Solomon Islands Government

Ministry of Environment, Climate Change, Disaster Management and Meteorology

First Biennial Update Report

First Biennial Update Report submitted to the United Nations Framework Convention on Climate Change

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The First Biennial Update Report is a significant national contribution to fulfilling the country's commitments to the UNFCCC. This document was produced with the technical and financial support of the United Nations Environment Programme (UNEP) and the Global Environment Facility (GEF).

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Finally, but not the least, the financial support from the Global Environment Facility through the United Nations Environment Programme is greatly acknowledged.

FOREWORD

The Solomon Islands are among the most susceptible countries to the effects of climate change, with severe consequences such as the destruction of communities and livelihoods, the submergence of entire islands, and the displacement of people despite their minimal contribution to global greenhouse gas emissions.

To fulfil its reporting requirements under the UNFCCC as a Non-Annex I Party, the Solomon Islands has prepared its First Biennial Updated Report (FBUR). This report updates the previously submitted National Communication and details the country's efforts to implement the Convention. It includes information on the status of greenhouse gas (GHG) emissions and removals, as well as measures taken to reduce emissions and enhance sinks, including details on mitigation actions, needs, and support received. It is evident that our capacity to adapt to and mitigate climate change is severely limited and requires additional resources to build resilience and aim for the goal of keeping global temperature rise well below 2 degrees Celsius, with efforts to limit it to 1.5 degrees Celsius.

The FBUR indicates that GHG emissions have continued to rise during the 2019–2021 reporting period, reflecting economic development and challenges in sectors like waste management and transportation. Nonetheless, the Solomon Islands remain carbon-neutral, with GHG removals exceeding annual emissions during this period.

This report highlights our critical needs for scaling up adaptation and mitigation actions and aims to encourage the mobilization of resources and support necessary for the Solomon Islands to effectively address the climate risks we face.

Ms. Susan Sulu
Permanent Secretary

EXECUTIVE SUMMARY

The Solomon Islands' First Biennial Update Report (FBUR) stands out as it is uniquely led and driven by Solomon Islanders from various government sectors and stakeholders, which has significantly contributed to its review and finalization with update on greenhouse gas (GHG) inventories, mitigation efforts, detail support received, and gaps and challenges faced as per the Enhanced Transparency Framework (ETF), Parties to the Paris Agreement submission requirement.

The Solomon Islands remains net carbon negative in terms of net GHG emissions including the removals. The Solomon Islands' total anthropogenic GHG emissions (excl. removals from the Forestry Sector) in the year 2019 was 862.23 Gg CO2e and 2020 was 890.61 Gg CO2e. During the inventory year 2020, the direct CO2 emission was 396.03 Gg, CH4 emission was 16.37 Gg and N2O emissions was 0.14 Gg. Emissions of other GHGs like per-fluorocarbons (PFCs), hydro-fluorocarbons (HFCs) and Sulphur hexafluoride (SF6) were not estimated since very limited (negligible) applications, and no manufacturing of the products containing these gases.

Table 1: Solomon Islands Total GHG Emission-Sector wise (excluding removals), Gg CO2e: 2019 and 2020

Inventory Year: 2019-2020 Categories	Net CO2 Emission (CO2 Equivalent Gg) 2019	2020
1. Energy	382.31	400.44
2. Industrial Processes and Product Use	0.24	0.45
3. Agriculture, Forestry and Other Land Use	130.39	131.11
3.B.1. Forest Land	-25,916.56	-28,062.10
4. Waste	349.30	358.61
Total GHG Emissions, excl. Removals	862.23	890.61
Total GHG Emissions, incl. Removals	-25,054.33	-27,171.49

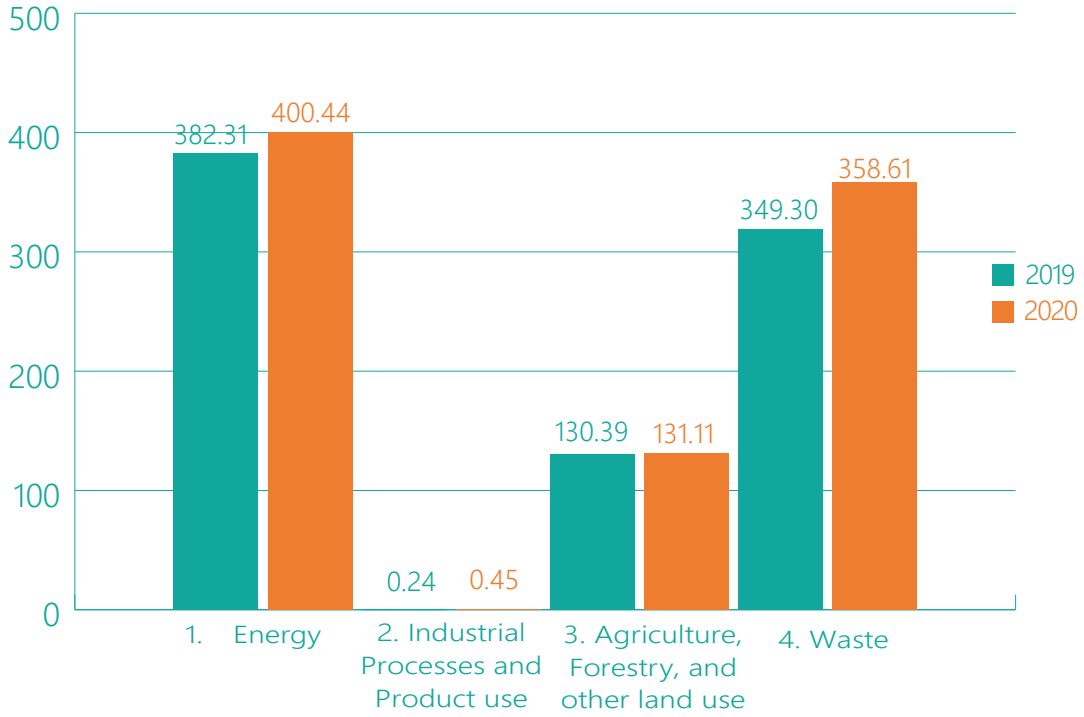

Figure 1: Solomon Islands Total GHG Emission - Sector wise (excluding removals), Gg CO2e: 2019 and 2020

GHG emissions comprises mainly of Carbon Dioxide (CO2) as major contributor from combustion of fossil fuel for generation of electricity, transportation, and other sectors; Methane (CH4) and Nitrous Oxide (N2O) emissions from agriculture-livestock (Enteric fermentation and Manure management), Waste Sector (Solid waste and wastewater) and Land. Solid waste and Livestock are a major source of Methane emission in Solomon Islands. The Solomon Islands GHG inventory includes the emissions from the indirect GHGs i.e., Oxides of Nitrogen (NOx), Carbon Monoxide (CO), Non-Methane Volatile Organic Compounds (NMVOC) and Sulphur dioxide (SO2). However, these indirect GHG emissions are not accounted in the aggregated national GHG. A summary of GHG emissions (excluding removals) of these gases are presented in Table 2.

Table 2: Solomon Islands Gas wise GHG emissions (excluding removals), Gg: 2019 and 2020

Solomon Islands GHG Emissions (excluding removals) (CO2 Equivalents Gg)				
Year	**CO2eq**	**CO2**	**CH4**	**N2O**
2019	862.23	378.87	15.94	0.140
2020	890.61	396.03	16.37	0.136

The total GHG emissions in Solomon Islands is majorly contributed from Energy sector (Energy Generation and Transport) 45%, followed by Waste sector (MSW and domestic wastewater) 40% and AFOLU (Livestock and Aggregate sources and non-CO2 emissions sources on land) 15% and Industrial Processes and Product Use (Lubricant Use) 0.1%.

Table 3: Solomon Islands GHG Emission-Sector and Sub-sector wise (excluding removals), Gg CO2e: 2019 and 2020

Inventory Year: 2019-2020	**Net CO2 Emissions, (CO2 Equivalents Gg)**	
Categories	**2019**	**2020**
Total National Emissions and Removals		
1 - Energy	382.31	400.44
1.A - Fuel Combustion Activities	382.31	400.44
1.A.1 - Energy Industries	67.20	67.96
1.A.3 - Transport	306.65	326.23
1.A.4 - Other Sectors	8.46	6.25
2 - Industrial Processes and Product Use	0.235	0.449
2.D - Non-Energy Products from Fuels and Solvent Use	0.235	0.449
2.D.1 - Lubricant Use	0.235	0.449
3 - Agriculture, Forestry, and Other Land Use	130.39	131.11
3.A - Livestock	116.81	120.09

3.A.1 - Enteric Fermentation	11.00	10.15
3.A.2 - Manure Management	105.81	109.94
3.C - Aggregate sources and non-CO2 emissions sources on land	13.58	11.02
3.C.3 - Urea application	1.93	1.25
3.C.4 - Direct N2O Emissions from managed soils	5.04	3.50
3.C.5 - Indirect N2O Emissions from managed soils	1.64	1.14
3.C.6 - Indirect N2O Emissions from manure management	4.98	5.13
4 - Waste	349.30	358.61
4.A - Solid Waste Disposal	328.16	336.87
4.D - Wastewater Treatment and Discharge	21.13	21.74
Total GHG Emissions, excl. Removals	862.23	890.61
Total GHG Emissions, incl. Removals	-25,054.33	-27,171.49

At the sub-sectoral level, Solid Waste Disposal is the largest GHG emissions contributing sub-category (38.1% –2019 & 37.8% –2020). This is followed by transport sector (36% –2019 & 37% –2020); Manure Management (12.27% –2019 & 12.34% –2020); Energy Industries (Electricity Generation) (7.8% –2019 & 7.6% –2020); Domestic Wastewater Treatment and Discharge (2.5% –2019 & 2.4% –2020); Enteric Fermentation (1.3% –2019 & 1.1% –2020). The remaining less than 1% is contributed from Indirect N2O Emissions from manure management, Direct N2O Emissions from managed soils, Indirect N2O Emissions from managed soils and Urea application respectively.

Key category analysis has been carried out to identify sources with significant impact (up to 95%) on total emission levels or trends. The primary purpose of key category analysis is to prioritize application of higher tier methodologies for key sectors, to design additional requirements of QA/QC for these key categories, and to allocate and make the best use of available resources for sources with significant impact on total emission estimate. This would lead to a reduction in the uncertainties in the estimates to the maximum extent possible. In order to identify the key categories, both, level analysis and trend analysis have been carried out. The analysis is excluding removals and includes all GHGs reported.

The level assessment reveals that the CH4 emission from the Solid Waste Disposal was the largest source with 38% of total emissions occurring in the country, followed by CO2 emissions from road transport accounting for about 19%, CO2 emissions from water-borne navigation for about 16%, CH4 emissions from manure management accounts for about 11%, CO2 emissions from energy industry/electricity generation for about 7.6%, CH4 emissions from wastewater treatment and discharge accounts for about 1.3%, N2O Emissions from manure management about 1.23%, CH4 emissions from enteric fermentation accounts for about 1.14%.

The CO2 emissions from Road transportation contribute 62% to the trend, followed by CO2 emissions from energy industry/electricity generation for about 29% and CO2 emissions from the other sectors for about 6% to the trend.

A consistent time series information on GHG inventory starting from 2011 to 2020 has been

presented in Figure 2 below.

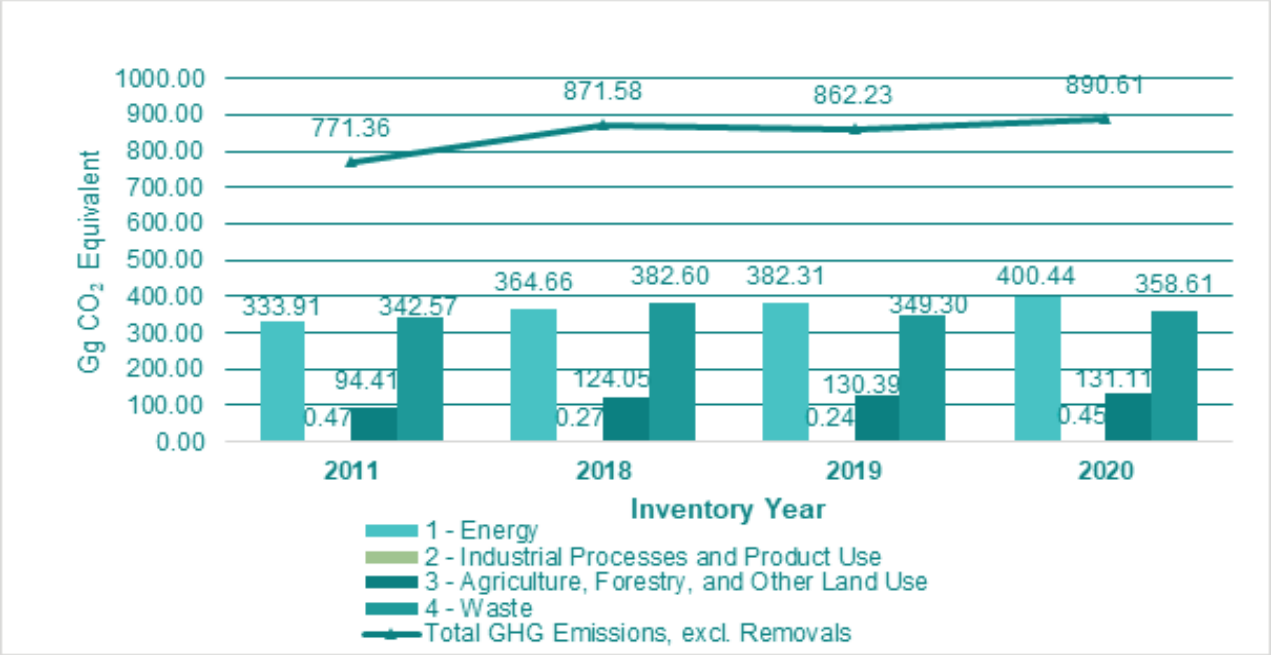

Figure 2: Solomon Islands Total GHG Emission - Sector wise (excluding removals), Gg CO2e: 2019 and 2020

The present GHG inventory of the Solomon Islands serves as a baseline for the country to measure its progress toward reduction of greenhouse gases. It also serves as an integral tool in designing the country's climate change policies and to measure the success of such policies. The current GHG inventory provides comprehensive information about GHG emissions and removals in Solomon Islands for the years 2019 and 2020 and also reflects the GHG emission trend since 2010. The 2010 to 2020 GHG emissions results revealed a reasonably increasing trend over the reporting period with the annual variation dominated by fuel consumption in the energy sector Waste sector- solid waste disposal. The compilation of the GHG inventory continues to be a challenge, especially in the availability of activity data for computation of GHG emissions. The key findings and recommendations of this inventory development exercise have been identified during and highlighted in previous sections of the report; however, data collection, monitoring and verification for GHG emission sector is key takeaway of this exercise. For the future GHG inventory Solomon Islands shall minimize the data gaps and uncertainty specifically Livestock, Energy and Waste sector.

The Solomon Islands faces numerous challenges in implementing effective mitigation efforts, including typical obstacles for developing nations and issues unique to its situation. Key problems include inadequate and inaccurate data on fuel consumption, electricity generation, and transportation, which hinder emissions accounting and planning. Additionally, limited collaboration between government agencies and fuel companies restricts data sharing, underscoring the need for improved cooperation to facilitate informed decision-making and promote sustainable, low-carbon development. The shift to renewable energy necessitates substantial upfront investments, which are impeded by restricted access to funding. Effective mitigation relies on timely capacity building, technology transfer, and financial support, primarily through grants. Delays in donor assistance and slow international financial transfers

further hinder progress, highlighting the necessity for efficient funding mechanisms to mobilize resources for low-carbon projects.

To enhance its GHG inventory compilation system, the Solomon Islands requires both technical and financial resources, along with capacity building. Improving data collection and management will require significant investment, and existing capacity limitations pose a major challenge. The National Inventory Implementation Plan (NIIP) outlines critical areas for improvement, such as Key Category Analysis, Trend Analysis, procedural arrangements, and an integrated Monitoring, Reporting, and Verification (MRV) tool. Comprehensive training for data providers and inventory compilers is essential for effective data management, as previous training efforts have been largely informal and unsustainable.

The Solomon Islands also acknowledges the need for a national climate change trust fund. From 2011 to 2020, the country received USD 283.73 million for climate projects, with significant portions allocated to both mitigation and adaptation. In 2023, the Solomon Islands Government (SIG) developed its GCF Country Programme (CP), outlining climate priorities for funding and proposing projects totaling USD 512.2 million for the GCF-2 funding period from 2024 to 2027. The government has sought financial and technical assistance to manage climate change costs, supporting initiatives like the National Electric Mobility Policy and a feasibility study for an e-Bus market.

In 2020, the country began a Technology Needs Assessment (TNA) to identify key sectors and technologies for climate action. The successful implementation of the 2021 Nationally Determined Contributions (NDC) relies on timely access to financial resources and capacity-building support. The Solomon Islands has requested USD 295,650 in GEF funding to back these initiatives. While the country has received support in technology and capacity building, further training is necessary in areas such as accessing climate finance, resource management, governance, and project management.

The Paris Agreement seeks to limit global warming to well below 2°C, with a target of 1.5°C. The Solomon Islands has submitted its NDCs to the UNFCCC under Article 4 and is operating within the ETF established by Article 13 to ensure clear reporting and progress tracking. Countries, including the Solomon Islands, are encouraged to develop robust MRV systems for greenhouse gas emissions and NDC actions, alongside Monitoring & Evaluation (M&E) systems for adaptation support.

The Solomon Islands aims to establish an Integrated MRV System and database to effectively implement the Paris Agreement and communicate its actions. With support from the Global Green Growth Institute (GGGI), the country developed an NDC MRV roadmap that identifies gaps in the existing framework and recommends a national MRV system. Key recommendations include the establishment of a National MRV Institutional Framework and enhanced training and capacity building.

However, significant challenges remain, including a lack of local renewable energy training, limited technical knowledge, and insufficient financial literacy, all of which hinder the shift to demand-driven investments. Strengthening technical capacity across government and relevant institutions is crucial for effective GHG data collection. Additionally, improving regulatory capacity for carbon trading and empowering stakeholders to design and implement carbon projects are vital. The national Renewable Energy Roadmap's implementation is limited, and ministries often lack the necessary support for carbon assessments. There are also challenges in retaining qualified personnel, impacting technology transfer and climate initiatives.

Overall, improvements are needed across institutional, regulatory, technical, financial, and socio-cultural capacities to develop sustainable proposals. Public understanding of climate change and the benefits of renewable energy is limited, which restricts support for low-carbon technologies. Moreover, there is insufficient awareness of the forest sector's role in mitigation and a lack of understanding of carbon trading markets. Government initiatives are essential to enhance education and awareness of green, low-carbon development, ensuring that the benefits of mitigation strategies are widely recognized and embraced.

ABBREVIATION

AFOLU	Agriculture, Forestry, and Other Land Use
AR5	IPCC Fifth Assessment Report
CCD	Climate Change Division
CH4	Methane
CO	Carbon Monoxide
CO2e	Carbon Dioxide Equivalent (also CO2-eq)
COP	Conference of Parties
GDP	Gross Domestic Product
GEFvvv	Global Environment Facility
Gg	Giga Gram
GHG	Greenhouse Gase
GWP	Global Warming Potential
HFCs	Hydro Florocarbon
IPCC	Intergovernmental Panel on Climate Change
IPPU	Industrial Process and Product use
J-PRISM	Project for Promotion of Regional Initiative Solid Waste Management
LPG	Liquefied Petroleum Gas
MECDM	Ministry of Environment, Climate Change, Disaster Management and Meteorology
MSW	Municipal Solid Waste
N2O	Nitrogen Oxide
NMVOCs	Non-methan Volatile Organic Compound
NOx	Oxides of Nitrogen
PICCAP	Pacific Islands Climate Change Assistance Programme
SIEA	Solomon Islands Electricity Authority
SNC	Second National Communication
SPREP	South Pacific Regional Environment Programme
TNC	Third National Communication
UNDP	United National Development Programme
UNFCCC	United Nationa Framework Conventional on Climate Change

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CHAPTER 1:
NATIONAL CIRCUMSTANCES

1

1.0. National Circumstance

The Solomon Islands is located in the South West Pacific populated mostly by indigenous peoples who have thrived on these Islands for centuries. The Solomon Islands has a parliamentary democracy system and a constitutional monarchy represented by a Governor-General who is the Head of the State. Legislative power is vested with the National Parliament which is elected every 4 years by 50 constituencies. The Cabinet, led by the Prime Minister, holds executive authority and the judicial system is headed by a Chief Justice. In terms of local government, the country is divided into 10 administrative areas, of which nine are provinces administered by elected provincial assemblies, and headed by a Premier, and the 10th is the city of Honiara which is led by an elected City Mayor and councillors, and some appointed councillors.

1.1. Geography, Climate and Demography

Solomon Islands is an archipelagic country. It has a tropical maritime climate. Its location near the Pacific Ring of fire and cyclone genesis zone makes it highly vulnerable to both geological and hydrometeorological hazards. More than 80% of the population reside in vulnerable coastal rural areas relying heavily on subsistence agriculture and fishing for livelihood. Most coastal and inland villages do not have access to electricity, roads and government services to the rural areas are often limited.

1.1.1. Geography

Solomon Islands comprises a scattered archipelago of 997 islands combining mountainous islands as well as low lying coral atolls within a tuna-rich and potentially mineral-rich maritime Economic Exclusive Zone (EEZ) of 1,589,477 square kilometers. With a land area of 28,896 square kilometers and 4,023 kilometers of coastline, it is the second largest in the Pacific after Papua New Guinea. There are six main islands, Choiseul, New Georgia, Santa Isabel, Malaita, Guadalcanal and Makira, which are characterized by a rugged and mountainous landscape of volcanic origin. Between and beyond the bigger islands are hundreds of smaller volcanic islands and low-lying coral atolls. All the mountainous islands of volcanic origin are forested with many coastal areas surrounded by fringing reefs and lagoons. More than 300 of the 994 islands are inhabited.

Table 4: Country Profile

Location	Solomon Islands is located approximately between latitude 5° and 13° south and longitude 155° east and 170° east
Area	28,896 square kilometres
Climate	Hot and humid tropical climate. Average temperature of 27°C all year round
Population	558,457 in 2009 and 720, 956 in 2019 (latest census)
GDP	USD 1.62 billion in 2019 and USD1.6 billion in 2022[1]
GDP per capita	USD 2, 398.8 in 2019 and USD 2, 205.3 in 2022[2]

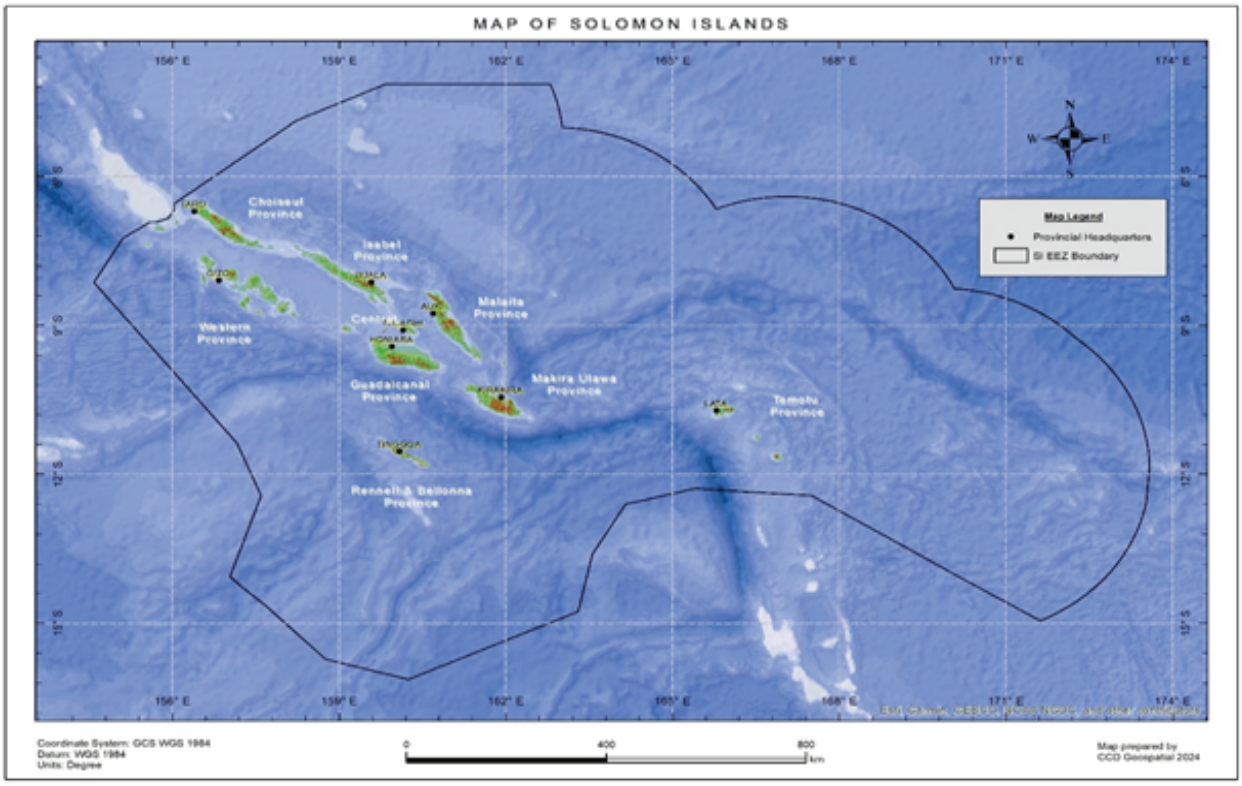

Figure 3: Map of Solomon Islands

[1]https://data.worldbank.org/indicator/NY.GDP.MKTP.CD?locations=SB
[2]https://data.worldbank.org/indicator/NY.GDP.PCAP.CD?locations=SB

The islands are grouped into three different major geological provinces; the Pacific Geological Province (including Malaita, Ulawa, and Northeastern part of Santa Isabel Island); the Central Geological Province (Makira, Guadalcanal, and the Florida Islands, the South-western part of Isabel and Choiseul); and the Volcanic Geological Province (New Georgia, Russell Islands, Shortland Islands and Northwestern tip of Guadalcanal and Savo). Guadalcanal is the largest of the bigger islands and the only one in the Solomon Islands with a significant area of grassland and rich alluvium soils. Most of the islands have highly weathered soils of low fertility with pockets of fertile areas mainly on volcanic islands and river valleys.

The country's location within the earthquake belt or "Ring of Fire" results in frequent earthquakes and associated tsunamis, and landslips. A major earthquake measuring 8.1 on the Richter scale occurred in the Western Province in 2007 causing a major tsunami that affected the Western and Choiseul provinces and causing 52 deaths and scores missing. About 40,000 people were affected. Many islands have subsided whilst a few have been uplifted a few meters. Extensive damage was experienced throughout the two provinces costing hundreds of millions of Solomon Island dollars. Recovery from such events can take years as observed in the past.

1.1.2. Climate

The climate of the Solomon Islands is hot and humid all year round, with an average temperature of 27 degrees Celsius. There are two distinct seasons: a wet season from November to April and a dry season from May to October. The wet season is also the tropical cyclone season for the country. The temperatures are strongly tied to changes in the surrounding ocean temperature. The warmest months are January, February, March, April, May, October, November, and December (31°C). The months with the lowest average temperature are July and August (29°C).

The weather and climate are determined by the seasonal movement and development of the equatorial trough; a belt of low pressure that migrates between hemispheres following the apparent movement of the sun, and the subtropical ridge of the southern hemisphere (a belt of high pressure typically located at about latitude 30 to 35 degrees south). During January to March, the equatorial trough is usually found close to, or south of the Solomon Islands, and this is a period of West to North-westerly monsoonal winds (National Meteorological Services, 2018) and heaviest rainfall. The equatorial trough is in the Northern hemisphere from May to October and the Islands experience stronger and more persistent Southeast trade winds blowing from the subtropical ridge towards the equatorial trough. These winds are moisture bearing resulting in heavy rainfalls on the southern sides of the larger islands.

The average annual rainfall ranges from 3000 to 5000 millimeters with most of the monthly rainfall exceeding 200 millimeters. The wettest months are during the Northwest monsoon season, with a tendency for reduced amounts during February when the equatorial trough is normally furthest south.

Orography plays an important role in rainfall distribution within and among islands. Depending on the local topography, rainfall could be expected to increase with elevation with a maximum at about 600-1000 meters above sea level on windward slopes. The heaviest average yearly rainfall could reach 9000mm at some elevated sites. Extreme rain falls often occur between the months of December to April when the equatorial trough migrates across the islands.

1.1.3. Demography

The Solomon Islands is an ethnically diverse

country comprising predominantly of indigenous peoples. Most of the population are Melanesians (80%), Polynesians and Micronesians account for five percent (5%) and other ethnic groups account for ten percent (10%). The latest National Population and Housing Census was done by the Solomon Islands National Statistics Office (SINSO) in 2019. As of November 2019, the enumerated population of Solomon Islands stood at 720,956. Compared with 558,457 people in the 2009 Census, this represented an increase of about 29% or 162, 499 people. This population increase represented an average annual growth rate of 2.6% (2009-2019) as shown in figure 4 below.

The total population comprised of 369,396 males (51.2%) and 351,560 females (48.8%). The majority (72.4%) of the population lived in rural areas than in urban areas (27.6%).

Between 2000 and 2019, the Human Development Index (HDI) increased by 19.4 percent from 0.475 to 0.567. Although Solomon Islands HDI is 0.567, this is below the average of 0.747 for countries in East Asia and the Pacific. Compared to more than 20 years ago, Solomon Islands HDI has seen improved demographic indicators such as increased life expectancy.

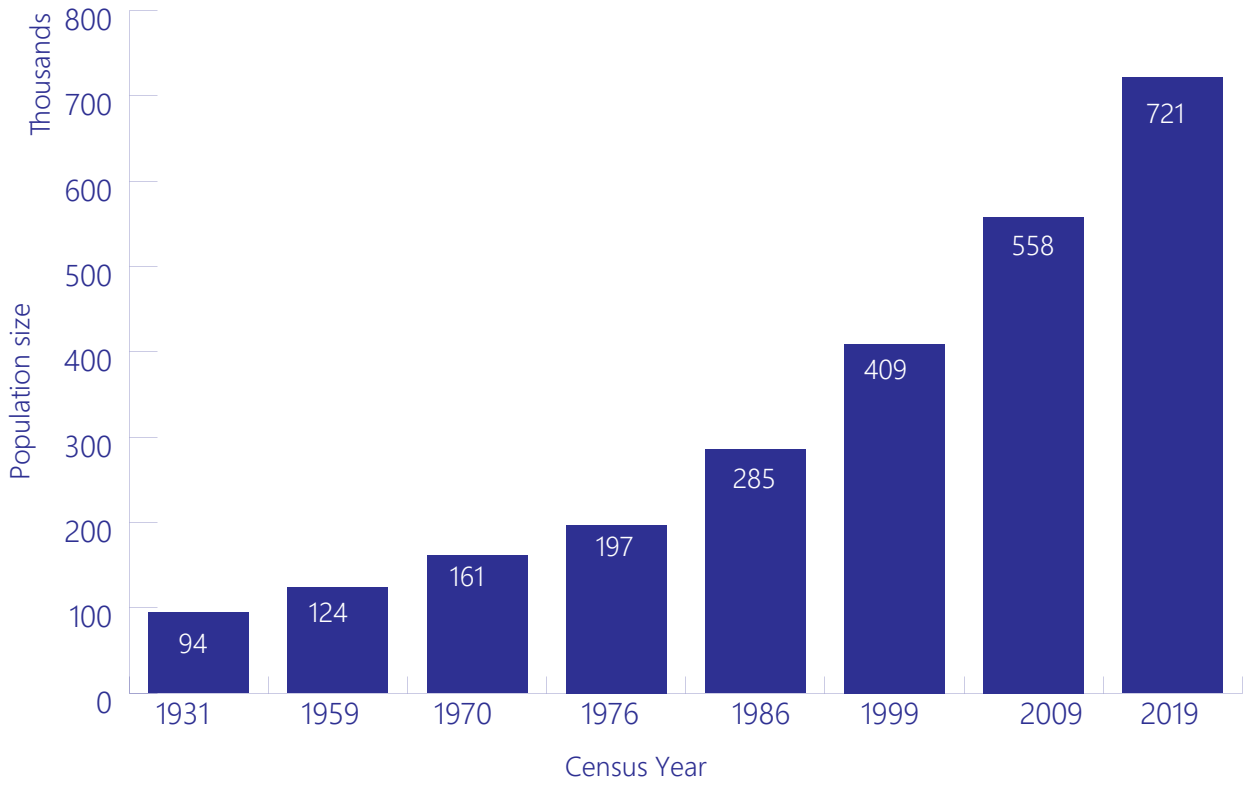

Figure 4: Total population size and trend, Solomon Islands 1931-2019

1.2. Economy

1.2.1. Formal

Solomon Islands real Gross Domestic Product (GDP) growth has been struggling to keep pace with the population growth and the National Development Strategy Objective of increasing GDP growth rate to 5% by 2025 and reach 7% by 2030 and beyond. The economy is heavily dependent on the primary sector, namely forestry, fishing, and agriculture with notable contributions from the industry and service sectors. From 2023, minerals have now taken a major role in the economy with gold production at Goldridge Mine and nickel mining in Isabel, although the latter contributes much less in terms of export earnings compared to gold. These key drivers of growth are very susceptible to the fluctuating world commodity prices and other global events including conflicts (e.g. Ukraine war), global pandemics like the Covid-19, economic recessions and onslaught by natural disasters and climate change.

In addition, the economy is also heavily dependent on overseas development assistance, although Solomon Islands has one of the lowest debts to GDP ratios in the Pacific region.

The period between 2003 and 2008 has seen an increase in economic growth, however, this is mostly driven by unsustainable harvesting of forests and a surge in inflow of aid. With the Global Financial Crisis (2008-2009), the country experienced weakened external demand, reduced log production and commodity prices. Other sectors have experienced slower growth than anticipated as domestically sourced revenue was impacted. Log production during the period has experienced a drop in log volumes owing to weak external demand as well. 2008 saw a drop in Sectoral contributions with overall growth owing to the primary sector and services sector.

The economy recovered in 2010, with annual real GDP growth of around 9.7 percent owing to increased value additions from the primary, industry, and service sectors. During the period of 2011-2018, the economy grew at an average of 9.3% mainly from primary sectors including Agriculture, Forestry, and Fishing.

The economic growth rate became negative in 2020 – 2022 as a result of COVID-19, Ukraine war and the effects of riots in Honiara towards the end of 2021 (see Figure 5). This clearly demonstrated the susceptibility of the domestic economy to global trends and events as well as internal events. Basic social services such as health and education are mainly managed and resourced by the state. These two sectors are also heavily dependent on funding from development partners.

Table 5: Real GDP Growth by major sectors from 2011 – 2022

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Real GDP Growth (%)	38.9	13.4	5.4	1.1	1.5	6	5.2	2.6	1.2	-3.6	0.6	2.4
Contributing to GDP by Key Major Sectors (%)												
Agriculture & Hunting	2.5%	2.7%	2.9%	3.0%	3.2%	3.5%	3.6%	3.8%	3.9%	1.0%	2.0%	2.5%
Forestry & Logging	1.2%	0.1%	0.0%	1.1%	0.8%	1.5%	0.1%	0.5%	2.4%	1.0%	1.5%	2.0%
Fisheries	0.5%	0.1%	0.0%	0.5%	0.2%	0.2%	0.1%	0.5%	2.5%	2.0%	3.0%	3.50%

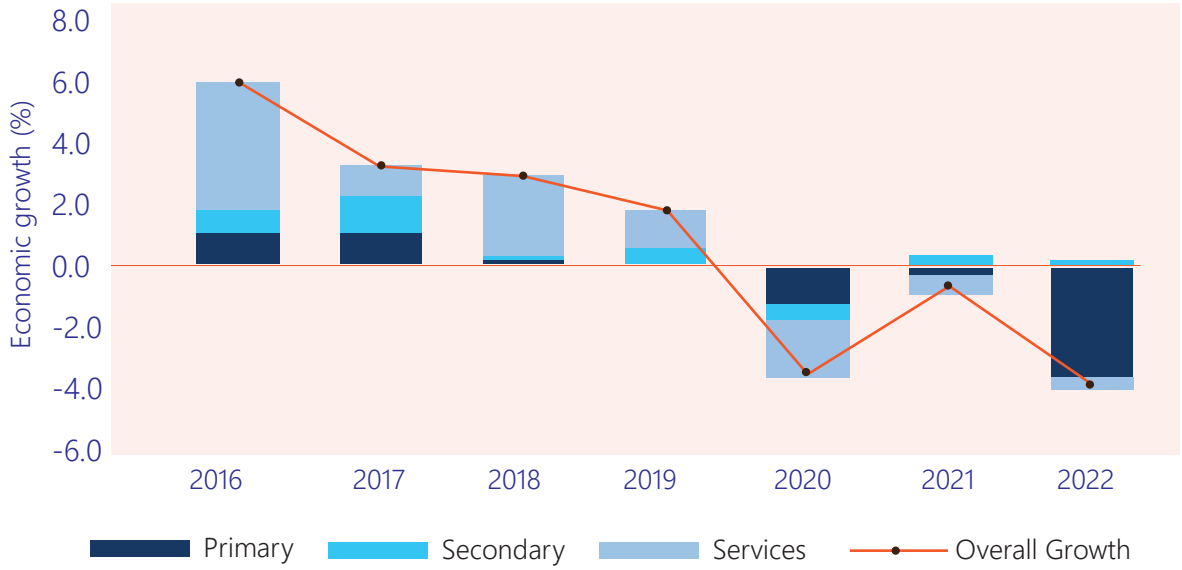

Figure 5: Economic growth for Solomon Islands from the period 2016-2022 (Sources: CBSI, 2022, Annual report)

1.2.1.1. Productive

The Solomon Islands economy is driven by a few sectors in particular agriculture, forestry, and fisheries. These sectors combined make up almost 31 percent of the total GDP. More than 70 percent of the people reside in rural areas and rely on subsistence agriculture and fishing for their source of income and livelihood. Although the country has wealth in natural resources, the uneven distribution of resources has impacted the development of different parts of the country differently. Another challenge faced by the Solomon Islands is the geographical spread of the islands hindering development in remote areas of the country and increasing the transaction costs of developments.

1.2.1.2. Industrial

The industry sector is made up of mining, quarrying, manufacturing, utilities (electricity & water), and construction. The industrial sector

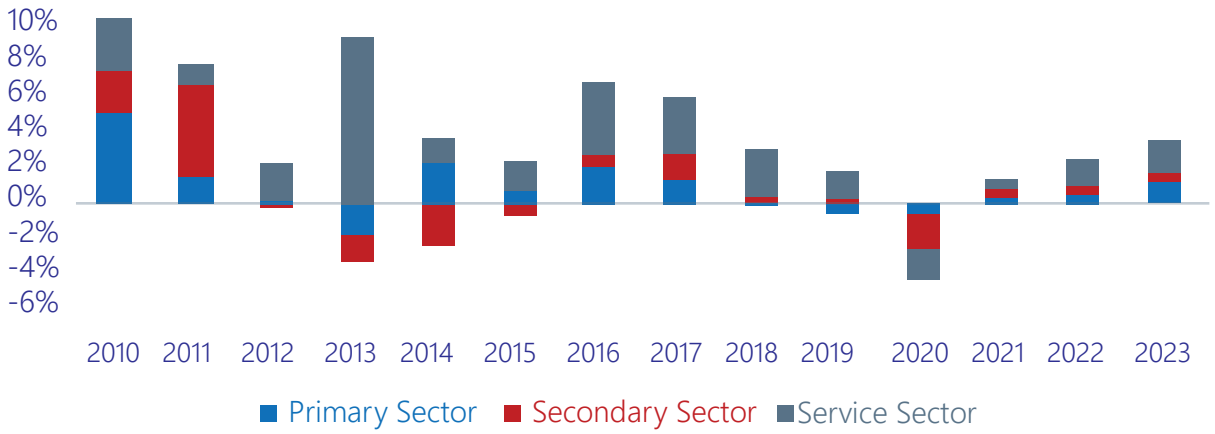

Figure 6: Sectoral Contribution to GDP Growth

over the years has seen steady growth. The service sector is one of the biggest contributors to economic growth. In 2019, the sector contributed approximately 1.4 % to real GDP growth. Over the medium term, the focus of the government is to stimulate broad-based economic growth in these key sectors.

1.2.2. Informal

The informal sector covers all other economic activities by workers or economic units that are in law or practice not covered or sufficiently covered by formal arrangements. The characteristics of the informal sector are missing legal identity, poor working conditions, and lack of membership in social protection systems such as the Solomon Islands National Provident Fund (SINPF), although SINPF has recently started "You Save" scheme which allowed youths and people in the informal sector to make contributions to SINPF. Most of the businesses in the country are of such characteristics. However, over the medium term, this is expected to change as new legislation and government incentives are promised to encourage more participation of businesses in the formal sector.

1.3. Enabling Environment

Solomon Islands ratified the United Nations Framework Convention on Climate Change (UNFCCC) in 1994, its Kyoto Protocol in 2004, and the Paris Agreement in 2016.

Since the ratification of the Convention, successive governments have made various policy and institutional changes to effectively implement the Convention. Although a small Climate Change Unit was established within the then Meteorological Service Department of the then Ministry of Aviation and Meteorology in 1994 which resulted in the development of the country's first national communication, the biggest institutional change that showed the country's serious commitment in implementing the Convention came in 2008 when the government back then established a dedicated Climate Change Division within the Ministry of Environment, Climate Change and Meteorology.

The division grew from two staff at the start and now has ten full-time officers and has been restructured to be more strategic in addressing climate change issues in the country. In addition to the full-time staff, there are project officers attached to the division as well. It is anticipated that more full-time staff will be engaged in the next three years in alignment with the overall restructuring plan of the Ministry.

Recent institutional and programme development of relevance to climate change action include the establishment of a climate change finance unit with the Ministry of Finance and Treasury, a REDD+ unit with the Ministry of Forest and Research, climate change programs driven through sectoral ministries like Ministry of Provincial Government and Institutional Strengthening and the establishment of climate change focal points within ministries.

1.3.1. National Climate Change Policies and Strategies

Since the establishment of the climate change division in 2008, the government had developed relevant frameworks, policies, and strategies to guide its work in addressing climate change in the country as well as implementing requirements of the Convention. This includes the National Climate Change Policy (NCCP 2012-2017) which was revised in 2023 (NCCP 2023-2032); the National Adaptation Plan of Action (NAPA 2008); Intended Nationally Determined Contribution (INDC 2015); three National Communications Reports to UNFCCC; Nationally Determined Contribution (2021); Relocation Guideline 2022 and other related sectoral policies and strategies.

1.3.2. Mainstreaming Climate Change

The Solomon Islands Government ensured that climate change is mainstreamed in it highest and longest development plan - its National Development Strategy (NDS 2016-2035). The fourth objective of the NDS focuses on resilience building. Directly linked to the implementation of the fourth objective of the NDS is the national climate change policy that was revised in 2023. There are various strategies that then link to parts of the climate change policy which are aimed at addressing cross cutting issues and sectors. This includes the NAPA, the Relocation Guideline, the NDC, the LEDS and other sector specific strategies.

A Measurement, Reporting, and Verification (MRV) framework has also been developed to measure the progress in the implementation of these various strategies and policies. Plans are also in place to develop provincial climate change or resilience frameworks.

In terms of government budgetary support, the Climate Change Division has had an annual budget of around SBD$4M (recurrent and development) since the establishment of the division in 2008. As the division continues to expand, it is envisaged that the financial support from the government will increase as well. It is also acknowledged that a substantial amount of international support (bilateral and multilateral) was secured in the past years toward the implementation of the above-mentioned policies and strategies.

1.3.3. National, Regional and International Climate Change Framework

The revised national climate change policy and development of various climate change and disaster risk management frameworks are also aligned with various regional and international climate change and disaster risk management frameworks.

Table 6: Alignment of National Climate Change and Disaster Risk Management frameworks to Regional and International Frameworks

Level	Climate Change	Disaster Risk Management
National	•National Climate Change Policy 2023-2032 •Updated Nationally Determined Contribution (NDC) 2021 •National Development Strategy 2016-2030 •Low Emission Development Strategy 2023 •Relocation Guideline 2022 •REDD+ Roadmap	•National Disaster Council Act 1989 •National Disaster Management Plan 2018 •Meteorology Act 1985
Regional	•Framework for Resilient Development in the Pacific (FRDP) 2017-2020. •Pacific Islands Framework for Action Climate Change (PIFACC)2006-2015 •The 2050 strategy for the Blue Pacific Continent	•Pacific Disaster Risk Reduction and Disaster Management Framework of Action (PDDFA) •Framework for Resilient Development in the Pacific (FRDP) 2017 - 2030
International	•Paris Agreement 2015	•Hyogo Framework for Action 2000-1015 •Sendai Framework for Disaster Risk Reduction 2015-2030

1.4 Forestry

In 2016 and 2017, around 65% of the country's export earnings came from forestry, mainly through the sale of round logs, which accounts for 20% of the state revenue (CBSI, 2017). The economic dependency on log exports has already spanned over the last two decades because of no significant investments in other sectors, and a nearly unfettered logging industry. In 2017, log exports reached an all-time high of more than 3.4 million cubic meters, an increase of about 21% from the previous year, and following a trend that has persisted since year 2000. Records of round log export were already above 1 million cubic meters in 2005 (SIG, 2018a), which is more than four times the sustainable rate estimated at 250,000 cubic meters per annum. At the current harvesting rate, timber resources are expected to last only 1-2 more decades before exhaustion (RAMSI, 2012). Nevertheless, logging is on the decline both in terms of the quality of logs as well as revenue from log exports in comparison to the mining sector (CBSI, 2023).

On a positive note, logging activities in rural areas give rise to employment opportunities, royalties, and spin-off benefits to resource owners and surrounding communities that improve rural livelihood at least during the lifetime of the logging developments. On the other hand, the social and environmental repercussions including GHG emissions are significant and may persist over a long period of time. Observing the historical and current trend of the logging industry, increased growth in commercial agriculture, mining, and hydroelectricity generation as per sector ministries' plans, and expected expansion of gardening areas and settlements due to population growth, it can be expected that deforestation and forest degradation activities will continue to increase in the short and mid-term.

1.5. Agriculture

Agriculture accounts for approximately 16% of the national GDP. Agriculture products are some of the major export earnings for the country. In 2014, agriculture exports accounted for 24% of total exports. Agriculture is also regarded as the main source of employment and livelihoods in the rural areas where the majority of Solomon Islanders live.

With more than 70% of Solomon Islanders living in rural areas with limited access to infrastructure and services, agriculture (including crops and livestock) is the foundation of livelihoods in the country. The wet tropical climate is favorable for a wide range of crops, including important cash crops such as cocoa and coconut, spice crops such as vanilla, cardamom, chili, ginger, and turmeric, as well as major food crops such as sweet potato, yams, cassava, taro, bananas as well as a range of fruits and vegetables.

Underlying challenges facing the sector are long-standing, including the highly dispersed rural population living on around 90 islands with poor access to infrastructure and services, high vulnerability to natural disasters (e.g., floods in 2014 followed by a severe drought in 2015-16), and climate change, and exacerbated by un-controlled deforestation. Customary land ownership has always been the foundation of the subsistence economy, but it constrains the development of commercial agriculture. More recent developments have added to these long-standing limitations, especially: (i) the youth population is hesitant to engage in semi-subsistence agricultural practices to replace an aging farming population, (ii) a growing rural-urban migration of young people, and (iii) the flooding of the domestic food market with cheap imported foods of low nutritional value.

The sector is also highly vulnerable to pests and diseases as evidenced by the 2015 incursion of the coconut rhinoceros beetle (CRB) which is

resistant to current conventional biological control measures. This presents a major threat to the coconut sector, which is an important cash and food crop, known as the "tree of life;" and affects oil palm. Cocoa pod borer (CPB) is a serious threat to the cocoa industry and is already present in nearby Bougainville, PNG.

Agriculture consists mainly of three sub-sectors. They are subsistence and smallholder farming; commercial sub-sector; and large plantations.

Subsistence and smallholder farming is the predominant occupation of the rural population (more than 70% of the total population) and in many cases the sole source of livelihood for rural communities. Most rural people rely on subsistence agriculture for food both for household consumption and to support living standards through the selling of excess products in local markets.

The main crops for subsistence and smallholder farming are sweet potato, cassava, taro, yam, and banana. Crops and livestock are occasionally used for cultural and social obligations.

The main crops for commercial sub-sector farming are Potato, cassava, kava, noni, ginger, melon, pineapple, and wild nuts. Livestock such as chicken and piggery are also the main source of income for small-holder farmers.

The commercial sub-sector has shown obvious growth during this period (2011-2018). This period has also shown interest and increase of the processing of agricultural goods from commercial sub-sector farmers. This is obvious with crops such as kava, cassava, cocoa, coffee, and noni. Some of these processed products are then exported to international markets.

Large plantations consist mainly of coconut, oil palm, and cocoa. They remain predominantly the main crops for export during this period.

Table 7: Agriculture in Summary

Agriculture sector GDP contribution	30% of the national GDP (2022). total export.
Types of agriculture in the Solomon Islands	Subsistence, commercial sub-sector, large plantations.
Main crops cultivated	Coconut (copra), palm oil, cocoa, cassava, potato, taro,yam, kava, coffee, and noni.

This reporting period has shown an increase in the development of new and reviewed guiding agriculture policies and strategies carried out by the Ministry of Agriculture and Livestock.

As part of addressing the continuous socio-economic challenges of the country, the Ministry of Agriculture and Livestock (MAL) developed the revised National Agriculture and Livestock Sector Policy 2015-2019. The policy provides a framework to reorient agriculture production to meet developmental needs, alleviate poverty, and provide food security in the country.

Other agriculture policies and strategies developed during this period include the National Food Security, Food Safety and

Nutrition Policy 2010-2015; Community-Based Land Use Planning Framework 2015; Solomon Islands Government Policy on Organic Agriculture Systems, and others. Additional commodity-specific policies, strategies, and guidelines include (i) Solomon Islands Coconut Sector Strategy 2010, (ii) Solomon Islands Cocoa Industry Policy and Strategies 2012-2020, (iii) Indigenous Fruit and Nut Industry in Solomon Islands Policies and Strategies 2014, (iv) "Kaikaim Lokol Kaikai" a Framework for Action on Local Food Promotion in Solomon Islands.

The recent investment plan developed by the MAL is the Agriculture Sector Growth Strategy and Investment Plan (ASGSIP) 2021-2030. This is an ambitious 10-year roadmap aimed at revitalizing, modernizing, and commercializing the agricultural sector to contribute to the well-being and prosperity of all Solomon Islanders, ensuring food and nutrition security and increased economic growth. The country's vision for the agriculture sector as presented in this strategy is for our nation to have a sustainable, competitive, and profitable agricultural sector that enhances economic growth, food sovereignty, and prosperity for all Solomon Islanders.

1.6. Fisheries

Solomon Islands is known for its rich biological diversity and endemism and is endowed with mangrove forests, coral reefs, and rich inshore and offshore fishery resources. The more than 70% of the population that lives in the rural areas depend mostly on subsistence fishing (oceanic and freshwater) farming (tilling the land) and wild harvest.

In the productive sector, fisheries and marine resources are the second largest source of export income after forestry, but it is mainly based on tuna. The fisheries and marine resources sector are defined in several categories, namely, subsistence, offshore, commercial inshore (coastal) which includes beach-de-mer, aquarium trade, trochus which are active now, inland (freshwater), and aquaculture with each contributing differently to the local population (socially) and to the national economy as shown in the table below.

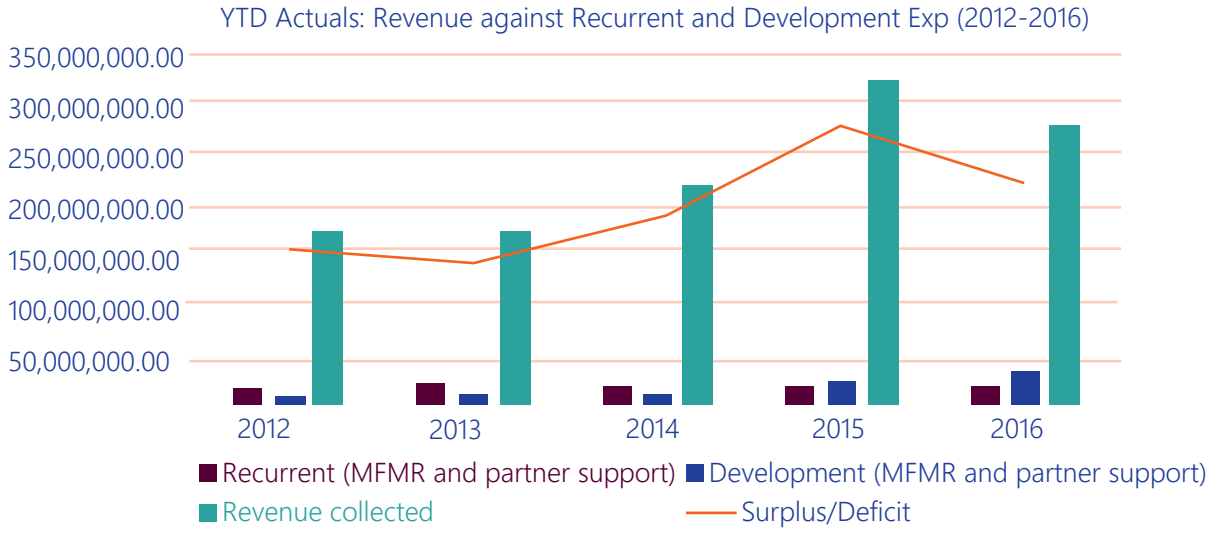

Figure 7: The implementation resources with revenue collected for the economy

1.6.1. Fisheries Sectors

1.6.1.1. Offshore fisheries

Offshore fishery is based on tuna that is caught through purse-siene, long-line and pole line by fishing vessels categorized and flagged as domestic vessels or foreign vessels. Targeted species are the four main tuna species namely, yellowfin (***Thunnus albacares***), big eye (***Thunnus obesus***), albacore (***Thunnus alalunga***) and skip jack (***Katsuwonus pelamis***) tuna.

In 2020, Solomon Islands recorded a total of 194 fishing vessels where 39 were nationally flagged vessels with 155 foreign fishing vessels given access to operate in Solomon Islands waters or EEZ.

1.6.1.1.1. Locally flagged Domestic Vessels

Flagged under the Solomon Islands flag are mainly purse-siene, long-line and pole and line vessels where they are licensed to fish in Solomon Islands EEZ of the Western and Central Pacific Fisheries Commission (WCPFC) Convention area.

Such flagged vessels are operated by locally-based companies such as the National Fisheries Development (NFD), South Seas International, Global Fishery, Willfish Investment and Solong Seafood.

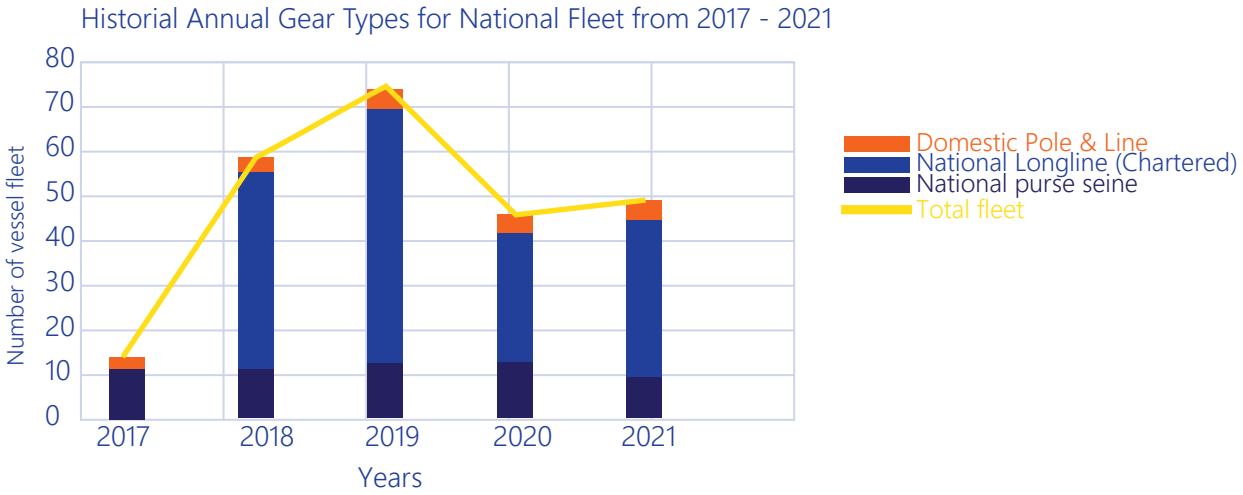

Figure 8: Historical summary of national (flagged) gear types/ fleets operating in the WCPFC Convention Area for 2017 – 2021[3]

11.6.1.1.2. Domestic Longline fishing vessels catch and effort distribution

Domestic long-line fishing vessels are operated under charter notification arrangement from various locally based companies namely, NFD, Global Fishery, Willfish Investment and Solong Seafood. Generally, the trend of catches and effort had declined since 2019 due to localized cost from proximity to designated ports within the region.

[3]https://meetings.wcpfc.int/node/15337

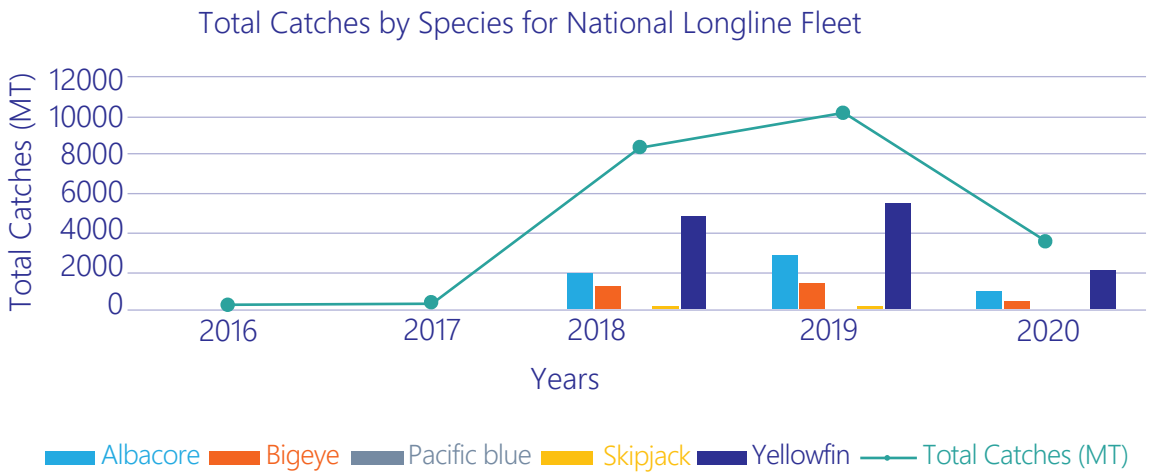

Figure 9: Total catch by species for long line vessels flying Solomon Islands Flag

1.6.1.1.3. Domestic Pole and line catch and effort distribution

The domestic pole and line are one of the long-standing fisheries sectors in the Solomon Islands where it continues to maintain its catch and efforts over the years. As of 2020 the catch estimates had increased slightly as compared to fleet or vessel sizes which is still the same over the years.

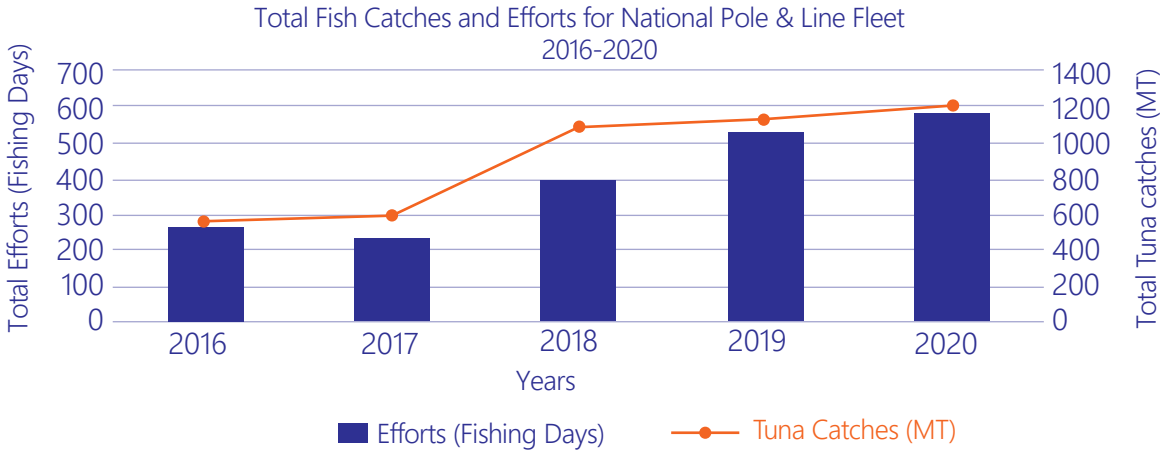

Figure 10: Domestic catch effort for pole and line vessels operating in the Solomon Islands EEZ

Due to their highly migratory behaviour in the Western and Central Pacific Ocean (WCPO), their management and development requires a high degree of cooperation between coastal states and those states with fishing interests with Solomon Islands.

The offshore fisheries section of the Ministry of Fisheries and Marine Resources (MFMR) is responsible for managing and collaboration with various inter-governmental regional agencies namely the WCPFC, Pacific Islands Forum Fisheries Agency (FFA), and between the tuna-rich Pacific countries under the Parties to

the Nauru Agreement, the Palau Arrangement and Federal States of Micronesia Arrangements.

The annual catch of the four main tuna species (albacore, bigeye, skipjack and yellowfin) from the Pacific region averages around 2.5 million tonnes, with approximately 6% of this coming from Solomon Islands waters. The estimated value of the Solomon Islands catch (at first point of sale) is about SBD 2,400 million per year. In 2017, the Solomon Islands government received more than SBD 300 million in fisheries access and administrative fees through the Ministry of Fisheries and Marine Resources.

The sector was estimated to employ more than 5,000 people in the formal sector in 2004 and is expected to have increased in the intervening years (Gillett 2016). All four major tuna stocks in the WCPO are in a relatively healthy status according to the 2018 SPC/FFA tuna fisheries report card (http://www.ffa.int/node/2016). There is however uncertainty around the stock status of bigeye and yellowfin.

Global warming is expected to progressively push tuna populations from the waters of 10 Pacific Small Island Developing States into the high seas, disrupting island economies, according to a collaborative study published in 2021 by Conservation International and a consortium of technical agencies, including the Pacific Community (SPC), the Forum Fisheries Agency (FFA), the Parties to the Nauru Agreement (PNA), the University of Wollongong and their partners. Based on the robust modelling done during the multi-disciplinary study demonstrates, if ocean warming continues at current rates the tuna catch in the combined waters of the 10 Pacific SIDS is expected to decline by an average of 20% by 2050[4].

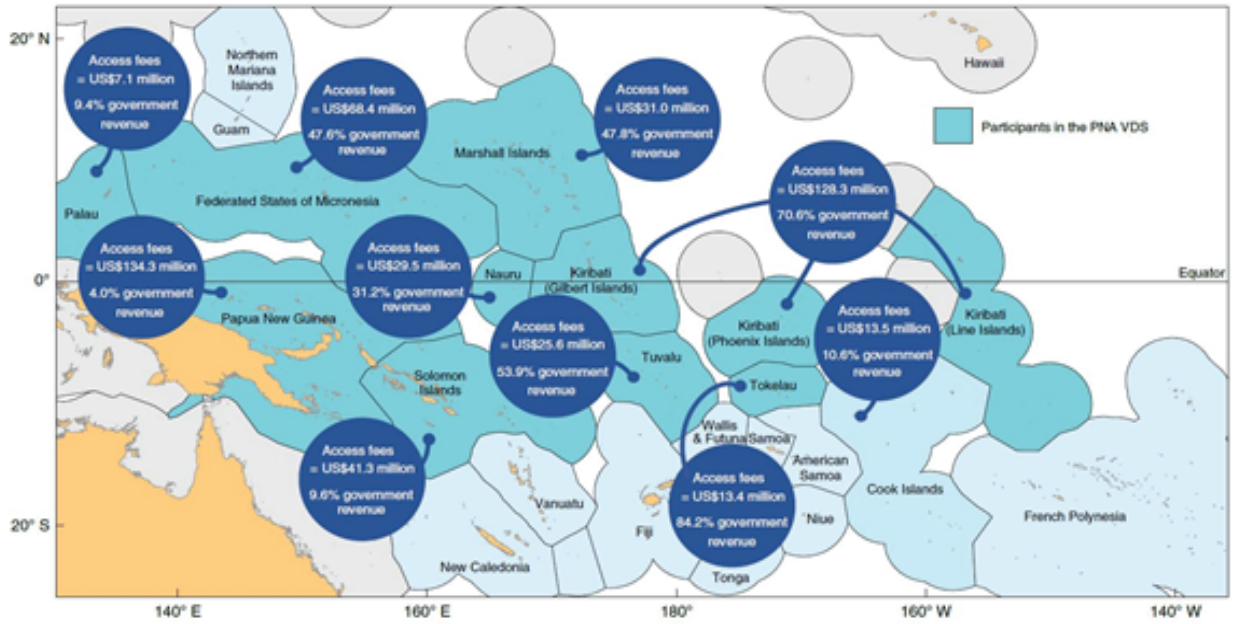

Figure 11: Average annual tuna-fishing access fees (US$) for the period 2015–2018 earned by the ten Pacific SIDS, together with the average percentage contributions of access fees to total government revenue (excluding grants) (Source: Bell J. et al., 2021)

[4]Bell J. et al., 2021. Pathways to sustaining tuna-dependent Pacific Island economies during climate change

1.6.1.2. Inshore fisheries

1.6.1.2.1. Inshore subsistence fisheries

As defined by the Marine and Coastal Biodiversity (MACBIO) 2015 report, inshore subsistence fisheries are catching fish for cultural ceremonial festivals and for home consumption. Its significance is valued by its direct benefits to the people within the coastal communities of Solomon Islands. Fishing and collection are done by wide range of gears and techniques with diversity of targeted species both plants, fish, and seashells.

Inshore subsistence fishing accounts for a total of SBD$442 million/year or SBD$857/person/year and is equivalent to about 5% nominal GDP. This fishery is important to the people of Solomon Islands livelihood. Its sustainability depends on the growing population, natural changes of climate and land developments.

1.6.1.2.2. Inshore commercial fisheries

Inshore commercial fisheries are collective fisheries which is driven by profit. This fishery involves commodities sold within local markets and exports of the country through legitimate consignment process according to state rules and regulation. Coral reef and demersal fish are sold locally, whereas beche-de-mer, trochus and giant clam shells and aquarium fish are traded to international markets. Coral reefs and demersal fisheries accounts for a total of SBD$70 million/year or SBD$156/person/year and is equivalent to 0.8% of the total nominal GDP of Solomon Islands.

Beche-de-mer is highly valued in the international market. According to CBSI Annual Report for 2019, this fishery accounts for a total volume of 223,559 kilograms which is valued at SBD$16.2 million. This fishery is already overfished, and regular lifting of bans will greatly affect Beche-de-mer stock.

Between 1999 and 2010 Trochus value had contributed an averaged between SBD$ 3.34 million and SBD$2.13 million/year. Catches however have been decreasing for the past 40 years. This fishery is also overfished.

1.7. Inland and Freshwater Fisheries

Inland population of the bigger islands (Choiseul, Guadalcanal, Malaita, Makira, Isabel) have limited access to marine food resources. Information is scarce for inland freshwater fisheries and no comprehensive studies on consumption and community resilience had been carried out in the past years. Few biodiversity studies and reports on the importance of native freshwater fish such as flagtails, gobies, eels, and freshwater shrimps (Gillett, 2016).

Mozambique tilapia is common in some streams, lakes, and swamps in the Solomon Islands, especially in Auki, Malaita, Lees Lake, Guadalcanal, and Lake Tengano on Rennell Islands. This fish had become a supplementary source of food for most (MFMR, 2010). According to reports by Gillett in 2016 freshwater fishery production in Solomon Islands was 2,300 metric tonnes, with farm gate valued at SBD$29 million dollars. To date there is no fisheries management plan for inland waters.

1.8. Aquaculture

Aquaculture was first introduced in Solomon Islands in the late 1950s. It was proven to be a viable option to support and contribute to food security and livelihoods for Solomon Islands. Aquaculture in the Solomon Islands is still in its infancy despite its long history from introduction of farming tilapia (Oreochromis mossambicus), pearl oyster, Macro brachium rosenbergii, clam farming and seaweed farming.

A new tilapia hatchery in Guadalcanal is set to ease in-shore fishing activities and boost food security for the Aruligo community, 32 km north-west of the Honiara. It is jointly funded by

the Solomon Islands and the New Zealand governments under the Mekem Strong Solomon Islands Fisheries programme (MSSIF). The hatchery will improve food security, help reduce pressure on existing in-shore fisheries, and help rural people, particularly youth, participate in the productive sector. The completed Tilapia farm host a laboratory, an office, a covered area of tanks for growing juvenile fish, and a perimeter fence.

1.9. Mining

Solomon Islands is highly prospective for porphyry deposits of copper, gold and other base metals, nickel laterites and bauxite and phosphate. Past and current exploration activities have confirmed the presence of these minerals in the country. Some of these prospects are; Kele River, North Vangunu, Sutakama Alluvial Gold prospect, North Central Guadalcanal, East Choiseul Nickel prospect, Choiseul, South East Isabel Lateritic Nickel Prospect, Isabel, Starfish Prospect, Charivunga Prospect, Central Guadalcanal, and South East Savo Geothermal Prospect.

1.9.1. Potential mining prospects

1.9.1.1. Gold Ridge Mining (Charivunga zone)

An additional resource at Charivunga (although within Gold Ridge) increases the resource at Gold Ridge. The mineralisation at Charivunga is probably due to a major North-North East (NNE) trending set of structures controlling higher-grade mineralisation, central to the Gold Ridge open pit mines. Drilling results continue to indicate that Charivunga is potentially a large mineralised system of earlier low-grade gold mineralisation over-printed by a series of later high-grade veins and faults.

1.9.1.2. Old Sumitomo Nickel Project

At the end of its prospecting activity Sumitomo made a preliminary announcement of its resource findings as 140 metric tonnes at 1% Ni at pre-feasibility study stage. This resource includes both Choiseul and Isabel. This is a large but slightly low-grade resource by international comparison. This will have a mine life of 30 years or more and a total investment of approximately USD1,500M, which includes a hydrometallurgical processing plant. The plan was to send a very small amount of high-grade saprolite ore (about 4% of the total resource) directly to Japan for processing. Unfortunately, Sumitomo relinquished these tenements due to issues regarding investment security and the inability of Government to provide an investment climate that is conducive to investments of this mega scale. Nevertheless, current nickel prospecting and mining operations in Isabel and Choiseul Province largely have depended on the Sumitomo prospective findings to inform their operations. In addition, current nickel mining does not involve any downstream processing and are only involved in the direct shipment of ore which does not maximize returns from this non-renewable resource.

1.9.1.3. Undersea Massive Sulphides

Bluewater Metals was issued a prospecting license for submarine massive sulphides and has submitted one mining lease application over the Starfish Prospect in the far eastern Temotu Province. However, undersea Mining is yet to take place. Currently, a lot of research is ongoing to understand this science. However, what is clear is that the science and technology needed to carry out deep-sea mining in a cost effective and efficient manner is still being developed. More importantly, many in the scientific community as well as national environmental authorities and civil society organisations still have serious concerns about the level and extent of the environmental impacts of deep-sea mining including on fish stocks and marine aquatic environment. In addition, there is no specific legislation for deep sea mining and the current mines and minerals act does not clearly and adequately cover deep sea mining.

1.9.1.4. Bauxite

Bauxite was discovered on Wagina Islands in 1967. Solomon Bauxite Limited obtained a Mining Lease over the Wagina Bauxite deposit in 2017 but mining has yet to commence after its development consent under the Environment Act was cancelled by the Minister of Environment in 2020. There are other known pockets of bauxite throughout the country and are currently evaluated by some companies.

Rennell Island bauxite deposits, was discovered by Mitsui in the 1970s. Rennell bauxite was mined since 2014 by APID/BMSI, however their Mining Lease was cancelled on the 3rd of June 2021 due to breaches in compliance with agreements. Worldlink Resources Limited also mined bauxite at Rennell since 2016 but its operation ceased due to cancellation of their mining lease for non-compliance in 2018. Mining of bauxite in Rennell was done with no value addition locally resulting in direct export of the ore with sub-optimal financial returns to the Government and landowners.

1.9.1.5. Geothermal

Savo geothermal resource was explored and evaluated by Kentor Energy Pty Ltd and Geodynamics (Savo Island) Pty Ltd and was found to be of high temperature volcanic geothermal resource. The geothermal resource has the potential to generate more than 30MW of power.

1.9.2. Current Mining Activity

1.9.2.1. Gold Ridge Mining

The Gold Ridge Mine owned by Gold Ridge Mining Limited (GRML) was sold in 2015 to Gold Ridge Community Investment Limited (GCIL) by St Barbara. Since then, another two investor partners, AXF and Wanguo joined the joint venture to operate this mine. The mine recently reported a reserve of 31.2Mt at 1.43g/t Au with a proposed production of 260t of gold concentrates per/ day and 93,600t of gold concentrates per year. This is a relatively small but high-grade open pit mine, with a projected mine life span of about 13 years. Gold Ridge Mining Limited re-opened the mine in 2022 and began exporting gold in 2023.

1.9.2.2. Turarana (Alluvial Mine)

This is an operation by Win Win Investment Solomon Ltd, conducting alluvial mining at Turarana, Central Guadalcanal. Production commenced in 2019 after granting of the mining lease in 2018.

1.9.2.3. Aggregate extraction

In addition to precious and base metals, the demand for building aggregates is also very high due to the rise in demand by the construction industry. Extraction of gravel are happening along the rivers outside of Honiara by various permit holders, mainly building hardware companies based in Honiara. MMERE oversees this activity under provisions of the Mines & Minerals Act. Monitoring their activities is very important since these extraction activities affect the environment and affect the livelihood of communities that live along rivers. Illegal extraction is also common; and is exacerbated by limited monitoring by relevant authorities.

1.10. Energy

While the country is endowed with renewable energy resources, e.g., geothermal, hydro, solar, ocean, and biomass, most of these (except for solar and hydro) have not yet been tapped. The country is almost entirely dependent on imported petroleum fuels for electricity generation and for transport (land, sea, and air). Biomass accounts for about 61% of gross national energy production (household

cooking), petroleum products for 34%, and hydropower and solar about 5%.

The geographical dispersion of population within and across island and, low densities make the capital costs of connecting consumers very high relative to the revenue generation. However, the lack of focus by the Solomon Power to increase assess to power albeit its long standing monopoly on power generation and supply is also a key factor in the low access to grid power throughout the country. Access to essential services such as water, sanitation, or electricity is low: less than 20 percent of the population have access to grid power supply. When electricity is available, it is costlier than elsewhere in the world and is often less reliable. Rates of access to an improved water source (primarily piped water), improved sanitation, and grid electricity are significantly higher in urban areas, but the quality of services for those who have them is variable.

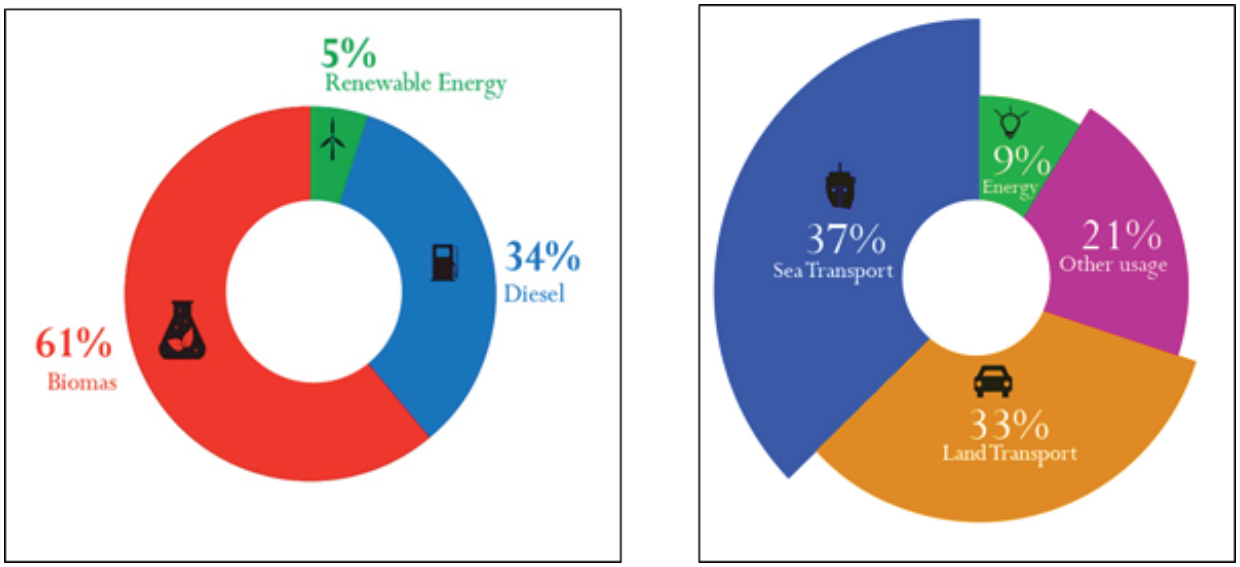

Figure 12: Energy supply mix (R) and Petroleum consumption (L)

The Ministry of Mines, Energy and Rural Electrification (MMERE) is the supervising ministry, and its Energy Division bears responsibility for legal and regulatory development, institutional strengthening, and supervision of the vertically integrated, state-owned utility, the Solomon Islands Electricity Authority (SIEA), trading as Solomon Power (SP) since December 2015.

Solomon Islands has a national energy policy 2019-2030 and recently developed a Renewable Energy Roadmap 2021-2030 for the Honiara grid. Furthermore, MMERE is currently developing a national electrification strategy and investment plan which should complete by end of 2021.

Operating under the Electricity Act, SP is the main supplier of electricity in the country, and responsible for electric power generation, transmission, and distribution to all urban and provincial centres, including Honiara, nine provincial centres (so-called "outstations"), and

Noro Township in the Western Province. SP has successfully rebounded from a financial crisis in 2001. The International Development Association (IDA)-funded Solomon Islands Sustainable Energy Project (SISEP), approved in June 2008 with additional financing to scale up the original project approved in November 2014, was instrumental in turning around management and the financial and operational performance of SP. This was accomplished through financing of an experienced and competent management team, together with technical assistance to support management decisions in financial and technical areas.

The current profitable status of SP has improved the electricity supply in Honiara with no experiences of daily power cuts as in the past and has set the utility on the right footing to convert its outstations to solar-hybrid plants with battery storage and plans to expand its operations further into large un-electrified communities in the rural areas.

Tina River Hydropower Development Project is Solomon Islands' first large-scale infrastructure project to be developed under a public-private and the first in the Pacific islands to be funded under the Green Climate Fund (GCF). Its development has its own challenges however, the project is progressing well.

1.10.1. Power Generation Capacity

The total installed power generation capacity in the country is about 35MW, of which 30MW is in Honiara – with a peak load of 16.0MW. The combined installed capacity in the provincial centres is 5 MW. In 2019, the total net electricity generation was 93.285GWh, of which 82.0% was sold, and 18.0% were total technical and non-technical losses. Electricity tariff in Solomon Islands is among the highest in the Pacific Islands as well as globally.

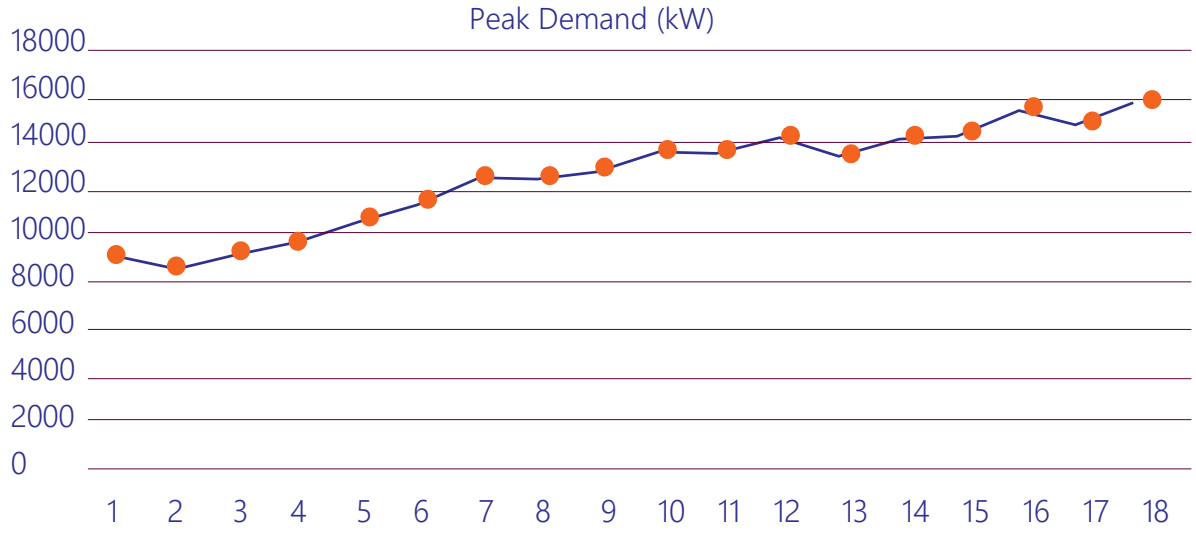

Figure 13: Honiara peak demand growth from 2001-2018

1.10.2. Reform of the Electricity Sector

The Government plans to reform the electricity sector and is current reviewing the Electricity Act to separate some of the regulatory functions away from SP to an independent entity to encourage private investments in the form of Independent Power Producers (IPP) into the sector to increase access to electricity, expand renewable energy on the network and reduce electricity costs.

1.11. Water

Water resources availability in Solomon Islands varies considerably. It ranges from sizeable rivers to small streams from high mountainous and dense rainforest islands to rainwater harvesting and thin freshwater lens of underground aquifers of the small low-lying atolls and islets. Evidence exists in the Solomon Islands that the quality and quantity of fresh water is reducing. The rate of reduction is not very well understood because of inadequate or unreliable hydrological data and limited knowledge of local hydrology and water resources. The essential need is an alteration of attitudes towards water which must be generally acknowledged to be a precious resource. In addition, training for hydrologists and other staff dealing with water must be sustained as an on-going activity as part of capacity building for the department responsible for water resources in MMERE. The main source of drinking water in Solomon Islands comes from surface water in the form of streams, springs, or rivers. Most small atoll islands collect rainwater for drinking and utilize brackish water from shallow hand dug wells for most of their other domestic needs. Some communities on the higher volcanic islands also use groundwater for domestic purposes. The major users of groundwater resource are Honiara city and Guadalcanal Plains. The Guadalcanal Plains on the northeast coast of Guadalcanal have abundant potential for groundwater. However, with increasing agricultural developments in the area there is an urgent need for proper planning and management of the resource.

The quality and supply of water resources in Solomon Islands is increasingly becoming threatened by development activities including logging, large scale agriculture and the fast-expanding land clearing for subsistence agriculture. On many of the large islands such activities are undertaken without regard for future demand for clean and sustainable supply of water. In some villages on the islands of Malaita, Vella la Vella, Makira and Choiseul communities are having to cope with situations where some rivers are frequently dirty while others flow rate have been reduced considerably. Community based water catchment and watershed management has not been carried out in the country and is becoming an urgent need now that there is increasing population pressure on land resources. Provincial governments have begun to consider establishing ordinances to protect water resources with support from the national government.

Water resources assessment, planning and management falls into the mandates of the following government ministries: MMERE, Ministry of Health and Medical Services (MHMS) and the Solomon Water which is a State-Owned Enterprise (SOE). MMERE under its water resources division is responsible for national water resource assessment, management, and the development of groundwater while MHMS through its Environment Health Division oversees the quality of water and provision of safe water and sanitation for the country's rural population through the Rural Water Supply and Sanitation (RWSS) Programme. Solomon Water is responsible for provision of safe water and wastewater services to urban populations.

An integrated national water and sanitation policy was developed but needs development of water legislation and strong collaboration with MAL, MFMR, and MECDM to effectively manage

the country's water resources considering agriculture, aquaculture, and industrial needs and effects of climate change.

CHAPTER 2:
GREENHOUSE GAS INVENTORY

2

2.0. National Greenhouse Gas Inventory

2.1. Inventory Overview

The Solomon Islands National Greenhouse Gas Inventory report provides an update to the national GHG inventory by sectors as per the biennial update reporting guidelines for Non-Annex I Parties. As required by the guidelines, the Solomon Islands national GHG inventory prepared in according to paragraphs 8–24 in the "Guidelines for the preparation of national communications from Parties not included in Annex I to the Convention" as contained in the annex to decision 17/CP.8[5]. The scope of the updates on national GHG inventories also consistent with capacities, time constraints, data availabilities and the level of support received for first biennial update reporting.

The GHG inventory report for Solomon Islands covers all the four IPCC sectors, namely: Energy, Industrial Processes and Product Use (IPPU), Agriculture, Forestry and Other Land-Use (AFOLU) and Waste. The inventory was compiled using the methods provided in the 2006 IPCC Guidelines and Good Practice guidelines (GPGs). GHG emissions from international bunker (international Aviation and international water-borne navigation have also been estimated and reported as memo items in the inventory. However, they are not included in the Solomon Islands total national GHG emissions. Further, a detailed description of the anthropogenic emissions by sources and removals by sinks of all GHGs not controlled by the Montreal Protocol and greenhouse gas precursors has been presented for the years 2019 and 2020. The main gases covered are carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O). It is to be noted that Solomon Islands has negligible or no emission of hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF_6), hence not applicable. The Tier-1 methodological tier and IPCC default emission factors employed for GHG estimation.

The Solomon Islands GHG inventory does not includes the emissions from the indirect GHGs i.e., Oxides of Nitrogen (NOx), Carbon Monoxide (CO), Non-Methane Volatile Organic Compounds (NMVOC) and Sulphur dioxide (SO_2). These indirect GHG emissions are not accounted in the aggregated national GHG emissions. The GHG emissions reported in Giga-grams (Gg) and the aggregated GHG emissions and removals are expressed in CO_2 equivalents (Gg CO_2e or CO_2eq) using the Global Warming Potential (GWP) defined by Fifth Assessment Report (AR5) by the Intergovernmental Panel on Climate Change (IPCC). This report also presents an account of the methodologies used, the quality assurance/quality control (QA/QC) measures applied, the results of the key category analysis, and approach-I quantification of the uncertainties associated with the estimates. As best practice, Solomon Islands has carried out a key category analysis[6] which helped to identify the most relevant GHG inventory categories for Solomon Islands and guided to focus available resources most efficiently. Furthermore, an uncertainty assessment[7] has been conducted on the estimates of emissions and removals, which identifies the potential for improvement.

2.2. Solomon Islands National GHG Inventory: Institutional Arrangements

2.2.1. National Entity for National Inventory Arrangement

The first biennial update report and third national communication of the Solomon Islands have been implemented by the MECDM, in collaboration with United Nations Environment Programme (UNEP) and with support from Global Environment Facility (GEF). MECDM is the National entity responsible for Solomon Islands inventory arrangements. The National Inventory Focal Point is:

[5]FCCC/CP/2002/7/Add.2; http://unfccc.int/resource/docs/cop8/07a02.pdf
[6]2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume1, Chapter 4: Methodological Choice and Identification of Key Categories, https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/1_Volume1/V1_4_CH4_MethodChoice.pdf
[7]2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume1, Chapter 3: Uncertainties, https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/1_Volume1/V1_3_Ch3_Uncertainties.pdf

Director, CCD
Ministry of Environment, Climate Change, Disaster Management and Meteorology (MECDM), P.O. Box 21, Vavaya Ridge, Honiara, Solomon Islands, Telephone- (677) 23031/ 23032, (677) 28054
Email: TSiota@mecdm.gov.sb

2.2.2. Inventory Preparation process

The Key steps towards the preparation of national GHG inventory for 2019 & 2020 was as follows:

- Project Organization Structuring
- Thematic Working Group (TWGs) formation
- Stakeholder Consultation Process
- Training and Capacity Building Programme
- Data collection, Identification of data gaps and uncertainty assessment
- Documents/data review for quality assurance
- Preparation of GHG Inventory Report and Key Criteria Analysis (KCA)
- Review and approval of the GHG Inventory Report

2.2.3. Project Organisation Structure

MECDM is responsible for supervising the national inventory process and reporting the emissions to the UNFCCC. The Project Steering Committee (PSC) was formed with main functions to guide TNC project implementation. The PSC works closely with the project Implementation team to ensure the project progress and backstopping. Project Coordinator and Administrative Assistant formed the project implementation team.

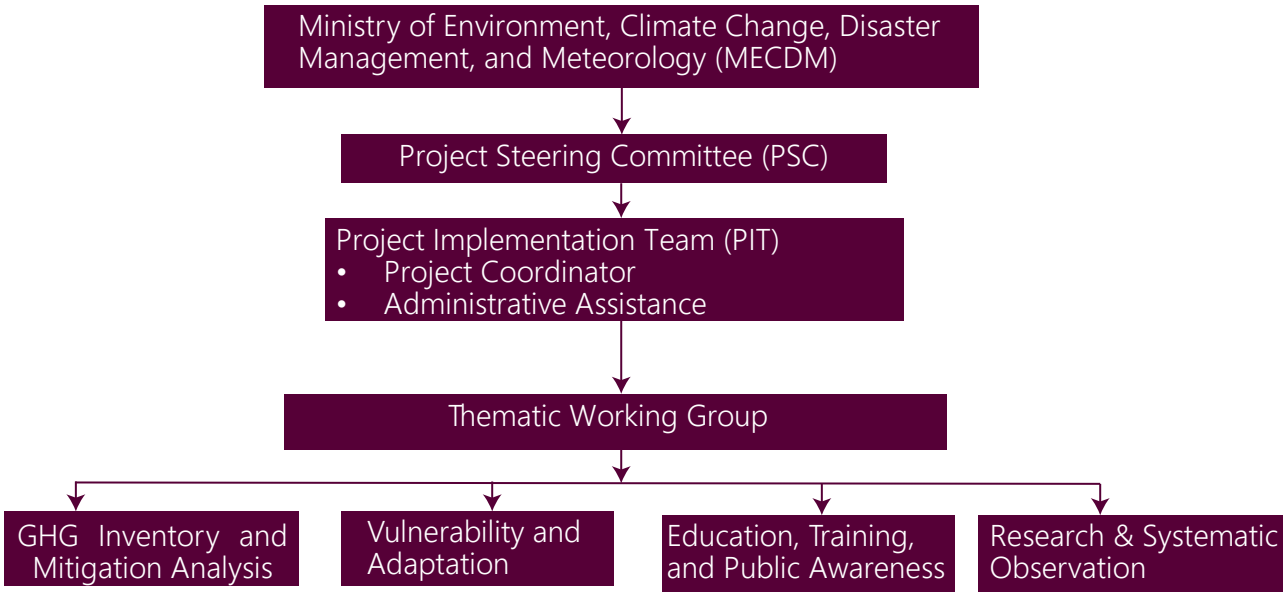

Figure 14: MECDM project organisation structure

2.2.4. Thematic Working Group

The thematic working groups were formed to assist with the preparation of various components of the national communication viz National Greenhouse Inventory and Mitigation Analysis, Vulnerability and Adaptation, Other information. Each thematic working group comprised of a few experts drawing both from public and private sectors, communities, and NGOs, as appropriate. The following table presents the key agencies within the TWGs.

Table 8: Thematic Working Group (TWG) for TNC

National Circumstance (TWG-1)	National Greenhouse Inventory (TWG-2)
Climate Change Division, MECDM Meteorology Division, MECDM REDD + Section, Ministry of Forests & Research Energy Division, Ministry of Mines, Energy, Rural Electrification Ministry of Agriculture & Livestock Fisheries Management Division, Ministry of Fisheries and Management Economic Reform Unit, Ministry of Finance	Climate Change Division, MECDM Environment Division, MECDM National Statistics Office Customs & Exercise Division REDD + Section, Ministry of Forests & Research Energy Division, Ministry of Mines, Energy, Rural Electrification Livestock Production Veterinary Services Department, Ministry of Agriculture Livestock Ministry of Infrastructure Development Ministry of Health & Medical Services South Pacific Oil Solomon Power Markwarth Oil

Vulnerability and Adaptation (TWG-3)	Mitigation (TWG-4)
Climate Change Division, MECDM Environment Division, MECDM Disaster Management Office Ministry of Forests Research Ministry of Agriculture & Livestock Ministry of Infrastructure Development Physical Planning Department, Ministry of Land, Housing and Survey Water Resources Division, Ministry of Mines, Energy and Rural Electrification	Climate Change Division, MECDM Energy Division, Ministry of Mines, Energy, Rural Electrification Livestock Production & Veterinary Services Department, Ministry of Agriculture & Livestock Solomon Power Solar Companies Tina River Hydro Ministry of Health & Medical Services
Other information (TWG-5)	
Climate Change Division, MECDM, Ministry of Finance and Treasury, National Seismological Observatory, Ministry of Mines, Energy, Rural Electrification, Women's Development Division; Ministry of Women, Children, Youth and Family Affairs, Ministry of Education, Human Resources & Development, NGOs, and Private Sector etc.	

2.2.5. Stakeholder Consultation Process

The focused stakeholder consultation was carried out with the key stakeholders (government and government departments, public and private sectors, local and international development partners, NGOs, and public groups). The first phase of the stakeholder consultation focused on the key objectives of the BUR and national GHG inventory, project inception and processes. The stakeholders were updated on the key steps of BUR and consulted on various aspect of GHG inventory sectors e.g., data collection process, climate change mitigation, adaptation, and V&A management. The stakeholders were also updated on IPCC 2006 Guidelines, updates, and Best Practices to develop the national GHG Inventory.

The second phase of stakeholder consultation involved presentation of the results i.e., National GHG Inventory of Solomon Islands for the year 2019-2020, data, standards and assumptions applied for Solomon Islands National GHG inventory, data gaps and uncertainties etc. The objective of this phase was also to validate the assumptions and standards used for GHG inventory and seeks the inputs from wide stakeholders.

2.2.6. Training and Capacity Building

The training and Capacity Building programme was designed and delivered to TWGs and the key stakeholders. A technical training and hand-holding workshop on development of GHG inventories was organized for the TWGs and other relevant key stakeholders. The overall objective was to empower the stakeholders to achieve the necessary level of expertise on development of national GHG inventory through data collection, analysis, monitoring and reporting procedures as per IPCC guidelines and UNFCCC reporting requirements.

2.2.7. Documents/ Data Review for Quality Assurance

An internal review of NIR was coordinated by the MECDM as per the National GHG inventory preparation and reporting requirements. The quality of GHG Inventory Report was also assessed through the examination of how the

principles of transparency, consistency, comparability, completeness, and accuracy (TCCCA) on reporting, established in the IPCC 2006 and Good Practice Guidance (GPGs). The main outcomes of QA/QC and review process was overall improvement in the quality of data collection, calculations, reporting and inclusion of the key criteria analysis, uncertainty estimates.

2.2.8. Archiving of information

The information regarding the data and results of the inventory carried out for the years 2019-2020 is kept, both in written and electronic format. The data and documents are kept by the Climate Change Division of MECDM.

Table 9: MECDM Archived data for the inventory 2019 – 2020

Categories	Carbon dioxide (CO2)			Methane (CH_4)			Nitrous Oxide (N2O)		
	Tier	CF	EF	Tier	CF	EF	Tier	CF	EF
1 - Energy									
1.A - Fuel Combustion Activities									
1.A.1 - Energy Industries	T1	D	D	T1	D	D	T1	D	D
1.A.3 - Transport	T1	D	D	T1	D	D	T1	D	D
1.A.4 - Other Sectors	T1	D	D	T1	D	D	T1	D	D
2 - Industrial Processes and Product Use									
2.D - Non-Energy Products from Fuels and Solvent Use									
2.D.1 - Lubricant Use	T2	D	D						
3 - Agriculture, Forestry, and Other Land Use									
3.A - Livestock									
3.A.1 - Enteric Fermentation				T1	D	D	NO	NO	NO
3.A.2 - Manure Management				T1	D	D	T1	D	D
3.B - Land									
3.B.1 - Forest land	T1	D	D						
3.C - Aggregate sources and non-CO2 emissions sources on land									
3.C.3 - Urea application	T1	D	D						
3.C.4 - Direct N2O Emissions from managed soils							T1	D	D
3.C.5 - Indirect N2O Emissions from managed soils							T1	D	D
3.C.6 - Indirect N2O Emissions from manure management							T1	D	D
4 - Waste									
4.A - Solid Waste Disposal				T1	D	D			
4.D - Wastewater Treatment and Discharge				T1	D	D	T1	D	D
Memo Items (5)									
International Bunkers									
1.A.3.a.i - International Aviation (International Bunkers)	T1	D	D	T1	D	D	T1	D	D
1.A.3.d.i - International water-borne navigation (International bunkers)	T1	D	D	T1	D	D	T1	D	D
1.A.5.c - Multilateral Operations	NO	NO		NO	NO		NO	NO	

Where:
T1 = IPCC Tier 1 methodological approach; CF = Conversion Factor; EF = Emission Factor; D = IPCC Default; NE = Not estimated; NO = Not occurring; NA: Not Applicable

2.2.9. Processes for Official Consideration and Approval of Inventory

The FBUR, TNC and NIR reports are subjected to formal approval and endorsement by the cabinet. Prior to the final approval, the NIR undergoes various review stages internally through stakeholder consultations. The report is submitted together with a cabinet paper to the cabinet for deliberation. The cabinet approves with a cabinet conclusion that entails specific editions to be made before submitting. The UNFCCC National focal point is responsible for submitting the report to the Secretariat.

2.3. Methodology

The National GHG inventory is structured as per the IPCC-2006 guidelines, to match the reporting requirements of the UNFCCC and is divided into the following four sectors: (i) Energy, (ii) Industrial Processes and Product Use (IPPU), (iii) Agriculture, Forestry and Land Use Change (AFOLU), and (iv) Waste sectors. Each of these sectors are further subdivided into sub-sectors, categories, and sub-categories. The GHG emissions by sources and removals by sinks were compiled using the methodology as same as under the inventory under the TNC for period 2011-2018 i.e., Tier 1 methodological approach apart from the category, Lubricant Use (2.D.1) for which Tier 2 methodological approach was used and are presented here in Table 11. The activity data were provided by government agencies, respective government departments under each sector, local authorities, individual private companies, and other sources indicated in Table 12. Default IPCC Emission Factors were obtained from the 2006 IPCC Guidelines for National Greenhouse Gas Inventories for estimation of emissions and removals of each of the following direct GHGs: CO2, CH4, N2O. Although not mandatory, the UNFCCC Reporting Guidelines encourage Parties to provide information on the following indirect GHGs: NOx, CO, NMVOC and SO2. To this end, an attempt is made to estimate emissions from these indirect gas in this inventory for the 2019-2020 using the emission factors provided in the EMEP/EEA Guidebook 2019. Further, for computation of carbon dioxide equivalents, Global Warming Potential (GWP) of CO2, CH4 and N2O were obtained from the IPCC Fifth Assessment Report (AR5).

2.3.1. Solomon Islands GHG Emissions: 2019 and 2020

2.3.1.1. Overview

The Solomon Islands remains the net carbon negative in terms of net GHG emissions including the removals. However, the total national GHG emissions excluding removals in year 2020 reached to 890.61 Gg CO2e (in comparison to 298.77 Gg CO2e estimated for year 1994 under the first national communication (INC), 597.15 Gg CO2e estimated for year 2010 under the SNC and 871.58 Gg CO2e estimated for 2018 under the TNC). This comprises direct CO2 emission 396.03 Gg, CH4 emission 16.37 Gg and N2O emissions 0.14 Gg during 2020. Emissions of other GHGs like per fluorocarbons (PFCs), hydro fluorocarbons (HFCs) and Sulphur hexafluoride (SF6) not estimated since very limited (negligible) applications and no manufacturing of the products containing these gases.

Forest acts as a sink for GHG emission from Solomon Islands, having land area of 2.8 million hectares, of which 89.94% is covered by natural forests and forest plantations. The net removal from the forest sector for the year 2020, 28,062.10 Gg CO2e.

2.3.1.2. Total GHG Emission: 2019 and 2020

The total GHG emissions (excl. Removals) in Solomon Islands for the year 2019 was 862.23 Gg CO2e and 2020 was 890.61 Gg CO2e as presented in the below Figure 16 and Table 10

Table 10: Solomon Islands Total GHG Emission-Sector wise (excluding removals), Gg CO2e: 2019 and 2020

Inventory Year: 2019-2020	Net CO2 Emissions, (CO2 Equivalents Gg)	
Categories	**2019**	**2020**
1 - Energy	382.31	400.44
2 - Industrial Processes and Product Use	0.24	0.45
3 - Agriculture, Forestry, and Other Land Use	130.39	131.11
4 - Waste	349.30	358.61
Total GHG Emissions, excl. Removals	862.23	890.61

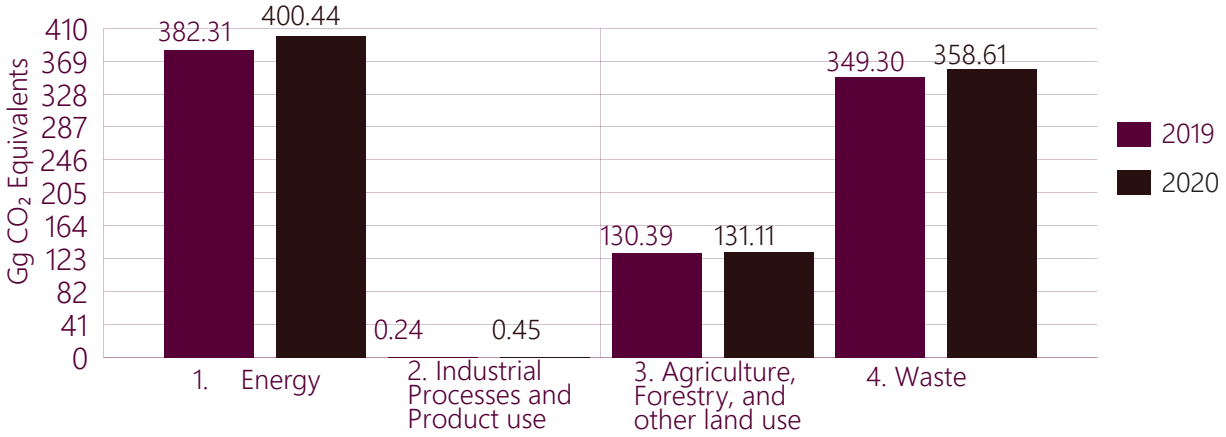

Figure 15: Solomon Islands Total GHG Emission-Sector wise (excluding removals), Gg CO2e: 2019 and 2020

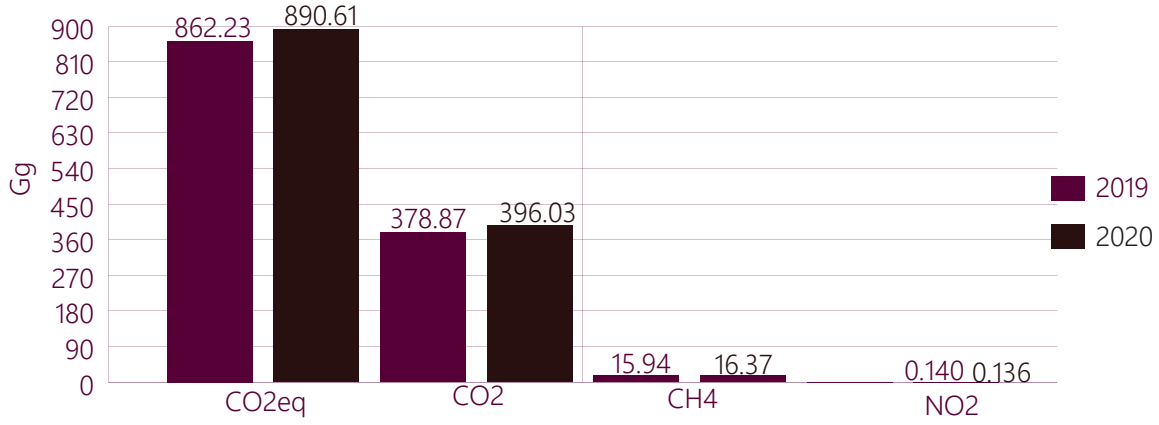

Figure 16: Solomon Islands Total GHG Emission-Gas wise (excluding removals), Gg CO2e: 2019 and 2020

As can be seen in above tables and figures, the total GHG emissions in Solomon Islands have increase in 2020 and indicative increase is in CO2 emissions followed by CH4. This indicative increase in CO2 emissions is mainly attributed to fossil fuel consumption in Electricity Generation and Transport subsectors. Whereas the indicative increase in CH4 emission is attributed to emissions from agriculture-livestock (Enteric fermentation and Manure management), Waste Sector (Solid waste and Wastewater). The N2O emissions is decreased slightly in 2020, this is mainly attributed to Direct and Indirect N2O Emissions from managed soils (decrease in nitrogen based synthetic fertilizer application to managed soil).

However, as discussed above the Solomon Islands is net carbon negative, since the land-use change and forestry sector are a net sink of CO2 in Solomon Islands. The CO2 removals from the land-use change and forestry sector were estimated at -28,062.10 Gg CO2e for the year 2020 and -25916.56 Gg CO2e for 2019.

2.4. Sector wise GHG Emissions: 2019 and 2020

The following table present the sector and sub-sector wise GHG emissions in Solomon Islands for the year 2019 and 2020.

Table 11: Solomon Islands GHG Emission-Sector and Sub-Sector wise (excluding removals), Gg CO2e

Inventory Year: 2019-2020 Categories	Net CO2 Emissions, (CO2 Equivalents Gg) 2019	 2020
Total National Emissions and Removals		
1 - Energy	382.31	400.44
1.A - Fuel Combustion Activities	382.31	400.44
1.A.1 - Energy Industries	67.20	67.96
1.A.3 - Transport	306.65	326.23
1.A.4 - Other Sectors	8.46	6.25
2 - Industrial Processes and Product Use	0.235	0.449
2.D - Non-Energy Products from Fuels and Solvent Use	0.235	0.449
2.D.1 - Lubricant Use	0.235	0.449
3 - Agriculture, Forestry, and Other Land Use	130.39	131.11
3.A - Livestock	116.81	120.09
3.A.1 - Enteric Fermentation	11.00	10.15
3.A.2 - Manure Management	105.81	109.94
3.C - Aggregate sources and non-CO2 emissions sources on land	13.58	11.02
3.C.3 - Urea application	1.93	1.25
3.C.4 - Direct N2O Emissions from managed soils	5.04	3.50
3.C.5 - Indirect N2O Emissions from managed soils	1.64	1.14
3.C.6 - Indirect N2O Emissions from manure management	4.98	5.13
4 - Waste	349.30	358.61
4.A - Solid Waste Disposal	328.16	336.87
4.D - Wastewater Treatment and Discharge	21.13	21.74
Total GHG Emissions, excl. Removals	862.23	890.61

As discussed above the main GHG emission sectors and sub-sectors in Solomon Islands includes:

Table 12: Main GHG Emission Sectors and Sub-Sectors in Solomon Islands

Sectors	Emission Sources
Energy Sector (Fuel Combustion Activities)	• Energy Industries (Electricity Generation) • Transportation • Road Transportation ▪ Aviation (Domestic) ▪ Water-borne Navigation (Domestic) • Other Sectors ▪ Commercial, Institutional, Residential
Industrial Processes and Product use	• Non-Energy Products from Fuels and Solvent Use ▪ Lubricant Use
Agriculture, Forestry and Land Use (AFOLU)	• Livestock ▪ Enteric Fermentation ▪ Manure Management • Land • Aggregate sources and non-CO2 emissions sources on land ▪ Urea Application ▪ Direct N2O Emissions from managed soils ▪ Indirect N2O Emissions from managed soils ▪ ndirect N2O Emissions from manure management
Water Sector	• Solid Waste ▪ Unmanaged Waste Disposal Sites (Municipal Solid Waste-MSW) • Wastewater Treatment and Discharge ▪ Domestic Wastewater Treatment and Discharge

Note: GHG emissions form international aviation and international water borne navigation has been calculated as memo item and not included in the total GHG emissions from Solomon Islands.

The total GHG emissions in Solomon Islands is majorly contributed from Energy sector (Electricity Generation) 45%, followed by Waste sector (MSW and domestic wastewater) 40% and AFOLU (Livestock and Aggregate sources and non-CO2 emissions sources on land) 15% and Industrial Processes and Product Use (Lubricant Use) 0.1%.

The following table present the sub-category wise GHG emissions from Solomon Islands during the inventory years 2019 and 2020.

Table 13: Solomon Islands GHG Emission-Sub Category wise (excluding removals), Gg CO2e: 2019 and 2020

Inventory Year: 2019 - 2020 Categories	Net CO2 Emissions, (CO2 Equivalents Gg) 2019	2020
1.A.1 - Energy Industries	67.20	67.96
1.A.3 - Transport	306.65	326.23
1.A.4 - Other Sectors	8.46	6.25
2.D.1 - Lubricant Use	0.24	0.45
3.A.1 - Enteric Fermentation	11.00	10.15
3.A.2 - Manure Management	105.81	109.94
3.C.3 - Urea application	1.93	1.25
3.C.4 - Direct N2O Emissions from managed soils	5.04	3.50
3.C.5 - Indirect N2O Emissions from managed soils	1.64	1.14
3.C.6 - Indirect N2O Emissions from manure management	4.98	5.13
4.A - Solid Waste Disposal	328.16	336.87
4.D - Wastewater Treatment and Discharge	21.13	21.74
Total GHG Emissions, excl. Removals	**862.23**	**890.61**

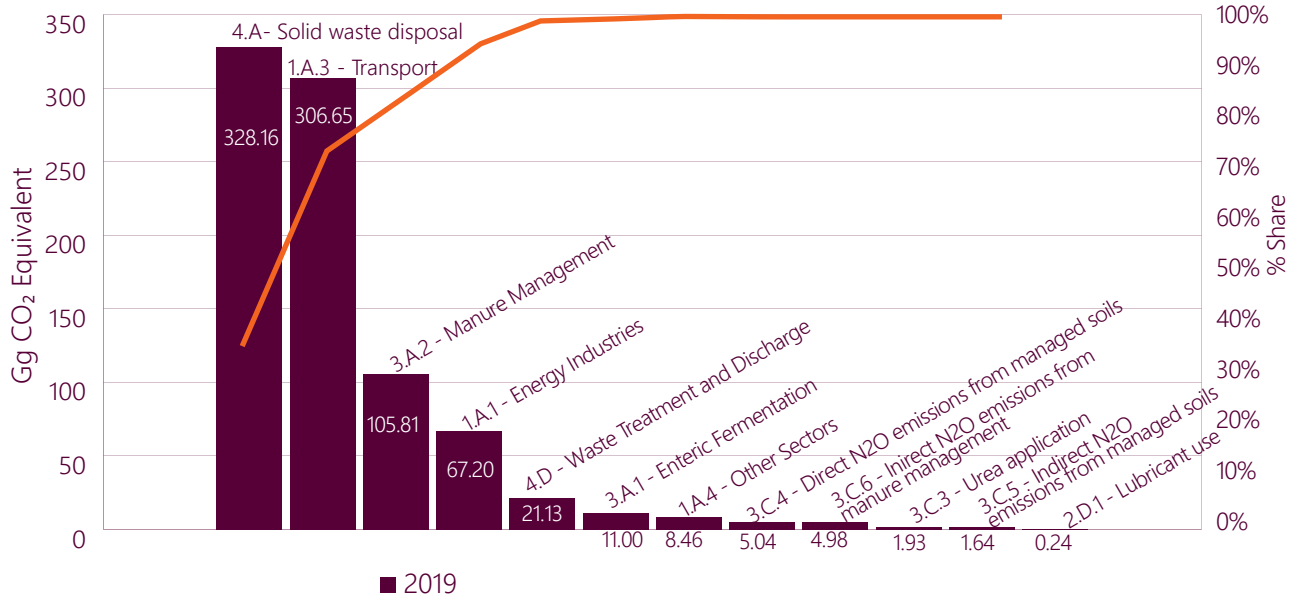

Figure 17: Solomon Islands GHG Emission Sub-category wise (excluding removals) Cg CO2e: 2019

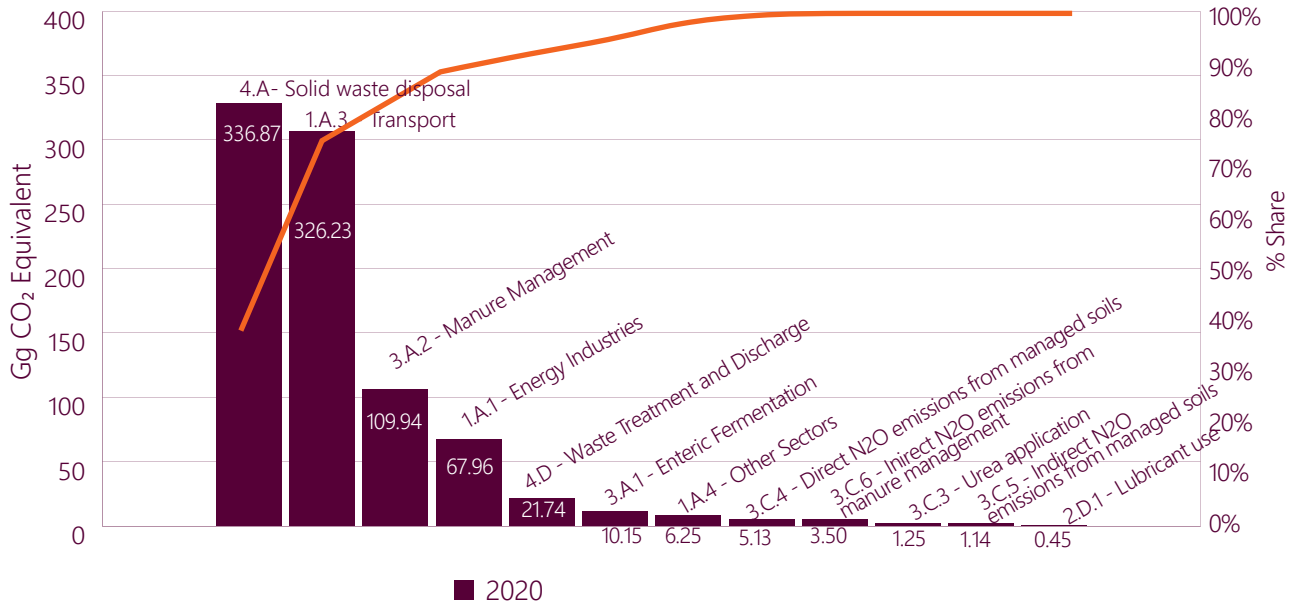

Figure 18: Solomon Islands GHG Emission Sub-category wise (excluding removals) Cg CO2e: 2020

As can be seen from above table and graph of sub-sectoral (sub-category wise) GHG emission of Solomon Islands for the inventory years 2019 and 2020 shows that the Solid Waste Disposal is the largest GHG emissions contributing sub-category (38.1% –2019 & 37.8% –2020). This is followed by transport sector (36% –2019 & 37% –2020); Manure Management (12.27% –2019 & 12.34% –2020); Energy Industries (Electricity Generation) (7.8% –2019 & 7.6% –2020); Domestic Wastewater Treatment and Discharge (2.5% –2019 & 2.4% –2020); Enteric Fermentation (1.3% –2019 & 1.1% –2020). The remaining less than 1% is contributed from Indirect N2O Emissions from manure management, Direct N2O Emissions from managed soils, Indirect N2O Emissions from managed soils and Urea application respectively.

2.5. Gas by Gas Emission Inventory: 2019 and 2020

This section discusses the gas-by-gas GHG emission inventory for Solomon Islands for the inventory years 2019 and 2020. As discussed above, the main GHG emission sectors in Solomon Islands includes Energy, IPPU, AFOLU and Waste sector. Greenhouse gases covered in this analysis include Carbon dioxide (CO2), Methane (CH4) and Nitrous oxide (N2O), the estimated quantum of these main GHGs presented in Table 14.

The emission from other direct GHGs i.e., hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and Sulphur hexafluoride (SF6) have not been included here since HFCs, PFCs, SF6 are not directly imported or sold in Solomon Islands. Hence direct emission of these gases does not occur. However negligible amount of these gases contained in equipment like air conditioners (ACs), Refrigerators, switchboards, and circuit-breakers etc. Further none of the activity listed under Tier-1 approach to estimate emissions from these gases applicable for Solomon Islands.

The national GHG inventory also include the emission of precursor gases like Carbon Monoxide (CO), Nitrogen Oxides (NOx) and non-Methane Volatile Organic Compounds (NMVOC) and other gases not controlled by the Montreal Protocol, such as Sulphur Oxides (SOx) from the Energy sector (Energy Industries, Transport, Other sectors- Commercial, Institutional and

Residential). However, they are not the main source of GHGs and have very negligible quantum. These emissions are not counted under national total GHG emissions. The table 18zz presents NOx, CO, NMVOCs and SO2 emission trend in Solomon Islands for the year 2019 and 2020.

Table 14: Solomon Islands Gas wise GHG Emissions (excluding removals), Gg: 2019 and 2020

Solomon Islands GHG Emissions (excluding removals) (CO2 Equivalents Gg)				
Year	**CO2eq**	**CO2**	**CH4**	**N_2O**
2019	862.23	378.87	15.94	0.140
2020	890.61	396.03	16.37	0.136

As can be seen from table 14, CO2 is the most potent GHG in Solomon Islands. This is primarily due to fossil fuel combustion emissions from energy industries mainly electricity generation, Transport- road and domestic aviation and navigation and other commercial, institutional and residentials. Next most prominent GHG in Solomon Islands is CH4 mainly from the livestock, land management, solid waste, and wastewater sub-sectors; followed by N2O mainly from livestock, land management and wastewater sub-sector. The detailed analysis of all three potent GHGs are discussed in the following section.

2.5.1. Carbon dioxide (CO2)

Net CO2 emissions in Solomon Islands estimated for the years 2019 and 2020 is presented in the table and graph below. The energy sector and sub-sectors are the main source of CO2 emissions, accounting for approximately 100% of CO2 emissions in 2020. A very small quantum of CO2 emissions comes from Lubricant use and Urea application (< 0.5%). Thus, the combustion of fossil fuels remains the main contributor of CO2 emissions in Solomon Islands. The CO2 emissions from Solomon Islands has shown the increasing trend historically and under the inventory period 2019 and 2020, the net CO2 emissions in year 2019 was 378.87 Gg and increase to 396.03 Gg in 2020, representing an increase of 5%.

Table 15: Solomon Islands Gg CO2e emissions (excluding removals): 2019 and 2020

Inventory Year: 2019-2020	Net CO_2 Emissions (Gg)	
Categories and Sub-categories	**2019**	**2020**
1 - Energy		
1.A - Fuel Combustion Activities	376.705	394.332
1.A.1 - Energy Industries	66.980	67.740
1.A.3 - Transport	301.283	320.354
1.A.4 - Other Sectors	8.443	6.237
2 - Industrial Processes and Product Use		
2.D - Non-Energy Products from Fuels and Solvent Use	0.235	0.449
2.D.1 - Lubricant Use	0.235	0.449
3.C - Aggregate sources and non-CO_2 emissions sources on land		
3.C.3 - Urea application	1.93	1.25
Net CO_2 Emissions	**378.867**	**396.034**

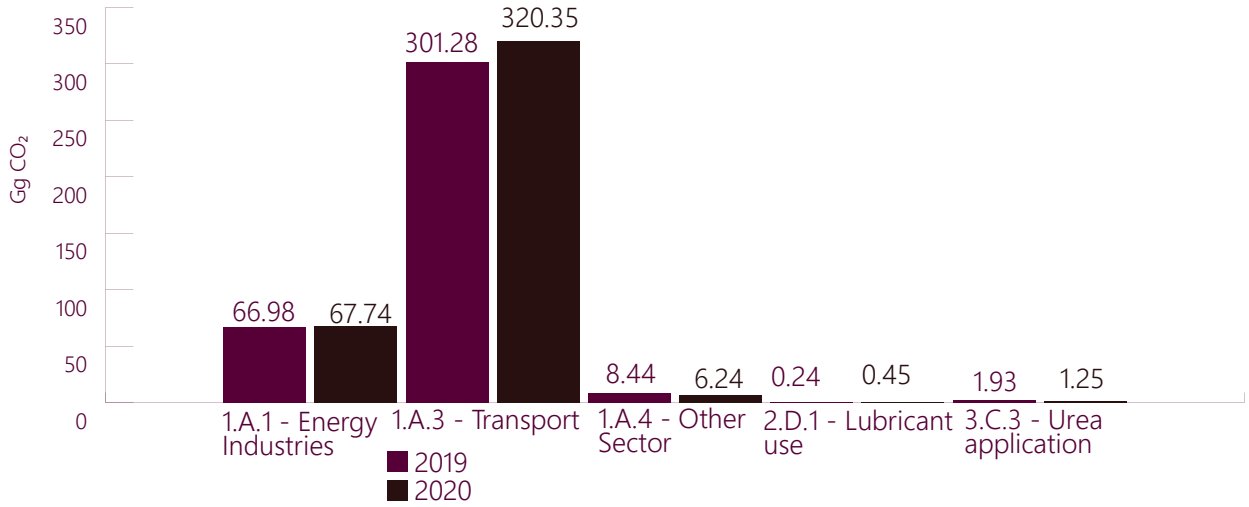

Figure 19: Solomon Islands Gg CO2 emissions: 2019 and 2020

The Sub-sector (sub-category) analysis of the total CO2 emission present that in 2020, the Transportation sub-sector (81%) i.e. Road Transport (54%), Domestic Aviation (1%) and Domestic Water Borne Navigation (45%) are the main source of CO2 emission in Solomon Islands; followed by the Energy Industry – Electricity Generation (17%), and remaining from Other sectors (2%) i.e. commercial, institutional and residential sub-sectors, Urea application (0.3%) and Non-Energy Products from Fuels and Solvent Use- Lubricant Use (0.1%).

2.5.2. Methane (CH4)

Net CH4 emissions in Solomon Islands estimated for the years 2019 and 2020 is presented in the table and graph below. The waste sector and subsector are the major contributor of CH4 emissions and account for approximately 76% of the net CH4 emissions in 2020 i.e., Solid Waste Disposal (73.5%) and Wastewater Treatment and Discharge (2.6%). The livestock sector is the second largest contributor of CH4 emissions accounting for 23.8% i.e., the Manure Manage-

ment sub-sector (21.6%) and enteric fermentation (2.2%). A minor fraction of methane comes from the energy sector; mainly as the emissions from combustion of fossil fuel (0.1%).

Table 16: Solomon Islands Gg CH4 emissions (excluding removals): 2019-2020

Inventory Year: 1994-2020	Net CH4 Emissions (Gg)	
Categories and Sub-categories	2019	2020
1 - Energy		
1.A - Fuel Combustion Activities	0.02	0.02
1.A.1 - Energy Industries	0.00	0.00
1.A.3 - Transport	0.02	0.02
1.A.4 - Other Sectors	0.00	0.00
3 - Agriculture, Forestry, and Other Land Use		
3.A - Livestock	3.79	3.90
3.A.1 - Enteric Fermentation	0.39	0.36
3.A.2 - Manure Management	3.40	3.53
4 - Waste	12.13	12.46
4.A - Solid Waste Disposal	11.72	12.03
4.D - Wastewater Treatment and Discharge	0.41	0.43
Net CH_4 Emissions	15.94	16.37

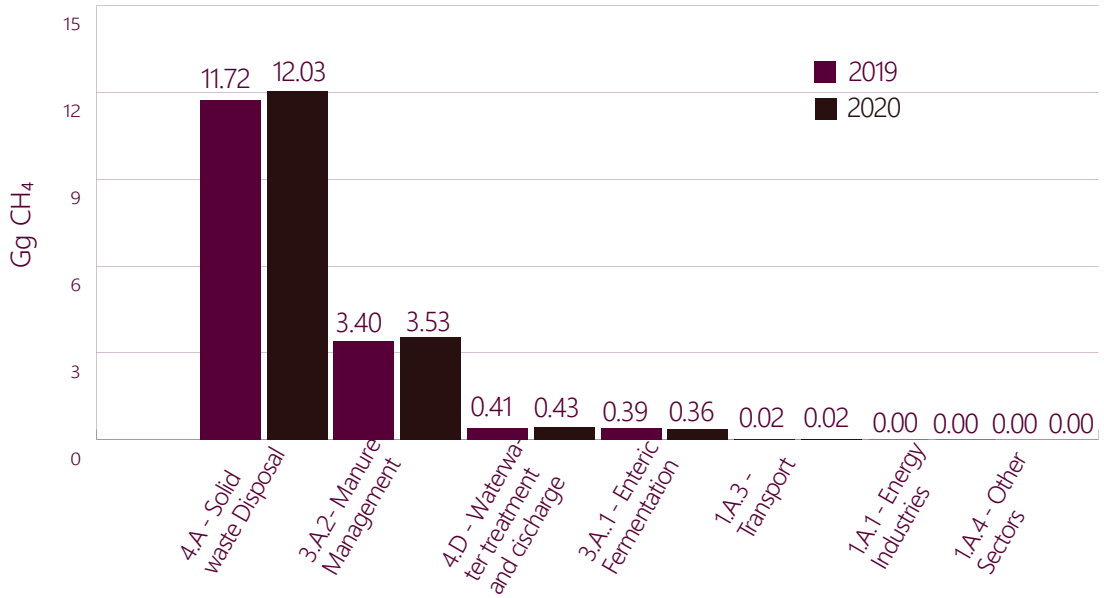

Figure 20: Solomon Islands Gg emission: 2019 and 2020

From the analysis it is observed that the Methane (CH4) emissions from Solomon Islands has shown minor increasing trend over the years 2019 and 2020, the net CH4 emissions in year 2019 was 15.94 Gg and increased to 16.37 Gg indicating an increase of about 3% in 2020. The increase in methane emission is due to an increase in livestock- manure management activities and MSW generation.

2.5.3. Nitrous oxide (N_2O)

Net N2O emissions in Solomon Islands estimated for the years 2019 and 2020 is presented in the table and graph below. The AFOLU sector and subsector are the major contributors of N2O emissions and account for approximately 57.5% of the net N2O emissions in 2020 i.e., Livestock- manure management (30.4%) and Aggregate sources and non-CO2 emissions sources on land (27%). The second largest source of N2O emissions in Solomon Islands is Waste sector, mainly Wastewater Treatment and Discharge contributing about 27.1% of the net N2O emissions in 2020. The energy sector and its subsector contribute to approximately 15.4% of the net CO2 emissions i.e., mainly from the transport sector tail gas emissions (mobile combustion) (15%) and minor emission from stationery combustion (0.4%).

Table 17: Solomon Islands Gg N2O emissions (excluding removals): 2019-2020

Inventory Year: 2019-2020	Net N2O Emissions (Gg)	
Categories and Sub-categories	2019	2020
1 - Energy		
1.A - Fuel Combustion Activities	0.019	0.021
1.A.1 - Energy Industries	0.001	0.001
1.A.2 - Manufacturing Industries and Construction	0.000	0.000
1.A.3 - Transport	0.019	0.020
1.A.4 - Other Sectors	0.000	0.000
3 - Agriculture, Forestry, and Other Land Use		
3.A - Livestock	0.040	0.041
3.A.2 - Manure Management	0.040	0.041
3.C - Aggregate sources and non-CO2 emissions sources on land	0.044	0.037
3.C.4 - Direct N2O Emissions from managed soils	0.019	0.013
3.C.5 - Indirect N2O Emissions from managed soils	0.006	0.004
3.C.6 - Indirect N2O Emissions from manure management	0.019	0.019
4 - Waste	0.036	0.037
4.D - Wastewater Treatment and Discharge	0.036	0.037
Net N2O Emissions	**0.140**	**0.136**

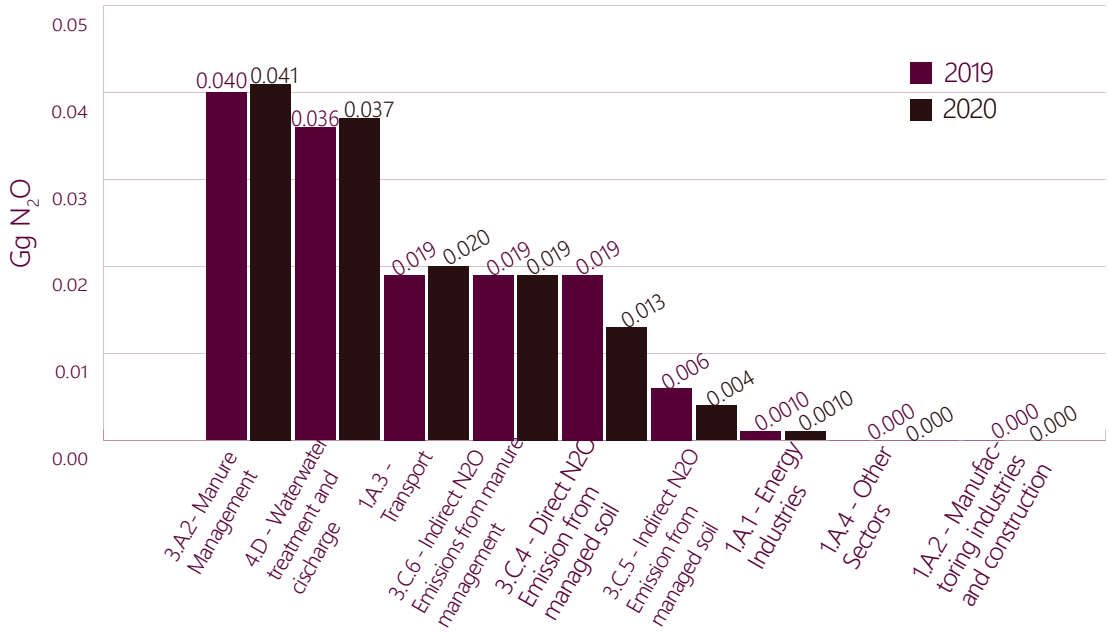

Figure 21: Solomon Islands Gg N2O emissions: 2019 and 2020

2.5.4. Other GHGs (PFCs, HFCs and SF6)

Emissions from per-fluorocarbons (PFCs), hydrofluorocarbons (HFCs) and Sulphur hexa-fluoride (SF6) in Solomon Islands is not estimated since very limited (negligible) application and lack of activity (consumption) data. Furthermore, the products containing these gases are not produced in the country.

2.5.5. Indirect Greenhouse Gases (NOx, CO, NMVOC and SO2)

Apart from the direct GHG emissions in Solomon Islands the other indirect emissions of NOx, CO, NMVOC and SO2 takes place. However, they are not the main source of the GHGs and have very negligible quantum. These emissions are not counted under national total GHG emissions. An effort is made to estimate emissions from indirect gases in Solomon Islands in Solomon Islands e.g., NOx, CO, NMVOC, SO2 from Energy Sector (Energy Industries, Transport, Other sectors- Commercial, Institutional and Residential). The following table and figure present the NOx, CO, NMVOCs and SO2 emission trend in Solomon Islands for the year 2019 and 2020. The increase in indirect GHG emission levels is directly attributed to the fuel consumption quantities.

Table 18: Solomon Islands Gg NOx, CO, NMVOC, SO2: 2019 and 2020

Inventory Year: 2019-2020	Net Indirect Emissions (Gg)			
	NOx	CO	NMVOCs	SO_2
2019	3.65	5.83	1.37	0.90
2020	3.80	6.86	1.60	0.96

2.5.6. Memo Items

In accordance with 2006 IPCC guidelines, CO2 emissions from International Bunkers and burning of biomass are not included under the national items, only International Bunkers i.e., international aviation and international water borne navigation have been estimated and reported separately as memo items in the inventory.

2.5.7. International Bunkers

International bunkers include international aviation and international water borne navigation. Total CO_2 emissions from international aviation and international water borne navigation for the year 2019 and 2020 were estimated and presented in the following table and graph, while emissions from other gases were insignificant. These emissions are not counted under national total GHG emissions.

Table 19: International Bunkers Emissions (gg CO2): 2019 and 2020

Inventory Year: 2019-2020	Net CO2 Emissions, (CO2 Equivalents Gg)	
Categories	2019	2020
International Bunkers		
1.A.3.a.i - International Aviation (International Bunkers)	8.13	2.12
1.A.3.d.i - International water-borne navigation (International bunkers)	20.43	21.33
Net GHG Emissions (Gg CO2eq.)	**28.56**	**23.45**

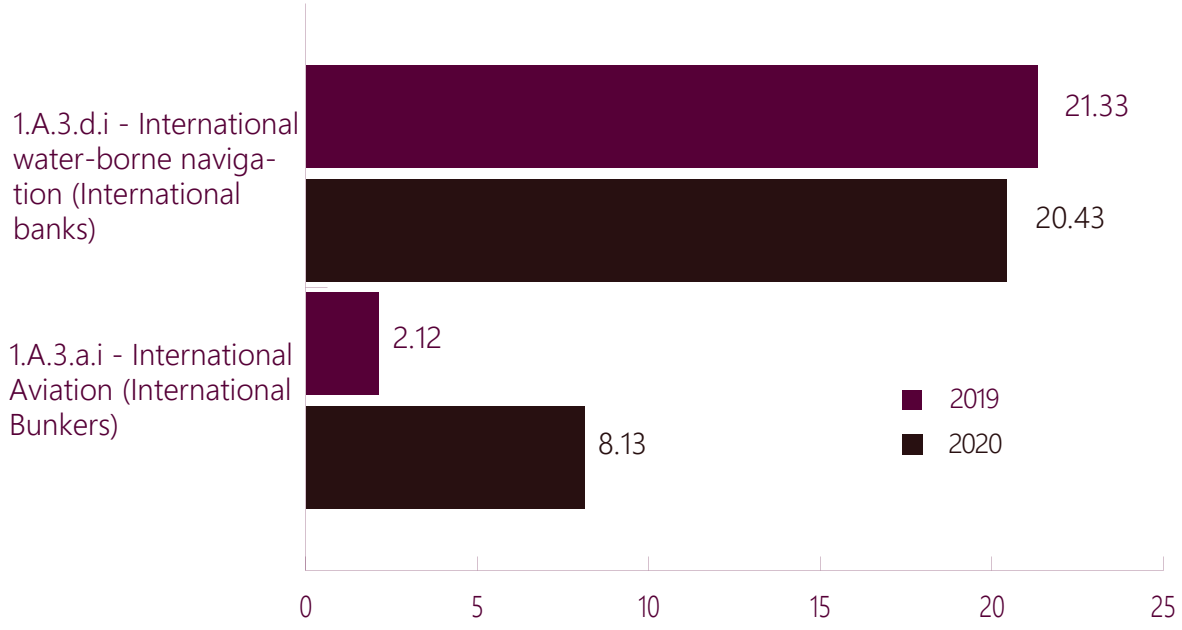

Figure 22: International Bunkers (Gc CO2): 2019 and 2020

2.6. GHG Emission Sector Analysis: 2020

This section of the report presents the sectoral GHG emission in Solomon Islands i.e., Energy, IPPU, AFOLU and Waste Sector during the inventory year 2019 and 2020.

2.6.1. Energy Sector

In 2020, the total emissions from energy sector were 400.44 Gg CO2e which is about 45% of the total national emissions (excluding removals). The energy sector of Solomon Islands is also the major contributor of CO2 emissions. The energy sector of Solomon Islands mainly comprises of energy industries (electricity generation), transportation i.e., road, aviation and marine navigation, and other sectors- residential, commercial, and institutional contributing to 17%, 81% and 2% of the total GHG emissions from energy sector respectively. The following table and figure gives the relative distribution of GHG emissions across the energy sector.

Table 20: Energy Sector Emissions (Gg CO2e): 2019-2020

Inventory Year: 2019-2020	Net CO2 Emissions (Gg)	
Categories and Sub-categories	2019	2020
1 - Energy	376.71	394.33
1.A - Fuel Combustion Activities	376.71	394.33
1.A.1 - Energy Industries	66.98	67.74
1.A.3 - Transport	301.28	320.35
1.A.4 - Other Sectors	8.44	6.24

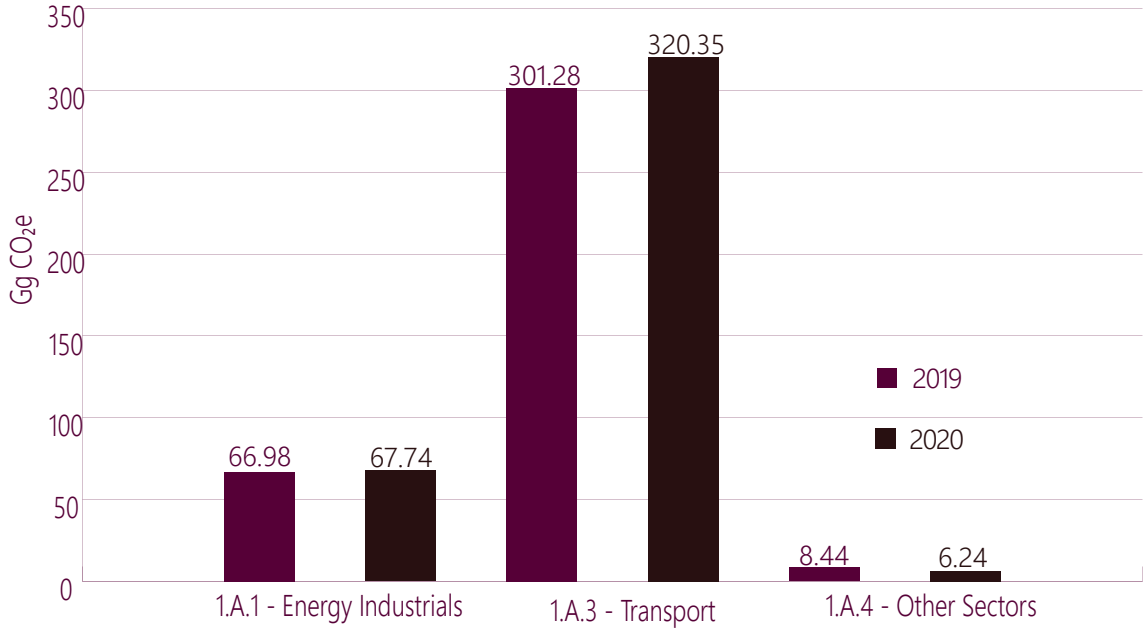

Figure 23: Energy Sector Emissions (Gg CO2e): 2019-2020

2.6.2. Comparison with Reference Approach

The reference approach was also used to estimate CO2 emissions from fuel combustion for the year 2019 and 2020. The GHG Emissions from the energy sector were estimated using reference and sectoral approaches using IPCC Tier 1 analytical framework. Under the reference approach, GHG emissions were estimated using only the fuel consumption data for each type of fuel. The results of estimated CO2 emissions for the GHG inventory year 2019 and 2020 using reference approach have been estimated and compared with the CO2 emissions estimated using sectoral approach. The difference in estimates of CO2 emissions from fuel combustion using the sectoral and reference approaches was within ±1%.

Table 21: Energy Sector CO2 Emissions using Reference and Sectoral Approach: 2019-2020

Inventory Year	Reference Approach				Sectoral Approach		Difference	
	Apparent Consumption (TJ)	Excluded Consumption (TJ)	Apparent Consumption-Excluding non-energy uses (TJ)	CO2 Emission (Gg)	Energy Consumption (TJ)	CO2 Emission (Gg)	Energy Consumption (%)	CO2 Emission (%)
2019	5583.69	406.27	5177.42	375.10	5199.30	376.71	-0.4%	-0.4%
2020	5766.29	356.48	5409.81	391.14	5453.32	394.33	-0.8%	-0.8%

2.6.3. Fuel Combustion

2.6.3.1. Energy industries (1.A.1)

In 2020, Electricity generation accounted for 67.74 Gg CO2eq, approximately 8% of the total national emissions. Electricity generation is the second largest fossil fuel consumer and GHG emitter within 'Energy Sector'. The state-owned Solomon Islands Electricity Authority is running the entire electricity power system from generation to distribution. Electricity generation in Solomon Islands is majorly based on diesel generators. Data on diesel consumption for electricity generation was provided by Solomon Power the year 2019 and 2020.

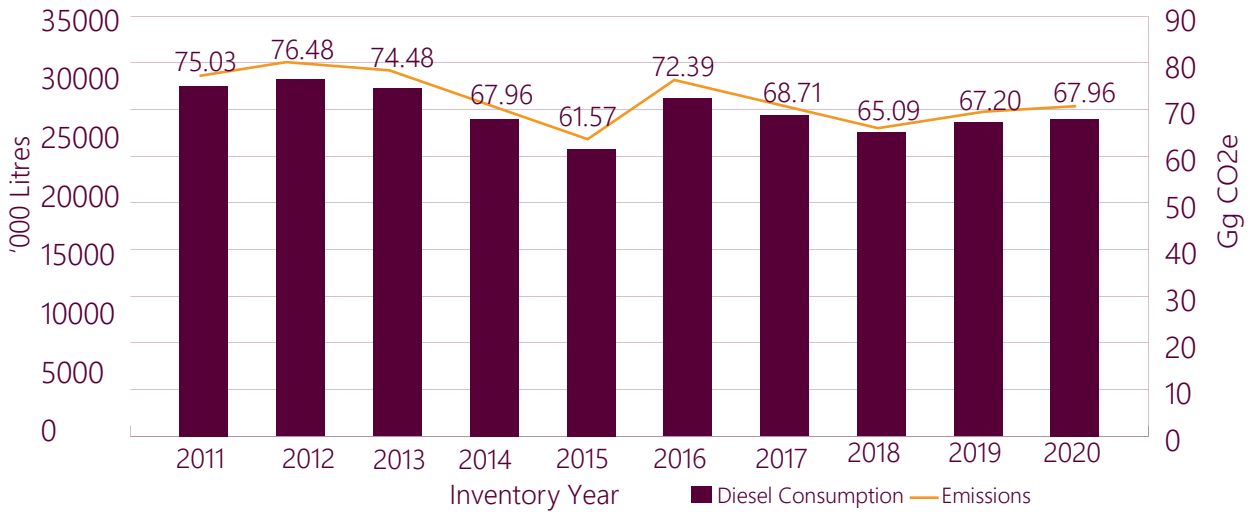

Figure 24: Electricity Generation-Diesel Consumption ('000 Litres) and GHG Emissions (Gg CO2e): 2019-2020

It is evident from the above figure, that the GHG emissions from energy industries have decreased over the period 2011-2020 in Solomon Islands. This is attributed to the increase in renewable energy generation leading to decrease in consumption of diesel fuel consumption.

Although, the IPCC guidelines (V1_8_Ch8_Reporting_Guidance)[8] do not provide Emission Factors for indirect GHGs such as NOX, CO, NMVOC and SO_2, the emissions from these indirect gases are also estimated for the inventory years 2019 and 2020 and they follow similar trend as that of total CO_2e emissions. Table and Figure, below presents the Indirect GHG emissions of NOx, CO, NMVOC and SO_2 gas from the Electricity generation for the period 2019-2020.

Table 22: Indirect GHG Emissions from Energy Industries (electricity generation) in Gg: 2019-2020

Inventory Year: 2019-2020	Net Indirect Emissions (Gg)			
Categories	**NOx**	**CO**	**NMVOCs**	**SO_2**
2019	0.06	0.01	0.00	0.04
2020	0.06	0.01	0.00	0.04

2.6.3.2. Transport – Road, Civil Aviation and Water-borne Navigation (1.A.3)

GHG emissions from the transport sector are 326.23 Gg CO2e which is about 81% of total CO2e emissions from the energy sector and 37% of total national GHG emissions (excluding removals) in the country for the year 2020. Road transport sector accounted for 54% (175.39 Gg CO_2e) of the total GHG emissions from the transport sector, followed by water borne navigation for 45% (147.31 Gg CO2e) and civil aviation for 1% (3.54 Gg CO2e). The below figure and table present the direct and indirect GHG emissions from transport sector in Solomon Islands for year 2019 and 2020 respectively.

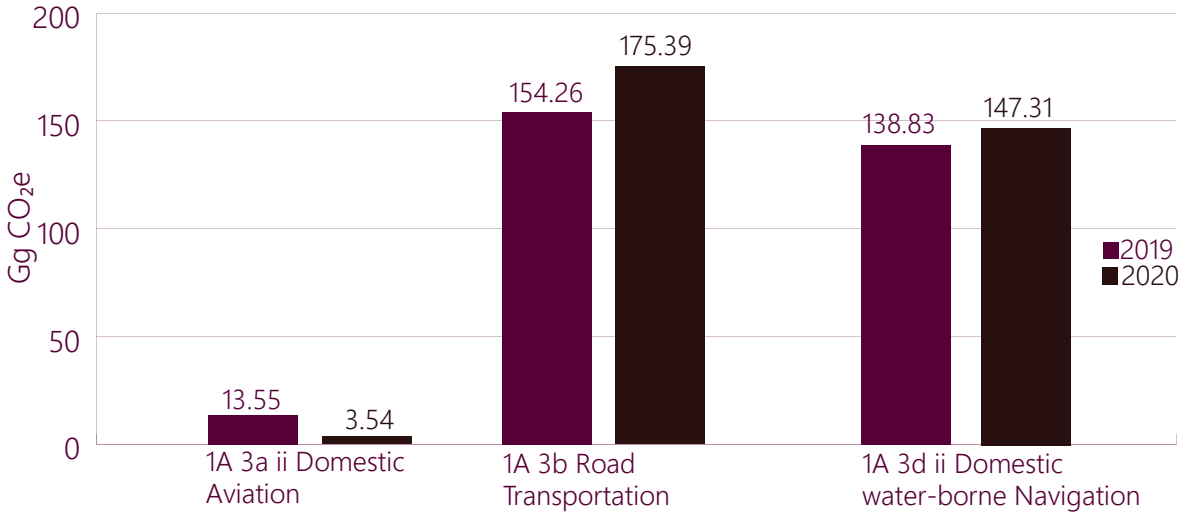

Figure 25: Solomon Islands Total GHG Emissions Transport Sub-sector (Gg CO2 CO2e): 2019-2020

[8]2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 1, Chapter 8, https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/1_Volume1/V1_8_Ch8_Reporting_Guidance.pdf

Table 23: Indirect GHG emissions from Transport sector in Gg: 2019-2020

Inventory Year: 2019-2020	Net Indirect Emissions (Gg)			
Categories	**NOx**	**CO**	**NMVOCs**	**SO_2**
2019	3.57	5.81	1.36	0.86
2020	3.74	6.84	1.59	0.91

As discussed in the above section, the data on diesel consumption for electricity generation was provided by Solomon Power the year 2019 and 2020. After subtracting the total quantity of fuel used for electricity generation from the total quantity of diesel imported in the country, the remaining fuel quantities are allocated to the transportation subsector in the following proportions:

- 30% of the total diesel import is used for road transportation
- 60% of the total diesel import is used for sea transportation i.e., domestic navigation
- And remaining 10% is used for international marine Bunkering

Further, it is assumed that out of total Gasoline import in the country, 85% is used in Road transportation and remaining 15% each for domestic water borne navigation. The fuel quantities used for the international bunker fuels for the marine and the aviation sectors is also poorly monitored in the country and the data as previously stated could not be accessed from their records as well. Hence, it is assumed that 70% of the Jet kerosene imported is used in domestic aviation and remaining 30% is used for international aviation bunker. Similar assumption is made for the total Aviation gasoline imported i.e., 70% is used in domestic aviation and remaining 30% in International Aviation bunker. The emission estimates made for the combustion of Aviation Gasoline (AVG) and Dual Purpose Kerosine (DPK) in international aviation is reported separately as a memo item under international bunkers.

It is also assumed that only 30% of the Total Lubricating oil imported in the country is used in Transport sector whilst the remaining 70% is consumed in the IPPU sector under the category Non-Energy Products from Fuels and Solvent Use - Lubricant.

The total fuel consumption during the inventory years 2019 and 2020 from the transport sector are presented in the following table:

Table 24: Total fuel consumption in Transport sector in Litres: 2019-2020

	2019	2020
1.A.3.b- Road Transportation	Litres	Litres
Diesel	22,771,384	23,772,912
Gasoline	39,521,998	47,028,713
Lubricating oil	384,152	764,113
1.A.3.a.i - International Aviation (International Bunkers)	Litres	Litres
Jet Kerosene	3,170,645	827,903
Aviation Gasoline	0	0
1 A 3 a ii Domestic Aviation	Litres	Litres
Jet Kerosene	5,284,408	1,379,839
Aviation Gasoline	0	0
1.A.3.d.i-International waterborne navigation (International bunkers)	Litres	Litres
Diesel	7,590,461,	7,924,304
1.A.3.d.ii-Domestic water-borne Navigation	Litres	Litres
Diesel	45,542,768	47,545,824
Gasoline	6,974,470	8,299,185

2.6.3.3. Other Sector (1.A.4)

In Solomon Islands, the others sub-sector of energy sector includes direct fuel consumption mainly in commercial, institutional, Residential and any other uncategorized and unorganized sector or purposes; this includes Hotels, tourism bungalow, guest houses, restaurants, retail, shopping complexes etc. The major fuels consumed in residential sector are firewood and LPG. The LPG consumption is expected to marginally increase due to awareness, affordability, and access to modern cooking fuel for residential sector. However, some quantities of Residual Fuel oil are also used for heating applications in commercial/ Institutional buildings.

In 2020, the other sectors together emitted 6.25 Gg of CO2e, which is approximately 2% of total CO2e emissions from the energy sector and 0.7% of total national GHG emissions (excluding removals). The biomass consumption in the residential sector (mainly form cooking) is mostly renewable biomass, collect form the forest land, in the absence of data emission form the biomass combustion not included in the national inventory report. The Biomass consumption data collection and QA/QC procedure will be implemented to include these fuels in the future inventory reports. The total fuel consumption and emissions from the other sector during the inventory years 2019 and 2020 is as follows:

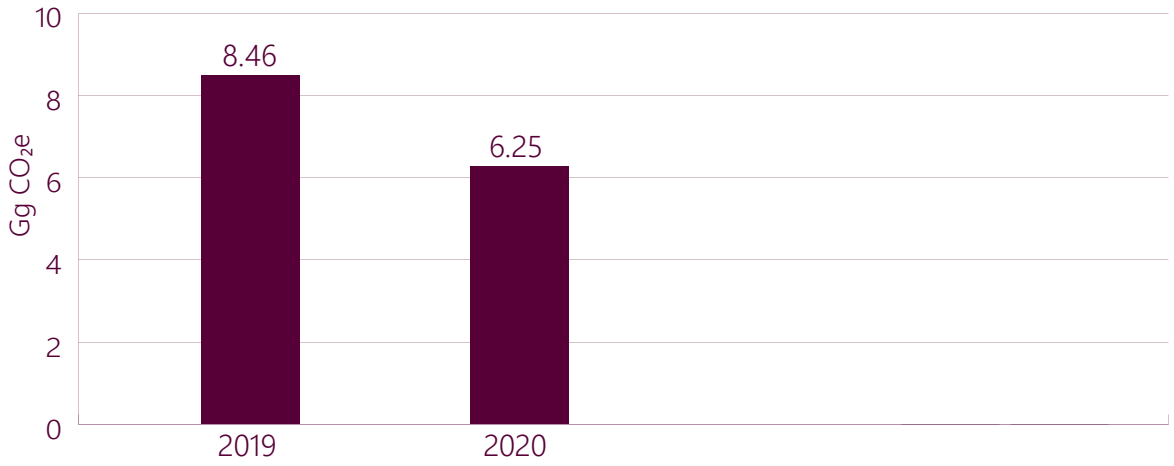

Figure 26: Solomon Islands Total GHG Emissions Other sector (Gg CO2e): 2019-2020

Table 25: Indirect GHG emissions from other sector in Gg: 2019-2020

Inventory Year: 2019-2020	Net Indirect Emissions (Gg)			
Categories	**NOx**	**CO**	**NMVOCs**	**SO_2**
2019	0.022	0.009	0.004	0.0042
2020	0.010	0.004	0.002	0.0001

Table 26: Total fuel consumption in other sector (residential, commercial and institutional): 2019-2020

1.A.4 Other Sectors	2019	2020
Commercial/Institutional		
Liquefied Petroleum Gas (LPG) (Tons)	359	559
Residual Fuel Oil (Litres)	0	22588
Residential		
Liquefied Petroleum Gas (LPG) (Tons)	667	1038

2.6.4. Industrial Processes and Product Use (IPPU)

2.6.4.1.1. Non-Energy Products from Fuels and Solvent Use – Lubricant Us (1.D.1)

Some CO2 emissions from the fossil fuels arise from uses that are not primarily for energy purposes but are used for so-called 'non-energy' purposes. The emissions from such non-energy use of fossil fuel that are not accounted under any of the other categories under IPPU are accounted under the category ' Non-Energy Products from Fuels and Solvent Use'. The examples of non-energy products are Lubricants and greases are used in engines for their lubricating properties; Paraffin waxes are used as candles, for paper coating etc.; bitumen on roofs and roads for its waterproofing and wear qualities.

In 2020, the IPPU sector contributed 0.449 Gg CO2e to the total national GHG emissions representing <0.05% of the total Solomon Islands

GHG emissions in 2020. The below figure and table present the GHG emissions from Non-Energy Products from Fuels and Solvent Use- Lubricant use and fuel consumption respectively for inventory years 2019 and 2020.

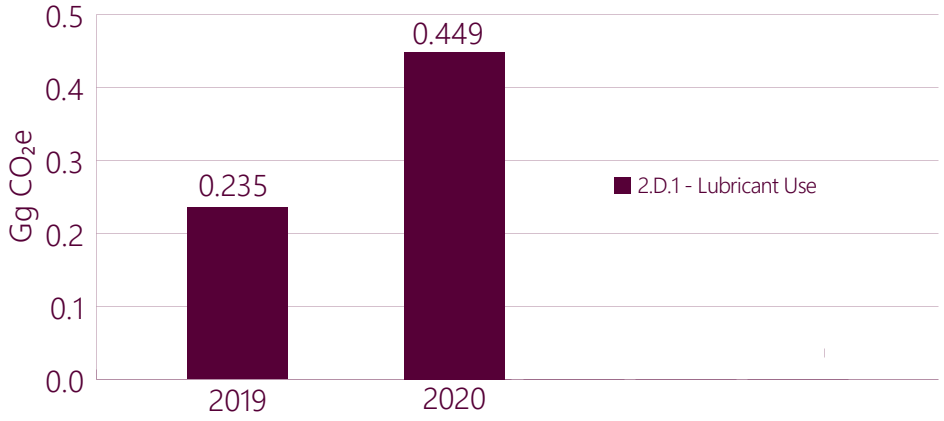

Figure 27: Solomon Islands Total GHG Emissions Lubricant Use (Gg CO2e): 2019-2020

As discussed above, it is assumed that 70% of the Total Lubricating oil imported in the country is used in IPPU sector under the category Non-Energy Products from Fuels and Solvent Use - Lubricant. While the whole quantity of Grease imported is used under the category Non-Energy Products from Fuels and Solvent Use - Lubricant. The quantity of Lubricants consumption and their emissions during the inventory year 2019 and 2020 in the Non-Energy Products from Fuels and Solvent Use sector is negligibly small as shown in the Table below:

Table 27: Total fuel consumption in Lubricant Use: 2019-2020

Lubricants	2019	2020	Units
Lubricating Oil	4,48,177	8,91,4658	Litres
Grease	73,328	13,1368	Kg

2.6.5. Agriculture, Forestry and Other Land Use (AFOLU)

The AFOLU sector is a major contributor to methane emissions followed by the Waste sector and is also the third largest GHG contribution sector to the Solomon Islands total GHG emissions (excl. removals). The AFOLU sector comprises of three sub-categories: Livestock (3.A); Land (3.B) and Aggregate sources and non-CO2 emissions sources on land (3.C).

In 2020, the emissions from Agriculture sector emitted which is about 131.11 Gg CO2e which is about 14.7% of the Solomon Islands total National GHG emissions. Emissions from the agriculture sector are primarily composed of methane and nitrous oxide. CO2 emissions also occur due to application of Urea on managed soils. While methane and nitrous oxide emissions mainly occur due to Livestock and land management activities. However, emissions of indirect GHGs such as CO and NOx are considered negligible and are not estimated. The GHG emissions from agriculture sector shows increasing trend in the recent years and this increase is primarily attributed due to the

increase in livestock farming and poor manure management and usage of Urea and other synthetic fertilizers.

Table 28: AFOLU Sector GHG Emissions in Gg CO2e (including Removals): 2019-2020

Inventory Year: 2019-2020	Net CO2 Emissions, (CO2 Equivalents Gg)	
Categories	2019	2020
3 - Agriculture, Forestry, and Other Land Use	130.39	131.11
3.A - Livestock	116.81	120.09
3.A.1 - Enteric Fermentation	11.00	10.15
3.A.2 - Manure Management	105.81	109.94
3.B - Land	-25,916.56	-28,062.10
3.B.1 - Forest land	-25,916.56	-28,062.10
3.C - Aggregate sources and non-CO2 emissions sources on land	13.58	11.02
3.C.3 - Urea application	1.93	1.25
3.C.4 - Direct N2O Emissions from managed soils	5.04	3.50
3.C.5 - Indirect N2O Emissions from managed soils	1.64	1.14
3.C.6 - Indirect N2O Emissions from manure management	4.98	5.13
Total GHG Emissions, excl. Removals	862.23	890.61
Total GHG Emissions, incl. Removals	-25,054.33	-27,171.49

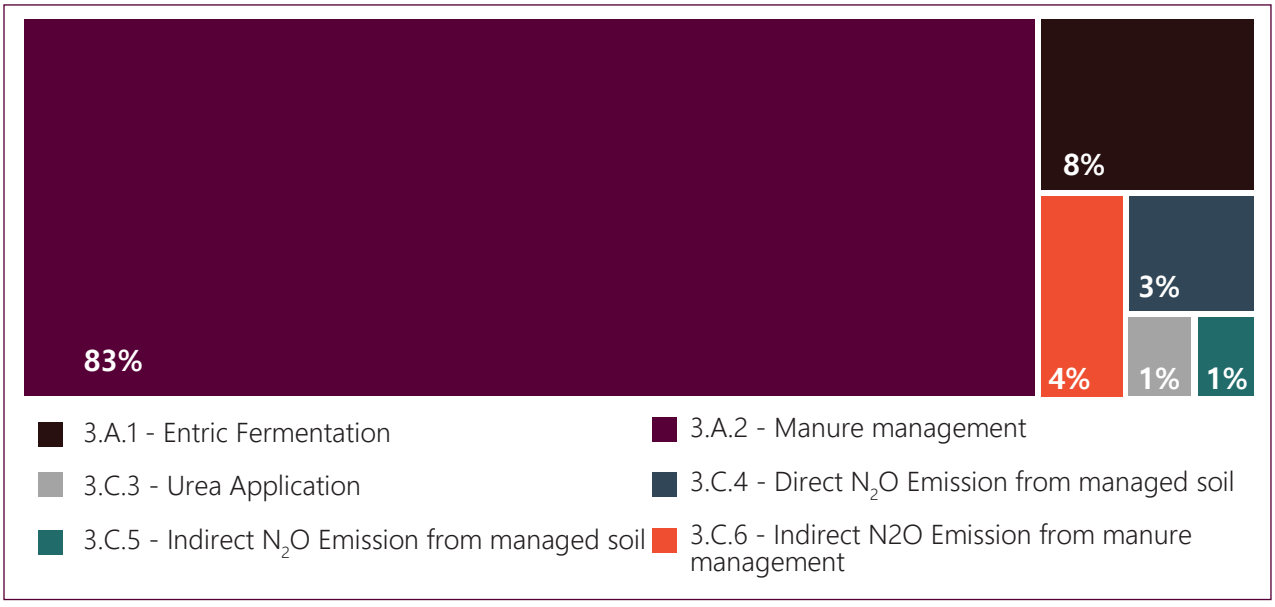

Figure 28: Solomon Islands AFOLU Sector Emissions (excluding Removals) breakdown by Sub-categories (%): 2019-2020

2.6.5.1. Livestock

Livestock is a significant and integral component of the livelihood of families and communities of Solomon Islands for many centuries. The livestock sector in Solomon Islands is under-developed and domestic production does not meet the meet consumption. The domestic livestock production has declined in the last decade owing to many factors such as: years of social, ethnic, and political unrest, disasters, disease incursion, lack of starting or breeding stock, high feed costs and lack of starting cash. The data and information on the total livestock population and livestock farming practices are very limited in Solomon Islands. The livestock population data used for the inventory year 2019 and 2020 is estimated based on the Report on National Agricultural Survey 2017 as the census of Livestock population is not available for the inventory year and was last conducted in year 2009 along with the national population and housing census (NPHC). Due to lack of detailed data and information of the Livestock sector Extrapolation and interpolation techniques were used in line with the IPCC good practice guidance (GPG) to generate missing year data. The following table present the estimated population of livestock species used for estimation of GHG emissions from the livestock sector. Furthermore, bifurcation of the total cattle population was not possible hence all the existing cattle are considered as Other Cattle. Also, no information on animal grazing and pasture and manure management system is available, which leads to using the standard IPCC values.

Table 29: Livestock population projection in Solomon Islands: 2019-2020

Livestock species	2019	2020
Cattle	4194	3592
Swine	141147	146946
Total	145341	150538

The emissions from Livestock sector equals 120.09 Gg CO2e in 2020 which is approximately 91.6% of the total GHG emissions from the agriculture sector and about 13.5% of the Solomon Islands total GHG emissions (excluding removals). The increase in emissions is attributed to the rising population of Livestock and poor manure management practices in Solomon Islands and is a major concern for the country.

Table 30: Livestock Sector GHG Emissions in Gg CO2e (excluding Removals): 2019-2020

Inventory Year: 1994-2018	Net CO2 Emissions, (CO2 Equivalents Gg)	
Categories	2019	2020
3.A - Livestock	116.81	120.09
3.A.1 - Enteric Fermentation	11.00	10.15
3.A.2 - Manure Management	105.81	109.94
Total GHG Emissions, excl. Removals	862.23	890.61

2.6.5.2. Enteric Fermentation

Methane is produced in herbivorous animals as a by-product of enteric fermentation, a digestive process by which carbohydrates are broken down by micro-organisms into simple molecules for absorption into the blood-stream. The amount of methane that is released depends on the type of digestive tract, age, and weight of the animal, and the quality and quantity of the feed consumed. Ruminant livestock (e.g., cattle, goat, sheep) are major sources of methane and moderate amounts produced from non-ruminant livestock (e.g., pigs, horses). This methane when released adds to GHG emission in the atmosphere.

Emissions from enteric fermentation decreased to 10.15 Gg CO2eq in 2020. The emission from enteric fermentation shows a decreasing trend in the recent years and is due to the decrease in the livestock population (mainly cattle). However, as of 2020 this livestock sub-sector accounts for about 8.5% of GHG emissions from Livestock farming in Solomon Islands in 2020.

2.6.5.3. Manure Management (3.A.2)

The methane emissions come from the decomposition of manure under anaerobic conditions during storage and treatment, produces methane; and N2O is produced directly and indirectly during the storage and treatment of manure. The emission of N2O generated by manure in the system 'pasture, range, and paddock' occur directly and indirectly from the soil and are therefore reported under the category 'N2O Emissions from Managed Soils'. Direct N2O emissions occur via combined nitrification and denitrification of nitrogen contained in the manure. Indirect emissions result from volatile nitrogen losses that occur primarily in the forms of ammonia and NOx during storage as solid. The GHG emissions from Livestock farming has increased over the years and is a major concern for the Solomon Islands. In 2020, the GHG emissions from this category reached to 109.94 Gg CO2e accounting to approximately 91.5% of GHG emissions from livestock farming sector and approximately 12% of the total national GHG emissions. This can be reduced by introducing animal modern waste management systems.

2.6.6. Land (3.B)

Solomon Islands is a High Forest Cover Low Deforestation (HFLD) Country with low historical but very high and steeply increasing recent forest emissions due to logging pressure. The total land area of Solomon Islands is 2.8 million hectares. Solomon Islands has constructed Forest Reference Level (FRL)[9] in 2017. For the construction of its FRL, Solomon Islands used methodologies provided in the 2006 IPCC Guidelines. The Party classified its national land-use categories into the six land use categories of the 2006 IPCC Guidelines, further stratifying forest based on the global ecological zones of FAO, in order to select the appropriate default values for carbon stocks from the 2006 IPCC Guidelines.

For the study, the Activity data on historical land use and land-use change were obtained from the analysis of a combination of high- and low-resolution satellite images performed using Collect Earth, an open-source tool developed by FAO. The analysis covered the annual historical time series of land use and land-use change, as well as forest disturbances, for 2000–2017. As per the FRL study, Solomon Islands had 2,529,641ha of forest land in year 2000, extending over 90.29% of its land area. However, in 2018, the forest land is estimated to be reduced to 25,18,737 ha, representing to about 89.94% of its total land area. The second major land use is cropland, which is estimated to cover around 8% of the land area. Wetlands covers 0.96% and Grassland covers 0.25%, while settlements and other lands are estimated to cover about 0.68% and 0.21% respectively.

[9]Solomon Islands National Forest Reference Level, https://redd.unfccc.int/files/2019_submission_frel_solomon_islands.pdf

In 2020, net CO2 removal from LULUCF sector reached to 28,062 Gg CO2e increasing from 29,180Gg CO2e in 2011 representing a decrease of about 4% during the period 2011-2020. This is largely due to degradation and deforestation of forest land and its conversion to another land use mainly for purposes like harvesting of timber for exports, unsustainable logging for fuel wood and other forest resources, commercial agriculture, and infrastructure development for growing population. The logging industry is the dominant sector within the economy but uncontrolled and destructive activities have resulted in serious problems with irreparable damage to the environment, the forests and the country's economic future.

2.6.6.1. Land Use Category Definitions

Solomon Islands has classified its national land-use categories into the six land use categories of the 2006 IPCC Guidelines i.e., i.e., Forest Land, Cropland, Grassland, Wetlands, Settlements, and Other Land. Further stratification of forests based on the global ecological zones of FAO is also made, in order to select the appropriate default values for carbon stocks from the 2006 IPCC Guidelines. The table presented below illustrates the classification of the Solomon Islands main forest types and its categorization as per Global Ecological Zones of FAO[10].

Solomon Islands has adopted the FAO definition for its National Forest land. The FAO definition for Forest Land is "**Land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds in situ. It does not include land that is predominantly under agricultural or urban land use**"[11].

Most of the forest area in the Solomon Islands is natural forest, followed by small areas of commercial plantations and community woodlots. Natural forests represent about 99% of the Forest land. The Community woodlot and Industrial plantation represent the remaining 0.04% and 0.95% of the forest land respectively as shown in the Figure below.

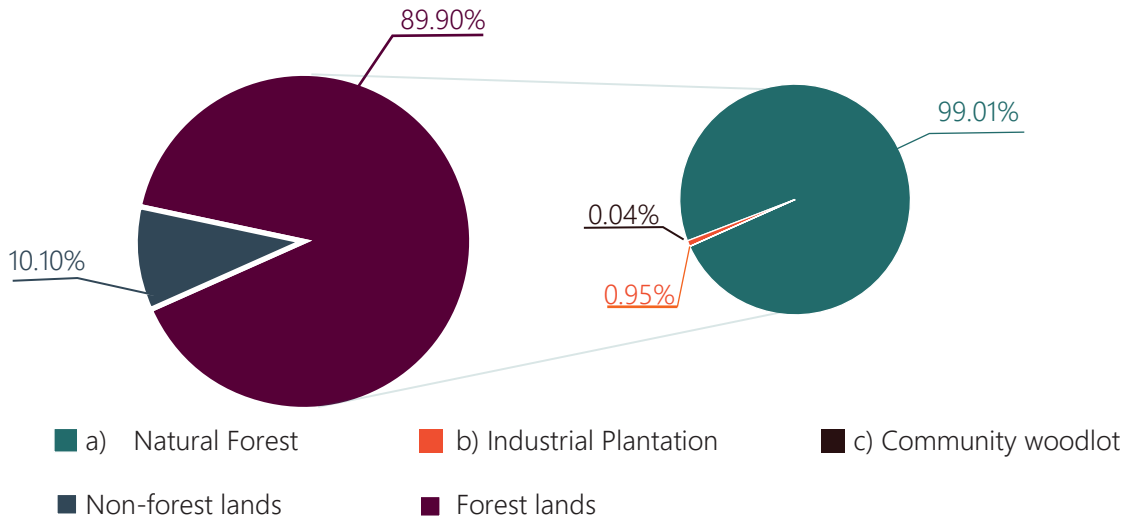

Figure 29: Current composition of Land Use types in Solomon Islands

[10]FAO, 2012a: Global Ecological Zones for FAO forest reporting: 2010 update.
[11]FAO, 2012: Forest Resources Assessment Working Paper 180: FRA 2015 Terms and Definitions.

Further, the five main types of natural forests in the order of their estimated area coverage/extension are Lowland Forests (51.23%), Hill Forests (37.71%), Montane Forests (9.69%), Mangroves (1.02%) and Freshwater Swamp and Riverine Forests (0.34%) as represented in the figure.

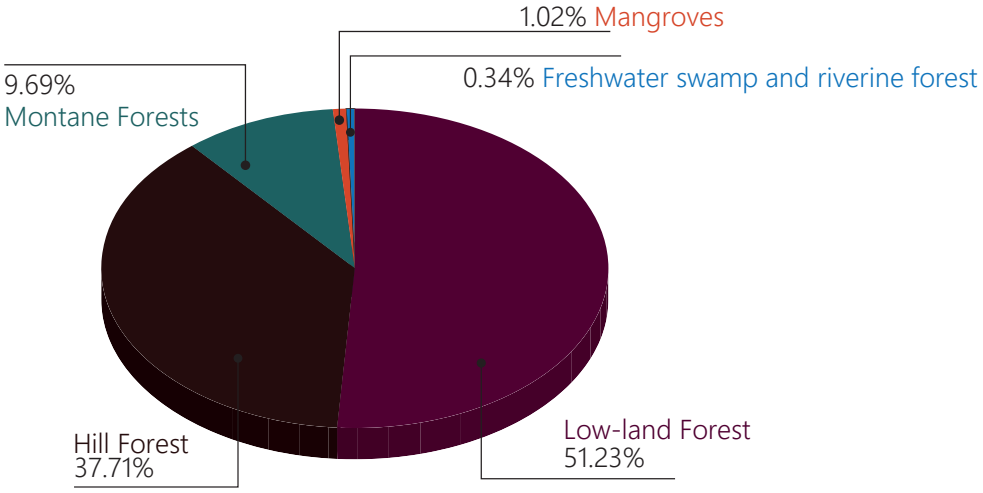

Figure 30: Current composition of Nature Forest Land types in Solomon Islands

Further, in accordance with 2006 IPCC Guidelines, each land use category is further classified into "Land remaining Land" and "Land converted to Land" depending on its history of land-use conversion. As discussed earlier, in Solomon Islands the land use change is due to conversion of Forest land to Cropland and Settlements. However, due to lack reliable data like national estimates on annual change of biomass stocks, area of perennial and annual crops and annual area subjected to harvesting, etc., estimating emissions/removals from most of the "Land remaining Land" category and " Land converted to Land" was not possible. Consequently, only emissions/removals from the category "Land remaining Land" has been estimated under this inventory for the years 2019-2020 and discussed in the following section and sub-sections.

2.6.7. Forest Land Use (3.B.1)

2.6.7.1.1. Forest Land Remaining Forest Land

According to 2006 IPCC Guidelines, GHG inventory for this sub-category involves estimation of changes in carbon stock from five carbon pools (i.e., above-ground biomass, below-ground biomass, dead wood, litter, and soil organic matter). The 2006 IPCC Guidelines do not provide default carbon stock values for deadwood and in case of litter, although 2006 IPCC Guidelines provide default carbon stock values for litter in some forest types, but not for the forest types which occur in the Solomon Islands. Further, as the soil in Solomon Islands Forests are not classified into the soil types as provided in the 2006 IPCC Guidelines. Due to these reasons, it was not possible to estimate emissions from dead wood, litter, and soil organic carbon pools and only emissions due to changes in carbon stocks in above-ground biomass and below-ground biomass) are estimated under this inventory.

For the inventory data on wood removals, including fuelwood removals are required. However, the data provided by the Solomon Islands Ministry of Forestry & Research and the Customs division covers information only on annual

log export volume. Whereas the annual fuelwood removal quantities are not reported and monitored in the country indicating that the actual wood removal from Solomon Islands forests could be much higher and the resulting emission levels. Consequently, net emissions/removals from this sub-category are estimated only due to changes in carbon stock in two carbon pools i.e., above-ground biomass and below-ground biomass and loss of carbon from wood removals.

Table 31: Solomon Islands Forest Land remaining Forest Land, Log export volume and annual CO2 emissions: 2019-2020

Inventory Year	Forest Land (ha)	Log Export Volume (m3)	Gg CO2e
2019	2518214	2898557	-25,916.56
2020	2517601	2415560	-28,062.10

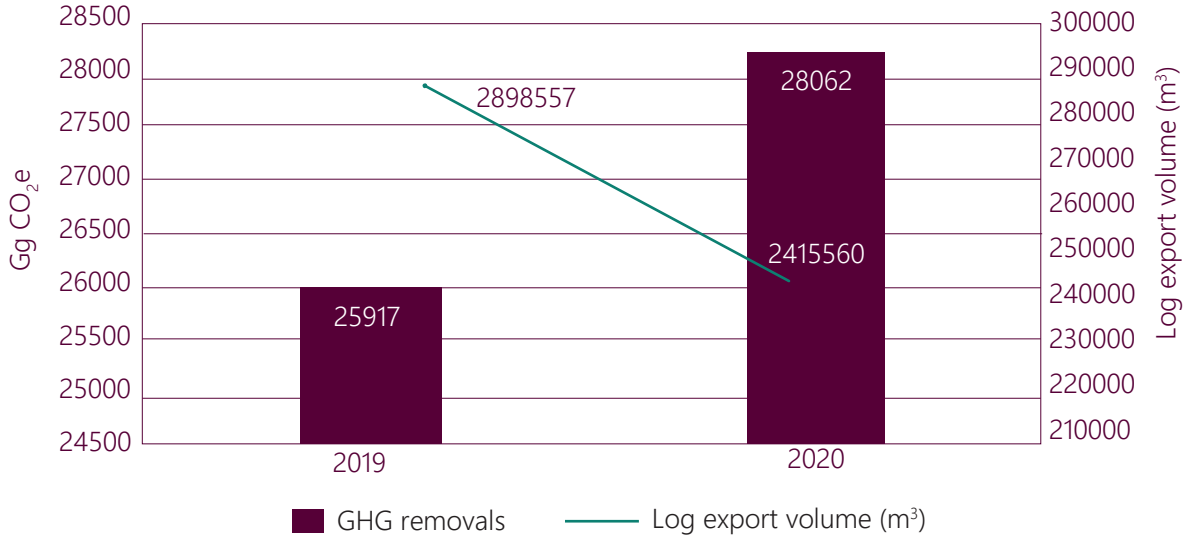

Figure 31: Forest Land remaining Forest Land annual CO2 removals and log export volume (m^3): 2019-2020

As can be seen in the above table and figure, the net removal by this subcategory in 2020 was 28,062.10 Gg CO2e compared to 25,916.56 Gg CO2e in 2019 indicating an increase in removals in 2020. This is well justified by the quantity of logs exported in 2020. However, the overall trend during the period 2011-2020 is decreasing due to the reasons like harvesting of timber for exports, unsustainable logging for fuel wood and other forest resources. The net removal was 29,180.12 Gg CO2e in 2011 representing a decrease of about 3.8% during the period 2011-2020.

2.6.7.1.2. Determining Forest Area

Activity data used to determine Forest Land Remaining Forest Land was derived from the land representation described in previous sections, generated by the Forest Reference Level (FRL). The information on the area of Forest Land remaining Forest Land is estimated based on the data on Land Use Change (ha/-year) provided by the Forestry department for years 2001-2017. The data for the years 2019 and 2020 is obtained by extrapolation of historical data. The table provided below presents the Annual area in hectares of Forest Land remain-

ing under Forest land category.

Table 32: Solomon Islands annual area of Forest Land remaining Forest Land (hectares): 2019-2020

Year	Forest land	Natural forest	Lowland forest	Hill forest	Montane forest	Mangroves	Freshwater Swamp & Riverine forest	b) Industrial plantation	c) Community Woodlot
	ha	ha	ha	ha	ha	ha	ha	ha	ha
2019	25,18,214.34	24,93,227.68	12,77,199.49	9,40,195.51	2,41,769.38	25,547.4	8,515.83	24,011.50	975.16
2020	25,17,600.98	24,92,614.32	12,76,727.26	9,40,084.53	2,41,739.23	25,547.48	8,515.83	24,011.50	975.16

2.6.7.1.3. Wood Removals

Further, the data on actual volume of log export (m3) was provided by the Forestry department and it dropped slightly in the year 2020 and was about 2,415,560 (m3). The annual volume of round log export during the years 2019-2020 is provided in Table 31.

2.6.8. Aggregate sources and non-CO2 emissions sources on land (3. C)

There are two pathways of N2O emissions from soils - direct and indirect. Direct N2O emissions to estimated using net N additions to soils (synthetic or organic fertilizers, deposited manure, crop residues) and mineralization of N in soil due to cultivation/land-use change on mineral soils.

Table 33: Aggregate sources and non-CO_2 emission sources on land GHG Emissions in Gg CO_2e (excluding Removals): 2019-2020

Inventory Year: 2019-2020	Net CO_2 Emissions, (CO_2 Equivalents Gg)	
Categories	2019	2020
3.C - Aggregate sources and non-CO2 emissions sources on land	13.58	11.02
3.C.3 - Urea application	1.93	1.25
3.C.4 - Direct N2O Emissions from managed soils	5.04	3.50
3.C.5 - Indirect N2O Emissions from managed soils	1.64	1.14
3.C.6 - Indirect N2O Emissions from manure management	4.98	5.13
Total GHG Emissions, excl. Removals	862.23	890.61

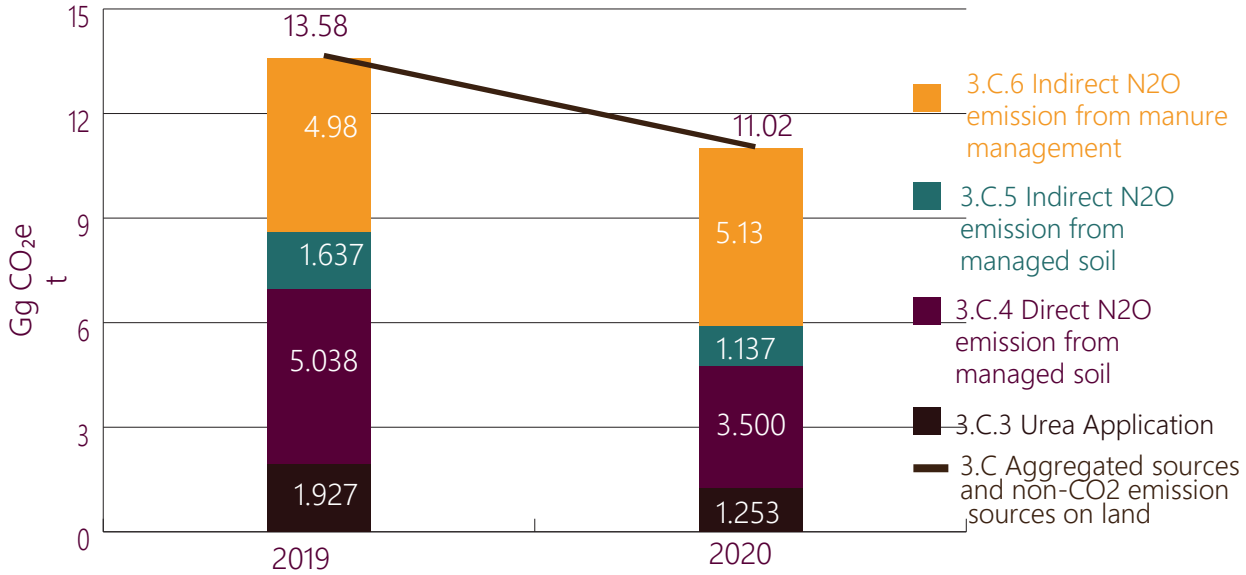

Figure 32: Aggregate sources and non-CO_2 emission sources on land GHG Emission in Gg CO_2e (excluding Removals): 2019 - 2020

The emissions from this category summed up to 11.02 Gg CO2e in 2020 representing a decreasing by about 19% compared to 2019 levels (13.58 Gg CO2e). This decrease in 2020 is attributed due to decrease in import and application of Urea and other synthetic fertilizers. However, the emission from this category shows an increasing trend during the period 2011 to 2020 and have increased by 183% increasing from 3.89 Gg CO2e in 2011 to 11.02 Gg CO_2e in 2020.

In 2020, majority share of emissions under this category is coming from Indirect N2O emissions from manure management (47%) followed by emissions from Direct N2O emissions from managed lands (32%), Urea application (11%) and Indirect N2O emissions from managed soils (remaining 10%) respectively. Direct and Indirect N2O emission have increased over the years due to use decreasing level of fertility and productivity of land and increased Nitrogen containing fertilizers on lands in Solomon Islands.

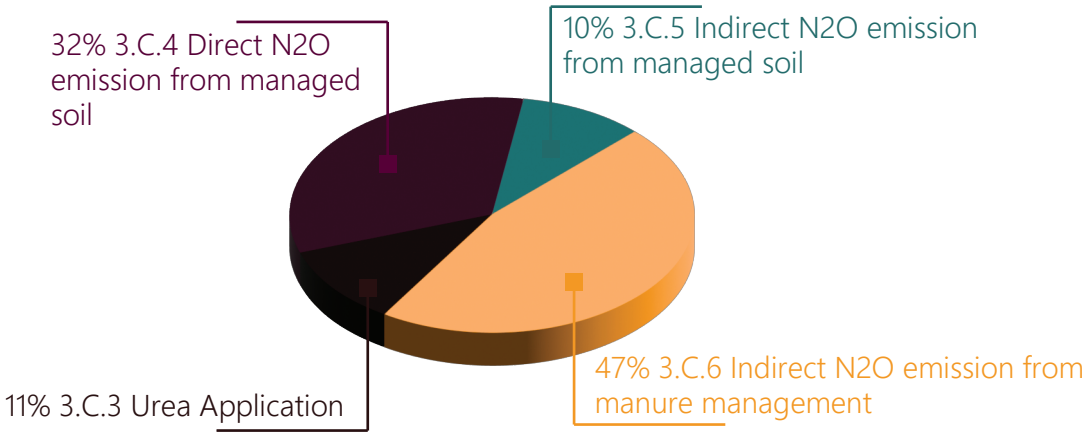

Figure 33: Aggregate sources and non-CO_2 emission sources on land GHG Emission in Gg CO_2e (excluding Removals): 2020

2.6.8.1. Urea Application (3.C.3)

Under this sub-category the emissions resulting from application of urea to soils are estimated. Adding urea to soils during fertilization leads to a loss of CO2 that was fixed in the industrial production process.

Solomon Islands has no fertilizer production plant and all the fertilizers including Urea is imported to the country. Also, the data on sales and/or usage of urea annually is poorly monitored or recorded and maintained in the country. To this end, it is assumed that all urea fertilizer imported in a particular year is added to soils in the same year.

The activity data used is the quantity of Urea imported into the country. Data provided by Solomon Islands National Statistics Office (SINSO) and Customs office has been used for estimating emissions from urea application for the inventory year 2019 and 2020. The quantum of urea import and its application on land decreased in year 2020 compared to 2019 leading to decrease in estimated emissions. In 2020, the emissions from this sub-category were estimated at 1.25 Gg CO2e.

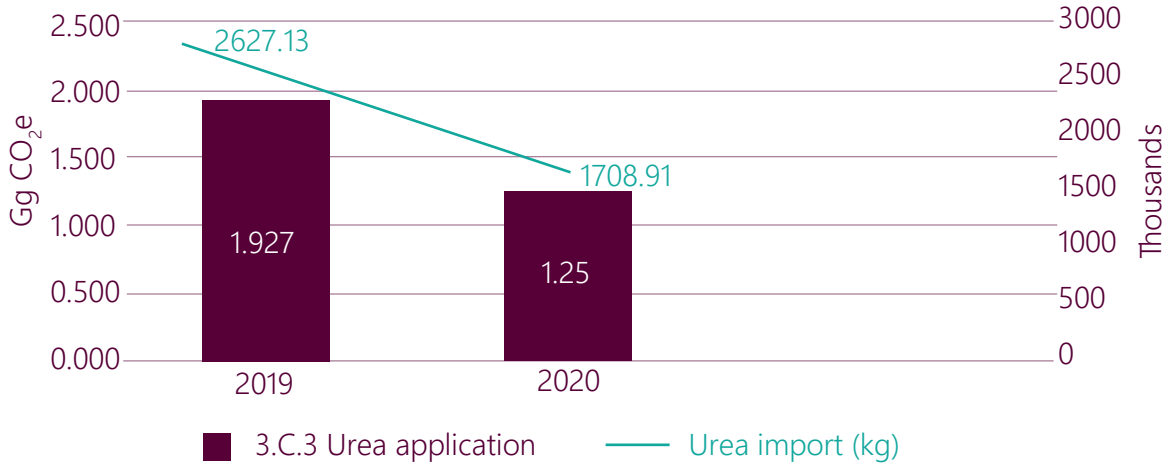

Figure 34: CO2 emissions from Urea application on land GHG Gg CO2e: 2019-2020

2.6.8.2. Direct N2O from managed soils (3.C.4)

The emissions from the Direct N2O emissions from managed soils category arise from the following sources:

- synthetic N fertilizers (FSN)
- organic N applied as fertilizer (FAM)
- urine and dung N deposited on pasture, range, and paddock by grazing animals (FPRP)
- N in crop residues, including from N-fixing crops and from forages during pasture renewal (FCR)
- N mineralization associated with loss of soil organic matter (FSOM)
- drainage/management of organic soils (FOS).

Some of these sources of emissions have N2O emissions from indirect pathways as well and are estimated separately though using a common set of activity data, will be discussed in more detail under the Indirect N2O emissions from managed soils. It is also to be noted that, only direct and indirect N2O emissions resulting from the use of synthetic N fertilizers (FSN) have been estimated in the Solomon Islands in this inventory for the years 2019 -2020 as emissions from other sources are found to be insignificant.

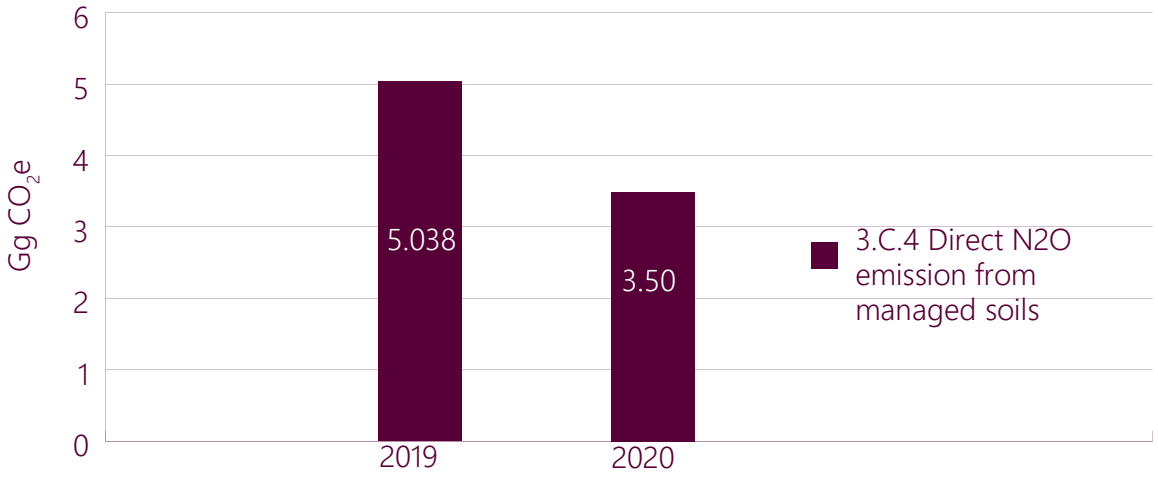

Figure 35: Direct N2O emission from managed soils due to use of synthetic N fertilizers GHG in Gg CO2e: 2019-2020

As can be seen in the above figure, the direct N2O emissions from managed soils in Solomon Islands due to use of synthetic N fertilizers (FSN) in managed soils were estimated at 3.50 Gg CO2 in 2020. Moreover, the emission trend of this sub-category follows the same trend as emissions from Urea application.

2.6.8.3. Applied Nitrogen Fertilizers (Fsn)

Considerable amounts of nitrogen are applied to soils with synthetic N fertilizer. Nitrous oxide is produced naturally in soils through the processes of nitrification and denitrification. The quantity of emissions from fertilizers consumption depends on several factors, such as: the amount and type of N fertilizers applied, crops type, soil type, climate, and other environment related conditions.

According to experts, there is no nitrogen fertilizer production in Solomon Islands. Therefore, quantity of nitrogen fertilizer imported in the country is applied to soil is entirely applied to soils in the same year. Data for Synthetic fertilizers imports were provided by Solomon Islands National Statistics Office (SINSO) and Customs department.

Table 34: Synthetic Nitrogen-containing fertilizers imported and use in managed soils and their corresponding default N-content: 2019-2020

Fertilizer	% N Content
NPK	16%
Di-ammonium Phosphate	18%
Urea	46%
Ammonium Phosphate	21%
Potassium Nitrate	13%
Ammonium Nitrate	33.5%

Table 35: Total quantity of Synthetic N-fertilizers imported and applied with corresponding Fraction of N-content: 2019-2020

Year	2019	2020
Urea Import (kg)	2,627,130	1,708,911
Amount of Synthetic Fertilizer applied to soil (kg)	2,636,785	1,876,072
FSN (kg)	1,209,885	840,388

2.6.8.4. Indirect N2O Emissions from Managed Soils (3.C.5)

In addition to the direct emissions of N2O from managed soils that occur through a direct pathway (i.e., directly from the soils to which N is applied), emissions of N2O also take place through two indirect pathways. The first of these pathways is through the volatilization of N as NH3 and oxides of N (NOx), and the deposition of these gases and their products NH4+ and NO3- onto soils and the surface of lakes and other waters. The second pathway is the leaching and runoff from land of N from synthetic and organic fertilizer additions, crop residues, mineralization of N associated with loss of soil C in mineral and drained/managed organic soils through land-use change or management practices, and urine and dung deposition from grazing animals.

The following N sources of indirect N2O emissions from managed soils arising from agricultural inputs of N:

- synthetic N fertilizers (FSN);
- organic N applied as fertilizer (FON);
- urine and dung N deposited on pasture, range, and paddock by grazing animals (FPRP);
- N in crop residues, including N-fixing crops and forage/pasture renewal returned to soils (FCR); and
- N mineralization associated with loss of soil organic matter resulting from change of land use or management on mineral soils (FSOM).

In this inventory, indirect N2O emissions from (i) Atmospheric deposition of N Volatilized and (ii) N2O from N leaching/runoff of synthetic N fertilizers (FSN) from managed Soils has been estimated for the years 2019 and 2020.

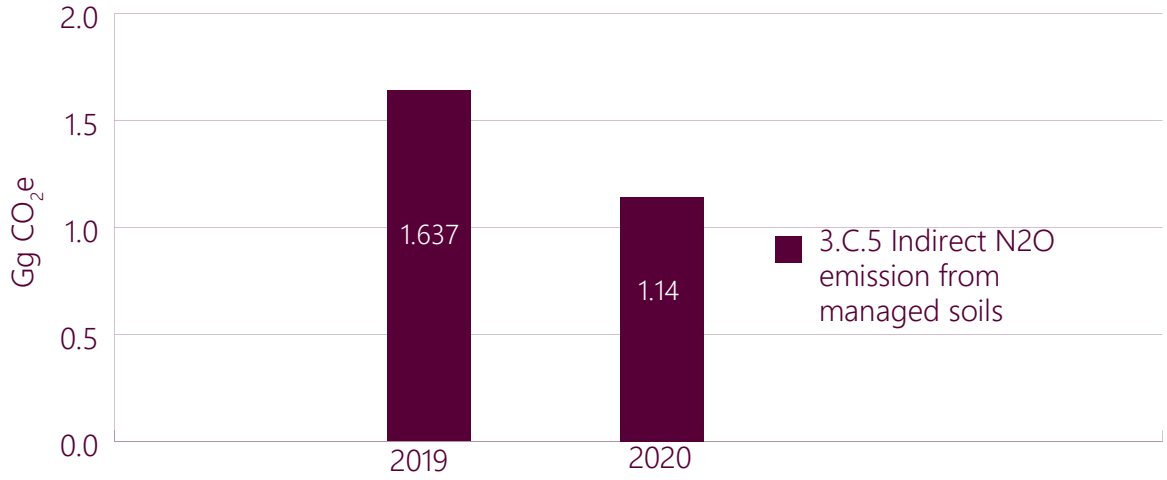

Figure 36: Indirect N2O emission from managed soils due to use of synthetic N fertilizers GHG in Gg CO2e: 2019-2020

In 2020, the emissions from this sub-category contributed were estimated at 1.14 Gg CO2e. The emissions from this sub-category also follow the same trend as emissions from Urea application and direct N2O emissions from managed soils.

2.6.8.5. Atmospheric Deposition of N Volatilized from Managed Soils

Atmospheric deposition of nitrogen oxides (NOx) and ammonia (NH4+) induce soil and surface waters fertilization, entailing biogenic formation of N2O. When synthetic N or organic (manure) fertilizer are applied on managed soils, a portion of nitrogen is lost through volatilization as ammonia and nitrogen oxides. The volatilized nitrogen is then re-deposited in soils and waters may incur further changes through nitrification denitrification entailing N2O emissions.

The amount of volatilized nitrogen depends on a series of factors, such as type of fertilizer, technology and time of application, type of soils, atmospheric precipitations, temperature, soil pH, etc.

2.6.8.6. N2O from N leaching/ runoff from Managed Soils

A fraction of nitrogen applied to soil through application of synthetic and organic fertilizer additions, crop residues, mineralization of nitrogen associated with loss of soil C in mineral and drained/managed organic soils through land use change or management practices, and urine and dung deposition from grazing animals, is lost through leaching and runoff.

Activity data required for estimating direct N2O emissions and indirect N2O emissions from atmospheric deposition of N on soils and water surfaces is same as used for estimating Direct N2O emissions from managed soils.

2.6.8.7. Indirect N2O Emissions from Manure Management (3.C.6)

Indirect N2O emissions from manure management can also occur through NH3 volatilization and leaching of N during storage and handling of animal manure. A fraction of the nitrogen in manure that is stored volatilizes in the form of NH3 and NOx in the atmosphere and subsequent redeposition as N to Soils and water bodies. Furthermore, solid manure exposed to rainfall will be prone to loss of N through leaching and runoff. The nitrogen that is transported from the manure storage site in this manner is assumed to undergo subsequent nitrification and denitrification elsewhere in the environment and, consequently, to produce N2O.

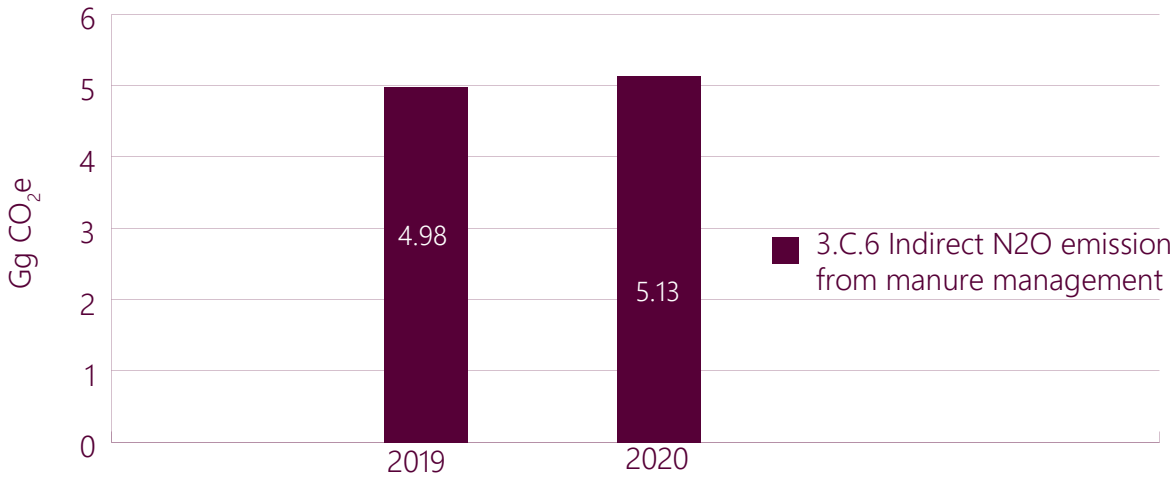

Figure 37: Indirect N2O Emissions from Manure Management in Gg CO2e: 2019-2020

The emissions from this sub-category were estimated at 5.13 Gg CO2e in 2020. The emissions from this sub-category have increased by over 36.5% during the period 2011-2020. This is mainly due to the increase in number of livestock (mainly swine) grazing on pasture range and paddock.

2.6.9. Waste Sector

The waste sector of Solomon Islands comprises mainly solid waste and wastewater. This sector contains methane (CH4) and Nitrous oxide (N2O) emission estimate from the following key categories for the inventory years 2019 and 2020:

- Solid Waste Management and Disposal (excluding biological waste)
- Domestic and Commercial wastewater handling (there is no industrial wastewater generation)

The GHG emissions from waste sector for 2019-2020, is presented in the following figure and table below. The total GHG emissions shows an increasing trend due to rising population of the country and were estimated at 358.61 Gg CO2e in 2020. However, share of waste sector in total GHG emissions from Solomon Islands remains constant i.e., about 44.10% during the inventory period of 2011-2018.

Table 36: Total quantity of Synthetic N-fertilizers imported and applied with corresponding Fraction of N-content: 2019-2020

Inventory Year: 2019-2020	Net CO2 Emissions, (CO2 Equivalents Gg)	
Categories	2019	2020
4 - Waste	349.30	358.61
4.A - Solid Waste Disposal	328.16	336.87
4.D - Wastewater Treatment and Discharge	21.13	21.74

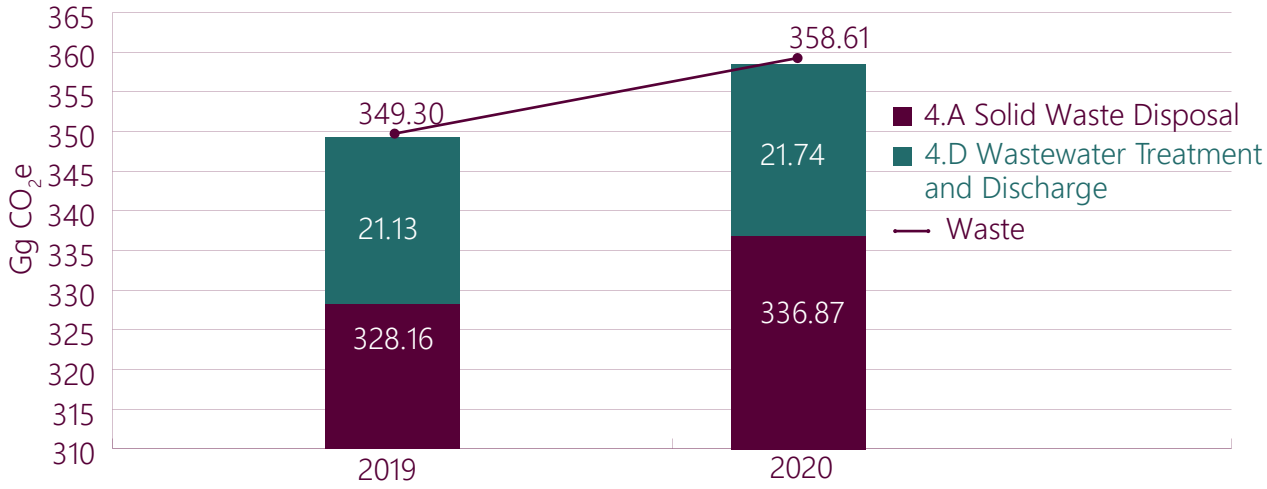

Figure 38: Solomon Islands Total GHG Emission Waste Sector in Gg CO2e: 2019-2020

The following section presents the detailed discussion on emission from the solid waste disposal and wastewater treatment and discharge during the inventory years 2019-2020 (No biological waste treatment or burning of municipal solid waste considered).

2.6.9.1. Solid Waste Disposal – Municipal Solid Waste (MSW) (4.A)

The key source of methane emissions from solid waste management and disposal includes emissions from anaerobic decomposition of waste disposed at Ranadi dumpsite and provisional waste dumps at Auki, Gizo and Noro Province. In Solomon Islands, less than half the waste generated in urban areas being captured through waste management systems currently in place.

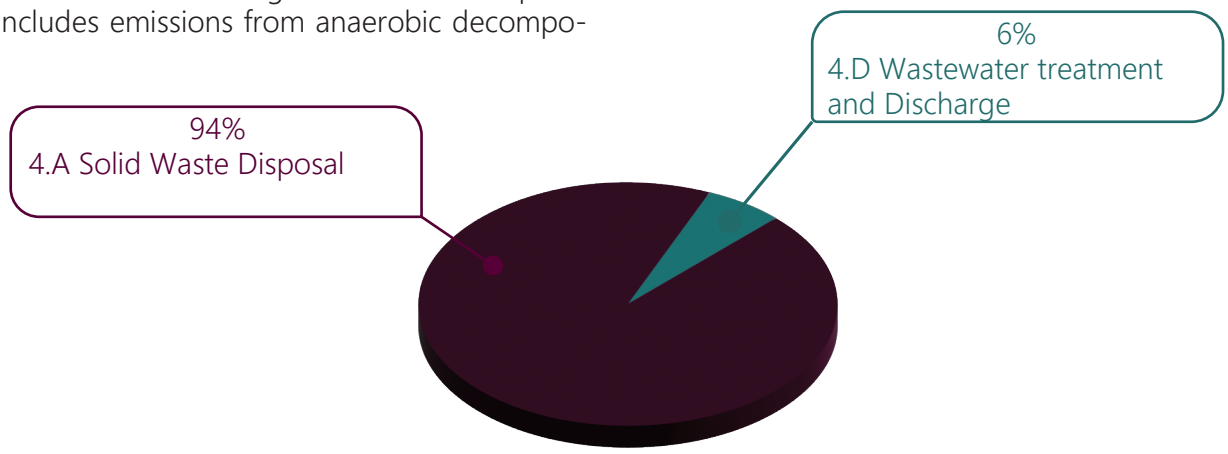

Figure 39: Waste Sector average GHG Emission contribution by Sub-Sectors (%): 2019-2020

Absence of proper disposal mechanism also makes the level of carbon dioxide and methane gas emission difficult to estimate. Whereas, in rural areas, collection systems are poor, ad hoc or completely absent. As a result, all waste generated in rural areas is being disposed of through burning, burying, and dumping, either on land or in nearby waterways. Until recently, waste collection services waste collection system was in place in the Honiara urban area only. Auki (Malaita province) recently have waste collection service and waste management plan in place following the donation and purchase of proper waste collection trucks. Whereas Gizo and Noro province are experiencing uncontrolled dumping and lack of regular waste collection creating public and environmental health risks. The management and control of the landfill has been and continue to be a challenge. In recent years, a significant degree of support has been provided to improve waste management systems under the first two phases of the Promotion of Regional Initiative Solid Waste Management project (J-PRISM I: 2011-2016 & JPRISM II: 2017 – 2022).

As can be seen in Figure 38, the emissions from Solid Waste Disposal increased were estimated at 336.87 Gg CO2e (i.e.,12.97 Gg) in 2020. The emission from this category is attributed to the waste generation, also improper and unorganized waste management practices during the years; the open dumping and decay of waste increased the net methane emissions in Solomon Islands. The contribution of Methane emissions in Solomon Islands net GHG emission is increasing rapidly and calls for serious action on improving the municipal solid and wastewater management practices and livestock manure management.

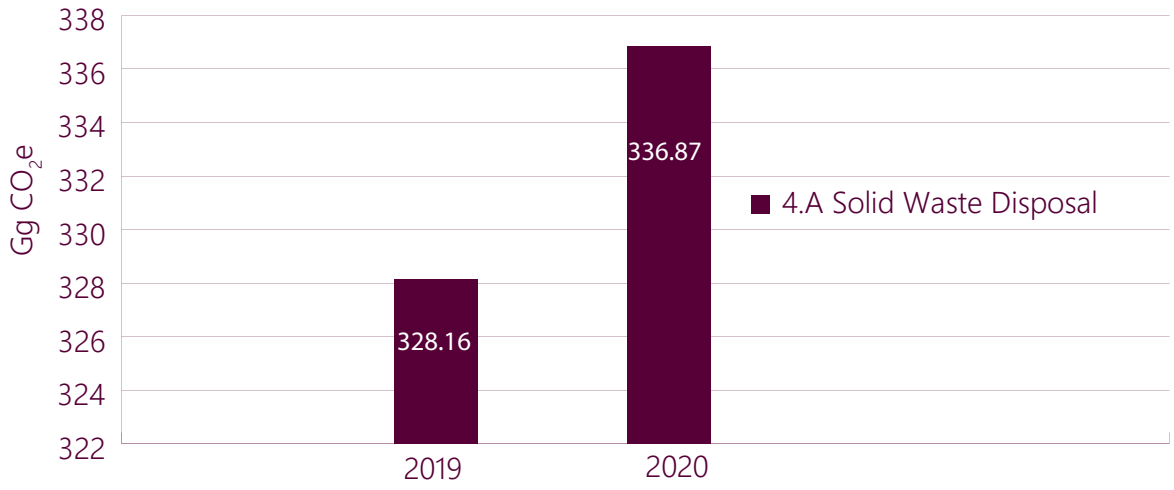

Figure 40: Solomon Islands total GHG Emission from Solid Waste Disposal (Gg CO2e): 2019-2020

The GHG emissions have been calculated as per the Tier 1 method: Based on the IPCC First Order Decomposition (FOD) method, using mainly default activity data and default parameters. In the absence of actual monitored data, the MSW generation in Solomon Islands estimated from the total population of the country and using average 0.88 kg/person/-day as per the report 'Cleaner Pacific 2025: Pacific Regional Waste and Pollution Management Strategy 2016-2025, Mid-term Review Report[12]' published in 2022. The waste composition was taken from the 'Solomon Islands – Waste Data report[13]' report published in April 2019. In 2018, Commonwealth Litter Programme (CLiP) contracted Asia Pacific Waste Consultants (APWC) to study waste management practices in the Solomon Islands and offer best-practice

[12]Cleaner Pacific 2025: Pacific regional waste and pollution management strategy 2016-2025, mid-term review report. Apia, Samoa: SPREP, 2022., https://library.sprep.org/sites/default/files/2022-07/CPIP-2021-Mid-term-review.pdf
[13]Solomon Islands – Waste Data report: Analysis of waste generation and disposal data collected in November 2018, Cefas U.K. (2019). https://www.cefas.co.uk/clip/resources/reports/south-pacific-clip-reports/waste-data-report-solomon-islands-apwc/

solutions and training to staff who are engaged in the design and delivery of waste services. This report presents the data, analysis and recommended best practice activities that address gaps in the management of waste within the Solomon Islands. The MSW generation and waste composition considered for the current inventory calculation is provided in the following Table and Figure.

Table 37: Activity data for Solid Waste Disposal: 2019-2020

Parameters	2019	2020
Total Population	721455	742196
MSW Generation rate (Kg/capita/day)	0.88	0.88
Total Solid Waste (MSW) generated- Ton	231731	238393
Waste disposed at managed sites (landfill)- Ton	0	0
Waste disposed at un-managed sites (landfill, open dumping)- Ton	231731	238393
No of landfill	3	3
Uncontrolled waste dumps	3	3

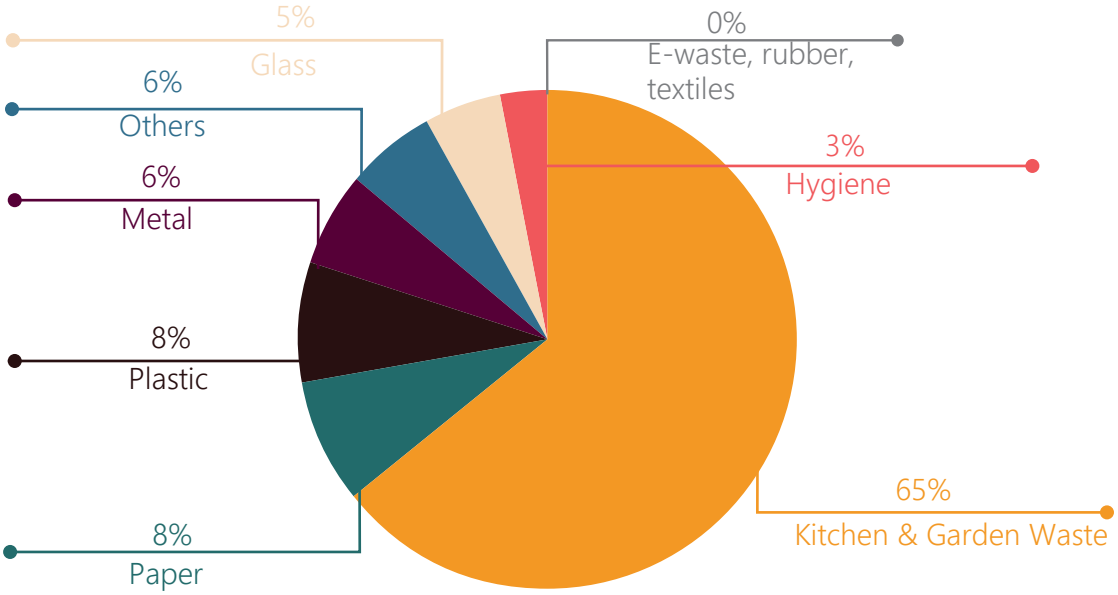

Figure 41: Solomon Islands MSW Waste Characterization (%WT): 2019-2020)

2.6.9.2. Wastewater Treatment Discharge (4.D)

The Solomon Islands Water Authority (SIWA) was established under the Solomon Islands Water Authority Act in 1992 and is charged with providing the management and development of urban water and sewerage services in the Solomon Islands. Solomon Water provides a conventional gravity sewerage system to around 30,000 people, approximately 30% of Honiara, the capital city of the Solomon Islands whilst the

remaining households and businesses are connected to traditional septic tanks regulated by Honiara City Council. These allow the decomposition of the waste but the process leaves sludge as a by-product. Periodically the residual sludge is removed by private service providers through tankers and disposed of at a designated site. Wastewater systems in rural communities are soak-pits usually located onsite to drain wastewater at household or public stand taps thus posing risk of polluting ground water. For rural areas any scale of collection and treatment is yet to be realized.

As can be seen in below Figure 42, the GHG emissions from wastewater treatment and discharge sub-sector emits were estimated at 21.74 Gg CO2e in 2020 of which 0.43 Gg was methane CH4 Gg (≈11.95 Gg CO2e) and 0.037 Gg was N2O (≈9.79 Gg CO2e).

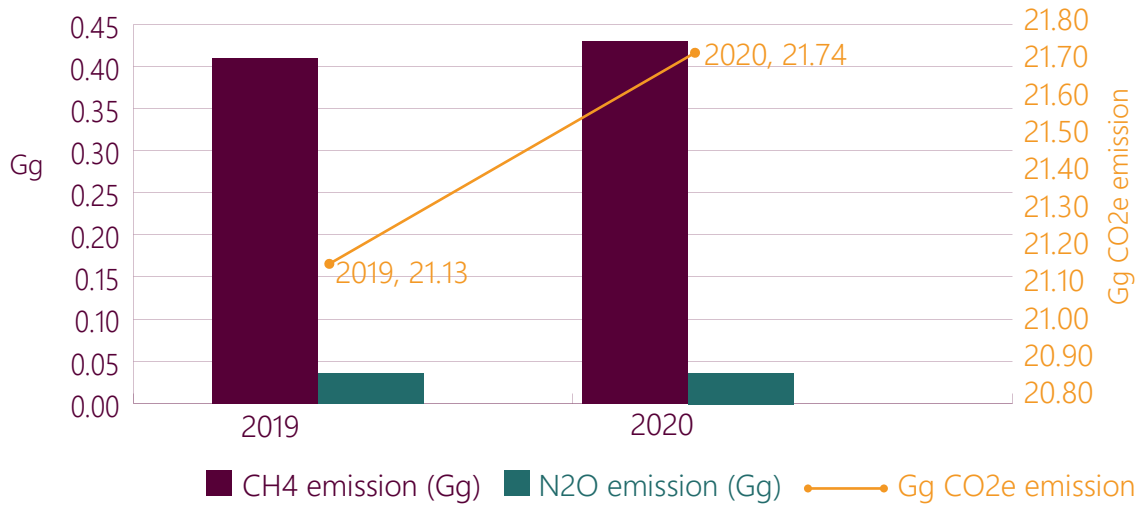

Figure 42: Solomon Islands MSW Waste Characterization (%Wt): 2019-2020

2.7. Key Category Analysis – 2020

This section addresses procedure adopted to identify key categories in a Solomon Islands national GHG inventory; "Non-Annex I Parties are encouraged in Decisions 17/CP.8[14] and 2/CP.17[15], to the extent possible, to undertake any key category analysis (level/trend or both) to assist in developing inventories that better reflect their national circumstances". The key category analysis is an essential element for the national GHG inventory development and driving factor to improve its quality, as well as greater confidence in the national GHG estimates. The KCA also helps in prioritization of limited resources and time.

The key categories for the Solomon Islands national GHG inventory have been identified in terms of their contribution to the absolute level of national GHG emissions and removals. Basic Approach 1 has been adopted for quantitative analysis in objective manner, accounting uncertainties and suggested aggregation level of analysis, as presented in the table below:

[14]FCCC/CP/2002/7/Add.2; http://unfccc.int/resource/docs/cop8/07a02.pdf
[15]FCCC/CP/2002/7/Add.2; http://unfccc.int/resource/docs/cop8/07a02.pdf

Table 38: Key Category Analysis (KC): Aggression Level of Analysis for Approach - 1

IPCC Category code	IPCC Category	Greenhouse gas	Remark
Energy			
1.A.1	Energy Industries	CO2, CH4, N2O	All Fuel
1.A.3.a	Civil Aviation	CO2, CH4, N2O	Domestic Aviation Only
1.A.3.b	Road Transportation	CO2, CH4, N2O	All Fuel
1.A.3.d	Water-borne Navigation	CO2, CH4, N2O	Domestic Navigation Only
1.A.4	Other Sectors	CO2, CH4, N2O	Institutional, Commercial and Residential
Industrial Processes and Product use			
2.D.1	Lubricant Use	CO2	Lubricating Oil and Grease
Agriculture, Forestry, and other land use			
3.A.1	Enteric Fermentation	CH4	All Category of Livestock
3.A.2	Manure Management	CH4, N2O	All Category of Livestock
3.B.1a	Forest Land Remaining Forest Land	CO2	Biomass only
3.C.3	Urea Application	CO2	
3.C.4	Direct N2O Emissions from Managed soils	N2O	Synthetic Fertilizers only
3.C.5	Indirect N2O Emissions from Managed soils	N2O	Synthetic Fertilizers only
3.C.6	Indirect N2O Emissions from manure management	N2O	All Category of Livestock
Waste			
4.A	Solid Waste Disposal	CH4	MSW Waste- Whole Country
4.D	Wastewater Treatment and Discharge	CH4, N2O	Domestic Wastewater- Whole Country

In Approach 1, key categories are identified using a pre-determined cumulative emissions threshold. The approach 1 identify key categories assesses the influence of various categories of sources and sinks on the level, and possibly the trend, of the national greenhouse gas inventory. Key categories are those that, when summed together in descending order of magnitude, add up to 95% of the total level; however as per GPG key categories identified between threshold of 95% and 97%. The result of approach 1 level KCA analysis for Solomon Islands National GHG Inventory for the recent year i.e., 2020 presented in the tables below:

Table 39: Key Category Analysis (KCA): Solomon Islands National GHG Inventory; 2020

IPCC Category code	IPCC Category	Greenhouse gas	Criteria
4.A	Solid Waste Disposal	Methane (CH4)	L1, T1
1.A.3.b	Road Transportation	Carbon dioxide (CO_2)	L1, T1
1.A.3.d	Water-borne Navigation	Carbon dioxide (CO2)	L1, T1
3.A.2	Manure Management	Methane (CH4)	L1
1.A.1	Energy Industries	Carbon dioxide (CO2)	L1, T1
4.D	Wastewater Treatment and Discharge	Methane (CH4)	L1
3.A.2	Manure Management	Nitrous Oxide (N2O)	L1, T1
3.A.1	Enteric Fermentation	Methane (CH4)	L1
1.A.4	Other Sectors	Carbon dioxide (CO2)	T1

• LUCF not included in the analysis
• The notation keys: L = key category according to level assessment; T = key category according to trend assessment; and Q = key category according to qualitative criteria.

2.8. Uncertainty Analysis

The uncertainty analysis on the national GHG inventory has been carried out as per the IPCC general guidance on uncertainty assessment[16]. The main objective of the uncertainty analysis is to identify the categories that have the greatest uncertainty contribution in the total GHG inventory estimation and the trend uncertainty with the objective of prioritizing improvements and distributing resources to reduce their uncertainties as much as possible. As per the 2006 IPCC Guidelines, Approach 1 i.e., analysis by using the error propagation equation have been used. Approach 1 is based on error propagation and is used to estimate uncertainty in individual categories, in the inventory, and in trends between a year of interest and a base year. Uncertainties from disaggregated levels are combined by multiplying the default uncertainty values. The overall uncertainty in national emissions i.e., Percentage uncertainty in total inventory was estimated as 26%; and the trend in national emissions between the base year and the current year has been estimated as 0%. The major uncertainty contributed from the Energy sector and Waste sector followed by the AFOLU. The Approach-1 Uncertainty calculation table annexed to this report.

The key uncertainties are associated with data availability, missing data, lack of comprehensive information, data archiving, and lack of country-specific emission factors. It is recognized that the detailed activity data and country-specific emission factors will reduce uncertainty in future inventory. The Inventory Team has also prepared the inventory improvement plan (IIP) to reduce the uncertainties as far as is practicable possible for the future GHG inventories.

[16]The IPCC 2006 Guidelines, http://www.ipccnggip.iges.or.jp/public/2006gl/pdf/1_Volume1/V1_3_Ch3_Uncertainties.pdf

Table 40: Uncertainty range for Key Sector Emissions

IPCC Categories	Gas	Activity data uncertainty Input data %	Emission factor/ estimation parameter uncertainty Input data %	Combined Uncertainty %
1 - Energy				
1.A - Fuel Combustion Activities				
1.A.1 - Energy Industries	CO_2	0.95	0.00	0.95
1.A.2 - Manufacturing Industries and Construction	CO_2	0.95	0.00	0.95
1.A.3 - Transport	CO_2	0.95	0.00	0.95
1.A.4 - Other Sectors	CO_2	0.95	0.00	0.95
2 - Industrial Processes and Product Use				
2.D - Non-Energy Products from Fuels and Solvent Use				
2.D.1 - Lubricant Use	CO_2	0.95	0.00	0.95
3 - Agriculture, Forestry, and Other Land Use				
3.A - Livestock	CH_4, N_2O	0.30	0.00	0.25
3.B - Land	CO2	0.30	0.00	0.25
3.C - Aggregate sources and non-CO2 emissions sources on land	N2O	0.30	0.00	0.40
4 - Waste	CH4, N2O	0.50	0.00	0.40

2.9. GHG Emission Trend Analysis: 2011-2022

2.9.1. Total GHG Emission Trend: 2011-2020

This section of the report presents an analysis of Solomon Islands Greenhouse Gas (GHG) emission estimates across key emission intensive sectors namely Energy, IPPU, Agriculture (Livestock, Forestry, and Land-use), Waste and by gas, for the years 2010 to 2020. The total GHG emissions (excluding removals) from Solomon Islands presented in the following tables and graphs.

Table 41: Total GHG Emission (excluding removals) by year and sector (Gg CO2): 2011-2020

Inventory Year: 2011-2020 Categories	Net CO2 Emissions, (CO2 Equivalents Gg) 2011	2018	2019	2020
Energy	333.91	364.66	382.31	400.44
Industrial Processes and Product Use	0.466	0.273	0.235	0.449
Agriculture, Forestry, and Other Land Use	94.41	124.05	130.39	131.11
Waste	342.57	382.60	349.30	358.61
Total GHG Emissions, excl. Removals	771.36	871.58	862.23	890.61

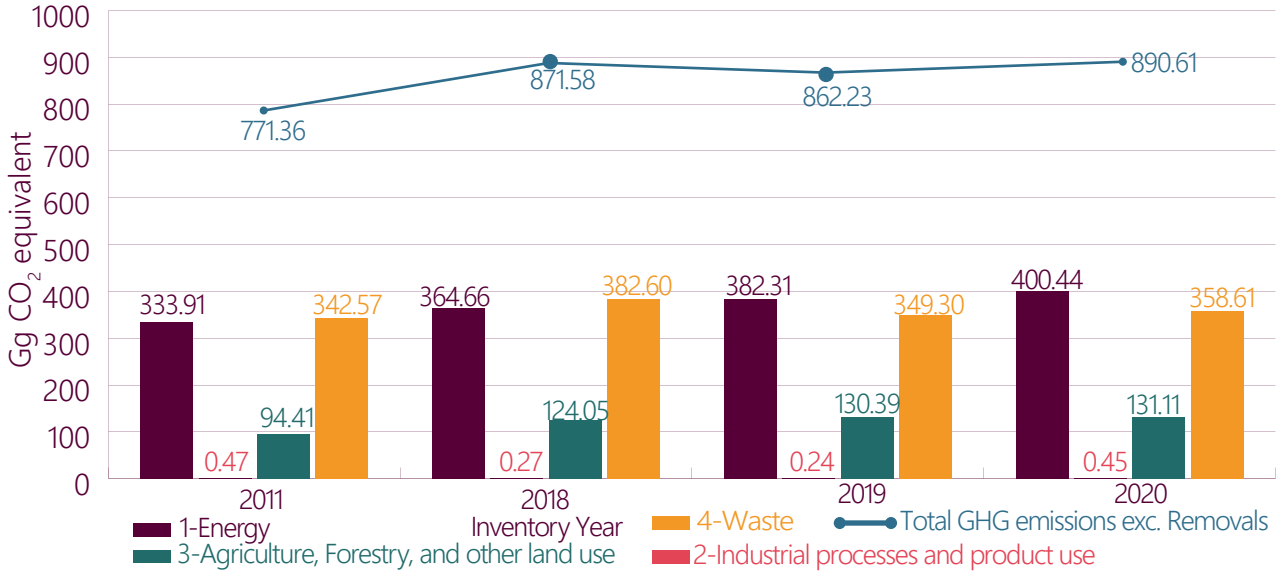

Figure 43: Total GHG Emissions (excluding removals) by year and sector (Gg CO2): 2011-2020

The net GHG emissions (excluding removals) of Solomon Islands increased from 771.36 Gg CO2e in 2011 to 890.61 Gg CO2e in 2020, an increase of about 15% over a period of 10 years. The increase in GHG emissions is attributed due to increase in economic activity and rising demand of growing population of the country.

The AFOLU sector, Livestock emissions has seen a major increase during the period 2011 and 2020. The AFOLU sector (mainly livestock) emissions were about 94.41 Gg CO2e in 2011 and increased to 131.11 Gg CO2e in 2020. This is an increase of approximately 39% and is mainly attributed to lack of modern/scientific manure management; hence the emissions form the livestock sector both the enteric fermentation and manure management has significant share in the total GHG emissions from Solomon Islands.

Solomon Islands total energy sector emission in 2011 was about 333.91 Gg CO2e; which is increased by 20% to 400.44 Gg CO2e in the year 2020. The higher GHG emission is mainly due to an increase in diesel-based electricity generation and the fossil fuel consumptions increase in transportation sector (mainly road transportation and domestic navigation).

The waste sector emission in 2011 was 342.57 Gg CO2e, which is increase to 358.61 Gg CO2eq, about 5% in the year 2020. The waste sector emission increase is mainly due to increase in population and increasing consumption pattern of population; further the Ranadi Dump site which is the located Honiara City boundary undergone rehabilitation and upgrading from unmanaged to semi-aerobic site with leachate pipes, connected to leachate ponds; reducing emission generation from the Ranadi landfill. A detailed assessment of the waste sector is included in the later section of this report.

The total GHG emissions from IPPU sector reached 0.45 Gg CO2e in 2020, decreasing by about 4% from 0.47 Gg CO2e in 2011. The emissions are mainly from use of lubricants in Non-Energy Products from Fuels and Solvent Use is found to be negligible (less than 0.1% contribution to the net total GHG emissions of Solomon Islands).

2.9.2. Gas-wise Emission Trend: 2011-2020

The gas wise GHG emissions trend 2011-2020 (Gg) in Solomon Islands is presented below. As discussed above, the main GHG emission sectors in Solomon Islands includes Waste sector (Municipal Solid waste and wastewater), Energy (Fuel combustion activities), AFOLU (Livestock and

Aggregate sources and non-CO2 emissions sources on land) and IPPU (Lubricants use). Greenhouse gases covered in this analysis include Carbon dioxide (CO2), Methane (CH4) and Nitrous oxide (N2O), the estimated quantum of these main GHGs presented in Table below.

Table 42: Total GHG Emission and removals by year and Gas (Gg): 2011-2020

Year Gas	2011	2017	2018 Gg	2019	2020	% change between 2011 and 2020
CO2	330.23	373.21	360.67	378.87	396.03	20%
CH4	14.91	16.97	17.07	15.94	16.37	10%
N2O	0.09	0.12	0.12	0.14	0.14	52%
HFCs PFCs SF6	NE					-
Total CO_2e	771.36	880.53	871.58	862.23	890.61	15%

Like the total sectoral GHG emissions the CO2 emission in Solomon Islands increased from 330.23 Gg to 396.03 Gg in 2020, which is an increase of about 20%. Methane emissions has also seen relatively growth, increased from 14.91 Gg in 2011 to 16.37 Gg in 2020. This is mainly due to the increase in livestock population (swine) and MSW waste generation. Further, an increase is also observed in total N2O emission during the period 2011 to 2020 and have increased by about 52% which is due to livestock, poor land management practices and wastewater disposal and treatment in Solomon Islands.

2.10. Conclusion

This GHG inventory serves as a baseline for the country to measure its progress towards reduction of greenhouse gases. It also serves as an integral tool in designing the countries climate change policies and to measure the success of such policies. The current GHG inventory provides comprehensive information about GHG emissions and removals in Solomon Islands for the years 2019 and 2020 and reflects the GHG emission trend since 2010. The 2010 to 2020 GHG emissions results revealed a reasonably increasing trend over the reporting period with the annual variation dominated by fuel consumption in the energy sector Waste sector- solid waste disposal.

The compilation of the GHG inventory continues to be a challenge, especially in the availability of activity data for computation of GHG emissions. The key findings and recommendations of this inventory development exercise have been identified during and highlighted in previous sections of the report; however, data collection, monitoring and verification for GHG emission sector is key takeaway of this exercise. For the future GHG inventory Solomon Islands shall minimize the data gaps and uncertainty specifically Livestock, Energy and Waste sector.

2.10.1. GHG Inventory Improvement Plan

Key Category Analysis: The activity data collection and review process will be improved and higher tier (tier 2) analysis of GHG from the key categories and sub-categories identified for Solomon Islands proposed for the next inventory. The activity data collection, review process and QA/QC procedure will be developed and implemented for all the key categories and sub-categories.

Trend Analysis: The GHG emissions from the previous year will be recalculated for trend analysis, if there is change in the methodologies used during the reporting period.

Procedural arrangements: (a) Data Collection: The activity data collection from the industry, public and private sector as well as institutions and department shall be formalized via suitable instrument e.g., legal contracts, MoUs, MoAs, or other legal documents. (b) The Ministry of Environment, Climate Change Disaster Management and Meteorology will initiate the regulation to formalize the database management, archives, and institutional setup for the above.

Procedural arrangements: Department of Climate Change will establish arrangements for implementing improved QA/QC procedures, manage and operate the inventory database, and document and archive inventory information and the operation of the inventory.

Implementation Integrated Monitoring, Reporting and Verification (MRV Tool) for National GHG Inventory: The department of Climate Change will implement and operationalize the web based integrated monitoring, reporting and verification system for national GHG inventory (energy sector).

Livestock Data: The livestock emission both enteric fermentation and manure management are key category; hence more frequent and granular data will be obtained from the Ministry of Agriculture and Livestock (MAL). In the future inventory the applicability of higher tier method (Tier 2- method) will be adopted for this subcategory if subjective to the data availability.

Forestry and Other Land Use: Limited data and information was available from this sub-sector hence tier-1 method used in this report. However; Solomon Islands is implementing REDD+ programme and more qualitative data and information will be available in near future and higher tier will be used in future inventory.

Waste Sector Data: The waste (Solid waste and wastewater) sector activity data monitoring and reporting needs to be initiated in urban centres.

CHAPTER 3:
MITIGATION ASSESSMENT

3

3.0. Mitigation Actions

This chapter presents the update of the information published in the recently updated Nationally Determined Contribution (NDC) concerning the climate change mitigation actions and policies and their effects. According to the Decision 2/CP.17, Annex III[17], Non-Annex I Parties should provide information, in a tabular format, on actions to mitigate climate change, by addressing anthropogenic emissions of all GHGs not controlled by the Montreal Protocol.

For each mitigation action or group of mitigation actions including, as appropriate, those listed in document FCCC/AWGLCA/2011/INF.1, developing country Parties should provide the following information to the extent possible:

- Name and description of the mitigation action, including information on the nature of the action, cover age (i.e., sectors and gases), quantitative goals and progress indicators.
- Information on methodologies and assumptions.
- Objectives of the action and steps taken or envisaged to achieve that action.
- Information on the progress of implementation of the mitigation actions and the underlying steps taken or envisaged, and the results achieved, such as estimated outcomes (metrics depending on the type of action) and estimated emission reductions, to the extent possible.
- Information on international market mechanisms.

To comply with these requirements, an overview of the mitigation actions previously reported in the Third National Communication (TNC) has been conducted to report on the previous emission reduction target and progress achieved to date. Since the implementation period of most of the mitigation actions proposed in the recent NDC was 2020-2030, the estimate of the GHG mitigation achieved for most of the mitigation actions was not estimated.

3.1. International Commitments

The Solomon Islands took a proactive stance in addressing climate change by ratifying the United Nations Framework Convention on Climate Change (UNFCCC) on December 28, 1994. As per Article 12 of the Convention, all participating countries are obligated to prepare and submit national communications detailing their climate actions. Upholding its commitment, the Government of Solomon Islands presented its initial national communication (INC) to the UNFCCC in 2004, followed by the submission of the Second National Communication (SNC) in 2017 and is preparing its Third National Communication and First Biennial Update Report (BUR1).

3.1.1. Revised Nationally Determined Contribution (NDC) (2021)

Solomon Islands updated NDC identifies the need for predictable, dedicated and low-cost financial resources and technical support to meet targets. The NDC increases its emissions ambition by targeting net-zero emissions by 2050. This significant leap in ambition is a marked contrast to the initial NDC's target of achieving a 45% reduction in emissions by the same year as presented in Table 43.

The NDC prioritizes renewable energy with a list of unconditional and conditional projects and energy-efficient technologies through appliance regulation in the energy sector and the sea and land transport subsectors. The forestry sector actions include a forest inventory, introducing a sustainable logging policy, protecting forests above 400 m, increasing the proportion of terrestrial, coastal, and marine ecosystems with a protected area status.

The NDC also includes adaptation priorities including developing a resilient development framework for climate change adaptation and disaster risk reduction, strengthening the capaci-

[17]FCCC/CP/2011/9/Add.1 https://unfccc.int/resource/docs/2011/cop17/eng/09a01.pdf

ty of relevant government stakeholders and communities, improving national information and early warning systems, and undertaking risk reduction and vulnerability assessment.

Table 43: Emissions reduction commitments contained in the Solomon Islands 2021 Nationally Determined Contributions

Target Year	Unconditional	Conditional
2025	14 per cent below 2015 BAU projection (reduction of 6,771 tCO2-e)	27 per cent below 2015 (Reduction of 55,347 tCO2e)
2030	33 per cent below 2015	45 per cent below 2015 (Reduction of 246,794 tCO2e)
2050		Net zero emissions

3.1.2. Long-Term Low Emissions Development Strategy (LEDS)

The Government of Solomon Islands developed its Low Emissions Development Strategy (LEDS) in 2023. Solomon Islands LEDS provides a vision and a pathway for Solomon Islands to achieve its national economic, environmental, and social goals over the long term. This LEDS provides a pathway towards a low emission, equitable and resilient development vision for Solomon Islands by 2050. The pathway is comprised of a 2050 emissions pathway, and steps. The steps move Solomon Islands from a Business-As-Usual (BAU) pathway to the low emissions, equitable growth, and resilience pathway. Within the domestic context, the LEDS serves to complement and support existing short- and medium-term strategies such as the National Development Strategy 2016–2035, sector strategies such as the National Forest Policy 2020, as well as cross-cutting strategies such as the National Climate Change Policy (NCCP). The LEDS captures development opportunities across sectors and over the long term, it provides an opportunity to identify pathway actions with benefits across sectors, or over a longer period that might otherwise not feature in the short- and medium- term strategies. Whereas in International context, the LEDS supports international climate action under the Paris Agreement. Through publication of the LEDS, Solomon Islands meets its obligations under Article 4, Paragraph 19, of the Paris Agreement to formulate and communicate long-term low GHG emission development strategies.

Eighteen steps from six emitting sectors were identified and prioritised to put Solomon Islands on a pathway to low emissions, equitable economic growth and resilience in line with the vision. A further four steps were identified for enabling institutions that span multiple sectors. All steps are outlined in Table 44.

Table 44: Summary of steps identified to transition Solomon Islands to a low emission, equitable growth and resilient pathways

Energy	
1.1	Increase renewable energy generation, particularly from hydropower and solar.
1.2	Mobilize international and domestic funds for rural electrification.
1.3	Establish a regulatory framework to enable Independent Power Producers (IPPs).
Transport	
2.1	Improve land transport efficiency.
2.2	Introduce electric vehicles and charging infrastructure.
2.3	Improve measurement and efficiency of maritime transport.
2.4	Introduce zero emissions technology and infrastructure for maritime transport.
Forest and Land Use	
3.1	Reduce the rate of forest clearing through tighter regulations on access or logging practices.
3.2	Increase forest area protected under the Protected Area Act 2010.
3.3	Implement community volunteer and private managed forest programs.
3.4	Undertake reafforestation programs to replant degraded and previously logged areas with native forest.
3.5	Focus on mangrove replanting and land reclamation for carbon conservation.
Agriculture	
4.1	Support organic agriculture to avoid inorganic fertilizer use and Persistent Organic Pollutants (PoPs).
4.2	Implement improved agriculture practices and technology to enhance resilience to climate change.
Livestock	
5.1	Develop emissions target for the livestock sector to guide national reporting of GHGs.
5.2	Work on livestock stock genetics improvement.
Waste Management	
6.1	Enhance landfill infrastructure to better sort and process municipal solid waste.
6.2	Focus on Honiara faecal sludge treatment and regulations.
Enabling Institution	
7.1	Consolidate climate and forest protection policy areas to better achieve emissions reduction goals.
7.2	Develop a program to enable participation in public and private carbon markets, including Article 6 transactions.
7.3	Establish the National Climate Change Trust Fund to consolidate international assistance, financial reporting requirements, and channel investment into needed areas, including R&D.
7.4	Set up institutional arrangements and build capacity to independently measure and report emissions and emissions-related activities.

3.2. National Context

3.2.1. Mitigation Actions by Sector

3.2.1.1. Energy Sector

The Solomon Islands Government views its energy sector as a key enabling factor to support its poverty alleviation effort, accelerate access to better health care and education services, and improve the standard of living and livelihoods of communities. At the same time, the energy sector is the major GHG emitting sector in Solomon Islands. According to the 2020 GHG inventory, the energy sector's total emissions were 400.44 Gg CO2e, accounting for 45% of the national emissions (excluding removals). The energy sector of Solomon Islands is a significant source of CO2 emissions. It includes energy industries (electricity genera-

tion), transportation (road, aviation, marine navigation), residential, commercial, and institutional sectors. These sectors contribute to 17%, 81%, and 2% of the total GHG emissions from the energy sector, respectively.

Given that a large part of the current GHG emission comes from the energy sectors, the Solomon Islands is committed to through development of renewable energy projects in the islands, the focus of the renewable energy generation of electricity will be through the use of solar PV and hydropower generation. Also given that a large portion of the energy consumption is by the transport sector, and with the Solomon Islands shifting its energy sources to renewable energy, it is also imperative that the transport sector also shifts its energy use to renewable energy or rather to electricity sourced from renewable energy sources.

Embarking on this, the SIG with support from UNEP has developed National Electric Mobility Policy and Market Readiness Framework for the Solomon Islands[18]. It focuses on the prioritisation of e-mobility in the Solomon Islands and analysis of barriers for implementing e-mobility options in the Solomon Islands. Specifically, it seeks to prioritise the vehicle categories or transport modes for both public and private urban transport and through stakeholder consultation identified the possible barrier e-mobility option will face in the Solomon Islands. Table 45 provides an update of energy sector mitigation actions and their status as of 2023 which will have sizeable contributions towards the NDC target also presented in more detail in Annexure 1.

Table 45: Update of energy sector mitigation actions and their status as of 2023 which will have sizeable contribution towards the NDC report

Number of Mitigation Actions Total estimated GHG Emission Reduction			
	Description	Status (Planned, Ongoing, Completed	Estimated GHG emission reduction
1	Solar Hybrid Systems (Conversion Projects) 2020- Munda, Tulagi, Kirakira, Malu'u, Lata)	Ongoing	26,500
2	Solar-Diesel Hybrid Systems 2020-2021- Hauhui, Sasamunga, Namugha, Vonunu, Selwyn College, Wairokai CHS	Ongoing	25,168
3	Solar-Diesel Hybrid Systems 2021-2022- Visale, Tingoa, Bina, Baolo, Dalo	Ongoing	21,809

[18]National Electric Mobility Policy and Market Readiness Framework for the Solomon Islands (2022), https://unepccc.org/publications/national-electric-mobility-policy-and-market-readiness-framework-for-the-solomon-islands/

4	Ranadi Office Rooftop Solar Farm	Ongoing	4,015
5	Henderson Fighter 1 Extension Solar	Ongoing	36,500
6	Tanagai Solar Farm	Ongoing	18,250
7	Tina Hydropower station 2024	Ongoing	0
8	Current Hydro-Power Stations- Malita	(2) Planned, (3) Completed	438
9	Current Hydro-Power Stations- Western	(2) Completed, (1) Ongoing	262.8
10	Current Hydro-Power Stations- Guadalcanal	Ongoing	730
11	Current Hydro-Power Stations- Makira	Ongoing	730
12	Energy Generation- Renewable Energy - Luembalele River	Ongoing (feasibility)	21,304
13	Energy Generation- Renewable Energy - Huro River	Ongoing (feasibility)	13,455

14	Energy Generation- Renewable Energy- Mase River	Ongoing (feasibility)	196,224
15	Energy Generation- Renewable Energy - Sorave River	Ongoing (Pre-feasibility)	22,426
16	Energy Generation- Renewable Energy - Rori River	Ongoing (feasibility)	33,638
17	Energy Generation- Renewable Energy - Vila River	Ongoing (Pre-feasibility)	135,675
18	Energy Generation- Renewable Energy - Kakabona Solar PV	Ongoing (feasibility)	35,040
19	OFF-GRID SOLAR –DIESEL HYBRID SYSTEMS- 10 Boarding Schools	Ongoing (Pre-feasibility)	29,020
20	OFF-GRID SOLAR –DIESEL HYBRID SYSTEMS- Whole Country	Ongoing (feasibility)	2.5
21	OFF-GRID SOLAR –DIESEL HYBRID SYSTEMS- Solomon Water seven pump stations (6 Honiara based and 1 Auki based stations)	Ongoing (feasibility)	8,148
22	Energy Generation- Renewable Energy - Savo Geothermal	Ongoing (preliminary assessment)	4,485,120

3.2.1.2. Forest and Land use

Solomon Islands has a large carbon sequestration potential being a high forest area country. Forest land cover of 87 per cent or 25,223 km2 was recorded in 2020[19]. The forestry sector is also a large economic driver for the country. Forest products account for about 65 percent of exports, licences provide around 20 per cent of government revenue, and the logging industry provides 20 per cent of total employment[20]. Reducing logging to sustainable levels is a priority for Solomon Islands.

The Solomon Islands Government developed and submitted to UNFCCC its National Forest Reference Level in 2019 in order to assess domestic policy effectiveness, demonstrate commitment to reduced emissions, and to qualify for results-based payments under REDD+ framework. Solomon Islands is committed to undertake a multi-purpose national forest inventory over the next few years. This will provide the basis for forest monitoring and informed decision-making to improve forest management and research. Further Solomon Islands intends to implement sustainable logging policy (Sustainable Logging Policy 2018) and quantify forest carbon sequestration and protect forest above 400-meter contour.

3.2.1.3. Other Climate Change projects in Solomon Islands

The Solomon Islands Government has enhanced its emission reduction ambition to achieving net zero by 2050, and it also considers investment in adaptation practices necessary for its survival. Given the geographic location and economic status, climate change poses serious challenges to the development aspirations of the SIG which makes access to finance and prudent public spending indispensable. Recognizing the interconnectedness of adaptation and mitigation, the importance of prioritizing resilience and adaptation measures alongside emissions reduction efforts cannot be overstated. To this end, the SIG has proposed/planned several mitigation and adaptation measures for finance support. Table 45 highlights the various baseline development (ODA) and national and regional climate projects that have been implemented, are being implemented or proposed for the Solomon Islands.

3.3. Projected GHG Emissions in Solomon Islands

This section of the report provides projection of Solomon Islands GHG emissions by 2030. Projections of greenhouse gas emissions and removals (GHG projections) are an estimate of a country's future greenhouse gas (GHG) emissions based on a set of assumptions about how activities in that country, that cause those emissions, might change over time. Two scenarios are presented:

(1). Baseline Scenario: This scenario presents a business-as-usual projection of Solomon Islands GHG emissions between 2021-2030. It is assumed that emissions will continue to increase with the current trend and that no GHG abatement measures will be implemented.

(2). With Measures Scenario: This scenario is built on the assumption that all of the mitigation opportunities identified in the previous section is being implemented. It is important to note that these scenarios do not include emissions and removal from land-use change and forestry. The With Measures Scenario is developed based on Scenario 3: RE100% in Rainy season scenario (Recommended scenario) considered under the Renewable Energy Road Map (2021). The assumptions underlying for development of this scenario are discussed hereunder.

3.3.1. Assumptions

This scenario considers 2% per year growth in demand with PP+PV+BESS and is recommended Renewable Energy 100% Scenario in Solomon Islands by 2030. Based on the studies so far, PV and the Tina River Hydropower Plant are

[19]FAO estimate 2021, available here: https://www.fao.org/faostat/en/
[20]National Forest Policy 2020 available here: https://www.mofr.gov.sb/documents/LegislationAndRegulation/SI%20National%20Forest%20Policy%202020.pdf

currently the only renewable energy resources that can feasibly be developed by 2030. Under this scenario, only REs that can be developed in SI are currently PV and hydropower. In this case, the RE supply share in 2030 in the annual generation is estimated to be 90.9%. In the rainy season (January-March, December), 100% supply of RE will be achieved. Some diesel supply is required only during the dry season nights. Regarding biomass, wood biomass and palm shell are expected to be promising, but there is no data that can be considered as a road map scenario because the potential survey of biomass power generation in Solomon has not been conducted. As for hydropower, the new hydropower plant to be developed next to Tina Hydro that is scheduled to commission in 2024 is expected not to be in time by 2030 based on the development results of Tina Hydro.

3.4. Challenges, Barriers, needs and Opportunities

Numerous barriers and gaps hinder effective mitigation efforts in Solomon Islands, encompassing challenges commonly encountered in developing countries, along with some specific to the nation. Addressing these barriers and needs will help mitigate significant obstacles to achieving sustainable and low-carbon development.

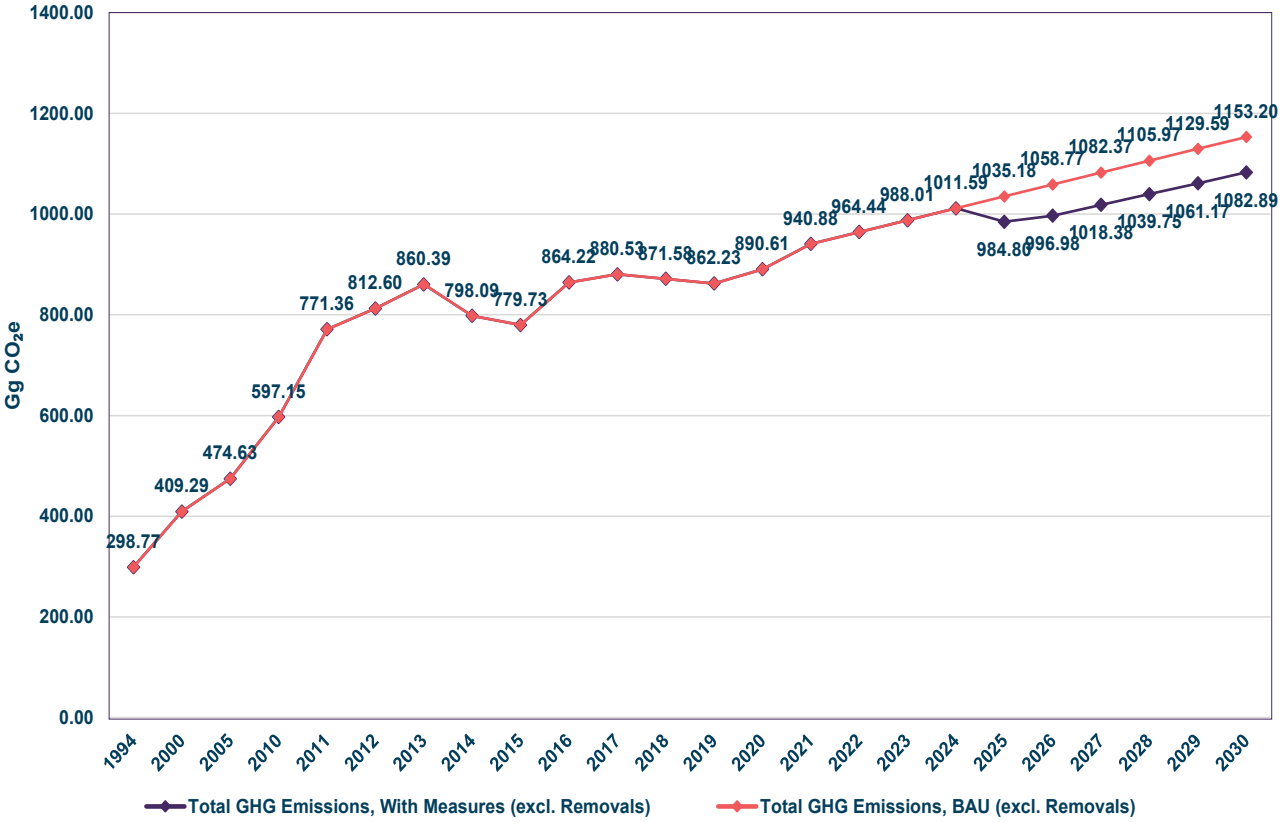

Figure 44: Projected GHG Emissions Reduction Scenarios

Numerous barriers and gaps hinder effective mitigation efforts in Solomon Islands, encompassing challenges commonly encountered in developing countries, along with some specific to the nation. Addressing these barriers and needs will help mitigate significant obstacles to achieving sustainable and low-carbon development.

3.4.1. Data Gaps and Accuracy

Incomplete Data: A major concern is the lack of comprehensive and accurate data. Information gaps in fuel usage, total electricity generation, and transport usage hinder accurate emissions accounting and effective mitigation planning.

Limited Information Sharing: Difficulties arise due to non-cooperation from responsible government departments and oil companies. Improved sharing of data between government departments is essential for informed decision-making.

3.4.2. Financial Challenges

Capital Constraints: The transition to renewable energy technologies requires higher upfront capital costs, which can be a significant barrier, particularly given limited access to capital in the country. Further, Conditional mitigation actions will require timely combination of capacity building, technical or technology transfer and financial support, primarily in the form of grants.

Slow Funding:

- While donors support renewable energy development, their slow response time impedes timely mitigation actions. Urgent and efficient funding mechanisms are needed to accelerate progress.

- Slow progress in transferring international finance towards mitigation efforts restricts funding for climate initiatives. Robust mechanisms are required to mobilize substantial finance for low-carbon projects.

Climate Change Trust Fund:
Need to establish national climate change trust fund.

3.4.3. Capacity and Expertise

Lack of Training and capacity:

- Limited technical knowledge and sound financial and business literacy to transform policies and climate-in duced and disaster-related risks into demand driven investment to scale up mitigation solutions with strong exit strategy beyond the one-off project.

- There is need to enhance government, private sector and other relevant institutions' technical capacity to collect and analyse baseline data to calculate ex-ante and ex-post GHG inventory emissions and sinks (removals) on regular basis, monitoring emissions and removals.

- Government needs capacity to regulate carbon trade and develop carbon trading legislation.

- Build capacity of national stakeholders to design and implement carbon projects including carbon trade.

- Limited Government, private sector and relevant institutions' capacity to translate the national Renewable Energy Road map into tangible climate investments.

- Relevant ministries lack capacity to support carbon assessments, carbon trading and renewable energy programmes.

- Limited capacity to develop and enforce Multilateral Environmental funds for Sustainable Land (MEFSL) Management scheme to reduce energy consumption at the public,

industrial, commercial and houshold levels.

Institutional Difficulties:

- Challenges in retaining qualified personnel in administrative positions within the government hinder smooth technology transfer and effective implementation of climate initiatives.

- There is need to improve institutional, regulatory, technical, financial, business and socio-cultural capacities of the NDA, line ministries and partners to design high quality proposal with strong exit strategy and sustainability beyond the one-off project.

3.4.4. Awareness and Education

Lack of Awareness:

- Insufficient public awareness about climate change, renewable energy benefits, and low-carbon technologies limits their adoption and support.

- Lack of awareness on significance of forest sector for mitigation and adaptation among citizens and some government departments.

Limited Technical Knowledge:
Limited understanding of carbon trading markets and mechanisms hinders the development of a carbon trading system.

Education Efforts Needed:
Government initiatives are needed to improve education and awareness regarding green, low-carbon development, ensuring that the benefits of mitigation strategies are understood and embraced.

3.4.5. Policy and Institutional Challenges

Enabling Environments:

- Inadequate regulatory environments deter private investment in the energy sector, necessitating policy improvements to facilitate renewable energy development.

- No e-mobility policy and guideline.

Institutional and Administrative Difficulties:
Difficulties in administrative roles hinder effective policy implementation and technology adoption.

CHAPTER 4:

FINANCE, TECHNOLOGY AND CAPACITY BUILDING NEEDS AND SUPPORT RECEIVED

4

4.0. Constraints, Gaps and Needs

4.1.0. GHG Inventory

Solomon Islands needs technical and financial resources and capacity building to improve its GHG inventory compilation system. Financial resources are required to improve the data collection and compilation system. Currently the most limiting of these is the lack of capacity.

Solomon Islands is serious about developing its capacity to carry out GHG inventory and have clear national carbon profile as stated as one of its strategies in its latest revised climate change policy (NCCP 2023 -2032) - to 'Build capacity of national, provincial, and local governments, commercial and extractive industries, and other relevant institutions to undertake regular inventory of GHG emissions by sources and removals by sinks, establish the national carbon profile and prioritize emission reduction strategies and actions for key sectors.

Data providers and inventory compilers at all government levels and across sectors and industries need training on various aspects of the GHG inventory update process for efficient and accurate data collection and inventory management. This has started in the last couple of years during the developments of National Communications but are mainly one-off and not institutionalised and sustainable. This includes the development of data collection template, 2006 IPCC guideline methodologies for all four sectors, use of 2006 IPCC software, estimation of uncertainties in the data collected, Key category analysis (KCA), QA/QC process and methods, uncertainty analysis. The constraints, gaps, and requirements identified for the national greenhouse gas (GHG) inventory, which are integral to the national inventory improvement plan (NIIP), are outlined below.

Key Category Analysis: The activity data collection and review process will be improved and higher tier (tier 2) analysis of GHG from the key categories and sub-categories identified for Solomon Islands proposed for the next inventory. The activity data collection, review process and QA/QC procedure will be developed and implemented for all the key categories and sub-categories.

Trend Analysis: The GHG emissions from the previous year will be recalculated for trend analysis, if there is change in the methodologies used during the reporting period.

Procedural arrangements: (a) Data Collection: The activity data collection from the industry, public and private sector as well as institutions and department shall be formalized via suitable instrument e.g., legal contracts, MoUs, MoAs, or other legal documents. (b) The Ministry of Environment, Climate Change, Disaster Management and Meteorology (MECDM) will initiate the regulation to formalize the database management, archives and institutional setup for the above.

Procedural arrangements: Department of Climate Change will establish arrangements for implementing improved QA/QC procedures, manage and operate the inventory database, and document and archive inventory information and the operation of the inventory.

Implementation Integrated Monitoring, Reporting and Verification (MRV Tool) for National GHG Inventory: The department of Climate Change will implement and operationalize the web based integrated monitoring, reporting and verification system for national GHG inventory (energy sector).

Livestock Data: The livestock emission both enteric fermentation and manure management are key category; hence more frequent and granular data will be obtained from the Ministry of Agriculture and Livestock (MAL). In future inventory, the applicability of higher tier method (Tier 2- method) will be adopted for this subcat-

egory, subjective to the data availability.

Forestry and Other Land Use: Limited data and information was available from this sub-sector hence tier-1 method was used in this report. However, Solomon Islands is implementing REDD+ programme and more qualitative data and information will be available in near future and higher tier will be used in future inventory.

Waste Sector Data: The waste (Solid waste and wastewater) sector activity data monitoring and reporting needs to be initiated in urban centres.

4.2.0. Mitigation action

Numerous barriers and gaps hinder effective mitigation efforts in Solomon Islands, encompassing challenges commonly encountered in developing countries, along with some specific to the nation. Addressing these barriers and needs will help mitigate significant obstacles to achieving sustainable and low-carbon development.

4.3.0. Data Gaps and Accuracy

Incomplete Data: A major concern is the lack of comprehensive and accurate data. Information gaps in fuel usage, total electricity generation, and transport usage hinder accurate emissions accounting and effective mitigation planning.

Limited Information Sharing: Difficulties arise due to non-cooperation from responsible government departments andfuel companies. Improved sharing of data between government departments is essential for informed decision-making.

4.4.0. Financial Challenges

Capital Constraints: The transition to renewable energy technologies requires higher upfront capital costs, which can be a significant barrier, particularly given limited access to capital in the country. Further, Conditional mitigation actions will require timely combination of capacity building, technical or technology transfer and financial support, primarily in the form of grants.

Slow Funding:

- While donors support renewable energy development, their slow response time impedes timely mitigation actions. Urgent and efficient funding mechanisms are needed to accelerate progress.

- Slow progress in transferring international finance towards mitigation efforts restricts funding for climate initiatives. Robust mechanisms are required to mobilize substantial finance for low-carbon projects.

Climate Change Trust Fund: Need to establish national climate change trust fund.

4.5.0. Capacity and Expertise

Lack of Training and capacity:

- The shortage of local renewable energy training impedes capacity building for installation and maintenance work associated with mitigation projects. The Solomon Island National University had gone in the right direction in establishing a diploma in solar PV course. However, having other tailored -shorter solar trainings that can accommodate more trainees will be useful as well. Note, as per the latest census (2019), more than 80 percent of the population (rural and urban) are using solar for lighting. There is definitely need for capacity for design, install and maintenance and other uses apart from lighting in this technology.

- Limited technical knowledge and sound financial and business literacy to transform policies and climate-induced and disaster-related risks into demand driven invest-

ment to scale up mitigation solutions with strong exit strategy beyond the one-off project.

- There is need to enhance government, private sector and other relevant institutions' technical capacity to collect and analyse baseline data to calculate ex-ante and ex-post GHG inventory emissions and sinks (removals) on regular basis, monitoring emissions and removals.

- Government needs capacity to regulate carbon trade and develop carbon trading legislation.

- Build capacity of national stakeholders to design and implement carbon projects including carbon trade.

- Limited Government, private sector and relevant institutions' capacity to translate the national Renewable Energy Roadmap into tangible climate investments.

- Relevant ministries lack capacity to support carbon assessments, carbon trading and renewable energy programmes.

- Limited capacity to develop and enforce MEFSL scheme to reduce energy consumption at the public, industrial, commercial and household levels.

Institutional Difficulties:

- Challenges in retaining qualified personnel in administrative positions within the government hinder smooth technology transfer and effective implementation of climate initiatives.

- There is need to improve institutional, regulatory, technical, financial, business and socio-cultural capacities of the NDA, line ministries and partners to design high quality proposal with strong exit strategy and sustainability beyond the one-off project.

4.6.0. Awareness and Education

Lack of Awareness:

- Insufficient public awareness about climate change, renewable energy benefits, and low-carbon technologies limits their adoption and support.

- Lack of awareness on significance of forest sector for mitigation and adaptation among citizens and some government departments.

Limited Technical Knowledge: Limited understanding of carbon trading markets and mechanisms hinders the development of a carbon trading system.

Education Efforts Needed: Government initiatives are needed to improve education and awareness regarding green, low-carbon development, ensuring that the benefits of mitigation strategies are understood and embraced.

4.7.0. Policy and Institutional Challenges

Enabling Environments:

- Inadequate regulatory environments deter private investment in the energy sector, necessitating policy improvements to facilitate renewable energy development.

- No e-mobility policy and guideline

Institutional and Administrative Difficulties: Difficulties in administrative roles hinder effective policy implementation and technology adoption.

4.8.0. Social and Land Issues

Accessing sites for hydro or even solar farms can be a challenge, especially if it's on customary land (note almost 80 % of all lands in Solomon

Islands customary owned). It can take years to negotiate these sites or even put investors of right at the start.

4.1. Financial Support Received and Needs

During 2011-2020, the Development finance for projects addressing climate change (both mitigation and adaptation) in Solomon Islands totalled USD 283.73 (Stockholm Environment Institute, 2023)[21]. Of this total $183mn (64.5%) targeted mitigation activities, $98.8mn (34.8%) was targeted at adaptation activities, and $1.93mn (0.68%) targeted both mitigation and adaptation simultaneously. The disbursement ratio[22] for development finance to Solomon Islands targeting Climate Change over this period was 42.1%. GCF investment in Solomon Islands amounts to USD 86 million through a project that covers both mitigation and adaptation.

Development finance commitments to Solomon Islands targeting Climate Change came from different funders and were allocated to different recipients, as shown in the Figure 45. The largest sources of finance were International Development Association (USD 98.7m), Asian Development Bank (USD 47m) and Global Environment Facility (USD 35.5m).

As shown in Figure 45, the development finance to Solomon Islands targeting Climate Change as provided to different sectors, as shown in the Figure below. The largest commitments were USD 150 million to Energy, USD 36.4 million to Transport & Storage and USD 25 million to Water Supply & Sanitation.

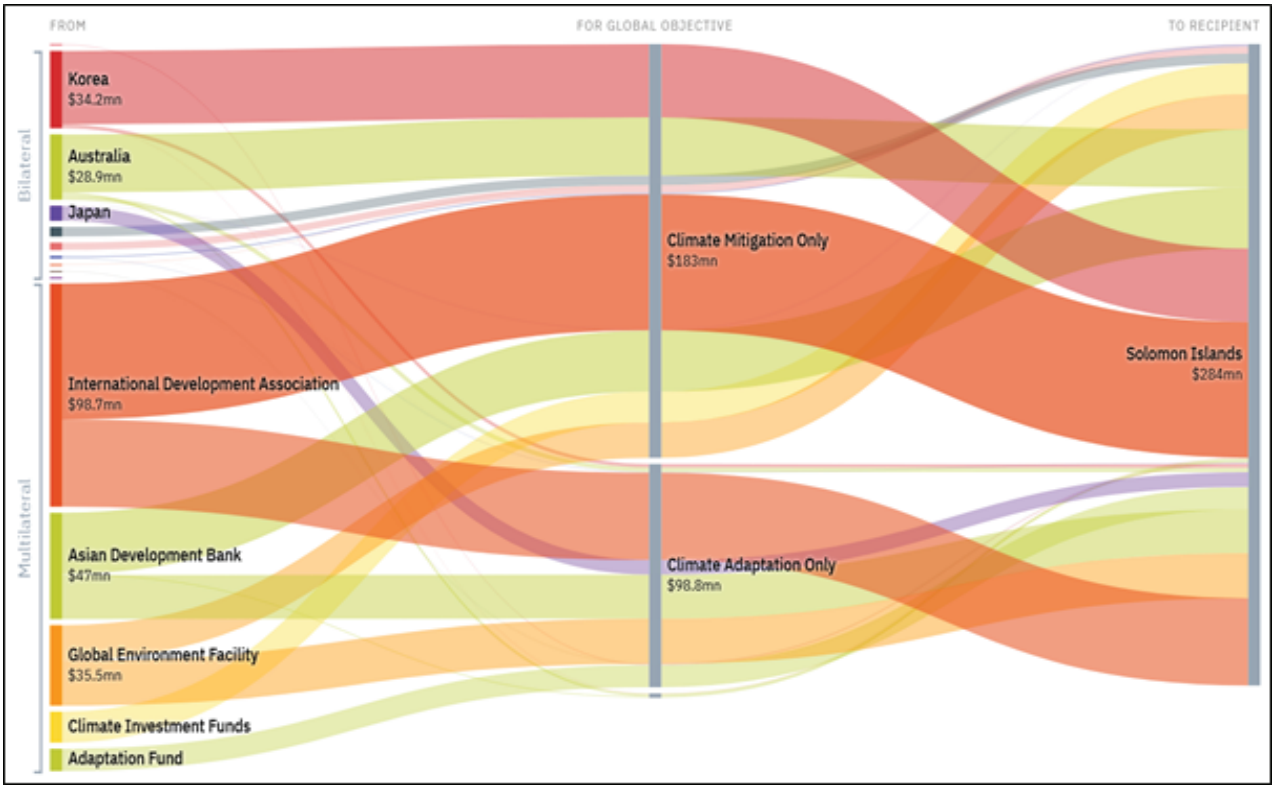

Figure 45: Development finance from all Donors in Solomon Islands for Climate Change (total): 2011-2020

[21]Stockholm Environment Institute (2023). Aid Atlas. Available at https://aid-atlas.org/profile/all/solomon-islands/climate-change-total/2011-2020?usdType=usd_commitment. Accessed on 09 Sept 2023.
[22]The 'disbursement ratio' refers to the amount of finance disbursed as a percentage of the total amount committed or approved in the same period. Low disbursement ratios could indicate that there are challenges implementing projects or that funding was subsequently re-directed after approval.

The Figures 45 & 46 indicate that there are several sources of external climate funds available that the Solomon Islands could access for addressing issues relating to climate change. However, like other countries in the region, there is a need to enhance capacity to access these funds so the country may benefit from these financial resources.

Moreover, SIG has mobilized USD 111m from Green Climate Fund (GCF). The current portfolio for Solomon Islands is highly concentrated with one hydropower project being managed by the World Bank. In comparison, other countries in the Pacific represent a more diverse portfolio. The readiness portfolio of SIG is also limited with only 1 readiness activity with USD 0.8967mn disbursed (until September 2023)[23].

Solomon Islands ranks among the top high-risk countries in the world that are affected by global warming. Climate change and disaster risks pose development challenges for the government and threatens the socio-economic livelihoods, wellbeing, and culture, which are the fundamental fabrics of survival for communities. Although Solomon Islands has been successful in the past to access several sources of climate funds, but they are not sufficient given the national circumstances of the country. More finance would be required in the near future to enhance resilience towards impact of Climate change and increase mitigation efforts to achieve net zero target by 2050.

The SIG has developed GCF Country Programme (CP)[24] in March 2023. It showcases climate priorities that could be financed and supported by national, regional and international climate finance, including the GCF. SIG has project proposals that have their GCF concept notes submitted to the GCF and available at the website are prioritised in the pipeline for GCF 2 period for 2024 to 2027. Such projects need finance support amounting to USD 512.2mn. SIG has also identified 24 potential projects for GCF-3 period (2028 to 2031) amounting to finance requirement of approximately USD 1155 m and presented in Annex 1.

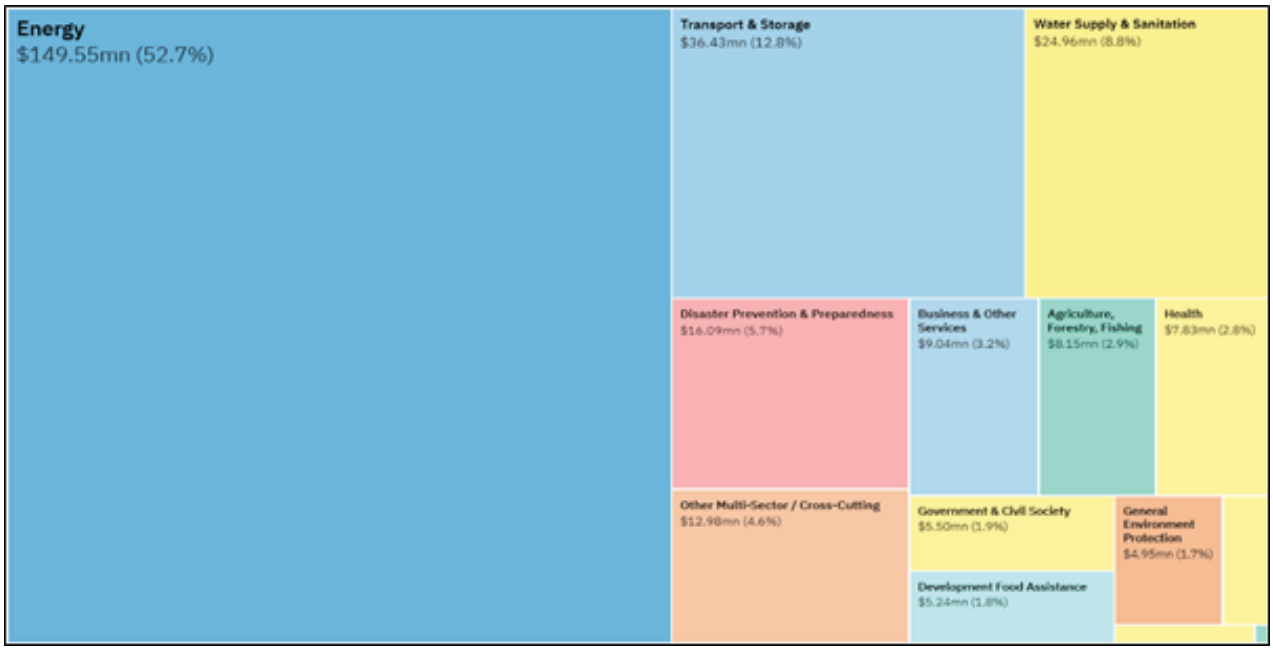

Figure 46: Total finance by sector targeted

[23]GCF Country portfolio. https://www.greenclimate.fund/countries/solomon-islands
[24]Green Climate Fund (GCF) Country Programme (2023), Solomon Islands, Secretariat of the Pacific Regional Environment Programme (SPREP)

4.2. Technology and capacity-building support received and needs

4.2.1. Technology

Technology support and capacity building is critical to achieving high climate ambition. As a result, Solomon Islands has been consistent in mobilizing financial resources and technical assistance from various sources to help offset the additional cost that the economy has in combating climate change and having managed to obtain these resources to prepare its reports (NCs and BUR), and for the implementation of several linked projects related to climate change that include financial, technical assistance and technology and capacity transfer. For example, Solomon Islands has received technical assistance for projects like National Electric Mobility Policy and Market Readiness Framework for the Solomon Islands, Policy Roadmap for e-Mobility in Solomon Islands, e-Bus Market feasibility in city of Honiara in recent times (but not limited to these).

The Solomon Islands started its Technology Needs Assessment (TNA) process in 2020 as part of the TNA IV project, has indicated priority sectors and technologies for both mitigation and adaptation. The TNA project is in accordance with Solomon Island's national priorities, including the priorities identified in the country's NAPA and the NCSA. The effective implementation of the adaptation and mitigation measures in Solomon Islands' 2021 Nationally Determined Contributions (NDC) is conditional upon the accessibility, availability and timely provision of financial resources, technology and capacity building support. The TNA will enable Solomon Islands to identify the priority technologies as well as the barriers to be removed to enable the proper deployment of the prioritized technologies. The SIG through UNEP has requested for GEF resources amounting to USD 295,650.

4.3. Capacity Building

Solomon Islands has received training and capacity building for the preparation of the TNC and FBUR from International consultants as a part of the TNC and FBUR project. SIG has received several other training and capacity building under Bilateral, Multilateral and Regional programs and projects to meet its obligation under the United Nations Framework Convention on Climate Change (UNFCCC). As an example, the CBIT Project for the Solomon Islands, strengthening capacity in the agriculture and land-use as well as energy sectors in Solomon Islands for enhanced transparency in implementation and monitoring of Solomon Islands Nationally Determined Contribution (NDC) supported by GEF. This project aims to strengthen Solomon Island's technical and institutional capacity for compliance by 2025 with the Enhanced Transparency Framework (ETF) of the Paris Agreement on Climate Change to track mitigation and adaptation actions of Nationally Determined Contribution priority sectors focusing on agriculture, land-use change, energy and waste sectors. The project has three components:

Project Component 1: Strengthening institutional arrangements and capacities to meet the Paris agreement requirements on ETF.

Outcomes of Project Component 1: Strengthened institutional arrangements to collect, archive, update and report climate transparency data through a centralized information management system. 1.2 Strengthened capacities to regularly monitor and report financing on NDC actions.

Project Component 2: Strengthening the technical capacity to develop a domestic MRV system.

Outcomes of Project Component 2: Strengthened emissions estimation of sources and sinks focusing on agriculture, land-use change, energy and wastes sectors.

Project Component 3: Strengthening capacity to monitor and report adaptation activities.

Outcomes of Project Component 3: Strengthened technical capacities for monitoring and reporting to track the progress of NDC adaptation actions.

FAO will be the GEF Implementing Agency for this project. The Ministry of Environment, Climate Change and Disaster Management and Meteorology will be the National Counterpart and will be responsible for the overall national coordination and execution of the field project activities. The MECDM will have the executing responsibility for the project, with FAO providing technical oversight and responsibility as GEF Agency.

The Solomon Islands have previously received assistance in technology and capacity building however mainstreaming-much training and awareness raising is needed to mainstream climate change across stakeholder organizations, provincial governments and communities (ii)Technology transfer and capacity building needs-best practices, information and improvement of human skills, especially those possessed by specialized professionals and engineers is required given that acquisition and absorption of foreign technologies, and their further development, are complex processes. (iv) education and public awareness on climate change is also required.

In a nutshell, the Solomon Islands have previously received assistance in technology and capacity building. However, training and capacity building is required to access climate finance, Improving Resource Management, Transparency and Accountability, Governance, Coordination and M&E Climate, Education, communication, and awareness, Project management and more.

CHAPTER 5:
MONITORING, REPORTING AND VERIFICATION (MRV) FRAMEWORK

5

5.0. Background and Context

The Paris Agreement (PA)[25], explicitly set out a global action plan to limit global warming to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels. In accordance with Article 4 of the PA, Solomon Islands has submitted its first and updated Nationally Determined Contribution (NDC)[26] to the United Nations Framework Convention on Climate Change (UNFCCC) that contributes to the previous mentioned goals of the PA. Moreover, Article 13 of the PA establishes the Enhanced Transparency Framework (ETF)[27] for action and support, which encourages clarity of information and the tracking of progress of the different parties in meeting different provisions of agreement. The ETF provisions require submission and reporting of national communications and biennial transparency report (BTR) with the key components: the national Greenhouse Gases (GHG) inventory; information necessary to track progress towards the NDC; information related to adaptation; information on the means of Implementation (MOI) which included financial, technology development, and capacity building support needed and received, and support a technical expert review and a facilitative multilateral consideration of progress.

To be able to track the key components of the ETF individual parties, such as the Solomon Islands, are encouraged to establish robust domestic Monitoring, Reporting and Verification (MRV) systems for GHG emissions and NDC actions, and Monitoring & Evaluation (M&E) systems for adaptation, and reporting on MOI support needed and received.

The Enhance Transparency Framework and Measurement, Reporting, and Verification (MRV) Systems for Climate actions and support are important elements of the UNFCCC 2015 Paris Agreement, to assess the status and progress of countries and the whole world, towards climate change targets. MRV of the greenhouse gas emissions system is a fundamental unit to post-2020 transparency arrangements being currently negotiated under MRV of actions. This is especially the case since all countries – both developed and developing - are expected to regularly report on their GHG inventories and NDC implementation and achievement progress under the new climate regime.

The international requirements of the MRV framework include the following elements:

- National Communications must be submitted every four years and must include information on national circumstances and institutional arrangements, national GHG inventories, steps taken or envisaged to implement the UNFCCC through mitigation and adaptation measures and programs, other information considered relevant to the implementation of the UNFCCC (e.g. technology transfer, capacity building, research and systematic observation), barriers and gaps, and related financial, technical and capacity needs (UNFCCC 2014).

- The Biennial Update Report (BUR), which must be submitted every two years, provides an update on the previous National Communication and covers national GHG inventories, mitigation actions and needed and received support. Support in this case may refer to financial, technical, and capacity-building. While it is mandatory for Parties to provide, as far as is practicable, information on their domestic MRV arrangements, reporting on REDD+ is voluntary and may be provided as an annex to the BUR. Similarly, the structure of the BUR does not require information on adaptation, but Parties wishing to provide this are permitted to do so (UNFCCC 2014).

- BURs are verified through the International Consultation and Analysis (ICA) process that is strongly geared towards supporting countries to improve their reporting over time.

[25]https://unfccc.int/process-and-meetings/the-paris-agreement
[26]https://unfccc.int/documents/497898
[27]https://unfccc.int/enhanced-transparency-framework

The ICA is a two-step process. In the first step, a team of technical experts conducts a technical assessment to ensure that the reports provide all the information required by the BUR guidelines and that this information is reported transparently (UNFCCC 2012). In addition, the team will seek to identify capacity-building needs for the Party under review. The second step involves a workshop process called the Facilitative Sharing of Views. Here, all Parties gather to present and discuss their most recent BURs communicated to the COP, an exchange that enables them to learn from the experiences of their peers.

The ETF of the Paris Agreement[28] has set expanded the requirements for Parties to measure, report and verify their climate actions and information provided under their NDCs.

The Chapter III of the Modalities, Procedures and Guidelines of the Article 13, as published under Decision 18/CMA.1 covers the requirements for information to be reported by the countries with regard to their NDCs under the biennial transparency reports (BTR). This includes:

- National circumstances and institutional arrangements;
- Description of a Party's NDC, including updates;
- Information necessary to track progress made in implementing and achieving the NDC;
- Mitigation policies and measures, actions and plans, including those with mitigation co-benefits resulting from adaptation actions and economic diversification plans, related to implementing and achieving the NDC;
- Summary of GHG emissions and removals;
- Projections of GHG emissions and removals, as applicable;
- Other information

An Integrated Monitoring, Reporting and Verification (MRV) system and database (or MRV Tool) for Solomon Islands Nationally Determined Contribution (NDC) is envisaged to effectively implement the PA and transparently communicate the domestic actions, strategies, and action plan to the domestic and international stakeholders.

5.1. Solomon Islands NDC MRV Roadmap

Solomon Islands has developed a NDC MRV roadmap during 2019-2020 with assistance from GGGI. The roadmap has carried out a gap analysis on the existing MRV set-up across the IPCC and NDC sectors and subsectors. Recommendations and a way forward in terms of development of a national MRV system has been identified based on this assessment.

The key recommendations for moving towards establishing a national MRV system for the Solomons include:

- Establishment of National MRV Institutional Framework & Structure

This involves establishment of formal institutional arrangements, along with the appropriate legislative and policy action including resources (financial, technical, human) needed for the institutional arrangements to begin performing key MRV functions.

- Training & Capacity Building

This involves development of standardized procedures, templates, training on technical tools and management systems

Based on the data gap analysis of the national GHGI and mitigation actions, the following are key areas that need development to ensure the

[28]https://unfccc.int/sites/default/files/resource/ETF_technical%20handbook_First%20Edition.pdf

National MRV system for the Solomon Islands is consistent with IPCC Guidelines and the Enhanced Transparency Framework in the Paris Agreement.

1. Lack of Sector-specific Activity Data: Most of the activity data for the GHGI are derived indirectly from expert sources and statistics, or approximated. For some sub-sectors, there are insufficient data, leading to incomplete estimates of emissions. Developing direct measurement and reporting is critical to improving activity data.
2. Lack of Country-specific Emission Factors: For SNC, the national GHGI is conducted using default IPCC values. For most sectors, developing country-specific emission factors will improve the GHG emissions estimates.
3. GHG Coverage: For some sectors, not all relevant GHGs are covered in inventories.
4. Uncertainty Reduction: For most sectors, there is no detailed calculation of uncertainty that provides information on what factors contribute to the high uncertainty of emissions estimates.
5. QA/QC: There were no QA/QC measures for the SNC, and these will have to be introduced to provide information on the quality of estimates, data quality issues, and to ensure comparability of estimates between years.
6. Data Management: There is limited record of the process of producing the national GHGI, archiving of data and consultations with TWGs.
7. Coherence of MRV System for Mitigation Action: The REDD+ MRV system is under development, but how will MRV for other NDCs and green development activities be combined for a national MRV system.

The Solomon Islands Government is developing an effective and robust national integrated MRV tool that will operationalize the MRV Roadmap and information system supporting the national climate change policy and support the Government in implementing the ETF and reporting provisions under the UNFCCC and the Paris Agreement.

In a nutshell, Solomon Islands' MRV system development will take the following points into consideration for developing a robust MRV system that effectively tracks, report and verify the performance of NDC actions (including projects and programmes).

- Developing Institutional arrangements: (i) Identification of institution for Implementation Integrated Monitoring, Reporting and Verification (MRV Tool) for National GHG Inventory. (ii) Identification of new and separate institutional framework (if required) for an effective implementation of the system through the addition of required elements for further enhancement of the processes, roles and responsibilities.

- Review of existing national processes: (i) Review of existing national processes for monitoring, data collection, archiving, internal/external verification etc. should be examined before the MRV system is designed and implemented to allow for efficient integration and strengthening between what exists and what will be developed. (ii) Identification of sources of data, measurement methods and procedures, and data sharing protocols; including the frequency of monitoring/recording; (iii) Procedures for reporting by both public institutions (national and county levels) and private entities.

- Legislation: Development or amendment of legislation if required.

- Data Collection: (i) The activity data collection from the industry, public and private sector as well as institutions and department shall be formalized via suitable instrument e.g., legal contracts, MoUs, MoAs, or other legal documents. (ii) The Ministry of National Resources and Environment (MNRE) should

initiate the regulation to formalize the database management, archives and institutional setup for the above. (iii) Development of SOPs for activity data collection, data collection templates and reporting templates for each GHG emission sector.

- Identification of actions to be monitored: The mitigation and adaptation actions (projects or programme) to be monitored, reported and communicated should be identified from NDC/NAP and non-NDC projects and programs.

- Identification of indicators and parameter: Identification of indicators, parameter, data to be monitored for mitigation and adaptation projects and activities such as (i) Financial Parameters e.g., Total Project Cost, Budget allocation, Payments and Balance etc. (ii) Technical Parameters e.g., Type of Solar Panels, Capacity, Generation (import/export) etc. (iii) Environmental Parameters e.g., GHG emission reductions, Saving of Diesel etc. (iv) Social Parameters e.g., No of employment generated, direct/indirect benefits etc.

- Roles and Responsibilities: (i) Define clear roles and responsibilities and give transparent guidance to each organization involved in developing and implementing MRV. (ii) Identification of roles and responsibilities of individuals in data monitoring, recording, maintaining, and reporting.

- Assessing capacity of institutions involved: Assessing existing human resources and human resource capacities, and existing monitoring and reporting systems (data collection and analysis).

- Training and capacity building: Development of training presentations and user manual for modules including hands-on exercises on the established Integrated MRV tool.

- Development of clear guidelines: Development of procedures and guidelines with joint effort of various stakeholders and continuous consultations with the line ministries, that includes quality control and assurance to ensure high transparency.

- Central Database/Data-hub for storing monitored data: Central database/data hub (on cloud) shall have all activity level operational monitored data as well as project-level data from the respective ministries, departments and implementation/operation agency.

- Verification and QA/QC: Data collected at central database/data and analysis of output/outcome shall be verified by the designated agency or official prior to finalization.

- Iterative approach for improving the system over time: (i) The key strength of the MRV system is the incorporation of a feedback mechanism in the implementation process of the MRV system to track, assess and monitor the progress of mitigation & adaptation actions and identify areas of improvements and success. (ii) The envisaged MRV tool/system should also encourage involvement and cooperation of key public and private sector stakeholders (including utilities, equipment and fuel suppliers, other government ministries and departments, NGOs, educational institutions, and other development partners) through continuous capacity building and awareness creation for long term sustainability.

- Alignment of the establishment of an MRV system with other national priorities to increase political buy-in: The MRV system should be designed in such a manner that it does not only track progress towards NDCs but also helps to implement the Enhanced Transparency Framework requirements, which fits into the larger national agenda.

5.2. Solomon Islands Integrated Monitoring, Reporting and Verification (iMRV) tool

Solomon Islands integrated MRV Tool will be a first-of-its-kind initiative to integrate most of the domestic and international climate action monitoring, tracking, and reporting requirements. Further once developed and implemented, it will support government agencies, development partners, and NGOs towards evidence-based decisions and data insights reporting. Solomon Islands integrated MRV Tool is customized to track, monitor, and report data critical for climate actions and sustainable development goals.

Solomon Islands integrated MRV tool will be an information and communications technology (ICT) web-based MRV system that includes a detailed online database for IPCC sectors and Climate actions. The integrated MRV tool to be developed will provide an overarching structure, approach and methodology for:

- National GHG emission monitoring and inventory;
- Basis for international and domestic reporting requirements (e.g. National Communications (NCs), Biannual Transparency Reports (BTR) etc);
- Real-time monitoring of GHG mitigation and climate change mitigation actions;
- Real-time monitoring of progress and impact of climate change adaptation actions;
- Climate Financial flow and progress towards implementation of climate actions;
- Monitoring Impact on Sustainable Development Goals (SDGs) from climate change actions;

Some of the Key steps to be taken into consideration while developing integrated MRV system are described here under as well as depicted in the Figure 47 below:

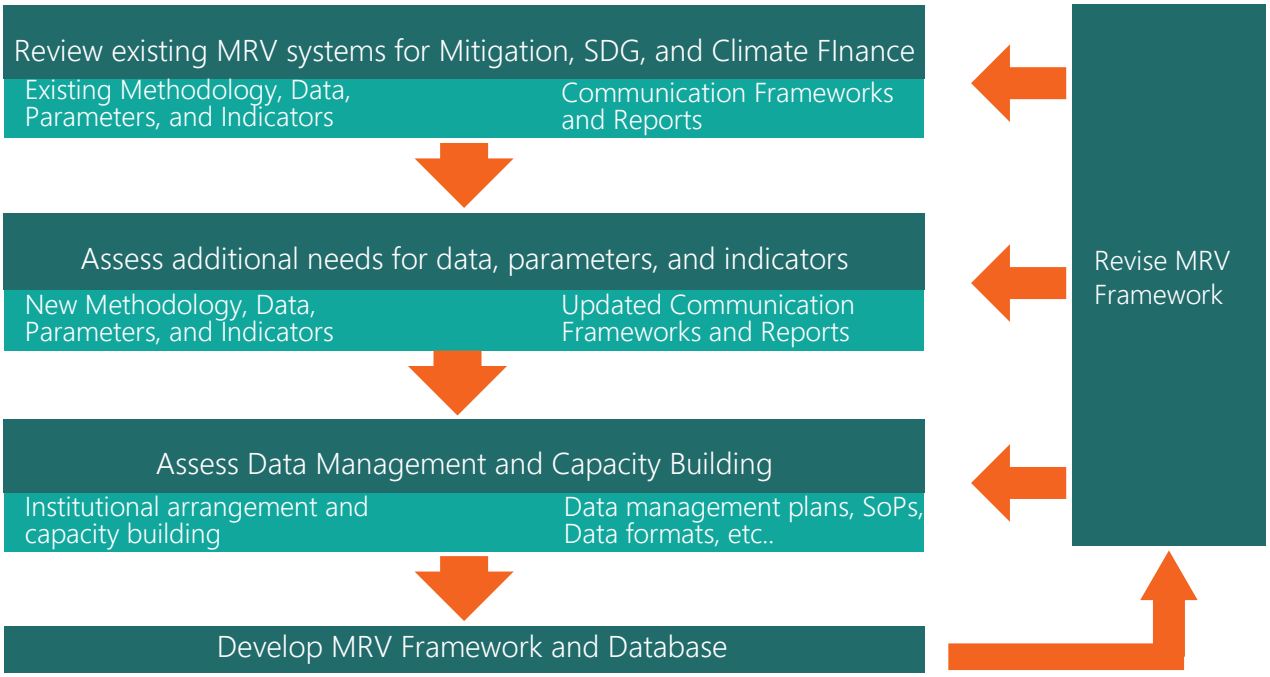

Figure 47: Key steps for designing the integrated MRV system

The Solomon Islands Integrated MRV Tool aims to assist the Climate Change Division (CCD) and other line ministries/departments to develop a concise and strategic domestic national MRV system to enhance monitoring, tracking, reporting and verification of climate actions, including GHG emissions, mitigation, adaptation and SDG impact of projects, programme, policies, etc., and, international, regional and domestic public and private climate finance flows. Key features and modules include:

- Module-1: National GHG Inventory
- Module-2: Mitigation Actions Tracking
- Module-3: Adaptation Actions Tracking
- Module-4: Climate Finance Tracking
- Module-5: Sustainable Development Goals (SDGs) Assessment

Apart for the above modules, crosscutting issues - i.e., human rights and gender-responsive climate change actions and protection of vulnerable groups - has been included in the SDG, mitigation and adaptation modules. Further each module has following key characteristics:

- Methods for generating, recording, storing, aggregating, collating and reporting data on monitored parameters;
- Sources of data, measurement methods and procedures, and data sharing protocols, including the frequency of monitoring/recording;
- Procedures for reporting by both public institutions (national and county levels) and private entities;
- Linkages to SDGs and Gender responsive indicators; and,
- QA/QC procedures.

This tool will specifically help the Solomon Islands Government with preparing the national GHG inventory, measuring progress in GHG mitigation and adaptation actions, track MOI support needed and received, and measure the linkage and impact on the SDGs. This tool will also provide a valuable coordinating, engagement and information management system that ensures timely high-quality information available for short-, medium, and long-term planning by Government. It will also contain relevant, structured thematic information and indicators necessary for informing national stakeholders and for use to support the Climate Change Division (CCD) in monitoring implementation of the NDC and relevant national policy frameworks for climate action.

5.2.1. Module-1: GHG Inventory

The National GHG inventory is typically an annual inventory of anthropogenic emissions by sources and removals by sinks of GHGs not controlled by the Montreal Protocol. The objective of the national GHG inventory is to communicate and report on annual anthropogenic GHG emission from source and removal from sink from four main sectors, i.e. Energy, Industrial Processes and Product use (IPPU), Agriculture, Forestry and Other Land Use (AFOLU) and Waste.

The GHG inventory module is based on the IPCC National Greenhouse Gas Inventory Tool and emission calculation templates. The purpose of this module is customizing the IPCC inventory tool with specific requirements of Solomon Islands and make it more user friendly and resource efficient. The GHG inventory module is to implement Tier1 methodologies in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories for the preparation of national GHG inventories according to 2006 IPCC Guidelines, either for complete inventories or for separate categories or groups of categories. The basic approach of the GHG inventory module is to enable filling out the 2006 IPCC Guidelines category worksheets with the activity and emission factor data. In addition, it also supports many other functions related to database administration, Quality Control, data compilation as well as data reporting.

5.2.2. Module-2: Mitigation Actions Tracking

The national climate change mitigation actions

monitoring and tracking is an important aspect for the integrated MRV tool. The rationale for introducing this module under integrated MRV is to be able to regularly update policy/decision makers, project implementers, managers and stakeholder on status and progress of mitigation actions in Solomon Islands. The national GHG inventory gives an overall picture of total emissions in the past; however, the mitigation action tracker provides information on progress toward meeting the NDC/Non-NDC commitments, including check on GHG reduction impact, success or gaps on policies and action taken towards GHG mitigation.

This module will incorporate all the Modalities, Procedures and Guidelines (MPGs) and Common Tabular Formats (CTFs) finalized under the PA, for international accounting guidelines and reporting requirement on NDC Mitigation Actions. However, the agreement gives an important information to policy maker at national level to track actions towards NDC commitments. The NDC Mitigation action tracker demonstrates the progressive approach of Solomon Islands integrated MRV Tool and further strengthen Solomon Islands commitment toward achieving NDC targets.

The Mitigation Action Tracking Module focus on both project implementation and operation phases. The bottom-up approach proposed to develop a comprehensive and integrated system considering the unique requirement.

5.2.3. Module-3: Adaptation Actions Tracking

The Climate Change adaptation action monitoring and tracking module will be designed as per the UNDP Climate Action Impact Tool (CAIT) Tool. This will also incorporate the M&E and reporting requirements defined under the National Adaptation Plan (NAP). The Adaptation action tracking tool will also follow similar bottom approach and methodology proposed for Mitigation Action Tracking and also follow the similar key steps as Climate Change Mitigation action tracking. The adaptation module will have both the qualitative and quantitative information. The Adaptation actions (projects or programmes) can be monitored, reported and communicated via analysis, project fact sheet, etc.

5.2.4. Module-4: Climate Finance Tracking

The climate finance module is designed to monitor and track the finance inflow in the country for climate actions (mitigation and adaptation) and disbursement of climate finance/expenditures. The PA agreement has given due importance to international and domestic financial flow for Climate Change (mitigation and adaptation). Further, as the key requirements such as monitoring and reporting, common modalities and procedures, detailed guidelines for the transparency framework under PA are finalized. The integrated MRV tool considers tracking international financial and technology support (provision, received and impact of support) for implementing GHG mitigation actions, training and capacity building, etc.

Two prong (top down and bottom up) approaches are being envisaged for designing the Climate Finance Flow Tracking Tool, which includes the international and domestic financial flow towards the implementation of NDC commitments and achieving climate change and interlinked sustainable development goals to be monitored, reported and communicated. The module enables financial tracking of policy, programme and projects.

5.2.5. Module-5: Sustainable Development Goals (SDGs) Assessment

The SDG module is based on SDG tool developed by UNDP-UNDP CAIT Tool. However, this will be customized for specific requirements of Solomon Islands keeping in mind the local context and capacity/resources available.

The SDG Module provides guidance for MRV and data collection with the aim of aligning the efforts to national reporting requirements to the UNFCCC for NDCs and to track progress made

towards the SDGs. The SDG module helps in managing the design, development, implementation, financing, measurement, reporting and verification of the various types of actions. This module enables identification of significant impacts, define indicators, quantify impacts and set targets and track the progress of the actions towards the NDCs. The tool is a bottom-up tool that can be applied to track 'significant, direct impacts' of actions.

The integrated MRV Tool of Solomon Islands will have in-built reporting template for sectors and institutions. The reporting templates will be designed considering the domestic and international reporting requirements as per the CTFs of ETF and shall also be customized as per the specific requirements of Solomon Islands. Further, the reports generated from the iMRV tool are subject to internal and external verification on periodic basis (or as and when required).

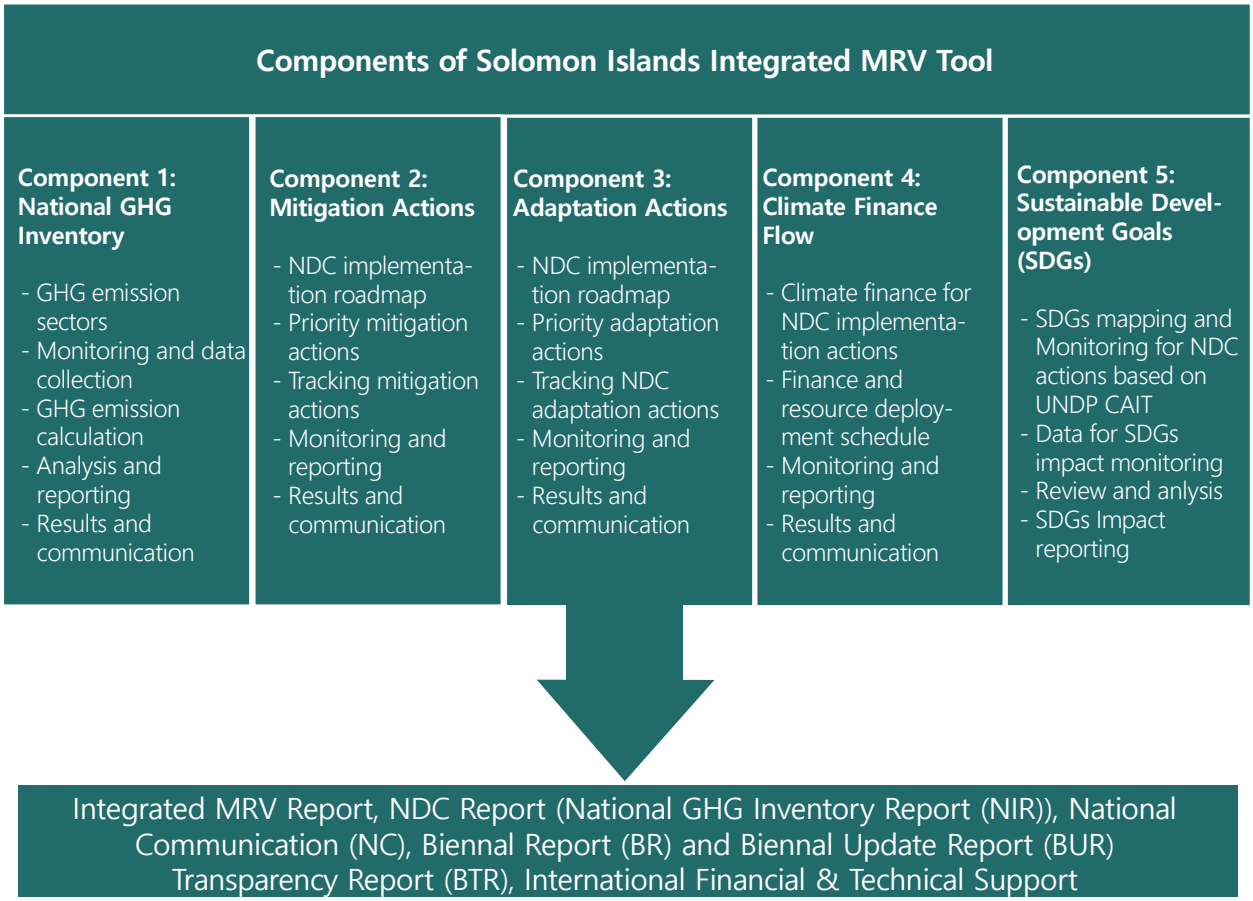

Figure 48: Components of Solomon Islands integrated MRV tool

5.3. Integrated MRV Tool – Operational and Institutional Structure

The Operational structure of the integrated MRV Tool is presented in the Figure below:

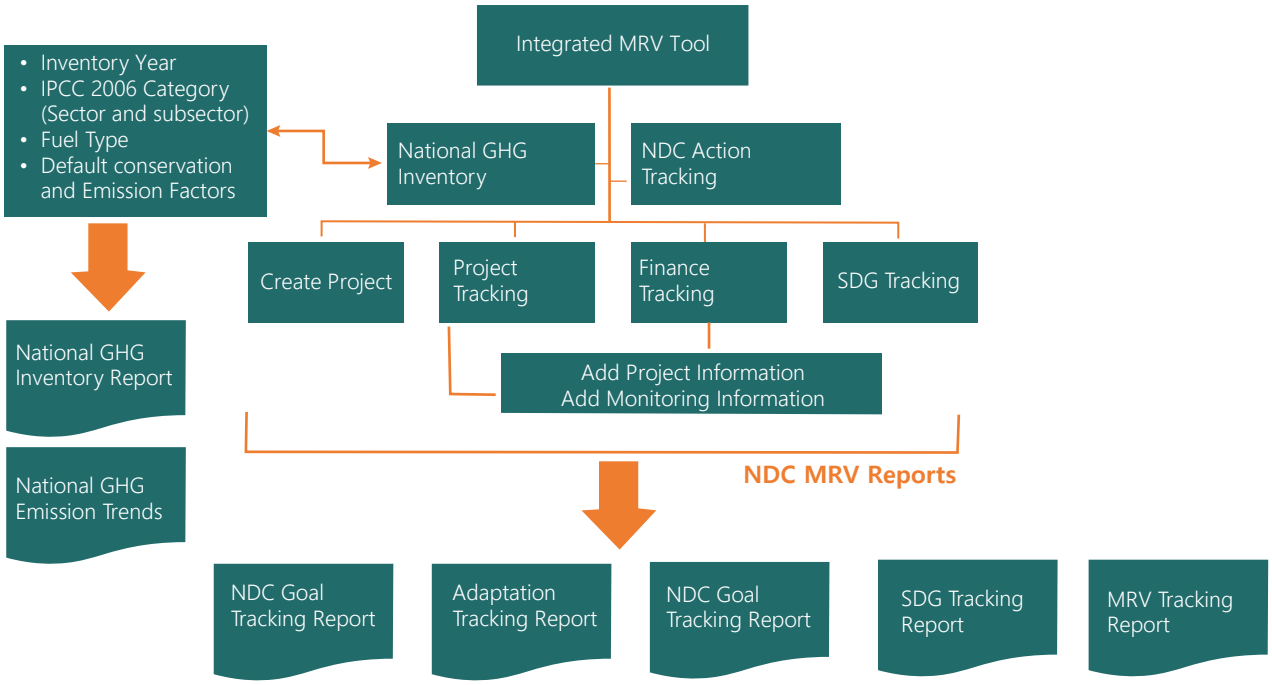

Figure 49: Solomon Islands iMRV Tool operational and institutional structure

The integrated MRV framework rollout strategy had four key components:

- Data measurement, monitoring and reporting, including interactive IT and enabled data collection templates for activity level and sectoral data;
- Institutional collaboration: building on existing data collection and data-sharing network, well-defined key roles and functions;
- Analysis, reporting and communication: data processing, analysis and review; report generation; communication; online public access database and archiving; and,
- Support infrastructure: IT hardware and software (implementation and operations and maintenance support); continuous training; and capacity building.

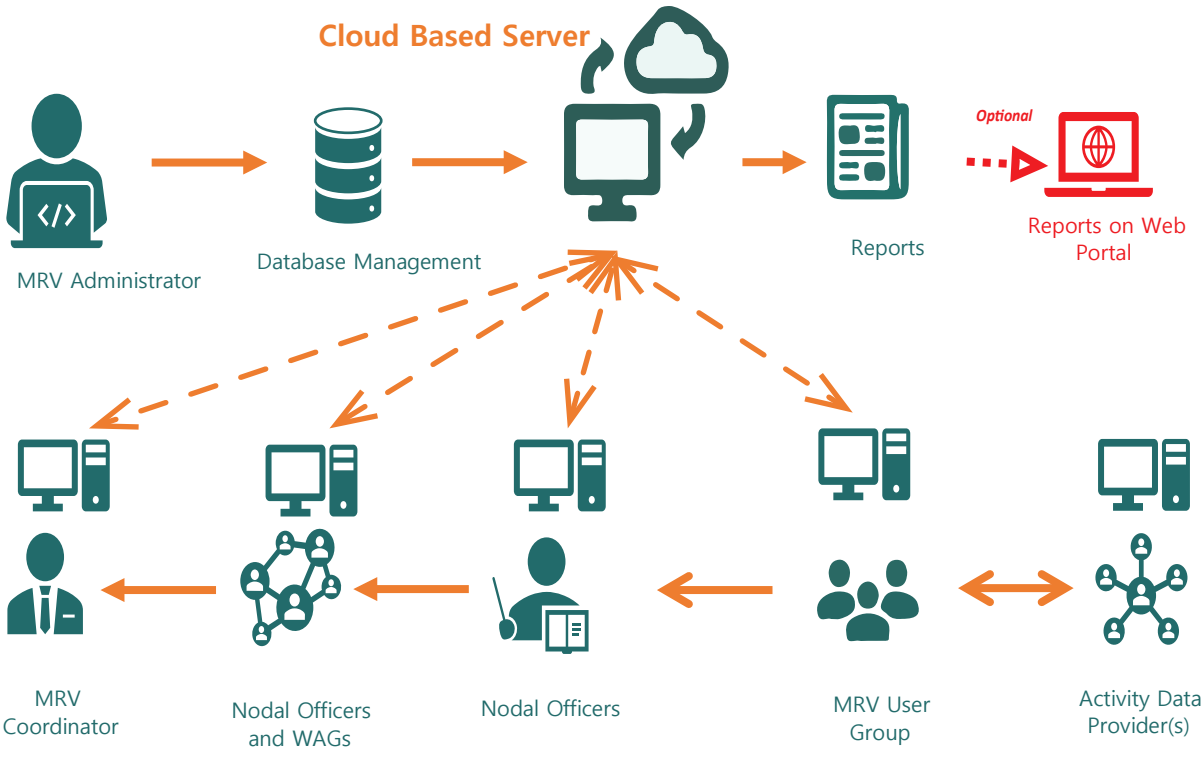

Figure 50: Solomon Islands MRV Tool Operational Structure

5.4. Integrated MRV Tool – Institutional Structure

Solomon Island's integrated MRV tool is a web-based digital MRV tool, deployed on a cloud server (final version uploaded on AWS cloud; however, CCD will decide final deployment on the SIG server). The users of integrated MRV Tool are the members of the CCD team (or any other relevant team (s) assigned by CCD for preparation of national GHG inventories, NDC Actions/Mitigation/Adaptation Monitoring, Climate Finance/Support monitoring and SDG Tracking.

In the Solomon Islands, the MECDM is responsible for sustainable environmental management, climate change adaptation and mitigation, disaster risk management and meteorological services. The Climate Change Division (CCD) of the ministry, mandated for close monitoring on the extent to which Solomon Islands is vulnerable to the effects of climate change, play a leading role in mobilizing resources for adaptation and mitigation initiatives, conduct relevant and priority research and information dissemination activities, seek resources to support national programmes to mitigate the causes of climate change, and be the country's lead agency in addressing Solomon Islands' obligations as a Party to the UNFCCC.

The CCD's functions and responsibility includes but not limited to carry out country-wide (i) climate change awareness and advocacy all year round, (ii) vulnerability and risk assessments on current and future impacts, (iii) research on effective and appropriate adaptation and mitigation options, (iv) strengthen our climate and geospatial system that will serve as the baseline hub for necessary data and information, (v) identify and develop evidence-based priority adaptation and mitigation project concepts and programs (project pipeline), (vi) plan and implement various adaptation and mitigation projects,

(vi) coordinate sectoral ministries and other stakeholders who are implementing climate change activities and development of guiding policies and strategies to effectively address climate change at all governance levels and across all sectors, (vi) secure international technical and financial support towards climate change initiatives in the country, (vii) provide technical and policy advice for the government on climate change issues at national, regional and international levels, and (viii) ensure the country adheres to our international obligations under the UN Climate Change Convention and the Paris Agreement.

The CCD also responsible to collect the appropriate information needed for and to prepare the reporting for meeting obligations under the UNFCCC and PA/ETF. The CCD has the objective to establish a well-functioning MRV system following the guidance from the MRV Roadmap (2020) and does not currently have a comprehensive national MRV framework that is operationalized in the context of the ETF, nor the specific tools for information gathering and reporting to meet all the reporting obligations under the PA. The realization of the ETF requirements and experience from the Third National Communication (TNC) / Biennial Update Report (BUR) work has led to the decision by the Government to start the process for developing an Integrated MRV (iMRV) Tool that is tailor-made to the national circumstances and needs of the Solomon Islands.

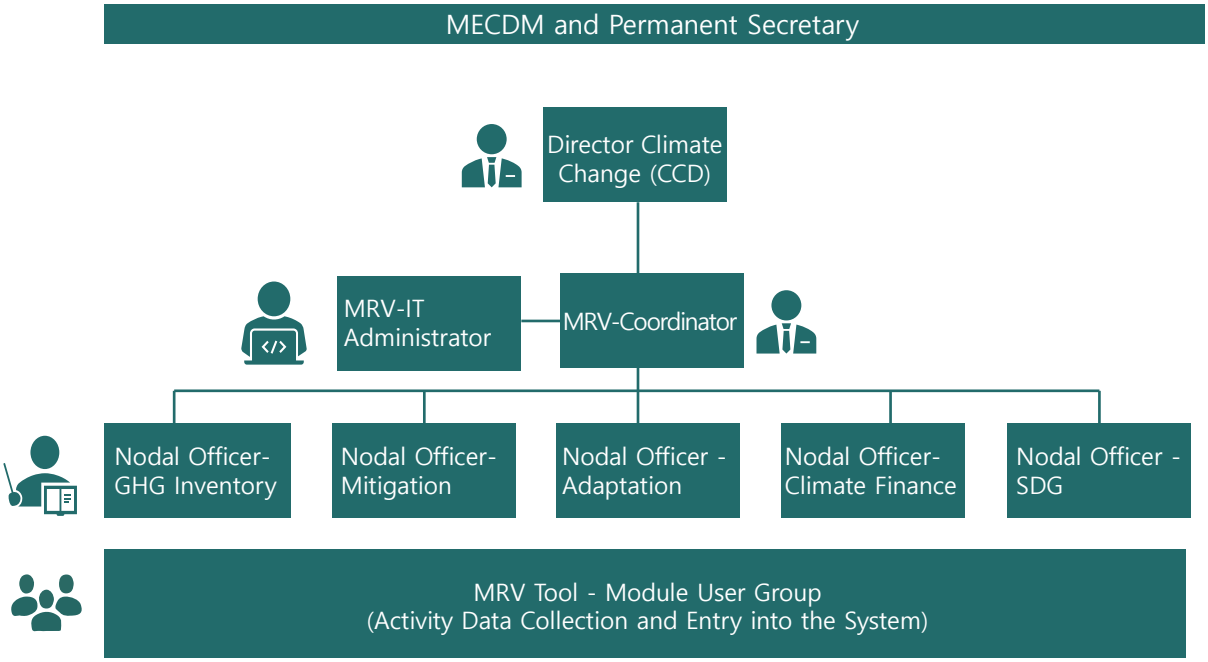

Figure 51: Overarching Institutional Structure for the Integrated MRV Tool

Roles and responsibility of key officials are presented here:

Director Climate Change Department: The Director climate change at CCD shall be heading the entire MRV system. The Director-CCD shall further update to the Permanent Secretary and line ministries on the implementation and progress of MRV System.

MRV Coordinator: The MRV coordinator shall have overall responsibility of integrated MRV Tool and MRV Reports. MRV Coordinator shall review the MRV System and MRV reports on periodic basis (quarterly, half yearly) or at least once in a year; shall also responsible for back-

stopping and capacity building.

MRV Administrator: Shall have overall responsibility of iMRV Tool implementation and functions. MRV Administrator will be a Master User with all privileges and rights; shall also Approve, edit and delete user registration and access, approve/edit emission factors, database etc. on recommendation of MRV Coordinator or Nodal Officer.

Nodal Officers: Shall have the right to Validate and Verity the entered activity data. Each Module shall have at least one Nodal Officer; designated by the MRV Coordinator. Nodal officer shall validate and verify the activity data entered in the iMRV tool i.e., approve or reject.

MRV Module and Sector User Group: Will have the right to enter/edit data in respective sector(s). Module or Sector User will be provided these rights by the MRV Administrator on recommendation of their Nodal Officer or MRV Coordinator.

Each user is assigned a role and different levels of the access rights, roles are not necessarily identical to a person's title (e.g., National Focal Point) and that a person can take on several roles.

User Registration: At first, each user needs to register with the MRV administration system. The process of registration will be a simple web-based process, where in user need to fill-in the registration form with personal details, roles and level of access required and submit for approval with the relevant authority.

The MRV-IT Administrator shall approve the user registration and on approval user can access the integrated MRV Tool using the internet connection on any device (work computer, home computer, laptop, tablet etc.).

The institutional structure for deployment of the integrated MRV tool has been developed in order to make the best use of the tool by the CCD; However, Director CCD and relevant government officials need to finalize and update the proposed institutional structure based on the available resources and in -house capacity. It is also recommended that the upcoming CBIT project, which is envisaged to establish a secretariat at the CCD involving a programme coordinator including support staff can be utilized for the implementation and sustainable management of the MRV system.

5.5. Sustainability of the Integrated MRV Tool

As noted, Solomon Island's integrated MRV tool is web-based tool and available on the Amazon Web Services (AWS-Cloud) and as a part of deliverable the integrated MRV Tool shall be handed over to CCD on their preferred server. Further the Integrated MRV Tool has 5 main modules those includes several components and sub-components. The efficient operation and usage of the requires sound understanding of various functionalities including data entry, report generation, user and database management etc.

However, in order to make it sustainable, there may be a need to provide on-going technical support to CCD and relevant stakeholders for at least 6-8 months after handing over the integrated MRV tool to CCD. The overall objective of this technical support would be to design and facilitate a comprehensive technical hand-holding, capacity building and training programme on the operation of the integrated MRV tool.

The support would involve:

The scope of the work under the assignment includes:

Hands-on class room type training and capacity building on the installation, operation and troubleshooting of the MRV tool for DoCC and DoE and other interested stakeholders. This includes:

- Designing the hands-on Training and Capac-

ity Building Programme

- Develop training material (manuals and exercises)
- Provide virtual training for CCD and other interested stakeholders
- Based on the training feedback update (including bug fix) the MRV Tool (if required)

Providing on-going technical support and remote hand-holding to CCD on the operational issues and glitches encountered during the initial usage of the MRV tool. This would include:

- Skype calls/email communication as and when requested by the CCD staff to provide operational and troubleshooting assistance

Calibration and certification workshop for CCD staff. This would include:

- Final fine tuning/updating of the MRV tool including bug fixing (if any) based on the user experience.
- Any other relevant services seek and agreed by CCD and Consultant during the engagement period.

5.6. Further Opportunities under the Enhanced Transparency Framework (ETF)

On implementation, the integrated MRV Tool shall fulfil most of the domestic and international climate action reporting requirements for Solomon Islands. However, there is a need in the future to develop and strengthen existing institutional structure, integration of public and private sector in implementation and improving the MRV system including extensive capacity building exercise to be carried out within the institutions and other stakeholders. Further, there is also opportunity to expand the scope of this integrated MRV Tool to include the Climate Change Mitigations Registry System or National Registry System. There is also scope to develop the domestic and regional registry system for the carbon market and emission trading (for all the mitigation sectors or any specific sector e.g., Waste, Renewable Energy, Energy Efficiency etc.

The Paris Climate Change Agreement, specifically Article 6, provides an opening for Parties to voluntarily cooperate in the implementation of their nationally determined contributions through the transfer of mitigation outcomes (MOS) i.e., Internationally Transferable Mitigation Outcomes (ITMOs).

The ITMOs will be essentially generated from climate change mitigation actions/projects implemented by the party and within or outside of the NDC; further, the NDCs will make a corresponding adjustment to prevent double counting, questions remain about how to treat ITMOs generated outside an NDC, which do not contribute to double counting. To encourage countries to reduce emissions from outside their NDCs while both safeguarding and raising climate ambition, the National Carbon Registry may play a key role. The design and implementation of a robust and 'future-proof' National Carbon Registry will have multiple potential benefits and mitigate risks of double counting and environmental integrity.

The integrated MRV Tool opens-up an opportunity to link domestic mitigation systems or mechanisms and the National Monitoring Reporting and Verification (MRV) to provide a supporting framework for the design, piloting, and scaling-up of market-based mechanisms. The outcome of the work will ultimately help the host country to develop and launch a system and software to record national GHG emission and emission reduction from mitigation action data (ITMOs) and potentially allow inter-linking among various (international) market-based mechanisms while avoiding double counting and enhancing environmental integrity.

The National Carbon Registry System involve large legal and financial interests. Trust in the accuracy and integrity of the reported data is therefore a prerequisite for a well-functioning registry system. To ensure accuracy and integrity of data a robust monitoring, reporting and verification (MRV) system is essential. Verification is essential to enhance trust in a carbon registry system. Where systems have large financial implications, participation is voluntary or international exchange of units is planned, this trust is paramount for successful implementation.

Figure 52: MRV System-Extension Opportunities

The National Carbon Registry System requires a comprehensive assessment of legal, regulatory, financial and institutional arrangements and is envisaged to complement the socio-economic and development goals of the host country. The initial assessment requires to carry out system assessment and design of a national carbon registry system through the development of its functional and technical specifications in the context of supporting and facilitating a set of existing policies and instruments for greenhouse gas (GHG) mitigation and GHG reductions in the host country.

The National Carbon Registry System is to be designed to serve dual purposes of data management and transaction registry. Thus, the national carbon registry will have two components:

1. Data Management System: which implies that it will collect, control, process, and analyze bottom-up data from national MRV (GHG inventory and mitigation actions) and regulatory sources. This would mean that the national carbon registry will control and consolidate the major chunk of GHG emissions data from all the sectors under national MRV. Therefore, this can be linked with a National Monitoring Reporting and Verification System (MRV) and enhance the transparency of the emissions data being reported under the domestic and international reporting requirements under PA.
2. Registry for Transactions, Transfer, and Cancellations: which implies that the national carbon registry will host and link infrastructure of the market-based instruments (existing or upcoming for both domestic and international) by providing relevant details on registries and thus making inter-linking possible.

As next step, Government of Solomon Island may consider developing the national or sectoral registry system to track and transfer the mitigation credits generated with in the country and eligible to transfer to other national or international registry system.

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ANNEX

Annex 1: Proposals with Project ideas (Potential Proposal for GCF-3 period (2028 to 2031))

SN	Project name	Type of GCF proposal	Project Preparatory Facility (PPF) required	Baseline	Estimated GCF Financing (USD M)	Potential Accredited entity	Financial instrument
1	Community-based Sustainable Forest Management in the Solomon Islands for Resilience to climate change	Mitigation	PPF	Concept Note being developed	50	FAO	Grant
2	Solomon Islands Water Sector Resilience Programme (Urban Water and Sanitation Project)	Adaptation	N/A	Project Proposal Feasibility studies completed by CTCN.	15	WB/ADB with Solomon Water Ltd	Grant
3	National Referral Hospital Resilience investment –costal protection.	Adaptation	PPF	Concept note under development.	130	WB	Grant Concessional Loan
4	Safe Homes for Atoll Artificial Island and coastal Communities	Adaptation	PPF	Draft concept note developed by CFAN Recommended for multiple locations.	60	SPREP	Grant
5	Promotion of energy efficient appliances, lighting, and equipment in Solomon Islands	Mitigation	N/A	GCF CN to be developed UNEP	20	SPC	Grant
6	Climate smart agriculture (cocoa, coconut-commercial crops).	Adaptation	N/A	GCF CN to be developed UNEP	30	FAO	Grant
7	KFPL Biomass power plant.	Mitigation	N/A	Prefeasibility study developed by KFPL. GCF CN to be developed.	80	ADB	Grant
8	Sponge City- Honiara and provincial towns	Adaptation	N/A	GCF CN to be developed UNEP	100	ADB	Grant
9	Solomon Islands National Forest Regeneration, Rehabilitation and Protection.	Adaptation	N/A	GCF CN to be developed UNEP	50	JICA to work with KFPL	Grant
10	Water security and renewable energy for rural education and health sector.	Adaptation	N/A	GCF CN to be developed UNEP	50	SPREP ADB	Grant
11	Buala and Gozoruru Resilient Township and Coastal protection for Fera Airport.	Adaptation	N/A	Feasibility study and Masterplan completed for Buala Township Coastal Protection. Other to be developed by CTCN.	80	UNEP	Grant
12	Lata and Graciosa Bay Coastal Protection	Adaptation	N/A	Feasibility study to be developed.	70	JICA	Under SICAP (for 2026 -2027)
13	Choiseul Bay and Taro Township coastal enhancement and infrastructure climate proofing	Adaptation	PPF	GCF CN to be developed.	60	SPREP with ADB or WB	Grant Loan
14	Climate Smart Waste Management for Provincial Townships.	Adaptation	N/A	Feasibility study to be developed.	30	JICA/SPREP	Grant
15	Renewable Energy- Transport sector –Electronic Out-boat Motor	Mitigation	N/A	Feasibility study to be developed.	30	World Bank ADB	Grant
16	Sustainable Forest Management	Mitigation	N/A	Feasibility study to be developed.	30	JICA/SPC	Grant
17	Electric vehicle availability.	Mitigation	N/A	Feasibility study.	30	UNEP	Grant
18	Renewable energy.	Mitigation	N/A	Feasibility study to be developed.	30	ADB/WB	Grant
19	Agriculture –e.g., focus on resilient crops / coconut.	Adaptation	N/A	Feasibility study to be developed.	30	ADB/FAO	Grant
20	Tourism –kind of fund business continuity scheme.	Adaptation	N/A	GCF CN to be developed.	30	WB	Grant
21	Payment of environment/ ecosystem services	Adaptation	N/A	GCF CN to be developed.	30	UNDP	Grant
22	Solomon Islands Coastal Infrastructure for protection from sea level rise.	Adaptation	N/A	GCF CN to be developed.	30	SPC	Grant
23	Climate-resilient office buildings –coastal protection.	Adaptation	N/A	GCF CN to be developed.	30	SPC	Grant
24	Climate smart farming (aquaculture).	Adaptation	N/A	GCF CN to be developed.	30	FAO	Grant
25	Resilient tuna industry development	Adaptation	N/A	GCF CN to be developed.	30	FAO	Grant