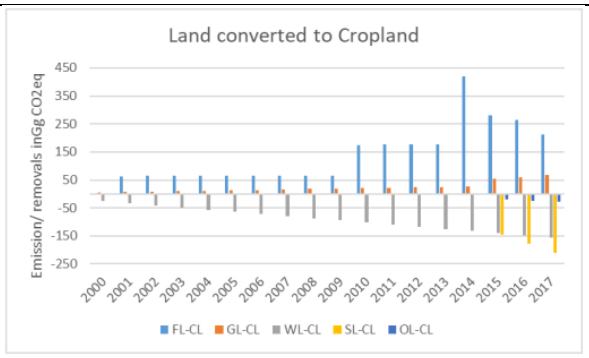


Figure 28: Cropland: trends of carbon emissions and removals for land converted to cropland by land by land conversion type

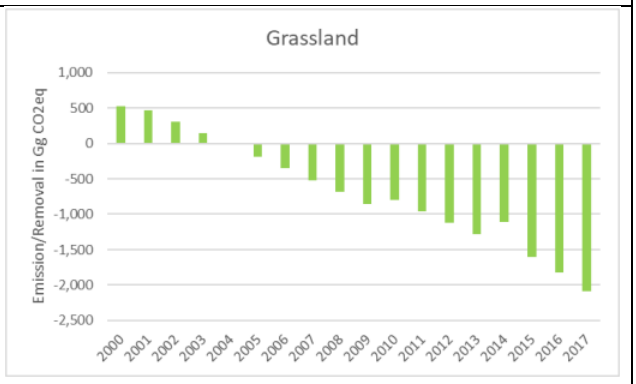


Figure 29: Grassland: Trends of carbon emissions and removals of grassland

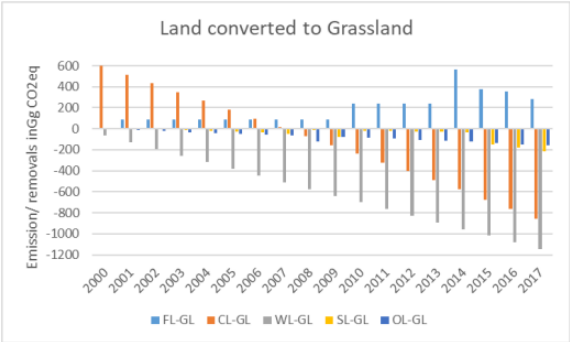


Figure 30: Grassland: Trends of carbon emissions and emissions for land converted to grassland by land conversion type

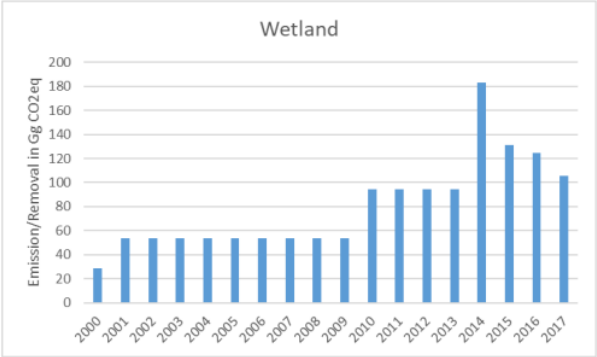


Figure 31: Wetland: Trends of carbon emissions of wetland

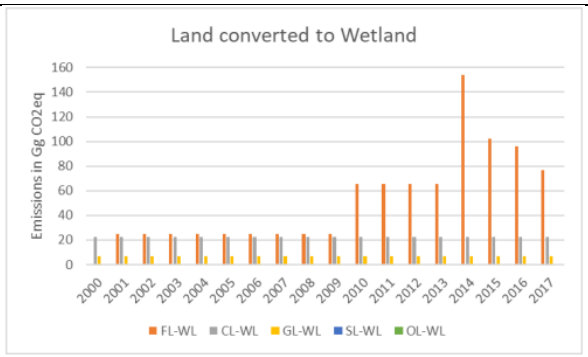


Figure 32:Trends of carbon emissions for land converted to wetland by land conversion type

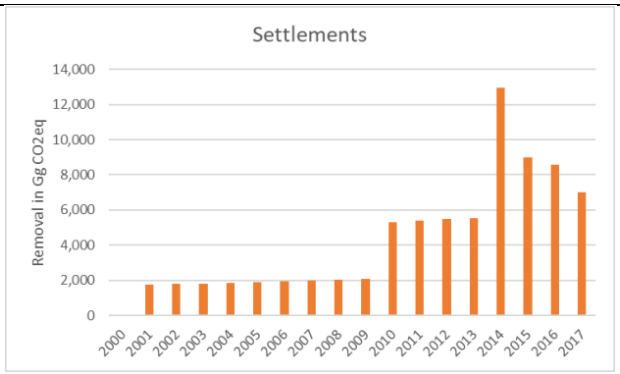


Figure 33: Settlements: Trends of carbon emissions of settlements

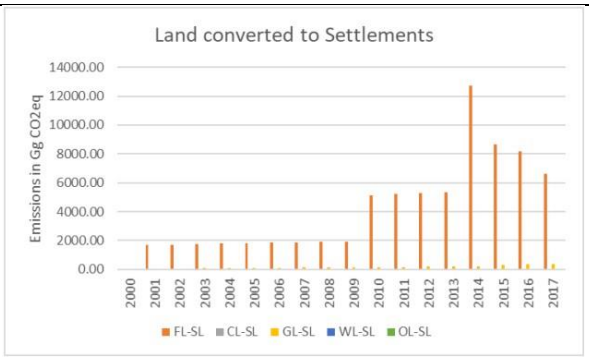


Figure 34: Settlements: trends of carbon emissions and sinks for land converted to settlements by land conversion type

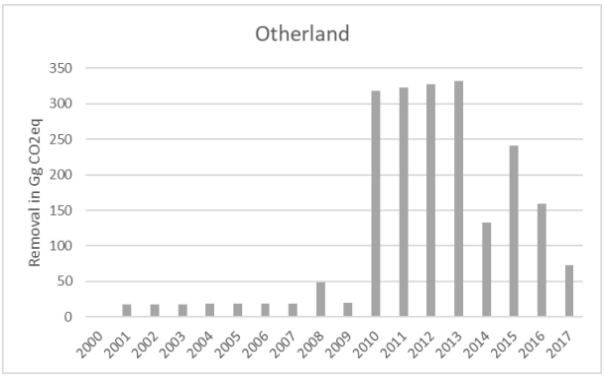


Figure 35: Other land: Trends of carbon emissions of other land

Aggregated and Non-CO2 Emissions Sources (3C):

Aggregated and non-CO_2 emissions on land is further divided into the sub-categories such as biomass burning, urea application, direct N_2O emissions from managed soils, indirect N_2O emissions from managed soils, indirect N_2O emissions from manure management and emissions from rice cultivation.

Overall, emissions resulting from urea application (2.26%), indirect emissions from managed soils (6.26%) and indirect emissions from manure management (0.58%) are insignificant contributors to the emissions, totalling 9.1% of

agricultural emissions (figures 36-39). For the period 2000-2017, emissions from urea fluctuate, but increases between 2012-2017 (figure 36) likely due to the growth of the agricultural sector.

Direct N_2O emissions also fluctuate for the period 2000-2017, but trend upwards between 2013-2017 (figure 37). Reasons for the fluctuations in this time series for direct N_2O emissions could not be discerned because input data was from the FAOSTAT database, rather than from Suriname-specific inputs.

Rice cultivation is the highest contributing factor in the agriculture emissions profile. Emissions from rice cultivation also fluctuated but trend upwards from 2005 (Figure 40). There is a direct positive correlation between the land mass used in cultivation and the methane emissions released.

All figures and tables below are taken from NC3 preparatory documents for the AFOLU sector

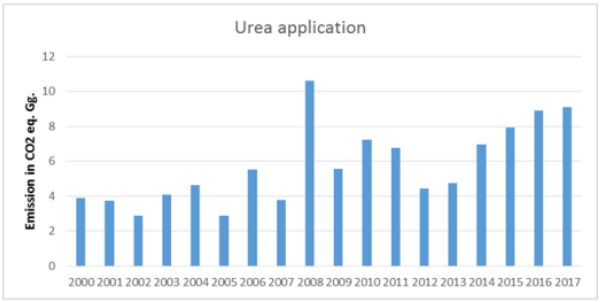


Figure 36: Urea application: Trends in emissions for urea application

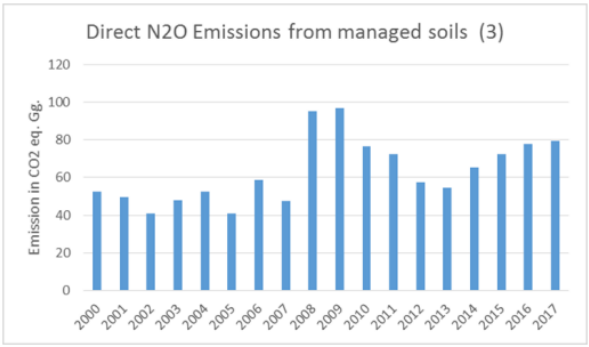


Figure 37: Direct N_2O emissions from managed soil: Trends in direct N_2O emissions from managed soils 2000-2017

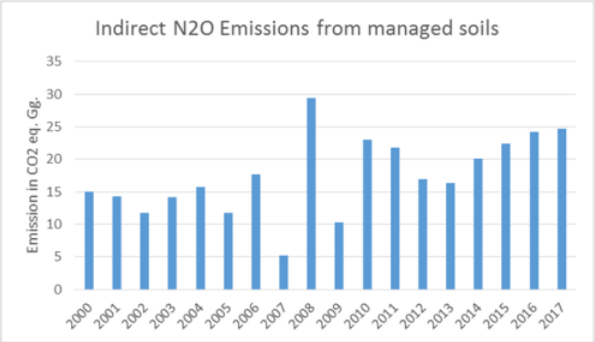


Figure 38: Indirect N_2O emissions from managed soils: Trend in indirect N_2O emissions from managed soils

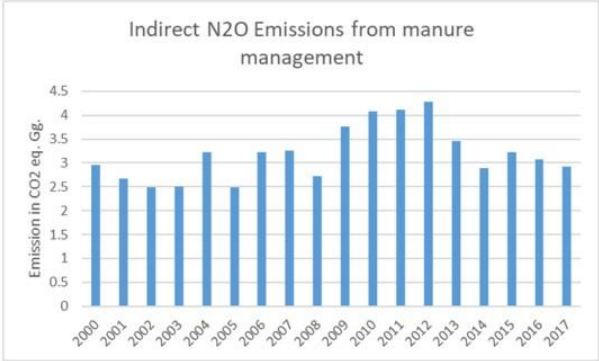


Figure 39: Indirect N_2O emissions from manure management: Trends in indirect N_2O emissions from manure management

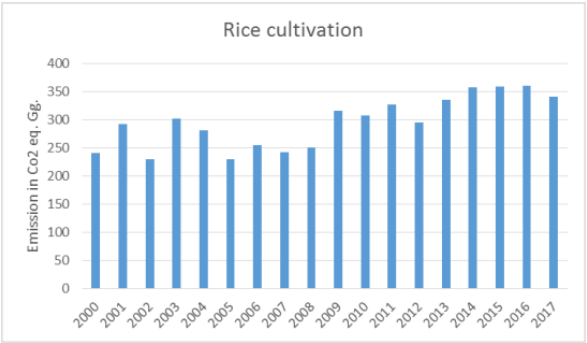


Figure 40: Rice cultivation: Trends in rice cultivation emissions

2.3.2. Energy sector

2.3.2.1. Overview

Suriname's energy sector is the largest contributor to the country's CO_2 emissions. Fuel combustion activities, i.e., the discharge of emissions into the atmosphere as a result of burning fossil fuels, and fugitive fuel emissions, i.e., gases released, both on purpose and accidentally, as a result of anthropogenic activities from the use of fossil fuels, are the two primary kinds of emissions from the energy sector. The energy sector is divided into several subsectors according to the 2006 IPCC guidelines; ideally, data should be collected at the lowest possible level in order to be more precise

with respect to the analysis of the data obtained and, more importantly, to allow for more targeted measures to be taken to reduce greenhouse gas emissions.

In terms of proportion, CO_2 dominates as the gas emitted (98% of the total emissions in CO_2eq), with CH_4 and N_2O having very little impact. Compared to 2012, CO_2 emissions have decreased by 13%. The amount of N_2O produced by fuel combustion has stagnated in 2017, as well as CH_4, in comparison with 2012.

2.3.2.2. Institutional arrangements

The GHG inventory was executed by the Ministry of Spatial Planning and the Environment together with UN Environment. The Surinamese Government has developed the following management structure which serves as the framework within which the inventory was performed:

Stakeholder	General Roles	Necessary Capabilities
Single National Entity	Overall responsibility	Administrative skills, government authority
Steering Committee	Provide overall planning, coordination, management and technical facilitators of inputs and outputs	Technical and administrative expertise, government authority
Management team	Responsible for overall planning, coordination, and management	Technical and administrative expertise, government authority, capacity to coordinate and lead the process
Sector experts	Undertake data collection, calculation, drafting, quality control, archiving and documentation	Technical expertise including knowledge of the UNFCCC reporting requirements and IPCC methodologies
Data providers	Timely delivery of input data in appropriate format	Technical skills, legal authority to improve and enhance data collection

Table 8: Roles and necessary capabilities of institutions and individual team members

The **Project Management Team (PMT)**, consisting of a **Project Coordinator (PC)**, focal points within the Ministry of Spatial Planning and Environment, and three **Coordinating Lead Authors (CLAs),** is responsible for the coordination of all project activities. CLAs are responsible for GHG inventory and mitigation assessment, National Circumstances and Institutional Arrangements, vulnerability assessment, and Other Information and Gaps and Constraints. Each CLA supervises a **Technical Expert Group (TEG).** TEGs are responsible for data gathering, analysis, and presentation of results and report to the CLA on progress made with regards to the execution of its assignment, including all challenges encountered, risks foreseen, proposed, or taken mitigation measures. The CLA provides a format in which information should be collected and how the reports will be developed, as well as approving all TEG deliverables. Alongside the PMT, there is a **Project Implementation Unit (PIU),** which is comprised of the PC and an Accountant, and is responsible for reporting the project's financial information to the NEA and UN Environment.

The project is monitored and guided by a multi-disciplinary **Project Steering Committee (PSC)** to ensure that the results are in line with national policy goals and developments. The PSC consists of representatives from the Ministry of Spatial Planning and Environment, The National Institute for Environment and Development in Suriname (NIMOS), Ministry of Finance & Planning, Ministry of Natural Resources, Anton de Kom University, Manufacturer's Association of Suriname (AFSA), Ministry of Public Works (OW), Ministry of Agriculture, Animal Husbandry, and Fisheries (LVV), Ministry of Land and Forest Management (GBB), and the United Nations Development Programme (UNDP) as an observer.

2.3.2.3. Methodology

The data and information required for compiling national GHG inventories includes data from online datasets, hard copies of reports, and information from discussions with national experts. All information and data are reviewed and analysed to ensure it is appropriately and accurately used within the inventory estimates. Throughout the inventory compilation process, good practice guidance from the IPCC Guidelines is applied to review and incorporate data gathered in a consistent and accurate manner. For transparency and replicability, all datasets and information used are documented in Excel spreadsheets and in the IPCC Inventory Software tool, which acts as a database and archiving system. The data gathering process is focused on key categories and assigns resources to collection and analysis of data to support the estimates in the key categories. As far as possible, national datasets have been used in the inventory. However, there are instances where the national datasets are not available, and information has been taken from international datasets. This is necessary as typically no one dataset spans the entire required time series. In these cases, effort has been put into ensuring time series consistency – a key quality assurance/quality control (QA/QC) aspect under the 2006 IPCC Guidelines.

Key categories analysis (KCA)

By emphasizing important categories, the KCA, as described in the 2006 IPCC Guidelines (and the 2019 update), is a helpful examination of the inventory figures, allowing for an accurate assessment of the data collection and methodology improvements should be prioritized for improvement of data gathering and methodologies. Additionally, KCA allows other users of the inventory to identify categories that are more applicable for mitigation to reduce national GHG emissions.

The concept of key category is used to identify the categories that have a significant influence on a country's total inventory of greenhouse gases in terms of the absolute level of emissions and removals, the trend in emissions and removals, or uncertainty in emissions and removals. There are two processes to determine key categories:

- **Approach 1 (Traditional):** key categories are identified using a pre-determined cumulative emissions threshold; key categories are those that, when summed together in descending order of magnitude, add up to 95%.
- **Approach 2 (Incorporating Monte Carlo Analysis)**: used when category uncertainties or parameter uncertainties are available. In this approach, categories are sorted according to their contribution to GHG emission uncertainty.

Figure 41 presents the decision tree used in selecting the approach for Suriname's GHG inventory, as is considered good practice under IPCC GHG Inventory Guidelines.

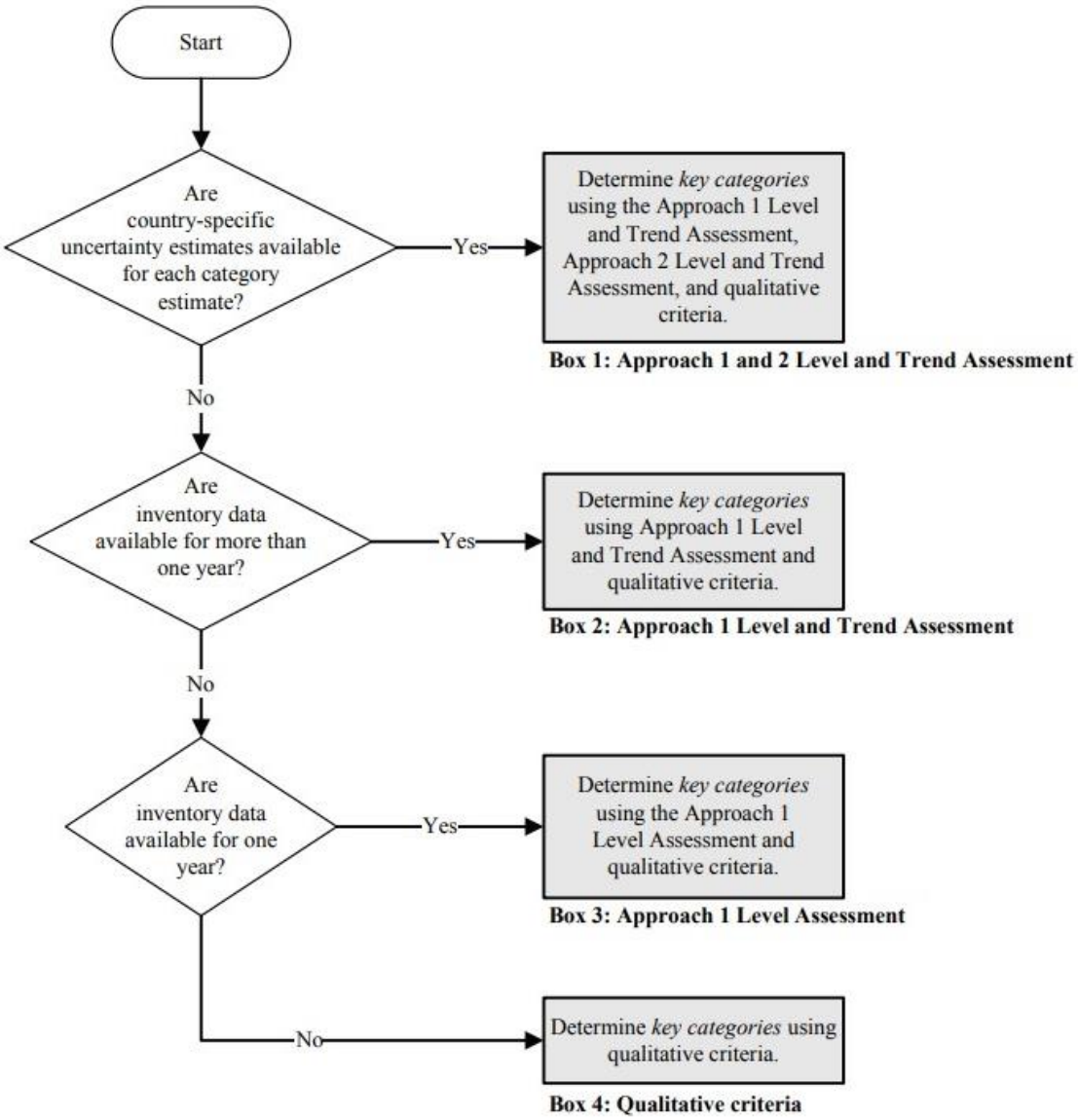


Figure 41: Decision tree to identify key categories (Source: IPCC Guidelines for National Greenhouse Gas Inventories, 2006)

The traditional approach (Approach 1) is used in Suriname's inventory, using the following assessments to identify key categories:

1. **Level assessment:** inventory categories are ordered from large to small in terms of emissions for a single year and categories that contribute to 95% of the total emissions are highlighted
2. **Trend assessment**: inventory categories are ordered from large to small in terms of their contribution to the total trend and categories that contribute to 95% of the total trend are highlighted
3. **Qualitative assessment:** categories in addition to those flagged by the Level and Trend assessment that are deemed significant are identified by the inventory team. This can be due to expected growth or completeness of the inventory

For each category, the estimation of GHGs depends on the quality of the data collected. Three classifications, or tiers, of methods are used to achieve these estimations, as developed by the IPCC. For data requirements and complexity, tier 1 is the basic method, tier 2 is intermediate, and tier 3 is the most advanced. Tier 1 is designed to incorporate national data with default emissions factors whereas tiers 2 and 3, referred to as higher tier methods, are considered more accurate. The tier selection process is iterative and will vary based on available information and data. For

example, a tier 3 approach can be chosen for a category, but after consultation with the data provider and/or experts, the conclusion can state that a tier 2 approach is more appropriate.

To facilitate the collection of data, data providers in each of the key sectors were identified. This includes contributors who are directly responsible for the emissions, as well as institutions responsible for collection and storage of relevant data, such as the General Bureau of Statistics. An information session on the inventory development process and its data requirements was held for the data providers before actual commencement of data gathering. For each of the providers, questionnaires were prepared for the entering of data and other pertinent information.

Table 9 presents the suggested aggregation level of analysis to perform Approach 1. **According to this approach, key categories are determined based on cumulative GHG emissions that constitute up to 95% of the total**. They depict the (single and cumulative) percentage contribution by categories to respectively GHG levels and trends.

Quantitative method used: Approach 1			
	B	**C**	**D**
IPCC Category Code	**IPCC Category**	**GHG assessed**	**Identification criteria**
1A2	Fuel combustion activities – manufacturing industries and construction	CO_2, CH_4, N_2O	L1*, T1**
1A3b	Fuel combustion activities – transport - road transportation	CO_2	L1, T1
1A4	Fuel combustion activities – other sectors	CO_2, CH_4, N_2O	L1, T1
1A1	Fuel combustion activities – energy industries	CO_2, CH_4, N_2O	L1, T1
1A3a	Fuel combustion activities – transport – civil aviation	CO_2, CH_4, N_2O	T1

Table 9: Quantitative method used (Source: NC3 Preparatory Documents for the Energy and IPPU Sectors)

**L1 = key category according to level assessment approach 1*
***T1 = key category according to trend assessment approach 1*

A	B	C	D	E	F	G
IPCC Category Code	**IPCC Category**	**GHG to be assessed**	**Latest Year Estimate Ex,t [in CO_2-equivalent units]**	**Absolute Value of Latest Year Estimate | E x,**	**Level Assessment L x,t**	**Cumulative Total of Column F**
1A2	Fuel Combustion Activities – Manufacturing Industries and Construction	CO_2, CH_4, N_2O	2922.05	2922.05	74.98%	74.98%
1A3b	Fuel Combustion Activities – Transport – Road transportation	CO_2	598.49	598.49	15.36%	90.33%
1A4	Fuel Combustion Activities – Other Sectors	CO_2, CH_4, N_2O	133.33	133.33	3.42%	93.76%
1A1	Fuel Combustion Activities – Energy Industries	CO_2, CH_4, N_2O	120.94	120.94	3.10%	96.86%
1A3a	Fuel Combustion Activities – Transport – Civil Aviation	CO_2, CH_4, N_2O	117.22	117.22	3.01%	99.87%
1A3e	Fuel Combustion Activities – Transport – Other Transportation	CO_2, CH_4, N_2O	5.11	5.11	0.13%	100.00%
1A3d	Fuel Combustion Activities – Transport – Water-borne Navigation	CO_2	0.09	0.09	0.00%	100.00%

Table 10: Approach 1 level assessment (Source: NC3 Preparatory Documents for the Energy and IPPU Sectors)

2.3.2.4. Quality Assurance/ Quality control

Guidelines for QA/QC are provided in the 2006 IPCC Guidelines to ensure that credible uncertainty data is entered into the inventory. The following QA/QC measures were taken to guarantee the highest level of data uncertainty input and provide a database output that most accurately reflects actual emissions:

- To ensure completeness of data, uncertainties were reported for all relevant categories of sources and sinks, and gases. Where necessary, additional information was requested from stakeholders.
- KCAs were performed using NC2 findings to determine the most important sector with respect to emissions
- For consistency, uncertainties for different inventory years, gases, and categories were calculated using the same method and using the IPCC software and access database. Differences in the results between years and categories were calculated to reflect real differences in emissions and were cross checked with actual events.
- IPCC indications for uncertainties for activity data and emission factors, as well as indications for densities and lower heating values were utilized. Cross checking of this data with the General Bureau of Statistics was performed where possible.
- Routine checks were done for uncertainty provided. These were recalculated if ranges were provided and validated against processes in practice to ensure data integrity, correctness, and completeness
- Errors and omissions in incorrectly displayed data were addressed and assumptions were checked
- Expert peer reviews were completed where required
- Potential sources of uncertainty that were not quantified were still described, in order to possibly quantify them in the future

With regards to time series completion, the following QA/QC methods were taken:

- Comparison of results of the splicing techniques (backwards linear extrapolation) on graphs
- Use of additional surrogate data to check spliced time series
- Use of splicing by the combining of more than one method in order to form a complete time series where possible, particularly the joining of surrogate data and extrapolation.

Finally, to ensure completeness of the sector, two checks were carried out:

1. **Industry coverage:** when data was collected from stakeholders, the proper use of the QA/QC system must be ensured to verify the data provided, as well as the accurate transfer of this information to the national inventory. Additionally, checks must be carried out to ensure that only enterprises that are part of national emissions reporting systems are included in the inventory, as well as to avoid double counting or omission of emissions.
2. **Methodology:** a check to ensure that, if data has only been reported by the largest industries in a given subsector, extrapolation to include all production facilities within the category has been applied using an appropriate method. This check includes the identification of the QA/QC systems parties have in place for emissions reports by industries.

2.3.2.5. Uncertainty and Trend Analyses

Uncertainties for both the IPPU and energy sectors were determined using IPCC approved methodologies as outlined in the 2006 GHG Inventory guidelines. They are derived for both national level and the trend estimates, as well as for the emission factors, activity data and other estimation parameters for each category. Estimates for both emissions factors and activity data are based on conceptualization, models, and input data and assumptions. Here, conceptualization refers to the presumptions around the structure of an inventory or sector. These presumptions include the size of the geographical area, the length of the averaging period, the categories, and the methods for emissions or removal.

Uncertainties have been reduced as far as possible during the process of compiling the inventory, but it should be noted that data for different sectors was collected by multiple groups, and while the inventory was compiled by one person, this person was not always a part of data collection groups. Even within categories, it can be expected that different persons have been involved in the data collection process as the inventory covers the period of 2000-2017. It is therefore likely that systemic errors will have varying values for each year and it is assumed that this will be higher in the earlier years where capability and capacity would have been significantly less. Approach 1 (traditional) was used in this analysis, based upon error propagation, and is used to provide an estimate of uncertainty in 1) individual categories, 2) the inventory as a whole, and 3) trends between a year of interest and a base year.

Energy	Gas	Activity data uncertainty (%)			Emission factor uncertainty (%)		
		Type	%	Combined uncertainty (%)	Type	(%)	Combined uncertainty (%)
1.A.1.a. - Electricity Generation	CO_2	Less developed statistical system, commercial, institutional, residential combustion	15, 200-2004: 25	15, 2000-2004: 25	The IPCC 1996 Guidelines (Table A1-1, Vol. I, p. A1.4) suggest an overall uncertainty value of 7 per cent for the CO2 emission factors of Energy	7	7
	CH_4				The default uncertainties shown in Table 2.12 derived from the EMEP/CORINAIR Guidebook ratings (EMEP/CORINAIR, 1999) may be used in the absence of country-specific estimates + expert judgment	150	150
	N_2O						

1.A.1.b - Petroleum refining	CO_2	Industrial combustion (Energy intensive industries), Well developed statistical systems	2	2	The IPCC 1996 Guidelines (Table A1-1, Vol. I, p. A1.4) suggest an overall uncertainty value of 7 per cent for the CO2 emission factors of Energy	7	7
	CH_4				The default uncertainties shown in Table 2.12 derived from the EMEP/CORINAIR Guidebook ratings (EMEP/CORINAIR, 1999) may be used in the absence of country-specific estimates + expert judgment	50	50
	N_2O						
1.A.1.c.ii - Other energy industries	CO_2	Industrial combustion (Energy intensive industries), Well developed statistical systems	2	2	The IPCC 1996 Guidelines (Table A1-1, Vol. I, p. A1.4) suggest an overall uncertainty value of 7 per cent for the CO2 emission factors of Energy	7	7
	CH_4				The default uncertainties shown in Table 2.12 derived from the EMEP/CORINAIR Guidebook ratings (EMEP/CORINAIR, 1999) may be used in the absence of country-specific estimates + expert judgment	100	100
	N_2O						
1.A.2.b - Non-ferrous Metals	CO_2	Industrial combustion (Energy intensive industries), Well developed statistical systems	2	2	The IPCC 1996 Guidelines (Table A1-1, Vol. I, p. A1.4) suggest an overall uncertainty value of 7 per cent for the CO2 emission factors of Energy	7	7
	CH_4				The default uncertainties shown in Table 2.12 derived from the EMEP/CORINAIR Guidebook ratings	50	50
	N_2O						

					(EMEP/CORINAIR, 1999) may be used in the absence of country-specific estimates + expert judgment		
1.A.2.i - Mining (excluding fuels) and quarrying	CO_2	Industrial combustion (Energy intensive industries), Well developed statistical systems	2	2	The IPCC 1996 Guidelines (Table A1-1, Vol. I, p. A1.4) suggest an overall uncertainty value of 7 per cent for the CO2 emission factors of Energy	7	7
	CH_4				The default uncertainties shown in Table 2.12 derived from the EMEP/CORINAIR Guidebook ratings (EMEP/CORINAIR, 1999) may be used in the absence of country-specific estimates + expert judgment	50	50
	N_2O						
1.A.3.a.i - International Aviation (international bunkers)	CO_2	for estimates or incomplete surveys the uncertainties may become large, perhaps a factor of two for the domestic share	200	200	Default	5	5
	CH_4				Default		-57 - +100
	N_2O				Default		-70 - +150
1.A.3.a.ii - Domestic Aviation	CO_2	for estimates or incomplete surveys the uncertainties may become large, perhaps a factor of two for the domestic share	200	200	Default	5	5
	CH_4				Default		-57 - +100
	N_2O				Default		-70 - +150
1.A.3.b - Road Transportation	CO_2	Possible sources of uncertainty, which will	15	15	Road Transport Default Carbon Dioxide Emission Factors have an	5	5

		typically be about +/-5, Expert opinion, estimated smuggling			uncertainty of 2-5 percent), due to uncertainty in the fuel composition		
	CH_4	For these gases, the emission factor uncertainty will dominate and the activity data uncertainty may be taken to be the same as for CO2.			The uncertainties in emission factors for CH4 and N2O are typically relatively high (especially for N2O) and are likely to be a factor of 2-3.	3	3
	N_2O	For these gases, the emission factor uncertainty will dominate and the activity data uncertainty may be taken to be the same as for CO2.					
1.A.4.b - Residential	CO_2	Well developed statistical systems, Commercial, institutional, residential combustion	5	5	The IPCC 1996 Guidelines (Table A1-1, Vol. I, p. A1.4) suggest an overall uncertainty value of 7 per cent for the CO2 emission factors of Energy	7	7
	CH_4				Default	150	150
	N_2O						
1.A.4.c.i - Stationary	CO_2	Less developed statistical systems, Commercial, institutional, residential combustion, extrapolated	25	25	The IPCC 1996 Guidelines (Table A1-1, Vol. I, p. A1.4) suggest an overall uncertainty value of 7 per cent for the CO2 emission factors of Energy	7	7
	CH_4				Default	150	150
	N_2O						
1.A.4.c.ii - Off-road	CO_2	Factor of 2 uncertainties	200	200	Default		-2.6 - +5.3
	CH_4						-59 - +143

vehicles and other machinery	N_2O	are certainly possible					-67 - +208
1.B.2.a.i - Venting	CO_2 CH_4 NMVOC	Counts of major facilities (e.g., gas plants, refineries and transmission compressor stations) will usually be known with little if any error (e.g., less than 5 percent).	5	5	Less developed or transition country	75	75
1.B.2.a.ii - Flaring	CO_2 CH_4 NMVOC	Counts of major facilities (e.g., gas plants, refineries and transmission compressor stations) will usually be known with little if any error (e.g., less than 5 percent).	5	5	Less developed or transition country	75	75
	N_2O						-10 - +1000
1.B.2.b.i – Venting	CO_2	Counts of well site facilities, minor field installations and gas gathering compressor stations, as well as the type and amount of equipment at each site, will be much less accurately	25	25.49509757	Default weighted total, Less developed or transition country		-10 - +1000

		known, if known at all (e.g., at least ±25 percent uncertainty or more).					
		Gas compositions	5				
1.B.2.b.ii – Flaring	CO_2	Counts of well site facilities, minor field installations and gas gathering compressor stations, as well as the type and amount of equipment at each site, will be much less accurately known, if known at all (e.g., at least ±25 percent uncertainty or more)	25	25.49509757	Less developed or transition country	75	75
	CH_4						
	NMVOC						
	N_2O						-10 - +1000
		Gas compositions	5				

Table 11: Uncertainty and Trend Analyses Input – Energy (Source: NC3 Preparatory Documents for the Energy and IPPU Sectors)

With regards to trends, several explanations can be provided with respect to observed trends, deviations, and abnormalities in the energy sector. The sector experienced a decline in emissions during the 2007–2008 period, which was brought on by the departure of a mine operator and a resulting decline in alumina refining in 2008. However, mine ownership was transferred to the refinery operator causing both production, and subsequent emissions, to increase once more. Between 2012-2015, the observed down trend in energy and its subcategories can be attributed to the decommissioning of blocks of production units of alumina refinery activities. These were completely stopped by 2015.

In sector specific cases, an uptake in emissions was noted in both Energy Industries and Manufacturing and Construction. These increases can be attributed to an increased portion of thermal power capacity coming online and a sharp increase in fugitive emissions as a result of increased crude oil production, and the commissioning of the gold refinery, which began operating in the fourth quarter of 2016 and gradually scaled up production the following year.

All figures below are taken from NC3 Preparatory Documents for the Energy and IPPU Sectors

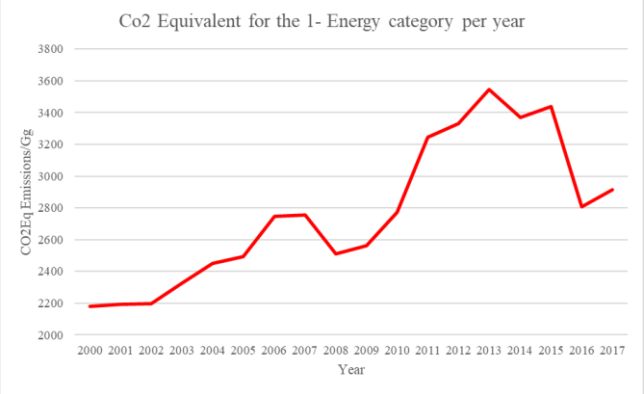


Figure 42: CO2 equivalent for the 1- Energy category per year from 2000-2017

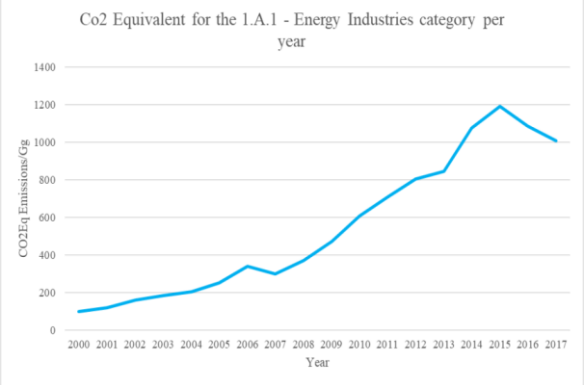


Figure 43: CO2 equivalent for the 1.A.1 – Energy Industries category per year from 2000-2017

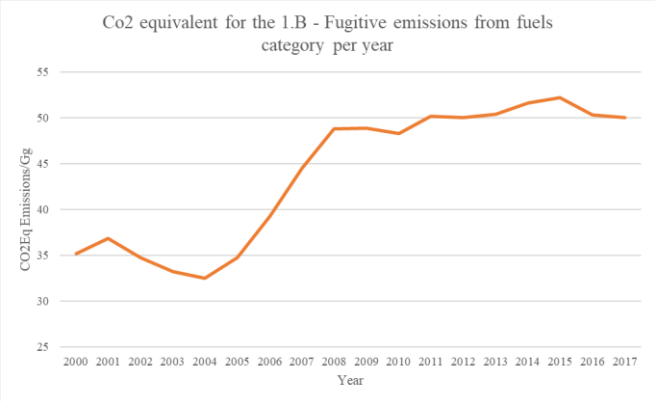


Figure 44: CO2 Equivalent for the 1.B – Fugitive emissions from fuels category per year from 2000-2017

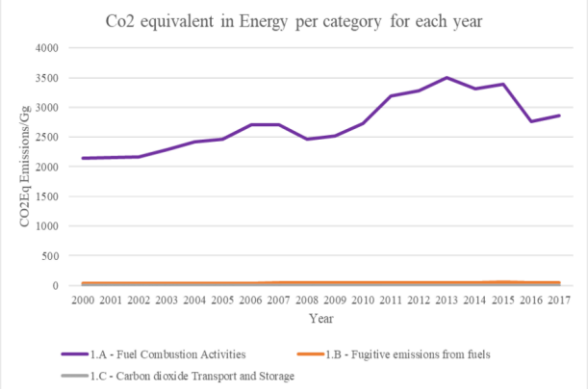


Figure 45: Data in CO2 Equivalents in Energy for each year from 2000-2017

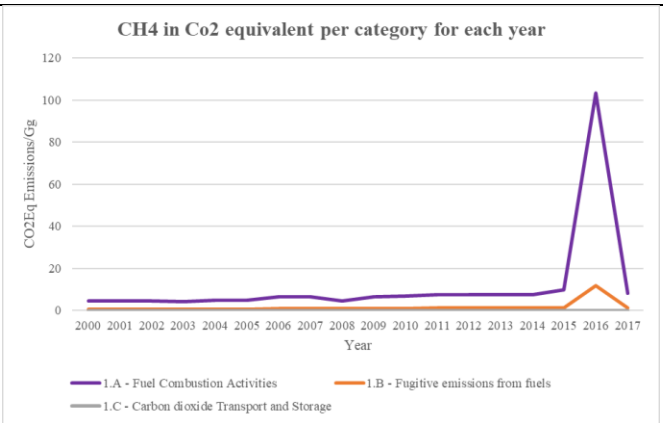


Figure 46: Ch4 in CO2 equivalent per category for each year

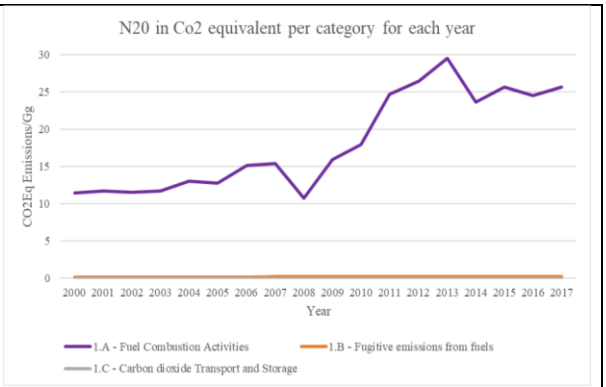


Figure 47: Data in N2O Equivalents in energy for each year from 2000-2017

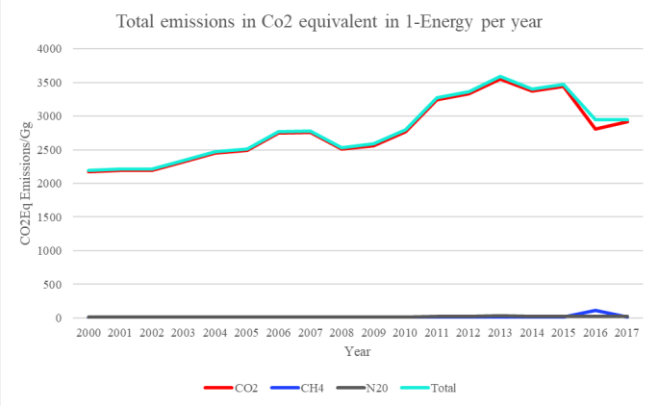


Figure 48: Energy emissions per category per GHG

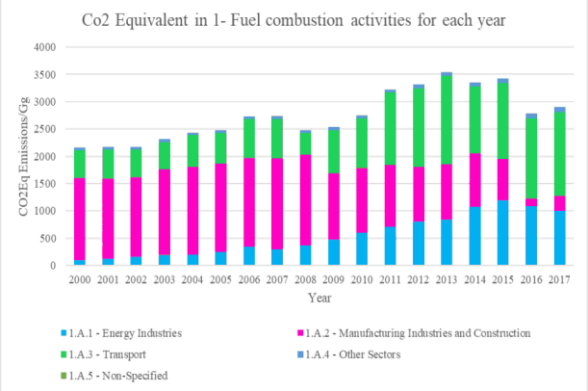


Figure 49: 1.A – Fuel combustion activities

2.3.2.6. Recalculation

All changes and gaps have been addressed and explained. The recalculations have not had an impact on the emissions and uncertainty.

2.3.2.7. Time series consistency

Time series have been calculated using the same method and data sources across years to prevent bias and ensure consistency. There were no methodological changes (i.e., switches to a different tier from the one previously used) in any category, as higher tier data was not available, therefore all computations were completed using tier 1 methodology.
However, there were several cases in which data was missing. In these instances, the following processes were undertaken:

- Data for certain categories within the energy and IPPU sectors, in particular historical data, was not available, therefore estimates were obtained through backward linear extrapolation. Due to the relatively small-scale nature of the economy, sudden developments, such as the closure of the Suralco refinery, can significantly impact reported emissions. However, estimates were only performed for periods where no significant changes occurred, resulting in similar changes in GHG emissions. Missing data in the periods where such events occur would render processes such as extra- and interpolation and involve higher uncertainty.
- Interpolation was used in cases where gaps were observed, for example if data for a particular year was missing.
- Surrogate data was used in cases where basic data was absent. The surrogate method relates emissions or removals to an underlying activity or other indicative data, and changes in these data form the basis for the trend simulation for the emissions or removals. The estimates are related to the statistical data source that best

explains the time variations of the category. It should be noted that expert judgment was also used to determine which splicing techniques should be utilized.

2.3.2.8. Constraints and needs

The following issues were reported during data collection:

- Lack of responses due to lack of capacity and capability
- Inconsistencies in data when viewed over time
- Incorrect display of data points, e.g., use of incorrect units
- Inconsistencies in the same figures when received from different data sources. An example is given of gold production figures from the General Bureau of Statistics and the Central Bank of Suriname

Some of these issues may be the result of inadequate or nonexistent systems or data to keep track of; people or businesses may have an unfounded fear that the data is intended to inform the taxes, putting them in the searchlight, or people are aware that there are no consequences for withholding data and data may have been made intentionally untraceable. It should be noted that actors that were able to provide data could only do so at the Tier-1 level.

The following issues were encountered during the data entry process:

- Database glitches
- Software crashes when multiple programs were run
- Inefficiencies in the database, i.e., the requirement to exit the database when moving between sector files

2.3.3. Industrial Processes and Product Use (IPPU) sector

2.3.3.1. Overview

The IPPU sector deals with the discharge of GHG emissions from products and industrial processes that physically or chemically convert inputs into emissions, excluding energy-related combustion, processing, fuel extraction, and transportation operations. Emissions from Suriname's IPPU sector are mostly a result of lime production within the mineral industry, although this has been declining since 2007/2008.

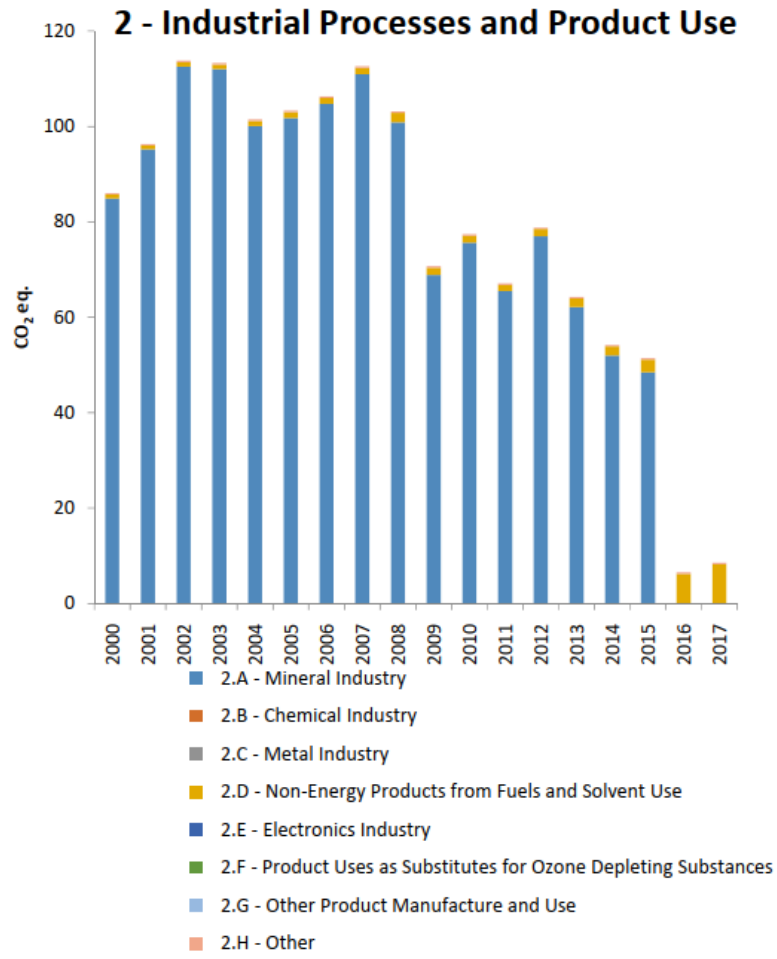


Figure 50: Total estimated GHG emissions per IPPU subcategory (CO2-eq) 2000-2017 (Source: NC3 Preparatory Documents for the Energy and IPPU Sectors)

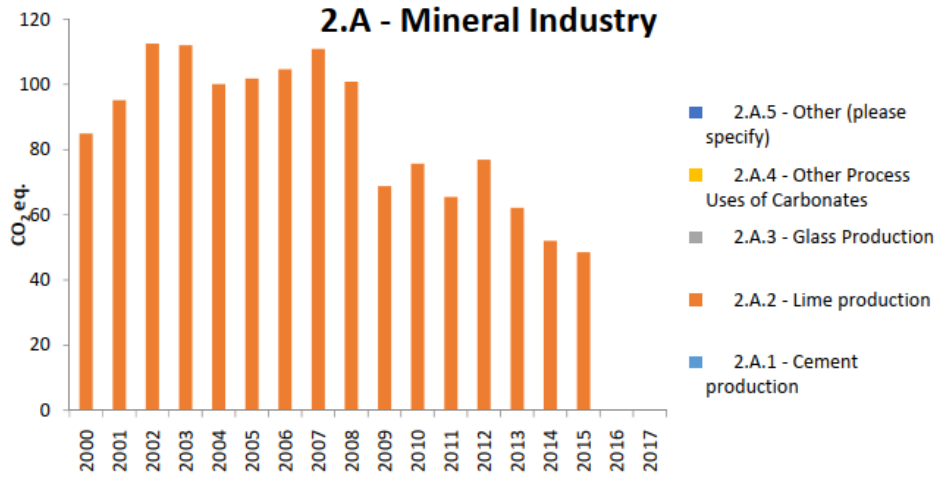


Figure 51: Total estimated GHG emissions per subcategory within the Mineral Industry (CO2-eq) 2000-2017 (Source: NC3 Preparatory Documents for the Energy and IPPU Sectors)

The IPPU sector is divided into the following subsectors, in accordance with IPCC guidelines:

- Lime production
- Lubricant use
- Solvent use/white spirit
- Other/asphalt production and use (road paving with asphalt)
- Refrigeration and stationary air conditioning
- Mobile air conditioning
- Foam blowing agents
- Fire protection
- Aerosols
- Electrical equipment/use of electrical equipment
- N_2O from product uses and medical applications
- Pulp and paper industry
- Food and beverages industry
- Other/plastic manufacturers

2.3.3.2. Methodology

As per IPCC guidelines, the estimation of GHG emissions for each IPPU subcategory is computed based on the quality of the data and its resulting tier classification. The IPPU sector and the energy sector utilize the same methodology for emissions calculations. A full breakdown of this methodology is provided in section 2.3.2.2.

2.3.3.3. QA/QC

The IPPU sector and the energy sector utilize the same methodology for QA/QC methods. A full breakdown of this methodology is provided in section 2.3.2.3**.**

2.3.3.4. Uncertainty and Trend Analyses

The IPPU sector and the energy sector utilize the same methodology for uncertainty and trend analyses. A full breakdown of this methodology is provided in section 2.3.2.4.

IPPU	Gas	Activity data uncertainty (%)			Emission factor uncertainty (%)		
		Type	%	Combined uncertainty (%)	Type	(%)	Combined uncertainty (%)
2.A.2 – Lime production	CO_2	Reported (plant-level) cement production data	1.5	30.63086678	Emission factor high calcium lime	2	2
		Uncertainty in assuming an average CaO in lime	6				
		Default assumption that emissions from LKD are 2% of process-related emissions from lime production. Uncertainty assumes that 33-50% of lime not recycled. If no recycling takes place or if the calcination percentage significantly exceeds 50%, uncertainty could be 50% or more	30				

2.D.2 – Lubricant use	CO_2	Much of the uncertainty in emission estimates is related to the difficulty in determining the quantity of nonenergy products used in individual countries, for which a default of 5%may be used in countries with well-developed energy statistics and 10-20% in other countries	20	20	Expert judgement suggests using a default uncertainty of 50%	50	50
2.D.3 – Solvent use	NMVOC	EMEP/CORINAIR Emission Inventory Guidebook (EEA, 2005)	200	200	EMEP/CORINAIR Emission Inventory Guidebook (EEA, 2005)	200	200
2.D.4 – Other: asphalt production	NMVOC CO	Production data for HMA and cutback asphalt may be as accurate as ±10 percent, when based on data compiled by the asphalt production or construction industry	10	10	the default factors for total HMA production and for cutback asphalt production and use will be about ±100 percent uncertain	100	100
2.G.1.b – Use of electrical equipment	SF6	Table 8.5. If the factors in Tables 8.2-8.4 are applied outside the countries and/or regions in which they were developed, uncertainties will be greater.	40	40	Table 8.5. If the factors in Tables 8.2-8.4 are applied outside the countries and/or regions in which they were developed, uncertainties will be greater.	40	40
2.H.2 – Food and beverage	C2F6	Expert judgement suggests using a default uncertainty of 10%	10	10	Expert judgement suggests using a default uncertainty of 10%	10	10

Table 12: Uncertainty and Trend Analyses Input – IPPU (Source: NC3 Preparatory Documents for the Energy and IPPU Sectors)

2.3.3.5. Time series consistency

To avoid bias and guarantee time series consistency, time series have been calculated across all years using the same methodology and data sources. Since Tier-1 methodology was employed throughout all computations since higher tier data was not accessible, there was no methodological shift in any category (move to a different tier from the one previously used). There were a few instances when data was lacking, and splicing techniques were used in these instances. These techniques mirror the backward linear extrapolation used in the energy sector. See section 2.3.2.7 for a full breakdown of this methodology.

The following actions were made about the completion of the time series for QA/QC:

- contrasting the outcomes of splicing methods on a graph
- examining the time series that have been spliced using extra surrogate data.
- whenever possible, splicing (connecting or merging more than one way to create a whole)

To do this, extrapolation and time series, in particular surrogate data, were coupled.

2.3.3.6. Constraints and needs

In this inventory, challenges encountered are:

- Lack of data received from stakeholders
- Use of UN statistics which are gross estimates
- Errors found in reference data
- Only estimates of total CO_2 emissions from source category available

2.3.4. Waste sector

2.3.4.1. Overview

Waste sector GHG emissions in Suriname are a result of wastewater treatment and discharge, solid waste disposal, and to a lesser extent, incineration and open burning of waste. Currently, sectoral emissions are relatively low, although a steady rise has been noted since 2000, mostly due to the following issues:

- Rapid economic development, increasing population, and resulting changes in lifestyle have caused solid waste generation per capita, the largest source of which is household waste (92%), in 2017 to be approximately 43% higher than it was in 2000. Additionally, the composition of the waste has changed with both hazardous medical and industrial waste, as well as bulky home and garden waste increasing.
- The discharge of untreated wastewater into surface waters and the risk of groundwater contamination from waste. In the greater Paramaribo area, sewage wastewater is discharged via septic tanks, ending up in ditches and canals. In the interior, all waste is discharged into the river due to poor levels of sanitation and wastewaters are discharged without the necessary purification treatment in the sewer or on surface waters in the area.

2.3.4.2. Methodology

The data sources used for this inventory span the years 2000-2017[1] and include:

- Environmental Statistics of the General Bureau of Statistics (ABS)
- Data from industrial companies
- Research reports
- International statistics (e.g. FAO)

The methodology applied mainly falls under a Tier 1 (T1) approach and default values (D) were derived using national data. The calculations generally involved the multiplication of local activity data (e.g., amount of waste sent to disposal sites, population connected to wastewater sewer networks) with predominantly default emission factors (EF).

Waste	Method	EF	Notes
Solid waste disposal (4A)	T1	D	National waste composition data
Biological treatment of solid waste (4B)	N/A	N/A	
Incineration and open burning of waste (4C)	T1	D	National waste composition data
Wastewater treatment and discharge (4D)	T1	D	National waste composition data
Other (4E)	N/A	N/A	
Default emission values	N/A	N/A	

Table 13: Methodology - calculation for waste sector

KCA was carried out through the IPCC software using Level and Trend Assessments to identify major GHG emissions sources. For the level assessment, levels for each category were calculated per year and for the trend assessment, the trend was calculated for a period of time. For both assessments, the largest levels and trends, i.e., those which cumulatively add up to 95% of the total, were selected as key categories. The largest key categories selected within

[1] It should be noted that companies with data from the year 2018 onwards were excluded from the analysis.

the waste sector were solid waste disposal, incineration and opening burning of waste, and wastewater treatment and discharge.

Emissions estimates from waste sector are comprised of the following gases:

Key category	GHG emissions
Solid waste disposal (4A)	CH_4 (CO_2 eq)
Incineration and open burning of waste (4C)	CO_2
	CH_4 (CO_2 eq)
	N_2O (CO_2 eq)
Wastewater treatment and discharge (4D)	CH_4 (CO_2 eq)
	N_2O (CO_2 eq)

Table 14: Key categories and related GHG for waste sector

The categories biological treatment of solid waste (4B) and other (4E) are excluded from further GHG emission estimations due to the following causes:

- Composting (to be reported as 4B) is not practiced on commercial/large scale in Suriname
- Land farming (of oil contaminated soil) may be a source of GHG emissions to be reported at 4E. Since the 2006 IPCC Guidelines do not provide a methodology for estimating these emissions, the limited availability of data, and the fact that these subcategories were not reported in previous NC's, Suriname is not obliged to report emissions from this activity.

2.3.4.3. Quality assurance and quality control (QA/QC)

QA/QC was implemented throughout the inventory preparation process for the following activities: data collection, emission factor selection, uncertainty, inventory results, and reporting. It was conducted by the waste sector group experts overseeing the technical implementation of the data collection, performing quality control, and verifying the GHG inventory results through regular meetings and training sessions.

QA/QC was implemented through:

- Personnel responsible for data and software entry
- Data review
- Discussing the issues related to data collection
- Discussing data accuracy
- Discussing emission factors
- Consultation and knowledge exchange for data entry into software, generating results
- Crosscutting check for overall inventory quality
- Detailed document control

2.3.4.4. Uncertainty and trend analyses

Suriname's emissions from the waste sector display a steady increase over the 2000-2017 period (figure 52). In 2017, emissions from the waste sector resulted in 95.5 Gg CO_2 eq as opposed to 45.8 Gg CO_2 eq in 2000. Solid waste disposal increased its contribution to the total waste sector emissions by 35% since 2000, while the contribution from wastewater treatment and discharge declined from 94% (2000) to 62% (2017) (figure 53). Suriname's waste sector produces mainly CH_4, accounting for over 80% of emissions in 2017. Smaller amounts of CO_2 and N_2O also factor into the total emissions profile of the sector (figure 54).

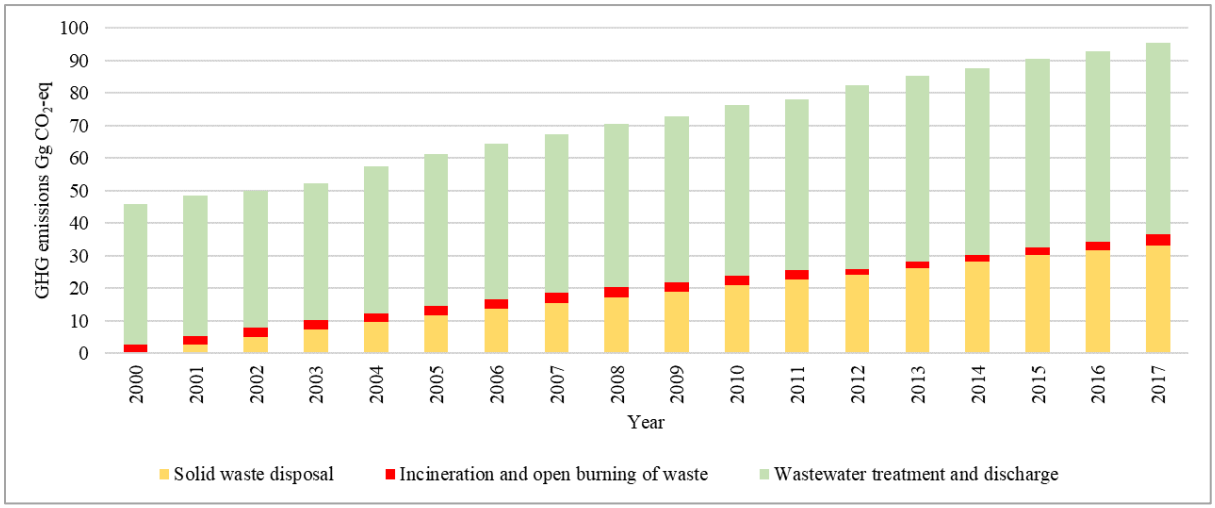


Figure 52: Total estimated GHG emissions from waste sector (Gg CO2-eq) 2000-2017 (Source: NC3 Preparatory Documents for the Waste Sector)

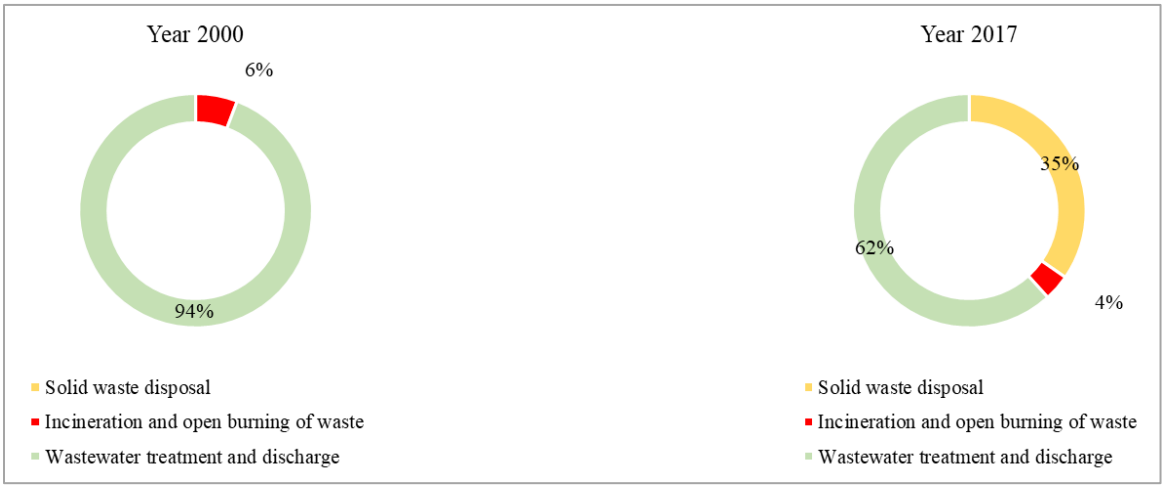


Figure 53: Contribution to GHG emission from waste sector for years 2000 and 2017 (Source: NC3 Preparatory Documents for the Waste Sector)

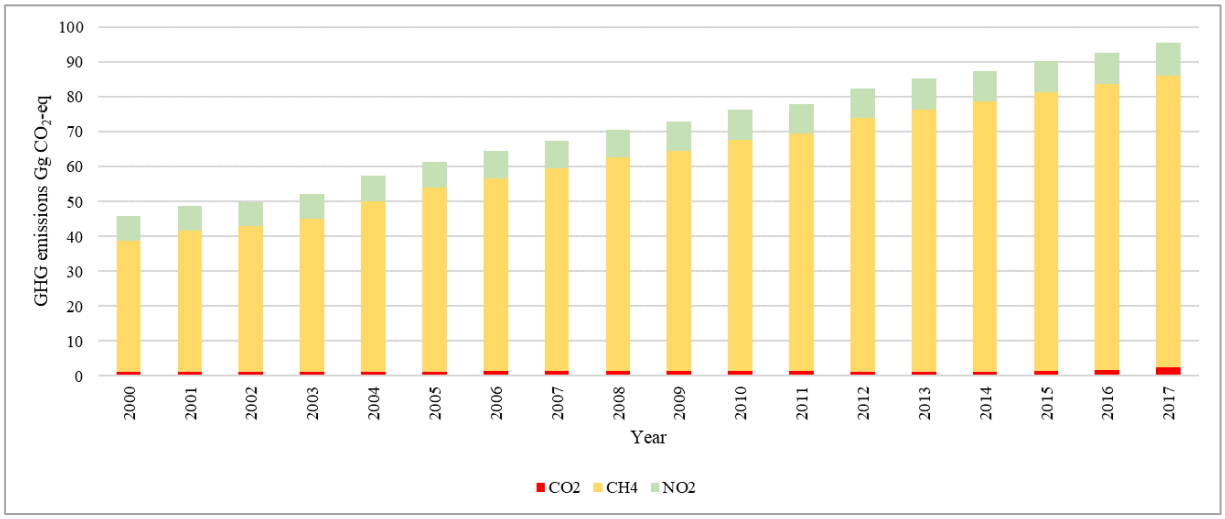


Figure 54: Total estimated GHG emissions per gas (Gg CO2 eq) 2000-2017 ((Source: NC3 Preparatory Documents for the Waste Sector)

The waste sector has relatively erratic activity data available. When this is combined with a lack of national emission factors that may be more suitable to account for national circumstances than the default IPCC factors, the amount of uncertainty increases, prohibiting the adoption of the higher, more exact tier levels of data.

The 2006 IPCC Inventory Software was used to automatically calculate the uncertainties. The program changes the base year automatically into 2000, which doesn't correspond with the base year 2008. This is for all inventory years 2000 - 2008, meaning that the uncertainty would be estimated for 2 base years, namely 2000 and 2008. For this reason, the uncertainty estimation was done for both 2000 (dummy base year) and 2008 (actual base year). The results were generated from the software which are compiled in table 15.

Year	Uncertainty (%) in total Inventory waste sector (dummy base year: 2000)	Uncertainty (%) in total Inventory waste sector (actual base year: 2008)
2000	38,14	-
2001	36,33	-
2002	35,66	-
2003	34,61	-
2004	32,68	-
2005	31,44	-
2006	30,63	-
2007	29,96	-
2008	30,73	-
2009	29,11	29,11
2010	28,58	28,58
2011	28,57	28,57
2012	29,41	29,41
2013	29,02	29,02
2014	28,84	28,84
2015	28,51	28,51
2016	28,39	28,39

2017	27,77	27,77

Table 15: Uncertainty in waste sector

Uncertainty from solid waste disposal (4A) is due to:

- Uncertain amounts and composition of waste disposed at disposal sites. Additionally, waste composition data is not regularly assessed, therefore default values were used
- Uncertainty around the quantity of methane produced from solid waste in landfill and emitted into the atmosphere
- The methodology used does not account for a delayed release of methane
- Landfill methane emissions are not directly measured but calculated based on data

Uncertainty from incineration and open burning of waste (4C) is due to:

- Only 2004 and 2012 data on the fraction of population percentage of burning waste was available, therefore assumptions were made for remaining years based on accessible data
- Only 2008 data on the amount of clinical waste was available, therefore, based on a calculated clinical waste generation rate, the amount of clinical waste incinerated was calculated

Uncertainty from wastewater treatment and discharge (4D) is due to:

- Only 2004 and 2012 data on the degree of utilization of treatment systems was available, therefore assumptions were made for remaining years based on accessible data
- Industrial data for some industries was not available, therefore assumptions were made for those estimations
- The fraction of wastewater that is anaerobically treated was estimated based on type of treatment technology as well as efficiency records (of industry plant).

2.3.4.5. Recalculation

Recalculation was not performed as this is the first time Suriname has used the IPCC 2006 Guidelines for the entire inventory. Additionally, as there is no inventory data from the previous NC (2016), comparisons could not be made, and recalculation was therefore not necessary.

Emissions should be calculated using default values and population numbers as there is no controlled waste management in Suriname according to NC2 (2016). However, emissions based on population numbers cannot produce an emissions figure due to the low population (less than 0.5 million) and low birth rate in the country. Until a waste management system is implemented, it will not be possible to produce emissions figures for the waste sector.

2.3.4.6. Assessment of completeness

The waste sector was assessed for all sources of emissions and this assessment is presented in table 16.

Key category	**CO_2**	**CH_4**	**N_2O**
Solid waste disposal (4A)	Not occurring	Estimated	Not occurring
Incineration and open burning of waste (4C)	Estimated	Estimated	Estimated
Wastewater treatment and discharge (4D)	Not occurring	Estimated	Estimated

Table 16: Assessment of completeness per key category

2.3.4.7. Time series consistency

For solid waste disposal (4A), the time series consistency is high as the estimates for all years are calculated from ABS. For incineration and open burning of waste (4C), the time series consistency is low due to the lack of data. For wastewater treatment and discharge (4D), the time series consistency was achieved by using protein supply data set obtained from FAO.

2.3.4.8. Gaps and constraints

Suriname lacks a proper GHG inventory management system with robust institutional arrangements and a pool of national experts for sustainable production of inventories. The absence of specific activity and emissions factor data was the main challenge encountered for this GHG emissions inventory.

Proposed improvements to overcome these challenges are mentioned in section '2.4. Improvement plans.'

2.4. Improvement plans

AFOLU
General proposed improvements for future GHG inventories of the AFOLU sector aim to address the current constraints and needs identified in the data collection and processing activities associated with preparing the previous GHG Inventory. Challenges include limited capacity for data collection and preparation, lack of skills to calculate uncertainty, lack of technological or methodological approaches adopted to achieve more detailed estimates of emissions and incongruencies between institutions in data collection.

Agriculture
General improvements for the agriculture sector are listed in Table 17. More detailed national improvement action plan for the GHG inventory of agriculture is under development.

Forestry
Overall, improvements in GHG inventory measurement in the FOLU sector could be improved through streamlining, collaboration and strengthening of institutions, while technical improvements could also be made. For better estimates of the emissions and sinks in forestry, inclusion of disaggregated land type classes should be included, for example: managed or unmanaged forests, crop types, etc. Additionally, using a sample-based approach of land use and land use change and continuous data gathering activities could improve estimates of GHG inventory and reduce uncertainties. It should be noted that a national forest inventory is being planned to collect more data and improve the EF for both deforestation per strata and forest degradation.

Suggested improvements for the FOLU sector have previously been described in the Technical Assessment (TA) of the Second FREL submitted in 2021. An outline of the main improvements considered are as follows:

1. Transition satellite forest monitoring from a wall-to-wall monitoring to a sample based systematic approach to provide statistics that include calculated uncertainties
2. Enhanced technology for satellite forest monitoring (cloud computing and automatic detection algorithms for near real time deforestation and degradation)
3. More research on the relationship of carbon emissions with shifting agriculture rotational cycles
4. Capacity building for measurement, monitoring and statistical reporting
5. Logging and SFISS
6. National Forest Inventory and stratification
7. Community-based monitoring, reporting and verification
8. Other capacity building needs

Energy and IPPU

The constraints in the developing of the energy and IPPU sector GHG inventory was due to a lack of information. This mostly stemmed from slow or non-existent participation from stakeholders in the data collection process and a lack of capacity and training on IPCC guidelines and software.

Sector	Recommendation
General	Clarify and/or establish institutional arrangements and ensure that they are in place to guarantee the continuation of the responsibility for executing the GHG inventory.
	Strengthen institutional capacity on a continuous basis to ensure skills building and staying up to date with best practices, methodologies and technologies regarding GHG emissions inventory.
	Strengthen collaboration between key stakeholders, including those responsible for GHG inventory execution and other related parties. Methodologies and protocols on data collection, data sharing, reporting and verification should align to enhance consistency between all reports. Additionally, efforts should be made to improve the consistency between international and national reports.
	A consistent calculation approach should also be agreed upon and used across all GHG emissions inventory data collectors to streamline all processes, including collating, and analysing data. Using one platform (software or Excel) would make data alterations and adjustments to the national context and other data points easy and more seamless to combine and manipulate.
	Cohesion of data storage into one national data platform that houses all relevant sector information would streamline processes and prevent redundancies in tasks and data collection.
	GHG inventory execution should be done on a consistent basis, with no ad hoc GHG inventories between. This would provide time to implement GHG inventory improvement measures between the NC, BUR and NDC.
Forestry	Include other required disaggregated classes of land, (I.e. forest types, managed and unmanaged forests, crop types, etc.). Including more detailed land classes would improve estimations of GHG emissions and sinks.
	Data gathering activities and inventories should continue to gather more information on country-based statistics, rather than using general estimates. This would decrease forestry-based GHG uncertainties in calculations.
	Sample-based approaches of land use and land use change monitoring done on consistent time series should be used and be available yearly.
	Establish Institutional arrangements to guarantee accountability and responsibility in future creation of the GHG inventory
	Define and choose a standard calculation approach for all future inventories to ensure consistency and make calculations easy to adjust, combine and manipulate
	Establish a national platform for data storage which includes standard operating procedures rating to GHG inventory protocols and related data and estimations
	Continue building institutional strength and capacity to adopt and follow new methodologies and technologies regarding the GHG inventory
	Improve consistency between national and international reports to create a harmonious, cohesive and accurate picture of Suriname
	Create and encourage stronger collaboration between key stakeholders and data owners to make data sharing and collection easier, faster, and more seamless.
	Perform GHG inventories on a predictable schedule to allow more time, capacity building and technology improvements from the previous inventory or other reports
Energy and IPPU	Improve software used as it can be “glitchy” and not user friendly
	Provide clear and comprehensive guidelines for methodology of GHG calculations as IPCC guidelines are difficult to follow at times due to the scattered nature of information across several documents.
	Provide greater incentives for stakeholders to participate in the data collection process.

	Provide tailored and hands-on training for the use of IPCC software
	Create clear and transparent flow paths and responsibilities with regards to the energy sector GHG inventory.
Agriculture	Establish institutional arrangements to facilitate cohesive GHG inventory data collection at the needed level of detail
	Establish agreements, procedures and protocols with data providers to develop data collection procedures to streamline data collection and mitigate errors.
	Develop a Quality Assurance/ Quality Control plan to improve data quality.
	Establish an MRV and archiving system for transparency.
Waste	Set up a proper GHG inventory management system with robust institutional arrangements.
	Rather than using general estimates, data gathering activities and inventories should continue to gather more information on country-based statistics e.g. data on the actual quantities/composition of waste, information on wastewater related activity, etc. This would decrease waste-based GHG uncertainties in calculations.
	A detailed improvement plan should be prioritized using key category analysis. It should be used to engage stakeholders and schedule development work.
	To implement recalculation in the future, data must be collected and analysed to execute GHG inventories.

Table 17. Summary of recommendations by sector

3. MITIGATION ACTIONS

3.1. Introduction

Since ratifying the Paris Agreement, steps have been taken to meet Suriname's goals of maintaining its high forest cover which contributes to its status as a net emissions remover. Suriname's commitment to mitigation measures is discussed in its Second NDC in 2020, the key areas for mitigation. This chapter discusses mitigation actions that are underway and benchmarks them against the goals and themes outlined in previous documents such as NC2 and NDC2. Additionally, this section will discuss areas for improvement in the future.

As stated by the UNFCCC Biennial Update Report Preparation Guidelines:

> The methodology for outlining the mitigation actions follows the BUR Requirements outlined by the UNFCCC in 2014. As a non-Annex I Party, Suriname aims to provide as much information as possible to provide an understanding of mitigation themes, objectives, and progress.
>
> "As part of the BUR, countries do not need to report on each and every mitigation action or project they may be implementing. BURs should paint a broad picture of a country's mitigation actions or group of mitigation actions. For example, some non-Annex I Parties have made pledges to UNFCCC on NAMAs that they will undertake or have submitted their NAMAs to the registry. Information on such NAMAs could be included as part of the BURs. In these cases, it may be sufficient to present information that relates to the overall mitigation goals and also to specific NAMAs at the level of policies and programmes. It is not necessary to provide information on each individual mitigation project that underpins NAMAs and/or mitigation policies and programmes. However, not all non-Annex I Parties have established national or sectoral policies or NAMAs. Countries without broad mitigation goals in place may report on the packages of projects. The classification of mitigation actions in the categories outlined, is not a requirement under the BUR guidelines, however, they can provide experts with a better understanding of the nature of actions and the potential order of magnitude of the effects."

3.2. Context

NDC2, which was published in 2020, describes mitigation actions for the energy, transport, forestry, and agriculture sectors, listed in table 18 with their estimated timeline for completion. These goals were compared against current circumstances. Since 2020, Suriname has gone through a number of economic and political changes and therefore the movement in certain sectors has been limited since NC2, but the government is restructuring its efforts with the assistance of various funding agencies to put the action plans in the NC2 into effect. It is believed that part of the proceeds from the carbon credit payment would be allocated to the strengthening of the data collection and organisation structure to facilitate collaboration of implementing MRV systems across the various ministries. As a result, whilst progress has been made are highlighted there are projects that would be started once funding and capacity is made available.

Mitigation action	Objective and description	Updated actions completed
Forestry		
1.1 Support alternative livelihoods and diversification of the economy in the interior	Increase the contribution of forests to the economy and welfare by providing alternative livelihoods that contribute to diversification, using the opportunities provided by nature, while at the same time protecting the environment, and increasing the well-being of Suriname's citizens.	Through various funding agencies and programs have been implemented to build capacity and industries such as Brazil Nut Oil and Fishery projects. This work continues in the interior, there have also been solar projects in the interior to make energy supply available.
1.2 Enforcement, control and monitoring forests	Ensure sufficient capacities exist to implement the necessary forest monitoring, control and enforcement activities and strengthening forest regulatory and supervisory institutions.	*This has started and will continue to 2030, as further explained below*
1.3 Promotion of Sustainable Forest Management	To maintain forest resources, while increasing the contribution of those resources to economic development in a sustainable manner.	Several initiatives started and will continue inclusive of Suriname filing for payment-based credits which will assist with financial support for these initiatives
1.4 Promotion of sustainable practices in other land use sectors	Improve institutional arrangements through laws and regulations for the purpose of promoting sustainable practices in other land use sectors.	Under implementation *2020-2030*
1.5 Protected areas	Increase the coverage of protected areas, provide for their protection, and strengthen the capacity to manage the protected areas.	New areas for protection are already identified but have not been formally established as protected areas as yet. Management plans for two existing areas have been produced, and management plans for two further areas are currently in development.
Agriculture		
2.1 Introduce national land use planning	Adopt land-use planning that protects natural resources, including clustering of agricultural development and planning against climate change impacts.	Not yet implanted, however a spatial planning act is in the drafting phases
2.2 Identify, trial and introduce more permanent agricultural systems to replace the traditional shifting cultivation	Existing systems from elsewhere will be evaluated for introduction is Suriname. Selected systems will first be tried in pilot schemes, and when successful, be introduced to farmers.	Under implementation *2020-2024*
2.3 Define and implement a national research, development and innovation program, and strengthen agricultural research sector	A national institute for land use planning is established and multidisciplinary land use / resource planning is conducted, involving all sectors and stakeholders.	Under implementation *2020-2022*
Energy		
3.1 Demonstrate sustainable business models	Promote renewable energy (RE) access by moving to the sustainable electrification of +200 villages in the interior by the replacement of existing use of diesel with solar supply and solar/hybrid systems.	Under implementation *2020-2025*
3.2 Public- private partnerships (PPPs)	Provide incentives for investors by encouraging an investment- friendly environment through risk mitigation by a Guarantee Fund.	Under implementation *2020-2030*

3.3 Policy and regulatory framework	Implementation of the Electricity Authority Suriname (sector regulator) and the development of the Renewable Energy Act and the Rural Electricity Act.	Under implementation *TBD*
3.4 Energy efficiency – Subsidy and fiscal reform	Promote energy efficiency (EE) and energy conservation through energy savings equipment (energy efficient appliances) by providing them to customers at reduced prices; including equipment labelling and performance standards.	Not yet implemented
3.5 Energy Efficiency standards	Introduce EE standards by developing legislation (amendment of Electricity Act) and set up a dedicated organization for implementation.	Under implementation *2020-2025*
Transport		
4.1 Improve public transport	Improve the public transport system, including adding separate bus lanes, public bus hubs outside the city centre and shuttle buses inside the city centre.	Not yet implemented
4.2 Introduce emissions and age limits for vehicles	Introduce a low or no emissions limits to exhaust gases/emissions from public and private vehicles such as cars, trucks, buses and other vehicles. Limit the import of used vehicles aged >5 years (Foreign Motor Vehicle Import Requirements).	Not yet implemented *2023-2025*
4.3 Improve traffic management, planning & Infrastructure	Improve traffic management and planning together with urban planning.	Not yet implemented *2022-2026*
4.4 Increase public green space	Increase public roads and walkways of Suriname by enhancing the "green component" as well as green terraces and parks (Green City).	Not yet implemented *2023-2030*
4.5 Improve Road conditions	Rehabilitate main roads, protect roads from flooding and decrease travel time and increase safety.	Not yet implemented

Table 18: Summary of mitigation actions outlined in NDC2

The GHG Inventory in Section 2 described the main sources of GHG emissions from various sectors. As such, mitigation actions in Suriname are driven by addressing some of the highest emission sectors, which include electricity, road transport, agriculture and forests. According to Suriname's latest GHG inventory 2000-2017, the highest emissions activities in Suriname per sector are listed below. These are potential areas for emissions reductions.

1. Energy
    a. Transportation
    b. Energy industries
2. IPPU
    a. Mineral Industry
3. Waste
    a. Wastewater treatment and discharge
    b. Solid waste disposal
4. Agriculture
    a. Rice cultivation
    b. Enteric fermentation
5. FOLU
    a. Settlements
    b. Forest land*

**Forest land is a carbon sink, not an emitter. Mitigation actions in the forestry sector will refer to actions taken to maintain this status.*

Currently, though Suriname has various mitigation actions in place, only the energy sector has identified an official Nationally Appropriate Mitigation Action (NAMA). No NAMAs have been identified for the other key emitting sectors of AFOLU, waste or IPPU. However, mitigation actions will still take place through various programmes and policies for AFOLU, transport and waste. These mitigation actions are discussed in more detail per sector below.

3.3. Mitigation actions by sector

3.3.1. Forestry

Mitigation in the forestry sector includes all policy measures that can lead to a reduction of GHG emissions or increase in carbon sequestration in forests. As Suriname is already a net emissions remover, mitigation actions in the forestry division are aimed at maintaining the forest's ability to sequester carbon and reduce emissions in the forestry sector. One way that Suriname is pursuing this is through implementation of Suriname's National REDD+ Strategy, which was published in 2019 and tackles four strategic approaches.

Strategy	Approach
To continue being a high forest cover and low deforestation (HFLD) country and receive compensation to invest in economic diversification	1. Multilateral and bilateral negotiations aiming at receiving financial support for the preservation of Suriname's forest cover; 2.Support existing, alternative, and additional sustainable livelihoods and diversification of the economy.
Forest governance and institutional strengthening	1. Advance participation of different stakeholders; 2. Enforcement, control and monitoring; 3. Forest and environmental laws and regulations; 4. Promotion of Sustainable Forest Management (SFM).
Strengthen land use planning and policies	1.Land tenure; 2. Land use planning; 3.Promotion of sustainable practices in other land use sectors; 4. Participatory community development.
Conservation of forests and reforestation as well as research and education to support sustainable development	1.Protected areas; 2. Rehabilitation of degraded and deforested areas; 3.Scientific research and education on forest management.

Table 19: Suriname's National REDD+ Strategy

NDC2 builds upon and incorporates the REDD+ Strategy into its commitments for forestry. The NDC2 mitigation themes outlined above for the forestry sector provides the basis for future mitigation actions. A review of policies, programmes and activities, including the NC2, NDC2 and REDD+ Strategy, and input from Ministries within Suriname, in particular ROM, in the identification of six specific priority themes and actions. Mitigation themes and actions in forestry include:

1. Forest governance: Institutional reinforcement, forest and environmental laws and regulations
2. Land use planning: Converting forestry-based activities into sustainable forestry activities
3. Conservation of forests, reforestation and training to support sustainable development: Ban/discourage roundwood exports and strengthen local processing, improve the management of protected areas, and expand relevant areas
4. Continue being a High Forest Cover and Low Deforestation country (HFLD): Strengthen land use policies and improve their implementation to maintain Suriname's status as an HFLD country
5. Convert forestry-based activities into sustainable forestry activities
6. Improve the resilience of forest communities (through encouraging sustainable livelihoods)

Table 20 outlines actions currently taking place that build upon previous policies and documents with linkages to how these mitigation actions satisfy and build upon projects outlined in NDC2.

Project	Period	Description	Progress made	Relation to NDC2
Forest governance: Reinforce and transform institutions involved in forestry	N/A	Build strength and capacity of current forestry institutions (SBB, NIMOS, LBB). Key activities include: 1. Adjusting legislation with consideration to, e.g., Warranty of permanence of CO_2 reductions, concession periods, CO_2 ownership and benefit sharing conditions 2. Enhancement of structural capacity, and particularly climate change and climate finance 3. Establishment of a financial structure to manage transactions 4. Promotion of sustainable forest management, including the transition from unplanned to planned logging by developing and implementing the SFM system	Several programs that enhance the development of National Forest Monitoring System (NFMS) have been put in place. 1. Establishment of Safeguard Information System (SIS) for REDD+ in 2019 to reduce negative social and environmental impacts while promoting positive impacts 2. Implementation of the Satellite Land Monitoring System (SLMS) 3. Implementation of near real time monitoring 4. Execution of a pilot NFI and mangrove forest inventory. The mangrove inventory is being continued. 5. Enhancement of reporting to national, regional, and international organisations	Enforcement, monitoring and control of forests.
Convert forestry-based activities into sustainable forestry activities: Climate Smart Forestry or National Forestry Practice Guidelines	2022-2023 (10 years)	**Objective:** Reduce damage due to forestry and reduce emissions by up to 40% in the next 10 years. Damage reductions would be due to: • Better felling and skidding techniques • Less abandoned wood • Smaller infrastructure like roads and timber landings Key activities required for execution: training, monitoring, investments in equipment, upskilling and attracting professionals and technicians	To bolster the monitoring and management of forestry activities, the Sustainable Forestry Information System (SFISS) was developed, which also tracks data on logging from harvest to export. Research on Reduced Impact Logging (RIL), mangrove inventory and mapping and emissions factor estimations is in progress through SBB, CELOS, and AdeKUS. Capacity building activities, such as the finalising the Code of Practice by setting up a financial mechanism, will be carried out in several projects starting in 2023: 1. UNDP GEF7/ALS 2 project: strengthening management of protected and productive	Promotion of sustainable forest management; Enforcement, control and monitoring of forests.

			landscapes in the Surinamese Amazon (starting phase) 2. Multi-indicative annual programme EU – EU-Suriname Forest Partnership for the protection, restoration, and sustainable use of Suriname's rainforests and mangroves 3. Joint Sustainable Development Goals (SDG) project – UNDP, UNEP, UNFPA FAO (SDG Fund) 4. Preparing for the development of a road map for a sustainable financial system for Suriname	
Phasing out of wood exports and strengthening of wood processing	2022-2023 (10 years)	**Objective:** to strengthen the wood processing sector and phase-out and/or ban round wood exports entirely. Necessary activities include capacity building in the sector, access to financial resources for investments, creating a favourable investment climate	1. Within the SDG joint programme, a draft forest finance strategy has been developed and the necessary investment has been calculated 2. Research has been carried out regarding the recovery rate of the processing industry 3. Research is ongoing with regards to the investment and capacity needs of the wood processing industry 4. A presidential commission has been formed to advise the President on sustainable development for the forestry sector, including the banning of round logs export 5. A kick off, high level workshop has been organised regarding climate finance	Promotion of sustainable forest management Support alternative livelihoods and diversification of the economy.

Land use planning: Converting forestry-based activities into sustainable forestry activities	N/A	**Objective:** Identify permanent forest to provide clarity on use of permanent forest areas, which will support enforcement and/or development of: Restrictions on mining activities within known planning areas, issuance of mining concessions; Rehabilitation of mined areas and degraded forests; Implementation of Climate Smart Agriculture; Solutions to land rights issues with ITPs.	1. Production of forest cover maps and deforestation maps 2. Production of LULC map 3. Collection and dissemination of data needed for the formulation and implementation of policy, programmes, projects, and guidelines for the enforcement of laws, in particular the Forest Management Act 4. Operational NFMS including the Sustainable Forest Information System Suriname	Enforcement, control and monitoring of forests; Protected areas; Promotion of sustainable forest management
Improve the resilience of forest communities by providing alternative livelihoods	N/A	**Objective:** Create a long-term strategy to support alternatives for livelihoods to current forest degradative activities. Key areas to support this action: Development of planning for the village; Development of the non-timber forest products (NTFP) sector; Development of agroforestry; Development of the tourism sector; Training to support sustainable development	Currently, NGOs do active work in the Interior to encourage sustainable livelihoods of ITPs. Several SFM training sessions have also been delivered to ITPs to encourage uptake of preferred methods. More information on updates required. The SBB is conducting awareness and training activities to the forest communities in SFM and entrepreneurship Formulation of projects (IDB, MIP-EU, GEF7/ASL to contribute to improving resilience of forest communities by providing alternative livelihoods. These projects are in initial phases.	Support alternative livelihoods and diversification of the economy in the interior; Promotion of sustainable forest management.
Strengthen land use policies and improve their implementation to maintain Suriname's status as an HFLD country	N/A	**Objective:** Continue being a High Forest Cover and Low Deforestation country (HFLD) through better management of nature reserves to protect vulnerable biodiversity and increase protected forest area. Options for achieving this goal: Creating new protected areas; Protecting the mangrove forests.	Proposals for expanding protected areas have been suggested, but they are not formal. News policies on land tenure rights are in discussion to guide on land ownership disputes in the future. The GCCA+ 2 project, GEF7/ASL and the MIP-EU project will all contribute to achieving these goals.	1. Protected areas 2. Improvement of the management of protected areas 3. Enforcement, control and monitoring of forests

Table 20: Mitigation actions in the forestry sector (source SBB) and in relation to NC2

Gaps and improvements

NC2 progress has been made within the forestry sector, specifically in SBB with regards to data gathering around forest related parameters. In the REDD+ readiness phase, the NFMS was implemented and included components that contribute to data related to mitigation assessment. However, barriers still exist to the implementation of mitigation actions in the forestry sector. Overall, major themes of barriers include human, technical and financial barriers that prevent implementation and progress of new actions.

Although some institutional capacity is present, increased capacity is needed to carry out plans and priorities present the main obstacle to mitigation in the forestry sector. Specifically, policy priorities are constantly shifting and changing, which present challenges to implementing mitigation techniques. Shifting priorities also presents the challenge of building stakeholder trust and participation. The Ministry of Spatial Planning and the Environment has made efforts in building trust with stakeholders through transparent and thorough stakeholder consultations and engagement, however this is an ongoing initiative to maintain positive relationships with stakeholders. Strong, clear and transparent policies are essential for providing clarity on the urgency and procedure to support mitigation actions.

Since Suriname's economy is heavily reliant on gold mining, which is also a high deforesting activity, it is challenging for Suriname to pursue impactful mitigation measures without negatively affecting its economy. Financial support for mitigation efforts will accelerate a future for sustainable forestry and progress mitigation and sustainable development strategies. Technological capabilities of institutions can also further be strengthened to increase the speed and ease of implementation of new technologies and processes. Technical needs have been outlined in project proposals.

Strengthening sustainable forestry capacities among ITPs is also critical in executing proposed mitigation actions. Efforts must be made to better facilitate sharing of best practices of sustainable forestry practices across ITP communities. Currently, several training sessions have already been delivered to ITPs to reinforce sustainable forest management practices, and more will be done in the future.

There is a lack of legislative structure in place to support and encourage decision making that benefits mitigation actions. For example, mapping of indigenous and tribal populations' land tenure and rights presents a challenge for furthering the REDD+ strategy. Currently, discussions of tenure rights policies are underway and are planned to be completed in the coming years to avoid negative social impacts of mitigation actions regarding sustainable forest management.

3.3.2. Agriculture

Projections in Suriname's NC2 estimate that business as usual activities in the agriculture sector could increase GHG emissions by 400% by 2025 in the absence of mitigation activities. The largest emissions contributors identified in the agriculture GHG inventory 2000-2017 in the agriculture sector are livestock-related emissions, rice cultivation and soil-related emissions, including the use of synthetic and organic fertilizers and non-conservative tillage practices that release N_2O and enteric fermentation. Though strategic actions have not yet been planned, measures are outlined for agriculture under NC2 and are included in the National Adaptation Plan in alignment with Suriname's REDD+ strategy. These include:

Project name	Description	Relation to NDC2
Reduction of fertilizer application in rice cultivation	Objective: Reduce CH_4, N_2O Limit the application of fertilizer to reduce the overuse of fertilizers and subsequently reduce the amount of GHG emitted. Regulating fertilizer use is a non-complex and cost-effective strategy to reducing emissions.	1. Define and implement a national research, development and innovation program and strengthen agricultural research sector. This also contributes to research for reduced emissions in rice cultivation, which was reported to begin in 2014.
Single aeration of paddy fields longer than 3 days	Objective: Reduce CH_4, N_2O Alter the drainage patterns of rice cultivation to reduce the period of inundation by introducing periodic aeration. Currently, rice fields are constantly inundated. When a dry period >3 days is implemented, significant CH_4 emissions reductions occur.	1. Define and implement a national research, development and innovation program and strengthen agricultural research sector. This also contributes to research for reduced emissions in rice cultivation, which was reported to begin in 2014.
Shortened cultivation time of rice cultivars	Objective: Reduce CH_4, N_2O	1. Define and implement a national research, development and innovation program and strengthen agricultural research sector. This also contributes to research for reduced emissions in rice cultivation, which was reported to begin in 2014.

Table 21. Agriculture mitigation actions (Source: NC3 Preparatory Documents for the Agriculture Sector)

Mitigation measures that are currently underway were determined by evaluating previously published literature to assess national policy programs, strategies and plans of mitigation measures. The mitigation actions identified are listed in Table 21 and are accompanied by discussions on research and expectations of the mitigation actions below.

Currently, there are few plans addressing emissions mitigation in the agriculture sector, however the Ministry of LVV has promoted Climate Smart Agriculture (CSA) pilot projects that focus on adaptation, rather than mitigation, for example for micro-irrigation, water harvesting and protective agriculture, including mulching, composting and integrated crop management. These will increase the resilience of the agriculture sector, however their contributions to mitigation efforts in Suriname have not been assessed. Additionally, various NGOs that operate in the Interior are promoting agroforestry practices as a form of sustainable agriculture, which will have both adaptation and mitigation benefits within the AFOLU sector (Source: NC3 Preparatory documents for Agriculture mitigation actions).

The National Climate Change Policy, Strategy and Action Plan for Suriname (NCCAP 2015), referenced in NDC2, also discusses the aim to concentrate agriculture in select locations and to re-use previously cultivated lands to reduce widespread deforestation for agricultural expansion. There has been progress towards goals of reduced emissions from rice cultivation, however no information was available on progress towards reduced emissions from re-use of cultivated lands.

Discussion on mitigation methods

- **Livestock**

The livestock sector is not a significant contributor to Suriname's economy, thus resource allocation to the suggested mitigation actions related to agriculture may not be pursued. Two changes in livestock management could mitigate emissions:

- Reduce livestock population
- Change livestock diet to one that reduces methane emissions from enteric fermentation. Dietary habits in Suriname can provide a challenge to changing the livestock diet to reduce CH_4 emissions. An alternative to changing the livestock diets could be changing the quality of pasture and grasslands. However, this may incur costs and would be challenging to implement and monitor. Overall, mitigation methods aimed at livestock would not result in significant emissions reductions in Suriname due to its low contribution to emissions in Suriname.

- **Rice cultivation**

The Final National Climate Change Policy, Strategy and Action Plan for Suriname (2014 – 2021) outlined outcome F3i: Technological transfer programme on sustainable and environmentally friendly agricultural practices with the goal of introducing modern technology to reduce GHG emissions in rice production and other current or future large-scale cultivated agricultural methods. Research and action to reduce emissions from rice cultivation were enabled by outcome F3i.

The GHG inventory discusses the contribution of rice cultivation to GHG emissions in the AFOLU sector. The expected continued expansion of rice cultivation will also increase emissions. Simultaneously, since Suriname's population relies on rice for both subsistence and export, rice cultivation is one of the largest contributors to Suriname's GDP of all agricultural subsectors per area. In fact, rice contributes on average to 38% of total foreign exchange income from agriculture.

Applying drainage management techniques by aerating rice fields for at least three days could reduce as much as 50% of emissions associated with rice cultivation and result in 120 Gg CO_2eq less emissions, based on 2017 CH_4 emissions of 241 Gg CO_2eq. These calculations were performed using the following equation to calculate methane emissions from rice cultivation. Aeration of a single aeration of rice would reduce methane emissions more than the contribution of the entire emissions associated with livestock (56 Gg CO_2eq according to 2017 GHG inventory). Thus, pursuing emissions reductions from livestock would be relatively low impact. This approach to emissions reductions is already part of Component I, Irrigation and Drainage, by the IDB as Sustainable Agricultural Productivity Program SU-L1052 and is elaborated upon in Section 5 Constraints and gaps, and related financial, technical, and capacity needs.

Methane (CH_4) emissions (Gg) from rice cultivation can be represented by a multiplication of:

$$A \bullet B \bullet (C \bullet D \bullet E)$$

whereby:
A= harvested area
B = cultivation period
C= base emission factor
D= emission scaling factor
E= correction factor for organic amendments

Table 22: General approach to calculation of methane emissions mitigation outcomes from rice cultivation

Further emissions reductions can be attained by switching between long to short cultivation periods, from 120 to 100 days (B in relation to the equation). This could result in a reduction of about 16% (38 Gg CO_2eq) from 2017 emissions.

- **Reduction of fertilizer**

Fertilizer contributes the second largest proportion of GHG emissions to the agricultural GHG inventory after CH_4. Reduced fertilizer levels could significantly reduce N_2O emissions. Standard practice amongst rice farmers is to use high

doses of up to 400 kg/ha Urea in 2 or 3 applications per growing cycle. Reduced fertilizer recommended doses of fertilizer ranges between 80-260 kg/ha. Adoption of reduced fertilizer practices would reduce costs to rice cultivation and reduce N_2O emissions by up to 50%.

Gaps and improvements

Research was conducted to estimate emissions reductions from mitigation actions in agriculture, however more research on the feasibility and overall environmental and social impact of some of these measures must be done, including the use of country-specific data, rather than proxies from global databases. Furthermore, it must consider Suriname as a country, taking into account factors such as population size, diversity, and inclusion of ITPs.

Additionally, collecting data on progress of mitigation actions could be improved through establishing an MRV system to consolidate updates and make data more available for use and future reporting. This would help to report on progress, successes and challenges faced in implementing mitigation actions.

Based on discussions with ROM, there are plans under development to implement a standardised MRV system across ministries to create a more collaborative ecosystem. However, building adequate financial capacity to adopt new technology, participating in trainings, and building capacity in the sector to address mitigation action needs is a challenge in the implementation of this. There is currently a lack of capacity to implement the research activities necessary to address all proposed mitigation actions. Technical capacity is also challenging, as national research institutions lack access to research and may not have access to adequate technology that can be used in the local context.

Education and awareness to stakeholders including farmers and ITPs is critical to the uptake of mitigation measures. The reason for and impact of adopting measures is important to reduce hesitancy amongst stakeholders. Research that supports mitigation actions must also be communicated to communities.

Additionally, collecting data on progress of mitigation actions could be improved through establishing an MRV system to consolidate updates and make data more available for use and future reporting. This would help to report on progress, successes and challenges faced in implementing mitigation actions.

Another challenge is building adequate financial capacity to adopt new technology, participate in trainings and build capacity in the sector to address mitigation action needs. There is currently a lack of capacity to implement the research activities necessary to address all proposed mitigation actions. Technical capacity is also challenging, as national research institutions lack access to research and may not have access to adequate technology that can be used in the local context.

Finally, education and awareness to stakeholders including farmers and ITPs is critical to the uptake of mitigation measures. The reason for and impact of adopting measures is important to reduce hesitancy amongst stakeholders. Research that supports mitigation actions must also be communicated to communities.

3.3.3. Energy

Suriname's energy sector is vast, encompassing the energy-specific needs of all economic activity in the nation, including industry (iron and steel, chemical and petrochemicals), transport (shipping, aviation, rail, and road transport etc.), and buildings (both commercial and residential). According to the GHG Inventory 2017, the energy sector is the major GHG emitter in Suriname, and within this, emissions are mostly from transport at 1,527 Gg CO_2eq or 53% of total sectoral emissions, and energy industries at 1008 Gg CO_2eq or 35% of total sectoral emissions. An officially submitted Nationally Appropriate Mitigation Action (NAMA) outlining ambitions for renewable energy for the energy sector has been submitted through the UNFCCC. Tables 24 and 25 provide an update of energy sector mitigation actions and their status as of 2022.

Mitigation action 1	Demonstrate sustainable business models
Mitigation action 2	Public-Private partnerships (PPPs)
Mitigation action 3	Policy and regulatory framework
Mitigation action 4	Energy efficiency – Subsidy and fiscal reform
Mitigation action 5	Introducing EE standards by developing legislation (amendment of Electricity Act) and set up a dedicated organization for implementation
Mitigation action 6	Renewable Energy Projects

Table 23: Mitigation actions from NDC (Source: NDC2)

Action	Responsible organization	Project name	Dates	Objectives	Description	Progress/results achieved
1	Ministry of Natural Resources and Rural Electrification Department (DEV)	Demonstrate sustainable business models	2020-2025	Promote renewable energy access by move to the sustainable electrification of +200 villages in the interior by the replacement of existing use of diesel by solar supply and solar/hybrid systems.	The project's objective is to strengthen the institutional and regulatory environment for implementing renewable energy (RE) and energy efficiency (EE) technologies in order to encourage the adoption of RE/EE measures and technologies, as well as demonstrating RE/EE technologies for interconnected and isolated grids, rural electrification in the interior, and delivering thorough feasibility studies and technical designs for EE demonstration pilots. Institutional structures, commercial models, and stakeholder skills need to be strengthened for Suriname to successfully create, run, and sustain RE/EE technology with demonstration of business and operational models for rural electrification. **(i)** Implementation of feasibility studies for renewable energy projects, as well as projects involving offshore oil reserves, including studies for the Tapajai and Kabalebo Project, gas for the aluminium industry. **(ii)** 150 kW off grid solar plant in Godolo, a rural isolated community. **(iii)** Development of solar mini grids in the area of the Upper Suriname river to bring electricity 24/7 to 12 villages. The GoS gave a mandate to EBS to electrify 12 villages. It is intended to fund the installation of ten solar mini grids, with energy storage and diesel as a backup, to provide electricity 24/7 to 12 villages in the Upper Suriname river with a total of 4,200 inhabitants.	The project is in the start phase. **(i)** Ongoing. **(ii)** Ongoing. **(iii)** Ongoing: As per February 2022, the implementation of 10 mini grids with solar energy in 10 villages has been started. Till 2024, The ministry intends to provide a total of 100 villages in the interior with sustainable, and clean energy.
2	Ministry of Finance and Ministry of	Public-private partnerships (PPPs)	2023-2030	Provide incentives for investors by encouraging an	The national development bank (NOB) has funds available for support: - Guarantee fund for loans where there are coverage problems;	The funds are available.

	Natural Resources			investment-friendly environment through risk mitigation by a Guarantee Fund.	- Participation fund: NOB participates in the share capital of newly started companies in exchange for lending; - Technical assistance fund for companies: for technical assistance, such as training and business guidance; - Other products which commercial banks are unwilling to assume risk, but that can have a significant impact on businesses and/or society, such as financing for demonstration projects, providing credit insurance for specific situations, assisting with solar lease/power purchase agreements - Guarantee fund with incentives for commercial banks (or NOB only) to deliver financial products that involve investment for customers (purchase and installation) in RE (mainly solar panels). The customer will be charged at a pre-agreed upon lower rate.	
3	Ministry of Natural Resources in coordination with NIMOS	Policy and Regulatory framework	TBD – 5 years	Implementation of the Electricity Authority Suriname and the development of the Renewable Energy Act and the Rural Electricity Act.	After the 2016 Electricity Act, the restructuring of the sector includes the following measures: - Start-up and operationalization of the Energy Authority Suriname (EAS); - Compilation and implementation of the Electricity Sector Plan (ESP); - Cost-reflective and affordable tariffs, and the introduction of a subject subsidy scheme that should guarantee affordability by providing a subsidy to groups in society to absorb the price shocks; - Additional legislation and regulations aimed at strengthening	- Electricity Authority of Suriname has been implemented; - With the adoption of the Electricity Act and EAS, the rules and conditions that the electricity sector must comply with have been laid down in the law; - ESP is currently being prepared; - The Renewable Energy Act and the Rural Electricity Act have not been developed yet.

					various essential elements and preconditions of the electricity supply sector.	
4	Ministry of Natural Resources and Ministry of Finance	Energy Efficiency – Subsidy and fiscal reform	2020-2030	Promote EE and energy conservation through energy saving equipment by providing them to customers at reduced prices, including labelling and performance standards	The CARICOM Regional Efficiency Building code (CREEBC) is under review by a group of experts from different organizations to determine its applicability future as a standard for Suriname. Preparation and decisions by the EAS regarding the electricity sector are central for the coming years, regarding the methodology for the calculation of new tariffs, the tariff structure and the subsidy scheme, revision of the general conditions and tariffs for the connection of electricity and the preparation of the ESP.	On-going
5	Ministry of Natural Resources	Energy Efficiency standards	2020-2025	Introduce EE standards by developing legislation (amendment of Electricity Act) and set up a dedicated organization for implementation.	CREEBC is currently under review for use in Suriname. Standaarden Bureau has also adopted several EE standards like NEN and IEC standards regarding EE.	On-going with the incorporation of efficiency standards into standards for housing construction, spatial planning equipment, road network with 4 projects focusing on efficiency standards namely: - Development of Renewable Energy, Energy Efficiency and Electrification of Suriname; - Improvement of road conditions; - Increase in public green spaces; - Improvement of traffic management, planning & infrastructure.
6	Ministry of Natural Resources	*Hydropower projects*		The share of renewable energy stays above 25% by 2025 and maintaining the share of electricity from	**(i)** Grankriki hydropower plant 2015/2016 15 MW. **(ii)** Tapa-Jai hydropower plant 2018/2019 302 MW. **(iii)** Additional capacity at Afobakka dam 2020 116 MW. **(iv)** Micro hydropower plants 2012/2014/2016/2020 1.2 MW.	**(i)** Not yet executed. **(ii)** Not yet executed. **(iii)** Not yet executed. **(iv)** Not yet executed.

		Biomass projects	renewable sources above 35% by 2030	**(i)** Power plant (electricity generation) of 60 MW based on the gasification of rice husk. **(ii)** Additional plant capacity of 25 MW for rice husk based on positive developments in the rice industries **(iii)** Wood has a caloric value of approximately 15 MJ/kg (equivalent to 4.3 kWh). Combustion installations that use wood as fuel, have a conversion efficiency of 30 %, meaning that currently approximately 4.5 MJ/kg energy output can be (equivalent to 1.29 kWh) produced with such combustion installations. Therefore, wood waste produced in Suriname has a potential to replace 110,000 MWh in 2012 and 240,000 MWh in 2025. 12.5MW/27MW.	**(i)**Not yet executed. **(ii)** Not yet executed. **(iii)** In 2012/2013 Greenheart Suriname was planning to construct a bioenergy plant of 1.5 MW which would use wood waste to generate electricity. The status of this project is unknown.
		Solar energy projects		**(i)** Implementation of 5M Wp Grid-connected PV system at Rosebel. **(ii)** State Oil Company Suriname - 25MWp – 75MWp floating PV system at Afobakka hydro dam (ongoing). - Implementation of 27kWp Grid-connected PV system in Paramaribo. **(iii)** Implementation of 500kWp Grid-connected Hybrid PV system at Atjoni. **(iv)** Implementation of 300kWp Grid-connected Hybrid PV system at Coronie. **(v)** Implementation of 2MW Grid-connected Hybrid PV system at Nieuw Nickerie. **(vi)** IDB project: SU-L1055 Consolidating a Sustainable Energy Sector (2020 – 2025). The specific objectives are to advance the implementation of energy reform through support to the Energy Authority of Suriname (EAS) and operational management of the EBS, increase the reliability of the power system and promote the diversification of the energy matrix through financing pre-investment activities related to Renewable Energy (RE) and Natural Gas (NG); and expand electricity coverage through a	**(i)** By 2018, the capacity was more than 5MW and in 2025 the capacity is expected to be approximately 10MW if planned projects by various institutes are taken into account. **(ii)** State Oil Company Suriname. - feasibility studies to be conducted in the near future, however these have not yet begun. - Operational since 2015 **(iii)** Operational since January 2018. **(iv)** Operational since 30 July 2022. **(v)** Operational since June 2022. **(vi)** Ongoing. **(vii)** Ongoing. **(viii)**Ongoing. **(ix)** Operational.

				combination of grid extension and off-grid-systems, increasing the provision of RE systems. **(vii)** IDB project: 500 kWp solar plant with battery energy storage, in Brownsweg, the main village for the Brokopondo district. (viii) IDB project: 200 kWp solar plant, including two hours of energy storage in Alliance, Commewijne (ongoing). **(ix)** 450 kWp PV system at Guyaba and Pikin Slee in Sipaliwini.	
		Wind energy projects		Wind energy (for electricity generation) could successfully be supplied in locations with relatively high wind velocities. Large scale application still seems only possible in the distant future. A conservative prediction stated that approximately 1 MW will be installed and operational by 2016 and by 2025 this will be approximately 3 MW.	As of 2022, there is no large-scale application of wind energy, and installed capacity did not reach 1MW. There are a few small wind turbine installations, but these are for research purposes.

Table 24:Energy sector mitigation actions and process (Source: NC3 Energy Sector Mitigation Actions final poster)

Policy structure and developments

The social and economic development of Suriname depends on the availability of energy and similarly, electricity is a requirement for the growth of the production sectors. As a result, Suriname's energy policy is built on three pillars:

1. *Ensuring that all citizens have adequate and reliable access to energy.*
2. *Increasing the promotion of energy-efficient homes, buildings, and street lighting.*
3. *Promoting the use of renewable energy sources to create the best possible energy mix to meet Suriname's growing demand as well as its emissions and other climate action targets.*

According to Staatsolie, national energy consumption will have more than doubled by 2030, meaning that to meet the expected demand for electricity in the coming years, necessary measures will need to be made as soon as possible to enhance production capacity. Several possibilities have been examined to satisfy demand while preserving Suriname's energy plan, and many plans are already in the implementation phases.

The adoption of the Electricity Act in 2016 was a key policy development within the sector, mandating the creation of the EAS, a regulator for the energy sector and a steering body to drive affordability, sustainability, and availability of supply within the energy sector. Since its inception and operationalisation in 2020, the EAS has begun implementing a number of projects, including:

- The development of an ESP, also referred to as the electrification masterplan. This document outlines the strategic, technical, and regulatory goals for the sector over the coming 20 years. This project is supported by the IDB and has an expected timeline for completion of Quarter 1 of 2023.
- The creation of an Integrated Resource and Resilience Planning (IRRP) model under the ESP with support from the Caribbean Centre for Renewable Energy and Energy Efficiency (CCREEE). The model will be used to build capacity and assist with climate resilient electrification planning and is expected to be completed within the first half of 2023 dependent on the availability of data. Suriname can follow the IRRP models of Guyana, Barbados and Jamaica, as these islands have already gone through the IRRP process.
- The publishing of an annual energy sector report card using a CCREEE provided model. This project is in the planning phases.
- The development of a public energy sector database that will integrate technical data from Staatsolie Power Company Suriname (SPCS) with climate data for the energy sector. A terms of reference (TOR) document is expected to be published for this project before the end of 2022.
- Energy sector future scenarios are under development to outline what Suriname's energy landscape will look like based on different energy mixes. Scenarios including the gradual increase of solar, an oil-to-gas fuel switch, and additional hydro have all been analysed. The results of these analyses can be utilised by decision makers and drive the development of agreements and final investment decisions for the eventual phase out of heavy fuel oil (HFO)
- Introduction of additional incentives for solar energy uptake. Currently, a 90% reduction on import tariffs for solar photovoltaic (PV) panels exist in Suriname, however there are no existing tariff reductions on battery and other solar PV related equipment and accessories. This will be required for uptake of solar energy as to become a viable alternative to existing generation using diesel and HFO.
- Assist with the development of laws and acts that cover renewable energy and electrification of the Interior. The former is in the drafting stage and is currently under review with a legal specialist. The EAS is responsible for the finalisation and implementation of this act. The latter is not yet in the drafting phases but is considered a vital piece of Suriname's energy planning, utilising mini hydro and solar generators to provide greater access to ITPs and local communities in rural areas in Suriname. This project is financially supported by the IDB. A TOR is expected to be published in November/December 2022 and results will be integrated into the final ESP. Planning for the rural electrification act also encompasses a feasibility assessment of prepaid metering, which will be viewed as an addition to the current electricity act in an attempt to incentivise further electrification of the Interior.

Ultimately, all policy plans and infrastructure developments for the energy sector under the mandate of the EAS will follow the scenarios and analysis of Suriname's short term and long term energy maps. A key tenet of this plan is that Suriname must maintain its current 50% share of renewable energy within its energy mix. These are shown below.

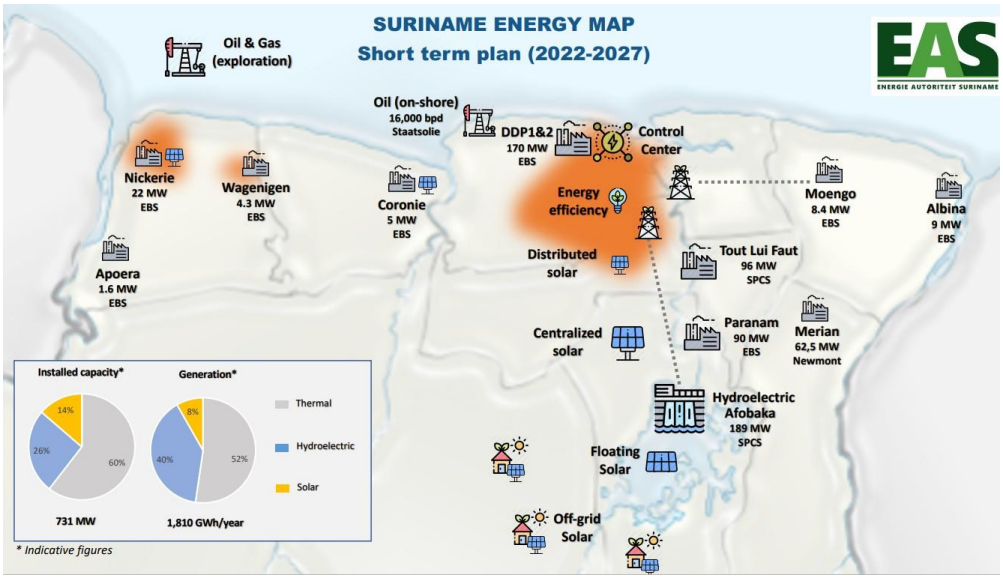


Table 25: Suriname short-term Energy Map (Source: EAS)

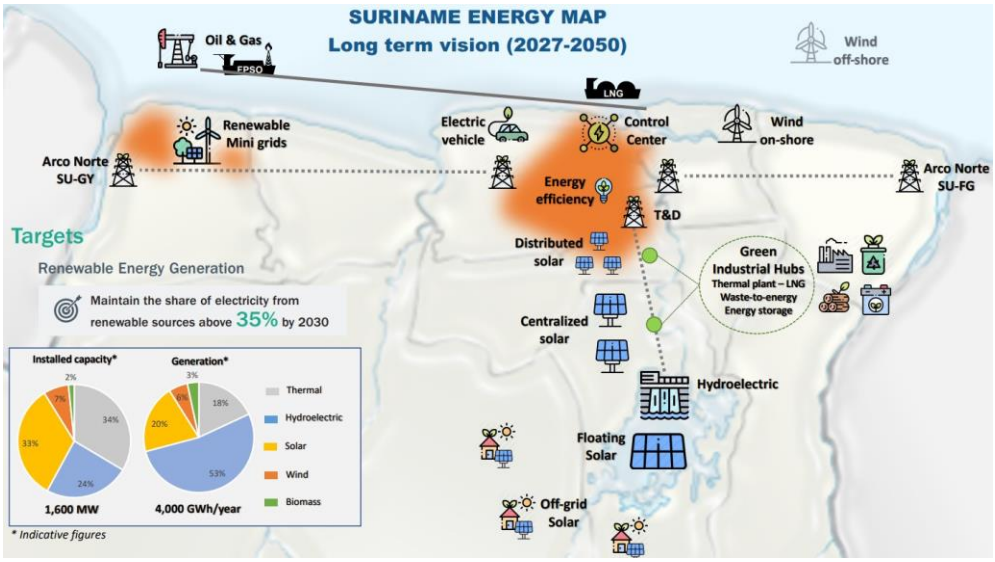


Table 26: Suriname Long Term Energy Map (Source: EAS)

Gaps and Improvements

Within the energy sector, many of the gaps and suggested improvements have already been identified and projects are either under development or in progress. Suriname has committed to both maintaining the share of electricity from renewable energy sources above 35% by 2030 in its NDC2 and to 47% by 2027 in the CARICOM Energy Policy. At the time of this report, both of these targets have been met as 50% of electricity is produced from renewable sources (**see section 1.8.2** for the full breakdown of Suriname's energy sector current state). The full scope of legal and regulatory measures to support these targets have not yet come into effect, however preparation is underway for the areas that are not yet active.

In keeping with obligations for the collection and reporting of climate data, and the encouragement of transparency, key considerations for improvement in the energy sector are an extension to the establishment of the technical database of energy data and initiatives, to ensure the repository in tandem with robust data management and QA/QC policies, and to ensure availability of the data for public use. Other ongoing projects that should be managed to ensure timely execution, include the ESP and the IRRP, as these are key developments in the energy sector, promoting sustainable energy futures by increasing reliability of connectivity and enhancing the resilience of the local power grid, while simultaneously minimizing both operating costs and negative environmental impacts. Additionally, the review of the 2018 CREEBC, to provide a model for regulating energy conservation requirements in both commercial and residential buildings, must be closely managed from a technical and resourcing standpoint, to ensure that the country's energy efficiency needs are

adequately addressed. To date, CREEBC stakeholder workshops have been carried out by Anton de Kom University, and the university intends to provide training as a next step. The major gaps to implementing these projects were lack of financial and human resource capacity, however, these needs were mostly met as the projects are now supported and in pre-implementation phases. These can be used as models for the future of Suriname's energy sector. By improving the current state of the energy sector, the EAS and the GoS are taking steps to close gaps in capacity and increase the future flow of financing into the sector.

Where energy and transport intersect is where the major space for improvement can be found. All transportation activities (water and road) depend on fossil fuels. The transport sector contributes approximately 16% to total GHG emissions of the energy sector and around 10% of total GHG emissions in Suriname. The sector presents an opportunity for GHG reductions especially in the greater Paramaribo urban area, with a population of some 400,000 people, which is two-thirds of the total population. While approximately 50% of Suriname's energy is from renewable sources, this does not apply to the transport sector. If Suriname wants to maintain this renewable energy share, electrifying the transport sector will be a crucial, yet huge, undertaking. Currently, this is not the most feasible option as there are no legal or financial incentives for investors to switch to renewable energy sources. However, creating a legal basis for incentives, for example, for increased solar energy uptake, including reducing tariffs on battery imports and solar parts would accelerate this transition. The grid is also an issue since electrifying the sector necessitates charging standards for vehicles. To switch from low voltage to high voltage, the grid would need to undergo significant changes. As a parallel step, initiating gas agreements and finalizing investment decisions for an oil to gas fuel switch would also make progress towards a lower-emissions future for Suriname.

3.3.4 Transport and urban transportation

The infrastructure of Paramaribo is overburdened by a steadily increasing amount of private car traffic. Since the economy has improved, car ownership has almost doubled in the past decade, which has resulted in a heavily crowded road network in the city during rush hour. With a declining trend, barely 15% of individuals use public transportation. Consequently, there are plans to improve the public transport system by improved route analysis and access. With improved public transport it is envisaged that more of the population will use this method of commute rather than private cars. It is also the expectation that E-mobility will be a major initiative in the next decade.

Additionally, there is a need for improving road and drainage infrastructure which include upgrading of roads and canals as well as sea defenses infrastructures (grey and green). Suriname commits to introduce by 2027 vehicle emissions controls and reduce import of vehicles older than 5 years, in order to reduce emissions.

Mitigation action 1	Improve public transport
Mitigation action 2	Introduce missions and age limits for vehicles
Mitigation action 3	Improve traffic management and age limits for vehicles
Mitigation action 4	Increase public green space
Mitigation action 5	Improve road conditions

Table 27: Mitigation actions from NDC

Urban growth and the resulting emissions are best mitigated through a more compact city. This requires a shift in urban planning, with public and private partners jointly seeking solutions. This includes restructuring the existing road system to allow smoother and shorter travel time and constructing alternative North-South and East-West transfer roads. To encourage people to use public transportation rather than their private car, the public transport system needs improvement (with extra transfer stations, shuttle bus system and public transport corridors).

As part of Suriname's ambition to become a transport hub in South America, a transport master plan for land, maritime and aviation is currently being formulated considering emissions reduction. One of the objectives is to reduce traffic congestion due to less personal cars and more hybrid and larger buses on the road. Currently, buses can carry up to 25 persons, the aim is to be able to carry 50.

One cannot ignore the fact that Paramaribo is very vulnerable to rising sea levels and therefore flooding. Therefore, there must be a focus on adaptation plans as well as mitigation actions, as the city's historical center and surrounding transport infrastructure is situated near the waterfront.

Action	Responsible organization(s)	Dates	Objectives	Description	Progress / results achieved
1	- Ministry of Public Works, Transport and Communication; - Road Authority Suriname.	2020 - 2025	Improve the public transport system.	Improve the public transport system, including adding separate bus lanes, public bus hubs outside the city center and shuttle bus inside the city center.	Not yet implemented.
2	- Ministry of Public Works, Transport and Communication; - Road Authority Suriname.	2020 - 2025	Introduce a low or no emissions limits; Limit the age of used vehicles for import.	**1)** Introduce a low or no emissions limits to exhaust gases/emissions from public and private vehicles such as cars, trucks, buses and other vehicles; **2)** Limit the age of used vehicles for import to < 5 years old (Foreign Motor Vehicle Import Requirements).	*On-going.* **1)** Currently, this is under consideration, and is supported by the IDB, but it has not yet been implemented. **2)** The age limit of used vehicles for import has been set to < 8 years old (Foreign Motor Vehicle Import Requirements) and for buses it is 15 years.
3	- Ministry of Public Works, Transport and Communication; - Road Authority Suriname.	2022 - 2026	New legislation; Incentivize new business models for transportation.	**1)** Adopt legislation on parking and on residential buildings; **2)** Incentivize new business models for transportation such as ride sharing, car and bike sharing etc.	*On-going.* **1)** Legislation will be adopted between 2023 and 2025; **2)** Incentive will be executed between 2023 and 2025.
4	- Ministry of Public Works, Transport and Communication; - Road Authority Suriname; - Ministry of Finance.	2020 - 2030	Increase public roads and walkaways of Suriname.	Increase public roads and walkaways of Suriname by enhancing the "green component" as well as green terraces and parks (Green City).	*On-going.* Legislation on green infrastructure will be adopted between 2020 and 2023.
5	- Ministry of Public Works, Transport and Communication; - Road Authority Suriname.	2020 - 2030	Rehabilitate main roads, protect roads from flooding and decrease travel time and increase safety	**1)** Redesign pedestrian friendly streets and redesign free bus-routes; **2)** Implement hub-and-spoke system for delivery transportation; **3)** Start structure planning followed by zoning planning, including principles of the Trinary Road System, reservations for utility infrastructure and public transportation;	*On-going.* All will be implemented between 2020 and 2030. Especially **1)** will be executed between 2023 and 2025.

				4) Redesign bus routes towards consolidated line structures; **5)** Start design and construction of new roads, including trajectories Stolkertsijver - Groot-Chatillon and Lelydorp - Groningen, roads for Tapajai project execution, making the East-West corridor up to IIRSA standards, etc.; **6)** Weighing and dewatering: construction of pumping stations and dewatering pumps will be carried out with the same speed as the cleaning and excavation of main drainage channels are taken by hand; **7)** Improvement of existing and construction of new North-South and East-West access roads will facilitate more efficient transport and (potential) development areas unlock; **8)** Improvement and completion of the Second East-West connection Apoera Zanderij-Carolina-Patamacca-Langa Tabbetje expands the economic possibilities; **9)** Spatial planning; **10)** Deployment via PPPs of water taxis and water buses for passenger transport / optimal use of the Surinamese waterways for the transport of people and goods; for example over the Suriname river (especially for freight traffic).	
6	- Ministry of Public Works, Transport and Communication; - Road Authority Suriname.	2022-2027	Improve transportation routes	As part of the transport master plan, transportation route plans were improved to make them more practical, effective and considerate of vulnerable groups.	*On-going.* This has not yet been presented to the ministries. Only after presentation and approval by ministries can it be implemented

Table 28: List of actions related to transport and urban infrastructure to implement mitigation actions (Source: NC3 Energy Sector Mitigation Actions final poster

Gaps and improvement

Mitigation actions in the transport sector are in early stages of development. This is mainly due to financial and technical constraints. Ideally, private, and public vehicles would be updated and switched to hybrid to reduce emissions as much as possible. Particularly in Paramaribo, promotion of the use of public transportation would greatly reduce congestion in the city, and by extension, emissions. To achieve this, education and awareness sessions are vital, which will promote public uptake of new policies.

Additionally, future planning by the Ministry must consider climate data and effects. Currently, advisors are looking into this, but this is in its infancy stage. A key gap in the execution of this initiative is financial support, which would allow more resource allocation to accomplishing this goal. There is low capacity at the Bureau of Statistics to measure and process data gathered for GHG reporting and other climate-related reporting in the sector.

Finally, collaboration across sectors is key to executing many of these plans. Policies must work in unison and support common goals and align across ministries to ensure that all initiatives are working towards Suriname's overall vision as a country. The socioeconomic status of Suriname is also a large deciding factor in the priorities of the country. Though the goal to promote public transportation and transition to hybrid or newer models and thereby reduce traffic congestion and emissions form the transport sector is ideal, careful consideration on the impacts of new policies must take place to reduce adverse socioeconomic effects. For example, during this economic downturn in Suriname, it is unfeasible to require public transportation drivers to purchase or upgrade vehicles to more efficient models.

4. MONITORING, REPORTING AND VERIFICATION (MRV) SYSTEM

4.1. Introduction

Under article 13 of the Paris Agreement, states are required to provide a clear understanding of climate change actions, considering the objective of the Convention (as set out in Article 2). This includes the tracking of progress towards achieving Parties' NDCs under Article 4, as well as Parties' adaptation actions, inclusive of good practices, priorities needs and gaps (UNFCCC, 2014).

Additionally, Article 13 states that there must be "the establishment of an enhanced transparency framework (ETF) with the objective to build mutual trust and confidence and promote the effective implementation of action." Under the ETF, a biennial transparency report (BTR) will supersede the current BUR requirement for both developed and developing countries, with the first BTR to be submitted in 2024. BTRs will be submitted by all Parties every two years. However, the UNFCCC indicates an allowance for non-annex 1 Parties whereby LDCs and SIDS may submit BTRs at their discretion.

Measurement, Reporting and Verification (MRV) systems are developed to meet these obligations, facilitating the progress tracking of activities designed to steer a country's policies and systems towards the meeting of national climate related targets. MRV is a crucial tool for increasing transparency, accuracy, and comparability of climate change adaptation and mitigation efforts on both the national and international levels. It encourages learning and enables a comparative, cross-border approach to measuring progress and identifying where additional support is needed. Metrics that enhance a country's level of reporting transparency when it comes to climate finance and actions should be included where possible in the development of MRV systems. MRV systems at the national level should therefore include measures to track:

1. The country's GHG inventory, providing a clear picture of national and sectoral GHG emissions trends and developments over time
2. Mitigation and adaptation actions and an assessment of whether the actions have delivered the expected results
3. Support received from various actors (national, international, multilateral etc.) to determine whether the country's climate action needs have been adequately met

This section will provide a deep dive into the processes and systems in place in Suriname for the measurement and assessment of data, reporting through NCs and BURs (Reporting), as well as giving context to the verification process under the UNFCCC International Consultation Assessment (ICA). Additionally, the section will outline gaps in the country's current MRV system and explore plans for improvement than can be implemented for future BUR/BTR compliance cycles.

4.2. Institutional arrangements

According to the UNFCCC (2020), the development of MRV institutional arrangements should be undertaken in parallel with the updating of national climate change strategies and reports, such as NDCs, NCs, BURs and BTRs. Establishing these arrangements for an enhanced transparency system can be executed in four phases, as detailed in Table 29.

Phase	Step	Action
1) Scoping	1) Clarify the scope and objectives	Determine the thematic scope for the transparency system's institutional arrangements (i.e., will mitigation, adaptation and support needed all be included?)
		Identify the transparency system objectives and outputs to determine boundaries, expert, and data requirements
	2) Understand existing national systems	Review data gathering and reporting activities to date for national reports and strategies (NCs, NDCs, BURs etc.)
		Identify experts and data sets already in use to: • Categorize the relevant institutions, systems and stakeholders • Determine gaps in documents/data as well as where experts are unavailable • Identify where documents exist but do not provide the level of detail required for the scope of the desired institutional arrangements (as identified in step 1)
		Engage with stakeholders and decision makers to understand data needs for policy, analysis and tracking of climate related actions
2) Key stakeholder and organizational mandate identification	3) Find a champion	Develop competency in the national focal point to engage stakeholders and understand reporting needs
	4) Establish high-level coordination	Develop a national forum of decision makers to facilitate a reporting process for the transparency system and allow key stakeholders to be updated on progress and targets
		Create terms of reference for the forum to ensure that contributions to the transparency system are effective and relevant
	5) Map proposed arrangements	Establish an overarching organisational structure for the transparency system to clearly show roles and responsibilities of key organisations, as well as scope and mandate of the institutional arrangements within the transparency system
		Establish the objectives and outputs of the transparency system. Identify: • Technical coordination units and technical working groups that will be responsible for data management • Key data suppliers • A team of national experts • Organisations who will implement actions (thus benefit from regular updates from the transparency system)
3) System, process and agreement development for the maintenance of data flows	6) Develop an implementation plan	Consult with stakeholders on organisational structure, roles and responsibilities, data/expertise gaps to devise a plan for implementing institutional arrangements
		Include developing legal arrangements, climate laws, training experts, and developing data systems in the plan
	7) Develop the legal framework	Develop laws and memorandums of understanding (MOUs) that will allow required data and expertise to be secured

	8) Establish structures for sustainable operations and long-term success	Establish the procedure for institutional arrangements to enable regular updates to information within the transparency system. Include QA/QC measures to maintain the system's value.
4) Review and improvement	9) Create space for the evolution of planned arrangements, systems and processes	Review institutional arrangements and amend as needed or as the scope evolves
		Develop communication and improvement plans for stakeholders and data providers
		Provide feedback on outputs from national and international review processes and incorporate into improvement plans

Table 29: Steps to establish institutional arrangements for transparency systems (Source: UNFCCC, 2020)

In Suriname, the coordination of emissions reductions planning, as well as the development and implementation of mitigation and adaptation initiatives, are executed by the NMA, an agency under the Ministry of Spatial Planning and Environment, and SBB is already collecting and reporting on all forest related data. ROM has made efforts to validate and verify this data with relevant national stakeholders and improve the availability and accessibility of the data through www.gonini.org and https://kopi.sbb.sr/. Collection of climate data in Suriname can be challenging and resource intensive (NAP, 2020), so in 2016, the decision was taken to bring several institutions and implement the SMIN. However, it should be noted that while there are set institutional arrangements for climate mitigation and adaptation actions, defined roles for MRV specific operations and responsibilities have not yet been established in Suriname.

4.3. Components of MRV systems

The UNFCCC provides a handbook on designing and implementing MRV systems for developing countries. Given that Suriname is currently in the embryonic stages of developing its MRV systems, the following section can be viewed as an ideal model when developing MRV systems in Suriname. Key elements of the MRV framework at the international level include submission of NCs and BURs, as agreed under the Bali Action Plan (UNFCCC, 2007), ICA review carried out by the UNFCCC Technical Team of Experts (TTE), and reporting of assistance given via technical and financial support. Additionally, the MRV system should be aligned with ETF requirements to ensure high levels of transparency within all the system's processes and frameworks.

At the national level, the UNFCCC requires the development of a domestic MRV framework based on the guidelines for the MRV of domestically supported NAMAs and the implementation of international MRV requirements.

International MRV	Submission of national reports, including: - NCs - BURs
	ICA process
Domestic MRV	Determine arrangements for domestic MRV of domestically supported NAMAs
	Report on domestic MRV in the BUR
MRV for REDD+	Report REDD+ results in a technical annex to the BUR

Table 30: Overview of key elements of the MRV Framework (UNFCCC, 2014)

In keeping with the international and domestic MRV requirements, the key elements for each aspect of MRV are summarized below, in accordance with the UNFCCC Handbook on MRV for Developing Country Parties.

Requirements for measurements:

- GHG emissions and removals by sinks
- Emissions reductions associated with mitigation actions as compared to a baseline scenario

- Progress in achieving climate change adaptation and mitigation targets
- Support received
- Progress with implementation of mitigation actions

Requirements for reporting

- Data on GHG emissions and removals by sinks (inventory as part of the national communication and inventory update report as part of the BUR)
- Data on emissions reductions associated with mitigation actions as compared to a baseline scenario
- Progress with implementation of mitigation actions
- Key assumptions and methodologies used in the development of the GHG inventory
- Sustainability objectives, coverage, institutional arrangements, and activities
- Information on constraints and gaps as well as support needed and received

Requirements for verification

- All quantitative and qualitative information reported in the BUR on national GHG emissions and removals, mitigation actions and their effects, and support needed and received. Data may be verified through national MRV and through ICA, where appropriate.

In developing an MRV, to ensure optimal efficiency and transparency, Suriname can ensure the inclusion of several features such as:

- Developing a baseline to determine the difference between the emissions projection with and without the mitigation actions. This action has already been taken in Suriname, as the 2000-2017 GHG inventory uses a 2008 baseline for comparison of emissions reductions over the period.
- Indicators to track progress of mitigation action and NDC goals.
  Some indicators exist to track progress on mitigation actions, but this must be made more robust and more data is needed.
- Establish role of each stakeholder to ensure accountability for reporting on mitigation actions.

4.3.1. Current state of MRV system in Suriname

Suriname's MRV system is still in embryonic stages, and is under development in collaboration with ROM, SMIN and the IDB. While progress is being made, capacity issues remain a major obstacle to the development of a robust MRV system. Currently, several databases and tools exist that support the domestic monitoring, reporting, and verification of climate related and environmental data. Suriname's domestic MRV system includes activities related to climate change at the national level. Considering the variety of activities Suriname has undertaken, the following are the highlights:

- National GHG inventory under UNFCCC
- NC1 and NC2 under UNFCCC, with BUR1 to be submitted in October 2022
- MRV for domestic and supported NAMAs
- MRV for national climate change policies in place.

One of the main MRV tools developed thus far is Dondru (dondru.sr), a climate database used to assess and track national climate change indicators and the implementation of mitigation actions. Dondru was developed and is managed by NIMOS. While the tool houses extensive data and is operational, there are a few system functions currently under development, such as mode of data submission to the portal. Regular updating of data on Dondru is also critical for transparency and effectiveness of MRV in Suriname.

Significant effort has gone into establishing a framework for Suriname to reduce emissions and enhance carbon stocks in the forestry sector under REDD+. The National REDD+ strategy outlines Suriname's mitigation actions, formulated in its REDD+ vision, as well as the policies and measures necessary to implement and successfully achieve climate targets associated with those actions. The NFMS is a combination of multiple parts and is a key component of this strategy, which represents commitment on Suriname's part to obtaining detailed information on forest resources, carbon stocks and activity data (NDC2). The NFMS is currently in use and is constantly improving using the NFMS roadmap as a guide for implementing new features and processes in the system (SBB, 2016)

NFMS Component	Description
SLMS	Within the SLMS component, land use and land cover data are being produced mainly based on satellite images. Currently, Sentinel 2 satellite data is being used with a spatial resolution of 10m. Deforestation maps are produced annually and post-deforestation Land Use Land Cover (LULC) maps are produced bi-annually. National LULC maps are made every five years. All the data that have been produced are available on the Gonini geoportal at www.gonini.org.
NRTM	The NRTM uses recent satellite images to identify unplanned logging activities. Currently, Sentinel 2 and Planet satellite images are being used. Drones are also applied during NRTM field visits to collect information.
NFI	Within the National Forest Inventory data is being collected to, among other things, estimate the national carbon stocks.
Community-based Monitoring	Withing the component CBM, the communities are being involved and engaged in monitoring the forest.
Reporting	All of the available data that has been produced is used for national and international reporting.
SFISS	The SFISS has been developed to, among other things, track each log from the moment it was felled till the export. SFISS also provides dashboard reports on the labels scanned in the field by SBB's field stations, production statistics, export statistics and label history.

Table 31: NFMS components

A central element of the NFMS is the Sustainable Forestry Information System Suriname (SFISS). The SFISS is a new forest monitoring system that has been developed in alignment with the public and private forest sector. This system aims to improve the services provided to the private sector, promote sustainable forest management, and minimize illegal logging. To increase transparency in the sector, the SFISS is accessible online, however this access is exclusive to approved public and private sector parties and is not open to the general public.

All statistical data produced within the framework of the NFMS can be viewed in the KOPI (https://kopi.sbb.sr/) data portal. This data can then be used for research, planning, monitoring, reporting, as well as policy making. The KOPI webpage was launched in 2021 and is currently managed and maintained by SBB.

Another MRV tool is Gonini (http://www.gonini.org/), a national geoportal that provides current data relating to forest cover in Suriname. It is designed in the context of the REDD+ programme to achieve transparency and accessibility of the forest-related data for key stakeholders, policy makers and national and international interested parties. The geoportal is designed with the technical assistance of the FAO and financed through the REDD+ Readiness programme. The geoportal is constantly being updated based on the production of the new national MRV system, as well as to maintain its user-friendliness and accessibility. There are plans in place as well to develop a mobile application to use the data of the Gonini in the field.

All of these tools support the overall monitoring of mitigation actions and facilitate reporting on their progress. Furthermore, they create a centralised repository of data that can be used by decision makers to inform policy, climate finance needs, and budget allocation.

The NFMS and other systems supporting MRV actions can be assessed and strengthened as necessary to further improve the domestic MRV system, to meet the Convention requirements. Under the current BUR1 project, an emphasis will be placed on strengthening the national domestic MRV system to track and verify support received, progression in mitigation actions and progress on emission reduction and sustainable development, as well as ensuring the information on the protocols and operational procedures of a domestic MRV system is transparent and accessible.

4.3.2. Government Structure and Coordination of MRV

There is currently not a clearly allocated institutional responsibility for MRV, however, SBB is already collecting and reporting on all forest related data. The ministry has also made efforts to validate and verify this data with relevant national stakeholders and improving the availability and accessibility of the data through Gonini and KOPI.

The NCCPSAP and its implementation team together with Ministry of Finance have agreed on a monitoring and evaluation (M&E) programme during Commencement stage (2014-2016), which also provides guidance on a results verification process and reporting protocol.

The M&E programme assists with international reporting obligations (e.g., by assisting with required GHG inventories submitted to the UNFCCC), and demonstrates Suriname's climate finance readiness, providing a strong platform for attracting international climate finance. A useful source of guidance for developing the M&E programme has been the CCCCC's Monitoring and Evaluation Instrument and Reporting Framework for the Caribbean (CCCCC, 2009). The NCCPSAP Implementation Team has aligned the Suriname M&E programme with the regional reporting framework (NCCPSAP, 2015).

A revised GHG Inventory was a prerequisite for operating a MRV system suitable to tracking the contributions of NDC-aligned projects, which Suriname has completed. While the NC1 and NC2 produced single year GHG inventories (for 2003 and 2008 respectively), the BUR1 and future national reports will present a reviewed and recalculated inventory covering emissions and sinks for the period 2000 – 2017. However, it should be noted that the Technical Annex for REDD+, attached to this BUR, contains emissions data for the Forestry sector up to the year 2021.

4.3.3. Stakeholder mapping to improve transparency

Key functions of MRV are to enhance transparency and to facilitate sharing information and lessons learnt, which allow the assessment on whether targets have been achieved. As a measure to expand transparency and mitigate certain

barriers, there has been the inclusion of stakeholders and experts of all fields, in the process of improving climate change actions. Inclusion provides timely and reliable data to stakeholders, allowing greater feedback and hence improved outcomes. A detailed list of key stakeholders for the implementation of the Agreement and the Convention, was developed to enhance transparency, clarity and understanding of the roles and action required to implement the MRV system. Identification of relevant stakeholders is an essential part of ensuring sustainable management and implementation of MRV systems. By creating an inclusive and accessible MRV system, it will facilitate timely and reliable data to stakeholders, allowing greater feedback and improved outcomes.

4.3.4. Private sector participation

Leveraging private capital can increase the pool of financing for governments to meet development needs, while fostering economic growth and job creation. Private capital is known to be the driver of productivity and participation, which drives economic progress. Given the Surinamese economy's current state, there is a greater need and opportunity for increasing private sector activity, notably in the creation of new industries and sectors. Including the business sector in initiatives for climate adaptation and mitigation has many advantages. For instance, aggressively involving the private sector in the creation and delivery of crucial infrastructure to support climate change could increase access to funding and help improve a project's value for money offer by supplying global best practices, experience, innovation, and capital. As the private sector would be motivated to provide the highest quality standards given their direct ownership in investments, this value-for-money gain should be reflected in the quality of the infrastructure, resulting in improved long-term efficiencies.

Public private partnerships (PPPs) offer the GoS the chance to free up much-needed fiscal space, preventing further debt accumulation. The private sector can contribute in a variety of ways, such as by promoting a better business climate and pushing for greater involvement in the development process, taking part in well-structured, win-win PPPs, utilizing their networks and international institutions to provide syndicated loans, providing technical support to fill in where governments may fall short, and creating opportunities for the improvement of the environment. Given the potential financial gains that come along with the aforementioned opportunities, there is an incentive for the Surinamese private sector to gather the necessary funds to speed up the growth goal for combating climate change, particularly in regions that are key producers company supply chains.

However, the Surinamese private sector faces several obstacles to participating in climate action initiatives, including difficulty obtaining financing, high financing costs, and a workforce with insufficient skills. The Surinamese government must work to create an environment with enough readily available finance, stable and proactive policies, reliable and high-quality infrastructure, a healthy and appropriately educated workforce, adequate regulation, and appropriate taxation to attract the volume of capital that will be required to develop and capitalize the current and potential climate change industries (NAP, 2019). This, however, takes capital.

4.4. MRV of GHG Emissions

As previously mentioned, The Ministry of Spatial Planning and Environment is the official ministry responsible for implementing UNFCCC reporting requirements and hence all related actions. Consequently, all activities related to GHG emissions inventories, including monitoring and reporting, are being coordinated by the Directorate for the Environment within the Ministry of Spatial Planning and Environment. Due to capacity restraints however, measurement and reporting activities have been performed by external consultants.

The goal of the reporting element of MRV is to share the results of activities and actions being taken to implement the Convention and facilitate discussion and information sharing on the progress made on implementation. GHG emissions are reported following the existing UNFCCC guidelines in the form of a national inventory included in NCs and BURs. Within Suriname's NCs and the current BUR1, GHG emissions and removals are calculated based on the IPCC guidelines. Presently, the main MRV systems for GHG emissions are that of the climate database Dondru which has been set up within the SMIN, and the NFMS. Both systems however need to be assessed and strengthened further to improve the national domestic MRV system.

4.5. MRV of Mitigation Actions

As Suriname is committed to contributing to efforts of the international community to combat climate change, the country has strengthened the existing institutional arrangements and engaged in the process of developing an MRV system to better implement and track mitigation of climate change. However, reporting on mitigation actions implemented by the country in the present BUR1, and in the NC1 and NC2, proved very challenging due to lack of human, financial and technical resources, resulting in delayed progress of activities implemented.

Nonetheless, Suriname continues to build and improve its system for the MRV of mitigation actions, including its NAMAs, and their effects while tracking support received in implementing these activities. As with the MRV of GHG emissions, the Directorate for the Environment within the Ministry of Spatial Planning and Environment is responsible for this process. The involved institutions and consultancies have so far been successful in recalculating the GHG inventory, involving many of the same institutions collaborating for the MRV of emissions. NDC2 builds upon past documents and highlights the specific actions undertaken in the forestry, electricity, transport, and agriculture sectors' progress towards a smooth transition to climate change related targets.

MRV for mitigation actions is not uniform across sectors. Sectors have varying systems in place to collect, monitor and report on data. The forestry and land use sector has a developed system for MRV including engagements with stakeholders and relevant institutions, which is part of their REDD+ NFMS. However, other sectors must work towards improving their data collection and processing which will contribute to their sector-specific data and information systems.

4.6. MRV of support needed and support received

Apart from projects supported by donors and/or special loans, as well as some departments of government, the MRV of support needed for various programmes and projects in the public sector is still in the early stages. Under its obligations to the UNFCCC, Suriname should be able to assess various aspects of objectives, implementation, and results promptly, as well as monitor the ways in which development projects and programmes are being carried out using standardized reporting procedures. As support is received from various institutions and for a wide variety of projects, efficient MRV of all support being received, as well as support needed is an important component to improve the tracking of resources, progress, and access to finance. Currently, an MRV tool or database for support received and needed is not fully developed and data, while available, is decentralized and scattered.

A move towards digitalization of the MRV system for support needed and received is highly likely given the volume and complexity of information flows (monitoring indicators) in individual projects. As such, the development of databases will be essential for tracking and evaluating both policies and initiatives. To address this, the Surinamese Monitoring and Evaluation Institute has developed a decentralized network and the technical capacity to monitor and evaluate the implementation and impact of the programmes and projects that are a part of Suriname's Vision 2035. This institute will also monitor and evaluate the medium-term (five-year) plans and the annual budgets of the ministries and report on these activities on a regular basis to the government and National Assembly (NDC2).

4.6.1. Policy Framework

Suriname's NC1 was issued in 2005, and great progress has been made since then. It is evident there have been advancements in filling in the gaps and overcoming the capacity, technical, and budgetary challenges outlined in the document, and improvements have been achieved in the areas of policy, the modernization of the institutional and legal framework, the analysis of more scientific data, and education, training, and awareness.

Following NC1, specific policies on climate change were created, and the issue was given a high priority level in the Development Plan for 2012–2016. This plan was then followed by the Final National Climate Change Policy, Strategy and Action Plan (2014-2021), a second Policy Development Plan spanning the years 2017-2021, a national REDD+ Strategy in 2019, the NAP (2019-2029) and finally, the Multi-Year Development Plan for the years 2022-2026. Policies are continuing to be developed, including land tenure and land rights policies, which would address the issue of land ownership and benefits sharing for sustainable forest management with ITPs that will be associated with future REDD+ developments. These policy developments are a testament to Suriname's determination to address the impacts of climate change.

4.6.2. Gaps and barriers

An overview of Suriname's current difficulties in complying with UNFCCC requirements can be found here. This evaluation was guided by the user manual's paragraphs 49-55 for non-annex I parties.

MRV systems presently under development in Suriname for GHG emissions, mitigation actions and support received currently do not have sufficient protocols, institutional arrangements equipment, and human resource capacity for full implementation or maintenance efforts once implemented. This is clearly seen in the lack of data collection systems and information to support coordination efforts and equipment, a lack of technical skillsets to plan for national commitments, and a lack of systems for expanding, retaining and institutionalizing new capacities for an MRV system.

Many of these gaps and limitations are stated in previous NCs and NDCs and have not yet been resolved. However, the continued prioritisation of climate change-related policymaking through the establishment of a taskforce within the Office of the President with a focus on a climate-friendly development strategy is a significant step forward since the NC2. The coordinating mechanism of this taskforce provides a coherent and focused approach to maximizing the outputs, outcomes, and impacts of all programmes and projects aimed at either assessing, mitigating, or adapting to the irreversible effects of climate change and will be the primary impact of this taskforce's institutionalization. It is made abundantly clear in both the previous and the current development plans that a greater emphasis is placed on adaptation as a result of Suriname's vulnerability to climate change.

The Ministry of Spatial Planning and Environment has identified several challenges, gaps, and barriers to implementing a fully operational MRV system. These challenges can primarily be summarized as inadequate technical and financial capacity, in tandem with inconsistencies, lack of coordination and alignment across key institutions, and insufficient stakeholder engagement and integration. These issues ultimately result in lost opportunities for collaborative partnerships with NGOs and marginalized groups and could lead to the accidental exclusion of stakeholder groups in climate action plans. Some strategies do exist, for example the National REDD+ Strategy, however these do not contain action plans for their full and sustainable implementation. This leads to another potential gap, as lack of a clear roadmap for implementation of climate initiatives could inhibit Suriname's ability to access funding and investment from both national and international sources.

SBB has clearly indicated that technical capacity building will play a huge role in achieving Suriname's climate goals. In the case of Suriname, it has been recognized that training workshops have not proven to be successful, therefore the ministry seeks to hire international consultants, who can effectively implement long term programmes to target key government officials in involved capacity building.

4.6.3. MRV Capacity Needs

Capacity building needs with respect to the MRV systems in Suriname are a combination of individual and institutional. Individual level capacity building refers to the skills and abilities of experts and Ministry teams to execute MRV processes whereas institutional needs refer to the bigger picture, encompassing the upgrading of legal frameworks and the developing of processes and resources at the systemic level. Currently, the availability of human, technical and financial resources in Suriname is disproportional to the immensity and complexity of all aspects that must be dealt with in the field of climate change, and as a result, gaps have been identified relating to the current system's inability to effectively aggregate cumulative impacts, evaluate individual mitigation measures and evaluate political measures. The final MRV system should be designed with defined roles and responsibilities that integrate into existing systems. Based on the above, the following needs have been identified:

1) Capacity building:

Suriname faces major development challenges that are typical of emerging economies and Small Island Developing States (SIDS). As stated in the NDC2, Suriname's human resource capacities are constrained, and in the wake of the most recent economic downturn, the country lacks the funding to launch critically required projects. In its 2017–2021 Policy Development Plan, the GoS prioritizes investments in people and seeks assistance from development partners in efforts to enhance research capacity in the field of climate change and the sectoral initiatives indicated in this NDC2. Many of these initiatives are still required, including:

- Increasing the capacity of cross-ministerial focal points
- Capacity building for GHG data management
- Improvement of GHG inventory reporting
- Improvement in the setting of curtailment baselines
- Provision of training for GHG inventory experts in each sector
- Development of mitigation scenarios for non-energy sectors (energy sector mitigation scenarios are currently under development)
- Improvement of existing institutional arrangements and creation of additional arrangements where necessary
- Assessment and monitoring of greenhouse gas impacts on mitigation measures at the policy level

2) Technology transfer

The ABS has collected and published biennial environmental statistical information since 2002; this activity is now funded by Conservation International. The main data and technology related gaps identified by ABS are:

- No full-time human resources employed for environmental statistics within ABS
- The main data collection needs are in the allocation of resources for:
    - Prioritizing an update on the legal framework that enables the unit to demand specific data from various sectors
    - Developing standards for data formats
    - Increasing awareness within the private sector to comply and submit required info

Suriname undertook a technology needs assessment in 2019 where the following priority sectors were determined. Pertinent technologies were identified based on existing gaps and shortlisted for prioritisation in future planning, once funding and capacity needs are met. These are outlined in Table 32.

Sector	Technologies for prioritisation
Water management	Water modeling
	Water resource mapping
	Water storage and harvesting
	Water purification
Agriculture	Climate resilient crop varieties and livestock breeds
	Improved irrigation efficiency
	Integrated farming systems
Infrastructure	Forest specific land use planning
	Ecosystem services framework
	Strategic environment assessments
Housing	Energy efficient building designs
	Energy efficient household appliances and energy conservation

Table 32: Shortlisted technologies for prioritisation based on key sectors (Source: Suriname Technology Needs Assessment, 2019)

4.7. Suggestions/Conclusions and needs for improvement of reporting

In order to meet the UNFCCC requirements and track climate action progress, Suriname's MRV system must be further developed to expand into sectors other than forestry, and accurately track and report on support needed and received. Although the nation is progressing well, there are several fundamental aspects of system design that the domestic MRV systems can incorporate more effectively, as well as additional capacity needed to fully implement the system. Most importantly, Suriname requires technological support for quality assurance and verification, including useful tools.

Other suggestions for the expansion and improvement of MRV include:

1) Existing data providing arrangements can be significantly improved, not only to maintain data continuity, but to raise the quality of the data and ensure that it is delivered in a format that is easily incorporated into existing emissions inventories. Several areas related to the current emissions inventory effort have already been identified, around the institutional arrangements and the management of inventory data, and plans are being developed to improve them.
2) The lead inventory compiler (an international expert) should be responsible for overseeing all QA/QC activities. This is considered a best practice by UNFCCC to ensure robust data management processes.
3) To guarantee that the diverse needs, concerns, and goals of women and men are considered, a gender-responsive transparency framework for MRV should be considered. By incorporating a gender lens, the MRV framework can actively encourage women lead in decision-making and participate in climate action. Additionally, this approach can improve national institutions' knowledge of and proficiency with the integration of gender considerations into their work. A national gender expert should be consulted during the process of creating the Transparency Framework for the MRV of climate actions and reporting to ensure that these considerations are adequately integrated.
4) The promotion of public awareness on climate change through nation-wide media campaigns and the facilitation of climate awareness sessions for public sector resources to enhance understanding of climate action in Suriname and increase participation and stakeholder engagement in MRV system development.
5) Provision of cross-sectoral support to execute initiatives, such as NAMAs, and drive participation in the Clean Development Mechanism (CDM) and other markets established under the UNFCCC. This would ensure the development and maintenance of institutional arrangements relating to the GHG inventory, MRV of mitigation actions, and MRV of support needed, and provide links to national budget processes to facilitate sustainable, long-term MRV operations.

Development of a communication strategy between governments and stakeholders to encourage collaboration between the public and private sector.

5. CONSTRAINTS, GAPS AND RELATED FINANCIAL, TECHNICAL AND CAPACITY NEEDS

5.1. Support needed

As a HFLD developing country, Suriname is faced with the challenge of balancing development for its economy and people, and maintenance of environmental integrity. In many ways, development in its key sectors means increased energy consumption and expansion of settlement areas and infrastructure, while increasing emissions and deforestation. As a primary goal in Suriname's NDC 2020, it aims to maintain its existing forest cover and status as a net remover of carbon emissions, which is supported by various contributions from the NDC.

Suriname's climate policies and action plan are structured around two main pillars: mitigation and adaptation. It targets, among others, the following sectors: energy, forestry, agriculture, transport, and urban infrastructure. However, there are constraints upon Suriname's ability to implement all desired initiatives as there are vulnerabilities at financial, technical, and capacity needs levels. While each sector experiences specific needs and gaps, the support needed, and constraints experienced by Suriname are not uncommon for a SIDS. As a SIDS, Suriname is already very susceptible to impacts of climate change and faces developmental challenges typical of smaller, developing economies.

As stated in the NDC2, Suriname's research and related human capacities are constrained, and in the wake of the most recent economic downturn, it lacks the funding to launch critically required projects. The Surinamese government prioritizes investments in people in its 2022-2026 Multi-Annual Development Plan and asks for aid from development partners in efforts to improve research capacity in the area of climate change and the sectoral activities described in the NDC2.

Many of the gaps and needs identified in NC2 are still relevant. Some of institutional and systemic support areas are:

- The creation and strengthening of information networks and continuous data collection and dialogue within the public, NGO, and private sectors
- Capacity building in monitoring and evaluation skills, as well as technical skills to operate data MRV tools
- Updating and adapting legislation and the availability of resources to effectively monitor compliance to law and regulations

Suriname identifies that, due to its current financial situation, it cannot achieve its sustainable development goals, nor the maintenance of its biodiversity-rich forests without international cooperation and support. Thus, any financial, technical, capacity, and technological support received directly enhances Suriname's ability to integrate best practices into its policies, measures, and activities. Key areas for support needed for Suriname's development and progress towards its NDC goals are outlined below.

5.1.1. Financial needs

Suriname needs significant funding to fulfill its obligations and implement its climate strategy. According to NDC2 (2020), a portfolio[2] of projects from the energy, transport, forest, and agriculture sectors, prepared as part of the NDC enhancement process, have been identified with a total project value of around US$696 million. The timeline for the projects is typically 5 or 10 years. This portfolio of projects was prepared as a part of Suriname's NDC enhancement process. Updates have been provided on the implementation status of these projects in 'Section 3 – Mitigation Actions', however, table 33 provides an overview of the financial support needed to sustain implementation.

[2] This portfolio does not encompass the full scope of the Suriname contribution.

Sector	Name	Objective	Duration	Finance (US$m)
Energy	Demonstrate sustainable business models	Rural electrification of 200+ villages in the interior	2020-2025	80
	PPPs	Guarantee Fund to provide incentives to investors	2020-2030	100
	Policy and regulatory framework	Implementation of EAS, RE Act and Rural Electricity Act	TBD	5.5
	EE – subsidy and fiscal reform	Promote EE and energy conservation	2020-2030	200
	EE – standards	Development of legislation and amendment of the Electricity Act	2020-2025	50
Transport	Improve public transport	Amend and improve the public transport system to create public bus hubs and shuttle buses	2020-2025	3
	Vehicular emissions and age limits	Introduction of low or no emissions limits to exhaust gases/emissions from public and private vehicles. Limit the age of used vehicles for import to >5 years old	2020-2025	1
	Improve traffic management and infrastructure	Improved planning and urban infrastructure	2022-2026	3
	Increase public green spaces	Increase walkways and enhance green terraces and parks	2020-2030	2
	Improve road conditions	Rehabilitate main roads for flood protection, decreased travel time, and increased safety	2020-2030	40
Forestry	Support of alternative livelihoods and economic diversification in the Interior	Increase contribution of forests to economy and welfare while protecting the environment and increasing citizen wellbeing	2020-2030	35
	Control and monitoring of forests	Capacity building to implement necessary forest monitoring, control and enforcement activities	2020-2030	71
	Sustainable forest management	Maintain forest resources while increasing contribution of those resources to economic development in a sustainable manner	2020-2030	70
	Sustainable practices in other land use sectors	Improve institutional arrangements via laws and regulations	2020-2030	16
	Protected areas	Increase coverage of protected areas and provide for their protection	2020-2030	17
Agriculture	Introduce national land use planning	Adopt land-use planning that protects natural resources	2020-2022	1

	Identify, trial and introduce more permanent agricultural systems to replace traditional cultivation	Evaluate existing systems in other countries for introduction in Suriname	2020-2024	0.5
	Define and implement a national research development and innovation programme	A national institute for land use planning is established and a multidisciplinary land use/resource planning is conducted involving all sectors and stakeholders	2020-2022	1.2

Table 33: Project Portfolio (Source: NDC2, 2020)

5.1.2. Technical and capacity needs

There is insufficient public and political awareness on climate change and low carbon emission development opportunities across Suriname. When coupled with the lack of technical capacity within ministries, climate experts, research opportunities, inter-institutional cooperation, and poor engagement from stakeholders, collaborative climate projects are often unsustainable and research findings are not always integrated into political policies and decision-making processes (IDB, 2021). In addition to this, a specific technical knowledge gap on climate adaptation, mitigation and policies exists, as well as gaps in methods and approaches on how to incorporate climate considerations into other national action plans of relevant ministries and institutions, in alignment with the NDCs and NCs. Knowledge on, and approaches to gender mainstreaming are also lacking.

Several targets for capacity building in the following areas are listed in the National Climate Change Policy, Strategy, and Multi-Annual Development Plan 2022-2026:

- Public reform and physical planning: interdepartmental cooperation and clear mandates and responsibility with respect to climate change management
- Capacity improvement and research: improved natural resource management, data gathering and national inventories and databases
- Systematic action: development and implementation of the Environmental Framework Bill
- Communication: cross-sector communication and coordination of governmental and general public awareness activities

Additionally, there is a gap in the consistent monitoring of finance and other support needed and received, along with other data sets, hence a centralized MRV system is required to be developed fully as there is currently no formalized system, though there are several databases and tools that are utilized in its place.

5.1.3. Technology needs

Funded by the Global Environment Facility (GEF) and executed by UN Environment Program (UNEP) through a partnership with the Technical University of Denmark, Suriname began undertaking a Technology Needs Assessment (TNA) in 2019. Based on the NDC, drivers of deforestation, forest degradation and barriers to REDD+, the following three sectors have been determined as priority (the pertinent technologies chosen for evaluation are provided in brackets):

- Water management (water modeling, water resource mapping, water storage and harvesting, and water purification)
- Agriculture (integrated farming systems, improved irrigation efficiency, and climate resilient crop varieties and livestock breeds)
- Infrastructure (forest specific land use planning) and housing (energy efficient building design)

5.2. Support received

5.2.1. Financial support received

Green Climate Fund and Green Environment Facility

Suriname has received funding from a number of sources specifically geared towards the development of climate adaptation and mitigation projects. The GCF, the world's largest climate fund mandated to support developing countries to meet their NDC ambitions, has allocated USD $16.7m towards projects and activities in Suriname, which the country seeks to access to implement readiness activities. In 2021, the ROM took over from the Ministry of Finance and Planning as the National Designated Authority (NDA), also taking over the initiated readiness process. The submitted proposal was aimed at accessing funding to strengthen climate finance planning and processes to enable implementation, monitoring and reporting of climate actions within the country. As of 2022 there are three proposed readiness activities that explicitly benefit Suriname listed on the GCF's online database. These projects comprise of US$1.8m in approved support and US$1.1m already disbursed. Suriname has also received the support from the Global Environment Facility (GEF) through the funding of 14 national projects totaling US$35.3m and part of 36 regional/global projects totaling US$545.6m. Table 40 in the appendix provides a full breakdown by project, type of funding, and amount received.

Japan-Caribbean Climate Change Partnership

Suriname is also one of the participants in the Japan-Caribbean Climate Change Partnership (JCCCP) that was launched in 2016. The partnership is funded by the Government of Japan and implemented by the United Nation Development Programme (UNDP and is designed to strengthen the capacity of Caribbean countries to invest in climate change mitigation and adaptation technologies, that are prioritised in their NAMAs and NAPs. The national coordination of this project lies within NIMOS. JCCCP aims to encourage policy innovation through the following outcomes:

1. NAMAs and NAPs to promote alternative low-emission and climate-resilient technologies
    - Under this project, Suriname's NAMA has been developed through a sectoral approach, prioritising the Energy and Forestry sectors. Electrification of the interior was a huge focus of the Energy NAMA, which has already been completed and approved. Emphasis was also placed on structure of implementation, monitoring and evaluation of the actions under the NAP.
2. Adopting and implementing mitigation and adaptation strategies and technologies.
    - Through the JCCCP, an amount of USD $600,000 was available for this outcome. The following projects were approved:
        - "Encouraging children's homes to grow crops and fish for food security and climate change resilience", a project of the Ministry of Agriculture, Animal Husbandry and Fisheries (LVV)
        - "Enhancing access to drinking water for the Maroon community of Asigron Brokopondo", a project of the Ministry of Regional Development
3. Enhancing knowledge networks through shared experience
    - A knowledge attitude practices, and behaviors (KAPB) study was carried out in Commewijne and Marowijne / Sipaliwini and a communications strategy was developed based on the results

Conservation International (CI)

SBB recently signed a partnership with conservation international Suriname and Greenheart Forest Central (GFC) to implement a Climate Smart Forestry (CSF) pilot programme. The programme aims to have 40% of forest concession in Suriname to adopt climate smart forestry management practices by 2025. This will be achieved by empowering the Matawi community and local authorities to implement these practices. Activities under this project include the monitoring of landscape interventions in the Matawai forests, developing an awareness programme, data collection and information on socio-economic factors, and the design and implementation of a voluntary carbon pilot with the Matawai community.

The Climate Smart Forestry Programme (CSF-P) was established to be used as a tool to improve climate mitigation, sustainable forest management, forest conservation efforts and socioeconomic conditions within the forestry sector. The national CSF-P is intended to start demonstration activities in 2022. CI has published a tender seeking a consultant to support in the provision of technical and strategic advice to support CI, SBB, and the Ministry of Spatial Planning and Environment to successfully design and validate the Suriname CSF-P. The expected delivery date of the consultancy is December 2022.

Global Climate Change Alliance

The Global Climate Change Alliance Suriname Adaptation (GCCA+) Project financing agreement was signed in December 2015 by the European Union (EU) and the UNDP, the project document was subsequently signed in Paramaribo by the Ministry of Finance and the UNDP. Once finalized, the EU/UNDP funded adaptation programme entitled "Increasing Suriname's resilience against the negative impacts of climate change" was developed with primary implementation partners: the Ministry of Finance, the Ministry of Spatial Planning, Land and Forestry, and the Ministry of Works, Transport and Communication. The total project budget was €3.4m and was focused on the provision of new climate information and institutional governance to support sustainable agriculture and mangrove protection. The project was executed between March 2016 – August 2019 and has enabled an increase in knowledge and capacity of government staff, support research and studies in water management, mangrove monitoring rehabilitation and conservation.

Based on the evaluation conducted toward the completion of the project, the following support activities were successfully implemented:

- Increase in hydro meta data collection capacity
- Installation of three micro-irrigation systems and one solar power operated greenhouse structure

- The digitization of historic climate data within the Ministry of Public Works
- Development of an integrated Water Resource Management Action Plan
- Development of a National Mangrove Strategy
- Set-up of a National Mangrove Monitoring System (UNDP, 2019)

Inter-American Development Bank (IDB)
In 2018, Suriname received US $20m in financing from the IDB towards the Sustainable Agricultural Productivity Program (SU-L1052). The aim of this program to increase the capacity and productivity for agricultural and rural development. Main goals in this project are 1) improvements in irrigation and drainage system 2) the upgrade and enhancement of institutional capacity required for management and sustainability 3) improving the data collection and information systems to support agricultural development. This project is not yet in the implementation phase, but it aligns with current mitigation actions, and has contributed to mitigation efforts through research to reduce emissions from rice cultivation through enhanced drainage and aeration periods.

The Amazon Cooperation Treaty
The Amazon Cooperation Treaty (ACTO) has been a source of support for Suriname. ACTO is an intergovernmental organization formed by the eight Amazonian countries, with the goal of enhance harmonious, sustainable and equitable development. A list of key projects ACTO is supporting in Suriname can be found in table 39 in the appendix.

United Nations Development Programme
The UNDP has been a significant source of funding and support in Suriname through joint initiatives with other UN agencies, leading on environmental and socio-economic development projects and activities. This includes stakeholder engagement, impact assessments, indigenous rights advocacy, amongst other initiatives aligned with the sustainable development goals. Under the UN multi country sustainable development cooperation framework (UNMSDCF), the UNDP will focus on three programmatic areas over the next 5 years - eradication of multidimensional poverty and conflict prevention, justice, environmental sustainability and building resilience. The programme has been agreed upon by the Government of Suriname, through the Ministry of Foreign Affairs, International Business, and International Cooperation. The government is also developing a new National Development Plan for 2022-2026 in which the UNDP programme is aligned with. Table 34 below summarizes some of national priorities and the estimated cost of implementation, by outcome (adapted form Country Programme Document for Suriname, UNDP, 2021).

National Priority / Goal	Indicative country programme outputs	Estimated cost by outcome (US)
Enhanced Safety, Justice, and the Rule of Law	• Parliaments, constitution-making bodies, and electoral institutions enabled to perform core functions for improved accountability, participation, and representation. • Human Rights Institute strengthened to perform its core functions to ensure human rights protections and improved access to justice for the public but more specifically the vulnerable population. • National institutions enabled to design and implement a transparent system to track migration and human movement to and from Suriname.	Regular: $423,000 Other: $1,165,000
Resilience to Climate Change and other shocks, and Sustainable Natural Resources Management	• Innovative solutions developed, financed, and scaled up for gender-responsive and sustainable management of renewable and non-renewable natural resources, inclusive value chains. • Environment, and climate change data and risk - informed development policies, plans, systems and financing incorporate integrated and gender - responsive solutions to reduce disaster risks, enable climate change adaptation and mitigation, and prevent the risk of conflict.	Regular: $141,000 Other: $23,700,000

	• Innovative nature-based and gender-responsive solutions developed, financed and applied for low-emission climate adaptation and disaster risk management and recovery	
Equality, Well-being and Leaving no one behind	• Income generating opportunities for indigenous and tribal women strengthened to promote economic recovery. • Persons with disabilities improve their skills to find employment or become microentrepreneurs. • Improved availability for water and sanitation to improve community public health Water installations (rainwater harvesting/water tank system) strengthened with portable hand washing stations and respective supplies (such as soap and dispenser).	Regular: $144,000 Other: $900,000

Table 34: National priorities, programme outputs and estimated cost of implementation

Multi-annual Indicative Programme (MIP)

The multi-annual indicative programme developed by the EU, provides a framework for the work being planned over the 7-year long period (2021-2017). The programme is focused on forestry and allows a partnership whereby the EU supports the state's goals while also supporting aligned EU-level policy goals and initiatives. The MIP will have a duration of 7 years with a financial allocation for the initial period 2021-2024. The total amount allocated for the first MIP period is €13m. See table 40 in the appendix for a full breakdown of the MIP allocation by project and amount.

5.2.2. Technical and capacity building support received

Activity	Status	Support needed	Support received
Preparation of BURs and NCs			UNEP
Compilation of GHG inventories			UNEP
Development and implementation of MRV systems	The NFMS has been established and is operational. The Geoportal (Gonini) and statistics portal (Kopi) have been developed and are available for public use	• Strengthening of the MRV system • Collection and analysis/processing of data	ACTO, REDD+ Readiness Programme, FCPF/WB, IDB, FAO
Quality assurance and control for forestry sector GHG inventory	Contribute to the NC3 regarding the AFOLU sector, including production of a Mitigation Assessment Report (in progress) Production of the FRELS, deforestation maps, forest cover maps, LULC maps	• Capacity strengthening and clear guidance for compilation of the GHG inventory • Availability of up to date but free technology, images, software etc. • Support in carrying out the NFI • Institutional arrangements, including the mechanism to consolidate and institutionalise the NFMS	REDD+ Readiness Programme, FCPF/WB, ACTO

Table 35.Technical and capacity building support received

5.3. Data and information gaps and capacity challenges

Suriname faces financial, technical, and capacity barriers which limit its ability to deal with environmental challenges and climate change. These barriers form a major obstacle to the availability and utilization of environmental data. Certain data that would enhance this BUR is in the process of being collected and analysed but was not finalised and verified in time for this submission cycle. The data gap of baseline scenarios to outline the expected future developments of Suriname's key sectors in the absence of specific GHG mitigation is expected to be filled in future national communication submissions.

However, additional gaps in data along with reporting constraints and capacity challenges exist and arrangements are required going forward to ensure that Suriname is strengthened to better collect and report on this data in subsequent BUR and BTR submissions. Overarching constraints, data gaps and capacity challenges include:

- Environmental data not being collected, which results in significant gaps in public databases, making it difficult to fully understand the impact of climate change on the country and limiting reporting and decision-making abilities.
- Lack of resources, both human and technical, for data collection, processing and sharing.
- Lack of protocols for monitoring and reporting on climate action and specifically finance needed and received on a timely and autonomous basis.
- Lack of integration of data collection systems to support coordination.
- Lack of capacity of government and non-government stakeholders in data management and ability to conduct assessments in order to inform policy and design proposals.
- Lack of appropriate policies, legal environments and transparency frameworks which negatively impact the data collection process as well as data management.
- Lack of appropriate policy priorities that would make data collection one of the priority points.
- Lack of standards, regulations and guidelines to facilitate data sharing resulting in difficulties in balancing making data accessible and safeguarding privacy as well as protecting intellectual, time and financial investments.

5.3.1. Forestry

In the forestry sector, huge efforts have been made to collect and produce emissions data with the available resources. Even though emissions data does exist, gaps have been identified and data can still be improved to be more accurate and better represent deforestation and carbon sequestration levels. Suriname's NFMS is responsible for detailed data collection but can still improve on the coverage and consistency of data. The National Forest Inventory (NFI), which is part of the NFMS does not currently map the entire forest area in Suriname. Increased land cover being monitored is necessary to make accurate representations of Suriname's current state. Additionally, satellite data monitoring should be improved to depict more accurately and capture deforestation and degradation data in real time.

Quality control for GHG emissions is also a gap in the data quality of the current GHG inventory. Quality control and assurance measures are integrated into some functions of the NFMS, but currently there is no overarching QC/QC protocols in place. There also has been no uncertainty data reported with the GHG emissions. For future collections, it is essential for the uncertainty data to be included and estimated while the data collection is taking a place.

The SBB and Ministry of ROM have been working closely with stakeholders to gain buy-in and trust in their activities. This relationship-building will continue to enhance data collection, uptake and understanding of current policy planning and activities.

Overall, the priority lays in improving regulatory and oversight systems, as well as local community participation. Issues like obsolete and ineffective legislation and the approach taken to the concessions policy have to be considered. Many huge concessions have been acquired by foreigners due to underuse of authorized timber concessions and rental/leasing of concessions to third parties. This occasionally causes environmental harm through unplanned and unsustainable logging. National Development Plan 2017-2021 outlines a strategy and action plan for forestry management that can be developed using the data and networks that will be made available by the implementation of research and consultation programs as well as through capacity building.

5.3.2. Agriculture

The agricultural sector has received financing for several different projects which aim to address some key challenges within the sector. The Sustainable Agriculture Productivity Program SU-L1052, funded by the IDB, addresses some of the technical and institutional gaps Suriname's agricultural sector, such as improving the technical capacity for implementing enhanced drainage and irrigation systems which aid in emissions reductions, increasing institutional capacity required for sustainable agriculture management and to upgrade the existing agricultural census and information system. The sustainable development of the agricultural sector will require good policy analysis and planning through improved and qualitatively available agricultural data. The management of data and databases is a foundational support area identified which is essential to ensure progress on climate interventions within the agricultural sector. Enhancing the availability of adequate, up-to-date and highly reliable data can be considered one of the most essential conditions for the further elaboration and implementation of projects to improve the sustainable development of the sector.

Accurate data and statistics are also important for communication and raising public awareness. The lack of data also results in other capacity gaps, such as difficulties in reporting and monitoring actions and progress of on-going projects, and insufficient knowledge and ability to implement evidence-based policy development and planning. Some technical research needs were provided by research/ academic institutions such as Anton de Kom Universiteit van Suriname (ADEKUS), and The Centre of Agriculture and Research in Suriname (CELOS), the SBB and NGO partners. Additional data and information gaps include a lack of proper documentation of lessons learnt, best practices and historical and traditional knowledge, and a lack of public awareness of the role that individuals and communities play in responding to climate change.

5.3.3. Energy

While the energy sector is in the process of establishing many improvement plans, certain data gaps and capacity challenges still persist. These gaps and challenges include a lack of standardized data providing arrangements and institutional arrangements for emissions inventory data as well as insufficient resources for timely data collection and processing. Additionally, there is an absence of a QA/QC system to verify and validate data collected along with an inadequate MRV system to ensure data is processed and reported timely, thoroughly and in accordance with UNFCCC standards. Furthermore, there is a lack of a technical database for public use, a need for increased legally based incentives to encourage an increased solar energy uptake, including tariffs on battery imports and an incomplete assessment of energy tariff rates. These gaps are intended to be addressed through the finalization and implementation of the ESP, Renewable Energy Act, Rural Electrification Act and CREEBC.

5.3.4. Transport and urban infrastructure

Within the transport and urban infrastructure sector, certain gaps were identified, mainly a lack of technical and financial capacity. As Suriname currently faces an economic recession, the consumer behavior, expenditure, and priorities of the population will naturally be impacted. While the country prioritizes climate adaptation and mitigation and meeting the goals of the NDCs, some ministries such as transport and urban infrastructure have challenges balancing the economic considerations with that of climate action. For example, even though a transition to more eco-friendly mode of transport, such as hybrids and electric vehicles, is a goal for the country, without the financial support or right incentives, affordability and access will continue to be a challenge.

In addition to the financial challenges, the technical and basic awareness of climate change and the severity of the risks posed to Suriname has been identified as a major gap by the Ministry of Transport, Communications and Tourism. Suriname's identity and status as a HFLD, carbon negative country has allowed misinterpretation of the vulnerabilities that the country still has, and susceptibility to climate change impacts.

5.3.5. Waste

In Suriname, whereas the collection of waste has improved, composting is still in a training phase which results in a lack of awareness of households for separating waste, plus there is no payment for waste collection by households. As regards to GHG inventory reporting, the country lacks:

- Available trained staff for data collection at company level;
- A robust QA/QC system;
- Trained workers at disposal sites to collect data.

In addition, documentation of data sources, assumptions and calculation methodologies are only partially available.

5.4. Suggestions and needs for improvement of reporting

Suriname is at a high risk of being severely impacted by climate change due to the occurrences of droughts, floods, and severe storms coupled with relatively low capacity to prepare for and manage these. As a HFLD country and a SIDS, large amounts of funding are available for Suriname. However, enhancement of access to climate finance will be improved through more transparent, structured, and robust monitoring, reporting and verification of technical and financial support being received. This will be improved as Suriname continues to develop its domestic MRV system, which will enhance the ability to identify gaps, plan projects, ensure sufficient allocation to various sectors and projects. The priority areas where there is significant room for improvement of reporting are: i) Capacity building, ii) Technology Transfer iii) Finance, and iv) Education and Awareness.

Priority areas for further improvement are:

- Institutional arrangements to ensure a permanent body in charge of reporting to the UNFCCC
- Capacity building of national experts and the strengthening of national institutions to ensure the technical skills for thorough data collection, processing, monitoring, and reporting
- Developing a QA/QC system as per IPCC guidelines to ensure data quality and consistency
- Education and awareness within the general public as well as public and private sector institutions
- Development of data sharing protocols

Strengthened institutional arrangements will allow improved coordination between organizations, NGOs, and the private sector. This can be achieved though cross-sectoral systems to ensure cohesion, efficient and effective management, informed policy and planning developments and more intersection and detailed climate risk assessments and impacts. Climate change is not restricted to one sector or Ministry, but operates and impacts in a cross-sectoral, intersectional nature. Clear definition of role and responsibilities on different aspects of climate adaptation and mitigation efforts and activities is needed as fragmentation and overlap of responsibilities and mandates exists. Ensuring robust governance structures in developing and implementation projects will be crucial for the success and long-term sustainability of these projects. In addition, inter-ministerial collaboration and partnership is needed at all levels, including on a technical and legislative level.

All sectors, including transport, energy, waste, agriculture, and forestry are highly susceptible to climate risks and disasters. All sectors will also play an important role in the achievement of Suriname's climate mitigation and adaptation goals. As such it is vital to enhance climate awareness within all ministries. Lack of awareness has been identified as a common gap in many sectors of the country. Workshop and practical knowledge building of climate change and its impact on specific areas, projects, and policies, will promote cooperation of ministerial bodies and technical climate experts, in project implementation and policy development. Publication and media sharing of ongoing activities, progress, as well as climate specific risks and challenges the country faces can be helpful in stimulating overall public awareness which will fuel urgency, action, and promote opportunities for stakeholder engagement and public participation.

APPENDIX:

Table 36. GHG Inventory Results 2000-2017 (Emission in Ton CO2 eq (-) Removals/ Sinks & (+) emissions)

No	GHG inventory FOLU Category/ sub-category			2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
1	**Forest land**	Forest land		-5,859,442.52	-6,448,990.24	-7,748,409.42	-8,995,064.34	-10,229,590.50	-11,373,123.06	-12,564,703.59	-13,957,368.39	-15,050,859.63	-16,255,267.55	-17,874,082.17	-18,423,657.47	-19,230,625.64	-20,613,637.94	-20,707,609.65	-21,662,767.82	-22,827,103.58	-22,798,375.96
		FL remaining FL	FL-FL	-4,695,120.13	-4,120,345.46	-4,255,442.24	-4,337,774.77	-4,407,978.54	-4,387,188.70	-4,414,446.83	-4,642,789.23	-4,571,958.08	-4,612,043.61	-5,066,535.84	-4,451,788.75	-4,094,434.52	-4,313,124.43	-3,242,773.74	-3,033,609.52	-3,033,622.88	-1,840,572.87
		Land converted to FL	CL-FL	-300,239.84	-600,479.68	-900,719.52	-1,200,959.36	-1,501,199.20	-1,801,439.04	-2,101,678.89	-2,401,918.73	-2,702,158.57	-3,002,398.41	-3,302,638.25	-3,602,878.09	-3,903,117.93	-4,203,357.77	-4,503,597.61	-4,803,837.45	-5,104,077.29	-5,404,317.13
			GL-FL	-764,473.22	-1,528,946.44	-2,293,419.67	-3,057,892.89	-3,822,366.11	-4,586,839.33	-5,351,312.56	-6,115,785.78	-6,880,259.00	-7,644,732.22	-8,409,205.45	-9,173,678.67	-9,938,151.89	-10,702,625.11	-11,467,098.33	-12,231,571.56	-12,996,044.78	-13,760,518.00
			WL-FL	-84,886.72	-169,773.45	-254,660.17	-339,546.90	-424,433.62	-509,320.35	-594,207.07	-679,093.80	-763,980.52	-848,867.25	-933,753.97	-1,018,640.70	-1,103,527.42	-1,188,414.15	-1,273,300.87	-1,358,187.60	-1,443,074.32	-1,527,961.05

			SL-FL	-7,019.57	-14,039.13	-21,058.70	-28,078.26	-35,097.83	-42,117.40	-49,136.96	-56,156.53	-63,176.09	-70,195.66	-77,215.22	-84,234.79	-91,254.36	-98,273.92	-105,293.49	-112,313.05	-119,332.62	-126,352.19
			OL-FL	-7,703.04	-15,406.08	-23,109.12	-30,812.16	-38,515.20	-46,218.24	-53,921.28	-61,624.32	-69,327.36	-77,030.40	-84,733.44	-92,436.48	-100,139.52	-107,842.56	-115,545.60	-123,248.64	-130,951.68	-138,654.72
2	**Cropland**	Cropland		-20,353.16	36,913.55	31,022.01	25,098.09	19,141.78	13,153.07	7,131.98	1,078.50	-4,630.81	-11,125.64	93,396.08	88,121.83	82,847.57	77,573.32	312,416.71	28,701.72	-26,295.60	-116,776.34
		CL remaining CL	CL-CL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Land converted to CL	FL-CL	0.00	63,388.60	63,706.59	64,024.59	64,342.58	64,660.58	64,978.57	65,296.57	65,614.56	65,932.56	174,968.12	175,815.76	176,663.39	177,511.03	418,476.30	279,869.51	263,334.73	211,088.56
			GL-CL	5,601.93	7,087.83	8,573.72	10,059.61	11,545.50	13,031.40	14,517.29	16,003.18	17,489.08	18,974.97	20,460.86	21,946.76	23,432.65	24,918.54	26,404.43	53,414.86	60,803.42	68,140.65
			WL-CL	-25,955.10	-33,562.88	-41,170.66	-48,778.44	-56,386.22	-63,994.00	-71,601.78	-79,209.56	-86,817.35	-94,425.13	-102,032.91	-109,640.69	-117,248.47	-124,856.25	-132,464.03	-140,071.81	-147,679.59	-155,287.38
			SL-CL	0.00	0.00	-87.64	-207.67	-360.09	-544.90	-762.10	-1,011.69	0.00	-1,608.04	0.00	0.00	0.00	0.00	0.00	-144,689.46	-178,324.95	-211,714.80

			OL-CL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-917.11	0.00	0.00	0.00	0.00	0.00	0.00	-19,821.39	-24,429.21	-29,003.37
3	**Grassland**	Grassland		527,591.06	462,155.15	303,195.97	142,461.18	-20,049.24	-184,335.29	-350,396.96	-518,234.25	-686,987.84	-859,235.69	-802,936.24	-961,585.72	-1,120,494.07	-1,279,661.29	-1,114,837.80	-1,604,629.69	-1,823,139.43	-2,090,621.85
		GL remaining GL	GL-GL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Land converted to GL	FL-GL	0.00	91,244.20	91,244.20	91,244.20	91,244.20	91,244.20	91,244.20	91,244.20	91,244.20	91,244.20	240,851.61	240,851.61	240,851.61	240,851.61	565,101.19	374,313.49	351,698.39	280,586.71
			CL-GL	600,498.37	516,725.56	433,195.96	349,572.24	265,854.40	182,042.46	98,136.39	14,136.22	-69,958.07	-154,146.48	-237,229.68	-321,002.49	-404,775.29	-488,548.10	-572,320.90	-674,155.77	-763,676.56	-853,566.61
			WL-GL	-63,689.73	-127,379.47	-191,069.20	-254,758.93	-318,448.67	-382,138.40	-445,828.13	-509,517.87	-573,207.60	-636,897.33	-700,587.07	-764,276.80	-827,966.53	-891,656.27	-955,346.00	-1,019,035.73	-1,082,725.47	-1,146,415.20
			SL-GL	-1,277.78	-2,555.55	-6,314.67	-11,728.02	-18,795.59	-27,517.40	-37,893.43	-49,923.69	-11,499.98	-78,946.91	-18,235.94	-21,312.13	-24,624.72	-28,173.70	-31,959.08	-148,186.32	-180,382.33	-212,677.05
			OL-GL	-7,939.80	-15,879.59	-23,860.31	-31,868.31	-39,903.59	-47,966.14	-56,055.98	-64,173.10	-123,566.39	-80,489.17	-87,735.16	-95,845.92	-103,979.14	-112,134.84	-120,313.01	-137,565.36	-148,053.47	-158,549.71

4	**Wetland**	Wetland		28,848.99	53,736.28	53,736.28	53,736.28	53,736.28	53,736.28	53,736.28	53,736.28	53,736.28	53,736.28	94,565.94	94,565.94	94,565.94	94,565.94	183,038.24	131,224.09	124,880.42	105,462.05
		WL remaining WL	WL-WL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Land converted to WL	FL-WL	0.00	24,887.29	24,887.29	24,887.29	24,887.29	24,887.29	24,887.29	24,887.29	24,887.29	24,887.29	65,716.96	65,716.96	65,716.96	65,716.96	154,189.25	102,375.10	96,031.43	76,613.06
			CL-WL	22,151.16	22,151.16	22,151.16	22,151.16	22,151.16	22,151.16	22,151.16	22,151.16	22,151.16	22,151.16	22,151.16	22,151.16	22,151.16	22,151.16	22,151.16	22,151.16	22,151.16	22,151.16
			GL-WL	6,697.83	6,697.83	6,697.83	6,697.83	6,697.83	6,697.83	6,697.83	6,697.83	6,697.83	6,697.83	6,697.83	6,697.83	6,697.83	6,697.83	6,697.83	6,697.83	6,697.83	6,697.83
			SL-WL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			OL-WL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	**Settlements**	Settlements		41,577.91	1,753,275.95	1,792,300.37	1,831,401.31	1,870,578.76	1,909,832.72	1,949,163.19	1,988,570.18	2,058,532.19	2,067,613.70	5,299,361.19	5,384,494.51	5,469,777.93	5,555,211.47	12,943,481.85	9,004,984.92	8,555,371.42	7,030,452.69

		SL remaining SL	SL-SL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Land converted to SL	FL-SL	0.00	1,699,889.86	1,726,898.75	1,753,907.65	1,780,916.54	1,807,925.43	1,834,934.33	1,861,943.22	1,888,952.12	1,915,961.01	5,136,438.24	5,208,432.10	5,280,425.97	5,352,419.83	12,727,100.44	8,657,662.04	8,166,373.67	6,600,007.13
			CL-SL	445.81	576.49	899.31	1,293.15	1,758.01	2,293.87	2,900.75	3,578.65	24,462.06	5,147.48	1,752.55	1,883.23	2,013.90	2,144.58	2,275.25	42,200.79	51,582.45	60,896.55
			GL-SL	41,132.10	52,809.61	64,502.31	76,200.51	87,904.21	99,613.41	111,328.11	123,048.31	145,118.01	146,505.21	161,170.39	174,179.17	187,338.06	200,647.06	214,106.16	305,122.09	337,415.30	369,549.00
			WL-SL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			OL-SL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	**Other land**	Other land		22.05	17,414.77	17,730.12	18,045.47	18,360.82	18,676.17	18,991.53	19,306.88	48,775.28	19,937.58	317,599.58	322,476.39	327,353.19	332,229.99	133,219.67	241,434.91	158,700.30	72,938.27
		OL remaining OL	OL-OL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

		Land converted to OL	FL-OL	0.00	17,386.46	17,695.55	18,004.64	18,313.73	18,622.82	18,931.91	19,241.00	19,550.09	19,859.18	317,514.93	322,385.47	327,256.01	332,126.55	133,109.97	221,933.76	134,692.57	44,458.42
			CL-OL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3,351.87	4,131.06	4,904.57
			GL-OL	22.05	28.31	34.57	40.83	47.09	53.35	59.62	65.88	29,225.19	78.40	84.66	90.92	97.18	103.44	109.70	16,149.28	19,876.67	23,575.28
			WL-OL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			SL-OL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Sum Land category	-5,281,756	-4,125,495	-5,550,425	-6,924,322	-8,287,822	-9,562,060	-10,886,078	-12,412,911	-13,581,435	-14,984,341	-12,872,096	-13,495,585	-14,376,575	-15,833,719	-8,250,291	-13,861,052	-15,837,586	-17,796,921

Table 37. GHG Inventory 2000-2017 (Emission in Gg CO2 eq (-) Removals/ Sinks & (+) emissions)

No	GHG inventory FOLU Category/ sub-category			2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
1	**Forest land**	Forest land		-5,859.44	-6,448.99	-7,748.41	-8,995.06	-10,229.59	-11,373.12	-12,564.70	-13,957.37	-15,050.86	-16,255.27	-17,874.08	-18,423.66	-19,230.63	-20,613.64	-20,707.61	-21,662.77	-22,827.10	-22,798.38
		FL remaining FL	FL- FL	-4,695.12	-4,120.35	-4,255.44	-4,337.77	-4,407.98	-4,387.19	-4,414.45	-4,642.79	-4,571.96	-4,612.04	-5,066.54	-4,451.79	-4,094.43	-4,313.12	-3,242.77	-3,033.61	-3,033.62	-1,840.57
		Land converted to FL	CL-FL	-300.24	-600.48	-900.72	-1,200.96	-1,501.20	-1,801.44	-2,101.68	-2,401.92	-2,702.16	-3,002.40	-3,302.64	-3,602.88	-3,903.12	-4,203.36	-4,503.60	-4,803.84	-5,104.08	-5,404.32
			GL-FL	-764.47	-1,528.95	-2,293.42	-3,057.89	-3,822.37	-4,586.84	-5,351.31	-6,115.79	-6,880.26	-7,644.73	-8,409.21	-9,173.68	-9,938.15	-10,702.63	-11,467.10	-12,231.57	-12,996.04	-13,760.52
			WL-FL	-84.89	-169.77	-254.66	-339.55	-424.43	-509.32	-594.21	-679.09	-763.98	-848.87	-933.75	-1,018.64	-1,103.53	-1,188.41	-1,273.30	-1,358.19	-1,443.07	-1,527.96
			SL-FL	-7.02	-14.04	-21.06	-28.08	-35.10	-42.12	-49.14	-56.16	-63.18	-70.20	-77.22	-84.23	-91.25	-98.27	-105.29	-112.31	-119.33	-126.35
			OL-FL	-7.70	-15.41	-23.11	-30.81	-38.52	-46.22	-53.92	-61.62	-69.33	-77.03	-84.73	-92.44	-100.14	-107.84	-115.55	-123.25	-130.95	-138.65
2	**Cropland**	Cropland		-20.35	36.91	31.02	25.10	19.14	13.15	7.13	1.08	-4.63	-11.13	93.40	88.12	82.85	77.57	312.42	28.70	-26.30	-116.78
		CL remaining CL	CL-CL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Land converted to CL	FL-CL	0.00	63.39	63.71	64.02	64.34	64.66	64.98	65.30	65.61	65.93	174.97	175.82	176.66	177.51	418.48	279.87	263.33	211.09
			GL-CL	5.60	7.09	8.57	10.06	11.55	13.03	14.52	16.00	17.49	18.97	20.46	21.95	23.43	24.92	26.40	53.41	60.80	68.14
			WL-CL	-25.96	-33.56	-41.17	-48.78	-56.39	-63.99	-71.60	-79.21	-86.82	-94.43	-102.03	-109.64	-117.25	-124.86	-132.46	-140.07	-147.68	-155.29
			SL-CL	0.00	0.00	-0.09	-0.21	-0.36	-0.54	-0.76	-1.01	0.00	-1.61	0.00	0.00	0.00	0.00	0.00	-144.69	-178.32	-211.71
			OL-CL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.92	0.00	0.00	0.00	0.00	0.00	0.00	-19.82	-24.43	-29.00

3	**Grassland**	Grassland		527.59	462.16	303.20	142.46	-20.05	-184.34	-350.40	-518.23	-686.99	-859.24	-802.94	-961.59	-1,120.49	-1,279.66	-1,114.84	-1,604.63	-1,823.14	-2,090.62
		GL remaining GL	GL-GL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Land converted to GL	FL-GL	0.00	91.24	91.24	91.24	91.24	91.24	91.24	91.24	91.24	91.24	240.85	240.85	240.85	240.85	565.10	374.31	351.70	280.59
			CL-GL	600.50	516.73	433.20	349.57	265.85	182.04	98.14	14.14	-69.96	-154.15	-237.23	-321.00	-404.78	-488.55	-572.32	-674.16	-763.68	-853.57
			WL-GL	-63.69	-127.38	-191.07	-254.76	-318.45	-382.14	-445.83	-509.52	-573.21	-636.90	-700.59	-764.28	-827.97	-891.66	-955.35	-1,019.04	-1,082.73	-1,146.42
			SL-GL	-1.28	-2.56	-6.31	-11.73	-18.80	-27.52	-37.89	-49.92	-11.50	-78.95	-18.24	-21.31	-24.62	-28.17	-31.96	-148.19	-180.38	-212.68
			OL-GL	-7.94	-15.88	-23.86	-31.87	-39.90	-47.97	-56.06	-64.17	-123.57	-80.49	-87.74	-95.85	-103.98	-112.13	-120.31	-137.57	-148.05	-158.55
4	**Wetland**	Wetland		28.85	53.74	53.74	53.74	53.74	53.74	53.74	53.74	53.74	53.74	94.57	94.57	94.57	94.57	183.04	131.22	124.88	105.46
		WL remaining WL	WL-WL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Land converted to WL	FL-WL	0.00	24.89	24.89	24.89	24.89	24.89	24.89	24.89	24.89	24.89	65.72	65.72	65.72	65.72	154.19	102.38	96.03	76.61
			CL-WL	22.15	22.15	22.15	22.15	22.15	22.15	22.15	22.15	22.15	22.15	22.15	22.15	22.15	22.15	22.15	22.15	22.15	22.15
			GL-WL	6.70	6.70	6.70	6.70	6.70	6.70	6.70	6.70	6.70	6.70	6.70	6.70	6.70	6.70	6.70	6.70	6.70	6.70
			SL-WL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			OL-WL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	**Settlements**	Settlements		41.58	1,753.28	1,792.30	1,831.40	1,870.58	1,909.83	1,949.16	1,988.57	2,058.53	2,067.61	5,299.36	5,384.49	5,469.78	5,555.21	12,943.48	9,004.98	8,555.37	7,030.45
		SL remaining SL	SL-SL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Land converted to SL	FL-SL	0.00	1,699.89	1,726.90	1,753.91	1,780.92	1,807.93	1,834.93	1,861.94	1,888.95	1,915.96	5,136.44	5,208.43	5,280.43	5,352.42	12,727.10	8,657.66	8,166.37	6,600.01

			CL-SL	0.45	0.58	0.90	1.29	1.76	2.29	2.90	3.58	24.46	5.15	1.75	1.88	2.01	2.14	2.28	42.20	51.58	60.90
			GL-SL	41.13	52.81	64.50	76.20	87.90	99.61	111.33	123.05	145.12	146.51	161.17	174.18	187.34	200.65	214.11	305.12	337.42	369.55
			WL-SL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			OL-SL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	**Other land**	Otherland		0.02	17.41	17.73	18.05	18.36	18.68	18.99	19.31	48.78	19.94	317.60	322.48	327.35	332.23	133.22	241.43	158.70	72.94
		OL remaining OL	OL-OL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Land converted to OL	FL-OL	0.00	17.39	17.70	18.00	18.31	18.62	18.93	19.24	19.55	19.86	317.51	322.39	327.26	332.13	133.11	221.93	134.69	44.46
			CL-OL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.35	4.13	4.90
			GL-OL	0.02	0.03	0.03	0.04	0.05	0.05	0.06	0.07	29.23	0.08	0.08	0.09	0.10	0.10	0.11	16.15	19.88	23.58
			WL-OL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			SL-OL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Sum Land category	-5,282	-4,125	-5,550	-6,924	-8,288	-9,562	-10,886	-12,413	-13,581	-14,984	-12,872	-13,496	-14,377	-15,834	-8,250	-13,861	-15,838	-17,797

Table 38: Financial Support Received from the GCF and GEF since 2017

Project name	Source of funding	Amount	Approval date	Type of funding
GEEREF NeXt	GCF	$750,000,000	2017	Equity / grant
Support to Eligible Parties to Produce the Sixth National Report to the CBD	GEF	$1,501,500	2017	Grant
Improving Environmental Management in the Mining Sector of Suriname, with Emphasis on Gold Mining	GEF	$7,589,041	2018	Grant
Technology Needs Assessments - Phase III (TNA Phase III)	GEF	$6,210,000	2018	Grant
Setting the Foundations for Zero Net Loss of the Mangroves that Underpin Human Wellbeing in the North Brazil Shelf LME	GEF	$592,202	2018	Grant
GEF Support to UNCCD 2018 National Reporting Process - Umbrella III	GEF	$1,981,735	2018	Grant
Enhancing Caribbean Civil Society's Access and Readiness for Climate Finance	GCF (Readiness)	$1,296,958	2019	Grant
NDA strengthening and country programming support for Suriname	GCF (Readiness)	$317,923	2019	Grant
Caribbean Disaster Emergency Management Agency (CDEMA) Early Warning Systems (EWS)	GCF (Readiness)	$1,747,223	2019	Grant
CReW+: An Integrated Approach to Water and Wastewater Management Using Innovative Solutions and Promoting Financing Mechanisms in the Wider Caribbean Region	GEF	$14,943,938	2019	Grant
Implementation of the Strategic Action Programme to Ensure Integrated and Sustainable Management of the Transboundary Water Resources of the Amazon River Basin Considering Climate Variability and Change	GEF	$11,735,780	2019	Grant
Strengthening the foundation for a climate responsive agricultural sector in the Caribbean	GCF (Readiness)	$1,199,943	2020	Grant
Improving the capacity of the Ministry of Agriculture of Suriname to build resilience to climate change in the agriculture sector	GCF (Readiness)	$496,467	2020	Grant
Umbrella Programme for Preparation of National Communications (NCs) and Biennial Update Reports (BURs) to the UN Framework Convention on Climate Change (UNFCCC)	GEF	$10,110,480	2020	Grant
Support to Preparation of the Fourth National Biosafety Reports to the Cartagena Protocol on Biosafety - ASIA-PACIFIC, GRULAC, CENTRAL AND EASTERN EUROPE REGIONS	GEF	$1,424,500	2020	Grant

The Amazon Bioeconomy Fund: Unlocking private capital by valuing bioeconomy products and services with climate mitigation and adaptation results in the Amazon	GCF	$598,000,000	2021	Equity / grant / loan
Strengthening management of protected and productive landscapes in the Surinamese Amazon	GEF	$5,165,138	2021	Grant
ISLANDS-Caribbean Incubator Facility	GEF	$10,000,000	2021	Grant
ISLANDS - Caribbean Child Project	GEF	$11,000,000	2021	Grant
Amazon Regional Technical Assistance	GEF	$8,256,881	2021	Grant
Strengthening of climate change finance planning processes to enable implementation, monitoring and reporting of climate actions in Suriname	GCF (Readiness)	$999,996	2022	Grant
GEF GOLD+: Advancing formalization and mercury-free gold in Suriname	GEF	$5,250,000	2022	Grant
Strengthening national-level institutional and professional capacities of country Parties towards enhanced UNCCD monitoring and reporting – GEF 7 EA Umbrella 1	GEF	$1,954,338	2022	Grant
Global Biodiversity Framework Early Action Support (Global 6)	GEF	$1,917,811	2022	Grant

Table 39: ACTO project provided support for priority support areas in Suriname (ACTO)

Project Name	**Expected Outcome**
Amazon Project: Regional action in the area of water resources	Improved technical capacity of institutions responsible for water resources management Data and information for the integrated management of water resources Knowledge dissemination
ACTO Biomaz: Support to the ACTO biodiversity program under the CBD Framework in Latin America	Improved availability of data Improved practices for the sustainable management of biological diversity and ecosystem services Enhanced coordination among member countries of a Regional Program on Biological Diversity for the Amazon Region
Regional Project for the Management, Monitoring and Control of Species of Wild Fauna and Flora Threatened by Trade Bioamazon Project	Interoperable national and regional information and knowledge management systems National electronic permitting mechanisms/systems/processes in operation, regionally compatible, strengthened and harmonized with international agreements Strengthened investments

Project Implementation of the Strategic Actions Program in the Amazon River Basin considering climate variability and change	Increased ability of Amazon communities to adapt to extreme hydrological events Improved understanding of climate impacts on major infrastructure projects Institutional strengthened water governance at the national and regional level Improve data and information to inform policies and decision-making

Table 40: Donor matrix showing the current indicative allocations per sector in Suriname

Implementing Agency	Project	Area/ Sector	Period	Budget, Donor
UNDP (supported by ROM)	Amazone sustainable landscape project	Forest natural resources	Period: 2020-2024 (estimated)	USD 6,473,600 Donor: GEF
UNDP	GCCA+ phase 2 project: Mangrove/integrated coastal and water management project	Natural resources/ Mangrove /Forest	Period: April 2020-September 2023 (3.5 years)	EUR 5,500.000 Donor: European Union (with 500,000 from UNDP)
UNDP	Green agreement, climate financing based on forests and small-scale mining	Green finance	Budget: To be confirmed Period: To be confirmed	Budget: To be confirmed Donor: SDG Fund component 1
UNDP	For pension funds as part of the banking and finance sector for analysis into greening finance, also looks at small-scale mining and forestry sector.	Green finance	Period: To be confirmed	Budget: To be confirmed Donor: SDG Fund component 1
Ministry of Economic Affairs and the Ministry of Natural Resources	Suriname Competitiveness and Sector Diversification (SCSD) Project	Forest/Governance/Mining/SME	Period: 2020-2025	Budget: USD 23,000,000 Donor: World Bank
IDB	Development of the information/ traceability systems with SBB (SFISS), improving capacities to adapt monitoring technology	Information/ traceability technology	Period: 2019-2021	Budget: To be confirmed Donor: GEF
IDB	Promoting Sustainable Forest Management	Improving forest management procedures and strengthening the SFISS	2021-2023	Budget: USD 300,000
Government of Suriname and	“Makandra” (meaning together)	Multiple sectors: e.g. justice, police,	Period: 2021-2024	Budget: EUR 6,000,000 (estimated) Donor: The Netherlands

Government of the Netherlands		financial, environment (can include forest and environment)		
Anton de Kom University	Mangrove restoration in Bigipan MUMA: through technical measures, seeking (science based) evidence, nature-based solutions and engaging local communities. Funded from Blue Carbon Fund (regional total budget 18 million managed by IDB): aiming to restore mangroves at the same time generating co-benefits like biodiversity conservation and livelihoods.	Mangrove restoration	Unknown	Budget: USD 1,705,000 (average project: USD 1.5 to 2.5 million grant) Donor: UK Department for Environment, Food and Rural Affairs (DEFRA)
Tropenbos International Suriname (TBS)	Climate smart land-use practices in Pikin Slee village (Upper Suriname region), including an agroforestry demonstration	Climate smart agriculture	Period: Jan 2019-July 2021	Budget: USD 49,500 Donor: UNDP - GEF Small grants programme
Tropenbos International Suriname (TBS) and TBI Netherlands	Programme in the Upper Suriname River landscape focussing on landscape governance, climate smart landuse practices and responsible business and finance	Forestry/Agro-forestry	Period: on-going (2019-2023)	Budget: EUR 800,000 Donor: DGIS (Netherlands)
Tropenbos International (TBI) Suriname and VHL Larenstein University (Netherlands)	Community forests: capacity building and sustainable forest management for village development. One community forest (Bigi Poika) in Para functions well; in Brownsweg more difficult due to higher pressure on the forest and competition from gold mining.	Forestry	Period: November 2019-October 2021	Budget: USD 115,00 Donor: Alcoa Foundation
Tropenbos International Suriname (TBS)	Towards a more liveable Paramaribo". The first Urban Forestry project in our	Forestry	Period: January 2019-	Budget: EUR 186,569 Donor: UTSN

	capital. ITC - University of Twente		October 2021	
Conservation International	Our Future Forests - Amazonia Verde	Indigenous forest communities/ restoration and sustainable management of rainforest	Period: 2020-2025	Budget: USD 17.4 million Donor: French government
Conservation International Suriname	Trio and Wayana Indigenous Community Empowerment (TWICE)	Indigenous forest communities	Period: Jan 2020-Dec 2022	Budget: EUR 285,160 Donor: European Union
Conservation International Suriname	Sustainable protection of the livelihood of indigenous communities in South Suriname	Non-Forest Timber Products	Period: Jan 2019-Oct 2021	Budget: USD 220,336 Donor: Dutch government
Conservation International Suriname	Sustainable income initiatives and biodiversity conservation in two indigenous communities in southern Suriname	Indigenous forest communities/ Non-Forest Timber Products	Period: March 2021-Feb 2023	Budget: USD 198,894.56 Donor: German Government
IUCN-South (coordinator) with consortium of trained organizations in Brazil, Colombia, Ecuador, Guyana, Peru and Suriname	Amazonia 2.0	Forests	Period: started in 2017	Budget: to be confirmed Donor: European Union
Ministry of Natural Resources and the National Institute for Environment and Development Suriname (NIMOS) with the support of UNDP and other parties)	Improving Environmental Management in the mining Sector of Suriname with emphasis on Gold Mining (EMSAG project)	Natural Resources	Period: 2018-2025	Budget: USD 7,589,041 Donor: GEF
OTCA To be confirmed: which partner(s) this project will support in Suriname (Nature Conservation Division of the Forestry service, SBB, Herbarium of Suriname, National Zoological Collection of Suriname)	Bioamazon Project (regional)	Wildlife trade - the regional project for the management, monitoring and control of wild flora and fauna species threatened by trade.	Period: 2021-2022	Budget: USD 870,000 Donor: KfW (German Development Bank)

WWF	FSC coordinator	Forest certification	WWF has no funds itself to support forest companies or forest communities with FSC certification. WWF sees the possibility to access REDD+ funds, or, that funds from oil and gas exploration are set aside in a sovereign wealth fund and are allocated to forest conservation	
WWF	Ecosystem Services Observatory for the Guiana Shield (ECOSEO): The goal is to promote and preserve the benefits given by terrestrial ecosystems (forest savannahs and freshwater) of the Guiana Shield	Forest preservation	Period: 19 months (Feb 2019- Jun 2021)	Budget: EUR 415,000 Donor: WWF France (with ERDF funds-PCIA)
WWF	Supporting mercury phase-out in the Guianas; Guyana. Suriname and French Guiana	Mining (gold) sector	Period: 4 years (Jan 2020- Jun 2023)	Budget: EUR 876,989 Donor: French Global Environment Facility represented by AFD
WWF	Early Warning System (EWS) piloted in Guianas to support near-real time forest monitoring and management and the prediction of deforestation	Forest preservation	Period: 4 months (May 2021- Aug 2021)	Budget: USD 41,800 Donor: WWF NL and Belgium
WWF	Collaborative agenda developed with key government institutions and Private sector to promote the adoption of forest certification within government policies	Forest conservation	Period: 7 months (Jun 2021-Dec 2021	Budget: USD 31,100 Donor: FSC
WWF	Suriname Jaguar Conservation and Survey Project	Conservation of jaguars (wildlife)	Period: 2 years (Apr 2021- Apr 2023)	Budget: USD 288,120 Donor: WWF Belgium with co-funding from project partners
WWF	Full concept on a regional observatory, prepared to support decision-making, monitoring of natural resources, and civil society advocacy	Support in the monitoring of natural resources and civil society advocacy	Start date: 2021	Budget: To be confirmed Donor: Unfunded, potentially WWF Belgium
WWF	Integrated landscape strategy for our interventions developed, in a to be determined key area in Suriname		Start date: July 2021	Budget: To be confirmed Donor: potentially WWF Belgium

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