First Biennial Update Report

SAMOA 2023

Government of Samoa

UNDP

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First Biennial Update Report Samoa 2023

Submitted by Government of Samoa

Government of Samoa

FOREWORD

As a Small Island Developing State (SIDS), Samoa shares with other SIDS the characteristics of being economically vulnerable and ecologically fragile because of its geographical location, isolation, limited resources and exposure to global economic crisis. Climate change impacts are an added imposition on the inherent challenges Samoa already faces as a SIDS to achieve its sustainable development goals.

The Pacific Island leaders recognize that climate change represents the single greatest threat to the livelihoods, security and wellbeing of the peoples of the Pacific

The Government of Samoa has made significant progress in its effort to address climate change since signing the United Nations Framework Convention on Climate Change(UNFCCC) in June 12, 1992, and ratified in November 29, 1994 and the Kyoto Protocol signed in 1998 and ratified in 2000. Samoa also signed and ratified the Paris Agreement in 2015. Samoa submitted its Initial National Communication (INC) in October 1999 and Second National Communication (SNC) in June 2010. With this, I am pleased to present Samoa's First Biennial Update Report and share the steps Samoa has taken to implement the United Nations Framework Convention on Climate Change.

Samoa's GHG emissions are negligible compared to the rest of the world. Nonetheless, Samoa is committed to playing its part to reducing the greenhouse gas emissions that arecausing global warming. The Climate Change Policy 2020 – 2030 is Samoa's national framework to coordinate and enhance the country's response to the impacts of climate change whilst pursuing national sustainable development goals in line with regional and international obligations.

Samoa's First Biennial Update Report (BUR) highlights the efforts we are making to reduce our emissions and to identify and implement mitigation options that reduce climate risksparallel to ongoing efforts to strengthen Samoa's capacity to manage climate risks by increasing awareness, enhancing knowledge and skills, strengthening institutions, and preparing and implementing policies and plans.

I acknowledge with appreciation the support from our development partners, the Global Environment Facility, and the United Nations Development Programme for their ongoing support to the Ministry and key stakeholders engaged through a highly consultative process.

Lastly, I want to thank everyone that have worked tirelessly to prepare this report, representatives from government ministries, private sector, NGOs, civil society, Universities and Research Institutions and our communities. We could not have done this without your collaboration and support.

Fa'afetai lava. God Bless.

Hon. Toesulusulu Cedric Pose Salesa Schuster
Minister for Ministry of Natural Resources and Environment

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Acronyms

ACDMD	Aid Coordination and Debt Management Division
AFOLU	Agriculture, Forestry and Other Land Use
AGO	Automotive Gasoline
ASP	Agriculture Sector Plan
BUR	Biennial Update Report
CC	Climate Change
CCD	Climate Change Division
CCGEF	Climate Change and Global Environment Facility
CDC	Cabinet Development Committee
CH4	Methane
CO2	Carbon dioxide
CoP	Conference of Parties
CRICD	Climate Resilience Investment and Coordination Division
DMO	Disaster Management Office
DOC	Degradable Organic Carbon
DPK	Dual Purpose Kerosene
EF	Emission Factor
EPC	Electric Power Corporation
FBUR	First Biennial Update Report
FCR	N in Crop Residues (both above and below ground)
FOD	First Order Decay
FON	Organic N Fertilisers
FPRP	N deposited on Pasture, Range and Paddock by grazing animals in the form of urine and dung
FSN	Synthetic N Fertilizers
FSOM	N mineralization associated with loss of soil organic matter
GCF	Green Climate Fund
GDP	Gross domestic product
GEF	Global Environment Facility
GHG	Greenhouse gases
GoS	Government of Samoa
GWP	Global Warming Potential
HFCs	Hydrofluorocarbons
IPCC	Intergovernmental Panel on Climate Change
IPPU	Industrial Processes and Product Use
IRD	International Relations Division
LEDS	Low Emission Development Strategy
LTO	Landing and Take-Off
MCF	Methane Correction Factor
MFAT	Ministry of Foreign Affairs and Trade
MLD	Minimal Liquid Discharge
MNRE	Ministry of Natural Resources and Environment
MOF	Ministry of Finance
MPMC	Ministry of Prime Minister & Cabinet
MPPC	Ministry of Police, Prisons and Corrections (MPPC)
MRV	Monitoring, Reporting and Verification
MSW	Municipal Solid Waste
MWTI	Ministry of Works, Transport & Infrastructure
N2O	Nitrous Oxide
NAMA	National Appropriate Mitigation Actions Plan
NCCC	National Climate Change Council
NCD	Non-communicable diseases
NDC	Nationally Determined Contributions
NECC	National Energy Coordination Committee
NF3	Nitrogen Trifluoride
NGGAS	National Greenhouse Gas Abatement Strategy
NMVOC	Non-Methane Volatile Organic Compounds

Acronyms

NWMS	**National Waste Management Strategy**
ODS	**Ozone Depleting Substances**
PDS	**Pathway for the Development of Samoa**
PFC	**Perfluorocarbons**
SDG	**Sustainable Development Goal**
SESP	**Samoa's Energy Sector Plan**
SF6	**Sulfur Hexafluoride**
SIDS	**Small Islands Developing States**
SNC	**Second National Communications**
SOS	**Samoa Ocean Strategy**
SPA	**Samoa Ports Authority**
SPCZ	**South Pacific Convergence Zone**
STA	**Samoa Tourism Authority**
tCO2e	**Tons of CO2 equivalent**
TNA	**Technology Needs Assessment**
TNC	**Third National Communication**
TPY	**Tons per year**
ULP	**Unleaded Petrol**
UNDP	**United Nations Development Programme**
UNFCCC	**United Nations Framework Convention on Climate Change**
WHO	**World Health Organisation**

Samoa, as a non-Annex I Party to the UNFCCC, is mandated by paragraph 41 (f) of Decision 2/CP.17 to submit its BUR every two years. Samoa's First Biennial Update report (FBUR) presents the national circumstances (chapter 1); the institutional arrangements related to MRV (chapter 2); the national greenhouse gas inventory (chapter 3); the mitigation actions (chapter 4); the finance, technology and capacity building needs and support Received (chapter 5); and lastly it details some additional observations (chapter 6).

ES.1. National Circumstances

The Independent State of Samoa is a volcanic archipelago in the heart of south pacific the Central South Pacific lies between 13ºS–14ºS and 170ºW–173ºW latitudes 13 degrees and 14 degrees south and longitudes 170 degrees and 173 degrees west. The total land area is 2,830 sq. km. It has the smallest Exclusive Economic Zone in the Pacific of approximately 98,500 sq. km. The following table presents a summary of Samoa's key geographic and socio-economic indicators

Table ES- 1: Summary of Samoa's key geographic and socio-economic indicators

BACKGROUND INFORMATION	
Country	**Samoa**
SIDS/LDC Country Status	*Yes*
Location	*13°50′00″S 171°45′44″W*
Capital	*Apia*
Area	*2,830 sq. km*
Exclusive Economic Zone (EEZ)	*98,500 sq. km*
Mean annual temperature	*24°C to 32°C*
Population (2021)	*2,05,557*
Ratio	*49:51 (Female: Male)*
Population <15 ***15-64*** ***65+***	*79,079* *1,14,929* *11,373*
Real GDP	*$475.7 million (December 2021 quarter)*
Currency	*Tālā (Symbol SAT, ST, T, WS$)*
Language	*Samoan, English*

The climate in Samoa is typically tropical and is characterised by high rainfall and humidity, near-uniform temperatures throughout the year, winds dominated by the south-easterly trade winds. Samoa experiences two distinct seasons: The "Hot and Wet" season, from November to April and the "Cool and Dry" season, from May to October. The El Niño Southern Oscillation (ENSO) brings lower than average rainfall for Samoa and is associated with droughts and forest fires.

Samoa has experienced an increase in population by 4.9% during last 5 years (2016-2021). Samoa's population in 2021 was 205,557 showing an increase of 9,578 from 195,979 in 2016 census. About 78% of the total population resides on the island of Upolu and 22% in Savaii.

The real Gross domestic product (GDP) for December 2021 quarter amounted to $475.7 million, declining by 3.2% compared to the December 2020 quarter. On a twelve-month basis, GDP at constant prices recorded a decline of 2.3%, registering at $1,942.67 million.

The energy sector is very important to Samoa and is accounting for 46% of the national total GHG emissions (in CO2 equivalents) in 2020. During the development of the new Pathway for Development of Samoa (PDS), Samoa's first NDC target was reviewed and changed to its goal of 70% RE use by the end of 2031. Further, the transport sub-sector remained the highest GHG emission contributing sector in 2020.

Samoa's transport sector includes all modes of transport via air, sea, and land. Samoa has a good transport infrastructure with an extensive network of roads, a high road density in inhabited areas and strategically located ports and airports throughout the country. There are five port in Samoa: Apia- main port of entry for international

trade and sea travel. There are four airports in the country: Faleolo International Airport (the main port of entry for air travel and freight); Fagalii Airport (used mainly for international flights and freight to American Samoa and some domestic flights); Asau Airport; and Maota Airport.

In Samoa, there are 2 approved landfills namely, Tafaigata Landfill and Vaiaata Landfill. The landfill sites are owned and managed by the government, but the daily operations of waste treatment, storage, and disposal are contracted to private companies. E-waste is considered a significant problem in Samoa and their quantities are rapidly increasing due to changes in technology, more affordable consumer electronics, and better access to electricity. The Samoa Water Authority (SWA) is the main water service provider in Samoa. It also collects, treat and dispose of wastewater within designated areas of the CBD in Upolu. The Septic tanks are still the main domestic wastewater disposal systems in use in Samoa followed by pit latrines.

The agriculture sector remains at the forefront of economic growth in Samoa and is key to ensuring food security, income generation and enhanced export capacity. Crop production plays a significant role in terms of food security and income both in local and export markets. Fisheries play a vital role in the livelihoods of most Samoans, as it is the main source of food and income for fishing communities. Samoa's commercial fishery, mostly of the tuna long line fishery, accounted for over 90 percent of Samoa's fish export by volume and value.

Tourism is an important contributor to the Samoan economy providing livelihood to many local businesses in the accommodation, catering and transportation sub-sectors, providing opportunities through its knock-off effects in the tourism value chain, such as handicrafts, agricultural production, communication services, and etcetera. The tourism sector has definitely grown over the past 5 years, but not without challenges. Samoa was also an "early adopter" of the Global Sustainable Tourism Council criteria (global baseline standards for sustainability in travel and tourism) in 2014.

Samoa has the highest life expectancy, and one of the lowest infant, and under five, mortality rates in the Pacific. Samoa has two main hospitals (one in Apia and another on Savaii Island) and 11 rural health facilities comprising 6 rural district hospitals and 5 community health centers. Samoa continues to face an increasing burden of non-communicable diseases (NCD) alongside an unfinished agenda of reducing communicable diseases and expanding public health. NCDs account for over 80% of all deaths and more than half the premature deaths in Samoa. Samoa also has Climate Adaptation Strategy for Health (CASH) which provides a strategic framework to strengthen the resilience of the health sector, to improve the capacity of the health sector, risk management and response to disasters and climate change.

Samoa is home to 991 species of marine fishes and is regarded as one of the richest marine fish fauna in the world. Samoa has the second largest native vascular flora in Polynesia after the Hawaiian Islands. In the agricultural ecosystem, the main cultivated crops are taro, bananas, breadfruits, yams, cacao and coconuts. In terms of faunal diversity, there are 13 species of terrestrial mammals, 44 species of land birds, 21 seabirds, 15 reptiles, 59 species of insects, 64 species of land snails and 28 species of butterflies. In terms of freshwater biodiversity, which remains relatively unknown, 30 species of fish and 17 species of macro-crustaceans have been reported.

Climate change is being mainstreamed into Samoa's National Development Plans. Samoa Climate Change Policy 2020 is a national policy with a cross-sectoral approach. The Government of Samoa (GoS) has introduced the first Pathway for the Development of Samoa (PDS) for the period, FY2021/22 – FY2025/26. Samoa 2040 has set Samoa's agenda for economic growth and development over the next 20 years. Samoa 2040 complements the Strategy for the Development of Samoa (SDS). The Government of Samoa has adopted a Low Emissions Development Strategy (LEDS) for the period 2020-2030 to promote low carbon development pathways with a target of 70% Renewable Energy use by the end of 2031.

Samoa currently has a Climate Change Policy that deals with mitigation issues, a Climate Change Bill is formulated to include all elements of Climate change in order to have a Framework in place for coordination of climate change initiatives. The draft Climate Change bill (Climate Change Management Act 2021) is to establish the Ministry of Climate Change and Resilience, and to enable Samoa to effectively respond to climate change adaptation and mitigation and meet its obligations under the United Nations Framework Convention on Climate Change and for related purposes.

ES.2. Institutional Arrangements Related to MRV

The current institutional framework governing the climate change management in Samoa is the Ministry of Natural Resources and Environment (MNRE) through the Division of Climate Change. MNRE is the ministry responsible for developing the key policy and planning documents that guide climate change programmes in Samoa. It is also the agency responsible for the overall oversight of the implementation of Samoa's adaptation and mitigation activities. Implementation is carried out by relevant ministries. The primary divisions dealing with climate change matters and implementation of activities are the Climate Change and Global Environment Facility (GEF), Disaster Management Office, and the Renewable Energy Division.

The Ministry of Foreign Affairs is the political and national focal point while the MNRE is the technical focal point to the United Nations Framework Convention on Climate Change (UNFCCC). Development, coordination, and implementation of the climate change policy is managed primarily through MNRE- Climate Change Division (CCD) which has the responsibility for overall coordination of the climate change program.

The domestic MRV system in Samoa is not yet formalized. The results, assessment of current institutional arrangement, capacity of the national institutions, stakeholders, experts and lesson learned during the development of First Biennial Update Report (BUR) and Third National Communication (TNC) will be used for development of a robust MRV system for Samoa. The First Biennial Update Report (BUR) and the Third National Communications (TNC) is being implemented by the Ministry of Natural Resources and Environment (MNRE) working closely with the United Nations Development Programme (UNDP) as its executing partner under the GEF. FBUR is being managed under its Climate Change and GEF Division.

An MRV for national GHG inventory is not yet formalized. The Climate Change Division (CCD) under the MNRE through their role as the national focal point of GEF coordinates the GHG Inventory development. MNRE with support from consultant is developing software-based database for the national GHG inventory. The CCD bears the responsibility of reviewing this data and prepare a climate change report card viz submitted to the cabinet development committee.

The coordination of the MRV for mitigation is linked to the coordination of the MRV of the GHG Inventory. Samoa has also developed a transport sector Nationally Appropriate Mitigation Actions (NAMAs) whose primary targets are piloting electric taxis and buses and biodiesel use in diesel vehicle. Implementation of the NAMA will be led by the Ministry of Natural Resources and Environment (MNRE) as the NAMA Coordinating Authority (NCA). The National Energy Coordination Committee (NECC) will act as National NAMA Approver and Focal Point (NA) and Focal Point to the UNFCCC. The role of NAMA Implementing Entity (NIE) will be taken by the Energy Policy and Coordination division, Ministry of Finance will take up the role of NIE in association with LTA and MWTI. The main responsibility of the MRV system lies with the NAMA implementing agency i.e., the NIE. The database and the compliance system will be set up by the NIE. The NIE may however delegate some of the tasks to the organizations operating the intervention, i.e., the NAMA Executing Entities (NEEs).

Currently, the MoF maintains an internal database of funding secured and expenditures incurred. The country does receive significant investment from donors such as the Green Climate Fund (GCF), the Adaptation Fund, and the Global Environment Facility (GEF), and including multilateral and bilateral funding sources. However, there is no national database or platform which supplies information related to climate support funding.

The MRV for support needed and support received is not yet formalized in Samoa. MoF has the responsibility to collect this information from various sectoral plan, review reports, annual reports and archive this information. Based on the results and learning from the preparation of the First BUR and TNC, Samoa will explore building an MRV for national GHG inventory, mitigation and finance that builds upon the current as well previous national GHG inventories and database that collects relevant information, existing sectoral and local data monitoring and collection systems, existing institutional network and improved upon the system with integrating new tools (IT enabled), SOPs, capacity building and training, and international best practices to meet the unique requirement and circumstances of Samoa.

ES.3. National Greenhouse Gas Inventory

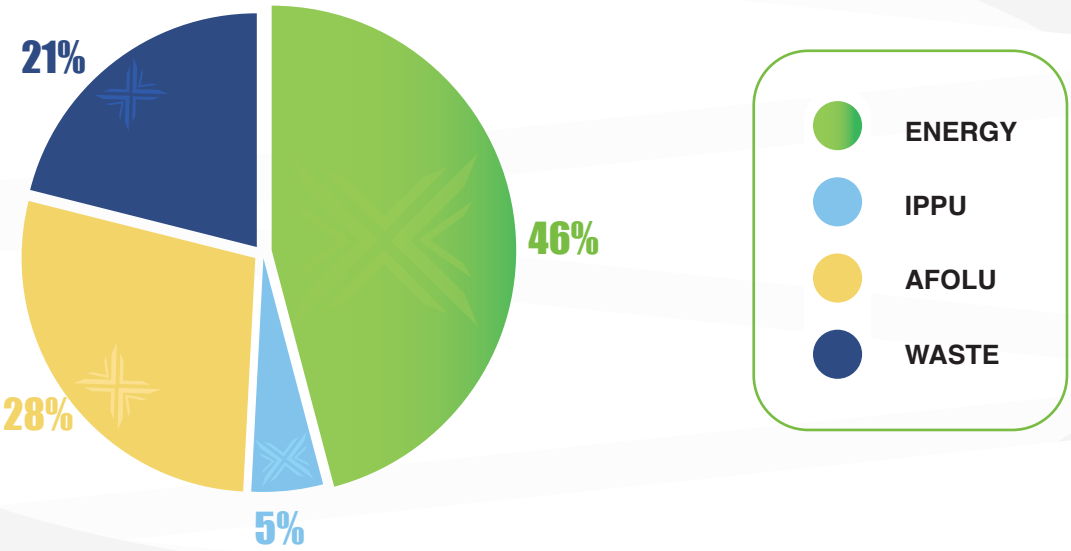
In 2020 Samoa's GHG emissions totalled approximately 496,332 tons of CO2 equivalents (tCO2e). The GHG inventory also estimated CO2 removals in forests, which totalled -850,568 tons in 2020. A summary of GHG emissions excluding removals from Samoa for the year 2021 is presented in Table ES-2 and shown in Figure ES-1.

Table ES- 2:Samoa's Total GHG Emission-Sector wise (excluding removals) in 2020, Gg CO2e

SECTOR	tCO_2	CH_4 (tCO_2e)	N_2O (tCO_2e)	HFC(tCO_2e)	Total (tCO_2e)	Percentage
Energy	229395	268	507	NO	230170	46.37%
Afolu (Sources)	NE	125207	12556	NO	137763	27.76%
Waste	93	104436	NA	NA	104529	21.06%
Industrial Process and Product Use	251	NO	NO	23619	23870	4.81%
TOTAL					**496332**	**100.00%**

The energy sector is the main source of GHG emissions, accounting for 46% of the national total (Figure 3.1). This is followed by the Agriculture, Forestry and Other Land Use (AFOLU) sector, which accounts for 28% of emissions. Emissions from the Waste and Industrial Processes and Product Use (IPPU) sectors make up 21% and 5% of total CO2e emissions, respectively.

Figure ES- 1: Samoa's Total GHG Emission (excluding removals) in 2020, Gg CO2e



Carbon dioxide and methane were the most important GHG emitted in Samoa in 2020, accounting for 46% and 46% of total CO2e emissions respectively. HFC and Nitrous Oxide are the next two most significant gases, accounting for 5% and 3% respectively.

Emissions from various sub-sectors of Energy, AFOLU, waste and IPPU sectors are depicted in table ES-2. below. The Road transport sub-sector has the highest contribution to the total emissions in Samoa, accounting to about 27.37 percent followed by Emissions from Enteric Fermentation, accounting for about 14 percent emissions. The least contributing sub-sector is the lubricating greases from IPPU, accounting for about 0 percent followed by Waste incineration from the waste sector, accounting for 0.02 percent.

Table ES- 3: Samoa's Emissions from various sub-sectors in 2020

Subsector	Emissions in 2020 (tCO_2e)	Percentage in total Emissions
Road Transport	*135868*	*27.37%*
Enteric Fermentation	*73919*	*14.89%*
Energy Industries (Energy Generation)	*69553*	*14.01%*
Managed Waste Disposal Sites	*69183*	*13.94%*
Manure Management	*54797*	*11.04%*
Domestic Wastewater Treatment and Discharge	*35253*	*7.10%*
Product Uses as Substitutes or Ozone Depleting Substances	*23619*	*4.76%*
Manufacturing Industries and Construction	*19538*	*3.94%*
Direct N2O emissions from managed soils	*9048*	*1.82%*
Waterborne Navigation	*3276*	*0.66%*
Other Sectors (Fishing)	*1935*	*0.39%*
Lubricant Use	*251*	*0.05%*
Waste Incineration	*93*	*0.02%*
Paraffin Wax Use	*1*	*0.00%*

Total GHG emissions in Samoa grew by 23 percent between 2010 and 2020. Although emissions decreased by less than 4 percent between 2019 and 2020. Emission by source and year are also summarized in Table ES-4.

Table ES- 4: Time series of Sector wise GHG Emissions (2010-2020)

SECTOR/ YEAR	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Energy (tCO_2e)	181726	184151	178960	185590	192775	202087	225451	227130	221744	243732	230170
AFOLU (tCO_2e)	147494	154673	159548	165574	171601	177646	169666	161686	153691	145726	137763
Waste (tCO_2e)	73911	79041	83697	87801	91202	94398	97033	99106	101093	102858	104529
IPPU (tCO_2e)	313	333	163	191	0	104	226	136	128	203	24527

ES.4. Mitigation Action

In Samoa, the four main sectors involved in implementing the national mitigation priorities are the Energy, AFOLU, Waste and IPPU. Second NDC states that Samoa aims to reduce overall GHG emissions by 26 percent in 2030 compared to 2007 levels (or by 91 Gg CO2e compared to the new reference year once Samoa's GHG emissions inventory has been updated). The mitigation priorities in the 2nd NDC focused mainly on opportunities to reduce emissions in the energy sector (including electricity, land transport, maritime transport, and tourism), the waste sector, and the AFOLU sector. However, GHG reduction targets were not identified for IPPU sector as it represents a small fraction of Samoa's total emission and also due to the lack of available data on IPPU emissions. However, due to the deficiency of capacity within the sectors. These mitigation targets weren't be able to verify quantitatively in term of GHG reduction at the moment.

Planned Mitigation Initiatives

A number of activities have been planned, which are likely to reduce GHG emissions in Samoa. Details of these activities are provided below. It is important, however, to note that most of the planned activities remain heavily dependent on continued international support.

Renewable Energy

Table ES- 5:RE Planned Mitigation Initiatives/ Options

RE Sources	Planned Projects/ Activities/ Initiatives
Hydro	• *Rehabilitation of the Lalomauga Hydroplant* • *Replacement of alternator for the No. 2 generator at Taelefaga hydro plant* • *Fuluasou Dam Enforcement* • *Tiapapata new hydro plant* • *Vaipu hydro pump storage* • *Alaoa Multi-Purpose Dam Project*
Solar	• *2MW solar system and battery storage in Savaii*
Biomass Gasification Plant	• *The Ministry of Natural Resources and Environment (MNRE), Samoa, in association with STEC has commissioned a 750kW biomass gasification- based power generation facility during the year 2020. It is estimated that around 15 tonnes per day of biomass is needed to feed the gasifier. The plant supports matching the residual load remaining from a high share of solar energy; the biomass gasification option can be utilized in a very flexible form.*
Biogas Systems	• *New potential Biogas systems to be added to the existing systems promoting the conversion of waste to energy. Biogas systems in the pipeline include Saasaai, Faleula, Vaisala, Afolau (Mulifanua) and Papauta.*

Energy Efficiency

The right combination of energy efficiency such as a Smart Grid Infrastructure with clean generation is key to ensuring reliable access to support people's wellbeing. To continually increase developments in Samoa, advanced energy management and increased use of renewable energy resources are key areas to focus on.

Transportation Initiatives

The overarching target of the Samoa Transport sector NAMA is the promotion and adoption of clean, sustainable and efficient means of land transport interventions at which will help Samoa achieve "Environmentally Sustainable, Energy Efficient and Socially Responsible Transport Sector" as identified in the Transport Sector Plan 2013-2018. Although little progress has been made in this area, the sector is still optimistic to progress with the implementation of the NAMA in the forthcoming years.

The most viable identified transport sector GHG mitigations options in the short run and medium term for Samoa would be low carbon fuel replacement strategies of which using biofuels for diesel vehicles and electric vehicles to replace petrol vehicles have been considered as viable options. In the longer term, a more complete electrification of the urban public transport system was considered as well as capacity building and training programs to stress the environment effects of using fossil fuel powered transport.

AFOLU

Three initiatives are identified under the AFOLU sector.

i) Forestry – 3 million trees campaign and other priorities
ii) Expansion of Agroforestry
iii) Agro-tourism Park

Waste

The following are planned priorities to address some of the waste management issues;

i) Development of the Circular Waste Policy: MNRE in collaboration with the United Nations Development Programme will be developing a Circular Waste Policy
ii) Strengthening of enforcements on Open Burning and Banning of plastics through consistent awareness, notifications and fines.
iii) Composting of organic waste
iv) Waste to energy projects (biogas projects)
v) Institutional changes to take place to increase prioritization on Waste Management- the establishment of separate Waste Management Division under MNRE
vi) Development of relevant policies for better sanitation and wastewater management such as the review and update of the National Sanitation Policy and the development of the National Effluent Discharge Standards for Samoa.

IPPU

Key priorities planned include the following.

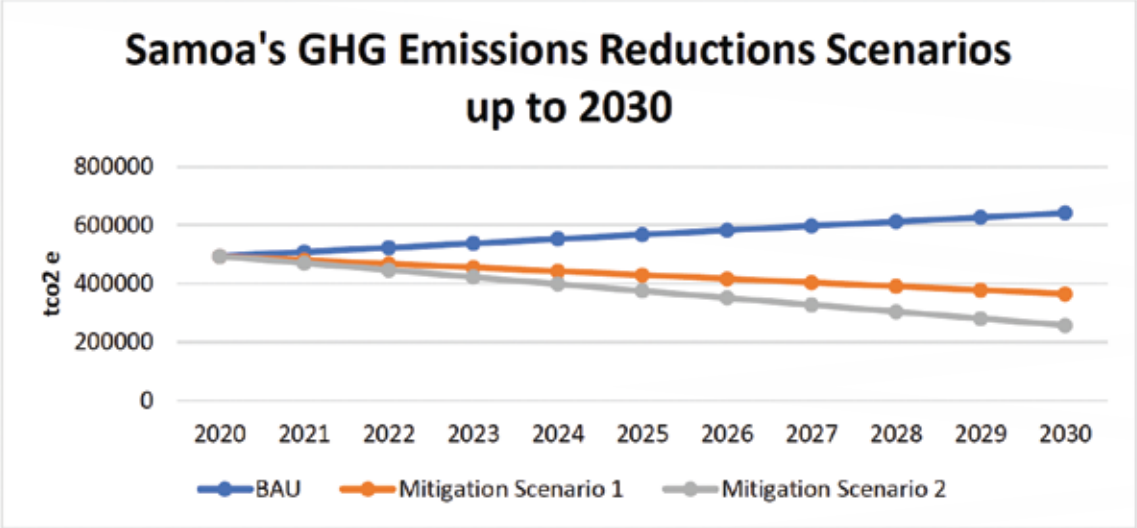
i) Review and update of the outdated regulations and development of new one as needed- Ozone Layer regulation 2006, development of a Refrigeration Management Regulations.
ii) National University of Samoa to undertake courses on the relevant ozone works and equipment involved.
iii) Increased investments in air quality monitoring.

The 2nd NDC Implementation Roadmap and Investment Plan 2021 has clearly identified a provisional list of key mitigation potential and opportunities for Samoa to assist with achievement of its 2nd NDC targets. Once implementation constraints are considered, these GHG mitigation opportunities have the potential to reduce GHG emissions by 802,124 tCO2 by 2030, with an annual mitigation potential of 122,151 tCO2e in 2030. These mitigation opportunities would reduce GHG emissions in Samoa in 2030 by 34 percent relative to 2007 levels.

GHG Emissions Scenarios- current and future trends

In consideration of the population increase and relevant demand, there is a projected increase of GHG emissions by 30% in 2030 for the Business- As-Usual scenario which make ups the Baseline Scenario. Given the current 2020 levels, projected reductions would double to approximately 48% reduction in GHG emission by 2030. However, in due considerations of the mitigation's constraints, the projected reductions to the GHG emissions of 26% will be applied to 2020 levels for Mitigation Scenario 1. This will be the same with Mitigation Scenario 2. However, realistically given the mitigation constraints and barriers to proposed options and opportunities, 48% will be applied to the 2020 levels for Mitigation Scenario 2.

Figure ES- 2: Samoa's Scenarios Trends up to 2030



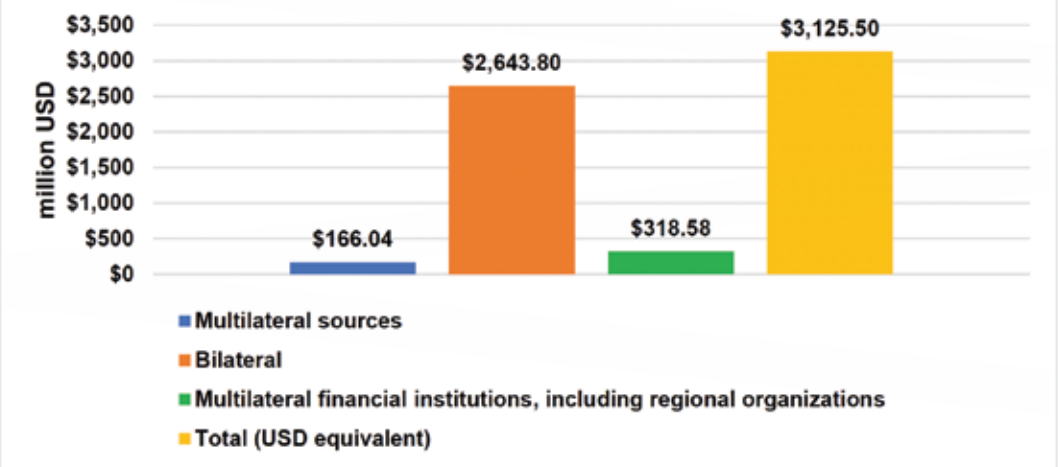
ES.5. Finance, Technology and Capacity Building Needs and Support Received

Samoa has not yet conducted Technology Needs Assessment (TNA) and capacity Needs Self-Assessment to inform its technology needs for enhanced climate change mitigation and adaptation actions. Apart from the financial constraints, to implement the interventions in the NDC, existing and pipeline projects requires building appropriate implementing capacity. The consideration to conduct a country needs assessment on Samoa's capacity and technology needs for climate actions, identifying gaps, capacity building and technology transfer will be important in bridging the gap between policy and implementation on the ground.

The estimated total cost to achieve climate adaptation and mitigation goals as well as social resilience spending needs totals about US$650 million over the years 2022–2026, or about 17% of GDP annually. On the basis of currently identified projects and sectoral plans, and with the majority of funding secured, the annualised cost of adaptation projects alone is approximately 11% of 2021 GDP. To achieve the SDGs for health and education, Samoa will also need to spend an additional 3% of GDP annually above current levels. Besides that, according to Samoa's second NDC, the investments required to meet its mitigation goals are estimated to be around 3% of GDP each year for the next five years, followed by around 1% of GDP each year from 2027 to 2030. Although funding sources for the NDC's mitigation goals have not yet been determined, but private sector investment may play a role.
The funding needs for Samoa's climate policy are significant and are unlikely to be met without additional donor support. Of the US$657 million in identified spending needs (US$306 million have committed funding from multilateral donors, mostly in the area of adaptation, and another US$100 million could be expected from bilateral donors, based on recent trends. This still leaves a funding gap worth US$250 million or roughly 6 percent of GDP per year if spread over the next five years.

Samoa has identified a list of pipeline projects which require finance support. It also indicates the investment requirement for meeting the costs of each of the pipeline projects and it is estimated at around USD 196.96 million. The GEF, GCF and UNDP are the main multilateral sources of financial assistance to Samoa. Further, Samoa has also received financial support from bilateral sources like Australia, New Zealand, EU, Japan, etc. Multilateral financial institutions, including regional development banks like ADB, World Bank, OPEC including some regional organizations have provided financial support to Samoa. The total financial support received to Samoa, from all sources during 2012-2022 totals to USD 3128.41 million. A summary of the financial support received to Samoa from various sources is provided in the figure ES-3 below during years 2012-2022.

Figure ES- 3: Climate-specific financial support received.



Technology support and capacity building is critical to achieving high climate ambition. As a result, Samoa 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. In a nutshell, Samoa has received some technology and capacity building support in the past but from the information collected it was found that the information on Technology and capacity building support received is not properly captured in the country and is not detailed enough in accordance with the guidelines of the convention. Thus, this is a key area for improvement and exhaustive work that meets what is required as minimum requirements by the convention, needs to be done with a view to being reported in the next reports.

ES.6. Additional Observations

A robust Monitoring (Measuring), Reporting and Verification (MRV) system is important for national policy decisions and is a key requirement under UNFCCC and the Paris Agreement. Further, under the PA commitments, Samoa will be subjected to participate in the enhanced transparency framework (ETF), which builds on the existing arrangements and shall require to communicate the National GHG Inventory, National Communications, Biennial transparency reports (BTR), Progress on NDC Implementation, Adaptation Communications and Reporting on Support (Provided/Received).

Under the Paris Agreement's reporting process, countries have the obligation to regularly report through a biennial transparency report (BTR) on

- National GHG inventories;
- Tracking progress: Information necessary to track progress made in implementing and achieving NDCs; and
- Support: Information on financial, technology-transfer, and capacity-building support needed and received (Voluntary for developing countries).
- Market mechanisms

Developing MRV systems is a process that will take many years, especially as the systems evolve in response to national circumstances and national needs. It is recommended that Samoa should aim at developing an Integrated MRV Tool based on Information and communications technology (ICT) designed specifically considering the requirement of Samoa, extensive desktop review of documents, followed by the stakeholder consultation and discussion with MNRE and MoF. The proposed integrated MRV tool shall provide an overarching structure, approach and methodology towards:

- National GHG emission monitoring and inventory;
- Basis for international and domestic reporting requirements (e.g., Notational Communications (NCs), Biannual Update Reports (BUR) 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;

1. National Circumstances

This chapter provides the overall context and a basis for understanding the information for the forthcoming chapters on the institutional structures for MRV, the GHG inventory, mitigation actions and support.

1.1. Geographic and climate profile

1.1.1. Geography

The Independent State of Samoa is a volcanic archipelago in the heart of south pacific the Central South Pacific lies between 13°S–14°S and 170°W–173°W latitudes 13 degrees and 14 degrees south and longitudes 170 degrees and 173 degrees west. The Samoa group is located 4,200 km south-east of Hawaii, 2,900 km from New Zealand and 4,300 km from Sydney, Australia. It consists of two main islands, Savaii and Upolu, with eight smaller islands Apolima, Manono, Fanuatapu, Namu'a, Nu'utele, Nu'ulua, Nu'ulopa, and Nu'usafe'e. The total land area is 2,830 sq. km. Savaii is the largest island (1,700 sq. km) and second largest island is Upolu with an area of 1,100 sq. km where the capital Apia is located. It has the smallest Exclusive Economic Zone in the Pacific of approximately 98,500 sq. km.

Samoa has a rugged and mountainous topography with the highest peak being Mt. Silisili on Savaii Island. On Upolu, the central mountain range runs along the length of the island with some peaks rising more than 1000 m above sea level. Savai'i has central volcanic peaks reaching 1860 m.

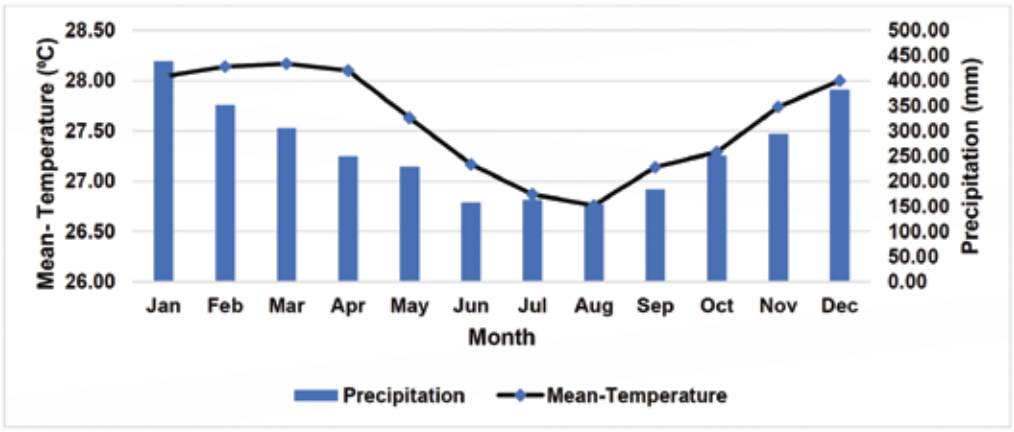
Figure 1.1: Map of Samoa[1]

[1] *Source: https://gisgeography.com/samoa-map/*

1.1.2. Climate

The climate in Samoa is typically tropical and is characterised by high rainfall and humidity, near-uniform temperatures throughout the year, winds dominated by the south-easterly trade winds. Samoa experiences two distinct seasons: The "Hot and Wet" season, from November to April and the "Cool and Dry" season, from May to October. Rainfall is greatly influenced by the position and strength of the South Pacific Convergence Zone (SPCZ), which lies between Samoa and Fiji during the wet season. The annual average rainfall in Samoa ranges from 3,000 to 6,000 millimeters, with the hot and wet season accounting for approximately 70 percent of annual rainfall.[2] Samoa's topography has a significant effect on rainfall distribution because of a predominant easterly wind and the mountain ranges determine the distribution of rainfall. The south to southeast regions of the main islands experiences more rainfall than the north to northwest regions. The El Niño Southern Oscillation (ENSO) brings lower than average rainfall for Samoa and is associated with droughts and forest fires. Whereas the La Niña brings above average rainfall, and is associated with flooding of low-lying areas, particularly in and around Apia. Seasonal temperature difference is very small in Samoa. The mean annual temperature ranges from 24ºC to 32ºC and generally remains constant during the entire year with little seasonal variation due to Samoa's near-equatorial location. It is observed that the highest mean temperature of 27.1°C occurs between December and March, while the lowest mean temperature of 26.0°C occurs between July and September.[3] Humidity is high, at around 80 percent or more.

Figure 1.2: Average monthly mean, max, min temperature and rainfall in Samoa, 1991–2020 [4]



Samoa is already experiencing increased inter-annual variability and significant positive trend in maximum temperatures over the last thirty years. The meteorological data of Samoa collected over the 101 years (1901-2001) indicates that the mean annual temperature has increased by 0.59°C and a decreasing trend in precipitation by 49.28 mm.[5] Moreover, positive trends are observed in both annual and seasonal mean air temperatures. The sea-level rise near Samoa measured by satellite altimeters since 1993 is about 4 mm per year which is slightly larger than the global average of 3.2 ± 0.4 mm per year. Further, Ocean acidification and costal erosion has also increased.

Table 1.1: Climate Parameters in Samoa

Climate Element:	Trend (1901-2001)
Country	*0.67 °C increase*
SIDS/LDC Country Status	*0.18 °C increase*
Location	*0.59 °C increase*
Capital	*49.28 mm decrease*

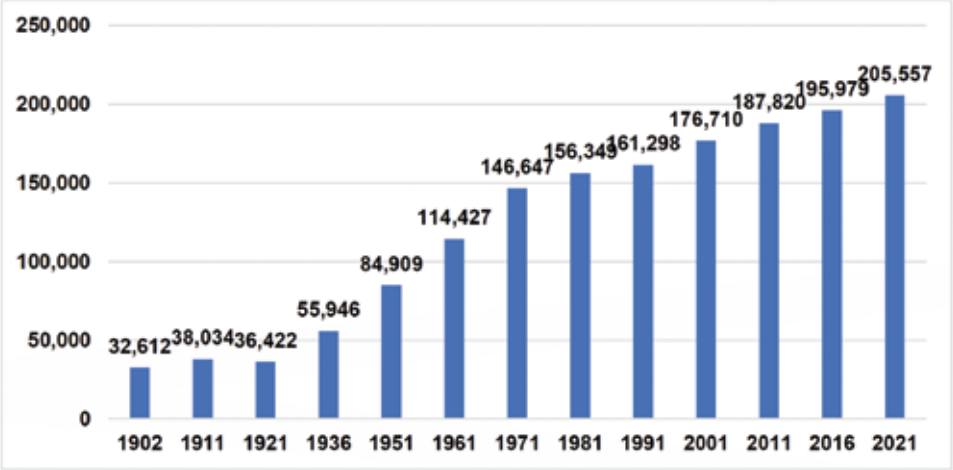
Alike other Small Islands Developing States (SIDS), Samoa also inherits high vulnerability to natural disasters tropical cyclones, prolonged periods of drought, extreme flooding, storm surges and sea level rise. Climate change and sea level rise poses a serious concern for the Samoan population livelihoods and puts strain on their capabilities to deal with extreme climatic events given that 70% of Samoa's population and infrastructure are located on low-lying coastal areas and productivity of primary industries such as agriculture and fishing.[6]

2 *http://www.samet.gov.ws/index.php/climate-of-samoahttps://ntbg.org/news/ntbg-completes-the-flora-of-samoa/*
3 *Climate Risk Country Profile: Samoa (2021): The World Bank Group. https://climateknowledgeportal.worldbank.org/sites/defaultfiles/country-profiles/15821-WB_Samoa%20Country%20Profile-WEB.pdf*
4 *WBG Climate Change Knowledge Portal (CCKP 2021). Samoa. https://climateknowledgeportal.worldbank.org/country/samoa*
5 *Climate Risk Country Profile: Samoa (2021): The World Bank Group. https://climateknowledgeportal.worldbank.org/sites/default/files/country-profiles/15821-WB_Samoa%20Country%20Profile-WEB.pdf*
6 *https://www.pacificclimatechangescience.org/wp-content/uploads/2013/06/11c_PCCSP_Poster_Samoa.pdf*

1.2. Population

Samoa has experienced an increase in population by 4.9% during last 5 years (2016-2021). This is well represented in Figure 1.3, which shows that Samoa's population in 2021 was 205,557 showing an increase of 9,578 from 195,979 in 2016 census. About 78% of the total population resides on the island of Upolu and 22% in Savaii. There is a continued growth and shift of population to Upolu compared to other islands. The growth on Upolu Island has been directed at North-West Upolu region (37%) and less on the central Apia Urban Area region (18%). Faleata1 is the most populated district (6%), but Falealupo is the least populated district (0.4%) among the 51 political districts.

Figure 1.3: Samoa's Population: 1902-2021

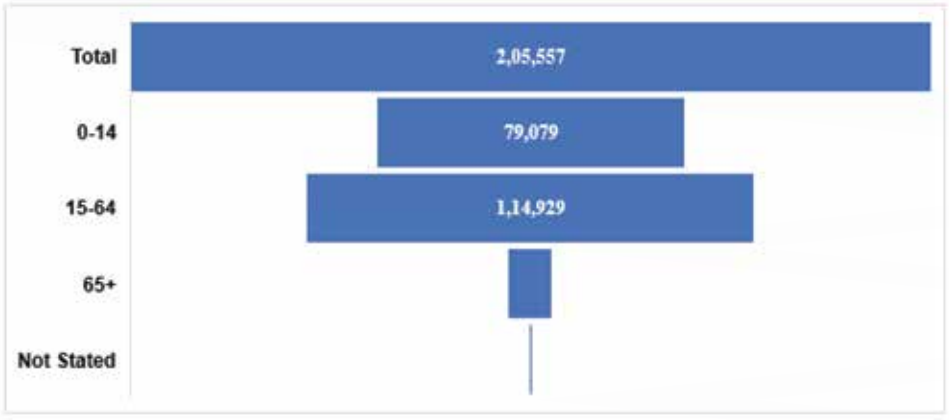


Samoa's population is experiencing a slower growth rate and it has been less than 1% since year 1971. Emigration has played a major role in slowing down the growth rate. The annual New Zealand quota of 1,100 people and the annual seasonal employment opportunities are some of the other major reasons causing outward migration. The impact of overseas migration on the growth of the population has been of major importance and has also had a profound influence on the social and economic structure of the country.

According to the Bureau of Statistics, the median or average age of the total population was 22 years reflecting a young and youthful Samoan population. As can be seen in figure 1.4, the proportion of young children (less than 15 years) is 38% (79,079) in 2021. While the age group 15-64 is 56% (114,929) and the oldest age-group of pensioners (65+) is 6% (11,373) in 2021. The youthful population indicated continuous demands for developments catering for the needs of the younger population such as education, health and employment opportunities.

Samoa is a male dominated country at birth and by total population. It is estimated about 49% of the total population is female and 51% is male. Women's are more engaged in domestic work and men's in subsistence work.

Figure 1.4: Samoa's Population by major age group, 2021



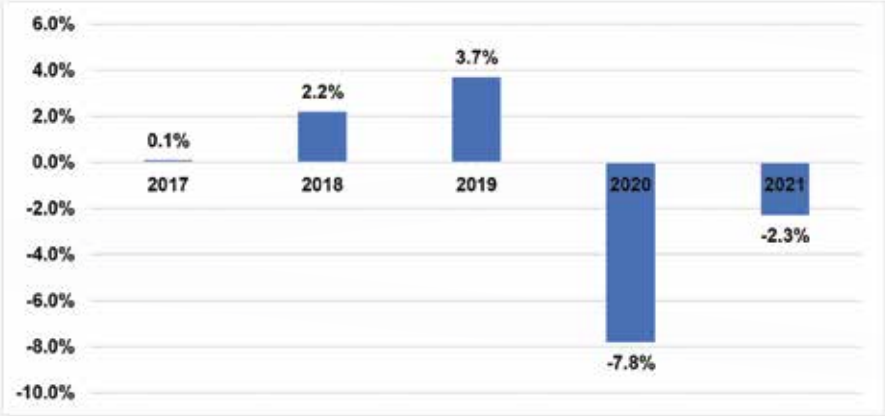
1.3. Economy

The real Gross domestic product (GDP) for December 2021 quarter amounted to $475.7 million, declining by 3.2% compared to the December 2020 quarter. The economy continues to decline as a result of the measles epidemic and the onset of Covid-19 pandemic. Lockdown of international borders, travel restrictions and containment measures were implemented to protect Samoa from the pandemic. Thereby, these measures adversely affected Samoa's local economy. This was reflected in the performance of industries such as Commerce (-17.6%), Food & Beverages Manufacturing (-14.3%), Agriculture (-13.3%), Construction (-7.8%), Fishing (-5.2%), Other Manufacturing (-3.7%), Personal & Other Services (-3.1%), and Communication (-1.2%). Despite this, several industries recorded positive growth rates for the reviewing period such as Electricity and Water (40.2%), Transport (21.4%), Business Services (9.3%), Accommodation & Restaurants (6.2%), Ownership of Dwellings (3.1%), Financial Services (2.9%), and Public Administration (2.3%).

On a twelve-month basis, GDP at constant prices recorded a decline of 2.3%, registering at $1,942.67 million. The main industries that contributed to this decline include Business Services (-40.6%), Construction (-10.7%), Commerce (-9.6%), Transport (-8.5%), Accommodation & Restaurants (-5.7%), Agriculture (-1.5%), Financial Services (-1.5%), and Food & Beverages Manufacturing (-1.4%). On the other hand, the industries that grew positively during the reviewing annual period include: Fishing (9.1%), Personal & Other Services (7.3%), Electricity and Water (4.7%), Communication (4.3%), Ownership of Dwellings (3.1%), Public Administrations (2.2%) and Other Manufacturing (1.6%).[7]

Figure 1.5 shows the annual growth rate in the real GDP from 2017-2021 as measured by the percentage change in GDP at constant 2013 prices over the previous years.

Figure 1.5: Percentage change in real GDP for Calendar year 2017 – 2021



1.3.1. Energy

The energy sector is very important to Samoa and is accounting for 46% of the national total GHG emissions (in CO2 equivalents) in 2020. It plays a vital role in the four priority areas as identified by the Government: Economic, Social, Infrastructural and Environmental. The vision of the Samoa's Energy Sector Plan (SESP) 2017-2022 is "Access to Quality Energy Supply for All Improved". According to the Samoa's second NDC, the government aims to reduce GHG emissions in the energy sector by 30 percent in 2030 compared to 2007 Levels. Samoa's government in its first NDC has set target to reach 100 percent renewable electricity generation by 2025, implement and monitor energy efficiency programs, implement grid stabilization and network loss reduction programs.[8][9]However, during the development of the new Pathway for Development of Samoa (PDS), its first NDC target was reviewed and changed to its goal of 70% RE use by the end of 2031.[10]

Samoa mainly imports four petroleum products, namely Unleaded Petrol (ULP), Automotive Diesel Oil (ADO), Jet fuel (also known as Dual Purpose Kerosene (DPK)) for aviation use and domestic cooking, Liquid Petroleum Gas (LPG) and including Lubricants & Greases.

7 *Quarterly Economic Review, Issue No. 95, Ministry of Finance, Government of Samoa https://www.mof.gov.ws/wp-content/uploads/2022/06/QER-2Q-FY2021-22-FINAL.pdf*
8 *Samoa's Intended Nationally Determined Contribution to UNFCCC, https://unfccc.int/sites/default/files/NDC/2022-06/Samoa%20INDC_Submission%20to%20UNFCCC.pdf*
9 *Samoa's Second Nationally Determined Contribution to UNFCCC, https://unfccc.int/sites/default/files/NDC/202206/Samoa%27s%20Second%20NDC%20for%20UNFCCC%20Submission.pdf*
10 *Samoa's Low-Emission Development Strategy 2022-2032. (Draft)*

In 2020, according to EPC, 38% of electricity was generated from renewable energy while remaining 62% from diesel-based power plants. This indicates still the most part of the Samoa's grid electricity, particularly for the main grid, is generated from diesel, hydropower (24%) and solar power generation stations (13.8%) and a very small amount of electricity is produced from wind energy (0.1%) and biomass resources. The share of renewable energy in the grid electricity generation has grown by around 37% between 2010-2020 while diesel-based generation has grown by 69% in comparison to 2010.[11] The residential sector is the major consumer of electricity followed by commercial and Institutional buildings.

Further, the transport sub-sector remained the highest GHG emission contributing sector in 2020. About 61.5% of the GHG energy sector emissions came from this subsector. Road transport accounted for the largest portion of transportation emissions (96%) followed by water navigation (4%) in the domestic transportation sector.

1.3.2. Transportation

Samoa's transport sector includes all modes of transport via air, sea, and land. However, land transport remains the most important mode of transport for inner island commutation. Samoa has a good transport infrastructure with an extensive network of roads, a high road density in inhabited areas and strategically located ports and airports throughout the country.[12] The road network provides good access for communities in terms of connectivity, and is generally in good condition, with over half of the total network and all major roads paved.

The main islands of Upolu and Savai'i as on 2015, had about 1,150 km of classified roads (747 km on Upolu and 403 km on Savai'i), and 52 bridges (44 bridges on Upolu and 8 on Savaii). Samoa's geographically compact nature and its road and shipping network make transport between and within islands relatively easy but external and internal transport costs are relatively high due to remoteness from major centres of trade and commerce (including tourism) and the cost of imported fuels. Modes of transportation include privately owned vehicles, buses and taxis. Private transport has increased considerably since 2009. The government of Samoa has also developed Transport Sector NAMA under which three potential interventions are identified: Scaling-up bio-diesel use in diesel vehicles; Introduction of electric cars and; Introduction of electric buses for public transport

There are five port in Samoa: Apia- main port of entry for international trade and sea travel; Asau- small "international" port on north west coast of Savaii (seldom used); Aleipata - new small wharf and slipway intended for vessel maintenance and cargo transport to and from American Samoa (seldom used); Mulifanua - main wharf and ferry terminal on Upolu for domestic passenger, cargo and vehicle transport to Savaii; Salelologa- wharf and ferry terminal on Savaii for domestic passenger, cargo and vehicle transport to Upolu. There are four airports in the country: Faleolo International Airport (the main port of entry for air travel and freight); Fagalii Airport (used mainly for international flights and freight to American Samoa and some domestic flights); Asau Airport; and Maota Airport. Regular flights are available on a daily basis to cater for international and inter-island travel.

1.3.3. Waste

According to a waste audit conducted in 2017, which surveyed households in urban Upolu, the amount of waste generated was 1,060 g/person/day, and the amount of waste discharged, which excludes waste disposed of within households, was 387 g/person/day.[13] Compared to the waste audit results of 2011, there is a slight increase in waste discharge amount (7g/person/day)[14]. Further, MNRE under its National waste management Strategy 2019-2023 has set target goals for 2023 of bringing down the household waste discharged amount (g/person/day) from current levels to 367 g/person/day with strategic actions. In Samoa, there are 2 approved landfills namely, Tafaigata Landfill and Vaiaata Landfill. The landfill sites are owned and managed by the government, but the daily operations of waste treatment, storage, and disposal are contracted to private companies. Waste collection services are provided for free to households and small businesses across the country, including remote islands, by private contractor. The collection services cover general and bulky waste.

Waste collected on Upolu Island and the nearby islands of Manono and Apolima is transported and disposed of at Tafaigata Landfill, located 10 km west of Apia. Tafaigata Landfill is categorized as a semi-aerobic landfill and was developed using the Fukuoka Method since 2002 with the support of JICA and is equipped with leachate collection pipes, gas venting pipes, leachate ponds, etc. In terms or organic waste generated there is custom in the country of utilizing food residues as feed for pigs and other livestock and using green waste as mulch for tree. In addition, composting of market waste was undertaken at the Tafaigata landfill in the past by MNRE and a private company. However, the composting has been stopped in recent years, primarily due to the absence of technical expert.

11 *Statistical Abstract 2020, Samoa Bureau of Statistics (SBS), Government of Samoa, Apia, Samoa, 2021, https://www.sbs.gov.ws/images/sbs-documents/social/Abstract/Abstract_2020.pdf*
12 *Samoa Transport Sector Plan (2013-2018), https://www.mof.gov.ws/wp-content/uploads/2019/09/TSP-Volume-I-Final.pdf*
13 *National Waste Management Strategy (2019-2023), MNRE,*
14 *Ministry of Natural Resources and Environment, 2011, "Solid Waste Characterization and Generation Study 2011.VAITELE.", https://www.sprep.org/attachments/j-prism/Waste%20Characterization%20Report/Samoa/2011_Waste_Audit_Report_-_Samoa_(light_data).pdf*

Samoa is highly depended on import for domestic consumption, most of the wastes are generated from products imported from overseas particularly from packaging. The aluminium cans and valuable materials from discarded home appliances and cars (such as scrap iron, copper, and discarded batteries) is essentially carried out by two recycling companies, which export them by container to New Zealand, Australia, South Korea, and other countries Whereas, the beverage containers, empty beer and juice bottles form the domestic manufacturers are collected by the manufacturers and reuse returnable bottles, paying a refund of WST 0.1 per bottle.[15]

E-waste is considered a significant problem in Samoa and their quantities are rapidly increasing due to changes in technology, more affordable consumer electronics, and better access to electricity. No e-waste recycling facilities exist but two operators have collaborated to recover reusable and recyclable materials for overseas recycling. Recyclers in Samoa cannot efficiently and safely extract valuable materials from e-waste without systematic support and a technical skills base.

The Samoa Water Authority (SWA) is the main water service provider in Samoa. SWA draw water from multiple water sources in and around Upolu and Savaii, treat and then supply this water to households and businesses (approximately 88% of the population) through a vast network of infrastructure. It also collects, treat and dispose of wastewater within designated areas of the CBD in Upolu. The Septic tanks are still the main domestic wastewater disposal systems in use in Samoa followed by pit latrines.

1.3.4. Agriculture and Fisheries

The agriculture sector remains at the forefront of economic growth in Samoa and is key to ensuring food security, income generation and enhanced export capacity. In 2020, agriculture represented 8.3 percent of Samoa's Gross Domestic Product compared to 9.5 percent in 2009 (in constant 2013 $WST). As recorded in the Samoa Agriculture Census 2019,[16] the total area of agricultural holdings was 106,423 acres compared to 92,310 acres in 2009 indicating an increase of 15.3%. The average size of a holding has decreased from 5.8 acres in 2009 to 4 acres in 2019. It was also recorded that 28,516 households with 26,776 households growing crops, an increase of 7,238 from 19,538 in 2009. This represents 94% of all households in Samoa and is 37 percent higher than 2009. This significant increase is attributed to be due to a number of factors including: Initiatives that were undertaken by the Ministry of Agriculture and Fisheries with the support of development partners [17] and Some households responding to the impact of Covid-19 with a loss of full-time employment by planting crops. The Government of Samoa's (GoS), Agriculture Sector Plan (ASP) 2016-2020 vision is 'a sustainable agriculture and fisheries sector for food security, health, prosperity, job creation and resilience'. A review of the ASP 2016-2020 is underway, including the development of the next ASP 2021-2025.

Crop production plays a significant role in terms of food security and income both in local and export markets. There were seven temporary crops (taro, ta'amu, head cabbage, Chinese cabbage, tomato, cucumber and pumpkins) considered to be grown recorded in the census. Whereas, coconut, cocoa, breadfruit, banana and kava were the major permanent crops recorded in the 2019 Agricultural Census.

Fisheries play a vital role in the livelihoods of most Samoans, as it is the main source of food and income for fishing communities. Economic activity in fishing, as measured by Gross Domestic Product (GDP) contributed $44 million Tala in the year ended December 2019, and $38 million Tala in the year ended December 2020. A total of 2,759 households in the agriculture census 2019 engaged in fishing activities. The number of households involved in fishing has been declining significantly with 10,884 households reporting fishing activities in 1989 and 5,752 in 2009. By and large, the number of households engaged in fishing activities decreased by 8,156 (75 percent) in the last 30 years.

Samoa's commercial fishery, mostly of the tuna long line fishery, accounted for over 90 percent of Samoa's fish export by volume and value. The catches recorded from commercial fishing are predominantly albacore tuna; 75-80 percent of the total annual catch are usually exported frozen to American Samoa. Yellowfin and bigeye tuna are also an important component of catches as both are exported fresh and chilled tuna to New Zealand and United States of America. Exports of tuna and other pelagic species have significantly increased since 2016 (5,703mt) with the highest marked export value in 2019 of about $45.5 million with a total volume of 5,726mt.

15 *Solid Waste Management Country Profile Samoa (2022), J-PRISM II, https://library.sprep.org/sites/default/files/2022-08/0722_Jprism_C-profile02_Samoa_fix.pdf*

16 *Samoa Agriculture Census, 2019, https://www.sbs.gov.ws/images/sbs-documents/Economics/SAMOA-AGRICULTURE-CENSUS/SAMOA_AGRICULTURE_CENSUS_2019.pdf*

17 *Agriculture Sector Plan (ASP) 2016-2020, https://www.mof.gov.ws/wp-content/uploads/2022/08/Agriculture-Sector-Plan-2016-2020-Vol-1.pdf*

1.3.5. Tourism

Tourism is an important contributor to the Samoan economy providing livelihood to many local businesses in the accommodation, catering and transportation sub-sectors, providing opportunities through its knock-off effects in the tourism value chain, such as handicrafts, agricultural production, communication services, and etcetera. The sector accounted for 24.5% of gross domestic product (GDP) in 2019.

Total number of visitors arriving in Samoa in 2019 recorded a total of 151,024 compared to 131,796 in 2014. Total visitors grew by 14.58% and New Zealand continues to hold the lion's share of the total visitor arrivals (64460), with Australia in second (32199).[18]

The tourism sector has definitely grown over the past 5 years, but not without challenges. For the sector these challenges include: limited resources for more efficient and effective marketing, unique product development, air accessibility to and from the emerging markets, tourism workforce development opportunities, adverse impacts of climate change and foreign investment opportunities.

Samoa has been a pioneer of the concept of sustainable tourism management since the 1990s, when it became the first country in the Pacific to develop sustainable tourism indicators. Samoa was also an "early adopter" of the Global Sustainable Tourism Council criteria (global baseline standards for sustainability in travel and tourism) in 2014. Sustainable development continues to be promoted through stringent planning and development regulations. Samoa in its Tourism sector Plan 2014 -2019 outlines a vision that "by 2019 Samoa will have a growing tourism sector, which engages our visitors and people and is recognized as the leading Pacific destination for sustainable tourism".[19] The Samoa Tourism Sector Plan has also laid the foundation for the coordinated and sustainable development of tourism for Samoa. The plan's goals are also closely aligned with the government's strategy for the development of Samoa. The strategy emphasizes the importance of tourism and advocates an improvement in destination marketing, product development, and tourist infrastructure, and proposes arrivals growth of more than 5% per annum and this target was largely achieved prior to 2020 and the onset of the coronavirus disease (COVID-19) pandemic.

Samoa is highly vulnerable to disasters triggered by natural hazards and the prevalence of disasters poses a potential deterrent for visitors and impacts tourist infrastructure, as a large proportion of accommodation is in vulnerable coastal areas. Beach erosion, flooding, and sea level rise are causing problems for beach fale operations and some budget accommodations while the current long dry spell is causing water shortage in many parts of the islands. that the combined effects of climate variability (such as changing seasonal weather patterns) and climate change (including gradual sea level and temperature rise, increasing frequency and intensity of storm surges and cyclones, changing precipitation patterns, including high intensity rainfall events and droughts), are posing threats to community-based tourism operators and their vital assets located in highly vulnerable coastal areas. Beach tourism is a highly climate-dependent activity, relying heavily on vulnerable natural coastal resources.[20] Samoa's volcanic islands provide ample surface water and groundwater, but water pollution is an ongoing concern. Further, poor waste management undermines the tourist experience.[21]

1.3.6. Health

Samoa has the highest life expectancy, and one of the lowest infant, and under five, mortality rates in the Pacific. The World Health Organization concludes that Samoa has already almost achieved, or is on track to achieve, important Sustainable Development Goal (SDG) goals. Nearly 80% of the strategic indicators in the previous Health Sector Plan 2008-2018 were fully or partially achieved over the course of that Plan. Samoa has two main hospitals (one in Apia and another on Savaii Island) and 11 rural health facilities comprising 6 rural district hospitals and 5 community health centers. Samoa continues to face an increasing burden of non-communicable diseases (NCD) alongside an unfinished agenda of reducing communicable diseases and expanding public health. NCDs account for over 80% of all deaths and more than half the premature deaths in Samoa. Risk factors for NCDs are increasing and the current health system is not well positioned to respond to the current and future challenge; also there are limited resources to respond.[22] Samoa has some of the highest risk factors for NCDs in the world, including 84% of the adult population being overweight or obese, and 70% of those tested having hypertension but not on medication.[23] The prevalence of diabetes among women has increased from 2% to 19% between 1978 and 2013. This is particularly worrying given the relatively high total fertility rate of women in Samoa and the known adverse

18 *Samoa Tourism Authority, https://www.samoatourism.org/articles/254/total-visitor-arrivals-by-countryyear*

19 *Government of Samoa. 2016. Strategy for the Development of Samoa 2016/17–2019/20. Apia. https://policy.asiapacificenergy.org/sites/default/ files/Strategy%20For%20The%20Development%20Of%20Samoa%202016%3A17-2019%3A20%20%28EN%29.pdf*

20 *National Tourism Climate Change Adaptation Strategy for Samoa (2012-2017), https://www.samoatourism.org/Content/SiteResources/PAGE/50/Na tional%20Tourism%20Cli mate%20 Change%20Strategy%20ENGLISH.pdf*

21 *Samoa Pacific Tourism Sector Snapshot (Nov 2021), Pacific Private Sector Development Initiative (PSDI). https://pacificpsdi.org/assets/Uploads/PSDI-TourismSnapshot-SAM3.pdf*

22 *Samoa Health Sector Plan FY2019/20 – FY2029/30, https://www.mof.gov.ws/wp-content/uploads/2022/08/Health-Sector-Plan-2020-2030.pdf*

23 *Government of Samoa Ministry of Health. National Non-Communicable Disease Control Policy 2018-2023. Page 13.*

health risks for the woman and her child if she is diabetic. The escalating costs associated with treating end-stage NCDs impose a major financial burden on the health system and broader society. The Government already allocates 18% of its total health budget, the second highest allocation after education, to the health sector. Samoa also has Climate Adaptation Strategy for Health (CASH) which provides a strategic framework to strengthen the resilience of the health sector, to improve the capacity of the health sector, risk management and response to disasters and climate change. Furthermore, the strategy aims to support cross- sectoral collaboration to ensure health concerns are addressed in decision-making in other sectors to reduce risks from climate change.[24] The CASH may need to be reviewed and updated as needed in light of new knowledge and understanding of climate change and health issues in Samoa.

1.3.7. Biodiversity

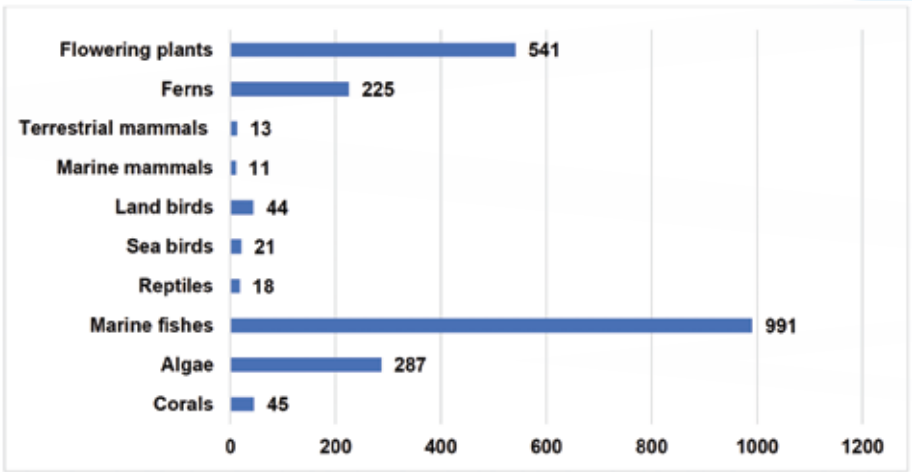
Samoa's vegetation is divided into five plant communities – the littoral, wetland, rainforest, volcanic scrub, and disturbed. Its archipelago is home to 991 species of marine fishes and is regarded as one of the richest marine fish fauna in the world. Due to its small size and isolation, these ecosystems are fragile and vulnerable. With 541 native species (186 of which are endemic) and nearly 300 naturalized flowering plant species and 225 ferns and fern allies, Samoa has the second largest native vascular flora in Polynesia after the Hawaiian Islands. About 34 percent of Samoa's native plants are found nowhere else, compared with 90 and 47 percent endemism among the floras of Hawaii and the Marquesas respectively. The Samoan flora is about one-third as large compared with the flora of Fiji, but they share many floristic affinities due to their relative proximity. The largest family of flowering plants in Samoa is the orchid family (Orchidaceae), with 101 native species. No other Polynesian islands have such a rich orchid flora. Samoa's second largest family is Rubiaceae, the coffee family, with 47 native and five naturalized species.[25]

In the agricultural ecosystem, the main cultivated crops are taro, bananas, breadfruits, yams, cacao and coconuts. Samoan coastal and marine ecosystems are characterized by large and vulnerable reefs cover (490 km2), as well as 14 families with at least 45 species of corals (mainly Acropora).

As shown in figure 1.6, in terms of faunal diversity, there are 13 species of terrestrial mammals, 44 species of land birds, 21 seabirds, 15 reptiles, 59 species of insects, 64 species of land snails and 28 species of butterflies. In particular, Samoa's fish fauna is regarded as among the richest in the world, with up to 991 species recorded (890 inhabiting shallow water or reefs, 56 found in deeper water and 45 being pelagic).

In terms of freshwater biodiversity, which remains relatively unknown, 30 species of fish and 17 species of macro-crustaceans have been reported. In 1999, 198 taxa of algae, with a known species count of 287, were reported.[26]

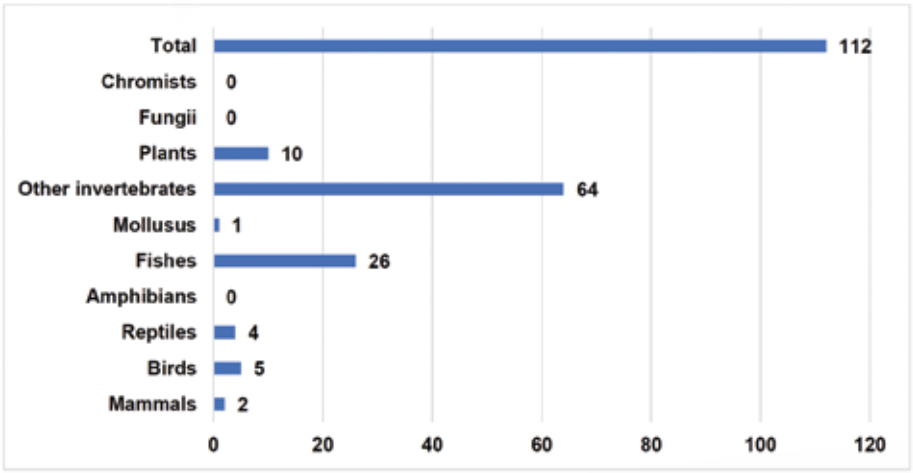
Figure 1.4: Samoa's Population by major age group, 2021



24 *Climate Adaptation Strategy for Health (CASH) 2013 -2014, https://www.health.gov.ws/wp-content/uploads/2022/07/2Climate-Adapation-Strategy-for-Health-.pdf*
25 *https://ntbg.org/news/ntbg-completes-the-flora-of-samoa/*
26 *Samoa's National Biodiversity Strategy and Action Plan (NBSAP) 2001, https://samoa-data.sprep.org/resource/national-biodiversity-strategy-and-action-plan-2001*

Samoa's number of threatened species in each major taxonomic group are listed as the 2022 IUCN Red List of Threatened Species is represented in the figure 1.7 below.

Figure 1.7: IUCN Red Listed Species in Samoa



1.4. Development priorities and objectives

Climate change is being mainstreamed into Samoa's National Development Plans. Samoa Climate Change Policy 2020[27] is a national policy with a cross-sectoral approach. It sets out plan of action and the interventions needed across all sectors, civil society, private sector and at the community level, to build resilience to the impacts of climate change while achieving sustainable development goals. The objectives of this policy are: (i) strengthened framework and support systems for effective response to climate change impacts, (ii) implementation of adaptation measures against the impacts of climate change, (iii) implementation of mitigation measures to reduce greenhouse gas emissions, (iv) sustainable financing mechanisms, (v) integration of climate change adaptation and mitigation into national planning, implementation and monitoring processes, (vi) improved data and information management on climate change for informed decision making, (vii) strengthened and effective coordination and representation at the national, regional and international level, and (viii) capacity building on the impacts of climate change.

The Government of Samoa (GoS) has introduced the first Pathway for the Development of Samoa (PDS) for the period, FY2021/22 – FY2025/26.[28] The Pathway has been developed from the people's vision of "Fostering social harmony, safety, and freedom for all". The Pathway has five Key Strategic Outcomes (KSO) comprising: improved social development; diversified and sustainable economy; security and trusted governance; secured environment and climate change; and structured public works and infrastructure.

Key Strategic Outcome 1: Improved Social Development

Statement: The Government will seek to provide all Samoans with equal access to affordable social services and livelihood/job opportunities.

- Key Priority Area 1: Alleviating Hardship
- Key Priority Area 2: Improved Public Health
- Key Priority Area 3: Quality Education
- Key Priority Area 4: People Empowerment
- Key Priority Area 5: Skilled Workforce

[27] *Samoa Climate Change Policy 2020, https://www.mnre.gov.ws/wp-content/uploads/2021/03/Samoa-Climate-Change-Policy-2020-2030.pdf*

[28] *Pathway for the Development of Samoa (PDS) Y2021/22 – FY2025/26, https://www.mof.gov.ws/wp-content/uploads/2022/02/Pathway-for-the-Development-of-Samoa.pdf*

Key Strategic Outcome 2: Diversified and Sustainable Economy

Statement: The Government will diversify economic development and improve access to equal economic opportunities for all, and for the benefit of individuals, households, communities and the nation.

- Key Priority Area 6: Community Development
- Key Priority Area 7: Agriculture, Fisheries and Aquaculture Productivity
- Key Priority Area 8: Tourism Revitalisation
- Key Priority Area 9: Business Innovation and Growth
- Key Priority Area 10: Increased Labour Mobility
- Key Priority Area 11: Macroeconomic Stability

Key Strategic Outcome 3: Security and Trusted Governance

Statement: The Government will ensure protection of rights to decision making as stipulated under various legislations and in conjunction with the Constitution of the Government of Samoa.

- Key Priority Area 12: Empowered Legislation
- Key Priority Area 13: Improved Accountability
- Key Priority Area 14: Dynamic Global Relations and Partnerships

Key Strategic Outcome 4: Secured Environment and Climate Change

Statement: The Government will maintain a safe environment for Samoa and promote sustainable economic use of natural resources.

- Key Priority Area 15: Build Climate Resilience
- Key Priority Area 16: Effective Environmental Protection and Management Frameworks
- Key Priority Area 17: Enhanced Conservation and Sustainable Use of Natural Resources
- Key Priority Area 18: Sustainable Energy Development Enhanced

Key Strategic Outcome 5: Structured Public Works and Infrastructure

Statement: The Government will ensure that public works and infrastructure are guided by a long-term phased development plan that underpins socio-economic progress in Samoa

- Key Priority Area 19: Responsive Public Utility Services
- Key Priority Area 20: Innovative Information, Communication and Technology Use
- Key Priority Area 21: Consolidated Infrastructure Management

Samoa 2040[29] has set Samoa's agenda for economic growth and development over the next 20 years. Samoa 2040 complements the Strategy for the Development of Samoa (SDS). It has identified a set of potentially transformational opportunities that have the potential to boost incomes, employment, and standards of living in Samoa over the longer-term. These developmental opportunities lie in four broad focus areas: tourism, agriculture and fishing, the development of a digital economy, and labour mobility. By providing a roadmap to take advantage of these opportunities – which will raise economic growth, create employment opportunities, and generate government revenues – Samoa 2040 aims to ensure that all Samoans have the means and opportunity to pursue a better life, and that no one is left behind.

The Samoa Second Nationally Determined Contributions, the NDC Implementation Roadmap & Investment Plan 2021, the Low Carbon Development Strategy 2020-2030 (draft 2021), the Pathway for the Development of Samoa (PDS) 2021/22-2025/26, National Appropriate Mitigation Actions Plan (NAMA) (2018), the Second National Communications to UNFCCC (2009), GHG Inventory (2007), the National Environment Sector Plan 2017-2021, the Energy Sector Plan 2017-2022, the Energy Management Act (2020), the Transport Sector Plan 2014-2019, and the Agriculture Sector Plan 2016-2020 (ASP), as well as the National Policy for Gender Equality 2021-2031 (2021) and the Inclusive Governance Policy 2021-2031 (2021) are some of the other overarching national development planning documents.

[29] *Samoa 2040, Ministry of Finance, Apia, 2021. https://www.mof.gov.ws/wp-content/uploads/2021/03/Samoa-2040-Final.pdf*

1.5. Priorities related to mitigation of climate change

In 2020 Samoa's GHG emissions totalled approximately 496,332 tons of CO2 equivalents (tCO2e). The GHG inventory also estimated CO2 removals in forests, which totalled -850,568 tons in 2020. The energy sector is the main source of GHG emissions, accounting for 46% of the national total GHG emissions. This is followed by the Agriculture, Forestry and Other Land Use (AFOLU) sector, Waste sector and Industrial Processes and Product Use (IPPU) with 28%, 21% and 5% of total CO2e emissions, respectively.

Samoa's Second NDC builds on the progress of its 2015 INDC and presents ambitious targets addressing both mitigation and adaptation to climate change. The updated target presented is 'to reduce overall GHG emissions by 26 percent in 2030 compared to 2007 levels. Samoa is focussing on opportunities to reduce emissions in the energy sector (including electricity, land transport, maritime transport, and tourism) by 30% (or by 53 Gg CO2e), the waste sector by 4% (or by 1.2 Gg CO2e) , and the Agriculture, Forestry and Other Land Use (AFOLU) sector by 26%(or by 35.2 Gg CO2e) (all reduction compared to the new reference year levels once the GHG emissions inventory is updated). GHG emissions reduction target for the industrial processes and product use (IPPU) sector are not developed because: GHG emissions from IPPU represent only a small fraction (less than 3 percent) of Samoa's total GHG emissions, given the absence of mineral, chemical, metal, electronics, and other manufacturing industries as well as the limited use of lubricants, paraffin waxes, and solvents. Further, there is a lack of data on emissions from the IPPU sector.

Key sectoral plans and strategies for these sectors are as follows:

1. Energy Sector

i) Electricity sector: Energy Sector Plan 2017-2022
ii) Land transport sector: Transport Sector Plan 2014-2019
iii) Maritime transport sector: Transport Sector Plan 2014-2019

2. Waste sector

i) National Waste Management Strategy 2019-2023 (NWMS)
ii) Water and Sanitation Sector Plan 2016-2020(WSSP

3. Tourism sector: Tourism Sector Plan 2014-2019
4. Marine sector: Samoa Ocean Strategy (SOS) 2020-2030 (2020)
5. AFOLU sector: Agriculture Sector Plan 2016-2020 (ASP)

1.5.1. Mitigation Legislation

Samoa currently has a Climate Change Policy that deals with mitigation issues, a Climate Change Bill is formulated to include all elements of Climate change in order to have a Framework in place for coordination of climate change initiatives. The draft Climate Change bill (Climate Change Management Act 2021) is to establish the Ministry of Climate Change and Resilience, and to enable Samoa to effectively respond to climate change adaptation and mitigation and meet its obligations under the United Nations Framework Convention on Climate Change and for related purposes. However, Samoa also has a broad list of National Policies, Legislations, Codes and Standards in place which supports the implementation of sectoral mitigation priorities (see Chapter 4: Mitigation Actions).

1.5.2. Low Emission Development Strategy (LEDS) (2020-2030) (draft 2021)

The Government of Samoa has adopted a Low Emissions Development Strategy (LEDS) for the period 2020-2030 to promote low carbon development pathways with a target of 70% Renewable Energy use by the end of 2031. The purpose of this document is to review the existing/outdated Greenhouse Gas Abatement Strategy 2008-2018 and other relevant sectoral policies and strategies to identify what was achieved and what other measures could be implemented in various sectors to further reduce GHG emissions for Samoa. This low carbon strategy is a living document that act as a guide to assist and is interlinked with Samoa's 1st and 2nd NDC.

This target and its implementation aim to support several other pathways that the Government of Samoa has set in its Pathway for Development Strategy, National Environment Sector Plan (NESP) 2017-2022 and the Energy Sector Plan (ESP) 2017-2022 including increasing

mitigation actions to reduce GHG emissions and implementing of adaptation measures. For meeting the 70% Renewable electricity generations the various measures are identified. These include aggregation of supply, demand and reserve through resource assessment and enhanced transmission, flexible generation, renewable power generation for baseload support and demand management.

The nine LEDS strategies comprise: Hydrogen, Pump Storage Hydropower, Battery Storage System, Energy Storage Systems, Smart Grid Infrastructure, Energy Efficiency, Biomass Gasification, Variable Renewable Energy Sources (Wind and Solar), and Hydropower.

1.5.3. Constraints and barriers to implementing mitigation priorities

Some of the key constraints identified to mitigation projects across the priority sectors includes:

- budget limitations
- human capacity (including the number of staff available and experience required)
- public awareness
- regulatory, legal, and institutional constraints
- market structure, and data deficiencies

The constraints and barriers in implementing mitigation priorities is discussed in more detail in Chapter 4: Mitigation Actions.

2. Institutional Arrangements Related to MRV

This chapter aims to provide an overview on the institutional structures and processes related to national MRV systems used for the compilation and submission of international and national reports; including National Communications, BURs, the GHG inventory, mitigation actions and support received and needed.

2.1. Government structure relevant to MRV

This section provides an overview of the existing institutional arrangements for handling climate change issues, covering governmental bodies, the private sector and NGOs, and development partners.

The current institutional framework governing the climate change management in Samoa is the Ministry of Natural Resources and Environment (MNRE) through the Division of Climate Change. MNRE is the ministry responsible for developing the key policy and planning documents that guide climate change programmes in Samoa. It is also the agency responsible for the overall oversight of the implementation of Samoa's adaptation and mitigation activities. Implementation is carried out by relevant ministries. The primary divisions dealing with climate change matters and implementation of activities are the Climate Change and Global Environment Facility (GEF), Disaster Management Office,[30] and the Renewable Energy Division.

All divisions within MNRE deal with climate change activities. The National Climate Change Council under the Climate Change Policy oversees the implementation, coordination, monitoring and evaluation of national climate change policies and strategies. Short-term implementation of the policy, the MNRE is identified in the first instance as the body responsible for promoting coordination of different sector interventions and a Cabinet Directive mandates all sectors to report to the MNRE on the steps being taken within their respective sectors on adaptation and mitigation, including reporting and compliance measures. The Government Ministries at sectoral level reports to the MNRE– Climate Change Division through sector quarterly/annual reviews reporting which is then reviewed and compiled to prepare a Climate Change Report on Quarterly basis and submitted to the cabinet development committee. Climate Change Report Card established as the National Reporting tool to ensure all national climate change actions are captured and reported to the decision makers including the Cabinet Development Committee. The expanded division of Climate Change and Global Environment Facility (CCGEF) provides a coordinating and facilitating role for Climate Change and GEF programs in Samoa.

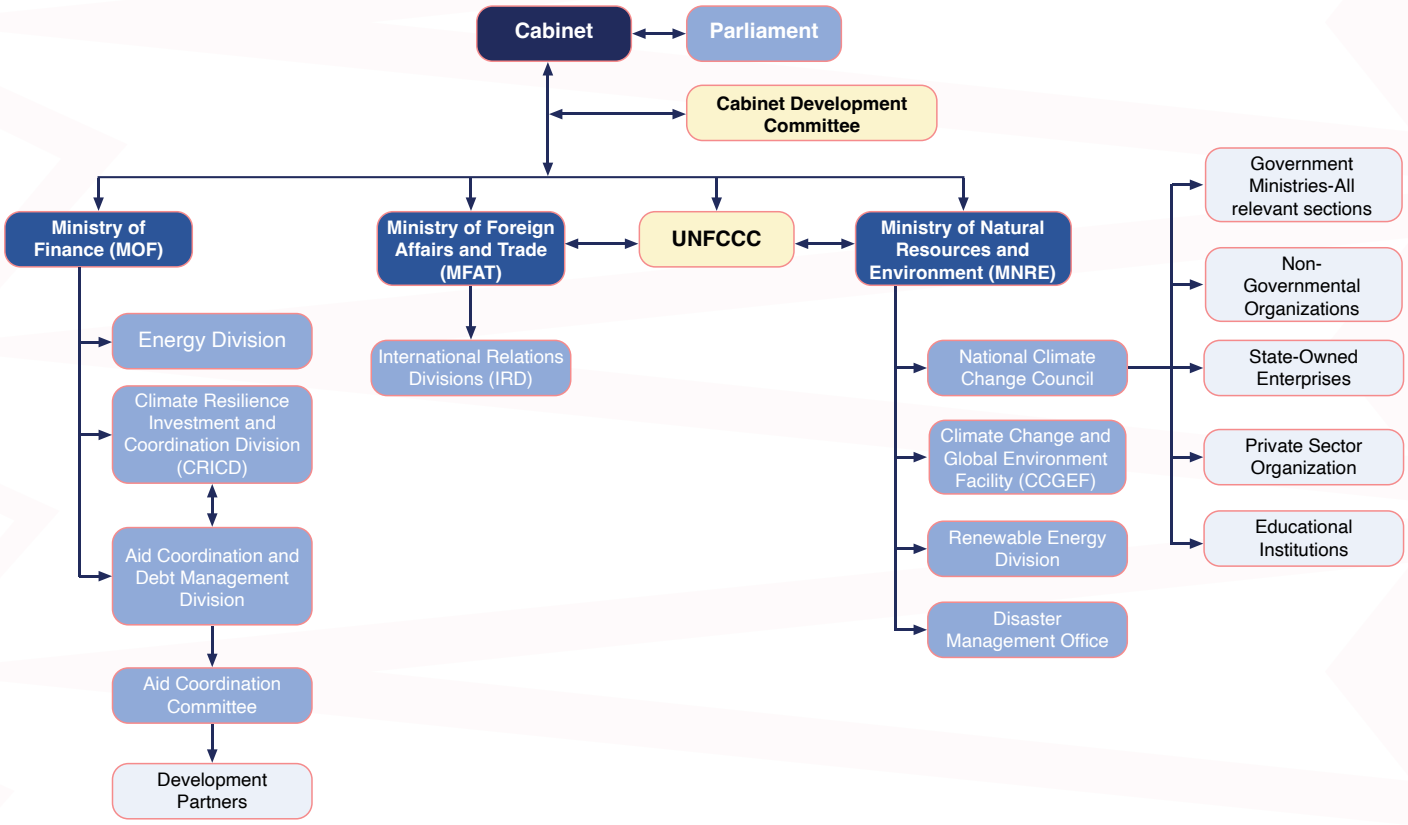
30 *In January 2021, Cabinet issued a cabinet directive to transfer the Disaster Management Office (DMO) to Ministry of Prime Minister & Cabinet (MPMC).*

The Ministry of Foreign Affairs is the political and national focal point while the MNRE is the technical focal point to the United Nations Framework Convention on Climate Change (UNFCCC). Development, coordination, and implementation of the climate change policy is managed primarily through MNRE- Climate Change Division (CCD) which has the responsibility for overall coordination of the climate change program. While the Ministry of Finance (MoF) coordinates the flow of, and accountability for, financial resources. In addition, Climate Resilience Investment and Coordination Division (CRICD) works closely with the Aid Coordination and Debt Management Division (ACDMD) to ensure links to financing for climate change activities from Development Partners. The multi-donor contributions are well coordinated by the ACDMD. Development partners work through the ACDMD. When development and related proposals are approved by Cabinet Development Committee, and require external financing, they are then processed through the ACDMD, chaired by Prime Minister, before submission to development partners.

The International Relations Division (IRD) under the MFAT is charged with the management of Samoa's foreign relations including the management of representation of other states and intergovernmental organizations resident in Samoa. The IRD ensures accurate implementation of Samoa's foreign policy in international fora and through the implementation of conventions and engagement with all international organizations Samoa is a member of including the United Nations, Commonwealth and the Organisation of the African Caribbean and Pacific States.

The figure 2.1, illustrates the current institutional arrangements for climate change responses in Samoa.

Figure 2.1: Institutional arrangements for climate change responses in Samoa



Government Ministries	State-Owned Enterprises	Private Sector Organization	Educational Institutions	Civil society and Non-Government Organizations	Development Partners	Donors
Ministry for Customs & Revenue	Electric Power Corporation	Samoa Chamber of Commerce and Industry (SCCI)	Australia Pacific Training Coalition	Adventist Development Relief Agency	Conservation International	Asian Development Bank
Ministry of Agriculture & Fisheries	Land Transport Authority	Petroleum Products Supplies Limited (PPS)	National University of Samoa	Samoa Red Cross Society (SRCS)	United Nation Development Programme	Japan Bank for International Cooperation
Ministry of Commerce, Industry & Labour	Office of the Attorney General	British Oxygen Company (BOC) Gas Limited	University of the South Pacific	Samoa Farmer Association	Secretariat of the Pacific Region Environment Programme	Australian AID (AusAID)
Ministry of Communication Information and Technology	Petroleum Product Distributors	Origin Gas	Samoa Qualification Authority	Samoa Umbrella for Non-Governmental Organizations (SUNGO)	Japan International Cooperation Agency (JICA)	Secretariat of the Pacific Regional Environment Programme (SPREP)
Ministry of Education, Sports & Culture	Samoa Airport Authority	Farmers' Federation Incorporated (FFI)		Samoa Conservation Society		International Finance Corporation (IFC)
Ministry of Finance	Samoa Business Hubs	Samoa Farmers Association (SFA)		Women in Business Development Incorporated (WIBDI)		World Bank
Ministry of Foreign Affairs & Trade	Samoa International Finance Authority	Samoa Association of Manufacturers (SAME)		Matuaileoo Environment Inc. (METI)		New Zealand Aid Programme
Ministry of Health	Samoa National Provident Funds	Small Business Enterprise Centre (SBEC)				European Investment Bank (EIB)
Ministry of Public Enterprises	Samoa Ports Authority	Samoa Red Cross Society (SRCS)				
Ministry of Women, Community & Social Development	Scientific Research Organization of Samoa	Plumbers Association of Samoa (PAS)				
Ministry of Works, Transport & Infrastructure	Samoa Shipping Corporation	Blue Bird Transport Co. Ltd				
Ministry of Prime Minister and Cabinet	Samoa Trust Estate Corporation	Jaffa Sanitary System Ltd				
Public Service Commission	Samoa Tourism Authority	LA painters				
Samoa Bureau of Statistics	Unit Trust of Samoa	Jed's Star Ltd				
	Samoa Water Authority	Apia Lua Co. Ltd				
	Samoa Fire and Emergency Services Authority	Tama ole Mau				

Table 2.1: Samoa's Institutional and Management Structure for Climate Change Management

Table 2.2: Samoa's Institutional and Management Structure for Climate Change Management

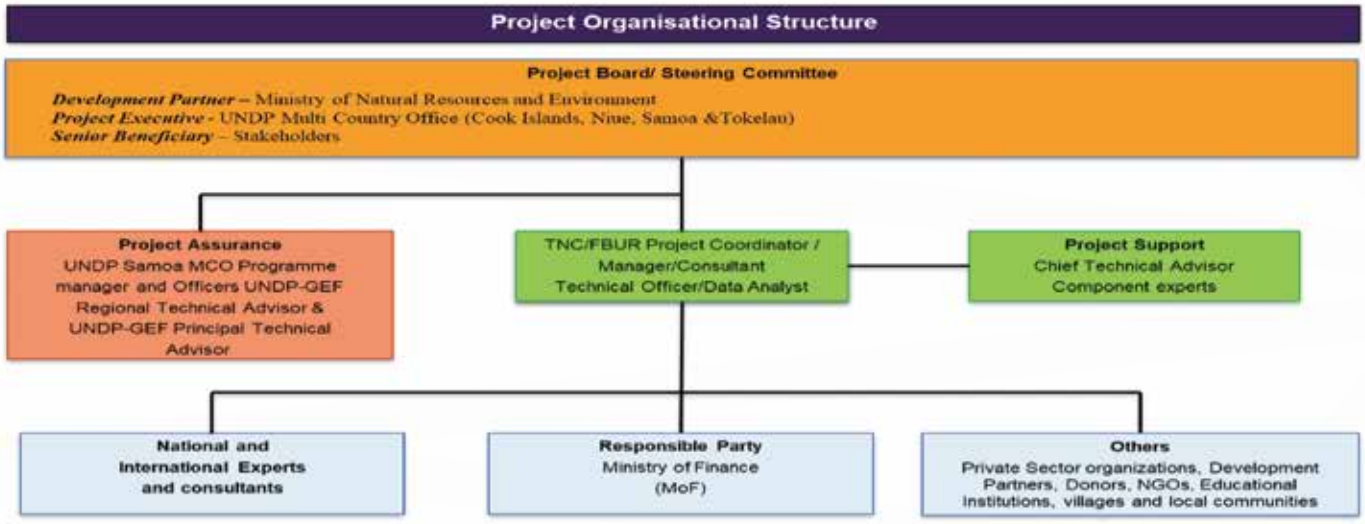
Entity/Agency	Role & Responsibilities
Cabinet Development Committee	Sets national policies, provides overall direction, monitors progress
Ministry of Natural Resources and Environment (MNRE)	Operational Focal Point; Responsible for producing the key policy documents that guide climate change programming for the country, including the National Policy Statement on Climate Change and the NAPA.
Climate Change and Global Environment Facility (CCGEF)	Coordinating and facilitating role for Climate Change and GEF programs in Samoa; Focusses on policy, technical and scientific coordination of various programs, reporting on climate change action, implementation and promoting adaptation and mitigation measures, to providing assistance on proposed climate change projects and ensuring effective reporting and advise is channelled through to all key players.
National Climate Change Council	Oversee the implementation, coordination, monitoring and evaluation of national climate change policies and strategies.
Ministry of Foreign Affairs and Trade (MFAT)	Political Focal Point; Provide policy advice and representation activities towards the management of Samoa's foreign and trade relations with other countries, international and regional organisations
Ministry of Finance (MoF)	Financial Focal Point; Responsible for overall coordination of donor and aid funding; supporting co-financing arrangements and programmatic linkages with other initiatives; making on-going linkages and updating national policies outlined in the PDS; financial management of project funds and monitoring of expenditures.
Climate Resilience Investment and Coordination Division (CRICD)	Responsible for coordination of climate resilience investment program
Aid Coordination and Debt Management Division (ACDMD)	Responsible for the coordination of development partner assistance and managing the internal and external public debt
International Relations Division (IRD)	Management of Samoa's foreign relations including the management of representation of other states and intergovernmental organizations resident in Samoa; Implementation of conventions and engagement with all international organizations Samoa is a member.
Government Ministries	Implementation of mitigation and adaptation activities and reporting their progress to the MNRE on quarterly basis
Private sector	Provide AD and other information to sectoral line ministries. Engage and support in implementation of projects, policies and programs.
Civil societies and NGOs	Participate in all activities under the mitigation and adaptation components of the TNC and BUR. Providing information on their member campaigns.
Education Institutions	Collaboration in knowledge management and capacity building activities through development and possible integration of project experience and training programs.

2.2. Overall description of MRV/ Domestic MRV arrangements for compilation and submission of National Communications and BURs on a continuous basis

The domestic MRV system in Samoa is not yet formalized. The results, assessment of current institutional arrangement, capacity of the national institutions, stakeholders, experts and lesson learned during the development of First Biennial Update Report (BUR) and Third National Communication (TNC) will be used for development of a robust MRV system for Samoa. The First Biennial Update Report (BUR) and the Third National Communications (TNC) is being implemented by the Ministry of Natural Resources and Environment (MNRE) working closely with the United Nations Development Programme (UNDP) as its executing partner under the GEF. FBUR is being managed under its Climate Change and GEF Division. A Project Board (also called Project Steering Committee), for the project is responsible for taking corrective action as needed to ensure the project achieves the desired results. The Project Board is comprised of: Ministry of Natural Resources and Environment, Resident Representative of UNDP Multi Country Office (Cook Islands, Niue, Samoa &Tokelau) and Directors of key stakeholder ministries and Departments. The project assurance role shall be provided by UNDP Samoa MCO Programme manager and Officers UNDP-GEF Regional Technical Advisor & UNDP-GEF Principal Technical Advisor. Project Assurance also perform the quality assurance role and supports the Project Board and Project Management Unit by carrying out objective and independent project oversight and monitoring functions. The structure of the project team is as follows:

The TNC/FBUR Project Coordinator/Manager/Consultant/ Technical Officer/Data Analyst forms the project implementation team. The responsible parties are the Ministry of Natural Resources and the Ministry of Finance. The Ministry of Natural Resources and Environment act as responsible party of the project by providing it's in-kind support to manage the project and the PMU sits under the Ministry within the Climate Change Division to ensure coordination with all climate change work nationally. The Ministry of Finance is also identified as a responsible party who will ensure coordination with other aids to ensure integrated approach toward meeting the objectives of the project. The thematic working group includes the experts of relevant ministries and agencies as well as representatives of civil society, the academia and business sphere.

Figure 2.2: Current institutional arrangement relevant to National Communications and Biennial Update Reporting in Samoa.



2.3. MRV system for the national GHG inventory

An MRV for national GHG inventory is not yet formalized. The Climate Change Division (CCD) under the MNRE through their role as the national focal point of GEF coordinates the GHG Inventory development. MNRE with support from consultant is developing software-based database for the national GHG inventory. Once developed, training will be provided to all the sectoral experts and relevant stakeholders. However, in the status quo, all the sectoral line ministries have the responsibility of collating and archiving the data required for the development of national GHG inventory. The sectoral line ministries through MoUs and email contacts are collecting data from the state-owned enterprises, private sector organizations, educational institutions, NGOs, which is archived and also submitted to the CCD on quarterly basis for preparing a climate change report. The CCD bears the responsibility of reviewing this data and prepare a climate change report card viz submitted to the cabinet development committee. The GHG Inventory related responsibilities for each of the sector are described in detail here under. Based on the results and learning from the preparation of the First BUR and TNC, Samoa will explore building an MRV for national GHG inventory that builds upon the current as well previous national GHG inventories and database that collects relevant information, existing sectoral and local data monitoring and collection systems, existing institutional network and improved upon the system with integrating new tools (IT enabled), SOPs, capacity building and training, and international best practices to meet the unique requirement and circumstances of Samoa. A description of recommended integrated MRV structure for Samoa is provided in Chapter 6: Additional Observations.

Energy Sector

The lead agency for the sector is the MoF. The Energy Policy Coordination Management Division (EPCMD) within the MoF is responsible for energy planning and policy, development of the Samoa Energy Sector Plan (energy roadmap), and a programme of activities to implement these policies. This division also covers overall monitoring and evaluation of the energy sector, including coordinating national and regional level energy projects and publishing annual energy reviews.

Within this Division, are core units crucial to Energy Organizational Structure in Samoa,

1) Petroleum Management Unit,

2) Energy Database Management Unit (this unit collects, maintains and reviews data from RE (EPC database) and non-RE (PPS database) on an annual basis. The national energy data repository exists within MOF through this Database Unit. All the data from EPC, PPS and other data providers sits within the Energy Database Unit.

3) Energy Efficiency Unit deals with the EE appliances (refrigerators, freezers, ACs and lights), reinforcement of EE Infrastructure (buildings & roads).

4) Energy Policy & Sector Coordination Unit,

The EPCMD has signed MOUs with petroleum supply companies such as Petroleum Products Supplies Limited (PPS). PPS is a privately owned Samoan company established in 2002. In 2003, PPS in partnership with Shell Fiji Ltd, successfully bid for the sole petroleum fuel supply and distribution contract in Samoa. PPS provides data on breakdown of fuels that are sold to other entities. EPC maintains a database of on-going renewable energy projects as well as projects in the pipeline. Whereas the RE division under the MNRE collects data from the EPC on quarterly basis. Electric Power Corporation (EPC) is the sole supplier of electricity in Samoa and maintains a database of on-going renewable energy projects as well as projects in the pipeline.

The Ministry of Natural Resources and Environment (MNRE) is responsible for environmental aspects of energy use including greenhouse gas emissions and climate change matters. The Renewable Energy Division under the MNRE is responsible for promotes climate change mitigation through renewable energy and energy efficiency. Apart from these Ministries, the Scientific Research Organisation of Samoa (SROS) and EPC, as well as NGOs and the private sector, play a role in the implementation of the energy and climate change plans.

AFOLU Sector

The lead agency for the sector is Ministry of Agriculture and Fisheries (MAF) with its six divisions;

1. Corporate Services Division
2. Policy, Planning and Communications Division (houses the Sector Coordination Unit)
3. Crops Division
4. Livestock Division
5. Fisheries Division
6. Quarantine Division

The MAF works closely with the Samoa Bureau of Statistics to strengthen data collection systems, systematization, analysis and reporting. Samoa Bureau of Statistics (SBS) and MAF has a sustainable agricultural statistical system in place centered on annual and biennial data collection activities. While the Forestry division under the MNRE manages and compile data/ information on forest management and utilization.

IPPU sector

Ministry of Commerce, Industry, and Labor is the GHG inventory lead for Industrial Process and Product Use (IPPU).

Waste Sector

The Waste Management Section of the Ministry of Natural Resources and Environment (MNRE) manages the SWM sector. MOH works in conjunction with MNRE and other stakeholders on matters associated with the management and disposal of health care wastes. Whereas the Water and Sanitation Sector under the MNRE are responsible for the overall coordination of the sector wide programmes and providing the data required for GHG inventory.
For QA/QC, the data compiled is send back to the stakeholders for their review before publishing.

Table 2.3: Key sources of data for GHG Inventory

Energy Sector	IPPU Sector	AFOLU Sector	Waste Sector
Electric Power Corporation (EPC)	Ministry of Commerce, Industry & Labour	MNRE – Forestry Division	MNRE – Division of Environment and Conservation
Land Transport Authority (LTA)	Samoa Chamber of Commerce	MAF – Livestock Division	MOH
MNRE- Renewable Energy Division	Samoa Association of Manufacturers and Exporters	MAF – Crop Division	Samoa Recyclers and Waste Management Association
MOF- Energy Division	Small Business Enterprise Centre		Blue Bird Transport Co. Ltd
Samoa Ports Authority (SPA)	Samoa Breweries Ltd		Jaffa Sanitary System Ltd
Samoa Shipping Corporation (SSC)			Apia Lua Co. Ltd
Samoa Tourism Authority (STA)			Tama ole Mau
Scientific Research Organization of Samoa (SROS)			LA painters
Samoa Bureau of Statistics			Jed's Star Ltd
Petroleum Products Supplies Limited (PPS)			2.4. MRV
Clipper Oil			
Origin Energy			

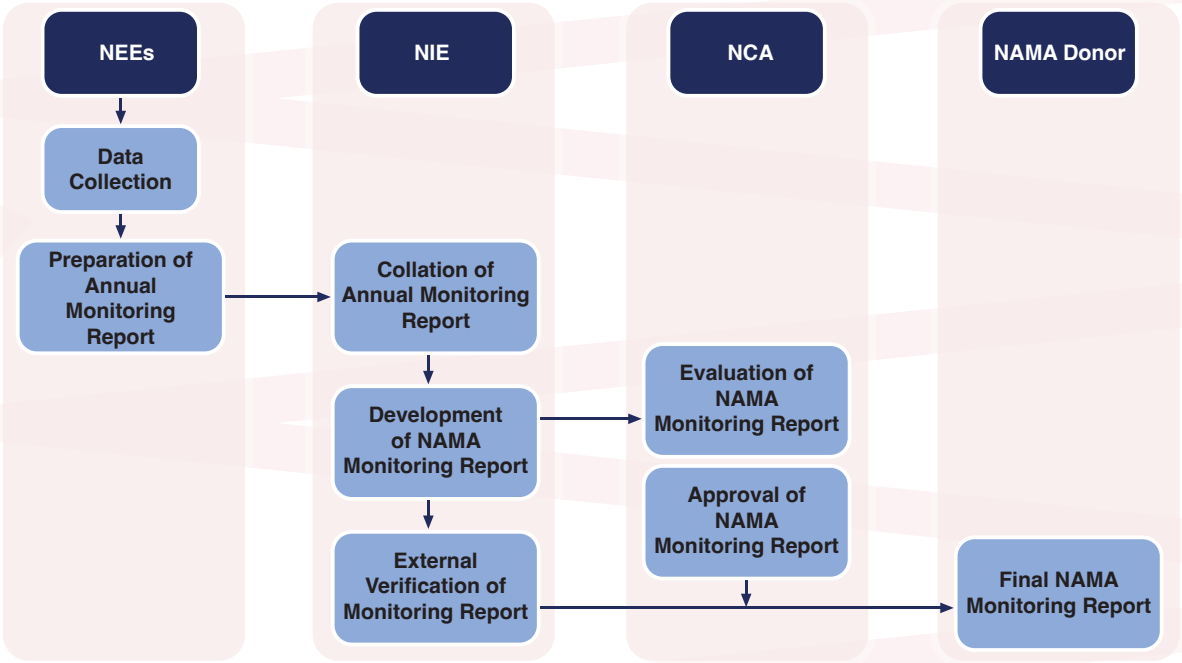
2.4. MRV of Mitigation Actions and NAMA

The coordination of the MRV for mitigation is linked to the coordination of the MRV of the GHG Inventory. Samoa has also developed a transport sector Nationally Appropriate Mitigation Actions (NAMAs) whose primary targets are piloting electric taxis and buses and biodiesel use in diesel vehicle. Implementation of the NAMA will be led by the Ministry of Natural Resources and Environment (MNRE) as the NAMA Coordinating Authority (NCA). The National Energy Coordination Committee (NECC) will act as National NAMA Approver and Focal Point (NA) and Focal Point to the UNFCCC. The role of NAMA Implementing Entity (NIE) will be taken by the Energy Policy and Coordination division, Ministry of Finance will take up the role of NIE in association with LTA and MWTI.

The MRV for Samoa Transport NAMA interventions provides opportunity for assessment of baseline emissions and GHG emission reduction projections from each intervention and associated sustainable development benefits. The main responsibility of the MRV system lies with the NAMA implementing agency i.e., the NIE. The database and the compliance system will be set up by the NIE. The NIE may however delegate some of the tasks to the organizations operating the intervention, i.e., the NAMA Executing Entities (NEEs).

The following figure 2.3, provides an overview of process flow for MRV of NAMA

Figure 2.3: NAMA MRV Management Process Flow



The process flow for the MRV management framework is as follows:

- The monitoring agency, which in case of the Samoa Transport Sector NAMA are the NEEs, will collect the data according to the monitoring plan (as part of their approved application), ensuring they fulfil all related requirements such as record keeping and quality control.
- The NEEs report the monitoring results to the NIE in an annual report.
- The NIE collects all monitoring reports, combines them in a central monitoring database and summarizes the results in a NAMA monitoring report. This report contains information on GHG emission reductions, progress in the SD indicators, and the financial performance of the NAMA activities.
- The report is then forwarded to the NAMA Coordinating Authority (NCA), who then checks and approves the annual monitoring report.
- The NIE also arranges for an external verification entity to verify the annual monitoring report.
- The final monitoring report together with the verification report of the external verifier is submitted to the NAMA donor(s).

2.5. MRV of Finance

Currently, the MoF maintains an internal database of funding secured and expenditures incurred. The country does receive significant investment from donors such as the Green Climate Fund (GCF), the Adaptation Fund, and the Global Environment Facility (GEF), and including multilateral and bilateral funding sources. However, there is no national database or platform which supplies information related to climate support funding.

2.6. MRV for support needed and support received

The MRV for support needed and support received is not yet formalized in Samoa. MoF has the responsibility to collect this information from various sectoral plan, review reports, annual reports and archive this information. Just as in case of MRV for national GHG inventory and mitigation actions, the MRV of support received is envisaged to be developed using the results, learning and assessment of Samoa's capacity during the development of First BUR and TNC. A description of recommended MRV structure for Samoa is provided in Chapter 6: Additional Observations.

3. National Greenhouse Gas Inventory

3.1. Introduction

Samoa is committed to reducing its contribution to global climate change and has taken efforts to measure and reduce greenhouse gas (GHG) emissions. The Samoan Government has made significant progress in its efforts to address climate change since signing the United Nations Framework Convention on Climate Change (UNFCCC) in 1992.

Under its commitments as a non-Annex I Party and as mandated by Article 12 of the UNFCCC and subsequent CoP decisions, Samoa will prepare and submit its Third National Communication (TNC) and First Biennial Update Report (FBUR) to the Conference of Parties (CoP) of the UNFCCC. In addition, under Paragraphs 7 to 10 of Article 13 of the Paris Agreement, it requires each Party to provide a national inventory report regularly, information is necessary to track progress made in implementing and achieving its nationally determined contribution (NDC) information related to climate change impacts. There is a need to support for building institutional and technical capacities In Samoa to meet these enhanced transparency requirements as defined in Article 13 of the Paris Agreement.
In this context, it is necessary to support Samoa's preparation of a high-quality National Communication and Biennial Update Report to be submitted to the UNFCCC. Given the last Second National Communication (2010) findings and the Intended National Determined Contributions (2015), important challenges remain. Although the exercises to prepare these reports have increased capacities to collect and manage data and information to carry out, such as vulnerability assessments, critical data and information gaps remain. Greater collaboration and institutional coordination are needed to ensure that critical understanding of all sectors' data and information needs is adequately understood to move forward with policy implementation.

The current National Inventory Report documents the Samoa greenhouse gas emission inventory in accordance with the revised UNFCCC reporting guidelines on inventories and using the guidelines associated with the preparation of National Communications (Decision 17/CP8) or BUR (Decision 2/CP17). The GHG emission estimates presented in this report include anthropogenic GHG emissions and sinks for Samoa for 2010-2020 from the following four sectors: Energy, Industrial Processes and Product Use (IPPU), Agriculture, Forestry, and Other Land Use (AFOLU), and Waste. This national inventory report includes a description of the methodologies and data sources used for estimating emissions by sources and removals by sinks, an analysis of the key source categories, a discussion of these emission estimates and their trends, information on recalculations, planned improvements, uncertainties and quality assessment and quality control.

3.1.1. Background

Greenhouse gases trap heat in the atmosphere by absorbing infrared radiation, thereby warming the planet. These gases include carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF6) and Nitrogen Trifluoride (NF3). While some the greenhouse gases occur naturally in the environment, human activities have significantly changed their atmospheric concentrations. Globally, GHG emissions continued to rise across all sectors and subsectors; annual anthropogenic GHG emissions have grown and reached a historic high.

The Intergovernmental Panel on Climate Change (IPCC) has assigned Global Warming Potential (GWP) concept to compare the ability of each GHG to trap heat in the atmosphere relative to the reference gas, CO2. Throughout this report the relative contribution of each gas is shown in million metric tons of carbon dioxide equivalent (MMT CO2e.). The GWP values used in this report are from the IPCC Fifth Assessment Report (IPCC 2014), assuming a 100-year time horizon.

Table 3.1: Global Warming Potentials of various gases

Gas	GWP
CO_2	**1**
CH_4	**28**
N_2O	**265**
HFC-32	**675**
HFC-134a	**1.43**

3.1.2. Inventory Scope

The GHG emission estimates presented in this report include anthropogenic GHG emissions and sinks for the Samoa from 2010 to 2020 from the following four sectors:

- Energy, including emissions from stationary combustion, transportation and incineration of waste.
- Industrial Processes and Product Use (IPPU), including emissions from lubricants and substitution of ozone depleting substances.
- Agriculture, Forestry, and Other Land Use (AFOLU), including emissions from livestock and agricultural activities, and land management practices. Specifically, this includes enteric fermentation, manure management, agricultural soil management, field burning of agricultural residues, and urea application as well as agricultural soil carbon, forest fires, landfilled yard trimmings and food scraps, urban trees, and forest carbon.
- Waste, including emissions from waste management and treatment activities such as landfills, composting, wastewater treatment, and incineration of waste.

This inventory was developed in accordance with the 2006 IPCC Guidelines for National Greenhouse Gas Inventories and revised guidelines 2019 to ensure completeness and allow for comparability of results with other inventories.

3.1.3. Methodologies and Data Source

The study relied on the best available activity data, emissions factors, and methodologies to develop emission estimates presented in this report. Emission factors relate quantities of emissions to an activity considered from IPPC guidelines. Key guidance and resources included the 2006 IPCC Guidelines for National Greenhouse Gas Inventories and the 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories). As appropriate and feasible, emissions and removals from source and sink categories included in this report were estimated using both Tier 1 and Tier 2 methodologies that are consistent

with the 2006 IPCC Guidelines. Where applicable, European Monitoring and Evaluation Program/ European Environment Agency (EMEP/EEA) and Air Pollutant Emission Inventory guidebook are used especially in the compilation of estimates of non-methane volatile organic compounds (NMVOC) sulphur dioxide (SO2), carbon monoxide and nitrogen oxides (NOx).
Specific data sources and methodologies used to develop estimates are discussed for each source and sink category in the subsequent sections of this report.

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

The study considered various quality assurance and quality control measures during the development of this inventory to assure the inventory's accuracy and continually enhance the quality. For example, data quality and relevance are evaluated; correct data management and inclusion into Excel workbooks is ensured; the numbers and estimates are checked for accuracy, and clear documentation is provided.

The emission estimates reported in this study were developed using the best available data and methodology. For example, past reports and studies of equivalent detail and complexity were referred to, relevant data inputs were re-evaluated, and targeted data comparisons were conducted across several data sources. The estimation was calculated in the spread sheet. To make QA/QC easier, the spreadsheets are equipped with built-in automated error checks. An extensive review process will take place before this report is finalized in order to ensure that all results transcribed from the workbooks are accurate.

3.2. Emissions Results

3.2.1. GHG Emissions in Samoa

In 2020 Samoa's GHG emissions totalled approximately 496,332 tons of CO2 equivalents (tCO2e). The GHG inventory also estimated CO2 removals in forests, which totalled -850,568 tons in 2020

Table 3.2: Total GHG emission from all the sources in the year 2020

SECTOR	tCO_2	CH_4 (tCO_2e)	N_2O (tCO_2e)	HFC(tCO_2e)	Total (tCO_2e)	Percentage
Energy	229395	268	507	NO	230170	46.37%
Upolu (Sources)	NE	125207	12556	NO	137763	27.76%
Waste	93	104436	NA	NA	104529	21.06%
Industrial Process and Product Use	251	NO	NO	23619	23870	4.81%
TOTAL					**496332**	**100.00%**

NO – Not Occurring, NE- NE (not estimated)

Greenhouse gas source and sink categories CO2	CO_2 Emissions (Gg)	CO_2 Removals (Gg)	CH_4 (Gg)	N_2O (Gg)	CO (Gg)	NO_x (Gg)	NMVOC (Gg)	SO_2 (Gg)
Total National Emissions and Removals	**229.74**	**-850.57**	**229.74**	**13.06**	**0.06**	**0.12**	**0.04**	**0.09**
1 ENERGY	**229.40**		**0.27**	**0.51**	**0.06**	**0.12**	**0.04**	**0.09**
1A Fuel Combustion Activities	229.40		0.27	0.51	0.06	0.12	0.04	0.09
1A1 Energy Industries (electricity y generation)	69.33		0.0786	0.1488	0.0152	0.0608	0.0007	0.0435
1A2 Manufacturing Industries and Construction	19.47		0.0221	0.0418	0.0379	0.0379	0.0379	0.0379
1A3 Transport (subtotal)	138.67		0.165	0.312	0.004	0.017	0.000	0.012
1A3a Civil Aviation (Domestic Aviation)	NE		NE	NE	NE	NE	NE	NE
1A3b Road Transport	135.40		0.16	0.30	0.12	0.00	0.09	0.28
1A3c Waterborne Navigation (Domestic Shipping)	3.27		0.0037	0.0070	0.0029	0.0000	0.0020	0.0064
1A4 Other Sectors (subtotal)	1.93		0.0022	0.0042	0.0004	0.0017	0.0000	0.0012
1A4 a Commercial/Institutional	IE		IE	IE	IE	IE	IE	IE
1A4 b Residential	IE		IE	IE	IE	IE	IE	IE
1A4 c Agriculture/ Forestry/ Fishing/ Fish Farms	1.93		0.0022	0.0042	0.0004	0.0017	0.0000	0.0012
1A5 Non-Specified	IE		IE	IE	IE	IE	IE	IE
1B Fugitive Emissions from Fuels	NO		NO	NO	NO	NO	NO	NO
1C Carbon Dioxide Transport and Storage	NO				NO	NO	NO	NO
2 INDUSTRIAL PROCESSES AND PRODUCT USE	**0.25**		**NE**	**NE**	**NE**	**NE**	**NE**	**NE**
2A Mineral Industry	NO		NO	NO	NO	NO	NO	NO
2B Chemical Industry	NO		NO	NO	NO	NO	NO	NO
2C Metal Industry	NO		NO	NO	NO	NO	NO	NO
2D Non-Energy Products from Fuels and Solvent Use	0.25		NE	NE	NE	NE	NE	NE
2D1 Lubricant Use	0.25				NE	NE	NE	NE
2D2 Paraffin Wax Use	0.00		NE	NE	NE	NE	NE	NE
2D3 Solvent Use	NE		NE	NE	NE	NE	NE	NE
2D4 Other (please specify)	NE		NE	NE	NE	NE	NE	NE
2E Electronics Industry	NO		NO	NO	NO	NO	NO	NO
2F Product Used as Substitutes for Ozone Dep. Subst.	NA		NA	NA	NA	NA	NA	NA
2G Other Product Manufacture and Use	NA		NA	NA	NA	NA	NA	NA
2G1 Electrical Equipment	NO		NO	NO	NO	NO	NO	NO
2G2 SF6 and PFCs from Other Product Uses	NO		NO	NO	NO	NO	NO	NO
2G3 N2O from Product Uses (medical uses)	NE		NE	NE	NE	NE	NE	NE
2G4 Other	NA		NO	NO	NO	NO	NO	NO

Table 3.3. National greenhouse gas inventory of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol and greenhouse gas precursors.

Greenhouse gas source and sink categories CO2	CO_2 Emissions (Gg)	CO_2 Removals (Gg)	CH_4 (Gg)	N_2O (Gg)	CO (Gg)	NO_x (Gg)	NMVOC (Gg)	SO_2 (Gg)
2H Other (please specify)	NA		NA	NA	NA	NA	NA	NA
2H1 Pulp and Paper Industry	NO		NO	NO	NO	NO	NO	NO
2H2 Food and Beverages Industry	NE		NE	NE	NE	NE	NE	NE
2H3 Other (Ammonia Use)	NA		NA	NA	NA	NA	NA	NA
3 AGRICULTURE, FORESTRY AND OTHER LAND USE	**NA**	**-850.57**	**125.21**	**12.56**	**NA**	**NA**	**NA**	**NA**
3A Livestock			125.21	3.51				
3A1 Enteric Fermentation			73.92					
3A2 Manure Management			51.29	3.51				
3B Land	NA	-850.57	NE	NE	NA	NA	NA	NA
3B1 Forest Land	NA	-850.57	NE	NE	NA	NA	NA	NA
3B2 Cropland	NA	NE	NE	NE	NA	NA	NA	NA
3B3 Grassland	NA	NE	NE	NE	NA	NA	NA	NA
3B4 Wetlands	NA	NE	NE	NE	NA	NA	NA	NA
3B5 Settlements	NA	NE	NE	NE	NA	NA	NA	NA
3B6 Other Land	NA	NE	NE	NE	NA	NA	NA	NA
3C Aggregate Sources and Non-CO2 Emissions Sources on Land	NA		NE	9.048	NA	NA	NA	NA
3C1 Biomass Burning	NA		**NE**	**NE**	NA	NA	NA	NA
3C2 Liming	NA							
3C3 Urea Application	NA							
3C4 Direct N2O Emissions from Managed Soils				9.05				
3C5 Indirect N2O Emissions from Managed Soils				NE				
3C6 Indirect N2O Emissions from Manure Management				NE				
3C7 Rice Cultivations			NO				NO	
3C8 Other (please specify)	NO		NO	NO	NO	NO	NO	NO
3D Other	NO		NO	NO	NO	NO	NO	NO
4 WASTE	**0.09**		**104.44**	**NA**	**NA**	**NA**	**NA**	**NA**
4A Solid Waste Disposal	NA		69.18		NA		NA	
4A1 Managed Waste Disposal Sites	NA		69.18		NA		NA	
4A2 Unmanaged Waste Disposal Sites	NA		NE	NA	NA	NA	NA	NA
4A3 Uncategorised Waste Disposal Sites	NA		NE	NA	NA	NA	NA	NA
4B Biological Treatment of Solid Waste	NA		NE	NA	NA	NA	NA	NA
4C Incineration and Open Burning of Waste	0.09		NE	NA	NA	NA	NA	NA

Table 3.3. National greenhouse gas inventory of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol and greenhouse gas precursors.

Greenhouse gas source and sink categories CO2	CO_2 Emissions (Gg)	CO_2 Removals (Gg)	CH_4 (Gg)	N_2O (Gg)	CO (Gg)	NO_x (Gg)	NMVOC (Gg)	SO_2 (Gg)
4C1 Waste Incineration	0.09288		NE	NA	NA	NA	NA	NA
4C2 Open Burning of Waste	NE		NE	NA	NA	NA	NA	NA
4D Wastewater Treatment and Discharge	NA		35.25	NA	NA	NA	NA	NA
4D1 Domestic Wastewater Treatment and Discharge	NA		35.25	NA	NA	NA	NA	NA
4D2 Industrial Wastewater Treatment and Discharge	NA		NE	NA	NA	NA	NA	NA
4E Other (please specify)	NO		NO	NO	NO	NO	NO	NO
5 OTHER	**NA**		**NA**	**NE**	**NA**	**NA**	**NA**	**NA**
5A Indirect N2O Emissions from the Atmospheric Deposition of Nitrogen in NOx and NH3	NA		NA	NE	NA	NA	NA	NA
5B Other (please specify)	NO		NO	NO	NO	NO	NO	NO
Memo items(5)								
International Bunkers (subtotal)	24.86		0.0285	0.0539	0.005494286	0.022044973	0.000271323	0.015770635
International Aviation (International Bunkers)	8.73		0.0102	0.0193	0.001966626	0.007890782	9.71173E-05	0.005644944
International Water-borne Transport (International Bunkers)	16.14		0.0183	0.03462	0.00352766	0.014154192	0.000174205	0.010125691
Multilateral Operations	NO		NO	NO	NO	NO	NO	NO

Table 3.3. National greenhouse gas inventory of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol and greenhouse gas precursors.

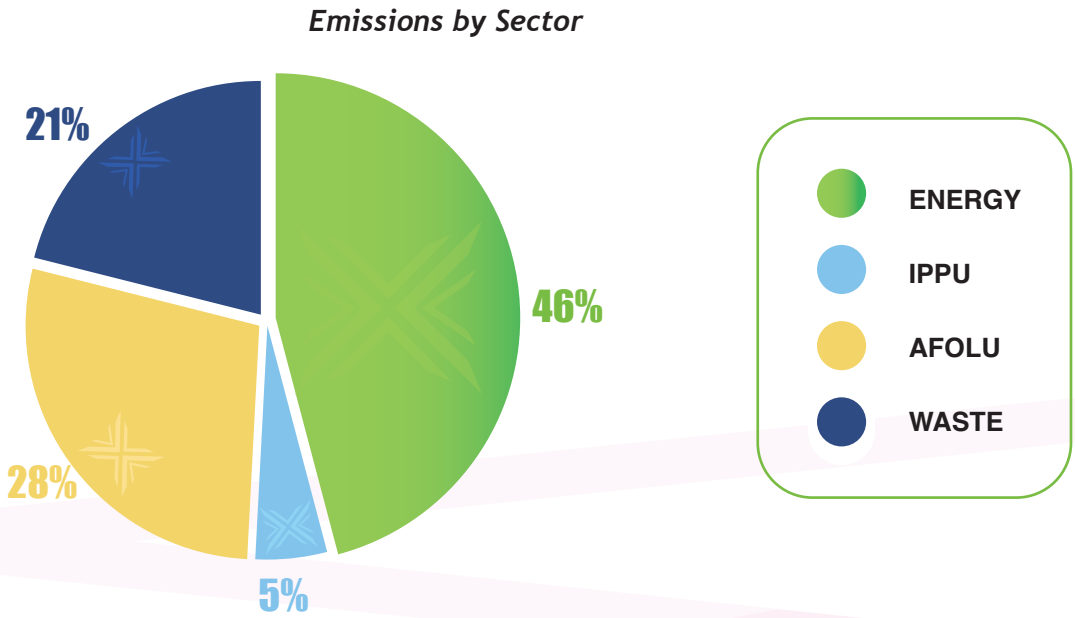
Key: *NA = not applicable, NE = not estimated, NO = not occurring, IE = Included Elsewhere*

Greenhouse gas source and sink categories CO2	HFCs(Gg)						PFCs(Gg)			SF_4
	HFC-32	HFC-134a	R404A	HFC-407C	HFC-507A	R410A	CF_4	C_2F_4	Other	
Total National Emissions and Removals	**0.230180**	**2.496520**	**12.892624**	**0.081200**	**0.111750**	**7.806611**	**NO**	**NO**	**NO**	**NO**
1 ENERGY										
1A Fuel Combustion Activities										
1B Fugitive Emissions from Fuels										
1C Carbon Dioxide Transport and Storage										
2 INDUSTRIAL PROCESSES AND PRODUCT USE	**0.230180**	**2.496520**	**12.892624**	**0.081200**	**0.111750**	**7.806611**	**NO**	**NO**	**NO**	**NO**
2A Mineral Industry										
2B Chemical Industry										
2C Metal Industry										
2D Non-Energy Products from Fuels and Solvent Use										
2E Electronics Industry										
2F Product Uses as Substitutes for Ozone Depleting Substances	0.23018	2.49652	12.89262425	0.0812	0.11175	7.8066108	NO	NO	NO	NO
2F1 Refrigeration and Air Conditioning	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F2 Foam Blowing Agents	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F3 Fire Protection	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F4 Aerosols	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F5 Solvents	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F6 Other Applications	0.230180	2.49652	12.89262425	0.0812	0.11175	7.8066108	NO	NO	NO	NO
2G Other Product Manufacture and Use										
2H Other (please specify)										
3 AGRICULTURE, FORESTRY AND OTHER LAND USE										
3A Livestock										
3B Land										
3C Aggregate Sources and Non-CO2 Emissions Sources on Land										
3D Other										
4 WASTE										
4A Solid Waste Disposal										
4B Biological Treatment of Solid Waste										
4C Incineration and Open Burning of Waste										
4D Wastewater Treatment and Discharge										
4E Other (please specify)										
5 OTHER										
5A Indirect N2O Emissions from the Atmospheric Deposition of Nitrogen in NOx and NH3										
5B Other (please specify)										
Memo items(5)										
International Bunkers (subtotal)										
International Aviation (International Bunkers)										
International Water-borne Transport (International Bunkers)										
Multilateral Operations										

Key: *NA = not applicable, NE = not estimated, NO = not occurring, IE = Included Elsewhere*

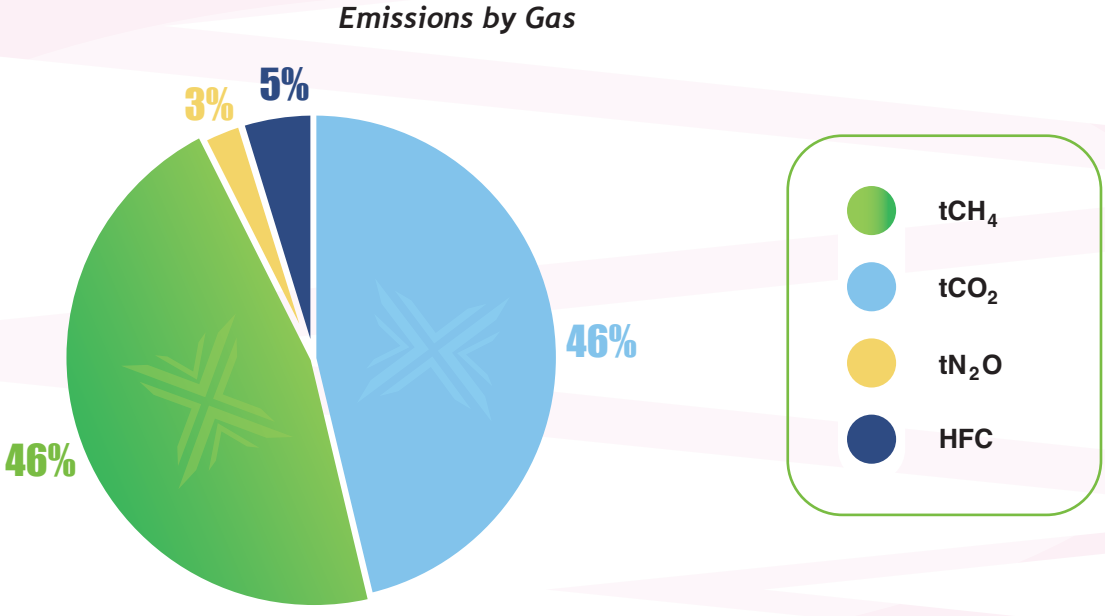
The energy sector is the main source of GHG emissions, accounting for 46% of the national total (Figure 3.1). This is followed by the Agriculture, Forestry and Other Land Use (AFOLU) sector, which accounts for 28% of emissions. Emissions from the Waste and Industrial Processes and Product Use (IPPU) sectors make up 21% and 5% of total CO2e emissions, respectively.

Figure 3.1: GHG emissions percentage in Samoa in the year 2020 for different sources



Carbon dioxide and methane were the most important GHG emitted in Samoa in 2020, accounting for 46% and 46% of total CO2e emissions respectively. HFC and Nitrous Oxide are the next two most significant gases, accounting for 5% and 3% respectively. However, the results of these other gases are presented in the figure 3.2 below.

Figure 3.2: Contribution of each GHG to total CO2e emissions (2020)

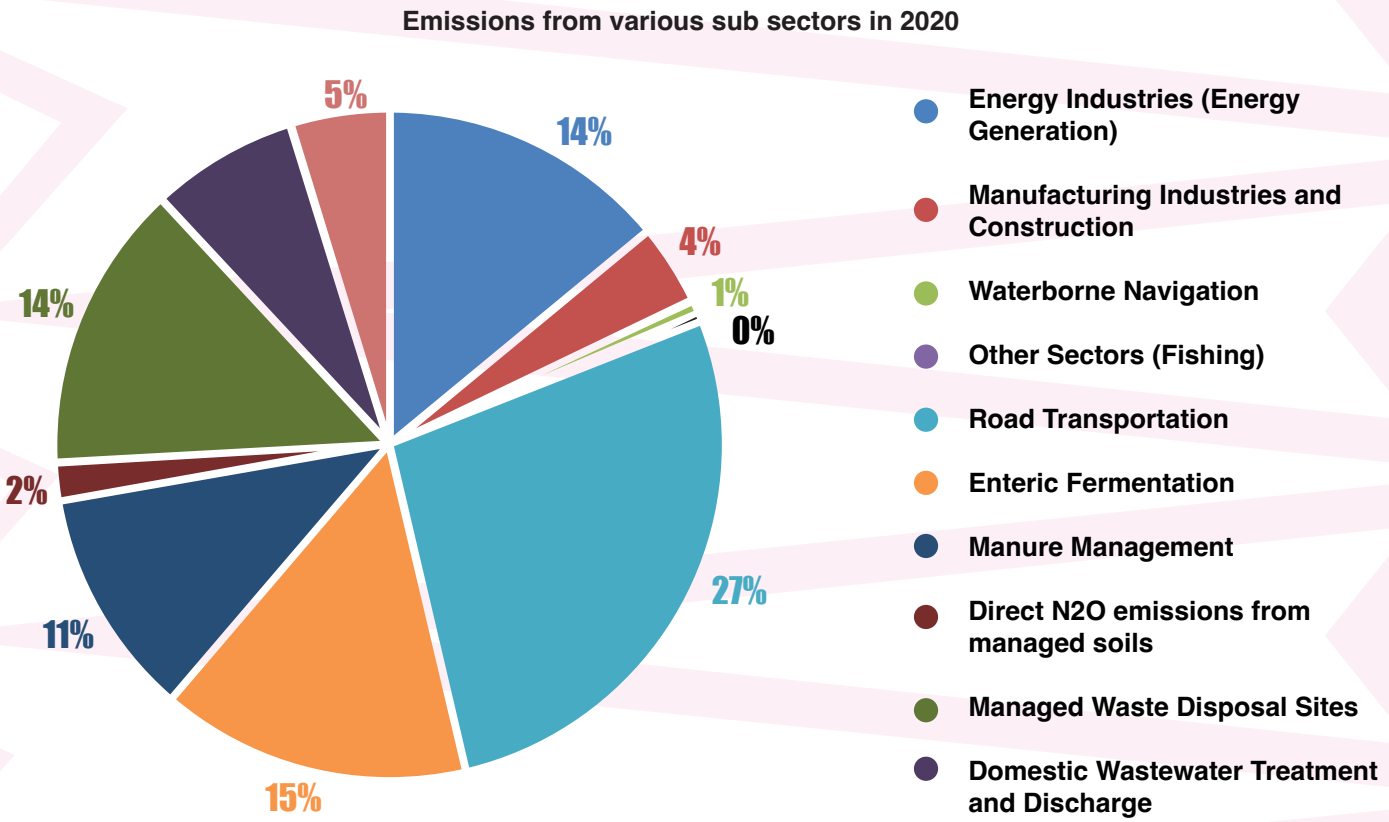


Emissions from various sub-sectors of Energy, AFOLU, waste and IPPU sectors are depicted in table 3.5 below. The Road transport sub-sector has the highest contribution to the total emissions in Samoa, accounting to about 27.37 percent followed by Emissions from Enteric Fermentation, accounting for about 14 percent emissions. The least contributing sub-sector is the lubricating greases from IPPU, accounting for about 0 percent followed by Waste incineration from the waste sector, accounting for 0.02 percent.

Table 3.5: Emissions from various sub-sectors in 2020

Subsector	Emissions in 2020 (tCO_2e)	Percentage in total emissions
Road Transport	135868	27.37%
Enteric Fermentation	73919	14.89%
Energy Industries (Energy Generation)	69553	14.01%
Managed Waste Disposal Sites	69183	13.94%
Manure Management	54797	11.04%
Domestic Wastewater Treatment and Discharge	35253	7.10%
Product Uses as Substitutes for Ozone Depleting Substances	23619	4.76%
Manufacturing Industries and Construction	19538	3.94%
Direct N2O emissions from managed soils	9048	1.82%
Waterborne Navigation	3276	0.66%
Other Sectors (Fishing)	1935	0.39%
Lubricant Use	251	0.05%
Waste Incineration	93	0.02%
Paraffin Wax Use	1	0.00%

Figure 3.3: Emissions from various sub sectors in 2020



3.2.2. Emissions Trends

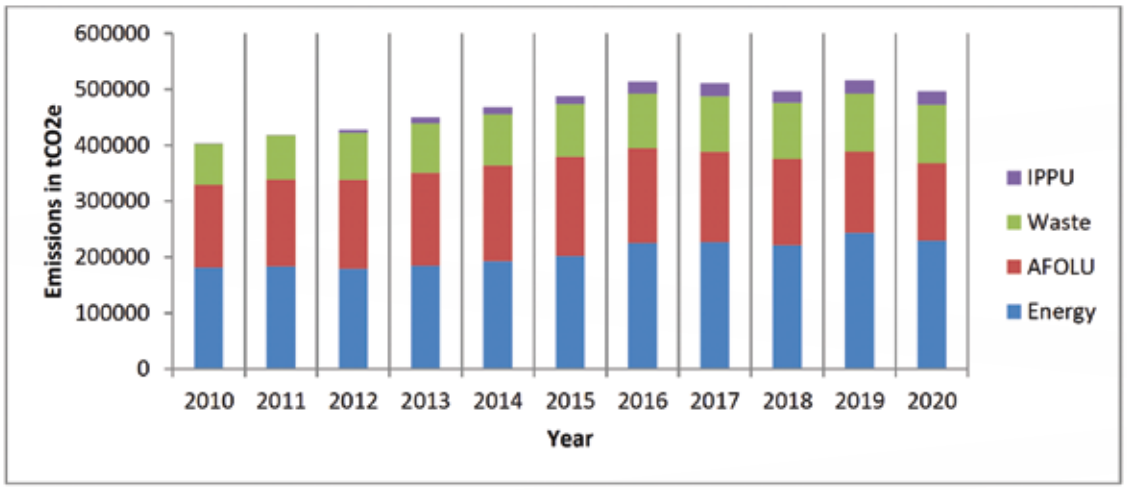
Emission Trend by Sector:

Total GHG emissions in Samoa grew by 23 percent between 2010 and 2020. Although emissions decreased by less than 4 percent between 2019 and 2020, Figure 3.4 shows emissions for each inventory year by sector. Emission by source and year are also summarized in Table 3.6.

Table 3.6: Sector wise emissions from 2010 to 2020

SECTOR/ YEAR	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Energy (tCO_2e)	181726	184151	178960	185590	192775	202087	225451	227130	221744	243732	230170
AFOLU (tCO_2e)	147494	154673	159548	165574	171601	177646	169666	161686	153691	145726	137763
Waste (tCO_2e)	73911	79041	83697	87801	91202	94398	97033	99106	101093	102858	104529
IPPU (tCO_2e)	313	333	163	191	0	104	226	136	128	203	24527

Figure 3.4: Sector wise emissions trend from 2010 to 2020



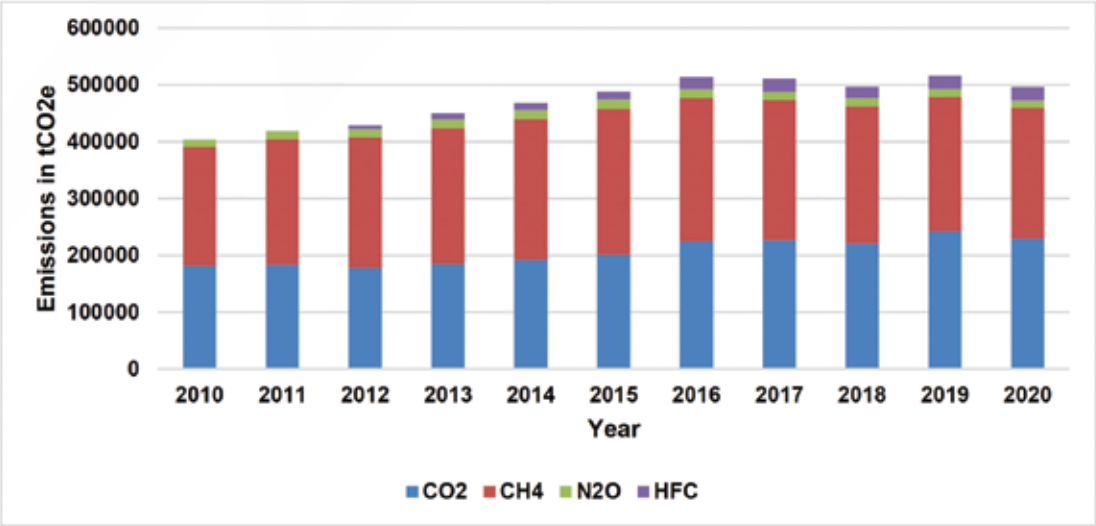
As the largest source of emissions in Samoa, the Energy sector is a major driver of the overall emissions trends, accounting for 46.37 percent of the emissions in 2020. Relative to 2010, emissions from the Energy sector in 2020 were higher by 26.66 percent. An emission from AFOLU is the second largest contributor in emission sources, relative to 2010, emissions from the AFOLU sector is fallen down by 6.59%.

Emission Trend by Gas:

Methane (CH4) gas stands as the highest contributor to the overall emissions in Samoa, followed by CO2. The emissions associated with CH4 increased in 2020 compared to 2010 by around 9%. The emissions associated with CO2 have increased till 2019 relative to the emissions in 2010. In comparison to 2019, the emissions associated with CO2 reduced 2020 by 5.5%. The overall emissions segregated gas-wise are summarized in Table 3.7 below.

GAS/ YEAR	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
CO_2	181429	183867	178523	185159	192128	201512	224919	226502	221126	243116	229740
CH_4 (tCO_2e)	209041	220617	229551	239026	247799	256386	251736	246498	241152	235645	229911
N_20 (tCO_2e)	12974	13715	14294	14972	15651	16337	15721	15057	14378	13758	13063
HFC (tCO_2e)	0	0	5653	11140	12328	13762	21459	22705	20085	23684	23619

Figure 3.5: Gas wise emission trend from 2010 to 2020



The figure 3.5 clearly depicts the emissions trend from 2010 to 2020. It is evident that the CO2 emissions show an increasing trend whereas the CH4 emissions show a decreasing trend in 2020 relative to 2010.

3.3. Energy

3.3.1. Overview of Sector

The energy sector includes emissions from fuel combustion. Samoa consists of two major islands i.e., Upolu and Savaii energy demand profiles, reflecting contributions from the fossil fuel and renewable energy sources. The energy sector, including power and transport, has long accounted for the major part of Samoa's greenhouse gas emissions and emissions of carbon dioxide dominate overwhelmingly in this sector. However, energy sector's carbon dioxide emissions per capita in recent years are relatively low in Samoa compared with other Pacific nations. This is due to the relatively high use of solar, wind and hydropower, low use of fossil fuels, and limiting industrialization. In Samoa, renewables made up 55 percent of electricity generation in 2021, much of it from hydropower (32 percent). It can be seen that in the energy sector, emissions of CO2 contribute about 46.37 percent of total greenhouse ga emissions (in CO2 equivalents) in 2020. Emissions of total greenhouse gases from the energy sector have increased by 26.66 %, from 181,726 tCO2e in 2010 to 230,170 tCO2e in 2020, mainly due to increased fossil fuel consumption in the land transport and increased power demand.

3.3.2. Emissions in Energy sector

The ground transportation sector stands out as the most contributing sub-sector towards emissions in all the sub-sectors of the energy sector, followed by Stationary combustion (mainly public electricity and heat production).

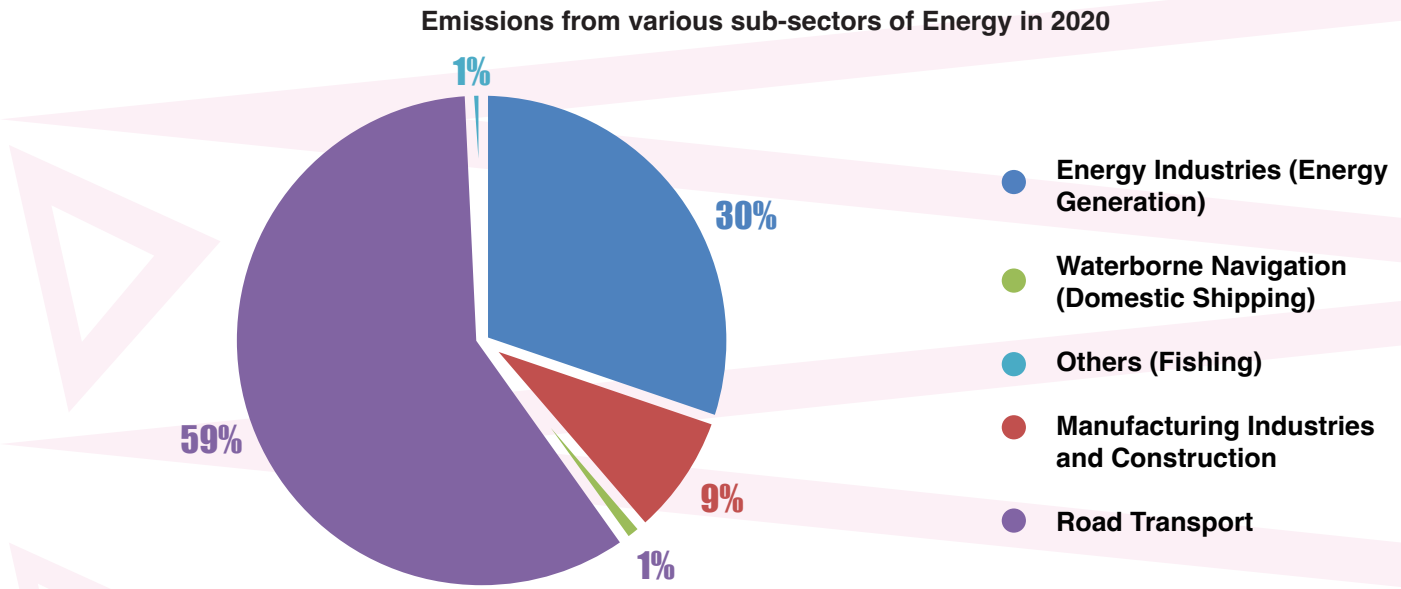
The ground transportation sector (i.e., government and service stations) accounts for the largest part of the energy sector's GHG emissions, accounting for about 59% in 2020. Emissions from stationary combustion account for the second most emission sources with about 39% (Energy Industries (Energy Generation) accounts for about 30%, and the manufacturing industries and construction sector accounts for about 9%) of total energy sector emissions in 2020. Despite, increased generation of renewable in the energy generation sector, it still contributes around 30% of total emissions. The waterborne navigation sector (including the domestic fishing boats) contributes for about 2% of total emissions from the energy sector in 2020.

The table 3.8 below depicts the amount of emissions and the respective percentages from various sub-sectors of the energy sector in 2020.

Table 3.8: Emissions from various sub-sectors of Energy in 2020

Sub-sector Name	Emissions in 2020 (tCO_2e)	Percentage
Road Transport	135868	59.0%
Energy Industries (Energy Generation)	69553	30.2%
Manufacturing Industries and Construction	19538	8.5%
Waterborne Navigation (Domestic Shipping)	3276	1.4%
Others (Fishing)	1935	0.8%

Figure 3.6: Emissions from various sub-sectors of Energy in 2020

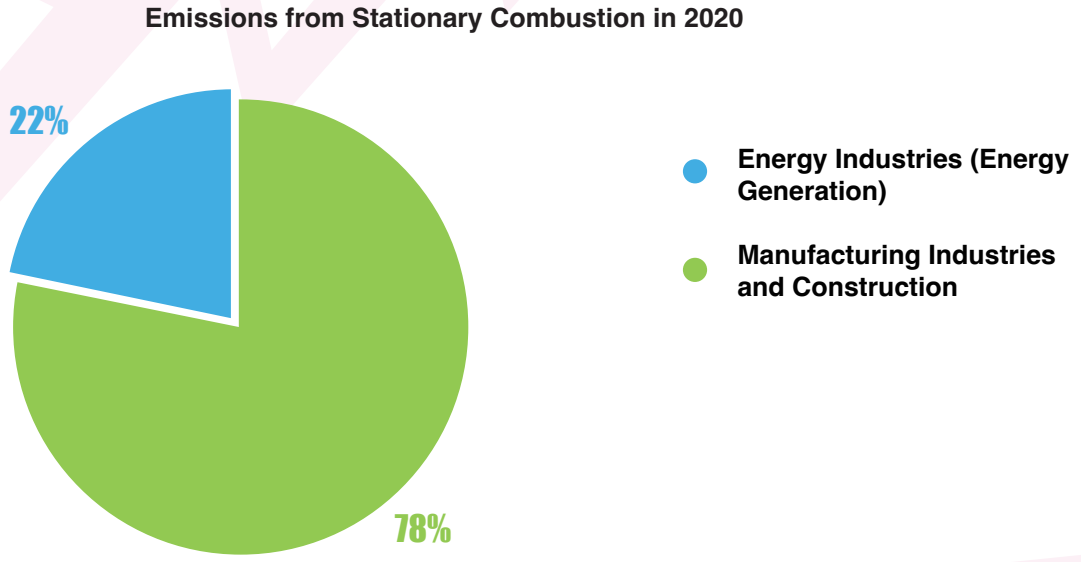


3.3.3. Stationary Combustion (IPCC Source Categories 1.A.1, 1.A.2, 1.A.4, 1.A.5)

Stationary combustion emissions can be broken out by economic sector (i.e., energy industries, residential, commercial, and industrial), based on where the fuel is combusted. In 2020, emissions from stationary combustion in Samoa were 89,091 tCO2e, accounting for 38.7 percent of energy sector emissions. The vast majority of these emissions are from Energy Industries (Energy Generation) sector which is 69,553 tCO2e, and operates electric power plants. Of these, the emissions from use of Automotive Gas Oil (AGO) form about 99% and the rest 1% is from Dual Purpose Kerosene (DPK).

The manufacturing industries and construction sector accounted for 22% of stationary combustion emissions. This category covers emissions from Samoa's manufacturing and construction sector, predominantly through heavy machinery and equipment use. Significant investment in infrastructure and growth in other areas of the economy are the main drivers of fuel consumption in this sector, resulting in GHG emissions of 19,538 tCO2e in 2020. Figure 3.7 shows the economic sector's breakout of stationary combustion emissions for 2020.

Figure 3.7: 2020 Stationary Combustion Emissions by Economic Sector



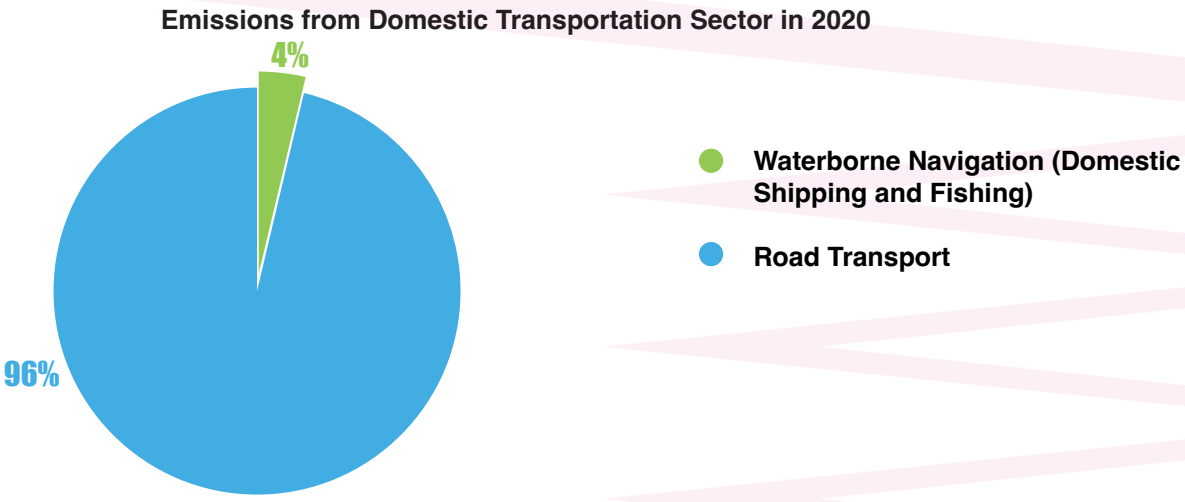
Fuel consumption data by end-use sector were obtained from the Ministry of Works, Transport and Infrastructure (MWTI), Samoa and Electric Power Corporation (EPC for all years. For commercial fuel consumption, it consists of ULP, AGO and DPK. It is assumed that all these fuels from the commercial establishment were used for energy generation.

3.3.3.1. Domestic Transportation (IPCC Source Category 1A3b and 1A3dii)

Emissions from transportation result from fuel combustion for road transportation (includes passenger cars, light trucks, two-wheelers and heavy-duty vehicles (i.e., trucks and buses)) and waterborne navigation (fishing boats, yachts and domestic bunker fuels). In 2020, emissions from transportation activities (both government and service stations) in Samoa were 135,868 tCO2e accounting for 59 percent of energy sector emissions. Of these emissions, the emissions from use of Unleaded petrol (ULP) are about 70 percent (95,752 tCO2e), Automotive Gas Oil (AGO) are about 30 percent (38,933 tCO2e) and Dual Purpose Kerosene (DPK) emissions are almost negligible in comparison(1184 tCO2e). Road transport accounted for the largest portion of transportation emissions (96 percent) followed by water navigation (4 percent) in the domestic transportation sector. Figure 3.8 shows the breakout of transportation emissions by end-use sector for 2020.

About 97 percent of the total road transportation emissions are from the service stations sector and about 3 percent are from the Government sector.

Figure 3.8: 2020 Transportation Emissions by End-Use Sector



3.3.3.2. International bunker fuels (Navigation) (IPCC Source Category 1.A.3.d.i)

Emissions from international bunkers for navigation are not included in the national total but instead reported separately. This source category covers all water-borne transport from recreational craft to large ocean-going cargo ships that are driven primarily by large, slow and medium-speed diesel engines and occasionally by steam or gas turbines. Marine bunker fuel consumption was calculated based on the estimated amount of Automotive Gas Oil (AGO) and a small amount of Unleaded Petrol (ULP) consumption used for international trips. Fuel consumption data by end-use sector were obtained from the Ministry of Works, Transport and Infrastructure (MWTI), Samoa for all years. The greenhouse gas (GHG) emissions from international navigation were 16,189 tCO2e in 2020.

3.3.3.3. International Bunker Fuels (Aviation) (IPCC Source Category 1.A 3.a.i)

Emissions from international aviation are not included in the national total but instead reported separately. The greenhouse gas (GHG) emissions from international aviation were 8,758 tCO2e in 2020, which is significantly lower than the emission from the previous year, which was 43,538 tCO2e due to disruption of air travel during the year 2020. The reason for this prominent decrease in emissions is the COVID-19. International travel was restricted entirely, with the exception to emergency services. The emission is expected to increase to the pre-COVID era in future years. Aviation bunker fuel consumption was calculated based on the amount of jet fuel (Dual Purpose Kerosene (DPK) used for international trips each year. Fuel consumption data by end-use sector were obtained from the Ministry of Works, Transport and Infrastructure (MWTI), Samoa for all years.

3.3.4. Indirect and Pre-cursor Emissions

Emissions of oxides of nitrogen (NOX) totalled 415 t in 2020 and CO is 217 tonnes. Emissions of non-methane volatile organic compounds (NMVOCs) were estimated at 5 t in 2020, while only 624 t of SOx was emitted. The study refers the EMEP/CORINAIR Guidebook (now this Guidebook) for the purpose of estimating emissions of SOx, CO, NOx, and NMVOCs.

3.4. AGRICULTURE, FORESTRY AND OTHER LAND USES (AFOLU)

This chapter presents GHG emissions from sources and GHG removals from sinks from agricultural activities, land use, changes in land use, and land management practices. For Samoa, emissions and removals from agriculture, forestry, and other land use (AFOLU) are estimated from the following source and sink categories: Enteric Fermentation (IPCC Source Category 3A1); Manure Management (IPCC Source Category 3A2 and 3C6); Agricultural Soil Management (IPCC Source Categories 3C4); Urea Application (IPCC Source Category 3C3); and Forest Carbon (IPCC Source Category 3B1a). In Samoa, urban trees data were unavailable, so forest carbon is only considered under CO2 sinks. In 2020, total emissions (excluding sinks) from the AFOLU sector were 137,763 tCO2e accounting for 28 percent of total Samoa.

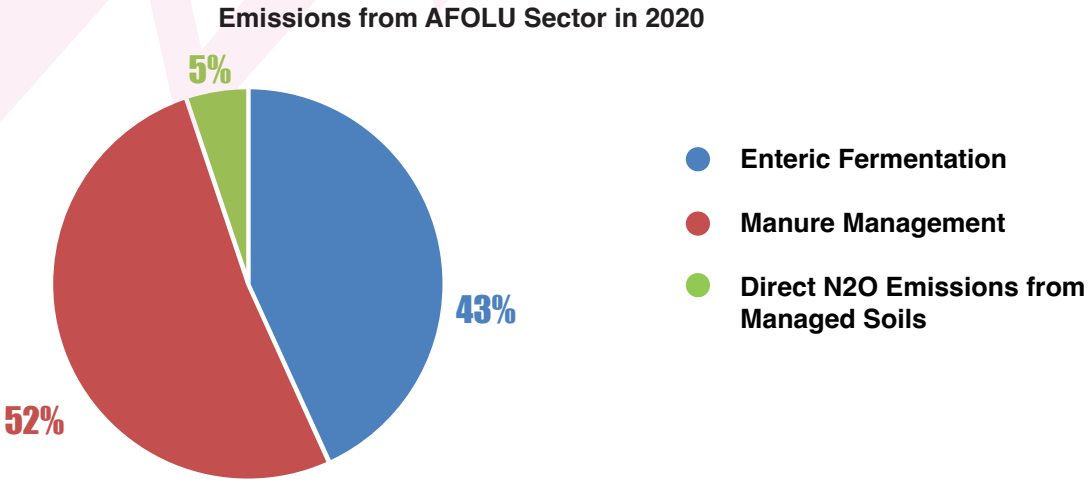
3.4.1. Overview of the sector

Enteric emission accounted for the largest share of AFOLU emissions, followed by manure management. The below figure 3.9 shows emissions from the AFOLU sector by source for 2020.

Table 3.9:Category wise Emissions in tCO2e in the year 2020

Emission Category	Total Emission (tCO_2e)
Enteric Fermentation	73,919
Manure Management	54,797
Direct N_2O Emissions from Managed Soils	9,048
Total (tCO_2e)	137,763

Figure 3.9: GHG emission contribution from different sectors under AFOLU for 2020



3.4.2. Emissions from Enteric Fermentation (IPCC Source Category 3A1)

This inventory estimates comprise only farm animals' emissions in households and institutions. Emissions from wild and semi-domesticated animals are not quantified, nor are emissions from humans or pet animals. In 2020, CH4 emissions from enteric fermentation were 73,919 tCO2e, accounting for 54 percent of AFOLU sector emissions. CH4 emission from enteric fermentation is a key source, both by level and trend. Dairy cows and non-dairy cattle (including other cows) are significant sources: dairy cows represent 74.67% of total CH4 emissions from enteric fermentation, while other cattle represent about 20.89% of total CH4 from enteric fermentation. Jointly, cattle are responsible for 95.56% of total CH4 emissions from enteric fermentation in 2020.

The contribution of all other animals to methane emissions from enteric fermentation, e.g., sheep, swine, horses, and goats, listed here according to the importance of their contribution, is a little more than 5%. Population data for livestock were obtained directly from the Ministry of Agriculture and Fisheries Samoa.

3.4.3. Manure Management (IPCC Source Category 3A2 and 3C6)

Emissions of CH4 related to manure handling and storage are reported under 'Manure Management.' In 2020, emissions from manure management were 51,289 tCO2e associated with methane emissions from manure management and 3,508 tCO2e associated with Nitrous oxide emissions from manure management.

Dairy and non-dairy cattle (including other cows) are significant sources: swine represents 65%, dairy cows represent 33% of total CH4 emissions from manure management, and swine represents about 69.5% of total N2O from manure management. Population data for livestock were obtained directly from the Ministry of Agriculture and Fisheries Samoa.

3.4.4. Liming and Urea Fertilization

Farmers' lime and urea are not reported during 2020 although a minor emission source was reported during 2007.

3.4.5. Agricultural Soil Management (IPCC Source Categories 3C4)

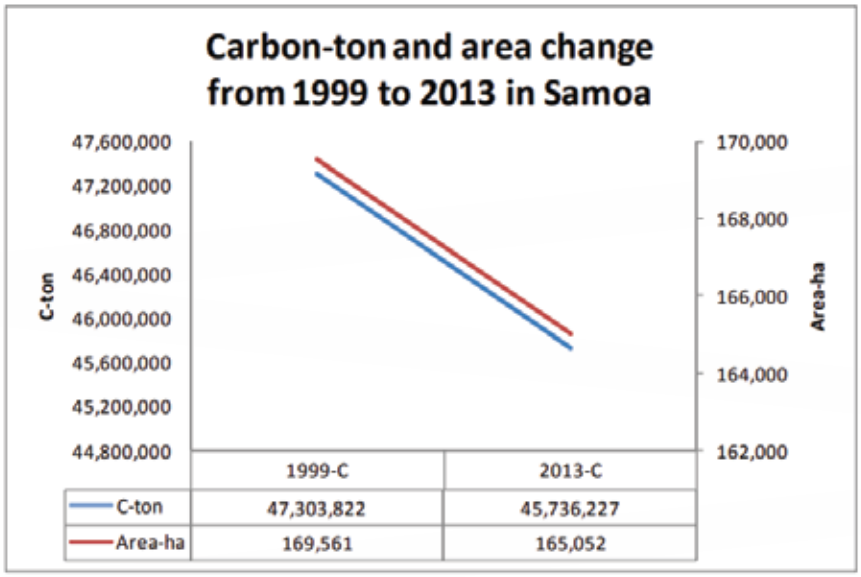
Applied synthetic fertilizer (FSN) and Applied organic N fertilizers (FON) are not reported due to the minor usage of these fertilizers. In addition, N mineralization is associated with loss of soil organic matter resulting from the change of land use or management of mineral soils (FSOM); and drainage/management of organic soils used by farmers are not reported during the year 2020 due to limited data availability. This section only reported emissions associated with urine and dung N deposited on pasture, range and paddock by grazing animals (FPRP).

In 2020, emissions from urine and dung from grazing animals were 9048 tCO2e accounting for 6.55 percent of AFOLU sector emissions.

3.4.6. Forest Carbon (IPCC Source Category 3B1a)

Samoa has developed the National Forest Inventory in the year 2013. The National Forest Inventory (NFI) sub-component was established through interview surveys and forest surveys in Upolu and Savaii. The study captured information related to landowners, land users, and the production and usage of non-timber forest products. The 2013 forest survey focused on tree biomass and non-tree biomass field surveys, field data entry processing and analysis, and reporting. Based on the forest area in 2013, the current carbon stock for each forest type over Samoa was estimated. The country's total carbon is 45,736,227 ton, which is composed of 8,814,724 ton in Upolu and 36,921,502 ton in Savaii. Most of the carbon (63%) in Savaii is derived from Medium Dense Forest (FM). Savaii island has a larger area of Medium Dense Forest (FM) where higher soil carbon content. Forest-based carbon stock in Samoa decreased from 1999 to 2013 (-1,567,595 c-ton or -3% against 1999), corresponding to the decrease of the forest area.

Figure 3.10: Carbon ton in forest area in Samoa in 1999 to 2003



Samoa's GHG inventory also includes estimates of CO2 removals in forests. The inventory does include CO2 removal and no emissions due to logging and fuel wood extraction and any clearing of forests. The study used the Tier 1 Gain Loss Method outlined by the 2006 IPCC Guidelines (IPCC 2006) to calculate carbon flux in managed Samoa forests. It is estimated that the net carbon removal in the forest and plantation is 850,568 net CO2e removals.

The total different type of forest and total area in Hectare for Samoa is given below:

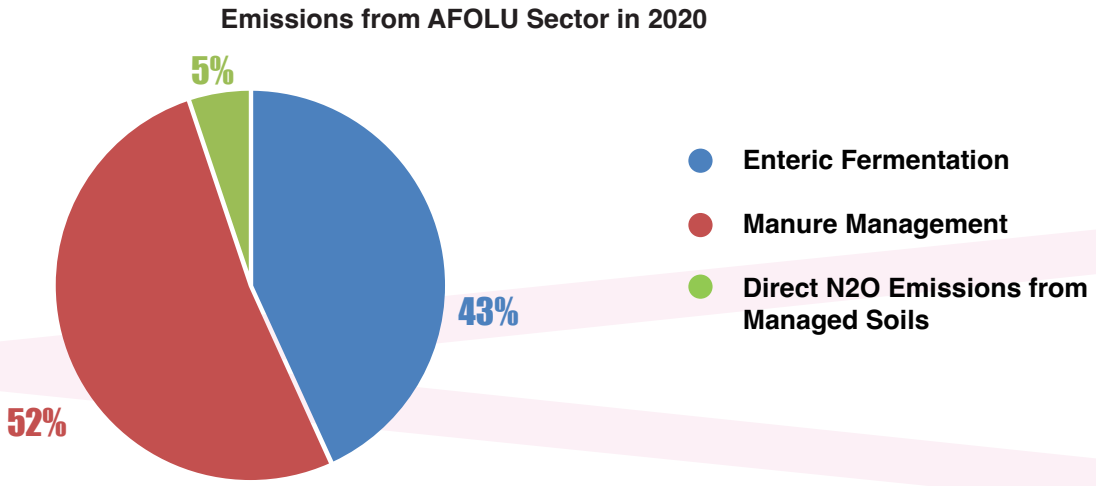
Table 3.10: Total different type of forest and total area in Hectare for Samoa

Row Labels	Aleipata Islands	Apolima	Manono	Nuusafee	Savaii	Upolu	Grand Total
Native Forest	117.7				92180.47	31565.39	123863.56
Non-Forest	30.79	99.13	185.64	1.54	56215.89	61587.99	118120.98
Plantation Forest					4549.25	493.68	5042.93
Secondary Forest			105.57		17254.55	18782.28	36142.4
Grand Total	**148.49**	**99.13**	**291.21**	**1.54**	**170200.16**	**112429.34**	**283169.87**

3.5. Waste

For Samoa, waste sector emissions are estimated from the following sources: Solid Waste Disposal (IPCC Source Category 4A1), and Wastewater Treatment (IPCC Source Category 4D) and Incineration and Open Burning of Waste (4C1 and 4 C2). In 2020, emissions from the Waste sector were 104,529 tCO2e, accounting for 21% of total Samoa emissions. Emissions from Solid Waste Disposal accounted for the largest share of Waste sector emissions (66.19 percent), followed by emissions from wastewater treatment (33.73 percent) and incineration and open burning of waste constitutes 0.11 percent of total emission. The below figure 3.11 depicts emissions from Waste sector in 2020.

Figure 3.11: Emission from Waste Sources in 2020



3.5.1. Solid Waste Disposal (IPCC Source Category 5A1)

A survey on Waste Generation Amount and Waste discharged amount were conducted in 2020. As a survey result, the waste disposed of at Tafaigata Landfill: 0.27 kg per person per day. The waste audit had identified that around 39 tons of waste per day are disposed of at the landfill site. The study has considered a population of 198000 during the year 2020 for Samoa which represents 77% population from Upolu. MSW is dumped, spread over a wide surface area, and covered with soil. This method unnecessarily exposes people to large areas of waste and increases the potential of rain infiltration. The disposal surface is generally untidy, with large areas of scattered wastes. Conventional composite liner systems are not installed in the facility, although basic compaction of the underlying soils is completed before placing waste. When placed in landfills, aerobic and anaerobic bacteria decomposes organic material in municipal solid waste (MSW) (e.g., paper, food scraps, and wood products). As a result of these processes, landfills generate biogas consisting of approximately 50 percent biogenic CO2 and 50 percent CH4, by volume. Consistent with IPCC (2006), biogenic CO2 from landfills is not reported in the Waste sector. In 2020, CH4 emissions from landfills in Samoa were 69,183 tCO2e.

Consistent with the methodology, potential MSW landfill emissions were calculated using IPCC Tier 1 first-order decay (FOD) model, which looks at the waste landfilled since the operation of the landfill site in the year 2006. Data on the tons of waste landfilled per year in Samoa for 2006 through 2020 were considered based on available data from MNRE, Samoa and waste generation and waste discharged audit. Historical MSW generation and disposal volumes from 2006 were assumed based on the findings from the waste audit.

3.5.2. Wastewater (IPCC Source Category 5A1)

Wastewater produced from domestic, commercial, and industrial sources varies in Samoa. It is treated either on-site (e.g., in septic systems) or in central treatment systems to remove solids, pathogenic organisms, and chemical contaminants in Samoa. During the wastewater treatment process, CH4 is generated when microorganisms biodegrade soluble organic material in wastewater under anaerobic conditions. The centralized wastewater treatment plants operating in Samoa has a capacity of 1 MLD that meets the Apia Township requirement. Septic tanks are the main domestic wastewater disposal systems in use in Samoa, with a declining number of households using pit latrines. In 2020, emissions from wastewater treatment in Samoa were 35,253 tCO2e accounting for 40.41 percent of Waste sector emissions.

3.5.3. Incineration and Open Burning of Waste (IPCC Source Category 4C1 and 4C2)

This category covers emissions from the incineration of hospital waste by the Ministry of Health and the open burning of residential waste. Emissions from incineration of hospital waste are relatively minor, totalling approximately 92 tCO2e in 2020.

According to the most recent waste audit, the open burning of waste remains a challenge for Samoa. However, no data is available on the open burning of the waste. Thus, no emission has been considered under open burning.

3.6. INDUSTRIAL PROCESSES AND PRODUCT USE (IPPU)

In 2020, emissions from the IPPU sector were 24,527 tCO2e accounting for 5 percent of total Samoa's emissions. Emissions from the substitution of ozone-depleting substances accounted for most emissions from the IPPU sector, representing 99 percent of total emissions.

3.6.1. Lubricant Use (IPCC Source Category 2F)

Using lubricant oils and greases results in a small amount of CO2 being emitted into the atmosphere. The data on lubricating oils and greases has been considered from the import data for the year 2010 to 2020. This accounts for approximately 4.97% of total CO2 emissions in 2020. Emissions from this source are 251 tCO2e in 2020, of which lubricating oil contributes 251 tCO2e and Greases contribute 1 tCO2e.

CO2 emissions are calculated by using IPCC (2006) Tier 2 methodology, with aggregated default data for the limited parameters available and the ODU factor based on a default composition of oil and greases in total lubricant.

3.6.2. Emissions of Fluorinated Substitutes for Ozone Depleting Substances (IPCC Source Category 2F)

In Samoa, the leading HFC refrigerants, far and away, are HFC 32, HFC-134a and the mixtures R404A, and R410A. In 2020, HFC emissions in Samoa were 23,619 tCO2e, accounting for 99 per cent of IPPU sector emissions.

The table 3.11 below details the Global warming Potential of Hydrofluorocarbon and the total quantity of HFC consumption during 2020.

Table 3.11: Emissions from the IPPU Sector in tCO2e

	A	B	C	D	E	F
	Quantity of HFCs Sold in Inventory Year	Quantity of HFCs Sold in Prior Year	Emission Factor (Loss of Current Year's Use)	Emissions of HFCs from Other Applications	Global Warming Potential	Emissions of HFCs from Other Applications
Chemical (please specify)	(ton)	(ton)	(fraction)	(ton)	GWP	tCO_2e
				D = A * C + B * (1 - C)		F=D*E
HFC 32	0	0.68	50%	0.34	677	230
HFC134a	2.7728	1.068	50%	1.9204	1300	2497
R404 A (R125 (44%), GWP = 3170, R143a (52%), GWP = 4800,R134a (4%), GWP = 1300)	3.31868	3.2208	50%	3.26974	3943	12893
R 407 C (R134a(52%), GWP=1300, R125 (25%), GWP=3170, R32 (23%), GWP=677)	0	0.1	50%	0.05	1624	81
HFC 507A (R125 (50%), GWP=3170, R143 (50%), GWP=1300)	0	0.1	50%	0.05	2235	112
R 410 A (R-32 (50%),R-125 (50%)	3.6472	4.472	50%	4.0596	1923	7807

In contrast to source categories in which emissions are calculated based on production data or are directly monitored at a small number of point sources, emissions of HFCs can occur from thousands of types of equipment from different sources, including refrigeration and air-conditioning units, aerosols, and solvents. However, emissions by sub-category are not captured under the current database in Samoa due to non-availability of data.

4. Mitigation Actions

4.1. Overview

Climate Change is the single greatest global threat to the sustainable development, livelihoods, security and wellbeing of the people of the Pacific and the rest of the world. As one of the twenty-one Pacific Island countries and territories dispersed across the sprawling Pacific Ocean, Samoa faces similar economic challenges related to remoteness, exposure to natural hazards, climate change and limited resources. Extreme events related to climate change such as cyclones and flash floods pose the biggest immediate threat to Samoa's biophysical environment as it is to its social and economic aspirations.

Samoa, a Party to the United Nations Framework Convention on Climate Change (UNFCCC), ratified the Kyoto Protocol in 2000 and the Paris Agreement in April 2016. Samoa's GHG emissions are negligible by global standards (0.0006 of global total emissions). Nonetheless, Samoa is committed to playing its part to reducing the greenhouse gas emissions that are causing global warming as well as reducing its dependence on fossil fuels in order to contribute to the Paris Agreement primary goal- to keep the average global temperature rise well below 2oC degrees and as close as possible to 1.5 oC above pre-industrial levels.

4.1.1. International Commitments

The 2nd National Communications Report for Samoa submitted in 2010 provided the 2nd update of the Greenhouse Gas Inventory for Samoa, key measures of mitigating greenhouse gas emissions as well as a description of its vulnerabilities and impacts from climate change. Key mitigation options/ priorities identified in the report for improvements included; energy efficiency through demand side management, increase in the use of renewable energy through the expansion of hydropower capacity and wind power, transport fuel efficiency improvements, avoided deforestation, Reforestation, organic waste recycling and phased out open burning.

In its INDC submitted to the UNFCCC in 2015, Samoa committed to reducing its GHG emissions from the Electricity sub sector through the adoption of a 100% Renewable energy target for electricity generation through to the year 2025. The government of Samoa was committed to increasing the use of renewables for electricity generation to improve sustainability and strengthen Samoa's energy sector through the reduction of the use of fossil fuels which would provide significant economic benefits by reducing expenditure on fuel imports. However, this commitment i.e 100% was conditional on reaching the 100% renewable electricity generation target in 2017 was conditional on receiving international assistance to maintain through to 2025. With limited financial capability and other constraints, Samoa's ability to make faster progress in reducing emissions was short of its target. [31]

[31] *Samoa's NDC Implementation Roadmap and Investment Plan 2021*

The renewable energy percentage in Samoa in 2021 was 50 percent. This is an increase in renewable energy share by 24 percentage points (from 26 percent in 2014). Although the share of renewable energy has increased, total electricity generation also increased from 126,800MWh in 2014 to 132,000MWh in 2019. While Samoa was one of the few countries that accounted for an increase in generation when setting its NDC targets, this increase still partially offsets the reduction in GHG emissions from increased renewable energy.

In the face of emerging challenges and inexorable disruptions such as the COVD19 Pandemic to progressing with its mitigation actions, Samoa has strengthened its commitments to the urgency of the Paris Agreement through the development of its Second NDC. This Second NDC states that Samoa aims to reduce overall GHG emissions by 26 percent in 2030 compared to 2007 levels (or by 91 Gg CO2e compared to the new reference year once Samoa's GHG emissions inventory has been updated). The mitigation priorities in the 2nd NDC focused mainly on opportunities to reduce emissions in the energy sector (including electricity, land transport, maritime transport, and tourism), the waste sector, and the AFOLU sector. However, GHG reduction targets were not identified for IPPU sector as it represents a small fraction of Samoa's total emission and also due to the lack of available data on IPPU emissions. The key Mitigation targets for the different sectors are;

- Energy: Samoa aims to reduce GHG emissions in the energy sector by 30 percent in 2030 compared to 2007 levels (or by 53 Gg CO2 e compared to the new reference year once the GHG emissions inventory is updated)

- Waste Sector: Samoa set the target of reducing GHG emissions in the waste sector by 4 percent in 2030 compared to 2007 levels (or by 1.2 Gg CO2 e compared to the new reference year once the GHG emissions inventory is updated).

- AFOLU: Samoa set the target of reducing GHG emissions in the AFOLU sector by 26 percent in 2030 compared to 2007 levels (or by 35.2 Gg CO2 e compared to the new reference year once the GHG emissions inventory is updated)[32]

However, due to the deficiency of capacity within the sectors. These mitigation targets weren't be able to verify quantitatively in term of GHG reduction at the moment.

In putting together, the 2nd NDC, key constraints identified to mitigation projects across the priority sectors include budget limitations, human capacity (including the number of staff available and experience required), public awareness, regulatory, legal, and institutional constraints, market structure, and data deficiencies.[33]

Samoa's Nationally Appropriate Mitigation Actions developed in 2018 contained information on what needed to be accomplished by Samoa as her contribution to the global efforts in reducing emissions from road transportation i.e., sustainable transportation systems as well as climate change mitigation opportunities. The main focus was on the Transport Sector as the highest emitter in the energy sector.

Through this same commitment, Samoa is taking urgent action to combat climate change and its impacts as per Sustainable Development Goal 13 and the relevant SDGs.

4.1.2. National Context

The national development planning framework for Samoa notably the Strategy for the Development of Samoa (SDS) provides the national priorities and strategies for economic, social, infrastructural and environmental developments and improvements over a 4-year timeframe for Samoa. Under the new government administration post 2021 elections, the updated version is now known as the Pathway for the Development of Samoa (PDS) for the time period 2021-2026. Within the reporting period, the key national development planning frameworks which provided direction for national developmental efforts included the Strategy for the Development of Samoa (SDS) 2008-2012, SDS 2012-2016, SDS 2016-2020. Initially Climate Change mitigation efforts in its initial stages focused mainly on the reduction of greenhouse gas emissions through increased renewable energy uses, energy efficiencies, sustainable transport systems, the phasing out of ozone –depleting substances and increased public awareness and educational programs. With greater importance placed on climate change mitigations and adaptations over the years, the mainstreaming of climate change and disaster risk management considerations into the sector planning processes were encouraged across all sectors of the government. As such, regulatory frameworks, institutional and coordination frameworks, systems, processes and procedures were developed and strengthened to facilitate the planning, coordination, programming, implementation, performance monitoring and reporting of mitigation actions nationally, regionally and globally. Investments in research and development have also increased with the main focus on more efficient and effective methods of implementation.

32 Samoa Second NDC 2021 pg 16
33 Samoa's NDC Implementation Roadmap and Investment Plan 2021

The renewed national development plan, the Pathway for the Development of Samoa 2021-2026 has re-empathized and re-enforced Samoa's commitments for a low carbon future. Nevertheless, Samoa continue to persist through its clean energy transition efforts to utilizing solar, wind and hydropower in concurrent with improving access to affordable and reliable power sources. The Government will continue to support new projects that have minimal impacts on the environment, such as small hydro plants. It will encourage innovation and use appropriate means to stimulate investment in renewable energy projects. In the transport sector, policies and plans will be strengthened to to explore alternatives and ensure supply chains is in place for substitution of petroleum fuels with biodiesels and biofuels and increase application of hybrid and electric vehicles. Increased resources will be dedicated towards latest research and development of clean alternative fuels such as biofuels and renewable energy fuelled charging stations for electric vehicles. In parallel, the careful management, storage, handling and monitoring of petroleum products to ensure public safety and efficient distribution remains a top priority.

The Samoa National Climate Change Policy 2020 is a key policy which sets out Samoa's plan of action and the interventions needed across all sectors, civil society, private sector and at the community level, to build resilience to the impacts of climate change in line with the nation's sustainable development objectives and to meet its regional and international obligations. Samoa, a Party to the United Nations Framework Convention on Climate Change (UNFCCC), is committed to playing its part to reducing the greenhouse gas emissions that are causing global warming and to reducing its dependence on fossil fuels. The eight broad objectives identified for this Climate Change Policy are as follows:[34]

i. Establish an effective Governance framework and support systems in place for effective response to climate change impacts.
ii. Implement Adaptation measures to protect Samoa from the impacts of climate change
iii. Implement Mitigation measures to reduce greenhouse gas emissions including matters relating to the Nationally Determined Contributions (NDC)
iv. Implement measures to enhance sustainable climate finance
v. Effectively mainstream climate change adaptation and mitigation into national planning, implementation and monitoring processes
vi. Improve data and information management on climate change for informed decision making
vii. Strengthen effective Coordination and representation at the national, regional and international Level.
viii. Promote and implement effective awareness, education and advocacy activities on climate change issues

The National Strategic, Policy and Legislative framework which makes up the Mitigation sector are detailed in the following table 4.1.

Table 4.1: National Strategic/ Policy/ Legislative Framework

Document title	Description
National Plans/ Strategies/ Reports	
Samoa 2040 (2021)	This document provides a roadmap to navigate Samoa's development over the next twenty years. It focuses on tourism, agriculture and fishing, digital economy, and labor mobility, with the goal of boosting economic growth, creating employment, generating government revenues, and raising standards of living. Samoa 2040 complements the Strategy for the Development of Samoa (SDS).
Strategy for the Development of Samoa (SDS) 2016-2020 (2016)	This strategy identifies four priority areas of development and 14 key outcomes to be achieved for Samoa.
Pathway for the Development of Samoa (PDS) 2021-2026	The renewed strategy for the development of Samoa identifies the priority areas for development to be achieved within the noted time period.
Second National Communication to the UNFCCC (2009)	This document provides information on the progress made by Samoa in implementing the United Nations Framework Convention on Climate Change (UNFCCC) and includes the national inventory of anthropogenic GHG emissions (based on 2007 figures).
GHG Inventory (2007)	This document presents Samoa's GHG emissions, covering the years 1994-2007. This emissions profile in this document is the most recent GHG emissions for Samoa.
Samoa's Nationally Determined Contribution (NDC) (2015 and 2021)	This document is the committed contribution of the Independent State of Samoa under the Paris Agreement of the United Nations Framework Convention on Climate Change (UNFCCC). Samoa submitted its First NDC in 2015[35] and submitted its Second NDC in July 2021.[36]

35 *https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Samoa%20First/Samoa%20INDC_Submission%20to%20UNFCCC.pdf*
36 *https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Samoa%20Second/Samoa%27s%20Second%20NDC%20for%20UNFCCC%20Submission.pdf*

Table 4.1: National Strategic/ Policy/ Legislative Framework

Document title	Description
National Plans/ Strategies/ Reports	
National Appropriate Mitigation Actions Plan (NAMA) (2018)	This plan contains Samoa's strategic commitment to reducing GHG emissions in the transport sector.
Greenhouse Gas Abatement Strategy 2020-2030 (draft 2021)	This strategy has been released in draft form and is not yet publicly available. It reviews and updates the previous GHG Abatement Strategy (2008-2018), identifies gaps, and explores sectors to achieve further greenhouse gas emission reductions.
Inclusive Governance Policy 2021-2031 (2021)	This policy aims to ensure that all decision-making bodies and groups are inclusive of all voices who live in the community. While this policy has close links with the Gender Equality and Rights of Women and Girls Policy and the Persons with Disability national policy, this policy focuses on social inclusion at all levels, from government and urban to rural and village-based community structures.
Community Integrated Management Plans (CIM Plans) (2018)	CIM Plans (for each district of Samoa) are envisaged as blueprints for climate change interventions across all development sectors, reflecting the programmatic approach to climate resilience adaptation taken by the GoS. The CMI Plans are linked to the Strategy for the Development of Samoa 2016/17 – 2019/20 and the relevant ministry sector plans.
National Environment Sector Plan 2017-2021 (NESP) (2017)	This plan updates the NESP 2013-2016 and outlines a roadmap to achieve four long-term outcomes. These goals include sustainable management and development of natural resources and environment, increasing the sustainability and resilience of Samoa's built environment, and climate change and disaster risk management across all sectors.
Energy Sector Plan 2017-2022 (2017)	This plan identifies the main areas for development in Samoa's energy sector. It has a particular focus on renewable energy, electricity services, energy efficiency, transport, petroleum management, and sector coordination.
Transport Sector Plan 2013-2018 (2013)	This plan is a sector framework to guide the development and funding of the transport sector to ensure environmentally sustainable, energy-efficient, and socially responsible transport sector. The plan focuses on improving and climate-proofing Samoa's road transport network, maritime services, air transport services.
Water and Sanitation Sector Plan (WSSP) (2017)	This plan covers the period 2016-2020 outlines the plan to address climate change impacts on water resources, expand the water resources, address capacity gaps, and improve awareness on hygiene and sanitation issues.
Agriculture Sector Plan 2016-2020 (ASP)	This plan provides the framework to guide coherent programs and actions from all key stakeholders to achieve the goal of increased food, nutrition, and income security in Samoa.
Tourism Sector Plan 2014-2019 (2014)	This plan is a roadmap to grow Samoa's tourism sector sustainably.
Samoa Ocean Strategy (SOS) (2020)	This strategy outlines a pathway towards sustainable management of Samoa's ocean and marine resources, including protecting ecological habitats and marine wildlife, and safeguarding important sources of food, income and economic growth derived from Samoa's ocean.
National Waste Management Strategy 2019-2023 (NWMS)	This strategy guides the waste management of Samoa for the period of 2019 to 2023 and sets out goals, including targeting solid wastes and chemical and hazardous wastes.

Table 4.1: National Strategic/ Policy/ Legislative Framework

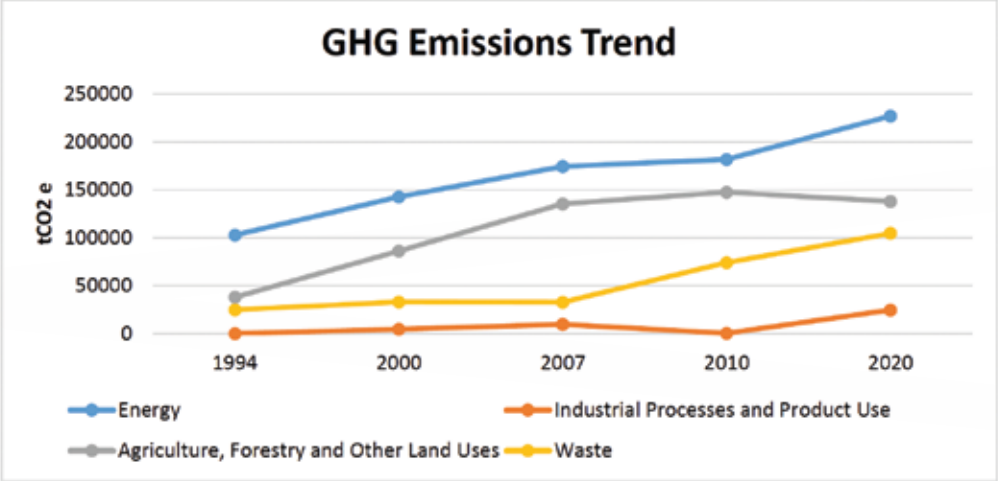
Document title	Description
National Policies/ Legislations/ Codes/ Standards	
Samoa's Climate Change Policy 2020	Climate Change Policy set out Samoa's plan of action and the interventions needed across all sectors, civil society, private sector and at the community level, to build resilience to the impacts of climate change, in line with the nation's sustainable development objectives and to meet its regional and international obligations.
National Building Code of Samoa (NBC) (2017)	A performance-based set of standards that provides objectives and descriptions of how a building and site should be constructed to achieve a structurally-sound and sustainable built environment.
Energy Management Act 2020	This Act sets minimum energy performance standards (MEPS)
Planning and Urban Management (Environment Impact Assessment) Regulations 2007	These regulations clarify the environment impact assessment (EIA) process and requirements. Regulations are supported by the Planning and Urban Management Act 2004.
Land Transport Authority Act 2007	This Act established the Land Transport Authority (LTA) and mandated it to provide a safe and environmentally friendly land transportation network for Samoa.
Planning and Urban Management Act 2004	The Act legislates a framework for planning the use, development, management, and protection of land in Samoa in the present and long-term interests of all Samoans and for related purposes.
Ministry of Works Act 2002	This Act reformed the law relating to public works by re-defining the role of the Public Works Department through the transfer of some of its functions to the private sector, and by revising the Department's functions and powers in relation to the regulation of building construction, planning, urban management and the provision and maintenance of roads, bridges, seawalls and related public assets.
Fisheries Management Act 2016	This Act regulates and controls the conservation, management, and development of fisheries and the licensing of Samoan fishing vessels and foreign fishing vessels.
Marine Pollution Prevention Act 2008	This Act aims to prevent pollution to the marine environment and legislates for responses to marine pollution incidents emanating from vessels, and other matters related to the implementation of international marine pollution conventions.
Shipping Act 1998	This Act consolidated and amended the law relating to Shipping and Seamen and to control the registration, safety, and manning of ships, and to give effect to various international maritime conventions, and for related purposes.
Waste Management Act 2010	This Act provides for the collection and disposal of solid waste and the management of all wastes in Samoa, and for related purposes.
National Forest inventory (NFI)	To provide accurate information about the size, distribution, composition and condition of our forests and woodlands and also about the changes taking place in the woodlands through time
Samoa Forestry Management act 2011	This act make provision for the effective and sustainable management of national forestry resources, and related purpose.
Samoa Water Authority (Sewerage and Wastewater) Regulations 2009	These regulations make provision with respect to sewerage and wastewater functions of the Authority and matters regarding sewerage in Samoa. Regulations are supported by the Samoa Water Authority Act 2003.
Samoa Water Authority Act 2003	This Act legislates the continued operations of the Samoa Water Authority (established by the Water Authority Act 1993/1994), promotes its financial independence and its role as a provider of economically viable services through an accountable management structure.

4.2. Mitigations Analysis by Sector

4.2.1. Overview

In Samoa, the four main sectors involved in implementing the national mitigation priorities are the Energy, AFOLU, Waste and IPPU. Greenhouse Gas Inventories conducted in 1994, 2007 and the most recent one in 2020 document Samoa's greenhouse gas emission inventory in accordance to the UNFCCC reporting guidelines. Over the years, Samoa's GHG emissions fluctuated but mostly increased as reflected and compared according to sectors in the figure 4.1 below. Energy, Waste and IPPU sectors emissions continue to increase over the year whilst there has been a drop of emissions in the AFOLU sector towards 2020.

Figure 4.1: GHG Emissions Trend (1994-2020)



4.2.2. Energy Sector

At the national level, political commitment to renewable energy manifested itself through the work of the Energy Sector spearheaded by the relevant stakeholders such as Electric Power Corporation (EPC), Ministry of Natural Resources and Environment (MNRE) and the Ministry of Finance (MoF). These government ministries have been working in-collaboration to facilitate the implementation of broad-spectrum programmes, including harnessing renewable resources for power generation, renewable energy projects for households, industries and commercial applications in urban and rural areas, and the development of alternate fuels and applications.

As the largest contributor to emissions in Samoa, the Energy Sector is a major driver of the overall trends amounting to 46.37% of the total GHG emissions in 2020. An increase by 26.66% from 2010 levels and 30% from 2007 levels of GHG emissions. The Energy sector is one of the key sectors that is looking into feasible climate mitigation actions to reduce GHG emissions.

The National Energy sector is regulated through the Energy Management Coordination Division housed under the Ministry of Finance, also the leading agency responsible for Energy Efficiency efforts, in collaboration with other Ministries and corporations governed though several instruments such as policies, strategies, institutions, legislations, and regulations. The Samoa Energy Sector Plan (SESP) provides the strategic direction and the priority areas that the energy sector focuses on achieving within the 4-5 years planning cycles with the current plan being the Samoa Energy Sector Plan 2017 – 2022 to be reviewed soon. The following table 4.2 provides the key outcomes and relevant key focus areas as per the SESP 2017-2022.

Table 4.2: Energy Sector Plan 2017-2022 ESPOs

ESPO	Key Outcomes	Key Focus Areas
1	**Renewable Energy Increased**	Reduce dependency on fossil fuel and promote use of renewable energy
2	**Electricity Services Improved**	Supply of electricity from fossil fuel and alternative electricity sources proven feasible including generation and distribution of electricity
3	**Energy Efficient Transport Sector**	Ensure that the transport sector adheres to legislations and acts that are governing the sector as well as promoting energy efficiency and considering other alternative fuels to power transportation and to ensure it is environmentally friendly.
4	**Management of Petroleum Products Improved**	Effective and efficient monitoring of the petroleum products, and to ensure that the distribution, storage and disposal of petroleum products adheres to legislations and required standards.
5	**Coordination of Energy sector Improved**	Institutional setting and governance framework focuses on good governance, leadership and coordination across the whole energy sector.

The governance arrangements and institutional setup within the Energy sector consists of different ministries, corporations and organizations that administer various energy related resources, projects and services at different levels under the guidance of a National Energy Coordination Committee (NECC), supported by various ministries of the Government. The sector uses the Samoa Monitoring, Evaluation and Reporting Framework (SMERF) to monitor the implementation of its priorities. A Medium Term Expenditure Framework (MTEF) was also developed and is continuously updated annually subject to the availability of funds and the status of implementation.

4.2.2.1. Electricity Subsector

The electricity sector is mandated by the Electricity Act 2020 which provides the legislative framework for the regulation of the electricity sector including the establishment of the Electricity Regulator. Key responsible agencies under the subsector include;

- Electric Power Corporation
- Ministry of Finance- Energy Policy, Coordination and Management Division
- Ministry of Natural Resources and Environment – Renewable Energy Division

The Electric Power Corporation (EPC) is the sole supplier of electricity in Samoa and is consistently striving towards 100% electricity generation from renewable energy sources by 2030. The national coverage of electricity in Samoa is very close to 100%, with a total of 98% of households having access to grid connected electricity while the other remaining 2% are connected to small scale diesel generators or stand alone solar PV systems.[37]

Mitigation Implementation

With a sound policy framework in place for renewable energy transition in the electricity sector, Samoa is well endowed with a broad mix of renewable energy resources including hydro, solar, wind, biomass, geothermal, and ocean energy. However, the exact potential of renewable energy resources has yet to be fully assessed particularity geothermal and ocean energy. Successful completion of such projects will lead to increasing renewable energy share to the national electricity grid, reducing reliance on imported fossil fuels. Key Renewable Energy related project undertaken from 2010-2020 are provided in the table 4.3 below.

37 *National Energy Sector Plan 2017-2021, MOF p. 29*

Table 4.3:EPC Renewable Energy Projects 2010-2020

Timeframes	Completed Projects
FY10/11	• Installation of Solar Home Systems for 200 households • Samoa's 400kWp Solar Photovoltaic Project • Installation of a monitoring mast on Mt Le Pu"ē in Upolu for wind energy assessments • Feasibility studies have been completed for five (5) sites that were identified as priority sites for • Hydropower development.
FY11/12	• The amended Electricity Act which came into effect December 2011 paved way for Independent Power Producers to generate and sell electricity to EPC.
FY 13/14	• The Aleipata Wind Farm Project was officially opened and handed over to the EPC on 29th August 2014 at Vailoa Aleipata. The project includes two 55m high wind turbines, each producing 275 kW of electricity with total output of 1.5 million units of electricity per year, and was connected directly to the EPC's electricity network. • The NZAID funded Solar Project at Tuanaimato was officially opened and handed over to the EPC on the 1st September 2014 during the UN-SIDS Conference. It included three solar systems installed on the roof of Gym 3 at Tuanaimato providing 250 KWp, ground mounted at the Tuanaimato Race Course of 2.2MWp and ground mounted at Salelologa of 250KWp
FY 14/15	• Four (4) Independent Power Producers (IPPs) solar power systems have been operational and connected to the electricity grid, supplying a total capacity of 10,000 kW.
FY 16/17	• Three (3) ground breaking ceremonies for construction of small hydro plants at Fuluasou, Tafitoala-Fausaga and Vailoa Palauli Savaii in March. • The Afulilo Aeration Project with the construction of an aeration and bubble technology system inside the Afulilo Dam to remove the formation of gas odor from organic materials and lack of oxygen at the bottom of the dam to improve water quality. • The construction of 80kW solar system for Mapuifagalele Home for the Aged at Vailele. • The rehabilitation of the Alaoa and Fale-ole-Fee Hydro Plants following damages from Cyclone Evan in 2012. • Full deployment of three Independent Power Producers to generate electricity from solar and sell to EPC with a total production of 15.7 million units of electricity compared to 6.8 million in 2015.
FY 17/18	• The refurbishment of three hydro plants at Alaoa, Fale-ole-Fee and Samasoni that were damaged by the Cyclone Evan in 2012, was fully completed and made official in December 2017 during a special ceremony. This project has returned some 4.7MW of hydro generation capacity to the EPC network. • The EPC successfully completed the installation of the Micro-Grid Controller and the Battery Storage System Project, to assist with stability of electrical grid. The Battery Storage Systems at Fiaga power station and Faleolo International Airport will store electricity generated from solar energy, and automatically inject that electricity to the grid when there was a sudden increase in demand or sudden loss of power generated. • The EPC through contractor Mpower, completed the installation of a 2.5 MVA transformer for Taelefaga hydro plant within the financial year, as replacement of old transformer used.
FY 18/19	• The small hydro plant at Fausaga-Tafitoala was dedicated in January 2019, with an installed capacity of 600 kilowatt. It contributed 798,687 kwh to the generation mix. • The Vailoa Palauli small hydro plant was dedicated in March 2019, with an installed capacity of 170 kilowatt, and producing 360,270 kwh.
FY 19/20	• The new small hydro plant at Fuluasou was the last of the three (3) small hydro plants under the Renewable Energy Development & Power Sector Rehabilitation Project • Installation and commissioning of the 3rd 2MW generator for Taelefaga Hydro Plant was completed

Samoa's target in the first NDC was to "reduce its GHG emissions from the electricity subsector through the adoption of a 100% Renewable Energy target for electricity generation through to the year 2025. Financial, institutional, information, coordination and capacity constraints hindered the progress of Samoa and was not able to achieve its target. Nonetheless, renewable energy in Samoa reached 45% as recorded in the EPC Annual Report FY2018/19.

Whilst EPC remain committed to achieving Governments renewable energy target through new renewable energy project in both Savaii and Upolu as Samoa moves to ever higher levels of renewables, the challenges of ensuring the additional renewable electricity is cheaper and more reliable than the diesel which it is replacing will become more acute. Therefore, it should be noted that in order to move forward the economics and PPA's for all future RE projects must significantly improve, whereby the parties must both share in the risks and rewards whilst ensuring that the cost of generation remains reasonable and thus sustainable.

In its 2nd NDC, Samoa has targeted to reduce GHG emissions in the electricity sector by 44.2 Gg CO2-e by 2030 compared to the 2007 levels and can be applied relative to the new reference year for the updated GHG inventory. The electricity targets for the first and second NDCs are conditional on external funding support. The Electricity Subsector makes up 14% of total GHG emission in 2020 which comes second to the highest emitter namely the land transport subsector.

For reporting purposes, the Electric Power Corporation (EPC) maintains a database of on-going renewable energy projects as well as projects in the pipeline which are reported annually in their corporate reports and annual reviews of the energy sector.

Implementation Constraints
Key constraints identified in the implementation of mitigation actions include;

- Financial/ Budget constraints to implement and manage new projects
- Lack of institutional capacity and experience for staff to implement, manage and monitor projects
- Data / information sharing and access
- Coordination amongst relevant agencies and stakeholders.
- Outdated technology and capacity of the grid / network system to uptake the injection of RE, minimizing grid stability issues.

4.2.2.2. Transportation- Land Transport sub-sector

The land transport subsector is mandated by the Ministry of Works Act 2002, the Planning Urban Management Agency Act 2004, the Planning and Urban Management Regulations 2007 and the Land Transport Authority Act 2007. Key agencies involved under the subsector include;

- Ministry of Works, Infrastructure and Transport
- Land Transport Authority
- Samoa Police Services
- Ministry of Customs and Revenue
- Ministry of Finance

The total public road network of Samoa is approximately 2500km with about 52% of these roads managed and maintained by the Land Transport Authority. The Transport Sector Plan 2013-2018 noted that there is approximately 665km of sealed roads in Samoa, of which 430 km are on Upolu and 235km on Savai'i. Unsealed roads are less well delineated and could be between 190 km and over 1000 km. Modes of transportation include privately owned vehicles, buses and taxis.

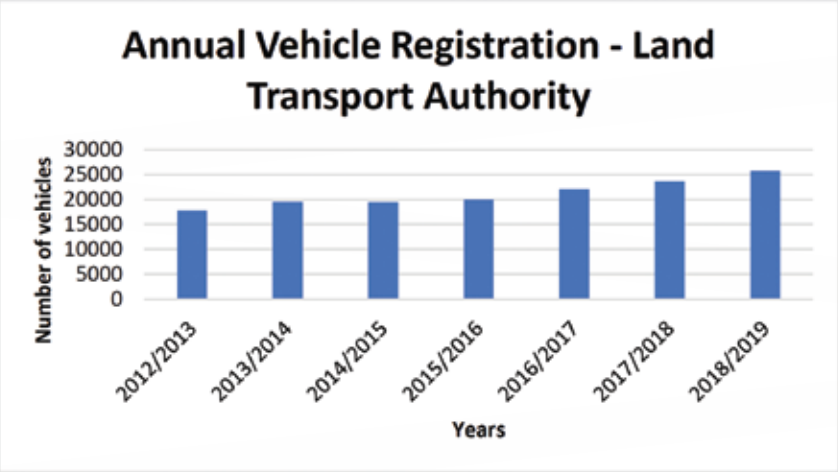
The Land transportation subsector remains as the highest emitter of all the subsectors under the energy sector in 2007 as well as 2020. The Samoa transport sector depends on imported petroleum fuels as its primary energy source, which accounts for 27% of total national emission in 2007. In 2020, about 59% of total GHG emissions under the energy sector is contributed by the land transportation.

A total of about 25,793 vehicles were registered in FY18/19 under the Land Transport Authority, a 45% increase in the number of vehicles compared to FY12/13. The following table 4.4 and figure 4.2 summarizes the total number of vehicles per year.

Table 4.4: Vehicles Registration – LTA

Vehicles Registration- Land Transport Authority Samoa	
Financial Years	**Total**
2012/2013	**17798**
2013/2014	**19527**
2014/2015	**19452**
2015/2016	**20035**
2016/2017	**22085**
2017/2018	**23661**
2018/2019	**25793**

Figure 4.2: Annual Vehicle Registration (12/13-18/19)



As of FY 18/19, about 90% of these vehicles were private cars, 8% were Taxis, 1.2% were buses and the remaining comprised of other types of vehicles. 89% of these vehicles were in Upolu and 11% in Savaii. There was a projected increase of 15% in the number of vehicles registered as per the 2nd NDC report 2021. The sector is heavily reliant on imported petrol and diesel with petrol vehicles making up about 70% of the vehicle fleet whilst the remaining 30% is made up of diesel vehicles.

Existing Mitigation Measures

In the first NDC, there was no specific quantitative target for the land transport as it was focused mainly on the electricity subsector. Nevertheless, in its 2nd NDC submission, other sectors were included in scope which includes land transport subsector with a target i.e., to reduce GHG emissions by 5.2Gg CO2-e compared to 2007 levels which can be applied relative to the updated GHG inventory.

Furthermore, in efforts to reduce it GHG emissions, Samoa's Nationally Appropriate Mitigation Actions developed in 2018 emphasized on key interventions in order for Samoa to reduce its emissions in the land transportation. Key interventions included;

- Short Term Interventions
  - Intervention 1: Scaling- up bio diesel use in diesel vehicles
  - Intervention 2: Introduction of electric cars
- Long Term Interventions
  - Intervention 3: Introduction of electric buses for public transport

To address high emissions and safety considerations due to ageing vehicle fleet, policies are in place such as restriction of imported vehicles to be no more than 10 years since manufacture. A 15% VAGST is imposed on imported vehicles. Most of these vehicles are imported from Japan. Samoa is also working on developing conditions and systems for Electric Vehicles (Evs) to enter into the markets. The Parliament passed a bill in 2020 waiving taxes on Evs imported to Samoa. There is a need for the development of specific legislations to allow for Evs to be used on the roads and charging stations for Evs to ensure public safety which may also require external funding support. Opportunities have also been identified for potential projects in the pipeline for mitigation. Policies and plans were strengthened to increase research works for the substitution of petroleum fuels with biodiesels and biofuels and application of hybrid and electric vehicles. In moving forward, increased resources will be dedicated towards latest research and development of clean alternative fuels such as biofuels and renewable energy fuelled charging stations for electric vehicles.
In moving forward, extensive (finance and capacity) resources needs to be dedicated towards latest research and development of clean alternative fuels such as biofuels and exploring renewable energy fuelled charging stations for electric vehicles.
For reporting purposes, the relevant agencies provide progress reports through their annual organizational reports, project reports and annual sector review reports.

Implementation Constraints
In implementing key mitigation priorities, key issues identified include

- Financial Constraints to fund key mitigation priorities
- Capacity constraints and lack of experience for staff to implement and monitor projects
- Lack of public awareness of the environmental benefits and co benefits of transitioning to low emission vehicles and infrastructure due to low carbon and Evs available in Samoa.
- Legislative framework for Evs
- Limited data on land transportation
- Coordination amongst agencies.

4.2.2.3. Transportation- Maritime Transport Subsector

The Maritime transport subsector is mandated by the Samoa Shipping Act 1998 and the Marine Pollution Prevention Act 2008. Key responsible agencies under the subsector include;

- Ministry of Works, Transport and Infrastructure
- Ministry of Natural Resources and Environment
- Ministry of Agriculture and Fisheries
- Ministry of Finance
- National University of Samoa
- Samoa Ports Authority
- Samoa Shipping Corporation

The maritime subsector is crucial for national development and social cohesion in any modern society and even more so for Pacific islands such as Samoa. With an Exclusive Economic Zone of 120,000km2, Samoa is dependent on the ocean for food, commerce, trade and mobility. There are six ports in Samoa with four located on Upolu and two located in Savaii and approximately 500 vessels visit the Samoan ports every year. The port of Apia is the main international port located on the north coast of Samoa's Upolu Island and is an important gateway for many visitors to Samoa. It is also vital to Samoa's economy with many of the nation's supplies and prized exports entering and leaving the port every single day.

Mitigation Implementation
Samoa's first NDC does not include a specific quantitative target for reducing maritime transport emissions. In its 2nd NDC, Samoa has targeted to reduce GHG emissions in the maritime transport subsector by 3.0Gg CO2-e compared to 2007 levels which can be applied relative to the updated GHG inventory. The implementation of mitigation priorities is subjective to the external funding.

According to the GHG inventory 2020, water navigation (fishing boats, yachts and domestic bunker fuels) accounts for 2% of total emissions of the total Energy sector GHG emissions and 4% of the transportation subsector total emission as opposed to land transportation.

The Samoa Shipping Corporation is a government-owned company in Samoa which provides freight and passenger services between Savai'i, Upolu and American Samoa. Established in 1974, the corporation operates the main travel and maritime support services in Samoa. The SSC services a fleet of six (6) ferries operating domestic sea transportation services, inter-island services, and operate charter trips between Upolu and Savaii and American Samoa, and Tokelau.

Some actions have been taken by the Corporation to incorporate renewable energy and energy efficiency efforts into their operations as follows;

- Conduct energy efficiency performance checks every month for the ferries.
- Reduce the number of voyages between Upolu and Savaii per day.
- Installation of solar panels on the boats to assist with the electricity supply on the boat. When the ferry docks, the engine is turned off with the electricity supplied by the solar panels.

Implementation Constraints
Key issues identified for Maritime Transport include;

- The 2nd NDC report noted data gaps with vessels registration as more than 50% of the vessels in Samoa were not registered. There is very limited information available on maritime transport which requires a thorough review of the existing national and international vessels, large and small boats, that are operating in the maritime boundary of Samoa
- Financial constraints
- Institutional capacity and experiences

4.2.3. Renewable Energy Initiatives

Other RE initiatives implemented by the Renewable Energy Division of MNRE are noted as follows.

4.2.3.1. Afolau Biomass Gasification Plant

In Samoa, Ministry of Natural Resources and Environment (MNRE), Samoa, in association with STEC has commissioned a 750kW biomass gasification-based power generation facility during the year 2020. It is estimated that around 15 tonnes per day of biomass is needed to feed the gasifier. 95% of the forest vegetation situated in the STEC Plantation areas is used as the raw material for the Afolau Biomass Gasification Power Plant. The plant uses wood chips, from selected invasive species i.e., tamaligi, puluvao, pulumamoe, coconut logs, husks, and coconut shells to feed the biomass gasifier. The plant biomass gasification option can be utilized in a very flexible form through matching the residual load remaining from a high share of solar energy;

4.2.3.2. Biogas Systems

The Renewable Energy Division (RED) continues to spearhead efforts to identify, resource and develop alternative sustainable on-site waste (solid and water) management technologies including biogas initiatives. Under the IMPRESS (Improving the Performance and Reliability of Renewable Energy Systems in Samoa) project, Biogas systems successfully been installed at Saasaai, Faleula, Vaisala, Afolau (Mulifanua) and Papauta. Lessons learnt from the unsuccessful Piu Biogas System have greatly contributed in how biogas systems are being implemented around the country.

4.2.3.3. Solar Lights

The IMPRESS Project through the Renewable Energy Division distributed and installed solar street lights for selected community groups and schools.

4.2.4. AFOLU Sector

The key responsible agencies under the AFOLU Sector include;

- Ministry of Agriculture and Fisheries
- Ministry of Natural Resources and Environment

4.2.4.1. Agriculture

In Samoa and across the Pacific, agriculture and coastal fisheries play an important role in meeting subsistence needs. Agriculture remains a prominent sector of Samoa's economic development agenda – for improving rural livelihoods, ensuring food security and good nutrition, and its contribution to rural incomes. Whilst it is expected that the relative share of agriculture's contribution to GDP will decline as the economy matures due to increased shares of higher value adding sectors such as the industry and services, the sector's importance for food security, good nutrition, prosperity and resilience in the face of climate change and associated natural disasters remains paramount. In 2020, agriculture represented 8.3% of Samoa's Gross Domestic Product compared to 9.5% in 2009 (in constant 2013 $WST). Most (62%) of the agriculture production was non-monetary or subsistence agriculture.

The most recent Agriculture Sector Plan 2016-2020 provides the planning and monitoring framework to guide coherent programs and actions from all key stakeholders to achieve the goal of increased food, nutrition and income security in Samoa. A review and update of the plan is currently underway. Key outcomes of the sector recorded included;

Table 4.5: Agriculture Sector Plan 2016-2020 ESPOs

ESPO	Key Outcomes
1	Sector coordination improved and investment in food security and inclusive commercial agriculture/ fisheries production systems increased
2	Sector coordination improved and investment in food security and inclusive commercial agriculture / fisheries production systems increased
3	A sustained increase in production, productivity, product quality, value adding and marketing of agriculture and fisheries products
4	Sustainable agricultural and fisheries resource management practices in place and climate resilience and disaster relief efforts strengthened

4.2.4.2. Forestry

About 60% of Samoa's total land area and equivalent to approximately 171,000 hectares is considered forest areas with forest coverage to total land areas in Upolu and Savaii of about 47% and 69% respectively. Most of the forest areas are open forests and secondary forests, 32% and 22% respectively38. Commercial logging, human settlements and impacts of cyclones are the key causes of forests depletion. Commercial logging was banned following the Forest Policy Banning on Commercial Logging in 2006 and the ban was lifted in 2007 with a focus now on small scale logging with strict monitoring by the Forestry Division under the Ministry of Natural Resources and Environment.

The forestry subsector is mandated by the Forest Management Act 2011 and guided by the National Environment Sector Plan 2017-2021 under its End of Sector Plan Outcome 1.2 on ensuring that the sustainable management and development of forests improved.

Mitigation Implementation

The AFOLU sector is the second highest emitter of about 28% of the total GHG emissions in 2020. Emissions from the AFOLU Sector increased by approximately 1.9% since 2007 that is equivalent to 135,366 tCO2e to 137,763 tCO2in 2020. Enteric emissions (54%) accounted for the largest share of the AFOLU followed by Manure Management (40%) and Direct N2O Emissions from managed soils (6%). Nonetheless, the GHG inventory also estimated CO2 removals in forests which totalled -775,937 tons in 2020. Key initiatives/ actions undertaken by the relevant subsector contributing to mitigation are provided in the following table.

Table 4.6: AFOLU sector Mitigation Implementation

Subsector	Initiatives
Agriculture	• Key investments on Researches on Agroforestry as a key solution to climate change mitigation. • The promotion of Agroforestry initiatives increased through projects such as the Samoa Agriculture & Fisheries Productivity and Marketing (SAFPROM) project which has assisted the communities to increase the productivity and access to markets, improve management of targeted productive natural resources and, in the event of an Eligible Crisis or Emergency, to provide an immediate response to the Eligible crisis or Emergency • Mixed crop would be an ideal action to be adopted. • Through agricultural stimulus packages, 400,000 seedlings of cocoa and 150,000 seedlings of coconut distributed to communities for planting. • Proper management of livestock farming (piggeries, cattle) through waste to energy solutions such as biogas systems. • Community trainings on agro-forestry and sustainable farming practices. • Reduction of use of fertilizers for crops as an alternative measures. • Encourage the donors and development partners to continuously support communities in planting of cocoa and coconuts in agro-forestry system like PPCR project funded by the world Bank lately.
Forestry	• Completion of the implementation of the 2 million trees campaign with a total of 2,109,300 trees recorded by FY19/20 • Enforcement of application for forestry harvesting and forestry harvesting permit in accordance to National Forestry management act and regulation. • Sustainable management of the 4 National Parks(OLPP, Lake Lanoto'o. Mauga o Salafai and Masamasa-Falelima), Vaipouli State Forest land and community lands under the community and agroforestry programs (683.4 ha maintained FY19/20) • Sustainable management of wetlands • Review/Development and implementation of Forestry Management Plans (O Le Pupu Pu'e, Masamasa/ Falelima) • Research on Assisted Natural Regeneration of forests and Phenology studies. • Biomass and carbon stock estimation per tree species: 17 trees (14 species) assessed including harvested, sampled, weighed, dried, monitored, recorded and calculated for Aboveground Biomass (AGB) and Carbon Stock (CS) estimation. Species including tavai, pulu vao, masame, lopa, tamaligi, fanaio, faapasi, talie, asi vai, mosooi, aamatie, maota tufaso, fetau and operera. • Educational Awareness and Tree Planting Activity targeting school children, communities and stakeholders and annual commemoration of the World Water, Forests and Wetlands Day.

Samoa's first NDC did not include a specific quantitative target for reducing the AFOLU sector emissions. Samoa's 2nd NDC targeted both the mitigation and adaptation measure for the AFOLU sector by (1) reducing GHG emissions in the AFOLU sector by 26% in 2030 compared to 2007 levels and applicable relatively to the updated GHG emissions inventory; (2) expand the area under agroforestry to additional 5% of agricultural land by 2030 relative to 2018.

Implementation Constraints

- Financial Constraints to sustain project and to fund new mitigation projects
- Land ownership is a key issue as more than 80% of land is customary land particularly when it comes to prioritization of land use for forestry as opposed to other agricultural practices.
- Institutional capacity and experiences of staff to plan, implement and monitor relevant mitigation projects.
- Coordination amongst relevant agencies- conflicting messages between MNRE and MAF
- Market structure- securing local financing instruments for agricultural investment (eg loans)
- Data collections and access.
- Public awareness of AFOLU sector importance and issues.
- Lack of awareness/outreach programmes in the community to encourage agroforestry, forestry replanting etc.
- Re-enforcement of policy is an issues.

4.2.5. Waste Sector

The Waste Sector is mandated by the Waste Management Act 2010 and the Samoa Water Authority Act 2003 and Regulations 2009. Key responsible agencies include.

- Ministry of Natural Resources and Environment
- Samoa Water Authority

Samoa generates approximately 27,000 tonnes of waste per annum with a waste generation rate of approximately 1 kilogram per person per day. There are more than 6000 collection points in Upolu and Savaii islands. A relatively small number of households, around 5% of the total, still either burn or dump their waste.

There are two landfills in Samoa, the Tafaigata landfill located in Upolu and the Vaiaata Landfill located in Savaii. Tafaigata is the largest landfill at approximately 100 acres. Projected increase in waste per year at the Tafaigata landfill is 2%. Municipal waste collection is directly transferred to these landfills. Many households segregate waste components, including food waste used as animal feed and green waste used as compost. Many also reuse valuable items, such as plastic containers. A few recycling initiatives have been attempted on Upolu on an ad hoc basis, but there is only one commercial-scale private sector recycler on the island. The Pacific Recyclers collects and processes ferrous and nonferrous metal scrap and ships to them to Australia, the Republic of Korea, and New Zealand for resale.

The Samoa Water Authority (SWA) is responsible for the operations, maintenance and management of the wastewater collection and treatment scheme through the Wastewater Treatment Plant at Sogi servicing the Apia Central Business area and National Hospital of Samoa. SWA is also the main water service provider in Samoa providing water supply to about 89% of the population. While the WWTP continues to meet the effluent standards, increased developments in the CBD, and resultant demand on sanitation services, means that the facility is nearing optimal utilization and an expanded capacity or new facility is required.

Mitigation Implementation

Waste accounts for 21% of total GHG emission for 2020. Emission amount to about 104,529 tCO2e. Emissions from solid waste disposal accounted for the largest share of waste sector emissions (66.19%) followed by wastewater emission (33.73%) and open burning emissions (0.11%)

Table 4.7: Waste Sector Mitigation Implementation

Subsectors	Key initiative/ activities
Agriculture	• Management of the Tafaigata and Vaiaata Landfills • Installation of bins in public site promoting the segregation of waste • Endorsement and implementation of Waste (Plastic Bag) Management Regulations 2018 with a focus on banning certain Single Use Plastics such as plastic shopping bags, plastic packing bags, plastic straws and Styrofoam food containers • Endorsement and implementation of the National Waste Management Strategy 2019 – 2023, an integrated strategy including Solid, Chemical and Hazardous Wastes and in line with the Regional Cleaner Pacific 2025 Strategy • Take Back Initiative Project in partnership with the Samoa Stationeries and Books on e-waste. • Ongoing monitoring of open burning. • Launching of Samoa Waste Oil Management Project (SWOMP) in partnership with Samoa Recycle and Waste Management Association (SRWMA) initiated by Hyundai and Nissan companies • Launching of the Review and Update National Implementation Plan (NIP) for Persistent Organic Pollutants (POPs) under the Stockholm Convention for Samoa • Development of the National University of Samoa's Waste Management Plan launched in March 2020 • Ongoing awareness programmes in schools, communities and stakeholders on sustainable waste management. • Ongoing monitoring of waste services and contracts
Wastewater Management	• Effluent discharge of the WWTP 100% compliant with the SPREP standards • Effective treatment of the wastewater prior to discharge.

Samoa's 2nd NDC has targeted reducing GHG emissions in the waste sector by 4% in 2030 compared to 2007 levels (or 1.2Gg CO2-e) and to be applied relatively to the updated GHG inventory.

Implementation Constraints

- The following are the noted constraints in the implementation of mitigation actions for the sector;
- Public Awareness of the benefits of improving Samoa's wastewater and solid waste management.
- Budget constraints
- Institutional Capacity and Experiences
- Environmental and social- affordability of monthly wastewater and solid waste
- Market structure- Local funding instruments to fund projects.

4.2.6. Industrial Processes and Products Use

The IPPU sector accounts for about 5% (24,527 tCO2-e) of the total GHG emissions for Samoa in 2020. Emissions from the substitution of ozone depleting substances account for 99% of the IPPU sector total emission as opposed to Lubricants. At the national level, emissions from HFC have increased dramatically by 362% since 2007.

The implementation of the Montreal Protocol on substances that deplete the ozone layer and the management of ozone related projects done by the Ozone Section under the Meteorology Division of the Ministry of Natural Resources and Environment. A key responsibility of the unit is to fulfil Samoa's obligations under the Montreal Protocol at which Samoa became a party to in 1992.

As a party to this Protocol, Samoa has been working on phasing out ODS through various measures. Nationally, the IPPU sector is mandated by the Ozone Layer Protection Regulation 2006 and the Meteorology, Geosciences' and Ozone Act 2021.

Implementation Constraints

Table 4.8: IPPU Mitigation Implementation

Subsectors	Initiative/ activities
ODS/ HFC monitoring by the Ozone Section - MNRE	• Enforcement of the Ozone Layer Protection Regulations 2006 and the Meteorology, Geosciences' and Ozone Act 2021 • Review of the Ozone Layer Regulation 2006. • Ongoing trainings and workshops for the Refrigeration and Air Conditioning Sector • Annual commemoration of the world Ozone Day in September. • Refrigeration Air Conditioning Association of Samoa (RACAS) Trade Nights • Producing of ozone depleting substance data reports and disseminated to stakeholders • Ongoing implementation of the Licensing system • Monitor consumption of controlled Substances including Ozone depleting substances (ODS) and high global warning potent Hydrofluocarbons (HFCs) • Monitor compliance to code of good refrigeration practices/procedures and standards • Mandatory labelling on Refrigerants • Implement recycling and recovery activities • Implement certification system for refrigeration personnel • Prepare reporting to the Montreal Protocol • Improve public awareness on Ozone Depleting Substances (ODS) • Promote awareness for all stakeholders on the Kigali Amendment obligations with regards to the phase-down of HFCs

Implementation Constraints

The following are constraints faced by the sector during implementation.

- Budget Constraints
- Limited staff to implement activities and share the workload.

4.3. Planned Mitigation Initiatives

A number of activities have been planned, which are likely to reduce GHG emissions in Samoa. Details of these activities are provided below. It is important, however, to note that most of the planned activities remain heavily dependent on continued international support.

4.3.1. Renewable Energy

Table 4.9: RE Planned Mitigation Initiatives/ Options

RE Sources	Planned Projects/ Activities/ Initiatives
Hydro	• Rehabilitation of the Lalomauga Hydroplant • Replacement of alternator for the No. 2 generator at Taelefaga hydro plant • Fuluasou Dam Enforcement • Tiapapata new hydro plant • Vaipu hydro pump storage • Alaoa Multi-Purpose Dam Project
Solar	• 2MW solar system and battery storage in Savaii
Biomass Gasification Plant	• The Ministry of Natural Resources and Environment (MNRE), Samoa, in association with STEC has commissioned a 750kW biomass gasification-based power generation facility during the year 2020. It is estimated that around 15 tonnes per day of biomass is needed to feed the gasifier. The plant supports matching the residual load remaining from a high share of solar energy; the biomass gasification option can be utilized in a very flexible form
Biogas systems	• New potential Biogas systems to be added to the existing systems promoting the conversion of waste to energy. Biogas systems in the pipeline include Saasaai, Faleula, Vaisala, Afolau (Mulifanua) and Papauta.

4.3.2. Energy Efficiency

The right combination of energy efficiency such as a Smart Grid Infrastructure with clean generation is key to ensuring reliable access to support people's wellbeing. To continually increase developments in Samoa, advanced energy management and increased use of renewable energy resources are key areas to focus on. The government cannot take initiatives for a complete change of electrical equipment across the country but there is a need for changing the way of operation and control of the electrical equipment. One of the major constituents is the smart meter, a very important constituent for the smart grid and is expected to provide cost-effective, social and ecological advantages for various stakeholders. Smart meters are a key part of the clean energy system of the future and it is no longer a new technology. The Electric Power Corporation has started rolling out smart meters for households starting in Vaitele and Falelauniu in 2020 and will continue its roll out to all households in 2021 despite some technical issues faced. This will assist households to better monitor and control their energy consumption and will play critical role in climate change mitigation.

4.3.3. Transportation Initiatives

4.3.3.1. NAMA Targets

The overarching target of the Samoa Transport sector NAMA is the promotion and adoption of clean, sustainable and efficient means of land transport interventions at which will help Samoa achieve "Environmentally Sustainable, Energy Efficient and Socially Responsible Transport Sector" as identified in the Transport Sector Plan 2013-2018. Although little progress has been made in this area, the sector is still optimistic to progress with the implementation of the NAMA in the forthcoming years.

The most viable identified transport sector GHG mitigations options in the short run and medium term for Samoa would be low carbon fuel replacement strategies of which using biofuels for diesel vehicles and electric vehicles to replace petrol vehicles have been considered as viable options. In the longer term, a more complete electrification of the urban public transport system was considered as well as capacity building and training programs to stress the environment effects of using fossil fuel powered transport.

- Intervention 1 of the NAMA aims to trial using biodiesel in 25 large trucks, 25 vans and 25 small trucks owned by the government and private owners in Samoa. Key executing agencies include SROS in association with LTA. Government line ministries and private sector. The overall GHG emission reduction from the implementation of the NAMA intervention 1 was calculated as 1347 tCO2e / year.

- Intervention 2 of the NAMA aims to introduce electric cars in Samoa wherein 100 electric cars will be operated and trialed as taxis as a pilot phase. The intervention in terms of taxis rather than private vehicles is because total emission reduction will be greater for this sector as taxis have much higher annual kilometers travelled than private cars. Key executing agencies will be local taxi association/ operators in association with relevant government line ministries and private sector. The overall GHG emission reduction from the implementation of NAMA intervention 2 has been calculated as 2110 tCO2e / year.

- Intervention 3 of the NAMA aims to introduce electric buses for public transport in Samoa wherein 10 electric buses (2 large and 8 mini buses) will be operated and trialed for public transport. Key executing agencies will be the local bus associations/ operators, relevant government line ministries and private sector. The overall GHG emission reduction from the implementation of NAMA intervention 3 has been calculated as 300 tCO2e / year.

4.3.3.2. Goal 5 of the Transport Sector Plan 2013-2018

The Goal 5 of the Transport Sector Plan 2013-2018 aims to ensure "Environmentally sustainable, energy efficient and socially responsible transport infrastructure and services". Continuous and planned activities and project to achieve this are as follows;

- Incorporate climate change adaptation and mitigation considerations in the design and construction of transport infrastructure.

- Encourage the use of energy efficient transport modes in the sector by measuring and limiting of vehicle carbon emission to a standard agreeable between LTA and MNRE

- Support inclusion of transport emissions including aviation and shipping emissions trading regime and the United National Framework Convention on Climate Change (UNFCCC) through better information management and monitoring.

- Support and ensure the inclusion of social impact assessment processes in design and construction of transport infrastructure through effective monitoring and reporting.

4.3.4. AFOLU

i) Forestry – 3 million trees campaign and other priorities

The launching and implementation of the 3 million trees campaign planned for 6 years from 2022-2028 which will be funded by the government of Samoa. The program as in a similar past 2 million trees campaign, will promote the planting of Samoa's native trees. In the past, the similar activities are usually dependent on external funding. The campaign will be implemented through the 51 districts of Samoa as well as community conservation areas and relevant NGOs. Other planned priorities include;

- Natural generation work

- Strengthening wetlands conservation

- Update of the National Forestry Inventory 2013

- Establish a National Forests Reference Level

ii) Expansion of Agroforestry

Strengthened collaboration between the MNRE and MAF will see the expansion of the agroforestry and mixed cropping.

iii) Agro-tourism Park

MAF has identified work in the pipeline in collaboration with SROS and STA on the creation of an Agro-tourism Park for local and international tourists at which will include a variety of fruit trees/ plants.

4.3.5. Waste

The increasing rate in waste generated is evidential and requires consistent attention and action given its impact on the health of people and the environment. There are limited recycling activities that are being piloted example plastics, glass and paper. The rest including used oil, e-waste, whitegoods, tires, batteries etc are stockpiled for overseas recyclers. Better and sustainable waste management practices are needed to reduce impacts of climate change. The following are planned priorities to address some of the waste management issues;

i) Development of the Circular Waste Policy:

MNRE in collaboration with the United Nations Development Programme will be developing a Circular Waste Policy with the key outputs of (1) Youth Employment is created in circular waste recovery industries in Samoa and Tokelau; and (2) Waste recovery policy guidelines are developed for a circular economy policy for Samoa and Tokelau. Three recyclable wastes i.e., paper, plastic and glass will be piloted in this project and the findings along with other parallel efforts at the regional and national level will be assessed through this exercise to inform relevant policy instrument for its management

ii) Strengthening of enforcements on Open Burning and Banning of plastics through consistent awareness, notifications and fines.

iii) Composting of organic waste

iv) Waste to energy projects (biogas projects)

v) Institutional changes to take place to increase prioritization on Waste Management- the establishment of separate Waste Management Division under MNRE

vi) Development of relevant policies for better sanitation and wastewater management such as the review and update of the National Sanitation Policy and the development of the National Effluent Discharge Standards for Samoa.

4.3.6. IPPU

Key priorities planned include the following.

i) Review and update of the outdated regulations and development of new one as needed- Ozone Layer regulation 2006, development of a Refrigeration Management Regulations.

ii) National University of Samoa to undertake courses on the relevant ozone works and equipment involved.

iii) Increased investments in air quality monitoring.

4.4. Mitigation Potential and Opportunities

The 2nd NDC Implementation Roadmap and Investment Plan 2021 has clearly identified a provisional list of key mitigation potential and opportunities for Samoa to assist with achievement of its 2nd NDC targets. Opportunities were ranked using a multi-criteria analysis considering mitigation potential, cost effectiveness and capacity requirements as well as the views of consulted stakeholders in Samoa. These are provided in the following table.

Table 4.10: GHG Mitigation Opportunities for Samoa (Source: Samoa's NDC Implementation Roadmap and Investment Plan 2021)

Opportunity	Pipeline priority Rank	Indicative investment need to 2030 (US$)	Annual GHG emissions reduction in 2030 (tCO2e)	Cumulative GHG emissions reduction by 2030 (tCO2e) [39]
Electricity sector				
Building energy efficiency program	2	250,000	3,046	15,230
Grid stabilization projects	3	5,050,000	2,218	15,526
Network loss reduction program	6	2,000,000	1,108	7,756
Refrigeration efficiency program	13	1,100,000	575	3,738
Land transport sector				
Shared electric cars	8	14,679,000	1,074	8,055
Electrification of commercial fleets	14	18,402,000	2,181	9,815
Electrification of government and municipal fleets	17	10,649,000	644	2,898
Electrification of Samoa's light vehicle fleet	19	42,506,000	1,457	6,557
Shared electric micro mobility	20	382,000	6	51
Maritime transport sector				
Transport optimization and energy efficiency review	7	75,000	1,121	5,605
Shore side electric supply for at berth vessels	12	50,000	144	1,080
Electric ferry	15	29,000,000	1,370	6,850
Biodiesel ferry	16	897,000	247	1976
Expansion of solar panel project	18	1,305,000	144	1,008
Waste sector				
Landfill gas collection system	11	2,752,000	1,214	9,712
Tourism sector				
Energy efficient appliances	10	250,000	545	2,998
Marine sector				
Mangrove restoration and planting	9	935,000	1,683	8,415
AFOLU sector				
Agroforestry support program	1	122,000	21,169	127,014
National forestry plan	4	3,877,000	80,553	563,871[40]
Manure management using anaerobic digesters	5	1,095,000	2,055	14,385
Improving the efficiency and precision of fertilizer use	21	546,000	15	113

Note: Mitigation figures (tCO2-e) are rounded to the nearest ton; indicative investment needs are rounded to the nearest US$1,000.
Note: This table reports indicative investment need and GHG emissions reduction potential without taking into account implementation constraints.

Once implementation constraints are considered, these GHG mitigation opportunities have the potential to reduce GHG emissions by 802,124 tCO2e by 2030, with an annual mitigation potential of 122,151 tCO2e in 2030. These mitigation opportunities would reduce GHG emissions in Samoa in 2030 by 34 percent relative to 2007 levels.[41] When combined with Samoa's annual GHG mitigation from renewable generation,[42] these mitigation opportunities would reduce GHG emissions in Samoa in 2030 by 48 percent relative to 2007 levels.[43] The opportunities are estimated to have an indicative investment need of US$135,414,000 by 2030.[44]

Further to the above, mitigation potential and opportunities are provided in the revised GHG Abatement Strategy (Samoa Low Emissions Development Strategy 2022-2030) and the draft Sustainable Energy Policy 2022-2032 at which further assessment work are needed to determine the GHG emissions reductions.

40 GHG emissions reduction potential is dominated by the 'National forestry plan' project.
41 Samoa's total GHG emissions is 352,030 tCO2-e (352.03 Gg CO2-e) (as at 2007).
42 Samoa's annual GHG mitigation from renewable generation is 48,225 tCO2-e.
43 The GHG emissions reduction potential of the projects in this NDC Roadmap and Plan (as well as the GHG emissions reduction potential of the renewable energy projects) is higher than the GHG emissions reduction target outlined in Samoa's Second NDC. This is because stakeholders in Samoa recommended that the '2 million trees' project be extended and included in the 'National forestry plan' project, which significantly increases the GHG emissions reduction potential in the AFOLU sector. This recommendation was provided after Samoa's Second NDC was published.
44 If implementation constraints are removed, these GHG mitigation opportunities have the potential to reduce GHG emissions in Samoa by 812,651 tCO2-e by 2030, have an annual GHG mitigation potential of 122,569 tCO2-e in 2030, and are estimated to have an indicative investment need of US$135,922,000 by 2030.

4.5. Barriers for Mitigation Options

There are many barriers for effective mitigation options in Samoa as shared with other Pacific Island countries. The IPCC lists some common barriers including;

1. **Capital:** Access to capital is limited for Samoa as in many of the Pacific Islands. The capital costs of renewable energy technologies are generally higher than those of conventional technologies. The slow progress in securing and transfer of external funds for financing of mitigation projects have impacted on the progress of projects. In addition, the high cost associated with RE technologies have discouraged the private sector to invest in RE projects and so there is a significant need for timely climate mitigations financing from the government, private sector and international assistance.
2. **Trade barriers:** Although many countries are revising their trade policies in order to liberalize markets, substantial tariff barriers remain in many cases for imports of (emission reducing) foreign technologies including energy supply equipment. In addition to ensuring trade barriers on emission-reducing imports are made low, tariff barriers to emission enhancing products and technologies, for example, fossil fuels and motor cars may need to be increased. Import tariffs in Samoa on most renewable energy products shall remain as low or non-existent to encourage the importation of cleaner energy sources appliances as well the reduction of ozone depleting substances.
3. **Vested Interests:** National interest groups such as powerful extraction and construction companies can influence technology choices in favor of conventional technologies. Through strong government advocacy, robust research and development work in RE as well as extensive awareness and consultation on RE priorities for mitigation, more favorable interest will be invested increasing the drive for mitigation actions. The engagements of Independent Power Producers have had positive impacts through increased RE contributions to the grid. The involvement of the private sector and other key partners through effective coordination will assist in boosting Samoa's mitigation efforts.
4. **Institutional and administrative difficulties:** Institutional capacities and experiences are key challenges in the implementation of mitigation priorities. The sector-wide and multi-sectoral approaches to climate mitigation have had positive impacts on the integration of mitigations priorities for implementation at different levels through collective efforts of different agencies. HR capacities have been identified as a key constraint to the implementation of NDC projects at which have delayed the progress of some projects. The establishment of a new Ministry of Climate Change in Samoa will improve the coordination of climate related financing support, programmes and projects, enhance CC technical capacities of staff as well as better monitoring and evaluation of relevant CC efforts.
5. **Regional Cooperation:** There is a need for greater regional cooperation among developing countries, both in research and development (R&D) work and in the international commercial contracting network. Through the collaboration of Pacific Island Countries and CROP agencies such as SPREP and SPC, increased cooperation has been fostered with good intentions in terms of assisting with climate change mitigation and adaptation. Samoa also gained ample technical assistance support in mitigation through this regional cooperation.
6. **Access to information:** This is noted as a key issue in the implementation of mitigation priorities in Samoa. The absence of good and reliable information is detrimental to the monitoring and assessment of mitigation projects. The relevant agencies involved in mitigation have their own information systems and access can be challenging at times. A national information repository system for mitigation priorities should be in place with all relevant KPIs in place for ease of monitoring. Academic institutions such as the University of the South Pacific and the National University of Samoa do provide information as needed for researches.
7. **Differing needs:** The differing needs of all developing countries compared to the developed nations is a serious barrier globally to emissions reduction, a barrier that has played out at all of the major UN meetings designed to encourage countries to cooperate on emissions reductions. Developing countries generally focus on large capacities of cheap, reliable power with low technical risk, and have new technologies as a lower priority. On the contrary, most developing countries rate development as a higher priority than reducing emissions.
8. **Economic incentives:** Limited private sector involvement in mitigation actions is a constraint due to limited capacity and funds to undertake mitigation projects. There is a need to encourage IPP involvement through less red-tape process as well as increased awareness and capacity building programs for key mitigation areas.

4.6. GHG Emissions Scenarios- current and future trends

Samoa's 2nd NDC proposed specific scenarios at which has been used to illustrate Samoa's potential contribution to global mitigation efforts. These emissions scenarios are meant to provide an insight into potential trends in Samoa's emissions, in different sets of circumstances. These scenarios do not predict the future, but rather provide a series of alternative views on how it might unfold. This is particularly useful with respect to GHG emissions, as it provides policy-makers with a broader context for making decisions

1. Emissions scenarios

Baseline Scenario: This scenario presents a business as usual projection of Samoa GHG emissions between 2020-2030. It is assumed that recent trends in population and economic growth will continue and that no GHG abatement measures will be implemented. This is based on the

Mitigation scenario 1: This scenario maintains the same assumptions as the baseline scenario, but also assumes that all planned GHG abatement activities will be implemented.

Mitigation Scenario 2: Mitigation scenario 2 builds on the assumptions made in mitigation scenario 1 by also assuming that all of the additional 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.

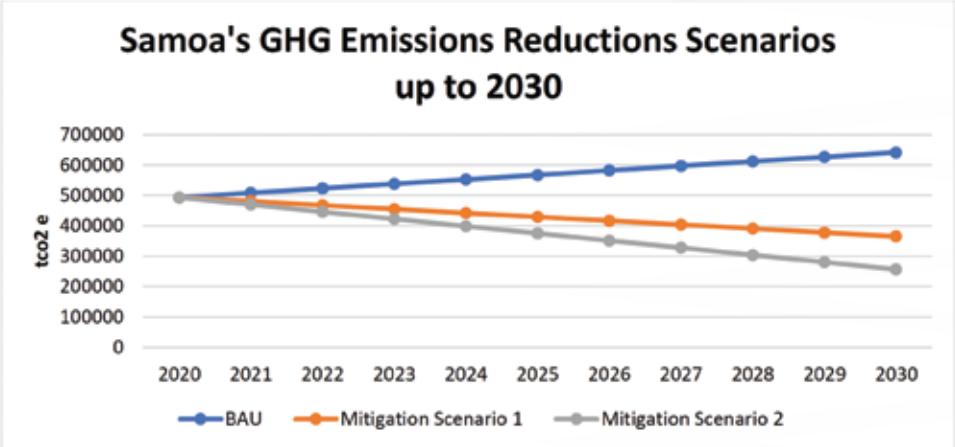
2. Projected Emissions

In consideration of the population increase and relevant demand, there is a projected increase of GHG emissions by 30% in 2030 for the Business- As-Usual scenario which make ups the Baseline Scenario. In the 2nd NDC, Samoa aims to reduce overall emissions by 26% in 2030 compared to 2007 levels. Given the current 2020 levels, projected reductions would double to approximately 48% reduction in GHG emission by 2030. However, in due considerations of the mitigation's constraints, the projected reductions to the GHG emissions of 26% will be applied to 2020 levels for Mitigation Scenario 1. This will be the same with Mitigation Scenario 2. About 48% GHG emissions reductions has been projected from 2007 levels in the 2nd NDC. If applied relatively to the 2020 levels, this will lead to GHG emissions reduction of about 67%. However, realistically given the mitigation constraints and barriers to proposed options and opportunities, 48% will be applied to the 2020 levels for Mitigation Scenario 2.

Table 4.11: Samoa's Scenarios Trends up to 2030

Scenarios	Projected Increase/ Decrease (%)
Baseline Scenario (BAU)	+30
Mitigation Scenario 1	-26
Mitigation Scenario 2	-48

Figure 4.3: Samoa's Projected GHG Emissions Reduction Scenarios



1. Mitigation Scenarios Implications

The emissions scenarios illustrate three key points:

- Without intervention, Samoa's emissions are projected to rise sharply by 30% over the next decade in line with the population increase. It is important, however, to note that even with this growth Samoa's emission will still be small compared to other countries, in both absolute and per capita terms.

- There is significant potential for Samoa to curb emissions. By 2030, Samoa could reduce emissions by up to 26% below the projected baseline. Potential abatement under the two mitigation scenarios does, however, depend on a significant investment in Samoa's energy and AFOLU sectors. This investment is largely beyond Samoa's financial capacity and is only achievable with support from development partners.

- New projects and breakthroughs will be needed to accelerate mitigations efforts in the Energy, Waste and AFOLU sectors as well as other contributing sectors such as the IPPU, tourism and marine. This could see the reduction of GHG emissions by 48% below the projected baseline by 2030.

4.7. Conclusions and Recommendations

With the hindsight of the 2015 Paris agreement and the present commitments from the countries of the world leading to a projected temperature increase in excess of 3oC, it is difficult to be optimistic in terms of conclusions for any specific country such as Samoa. Nevertheless, there are options and opportunities for Samoa to do its share in terms of both mitigation and adaptation. The key barrier, however, detailed above, is securing the required finance for its technology needs. In addition, it is clear that developing countries need to see some real action from developed countries both to give incentive to their own efforts and to spearhead mitigation measures, such as electric vehicles and solar PV, that can be then cost-effectively transferred to developing countries.

5. Finance, Technology and Capacity Building Needs and Support Received

This Chapter presents the finance, technology and capacity building needs and support received for Samoa's climate action. The aim of this chapter is twofold: firstly, to present a country's constraints and gaps, and related needs for capacity building, technology transfer and financial support; secondly, to provide information on the support received by and pledged to that country in these areas.

5.1. Constraints, gaps and support needed

This section provides information on Samoa's constraints and gaps, and related financial, technical and capacity-building needs. Samoa has not yet conducted Technology Needs Assessment (TNA) and capacity Needs Self-Assessment to inform its technology needs for enhanced climate change mitigation and adaptation actions. Apart from the financial constraints, to implement the interventions in the NDC, existing and pipeline projects requires building appropriate implementing capacity. The consideration to conduct a country needs assessment on Samoa's capacity and technology needs for climate actions, identifying gaps, capacity building and technology transfer will be important in bridging the gap between policy and implementation on the ground.

Table 5.1: Key constraints and gaps

Categories	Key constraints and gaps
Finance	• Lack of budget for implementation and management of new projects • Private sector involvement and investment is minimal • Limited budget for Energy efficient ACs and procuring solar lights to replace existing lighting systems to power all NUS campuses. • Limited research funding to conduct CCAM projects and studies • Funding to sponsor and encourage students to take the CC program • Funding required for procurement of project equipment
Capacity	• Limited human capacity to implement and manage projects (lack of staff members and lack of time). For example: Climate Change and Health Unit under MoH consists of 1 staff and there is need for additional officers to support the work of the Principal Climate Change and Health Officer.
Multi-sector coordination	• Coordination challenges within and between institutions for example: many of the projects are cross-sectoral and requires collaboration between multiple institutions

Categories	Key constraints and gaps
Education	• Developing a degree/short-term course on Climate Change • Introduction of climate change in school curriculum
Data availability and collection	• Limited data about GHG emissions especially from AFOLU (Livestock and manure management) and IPPU (manufacturing, lubricants, etc) sector • Lack of data on Health care waste management • Lack of data archive system • Lack of QA/AC procedure which results in higher uncertainty
Legislation	• GHG emissions related data collection needs to be mandated under the sectoral policies • Draft Climate Change bill needs to be endorsed • Enforcement and compliance of National Building Code, applicable regulations and standards and building permit system.
Public awareness	• Low awareness of the environmental benefits and co-benefits of switching to energy-efficient and low-emission technologies, such as EVs, wastewater and solid waste management, among stakeholders and the general public. • Promoting the enrolment of females in sustainable agriculture
Coordination	• Activities in the sector are not well coordinated between ministries, agencies, development partners, financial entities, private businesses, and individuals.
MRV for Climate Change	• MRV for GHG inventory needs to be implemented for tracking of national GHG emission levels • MRV for mitigation is required to track the implementation status and achievements of results from mitigation projects. • MRV for climate finance to track funding received and funding required from donor partners.
Research	• Lack of research on adaptation and mitigation strategies for the health sector and healthcare facilities
Project management and Reporting	• Tedious process with reporting mechanisms • Management of healthcare waste in terms of shortage of staff, waste collection, waste data on healthcare waste and reporting system

5.1.1. Finance support need

The estimated total cost to achieve climate adaptation and mitigation goals as well as social resilience spending needs totals about US$650 million over the years 2022–2026, or about 17% of GDP annually.[45]On the basis of currently identified projects and sectoral plans, and with the majority of funding secured, the annualised cost of adaptation projects alone is approximately 11% of 2021 GDP. To achieve the SDGs for health and education, Samoa will also need to spend an additional 3% of GDP annually above current levels. Besides that, according to Samoa's second NDC, the investments required to meet its mitigation goals are estimated to be around 3% of GDP each year for the next five years, followed by around 1% of GDP each year from 2027 to 2030. Although funding sources for the NDC's mitigation goals have not yet been determined, but private sector investment may play a role.

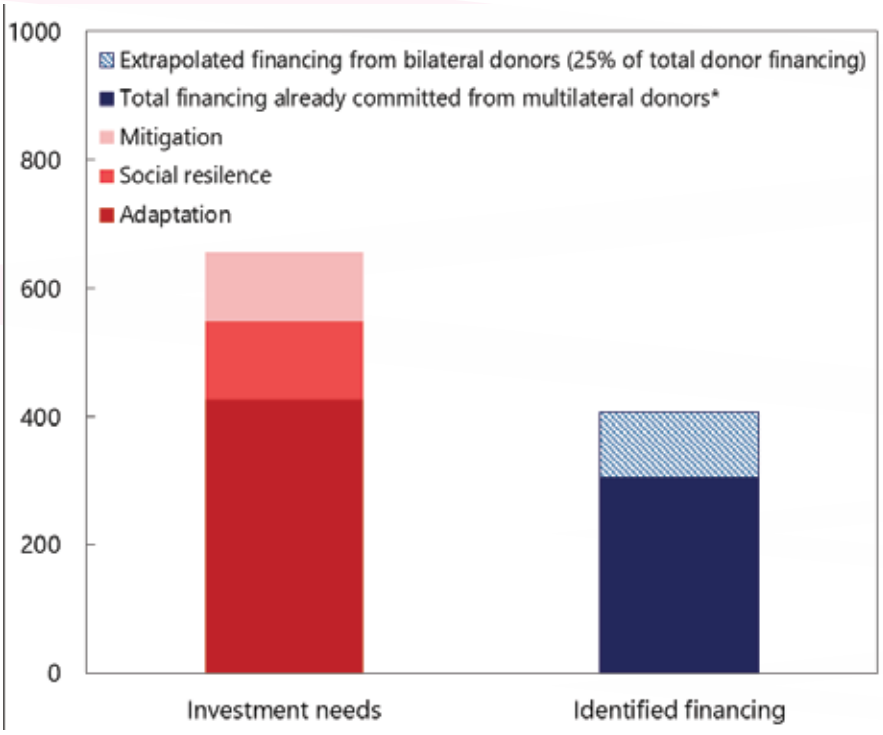
As can be observed from figure 5.1., the funding needs for Samoa's climate policy are significant and are unlikely to be met without additional donor support. Of the US$657 million in identified spending needs (see Table 5.2) US$306 million have committed funding from multilateral donors, mostly in the area of adaptation, and another US$100 million could be expected from bilateral donors, based on recent trends. This still leaves a funding gap worth US$250 million or roughly 6 percent of GDP per year if spread over the next five years. Samoa's vulnerability to external shocks leaves limited fiscal space for borrowing of this magnitude, implying additional grant financing will be required.

45 *Samoa: Technical Assistance Report—Climate Macroeconomic Assessment Program (March 2022) https://www.imf.org/en/Publications/CR/Issues/2022/03/21/Samoa-Technical-Assistance-Report-Climate-Macroeconomic-Assessment-Program-515505*

Table 5.2: Samoa: Spending Needs for Adaptation, Social Resilience and Mitigation

	Total estimated costs over 2022-2026 (millions of USD)	Annualized (percent of GDP)
Identified Adaptation Projects	**426**	**11.0**
Transportation	231	6.0
Flood mitigation	79	2.0
Water and Sanitation	61	1.6
Environment	24	0.6
Agriculture and Fisheries	22	0.6
Early Warning Systems	10	0.3
Social spending needs	**122**	**3.2**
Health	41	1.1
Education	81	2.1
Mitigation goals (NDC)	**107**	**2.8**
Land transport	62	1.6
Maritime transport	31	0.8
Electricity	8	0.2
AFOLU	4	0.1
Waste, Tourism and Marine	3	0.1
Social spending needs	**122**	**17.0**

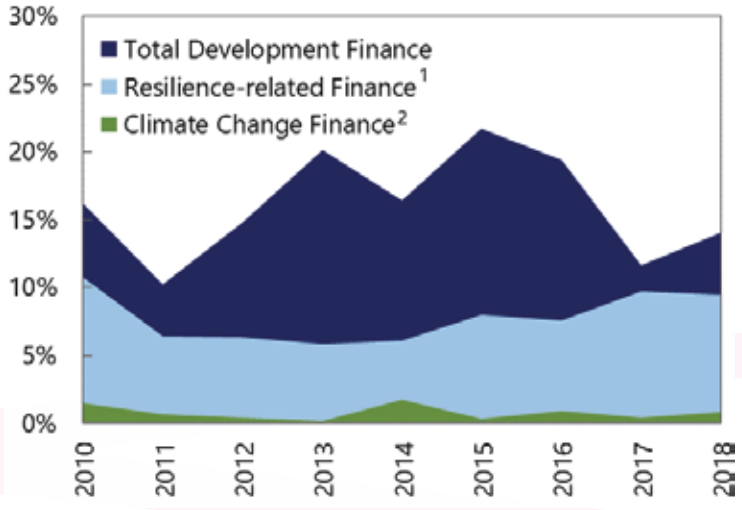
Figure 5.1: Spending Needs vs. Identified Financing, 2022-2026 (in millions of USD)



Source: Samoa: Technical Assistance Report—Climate Macroeconomic Assessment Program (March 2022)

Samoa depends on support from international donors to finance its development objectives, with the majority coming in the form of grants. However, among PICs, Samoa ranks towards the bottom in terms of total donor support received. Between 2014 and 2018, Samoa received on average around 16 percent of GDP in development finance each year (see Figure 5.2). Out of this, roughly 8 percent of GDP went to sectors broadly related to climate resilience and just under 1 percent of GDP went to activities specifically identified as aiming either at climate change mitigation or adaptation as their goals.

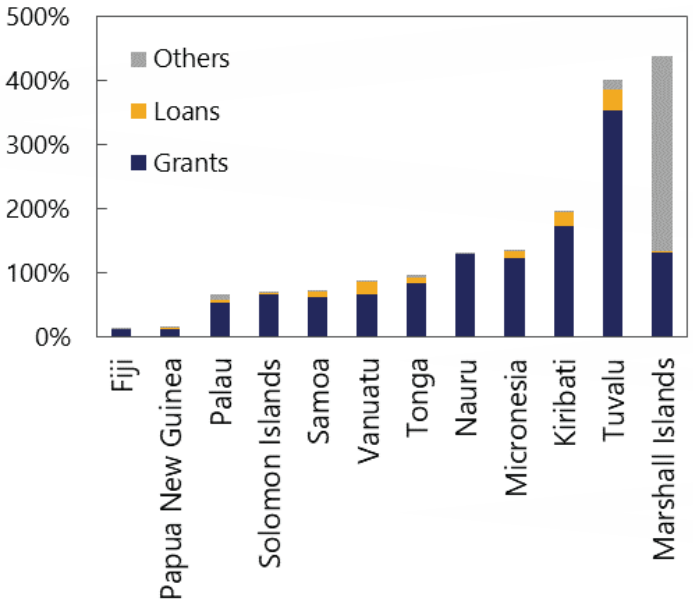
Figure 5.2: Disbursed Development Financing in Samoa, 2010-18 (in percent of GDP)[46]



Source: Samoa: Technical Assistance Report—Climate Macroeconomic Assessment Program (March 2022)

Samoa has been successful in gaining access to a number of international and regional sources of concessional climate financing on par with its peers (see Figure 5.3). Focusing on recently committed climate finance, Samoa ranks roughly in the middle of the PICs. Samoa has pursued climate financing most recently through the Global Environment Facility (GEF), Green Climate Fund (GCF), World Bank, and Asian Development Bank as well as the Climate Investment Funds, Adaptation Funds, and other multilateral climate funds in the past. Like other small island states, Samoa does not have direct access accreditation for climate funds and relies on internationally accredited entities, in particular the UNDP, for the execution of its GCF- and GEF-financed projects. Samoa is seeking direct accreditation with the GCF for the Development Bank of Samoa. However, this process is likely to take time. Bilateral donors have also been involved in financing climate-related projects with most support coming from Australia, Japan, and New Zealand.

Figure 5.3: Disbursed Total Development Financing in PICs by Financing Type, 2014-18 (in percent of GDP)



Source: Samoa: Technical Assistance Report—Climate Macroeconomic Assessment Program (March 2022)

46 *1/ Resilience-related Finance includes donor finance on Agriculture, Forestry and Fishing, Disaster Prevention and Preparedness, General Environment Protection, Education, Health, Transport and Storage, and Water Supply and Sanitation sectors 2/ Climate Change Finance includes donor finance with the explicit goal of either climate change mitigation or adaptation*

Complex and demanding requirements for climate funds, along with a domestic capacity constraint common to small states, frequently make it difficult for small states to access climate finance. Complying with complex access requirements of multilateral climate funds, including repeated accreditation, is time-consuming and many of the smaller funds have temporal access limits which can be easily exhausted. Even if funding for climate change has been secured, slow disbursement rates prevent it from being realised. Thus, the government needs to be strategic in matching its climate project pipeline to those financing sources that provide a positive balance of administrative costs and total funding access. Combining smaller projects together into one large project with different sub-components may be one way to reduce the per-dollar administrative cost of accessing climate funds. Where smaller projects cannot easily be combined or where particularly urgent needs exist, bilateral donor financing can be prioritized, which tends to be easier to access and get disbursed faster. Also, Private capital can be mobilized to finance mitigation investments within limits.

Table 5.3, below, identifies the list of pipeline projects which require finance support. It also indicates the investment requirement for meeting the costs of each of the pipeline projects and it is estimated at around USD 196.96 million. Some of the projects enlisted in the table are illustrative, having feasibility studies done for those projects will help in identifying the financial and capacity building needs for their realization.

Table 5.3: Identified Investment/finance needs for implementation of pipeline and proposed projects.

SN	Projects	Executors (Implementing Agency)	Supporting agency(ies)	Funding Secured (Yes/No)	Indicative Investment Needs(Million US$)
1.	Building energy efficiency program	MNRE	MOF	No	0.250
2.	Grid stabilization projects	EPC	MOF, MWTI	No	5.050
3.	Manure management using anaerobic digesters	MAF-Livestock Division	MNRE	No	1.095
4.	Network loss reduction program	MOF	MNRE	No	2.000
5.	Transport optimization and energy efficiency review	MWTI	SPA, MOF	No	0.075
6.	Shared electric cars	EPC	MWTI, MOF, Ministry of Customs and Revenue (MCR), MPPC	No	14.679
7.	Energy efficient appliances	STA	MOF	No	0.250
8.	Electrification of commercial Fleets	MWTI	MOF, MWTI	No	18.402
9.	Electric ferry	Samoan Shipping Corporation	MWTI	No	29.000
10.	Electrification of government and municipal fleets	MOF	MWTI, MOP, MCR, EPC, MPPC	No	10.649
11.	Expansion of solar panel project	Samoan Shipping Corporation	MWTI	No	1.305
12.	Electrification of Samoa's light vehicle fleet	EPC	MWTI, MOF, MCR, MPPC	No	42.506
13.	Samoa Aviation and Road Investment Project (SARIP)	EPC	MNRE	No	66
14.	USD$5.7million to construct the proposed Tiapapata 750KiloWatts Hydro Station	EPC	MNRE	No	66
15.	Samoa Governance and Economic Growth Facility	EPC	MNRE	No	NE
16.	Samoa Human Development and Social Inclusion Facility	EPC	MNRE	No	NE
17.	Alaoa Multipurpose Dam Project	EPC	MNRE	No	NE
18.	Solar System - minimum 2MW with storage system.	EPC	MNRE	No	NE
19.	Batteries Energy Storage System - minimum 4MW.	EPC	MNRE	No	NE
20.	Electric Vehicles - Pick Ups	EPC	MNRE	No	NE
21.	Solar/Wind Street Lights	EPC	MNRE	No	NE
22.	Wind Farm	EPC	MNRE	No	NE
23.	Geo-Thermal Station	EPC	MNRE	No	NE

SN	Projects	Executors (Implementing Agency)	Supporting agency(ies)	Funding Secured (Yes/No)	Indicative Investment Needs(Million US$)
24.	Green Hydrogen	EPC	MNRE	No	NE
25.	Ocean Energy	EPC	MNRE	No	NE
26.	Bioenergy	EPC	MNRE	No	NE
			Total indicative investment need (million US$)		**196.961**

NE- Not estimated

5.1.2. Technical and Capacity Building support needs

This section highlights the technical, technology and capacity building support needs identified for Samoa. Table 5.4 and 5.5 presents an illustrative list of technology, and technical and capacity building support need identified.

Table 5.4 Technology support needs

SN	Projects	Sector
1.	Biomass gasifiers	Agriculture
2.	Battery Energy Storage Systems (BESS)	Energy
3.	Electric Vehicles and Charging stations	Energy
4.	Solar panels/Floating PV Systems	Energy
5.	Biogas systems	Agriculture
6.	Green Hydrogen	Agriculture
7.	Geothermal	Energy
8.	Ocean Energy	Energy
9.	Waste Incinerators	Waste
10.	Early warning systems	Agriculture and Disaster management

Table 5.5 Technical, Financial and Capacity Building support needs

SN	Need identified	SN Need identified Support needed	Specific type of support requested [technical, capacity building, financial support]
1.	Continuous and regular data collection and analysis for all sectors in close reference to 2006 IPCC guidelines.	Capacity Building for national experts and stakeholders	Technical assistance and Capacity building
2.	Enhance understanding on 2006 IPCC guidelines, its 2019 refinement, different tools used for GHG inventory (IPCC software) and mitigation and uncertainty analysis	Capacity Building for national experts and stakeholders	Capacity Building
3.	Improvement of database management and archiving of GHG emissions, mitigation and adaptation projects	Capacity Building for database management and archiving	Capacity Building
4.	Usage of LIDAR for collection of spatial data and land use changes	Capacity Building for collection of spatial data and land use change mapping	Capacity Building
5.	Targeted awareness public awareness and education programmes sharing knowledge and information on Renewable Energy (RE), Energy Efficiency (EE), energy conservation and identifying costs and benefits of RE.	Capacity Building for government, ministries and targeted groups	Capacity building
6.	Establish a centralized database for RE projects	Technical Assistance to EPC for developing RE project database	Capacity Building
7.	Development of MRV system for GHG inventory, mitigation, adaptation and climate finance	Technical Assistance for development of robust MRV system that meets country specific needs	Technical assistance and Capacity building
8.	Evaluation of emissions reductions of mitigation projects	Capacity Building for national experts to analyze, quantify and monitor mitigation potential of planned/pipeline and implemented projects	Capacity building

Table 5.5 Technical, Financial and Capacity Building support needs

SN	Need identified	SN Need identified Support needed	Specific type of support requested [technical, capacity building, financial support]
9.	Enforcement and compliance for the updated national building codes	Capacity Building for enforcement, monitoring and compliance of the buiding codes	Capacity building
10.	Conducting quality assurance of sectoral GHG inventory reports and/or National Inventory Reports	Inhouse Capacity building for national experts to conduct QA/QC	Technical assistance and Capacity building
11.	Limited knowledge of gasification systems and proper operation	Capacity building for technicians and locals for proper set up, operation and maintenance of biomass gasification systems	Capacity Building
12.	Capacity building required to advance technical skills, understandings of technological changes, and knowledge of projects, and to improve project implementation, management, and monitoring skills	Capacity Building for ministries and its employees to improve project management	Capacity Building
13.	Train EPC engineers/technicians and locals to increase knowledge, operation and maintenance of solar PV systems and battery energy storage systems	Capacity building for technical experts and interested locals by developing training program for installation, maintenance of Solar PV system and BESS	Capacity Building
14.	Train EPC engineers/technicians and locals to install, operation and maintenance of diesel based and RE based plants (including Hydro)	Capacity building for EPC engineers, technicians and locals by developing training program for operation and maintenance of existing diesel and new RE power plants (hydro)	Capacity Building
15.	Promoting women in subsistence farming – workshops for young women in local communities	Capacity Building for women's in local communities	Capacity Building
16.	Micro-credential in Climate Change, Adaptation and Mitigation for women in rural villages	Technical Assistance to develop academic programs	Technical assistance and Capacity building
17.	Developing academic programmes related to climate change and education, gender etc.	Technical Assistance to develop programs	Technical assistance and Capacity building
18.	Establishing a multidisciplinary climate change institute to drive Climate Change, Adaptation and Mitigation (CCAM) research to inform policy & other relevant developments	Technical Assistance and funding for setting up a dedicated institute focussing on CCAM research	Technical assistance and financial support
19.	Technical Assistance to finalize the Climate Adaptation Strategy for Health (CASH)	Technical Assistance to Ministry of Health	Technical assistance
20.	Trainings on scientific research on health and climate change adaptation	Capacity Building for Ministry of Health	Capacity building
21.	Training on epidemiology within health and climate change	Capacity Building for Ministry of Health	Capacity building
22.	Trainings on adaptation and mitigation strategies for the health sector and healthcare facilities	Capacity Building for Ministry of Health	Capacity building
23.	Promotion of energy efficient and low-emissions technology (like e-vehicles)	Technical assistance and financial support to promotion and procurement of low emission technologies	Technical assistance and financial support
24.	Technology Needs Assessment (TNA) and country capacity assessment	Technical, financial and capacity building need to conduct TNA and country capacity assessment to identify technology, gap, constraints and capacity building needs	Technical, financial, and capacity building
25.	Development of training program on install biogas plants, its maintenance and operation for promoting waste to energy and organic waste composting	Technical assistance and capacity building for EPC, MNRE and interested locals and private sector on installation of biogas plants, its operation and maintenance and organic waste composting	Technical, financial, and capacity building

5.2. Financial support received

This section provides updated information on financial support received from the Global Environment Facility, Parties included in Annex II to the Convention and other developed country Parties, the Green Climate Fund and multilateral institutions for activities relating to climate change, including the preparation of the current Biennial Update Report. The GEF, GCF and UNDP are the main multilateral sources of financial assistance to Samoa. Further, Samoa has also received financial support from bilateral sources like Australia, New Zealand, EU, Japan, etc. Multilateral financial institutions, including regional development banks like ADB, World Bank, OPEC including some regional organizations have provided financial support to Samoa. A summary of the financial support received to Samoa from various sources is provided in the table 5.6 below during years 2012-2022.

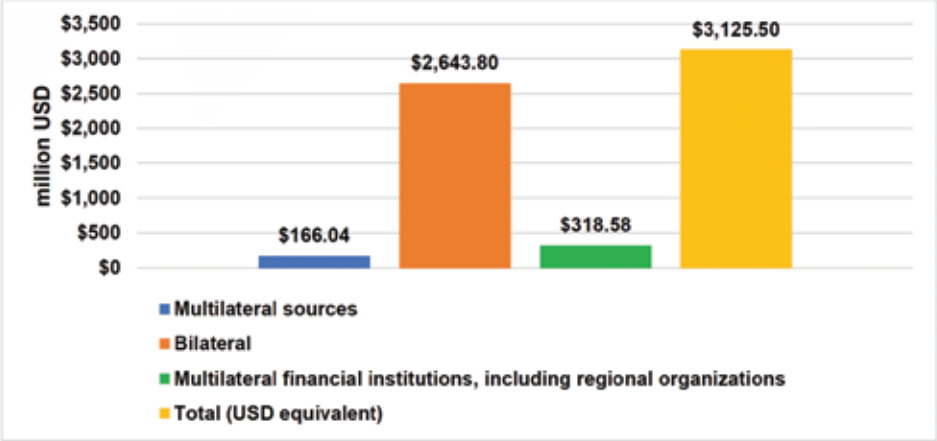
In a nutshell, Samoa has received about USD 166.03 million from multilateral sources and USD 2634.37 million from bilateral sources. While support received from multilateral financial institutions, including regional development banks and other regional organizations is about USD 318.58 million. Thus, the total financial support received to Samoa, from all sources during 2012-2022 totals to USD 3128.41 million.[47] A detailed list of projects supported by climate finance during the years 2012-2022 is provided in the annexure 13 of this report.

Table 5.6: Climate-specific financial support received.

By Donor Multilateral sources	Amount	Currency
GEF/UNDP/SPC	7,88,85,917	USD
GCF	8,69,17,748	USD
UNDP	2,35,000	USD
Sub-total	**16,60,38,665**	**USD**
Bilateral		
Australia	11,79,15,836	USD
	32,65,978	AUD
New Zealand	65,33,000	USD
	2,63,01,387	NZD
EU	6,40,000	EUR
Japan	2,50,01,40,120	USD
PRC		
Sub-total (USD equivalent)	**2,64,37,95,080.31**	**USD**
Multilateral financial institutions, including regional organizations		
World Bank	22,94,64,060	USD
ADB	13,59,61,605	USD
IFAD	39,85,000	USD
OPEC	1,20,00,000	USD
Other international organization (KOIST, YEOSU Korea Foundation, FAO)	92,263	USD
	2,06,381	AUD
	63,120	SAT
Regional Organisation		
FFA	25,55,276	USD
	6,79,089	SAT
SPC	2,97,096	SAT
Sub-total (USD equivalent)	**31,85,83,813**	**USD**
Total (USD equivalent)	**3,12,84,17,558**	**USD**

47 *Some of the funding secured are not in USD. Hence, they have been converted to USD equivalent using following conversion factors: 1 SAT= 0.3707 USD, 1 AUD= 0.68 USD, 1 NZD= 0.62 USD, 1 EUR= 1.06 USD*

Figure 5.4 Climate-specific financial support received.



5.3. Technology and capacity building support received

Technology support and capacity building is critical to achieving high climate ambition. As a result, Samoa 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, Samoa has received technical assistance for biomass-based power generation, and training and capacity building program developed for EPC personnel for enhancement of electricity system stability and energy performance under the Improving Performance and Reliability of Renewable Energy Power Systems in Samoa (IMPRESS) Project (Refer project no 5 in Annexure 13). Likewise, Samoa has received Light Detection and Ranging (LIDAR) technology including training and capacity building for the operation of LIDAR under the Enhancing Resilience of Coastal Communities to Climate Change - Adaptation Fund project (Refer project no 9 in Annexure 13). In a nutshell, Samoa has received some technology and capacity building support in the past but from the information collected it was found that the information on Technology and capacity building support received is not properly captured in the country and is not detailed enough in accordance with the guidelines of the convention. Thus, this is a key area for improvement and exhaustive work that meets what is required as minimum requirements by the convention, needs to be done with a view to being reported in the next reports.

6. Additional Observations

6.1. Recommendations on development of MRV system

A robust Monitoring (Measuring), Reporting and Verification (MRV) system is important for national policy decisions and is a key requirement under UNFCCC and the Paris Agreement. Further, under the PA commitments, Samoa will be subjected to participate in the enhanced transparency framework (ETF), which builds on the existing arrangements and shall require to communicate the National GHG Inventory, National Communications, Biennial transparency reports (BTR), Progress on NDC Implementation, Adaptation Communications and Reporting on Support (Provided/Received).

The Paris Agreement (PA) has established a universal and harmonized measurement, reporting, and verification (MRV) provisions for climate change mitigation. A common system of transparency now applies to all countries. MRV is central to effectively implementing the Nationally Determined Contributions (NDCs) submitted under the Paris Agreement, which describe countries' mitigation goals and policies. Measurement is needed to identify emissions trends, determine where to focus greenhouse gas (GHG) reduction efforts, track mitigation-related support, assess whether mitigation actions planned under NDCs or otherwise are proving effective, evaluate the impact of support received, and monitor progress achieved in reducing emissions. Reporting and verification are important for ensuring transparency, good governance, accountability, and credibility of results, and for building confidence that resources are being utilized effectively.

Many countries have engaged in MRV to serve a variety of domestic and international purposes. Internationally, MRV enables countries to meet their international reporting obligations, compare their national mitigation commitments, track emissions trends, build trust in their actions and reported data, unlock new sources of finance to tackle climate change by demonstrating impact and good governance practices, and so on.

6.2. What is MRV?

The term MRV is mostly used in the context of climate change mitigation; effective mitigation of climate change requires a clear understanding of greenhouse gas (GHG) emissions and their sources, and regular monitoring of mitigation strategies and their impacts. The practice of "MRV," which integrates three independent, but related, processes of measurement or monitoring (M), reporting (R), and verification (V).

- Measure or monitor (M) data and information on emissions, mitigation actions, and support. This may entail direct physical measurement of GHG emissions, estimating emissions or emissions reductions utilizing activity data and emission factors, calculating changes relevant to sustainable development, and collecting information about support for climate change mitigation.

- Report (R) by compiling this information in inventories and other standardized formats to make it accessible to a range of users and facilitate public disclosure of information.

- Verify (V) by periodically subjecting the reported information to some form of review or analysis or independent assessment to establish completeness and reliability. Verification helps to ensure accuracy and conformance with any established procedures and can provide meaningful feedback for future improvement.

The term MRV first appeared in the context of climate change mitigation policy as part of the Bali Action Plan (2007), which called for "measurable, reportable, and verifiable nationally appropriate mitigation commitments or actions" and stated that they should be "supported and enabled by technology, financing and capacity-building, in a measurable, reportable and verifiable manner"; Subsequently, efforts have been made to fill in the details and define what should be measured, reported, and verified, how, by whom, and for what purpose. Under the Paris Agreement, it was agreed that all countries will provide emissions data and track progress against their contributions. MRV systems will be a significant component in effectively tracking and improving the implementation of mitigation goals and policies articulated under countries' Nationally Determined Contributions (NDCs).

6.3. Types of MRV

The term "MRV" is widely used but often without a clear reference to the type of MRV, nature of MRV-related activities and application. Hence, it is imperial to understand the different types of MRV and how they differ from one another. The different type of MRV system includes following:

- **MRV of GHG emissions refers** to estimating, reporting, and verifying actual emissions over a defined period of time. This type of MRV can be performed at national level, or by organizations and facilities.

- **MRV of mitigation actions** involves assessing (ex-ante or ex-post) GHG emissions reductions and/or sustainable development (non-GHG) effects of policies, projects, and actions, as well as monitoring their implementation progress. It also involves assessing progress toward mitigation goals.

- **MRV of adaptation actions** involves assessing (ex-ante or ex-post) specific adaptation and/or sustainable development (SDGs) effects of policies, projects, and actions, as well as monitoring their implementation progress. It also involves assessing progress toward national adaptation plans.

- **MRV of support** (e.g., climate finance, technology transfer, and capacity building) to track provision and receipt of climate support, monitor results achieved, and assess impact (Focused mainly on monitoring the provision and receipt of financial flows, technical knowledge, and capacity building, and evaluating the results and impact of support).

There are other sub-categories of MRV system like MRV of emissions at the sub-national level (e.g., county, provincial and city level), the sector level (e.g., power generation sector, cement sector), or emissions associated with a product's lifecycle. Other sub-category of MRV can be national, organization or facility level; goal, policy or project level; the project level MRV may also include GHG effect, SDG effect, implementation progress; support provided (funding provided), support received (fund received), result and impact etc.

6.4. Selection of MRV System

The selection of MRV system is very subjective for decision maker and can be developed at international or domestic level as per the requirement. There is no-single MRV system model available but shall be customized to fulfil the short-medium- or long-term objectives of a country. To select or set-up a MRV system following questions can assist in identifying which type of MRV may be best matched to the needs.

- Why carry out MRV? Answering this question describes the objectives of the MRV process and helps to build ownership and consensus around MRV-related initiatives.
- How will MRV be carried out? Here the focus is on outlining the methodological and technical guidelines and processes that will be necessary to perform MRV.
- When will MRV be performed? This involves deciding on the appropriate timeframe to undertake MRV.
- Who will carry out MRV? The next step is to identify entities that can undertake MRV. It also considers the resources and capacity that will be required, and where these could come from, for example, from the national budget or international support.

6.5. Enhanced Transparency Framework and MRV

The 2015 Paris Agreement (Article 13) outlines an "enhanced transparency framework" (ETF) including greater requirements for MRV; though this can be built upon existing available system. Under the ETF, a single set of requirements applies to all countries, with "flexibility" in meeting these requirements. The focus for capacity-building efforts has shifted to the implementing and enhancing of nationally determined contributions (NDCs) and strengthening countries' transparency (measurement, reporting, and verification, or MRV) systems. These two efforts are mutually reinforcing. The implementation of the enhanced transparency framework should serve as a foundation for the "plan-implement-review" cycle that would drive and operationalize not only the implementation of the Paris Agreement at the international level but also the design and enhancement of NDCs at the national level. The requirements for the enhanced transparency framework will take effect by 2024; however it is important to initiate the transition at the earliest.

Under the Paris Agreement's reporting process, countries have the obligation to regularly report through a biennial transparency report (BTR) on

- National GHG inventories;
- Tracking progress: Information necessary to track progress made in implementing and achieving NDCs; and
- Support: Information on financial, technology-transfer, and capacity-building support needed and received (Voluntary for developing countries).
- Market mechanisms

6.6. Recommended MRV system for Samoa

Developing MRV systems is a process that will take many years, especially as the systems evolve in response to national circumstances and national needs. Over the years countries have building their capacities and developing/developed MRV systems in line with the domestic and international requirements. As discussed above since there is no single solution or MRV system that fulfil the national circumstances, domestic and international requirement; MRV system has to develop over time and expectations that system will be fully functional and implemented overnight or in the immediate short term are unrealistic. Creating an effective, robust MRV system takes time and significant resources, as well as supportive legislative and institutional instruments.

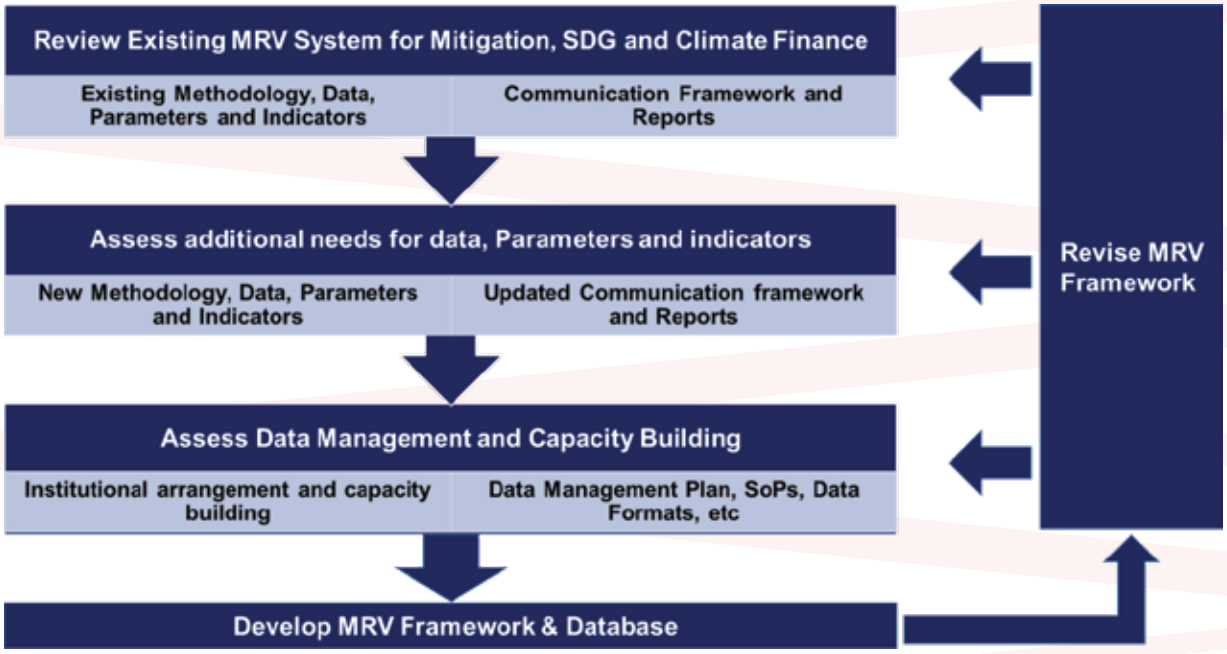
However, the domestic MRV systems will allow Samoa to better track and assess the progress of the implementation of their NDCs.

The national MRV system must be robust but built on available resources e.g., data, human resources, capacity etc. and existing systems of monitoring and reporting (data collection and analysis); with minimal additional burden to the reporting agency and relevant stakeholders.

Further, it is recommended that Samoa should aim at developing an Integrated MRV Tool based on Information and communications technology (ICT) designed specifically considering the requirement of Samoa, extensive desktop review of documents, followed by the stakeholder consultation and discussion with MNRE and MoF. The proposed integrated MRV tool shall provide an overarching structure, approach and methodology towards:

- National GHG emission monitoring and inventory;
- Basis for international and domestic reporting requirements (e.g., Notational Communications (NCs), Biannual Update Reports (BUR) 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 7.1 below:

Figure 6.1: key steps for designing the integrated MRV system



In a nutshell, Samoa's MRV system development should take following points into consideration for developing a robust MRV system that effectively track, 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 theEnhanced Transparency Framework requirements, which fits into the larger national agenda.

References

Agriculture Sector Plan 2016-2020 (ASP)
https://www.mof.gov.ws/wp-content/uploads/2022/08/Agriculture-Sector-Plan-2016-2020-Vol-1.pdf

Community Integrated Management Plans (CIM Plans) (2018),
https://www.mnre.gov.ws/wp-content/uploads/2018/10/Palauli-Falefa_District_FINALEDIT_August-2018.pdf

Energy Sector Plan 2017-2022 (2017),
https://www.mof.gov.ws/wp-content/uploads/2022/08/Energy-Sector-Plan-2017-2022.pdf

Fiji low development strategy 2018 – 2050,
https://unfccc.int/sites/default/files/resource/Fiji_Low%20Emission%20Development%20%20Strategy%202018%20-%202050.pdf

Fiji TNC Report 2019, https://unfccc.int/sites/default/files/resource/Fiji_TNC%20Report.pdf

Greenhouse Gas Abatement Strategy 2020-2030 (draft 2021)

Inclusive Governance Policy 2021-2031 (2021)

Ministry of Natural Resources and Environment, 2011, "Solid Waste Characterization and Generation Study 2011.VAITELE.",
https://www.sprep.org/attachments/j-prism/Waste%20Characterization%20Report/Samoa/2011_Waste_Audit_Report_-_Samoa_(light_data).pdf

National Appropriate Mitigation Actions Plan (NAMA) (2018)

National Building Code of Samoa (NBC) (2017),
https://www.cip-icu.ca/Files/APE-2017-Projects/NBC-Draft-2017-February15-FINAL-for-STAPLES-8x11.aspx

National Environment Sector Plan 2017-2021 (NESP) (2017),
https://policy.asiapacificenergy.org/sites/default/files/National%20Environment%20Sector%20Plan%20%28NESP%29%202017-2021.pdf

National Forestry Act – 2011, https://faolex.fao.org/docs/pdf/sam131140.pdf

National Forestry regulation – 2015,
https://samoa.tradeportal.org/media/150331%20Final%20Draft%20Forestry%20Management%20Regulations%202015.pdf

National Waste Management Strategy 2019-2023 (NWMS),
https://www.sprep.org/attachments/VirLib/Samoa/national-waste-management-strategy-2019-2023.pdf

Pathway for the Development of Samoa (PDS) Y2021/22 – FY2025/26,
https://www.mof.gov.ws/wp-content/uploads/2022/02/Pathway-for-the-Development-of-Samoa.pdf

Samoa 2040, Ministry of Finance, Apia, 2021.
https://www.mof.gov.ws/wp-content/uploads/2021/03/Samoa-2040-Final.pdf

Samoa Agriculture Census, 2019,
https://www.sbs.gov.ws/images/sbs-documents/Economics/SAMOA-AGRICULTURE-CENSUS/SAMOA_AGRICULTURE_CENSUS_2019.pdf

Samoa Climate Change Policy 2020,
https://www.mnre.gov.ws/wp-content/uploads/2021/03/Samoa-Climate-Change-Policy-2020-2030.pdf

Samoa GHG Inventory report 2010 - 2020

Samoa Health Sector Plan FY2019/20 – FY2029/30, https://www.mof.gov.ws/wp-content/uploads/2022/08/Health-Sector-Plan-2020-2030.pdf

Samoa Health Sector Plan FY2019/20 – FY2029/30, https://www.mof.gov.ws/wp-content/uploads/2022/08/Health-Sector-Plan-2020-2030.pdf

Samoa National Forest Inventory – 2014

Samoa Ocean Strategy (SOS) (2020), https://www.sprep.org/sites/default/files/documents/publications/samoa-ocean-strategy-management.pdf

Samoa Second National Communication to the UNFCCC (2009), https://unfccc.int/resource/docs/natc/samnc2.pdf

Samoa's Intended Nationally Determined Contribution (INDC) to UNFCCC (2015) https://unfccc.int/sites/default/files/NDC/2022-06/Samoa%20INDC_Submission%20to%20UNFCCC.pdf

Samoa's Low-Emission Development Strategy 2022-2032. (Draft)

Samoa's Second Nationally Determined Contribution (NDC) (2021) https://unfccc.int/sites/default/files/NDC/202206/Samoa%27s%20Second%20NDC%20for%20UNFCCC%20Submission.pdf

Samoa's National Biodiversity Strategy and Action Plan (NBSAP) 2001, https://samoa-data.sprep.org/resource/national-biodiversity-strategy-and-action-plan-2001

Samoa's NDC Implementation roadmap and investment plan

Statistical Abstract 2020, Samoa Bureau of Statistics (SBS), Government of Samoa, Apia, Samoa, 2021, https://www.sbs.gov.ws/images/sbs-documents/social/Abstract/Abstract_2020.pdf

Strategy for the Development of Samoa (SDS) 2016-2020 (2016), https://policy.asiapacificenergy.org/sites/default/files/Strategy%20For%20The%20Development%20Of%20Samoa%202016%3A17-2019%3A2028EN%29.pdf

Tourism Sector Plan 2014-2019 (2014), https://pafpnet.spc.int/attachments/article/684/Samoa-Tourism-Sector-Plan-2014-2019.pdf

Transport Sector Plan 2013-2018 (2013) https://www.mof.gov.ws/wp-content/uploads/2019/09/TSP-Volume-I-Final.pdf

Water and Sanitation Sector Plan (WSSP) (2017), https://www.mof.gov.ws/wp-content/uploads/2022/08/Water-Sanitation-Sector-Plan-2016-2020.pdf

Annexures

Annexure 1: 2020 Emissions Reporting Tables

UNFCCC Reporting Table 1. Samoa's National greenhouse gas inventory of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol and greenhouse gas precursors (2020)

Greenhouse gas source and sink categories CO2	CO_2 Emissions (Gg)	CO_2 Removals (Gg)	CH_4 (Gg)	N_2O (Gg)	CO (Gg)	NO_x (Gg)	NMVOC (Gg)	SO_2 (Gg)
Total National Emissions and Removals	**229.74**	**-850.57**	**229.74**	**13.06**	**0.06**	**0.12**	**0.04**	**0.09**
1 ENERGY	**229.40**		**0.27**	**0.51**	**0.06**	**0.12**	**0.04**	**0.09**
1A Fuel Combustion Activities	229.40		0.27	0.51	0.06	0.12	0.04	0.09
1A1 Energy Industries (electricity y generation)	69.33		0.0786	0.1488	0.0152	0.0608	0.0007	0.0435
1A2 Manufacturing Industries and Construction	19.47		0.0221	0.0418	0.0379	0.0379	0.0379	0.0379
1A3 Transport (subtotal)	138.67		0.165	0.312	0.004	0.017	0.000	0.012
1A3a Civil Aviation (Domestic Aviation)	NE		NE	NE	NE	NE	NE	NE
1A3b Road Transport	135.40		0.16	0.30	0.12	0.00	0.09	0.28
1A3c Waterborne Navigation (Domestic Shipping)	3.27		0.0037	0.0070	0.0029	0.0000	0.0020	0.0064
1A4 Other Sectors (subtotal)	1.93		0.0022	0.0042	0.0004	0.0017	0.0000	0.0012
1A4 a Commercial/Institutional	IE		IE	IE	IE	IE	IE	IE
1A4 b Residential	IE		IE	IE	IE	IE	IE	IE
1A4 c Agriculture/ Forestry/ Fishing/ Fish Farms	1.93		0.0022	0.0042	0.0004	0.0017	0.0000	0.0012
1A5 Non-Specified	IE		IE	IE	IE	IE	IE	IE
1B Fugitive Emissions from Fuels	NO		NO	NO	NO	NO	NO	NO
1C Carbon Dioxide Transport and Storage	NO				NO	NO	NO	NO
2 INDUSTRIAL PROCESSES AND PRODUCT USE	**0.25**		**NE**	**NE**	**NE**	**NE**	**NE**	**NE**
2A Mineral Industry	NO		NO	NO	NO	NO	NO	NO
2B Chemical Industry	NO		NO	NO	NO	NO	NO	NO
2C Metal Industry	NO		NO	NO	NO	NO	NO	NO
2D Non-Energy Products from Fuels and Solvent Use	0.25		NE	NE	NE	NE	NE	NE
2D1 Lubricant Use	0.25				NE	NE	NE	NE
2D2 Paraffin Wax Use	0.00		NE	NE	NE	NE	NE	NE
2D3 Solvent Use	NE		NE	NE	NE	NE	NE	NE
2D4 Other (please specify)	NE		NE	NE	NE	NE	NE	NE
2E Electronics Industry	NO		NO	NO	NO	NO	NO	NO
2F Product Used as Substitutes for Ozone Dep. Subst.	NA		NA	NA	NA	NA	NA	NA
2G Other Product Manufacture and Use	NA		NA	NA	NA	NA	NA	NA
2G1 Electrical Equipment	NO		NO	NO	NO	NO	NO	NO
2G2 SF6 and PFCs from Other Product Uses	NO		NO	NO	NO	NO	NO	NO
2G3 N2O from Product Uses (medical uses)	NE		NE	NE	NE	NE	NE	NE
2G4 Other	NA		NO	NO	NO	NO	NO	NO

Greenhouse gas source and sink categories CO2	CO_2 Emissions (Gg)	CO_2 Removals (Gg)	CH_4 (Gg)	N_2O (Gg)	CO (Gg)	NO_x (Gg)	NMVOC (Gg)	SO_2 (Gg)
2H Other (please specify)	NA		NA	NA	NA	NA	NA	NA
2H1 Pulp and Paper Industry	NO		NO	NO	NO	NO	NO	NO
2H2 Food and Beverages Industry	NE		NE	NE	NE	NE	NE	NE
2H3 Other (Ammonia Use)	NA		NA	NA	NA	NA	NA	NA
3 AGRICULTURE, FORESTRY AND OTHER LAND USE	**NA**	**-850.57**	**125.21**	**12.56**	**NA**	**NA**	**NA**	**NA**
3A Livestock			125.21	3.51				
3A1 Enteric Fermentation			73.92					
3A2 Manure Management			51.29	3.51				
3B Land	NA	-850.57	NE	NE	NA	NA	NA	NA
3B1 Forest Land	NA	-850.57	NE	NE	NA	NA	NA	NA
3B2 Cropland	NA	NE	NE	NE	NA	NA	NA	NA
3B3 Grassland	NA	NE	NE	NE	NA	NA	NA	NA
3B4 Wetlands	NA	NE	NE	NE	NA	NA	NA	NA
3B5 Settlements	NA	NE	NE	NE	NA	NA	NA	NA
3B6 Other Land	NA	NE	NE	NE	NA	NA	NA	NA
3C Aggregate Sources and Non-CO2 Emissions Sources on Land	NA		NE	9.048	NA	NA	NA	NA
3C1 Biomass Burning	NA		**NE**	**NE**	NA	NA	NA	NA
3C2 Liming	NA							
3C3 Urea Application	NA							
3C4 Direct N2O Emissions from Managed Soils				9.05				
3C5 Indirect N2O Emissions from Managed Soils				NE				
3C6 Indirect N2O Emissions from Manure Management				NE				
3C7 Rice Cultivations			NO				NO	
3C8 Other (please specify)	NO		NO	NO	NO	NO	NO	NO
3D Other	NO		NO	NO	NO	NO	NO	NO
4 WASTE	**0.09**		**104.44**	**NA**	**NA**	**NA**	**NA**	**NA**
4A Solid Waste Disposal	NA		69.18		NA		NA	
4A1 Managed Waste Disposal Sites	NA		69.18		NA		NA	
4A2 Unmanaged Waste Disposal Sites	NA		NE	NA	NA	NA	NA	NA
4A3 Uncategorised Waste Disposal Sites	NA		NE	NA	NA	NA	NA	NA
4B Biological Treatment of Solid Waste	NA		NE	NA	NA	NA	NA	NA
4C Incineration and Open Burning of Waste	0.09		NE	NA	NA	NA	NA	NA

Greenhouse gas source and sink categories CO2	CO_2 Emissions (Gg)	CO_2 Removals (Gg)	CH_4 (Gg)	N_2O (Gg)	CO (Gg)	NO_x (Gg)	NMVOC (Gg)	SO_2 (Gg)
2H Other (please specify)	NA		NA	NA	NA	NA	NA	NA
2H1 Pulp and Paper Industry	NO		NO	NO	NO	NO	NO	NO
2H2 Food and Beverages Industry	NE		NE	NE	NE	NE	NE	NE
2H3 Other (Ammonia Use)	NA		NA	NA	NA	NA	NA	NA
3 AGRICULTURE, FORESTRY AND OTHER LAND USE	**NA**	**-850.57**	**125.21**	**12.56**	**NA**	**NA**	**NA**	**NA**
3A Livestock			125.21	3.51				
3A1 Enteric Fermentation			73.92					
3A2 Manure Management			51.29	3.51				
3B Land	NA	-850.57	NE	NE	NA	NA	NA	NA
3B1 Forest Land	NA	-850.57	NE	NE	NA	NA	NA	NA
3B2 Cropland	NA	NE	NE	NE	NA	NA	NA	NA
3B3 Grassland	NA	NE	NE	NE	NA	NA	NA	NA
3B4 Wetlands	NA	NE	NE	NE	NA	NA	NA	NA
3B5 Settlements	NA	NE	NE	NE	NA	NA	NA	NA
3B6 Other Land	NA	NE	NE	NE	NA	NA	NA	NA
3C Aggregate Sources and Non-CO2 Emissions Sources on Land	NA		NE	9.048	NA	NA	NA	NA
3C1 Biomass Burning	NA		**NE**	**NE**	NA	NA	NA	NA
3C2 Liming	NA							
3C3 Urea Application	NA							
3C4 Direct N2O Emissions from Managed Soils				9.05				
3C5 Indirect N2O Emissions from Managed Soils				NE				
3C6 Indirect N2O Emissions from Manure Management				NE				
3C7 Rice Cultivations			NO				NO	
3C8 Other (please specify)	NO		NO	NO	NO	NO	NO	NO
3D Other	NO		NO	NO	NO	NO	NO	NO
4 WASTE	**0.09**		**104.44**	**NA**	**NA**	**NA**	**NA**	**NA**
4A Solid Waste Disposal	NA		69.18		NA		NA	
4A1 Managed Waste Disposal Sites	NA		69.18		NA		NA	
4A2 Unmanaged Waste Disposal Sites	NA		NE	NA	NA	NA	NA	NA
4A3 Uncategorised Waste Disposal Sites	NA		NE	NA	NA	NA	NA	NA
4B Biological Treatment of Solid Waste	NA		NE	NA	NA	NA	NA	NA
4C Incineration and Open Burning of Waste	0.09		NE	NA	NA	NA	NA	NA

Greenhouse gas source and sink categories CO2	CO_2 Emissions (Gg)	CO_2 Removals (Gg)	CH_4 (Gg)	N_2O (Gg)	CO (Gg)	NO_x (Gg)	NMVOC (Gg)	SO_2 (Gg)
4C1 Waste Incineration	0.09288		NE	NA	NA	NA	NA	NA
4C2 Open Burning of Waste	NE		NE	NA	NA	NA	NA	NA
4D Wastewater Treatment and Discharge	NA		35.25	NA	NA	NA	NA	NA
4D1 Domestic Wastewater Treatment and Discharge	NA		35.25	NA	NA	NA	NA	NA
4D2 Industrial Wastewater Treatment and Discharge	NA		NE	NA	NA	NA	NA	NA
4E Other (please specify)	NO		NO	NO	NO	NO	NO	NO
5 OTHER	**NA**		**NA**	**NE**	**NA**	**NA**	**NA**	**NA**
5A Indirect N2O Emissions from the Atmospheric Deposition of Nitrogen in NOx and NH3	NA		NA	NE	NA	NA	NA	NA
5B Other (please specify)	NO		NO	NO	NO	NO	NO	NO
Memo items(5)								
International Bunkers (subtotal)	24.86		0.0285	0.0539	0.005494286	0.022044973	0.000271323	0.015770635
International Aviation (International Bunkers)	8.73		0.0102	0.0193	0.001966626	0.007890782	9.71173E-05	0.005644944
International Water-borne Transport (International Bunkers)	16.14		0.0183	0.03462	0.00352766	0.014154192	0.000174205	0.010125691
Multilateral Operations	NO		NO	NO	NO	NO	NO	NO

Key: NA = not applicable, NE = not estimated, NO = not occurring, IE = Included Elsewhere

UNFCCC Table 2. Samoa's National greenhouse gas inventory of anthropogenic emissions of HFCs, PFCs and SF6 (2020)

Greenhouse gas source and sink categories CO2	HFCs(Gg)						PFCs(Gg)			SF_4
	HFC-32	HFC-134a	R404A	HFC-407C	HFC-507A	R410A	CF_4	C_2F_4	Other	
Total National Emissions and Removals	**0.230180**	**2.496520**	**12.892624**	**0.081200**	**0.111750**	**7.806611**	**NO**	**NO**	**NO**	**NO**
1 ENERGY										
1A Fuel Combustion Activities										
1B Fugitive Emissions from Fuels										
1C Carbon Dioxide Transport and Storage										
2 INDUSTRIAL PROCESSES AND PRODUCT USE	**0.230180**	**2.496520**	**12.892624**	**0.081200**	**0.111750**	**7.806611**	**NO**	**NO**	**NO**	**NO**
2A Mineral Industry										
2B Chemical Industry										
2C Metal Industry										
2D Non-Energy Products from Fuels and Solvent Use										
2E Electronics Industry										
2F Product Uses as Substitutes for Ozone Depleting Substances	0.23018	2.49652	12.89262425	0.0812	0.11175	7.8066108	NO	NO	NO	NO
2F1 Refrigeration and Air Conditioning	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F2 Foam Blowing Agents	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F3 Fire Protection	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F4 Aerosols	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F5 Solvents	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F6 Other Applications	0.230180	2.49652	12.89262425	0.0812	0.11175	7.8066108	NO	NO	NO	NO
2G Other Product Manufacture and Use										
2H Other (please specify)										
3 AGRICULTURE, FORESTRY AND OTHER LAND USE										
3A Livestock										
3B Land										
3C Aggregate Sources and Non-CO2 Emissions Sources on Land										
3D Other										
4 WASTE										
4A Solid Waste Disposal										
4B Biological Treatment of Solid Waste										
4C Incineration and Open Burning of Waste										
4D Wastewater Treatment and Discharge										
4E Other (please specify)										
5 OTHER										
5A Indirect N2O Emissions from the Atmospheric Deposition of Nitrogen in NOx and NH3										
5B Other (please specify)										
Memo items(5)										
International Bunkers (subtotal)										
International Aviation (International Bunkers)										
International Water-borne Transport (International Bunkers)										
Multilateral Operations										

UNFCCC Reporting Table 1. Samoa's National greenhouse gas inventory of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol and greenhouse gas precursors (2019)

Greenhouse gas source and sink categories	CO_2 Emissions (Gg)	CO_2 Removals (Gg)	CH_4 (Gg)	N_2O (Gg)	CO (Gg)	NO_x (Gg)	NMVOC (Gg)	SO_2 (Gg)
Total National Emissions and Removals	**243.12**	**-850.57**	**235.65**	**13.22**	**0.15**	**0.09**	**0.10**	**0.34**
1 ENERGY	**242.91**		**0.28**	**0.54**	**0.15**	**0.09**	**0.10**	**0.34**
1A Fuel Combustion Activities	242.91		0.28	0.54	0.15	0.09	0.10	0.34
1A1 Energy Industries (electricity y generation)	73.45		0.0833	0.1576	0.0161	0.0644	0.0008	0.0461
1A2 Manufacturing Industries and Construction	22.46		0.0255	0.0482	0.0049	0.0197	0.0002	0.0141
1A3 Transport (subtotal)	144.04		0.171	0.324	0.132	0.002	0.095	0.283
1A3a Civil Aviation (Domestic Aviation)	NO		NO	NO	NO	NO	NO	NO
1A3b Road Transport	140.00		0.17	0.32	0.13	0.00	0.09	0.28
1A3c Waterborne Navigation (Domestic Shipping)	4.04		0.0046	0.0087	0.0035	0.0000	0.0025	0.0064
1A4 Other Sectors (subtotal)	2.96		0.0034	0.0064	0.0007	0.0026	0.0000	0.0019
1A4 a Commercial/Institutional	IE		IE	IE	IE	IE	IE	IE
1A4 b Residential	IE		IE	IE	IE	IE	IE	IE
1A4 c Agriculture/ Forestry/ Fishing/ Fish Farms	2.96		0.0034	0.0064	0.0007	0.0026	0.0000	0.0019
1A5 Non-Specified	IE		IE	IE	IE	IE	IE	IE
1B Fugitive Emissions from Fuels	NO		NO	NO	NO	NO	NO	NO
1C Carbon Dioxide Transport and Storage	NO				NO	NO	NO	NO
2 INDUSTRIAL PROCESSES AND PRODUCT USE	**0.20**		**NE**	**NE**	**NE**	**NE**	**NE**	**NE**
2A Mineral Industry	NO		NO	NO	NO	NO	NO	NO
2B Chemical Industry	NO		NO	NO	NO	NO	NO	NO
2C Metal Industry	NO		NO	NO	NO	NO	NO	NO
2D Non-Energy Products from Fuels and Solvent Use	0.20		NE	NE	NE	NE	NE	NE
2D1 Lubricant Use	0.20				NE	NE	NE	NE
2D2 Paraffin Wax Use	0.001724651		NE	NE	NE	NE	NE	NE
2D3 Solvent Use	NE		NE	NE	NE	NE	NE	NE
2D4 Other (please specify)	NE		NE	NE	NE	NE	NE	NE
2E Electronics Industry	NE		NO	NO	NO	NO	NO	NO
2F Product Used as Substitutes for Ozone Dep. Subst.	NA		NA	NA	NA	NA	NA	NA
2G Other Product Manufacture and Use	NA		NA	NA	NA	NA	NA	NA
2G1 Electrical Equipment	NO		NO	NO	NO	NO	NO	NO
2G2 SF6 and PFCs from Other Product Uses	NO		NO	NO	NO	NO	NO	NO
2G3 N2O from Product Uses (medical uses)	NA		NE	NE	NE	NE	NE	NE
2G4 Other	NO		NO	NO	NO	NO	NO	NO

Greenhouse gas source and sink categories CO2	CO_2 Emissions (Gg)	CO_2 Removals (Gg)	CH_4 (Gg)	N_2O (Gg)	CO (Gg)	NO_x (Gg)	NMVOC (Gg)	SO_2 (Gg)
2H Other (please specify)	NA		NA	NA	NA	NA	NA	NA
2H1 Pulp and Paper Industry	NO		NO	NO	NO	NO	NO	NO
2H2 Food and Beverages Industry	NA		NE	NE	NE	NE	NE	NE
2H3 Other (Ammonia Use)	NA		NA	NA	NA	NA	NA	NA
3 AGRICULTURE, FORESTRY AND OTHER LAND USE	**NA**	**-850.57**	**132.50**	**13.22**	**NA**	**NA**	**NA**	**NA**
3A Livestock			132.50	NE				
3A1 Enteric Fermentation			75.52					
3A2 Manure Management			56.98	3.981688146				
3B Land	NA	NE	NE	NE	NA	NA	NA	NA
3B1 Forest Land	NA	850.568	NE	NE	NA	NA	NA	NA
3B2 Cropland	NA	NE	NE	NE	NA	NA	NA	NA
3B3 Grassland	NA	NE	NE	NE	NA	NA	NA	NA
3B4 Wetlands	NA	NE	NE	NE	NA	NA	NA	NA
3B5 Settlements	NA	NE	NE	NE	NA	NA	NA	NA
3B6 Other Land	NA	NE	NE	NE	NA	NA	NA	NA
3C Aggregate Sources and Non-CO2 Emissions Sources on Land	NA		NE	9.240	NA	NA	NA	NA
3C1 Biomass Burning	NA		**NE**	**NE**	NA	NA	NA	NA
3C2 Liming	NA							
3C3 Urea Application	NA							
3C4 Direct N2O Emissions from Managed Soils				9.24				
3C5 Indirect N2O Emissions from Managed Soils				NE				
3C6 Indirect N2O Emissions from Manure Management				NE				
3C7 Rice Cultivations			NO				NO	
3C8 Other (please specify)	NO		NO	NO	NO	NO	NO	NO
3D Other	NO		NO	NO	NO	NO	NO	NO
4 WASTE	**0.00**		**104.44**	**NA**	**NA**	**NA**	**NA**	**NA**
4A Solid Waste Disposal	NA		69.18		NA		NA	
4A1 Managed Waste Disposal Sites	NA		69.18		NA		NA	
4A2 Unmanaged Waste Disposal Sites	NA		NE	NA	NA	NA	NA	NA
4A3 Uncategorised Waste Disposal Sites	NA		NE	NA	NA	NA	NA	NA
4B Biological Treatment of Solid Waste	NA		NE	NA	NA	NA	NA	NA
4C Incineration and Open Burning of Waste	0.00		NE	NA	NA	NA	NA	NA

Greenhouse gas source and sink categories CO2	CO_2 Emissions (Gg)	CO_2 Removals (Gg)	CH_4 (Gg)	N_2O (Gg)	CO (Gg)	NO_x (Gg)	NMVOC (Gg)	SO_2 (Gg)
4C1 Waste Incineration	0		NE	NA	NA	NA	NA	NA
4C2 Open Burning of Waste	NE		NE	NA	NA	NA	NA	NA
4D Wastewater Treatment and Discharge	NA		35.07	NA	NA	NA	NA	NA
4D1 Domestic Wastewater Treatment and Discharge	NA		35.07	NA	NA	NA	NA	NA
4D2 Industrial Wastewater Treatment and Discharge	NA		NE	NA	NA	NA	NA	NA
4E Other (please specify)	NO		NO	NO	NO	NO	NO	NO
5 OTHER	**NA**		**NA**	**NE**	**NA**	**NA**	**NA**	**NA**
5A Indirect N2O Emissions from the Atmospheric Deposition of Nitrogen in NOx and NH3	NA		NA	NE	NA	NA	NA	NA
5B Other (please specify)	NO		NO	NO	NO	NO	NO	NO
Memo items(5)								
International Bunkers (subtotal)	62.71		0.0726	0.1374	0.014000305	0.056174063	0.000691373	0.04018606
International Aviation (International Bunkers)	43.39		0.0507	0.0960	0.009776626	0.039227205	0.000482796	0.028062539
International Water-borne Transport (International Bunkers)	19.32		0.0219	0.04144	0.004223678	0.016946858	0.000208577	0.012123522
Multilateral Operations	NO		NO	NO	NO	NO	NO	NO

Key: NA = not applicable, NE = not estimated, NO = not occurring, IE = Included Elsewhere

UNFCCC Table 2. Samoa's National greenhouse gas inventory of anthropogenic emissions of HFCs, PFCs and SF6 (2020)

Greenhouse gas source and sink categories CO2	HFCs(Gg)						PFCs(Gg)			SF_4
	HFC-32	HFC-134a	R404A	HFC-407C	HFC-507A	R410A	CF_4	C_2F_4	Other	
Total National Emissions and Removals	**0.232211**	**2.502110**	**11.924026**	**0.081200**	**0.111750**	**8.832724**	**NO**	**NO**	**NO**	**NO**
1 ENERGY										
1A Fuel Combustion Activities										
1B Fugitive Emissions from Fuels										
1C Carbon Dioxide Transport and Storage										
2 INDUSTRIAL PROCESSES AND PRODUCT USE	**0.232211**	**2.502110**	**11.924026**	**0.081200**	**0.111750**	**8.832724**	**NO**	**NO**	**NO**	**NO**
2A Mineral Industry										
2B Chemical Industry										
2C Metal Industry										
2D Non-Energy Products from Fuels and Solvent Use										
2E Electronics Industry										
2F Product Uses as Substitutes for Ozone Depleting Substances	0.232211	2.502110	11.924026	0.081200	0.111750	8.832724	NO	NO	NO	NO
2F1 Refrigeration and Air Conditioning	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F2 Foam Blowing Agents	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F3 Fire Protection	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F4 Aerosols	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F5 Solvents	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F6 Other Applications	0.232211	2.50211	11.9240263	0.0812	0.11175	8.8327236	NO	NO	NO	NO
2G Other Product Manufacture and Use										
2H Other (please specify)										
3 AGRICULTURE, FORESTRY AND OTHER LAND USE										
3A Livestock										
3B Land										
3C Aggregate Sources and Non-CO2 Emissions Sources on Land										
3D Other										
4 WASTE										
4A Solid Waste Disposal										
4B Biological Treatment of Solid Waste										
4C Incineration and Open Burning of Waste										
4D Wastewater Treatment and Discharge										
4E Other (please specify)										
5 OTHER										
5A Indirect N2O Emissions from the Atmospheric Deposition of Nitrogen in NOx and NH3										
5B Other (please specify)										
Memo items(5)										
International Bunkers (subtotal)										
International Aviation (International Bunkers)										
International Water-borne Transport (International Bunkers)										
Multilateral Operations										

UNFCCC Reporting Table 1. Samoa's National greenhouse gas inventory of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol and greenhouse gas precursors (2018)

Greenhouse gas source and sink categories	CO_2 Emissions (Gg)	CO_2 Removals (Gg)	CH_4 (Gg)	N_2O (Gg)	CO (Gg)	NO_x (Gg)	NMVOC (Gg)	SO_2 (Gg)
Total National Emissions and Removals	**221.13**	**-850.57**	**241.15**	**13.89**	**1.05**	**2.20**	**3.01**	**4.15**
1 ENERGY	**221.00**		**0.26**	**0.49**	**1.05**	**2.20**	**3.01**	**4.15**
1A Fuel Combustion Activities	221.00		0.26	0.49	1.05	2.20	3.01	4.15
1A1 Energy Industries (electricity y generation)	61.79		0.0700	0.1326	0.0135	0.0542	0.0007	0.0388
1A2 Manufacturing Industries and Construction	19.58		0.0222	0.0421	0.0043	0.0172	0.0002	0.0123
1A3 Transport (subtotal)	137.35		0.163	0.308	0.031	0.126	0.002	0.090
1A3a Civil Aviation (Domestic Aviation)	NO		NO	NO	NO	NO	NO	NO
1A3b Road Transport	133.31		0.16	0.30	0.03	0.12	0.00	0.09
1A3c Waterborne Navigation (Domestic Shipping)	4.04		0.0046	0.0087	0.0009	0.0035	0.0000	0.0025
1A4 Other Sectors (subtotal)	2.27		0.0026	0.0049	1.0038	2.0038	3.0038	4.0038
1A4 a Commercial/Institutional	IE		IE	IE	IE	IE	IE	IE
1A4 b Residential	IE		IE	IE	IE	IE	IE	IE
1A4 c Agriculture/ Forestry/ Fishing/ Fish Farms	2.27		0.0026	0.0049	1.0038	2.0038	3.0038	4.0038
1A5 Non-Specified	IE		IE	IE	IE	IE	IE	IE
1B Fugitive Emissions from Fuels	NO		NO	NO	NO	NO	NO	NO
1C Carbon Dioxide Transport and Storage	NO				NO	NO	NO	NO
2 INDUSTRIAL PROCESSES AND PRODUCT USE	**0.13**		**NE**	**NE**	**NE**	**NE**	**NE**	**NE**
2A Mineral Industry	NE		NO	NO	NO	NO	NO	NO
2B Chemical Industry	NE		NO	NO	NO	NO	NO	NO
2C Metal Industry	NE		NO	NO	NO	NO	NO	NO
2D Non-Energy Products from Fuels and Solvent Use	0.13		NE	NE	NE	NE	NE	NE
2D1 Lubricant Use	0.13				NE	NE	NE	NE
2D2 Paraffin Wax Use	0		NE	NE	NE	NE	NE	NE
2D3 Solvent Use	NE		NE	NE	NE	NE	NE	NE
2D4 Other (please specify)	NE		NE	NE	NE	NE	NE	NE
2E Electronics Industry	NE		NO	NO	NO	NO	NO	NO
2F Product Used as Substitutes for Ozone Dep. Subst.	NA		NA	NA	NA	NA	NA	NA
2G Other Product Manufacture and Use	NA		NA	NA	NA	NA	NA	NA
2G1 Electrical Equipment	NO		NO	NO	NO	NO	NO	NO
2G2 SF6 and PFCs from Other Product Uses	NO		NO	NO	NO	NO	NO	NO
2G3 N2O from Product Uses (medical uses)	NA		NE	NE	NE	NE	NE	NE
2G4 Other	NO		NO	NO	NO	NO	NO	NO

Greenhouse gas source and sink categories CO2	CO_2 Emissions (Gg)	CO_2 Removals (Gg)	CH_4 (Gg)	N_2O (Gg)	CO (Gg)	NO_x (Gg)	NMVOC (Gg)	SO_2 (Gg)
2H Other (please specify)	NA		NA	NA	NA	NA	NA	NA
2H1 Pulp and Paper Industry	NO		NO	NO	NO	NO	NO	NO
2H2 Food and Beverages Industry	NA		NE	NE	NE	NE	NE	NE
2H3 Other (Ammonia Use)	NA		NA	NA	NA	NA	NA	NA
3 AGRICULTURE, FORESTRY AND OTHER LAND USE	**NA**	**-850.57**	**139.80**	**13.89**	**NA**	**NA**	**NA**	**NA**
3A Livestock			139.80	NE				
3A1 Enteric Fermentation			77.13					
3A2 Manure Management			62.67	4.455714633				
3B Land	NA	NE	NE	NE	NA	NA	NA	NA
3B1 Forest Land	NA	-850.568	NE	NE	NA	NA	NA	NA
3B2 Cropland	NA	NE	NE	NE	NA	NA	NA	NA
3B3 Grassland	NA	NE	NE	NE	NA	NA	NA	NA
3B4 Wetlands	NA	NE	NE	NE	NA	NA	NA	NA
3B5 Settlements	NA	NE	NE	NE	NA	NA	NA	NA
3B6 Other Land	NA	NE	NE	NE	NA	NA	NA	NA
3C Aggregate Sources and Non-CO2 Emissions Sources on Land	NA		NE	9.434	NA	NA	NA	NA
3C1 Biomass Burning	NA		**NE**	**NE**	NA	NA	NA	NA
3C2 Liming	NA							
3C3 Urea Application	NA							
3C4 Direct N2O Emissions from Managed Soils				9.43				
3C5 Indirect N2O Emissions from Managed Soils				NE				
3C6 Indirect N2O Emissions from Manure Management				NE				
3C7 Rice Cultivations			NO				NO	
3C8 Other (please specify)	NO		NO	NO	NO	NO	NO	NO
3D Other	NO		NO	NO	NO	NO	NO	NO
4 WASTE	**0.00**		**101.09**	**NA**	**NA**	**NA**	**NA**	**NA**
4A Solid Waste Disposal	NA		66.20		NA		NA	
4A1 Managed Waste Disposal Sites	NA		66.20		NA		NA	
4A2 Unmanaged Waste Disposal Sites	NA		NE	NA	NA	NA	NA	NA
4A3 Uncategorised Waste Disposal Sites	NA		NE	NA	NA	NA	NA	NA
4B Biological Treatment of Solid Waste	NA		NE	NA	NA	NA	NA	NA
4C Incineration and Open Burning of Waste	0.00		NE	NA	NA	NA	NA	NA

Greenhouse gas source and sink categories CO2	CO_2 Emissions (Gg)	CO_2 Removals (Gg)	CH_4 (Gg)	N_2O (Gg)	CO (Gg)	NO_x (Gg)	NMVOC (Gg)	SO_2 (Gg)
4C1 Waste Incineration	0		NE	NA	NA	NA	NA	NA
4C2 Open Burning of Waste	NE		NE	NA	NA	NA	NA	NA
4D Wastewater Treatment and Discharge	NA		34.90	NA	NA	NA	NA	NA
4D1 Domestic Wastewater Treatment and Discharge	NA		34.90	NA	NA	NA	NA	NA
4D2 Industrial Wastewater Treatment and Discharge	NA		NE	NA	NA	NA	NA	NA
4E Other (please specify)	NO		NO	NO	NO	NO	NO	NO
5 OTHER	**NA**		**NA**	**NE**	**NA**	**NA**	**NA**	**NA**
5A Indirect N2O Emissions from the Atmospheric Deposition of Nitrogen in NOx and NH3	NA		NA	NE	NA	NA	NA	NA
5B Other (please specify)	NO		NO	NO	NO	NO	NO	NO
Memo items(5)								
International Bunkers (subtotal)	54.25		0.0629	0.1190	0.01212772	0.048660605	0.0005989	0.034811048
International Aviation (International Bunkers)	39.82		0.0465	0.0880	0.008971034	0.03599489	0.000443014	0.025750191
International Water-borne Transport (International Bunkers)	14.44		0.0164	0.03096	0.003156686	0.012665715	0.000155886	0.009060857
Multilateral Operations	NO		NO	NO	NO	NO	NO	NO

Key: NA = not applicable, NE = not estimated, NO = not occurring, IE = Included Elsewhere

UNFCCC Table 2. Samoa's National greenhouse gas inventory of anthropogenic emissions of HFCs, PFCs and SF6 (2018)

Greenhouse gas source and sink categories CO2	HFCs(Gg)						PFCs(Gg)			SF_4
	HFC-32	HFC-134a	R404A	HFC-407C	HFC-507A	R410A	CF_4	C_2F_4	Other	
Total National Emissions and Removals	**0.002031**	**3.01015**	**9.5732097**	**0.18351**	**0.06314**	**7.25279**	**NO**	**NO**	**NO**	**NO**
1 ENERGY										
1A Fuel Combustion Activities										
1B Fugitive Emissions from Fuels										
1C Carbon Dioxide Transport and Storage										
2 INDUSTRIAL PROCESSES AND PRODUCT USE	**0.002031**	**3.01015**	**9.5732097**	**0.18351**	**0.06314**	**7.25279**	**NO**	**NO**	**NO**	**NO**
2A Mineral Industry										
2B Chemical Industry										
2C Metal Industry										
2D Non-Energy Products from Fuels and Solvent Use										
2E Electronics Industry										
2F Product Uses as Substitutes for Ozone Depleting Substances	0.002031	3.01015	9.5732097	0.18351	0.06314	7.25279	NO	NO	NO	NO
2F1 Refrigeration and Air Conditioning	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F2 Foam Blowing Agents	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F3 Fire Protection	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F4 Aerosols	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F5 Solvents	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F6 Other Applications	0.002031	3.010150	9.57320970	0.183512	0.063139	7.252787	NO	NO	NO	NO
2G Other Product Manufacture and Use										
2H Other (please specify)										
3 AGRICULTURE, FORESTRY AND OTHER LAND USE										
3A Livestock										
3B Land										
3C Aggregate Sources and Non-CO2 Emissions Sources on Land										
3D Other										
4 WASTE										
4A Solid Waste Disposal										
4B Biological Treatment of Solid Waste										
4C Incineration and Open Burning of Waste										
4D Wastewater Treatment and Discharge										
4E Other (please specify)										
5 OTHER										
5A Indirect N2O Emissions from the Atmospheric Deposition of Nitrogen in NOx and NH3										
5B Other (please specify)										
Memo items(5)										
International Bunkers (subtotal)										
International Aviation (International Bunkers)										
International Water-borne Transport (International Bunkers)										
Multilateral Operations										

UNFCCC Reporting Table 1. Samoa's National greenhouse gas inventory of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol and greenhouse gas precursors (2017)

Greenhouse gas source and sink categories	CO_2 Emissions (Gg)	CO_2 Removals (Gg)	CH_4 (Gg)	N_2O (Gg)	CO (Gg)	NO_x (Gg)	NMVOC (Gg)	SO_2 (Gg)
Total National Emissions and Removals	**226.50**	**-850.57**	**241.15**	**14.56**	**0.05**	**0.20**	**0.00**	**0.15**
1 ENERGY	**221.00**		**0.26**	**0.50**	**0.05**	**0.20**	**0.00**	**0.15**
1A Fuel Combustion Activities	221.00		0.26	0.50	0.05	0.20	0.00	0.15
1A1 Energy Industries (electricity y generation)	61.79		0.0832	0.1574	0.0160	0.0644	0.0008	0.0460
1A2 Manufacturing Industries and Construction	19.58		0.0197	0.0373	0.0038	0.0152	0.0002	0.0109
1A3 Transport (subtotal)	137.35		0.159	0.301	0.031	0.123	0.002	0.088
1A3a Civil Aviation (Domestic Aviation)	NO		NO	NO	NO	NO	NO	NO
1A3b Road Transport	133.31		0.16	0.30	0.03	0.12	0.00	0.09
1A3c Waterborne Navigation (Domestic Shipping)	4.04		0.0001	0.0003	0.0000	0.0001	0.0000	0.0001
1A4 Other Sectors (subtotal)	2.27		0.0019	0.0036	0.0004	0.0015	0.0000	0.0011
1A4 a Commercial/Institutional	IE		IE	IE	IE	IE	IE	IE
1A4 b Residential	IE		IE	IE	IE	IE	IE	IE
1A4 c Agriculture/ Forestry/ Fishing/ Fish Farms	2.27		0.0019	0.0036	0.0004	0.0015	0.0000	0.0011
1A5 Non-Specified	IE		IE	IE	IE	IE	IE	IE
1B Fugitive Emissions from Fuels	NO		NO	NO	NO	NO	NO	NO
1C Carbon Dioxide Transport and Storage	NO				NO	NO	NO	NO
2 INDUSTRIAL PROCESSES AND PRODUCT USE	**0.13**		**NE**	**NE**	**NE**	**NE**	**NE**	**NE**
2A Mineral Industry	NE		NO	NO	NO	NO	NO	NO
2B Chemical Industry	NE		NO	NO	NO	NO	NO	NO
2C Metal Industry	NE		NO	NO	NO	NO	NO	NO
2D Non-Energy Products from Fuels and Solvent Use	0.13		NE	NE	NE	NE	NE	NE
2D1 Lubricant Use	0.13				NE	NE	NE	NE
2D2 Paraffin Wax Use	0		NE	NE	NE	NE	NE	NE
2D3 Solvent Use	NE		NE	NE	NE	NE	NE	NE
2D4 Other (please specify)	NE		NE	NE	NE	NE	NE	NE
2E Electronics Industry	NE		NO	NO	NO	NO	NO	NO
2F Product Used as Substitutes for Ozone Dep. Subst.	NA		NA	NA	NA	NA	NA	NA
2G Other Product Manufacture and Use	NA		NA	NA	NA	NA	NA	NA
2G1 Electrical Equipment	NO		NO	NO	NO	NO	NO	NO
2G2 SF6 and PFCs from Other Product Uses	NO		NO	NO	NO	NO	NO	NO
2G3 N2O from Product Uses (medical uses)	NA		NE	NE	NE	NE	NE	NE
2G4 Other	NO		NO	NO	NO	NO	NO	NO

Greenhouse gas source and sink categories CO2	CO_2 Emissions (Gg)	CO_2 Removals (Gg)	CH_4 (Gg)	N_2O (Gg)	CO (Gg)	NO_x (Gg)	NMVOC (Gg)	SO_2 (Gg)
2H Other (please specify)	NA		NA	NA	NA	NA	NA	NA
2H1 Pulp and Paper Industry	NO		NO	NO	NO	NO	NO	NO
2H2 Food and Beverages Industry	NA		NE	NE	NE	NE	NE	NE
2H3 Other (Ammonia Use)	NA		NA	NA	NA	NA	NA	NA
3 AGRICULTURE, FORESTRY AND OTHER LAND USE	**NA**	**-850.57**	**147.13**	**14.56**	**NA**	**NA**	**NA**	**NA**
3A Livestock			147.13	NE				
3A1 Enteric Fermentation			78.75					
3A2 Manure Management			68.38	4.929741119				
3B Land	NA	NE	NE	NE	NA	NA	NA	NA
3B1 Forest Land	NA	-850.568	NE	NE	NA	NA	NA	NA
3B2 Cropland	NA	NE	NE	NE	NA	NA	NA	NA
3B3 Grassland	NA	NE	NE	NE	NA	NA	NA	NA
3B4 Wetlands	NA	NE	NE	NE	NA	NA	NA	NA
3B5 Settlements	NA	NE	NE	NE	NA	NA	NA	NA
3B6 Other Land	NA	NE	NE	NE	NA	NA	NA	NA
3C Aggregate Sources and Non-CO2 Emissions Sources on Land	NA		NE	9.628	NA	NA	NA	NA
3C1 Biomass Burning	NA		**NE**	**NE**	NA	NA	NA	NA
3C2 Liming	NA							
3C3 Urea Application	NA							
3C4 Direct N2O Emissions from Managed Soils				9.63				
3C5 Indirect N2O Emissions from Managed Soils				NE				
3C6 Indirect N2O Emissions from Manure Management				NE				
3C7 Rice Cultivations			NO				NO	
3C8 Other (please specify)	NO		NO	NO	NO	NO	NO	NO
3D Other	NO		NO	NO	NO	NO	NO	NO
4 WASTE	**0.00**		**99.11**	**NA**	**NA**	**NA**	**NA**	**NA**
4A Solid Waste Disposal	NA		64.39		NA		NA	
4A1 Managed Waste Disposal Sites	NA		64.39		NA		NA	
4A2 Unmanaged Waste Disposal Sites	NA		NE	NA	NA	NA	NA	NA
4A3 Uncategorised Waste Disposal Sites	NA		NE	NA	NA	NA	NA	NA
4B Biological Treatment of Solid Waste	NA		NE	NA	NA	NA	NA	NA
4C Incineration and Open Burning of Waste	0.00		NE	NA	NA	NA	NA	NA

Greenhouse gas source and sink categories CO2	CO_2 Emissions (Gg)	CO_2 Removals (Gg)	CH_4 (Gg)	N_2O (Gg)	CO (Gg)	NO_x (Gg)	NMVOC (Gg)	SO_2 (Gg)
4C1 Waste Incineration	0		NE	NA	NA	NA	NA	NA
4C2 Open Burning of Waste	NE		NE	NA	NA	NA	NA	NA
4D Wastewater Treatment and Discharge	NA		34.72	NA	NA	NA	NA	NA
4D1 Domestic Wastewater Treatment and Discharge	NA		34.72	NA	NA	NA	NA	NA
4D2 Industrial Wastewater Treatment and Discharge	NA		NE	NA	NA	NA	NA	NA
4E Other (please specify)	NO		NO	NO	NO	NO	NO	NO
5 OTHER	**NA**		**NA**	**NE**	**NA**	**NA**	**NA**	**NA**
5A Indirect N2O Emissions from the Atmospheric Deposition of Nitrogen in NOx and NH3	NA		NA	NE	NA	NA	NA	NA
5B Other (please specify)	NO		NO	NO	NO	NO	NO	NO
Memo items(5)								
International Bunkers (subtotal)	61.17		0.0707	0.1339	0.013639795	0.054727573	0.00067357	0.039151264
International Aviation (International Bunkers)	39.84		0.0465	0.0881	0.008977306	0.036020053	0.000443324	0.025768192
International Water-borne Transport (International Bunkers)	21.33		0.0242	0.04576	0.00466249	0.01870752	0.000230246	0.013383072
Multilateral Operations	NO		NO	NO	NO	NO	NO	NO

Key: NA = not applicable, NE = not estimated, NO = not occurring, IE = Included Elsewhere

UNFCCC Table 2. Samoa's National greenhouse gas inventory of anthropogenic emissions of HFCs, PFCs and SF6 (2017)

Greenhouse gas source and sink categories CO2	HFCs(Gg)						PFCs(Gg)			SF_4
	HFC-32	HFC-134a	R404A	HFC-407C	HFC-507A	R410A	CF_4	C_2F_4	Other	
Total National Emissions and Removals	**0.006093**	**3.394560**	**12.820270**	**0.227685**	**0.063139**	**6.193598**	**NO**	**NO**	**NO**	**NO**
1 ENERGY										
1A Fuel Combustion Activities										
1B Fugitive Emissions from Fuels										
1C Carbon Dioxide Transport and Storage										
2 INDUSTRIAL PROCESSES AND PRODUCT USE	**0.006093**	**3.394560**	**12.820270**	**0.227685**	**0.063139**	**6.193598**	**NO**	**NO**	**NO**	**NO**
2A Mineral Industry										
2B Chemical Industry										
2C Metal Industry										
2D Non-Energy Products from Fuels and Solvent Use										
2E Electronics Industry										
2F Product Uses as Substitutes for Ozone Depleting Substances	0.006093	3.394560	12.820270	0.227685	0.063139	6.193598	NO	NO	NO	NO
2F1 Refrigeration and Air Conditioning	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F2 Foam Blowing Agents	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F3 Fire Protection	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F4 Aerosols	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F5 Solvents	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F6 Other Applications	0.006093	3.39456	12.8202702	0.2276848	0.06313875	6.1935984	NO	NO	NO	NO
2G Other Product Manufacture and Use										
2H Other (please specify)										
3 AGRICULTURE, FORESTRY AND OTHER LAND USE										
3A Livestock										
3B Land										
3C Aggregate Sources and Non-CO2 Emissions Sources on Land										
3D Other										
4 WASTE										
4A Solid Waste Disposal										
4B Biological Treatment of Solid Waste										
4C Incineration and Open Burning of Waste										
4D Wastewater Treatment and Discharge										
4E Other (please specify)										
5 OTHER										
5A Indirect N2O Emissions from the Atmospheric Deposition of Nitrogen in NOx and NH3										
5B Other (please specify)										
Memo items(5)										
International Bunkers (subtotal)										
International Aviation (International Bunkers)										
International Water-borne Transport (International Bunkers)										
Multilateral Operations										

UNFCCC Reporting Table 1. Samoa's National greenhouse gas inventory of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol and greenhouse gas precursors (2016)

Greenhouse gas source and sink categories	CO_2 Emissions (Gg)	CO_2 Removals (Gg)	CH_4 (Gg)	N_2O (Gg)	CO (Gg)	NO_x (Gg)	NMVOC (Gg)	SO_2 (Gg)
Total National Emissions and Removals	**224.92**	**-850.57**	**251.74**	**15.23**	**0.05**	**0.20**	**0.00**	**0.14**
1 ENERGY	**224.69**		**0.26**	**0.50**	**0.05**	**0.20**	**0.00**	**0.14**
1A Fuel Combustion Activities	224.69		0.26	0.50	0.05	0.20	0.00	0.14
1A1 Energy Industries (electricity y generation)	69.44		0.0787	0.1490	0.0152	0.0609	0.0007	0.0436
1A2 Manufacturing Industries and Construction	16.03		0.0182	0.0344	0.0035	0.0141	0.0002	0.0101
1A3 Transport (subtotal)	137.26		0.163	0.308	0.031	0.126	0.002	0.090
1A3a Civil Aviation (Domestic Aviation)	NO		NO	NO	NO	NO	NO	NO
1A3b Road Transport	132.37		0.16	0.30	0.03	0.12	0.00	0.09
1A3c Waterborne Navigation (Domestic Shipping)	4.89		0.0055	0.0105	0.0011	0.0043	0.0001	0.0031
1A4 Other Sectors (subtotal)	1.96		0.0022	0.0042	0.0004	0.0017	0.0000	0.0012
1A4 a Commercial/Institutional	IE		IE	IE	IE	IE	IE	IE
1A4 b Residential	IE		IE	IE	IE	IE	IE	IE
1A4 c Agriculture/ Forestry/ Fishing/ Fish Farms	1.96		0.0022	0.0042	0.0004	0.0017	0.0000	0.0012
1A5 Non-Specified	IE		IE	IE	IE	IE	IE	IE
1B Fugitive Emissions from Fuels	NO		NO	NO	NO	NO	NO	NO
1C Carbon Dioxide Transport and Storage	NO				NO	NO	NO	NO
2 INDUSTRIAL PROCESSES AND PRODUCT USE	**0.13**		**NE**	**NE**	**NE**	**NE**	**NE**	**NE**
2A Mineral Industry	NE		NO	NO	NO	NO	NO	NO
2B Chemical Industry	NE		NO	NO	NO	NO	NO	NO
2C Metal Industry	NE		NO	NO	NO	NO	NO	NO
2D Non-Energy Products from Fuels and Solvent Use	0.23		NE	NE	NE	NE	NE	NE
2D1 Lubricant Use	0.23				NE	NE	NE	NE
2D2 Paraffin Wax Use	0		NE	NE	NE	NE	NE	NE
2D3 Solvent Use	NE		NE	NE	NE	NE	NE	NE
2D4 Other (please specify)	NE		NE	NE	NE	NE	NE	NE
2E Electronics Industry	NE		NO	NO	NO	NO	NO	NO
2F Product Used as Substitutes for Ozone Dep. Subst.	NA		NA	NA	NA	NA	NA	NA
2G Other Product Manufacture and Use	NA		NA	NA	NA	NA	NA	NA
2G1 Electrical Equipment	NO		NO	NO	NO	NO	NO	NO
2G2 SF6 and PFCs from Other Product Uses	NO		NO	NO	NO	NO	NO	NO
2G3 N2O from Product Uses (medical uses)	NA		NE	NE	NE	NE	NE	NE
2G4 Other	NO		NO	NO	NO	NO	NO	NO

Greenhouse gas source and sink categories CO2	CO_2 Emissions (Gg)	CO_2 Removals (Gg)	CH_4 (Gg)	N_2O (Gg)	CO (Gg)	NO_x (Gg)	NMVOC (Gg)	SO_2 (Gg)
2H Other (please specify)	NA		NA	NA	NA	NA	NA	NA
2H1 Pulp and Paper Industry	NO		NO	NO	NO	NO	NO	NO
2H2 Food and Beverages Industry	NA		NE	NE	NE	NE	NE	NE
2H3 Other (Ammonia Use)	NA		NA	NA	NA	NA	NA	NA
3 AGRICULTURE, FORESTRY AND OTHER LAND USE	**NA**	**-850.57**	**154.44**	**15.23**	**NA**	**NA**	**NA**	**NA**
3A Livestock			154.44	NE				
3A1 Enteric Fermentation			80.36					
3A2 Manure Management			74.08	5.403767606				
3B Land	NA	NE	NE	NE	NA	NA	NA	NA
3B1 Forest Land	NA	-850.568	NE	NE	NA	NA	NA	NA
3B2 Cropland	NA	NE	NE	NE	NA	NA	NA	NA
3B3 Grassland	NA	NE	NE	NE	NA	NA	NA	NA
3B4 Wetlands	NA	NE	NE	NE	NA	NA	NA	NA
3B5 Settlements	NA	NE	NE	NE	NA	NA	NA	NA
3B6 Other Land	NA	NE	NE	NE	NA	NA	NA	NA
3C Aggregate Sources and Non-CO2 Emissions Sources on Land	NA		NE	9.822	NA	NA	NA	NA
3C1 Biomass Burning	NA		**NE**	**NE**	NA	NA	NA	NA
3C2 Liming	NA							
3C3 Urea Application	NA							
3C4 Direct N2O Emissions from Managed Soils				9.82				
3C5 Indirect N2O Emissions from Managed Soils				NE				
3C6 Indirect N2O Emissions from Manure Management				NE				
3C7 Rice Cultivations			NO				NO	
3C8 Other (please specify)	NO		NO	NO	NO	NO	NO	NO
3D Other	NO		NO	NO	NO	NO	NO	NO
4 WASTE	**0.00**		**97.03**	**NA**	**NA**	**NA**	**NA**	**NA**
4A Solid Waste Disposal	NA		62.31		NA		NA	
4A1 Managed Waste Disposal Sites	NA		62.31		NA		NA	
4A2 Unmanaged Waste Disposal Sites	NA		NE	NA	NA	NA	NA	NA
4A3 Uncategorised Waste Disposal Sites	NA		NE	NA	NA	NA	NA	NA
4B Biological Treatment of Solid Waste	NA		NE	NA	NA	NA	NA	NA
4C Incineration and Open Burning of Waste	0.00		NE	NA	NA	NA	NA	NA

Greenhouse gas source and sink categories CO2	CO_2 Emissions (Gg)	CO_2 Removals (Gg)	CH_4 (Gg)	N_2O (Gg)	CO (Gg)	NO_x (Gg)	NMVOC (Gg)	SO_2 (Gg)
4C1 Waste Incineration	0		NE	NA	NA	NA	NA	NA
4C2 Open Burning of Waste	NE		NE	NA	NA	NA	NA	NA
4D Wastewater Treatment and Discharge	NA		34.72	NA	NA	NA	NA	NA
4D1 Domestic Wastewater Treatment and Discharge	NA		34.72	NA	NA	NA	NA	NA
4D2 Industrial Wastewater Treatment and Discharge	NA		NE	NA	NA	NA	NA	NA
4E Other (please specify)	NO		NO	NO	NO	NO	NO	NO
5 OTHER	**NA**		**NA**	**NE**	**NA**	**NA**	**NA**	**NA**
5A Indirect N2O Emissions from the Atmospheric Deposition of Nitrogen in NOx and NH3	NA		NA	NE	NA	NA	NA	NA
5B Other (please specify)	NO		NO	NO	NO	NO	NO	NO
Memo items(5)								
International Bunkers (subtotal)	60.63		0.0702	0.1317	0.013531577	0.054293366	0.000668226	0.038840639
International Aviation (International Bunkers)	40.17		0.0469	0.0888	0.009049968	0.036311601	0.000446912	0.025976761
International Water-borne Transport (International Bunkers)	20.46		0.0232	0.04283	0.004481609	0.017981765	0.000221314	0.012863878
Multilateral Operations	NO		NO	NO	NO	NO	NO	NO

Key: NA = not applicable, NE = not estimated, NO = not occurring, IE = Included Elsewhere

UNFCCC Table 2. Samoa's National greenhouse gas inventory of anthropogenic emissions of HFCs, PFCs and SF6 (2016)

Greenhouse gas source and sink categories CO2	HFCs(Gg)						PFCs(Gg)			SF_4
	HFC-32	HFC-134a	R404A	HFC-407C	HFC-507A	R410A	CF_4	C_2F_4	Other	
Total National Emissions and Removals	**0.006093**	**4.560920**	**11.342828**	**0.044173**	**0.106163**	**5.398630**	**NO**	**NO**	**NO**	**NO**
1 ENERGY										
1A Fuel Combustion Activities										
1B Fugitive Emissions from Fuels										
1C Carbon Dioxide Transport and Storage										
2 INDUSTRIAL PROCESSES AND PRODUCT USE	**0.006093**	**4.560920**	**11.342828**	**0.044173**	**0.106163**	**5.398630**	**NO**	**NO**	**NO**	**NO**
2A Mineral Industry										
2B Chemical Industry										
2C Metal Industry										
2D Non-Energy Products from Fuels and Solvent Use										
2E Electronics Industry										
2F Product Uses as Substitutes for Ozone Depleting Substances	0.006093	4.560920	11.342828	0.044173	0.106163	5.398630	NO	NO	NO	NO
2F1 Refrigeration and Air Conditioning	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F2 Foam Blowing Agents	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F3 Fire Protection	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F4 Aerosols	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F5 Solvents	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F6 Other Applications	0.006093	4.56092	11.3428281	0.0441728	0.1061625	5.3986302	NO	NO	NO	NO
2G Other Product Manufacture and Use										
2H Other (please specify)										
3 AGRICULTURE, FORESTRY AND OTHER LAND USE										
3A Livestock										
3B Land										
3C Aggregate Sources and Non-CO2 Emissions Sources on Land										
3D Other										
4 WASTE										
4A Solid Waste Disposal										
4B Biological Treatment of Solid Waste										
4C Incineration and Open Burning of Waste										
4D Wastewater Treatment and Discharge										
4E Other (please specify)										
5 OTHER										
5A Indirect N2O Emissions from the Atmospheric Deposition of Nitrogen in NOx and NH3										
5B Other (please specify)										
Memo items(5)										
International Bunkers (subtotal)										
International Aviation (International Bunkers)										
International Water-borne Transport (International Bunkers)										
Multilateral Operations										

UNFCCC Reporting Table 1. Samoa's National greenhouse gas inventory of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol and greenhouse gas precursors (2015)

Greenhouse gas source and sink categories	CO_2 Emissions (Gg)	CO_2 Removals (Gg)	CH_4 (Gg)	N_2O (Gg)	CO (Gg)	NO_x (Gg)	NMVOC (Gg)	SO_2 (Gg)
Total National Emissions and Removals	**201.51**	**-850.57**	**256.39**	**15.89**	**0.05**	**0.18**	**0.00**	**0.13**
1 ENERGY	**201.51**		**0.23**	**0.44**	**0.05**	**0.18**	**0.00**	**0.13**
1A Fuel Combustion Activities	201.51		0.23	0.44	0.05	0.18	0.00	0.13
1A1 Energy Industries (electricity y generation)	63.68		0.0722	0.1366	0.0139	0.0559	0.0007	0.0400
1A2 Manufacturing Industries and Construction	18.11		0.0205	0.0389	0.0040	0.0159	0.0002	0.0114
1A3 Transport (subtotal)	117.44		0.139	0.264	0.027	0.108	0.001	0.077
1A3a Civil Aviation (Domestic Aviation)	NO		NO	NO	NO	NO	NO	NO
1A3b Road Transport	117.36		0.14	0.26	0.03	0.11	0.00	0.08
1A3c Waterborne Navigation (Domestic Shipping)	0.07		0.0001	0.0002	0.0000	0.0001	0.0000	0.0000
1A4 Other Sectors (subtotal)	2.19		0.0025	0.0047	0.0005	0.0019	0.0000	0.0014
1A4 a Commercial/Institutional	IE		IE	IE	IE	IE	IE	IE
1A4 b Residential	IE		IE	IE	IE	IE	IE	IE
1A4 c Agriculture/ Forestry/ Fishing/ Fish Farms	2.19		0.0025	0.0047	0.0005	0.0019	0.0000	0.0014
1A5 Non-Specified	IE		IE	IE	IE	IE	IE	IE
1B Fugitive Emissions from Fuels	NO		NO	NO	NO	NO	NO	NO
1C Carbon Dioxide Transport and Storage	NO				NO	NO	NO	NO
2 INDUSTRIAL PROCESSES AND PRODUCT USE	**0.10**		**NE**	**NE**	**NE**	**NE**	**NE**	**NE**
2A Mineral Industry	NE		NO	NO	NO	NO	NO	NO
2B Chemical Industry	NE		NO	NO	NO	NO	NO	NO
2C Metal Industry	NE		NO	NO	NO	NO	NO	NO
2D Non-Energy Products from Fuels and Solvent Use	0.10		NE	NE	NE	NE	NE	NE
2D1 Lubricant Use	0.10				NE	NE	NE	NE
2D2 Paraffin Wax Use	0		NE	NE	NE	NE	NE	NE
2D3 Solvent Use	NE		NE	NE	NE	NE	NE	NE
2D4 Other (please specify)	NE		NE	NE	NE	NE	NE	NE
2E Electronics Industry	NE		NO	NO	NO	NO	NO	NO
2F Product Used as Substitutes for Ozone Dep. Subst.	NA		NA	NA	NA	NA	NA	NA
2G Other Product Manufacture and Use	NA		NA	NA	NA	NA	NA	NA
2G1 Electrical Equipment	NO		NO	NO	NO	NO	NO	NO
2G2 SF6 and PFCs from Other Product Uses	NO		NO	NO	NO	NO	NO	NO
2G3 N2O from Product Uses (medical uses)	NA		NE	NE	NE	NE	NE	NE
2G4 Other	NO		NO	NO	NO	NO	NO	NO

Greenhouse gas source and sink categories CO2	CO_2 Emissions (Gg)	CO_2 Removals (Gg)	CH_4 (Gg)	N_2O (Gg)	CO (Gg)	NO_x (Gg)	NMVOC (Gg)	SO_2 (Gg)
2H Other (please specify)	NA		NA	NA	NA	NA	NA	NA
2H1 Pulp and Paper Industry	NO		NO	NO	NO	NO	NO	NO
2H2 Food and Beverages Industry	NA		NE	NE	NE	NE	NE	NE
2H3 Other (Ammonia Use)	NA		NA	NA	NA	NA	NA	NA
3 AGRICULTURE, FORESTRY AND OTHER LAND USE	**NA**	**-850.57**	**161.75**	**15.89**	**NA**	**NA**	**NA**	**NA**
3A Livestock			161.75	NE				
3A1 Enteric Fermentation			81.98					
3A2 Manure Management			79.78	5.877794092				
3B Land	NA	NE	NE	NE	NA	NA	NA	NA
3B1 Forest Land	NA	-850.568	NE	NE	NA	NA	NA	NA
3B2 Cropland	NA	NE	NE	NE	NA	NA	NA	NA
3B3 Grassland	NA	NE	NE	NE	NA	NA	NA	NA
3B4 Wetlands	NA	NE	NE	NE	NA	NA	NA	NA
3B5 Settlements	NA	NE	NE	NE	NA	NA	NA	NA
3B6 Other Land	NA	NE	NE	NE	NA	NA	NA	NA
3C Aggregate Sources and Non-CO2 Emissions Sources on Land	NA		NE	10.015	NA	NA	NA	NA
3C1 Biomass Burning	NA		**NE**	**NE**	NA	NA	NA	NA
3C2 Liming	NA							
3C3 Urea Application	NA							
3C4 Direct N2O Emissions from Managed Soils				10.02				
3C5 Indirect N2O Emissions from Managed Soils				NE				
3C6 Indirect N2O Emissions from Manure Management				NE				
3C7 Rice Cultivations			NO				NO	
3C8 Other (please specify)	NO		NO	NO	NO	NO	NO	NO
3D Other	NO		NO	NO	NO	NO	NO	NO
4 WASTE	**0.00**		**94.40**	**NA**	**NA**	**NA**	**NA**	**NA**
4A Solid Waste Disposal	NA		59.86		NA		NA	
4A1 Managed Waste Disposal Sites	NA		59.86		NA		NA	
4A2 Unmanaged Waste Disposal Sites	NA		NE	NA	NA	NA	NA	NA
4A3 Uncategorised Waste Disposal Sites	NA		NE	NA	NA	NA	NA	NA
4B Biological Treatment of Solid Waste	NA		NE	NA	NA	NA	NA	NA
4C Incineration and Open Burning of Waste	0.00		NE	NA	NA	NA	NA	NA

Greenhouse gas source and sink categories CO2	CO_2 Emissions (Gg)	CO_2 Removals (Gg)	CH_4 (Gg)	N_2O (Gg)	CO (Gg)	NO_x (Gg)	NMVOC (Gg)	SO_2 (Gg)
4C1 Waste Incineration	0		NE	NA	NA	NA	NA	NA
4C2 Open Burning of Waste	NE		NE	NA	NA	NA	NA	NA
4D Wastewater Treatment and Discharge	NA		34.54	NA	NA	NA	NA	NA
4D1 Domestic Wastewater Treatment and Discharge	NA		34.72	NA	NA	NA	NA	NA
4D2 Industrial Wastewater Treatment and Discharge	NA		NE	NA	NA	NA	NA	NA
4E Other (please specify)	NO		NO	NO	NO	NO	NO	NO
5 OTHER	**NA**		**NA**	**NE**	**NA**	**NA**	**NA**	**NA**
5A Indirect N2O Emissions from the Atmospheric Deposition of Nitrogen in NOx and NH3	NA		NA	NE	NA	NA	NA	NA
5B Other (please specify)	NO		NO	NO	NO	NO	NO	NO
Memo items(5)								
International Bunkers (subtotal)	57.09		0.0660	0.1250	0.012736718	0.051104116	0.000628974	0.036559099
International Aviation (International Bunkers)	38.19		0.0446	0.0845	0.008604999	0.03452623	0.000424938	0.024699533
International Water-borne Transport (International Bunkers)	18.90		0.0214	0.04055	0.004131719	0.016577887	0.000204036	0.011859565
Multilateral Operations	NO		NO	NO	NO	NO	NO	NO

Key: NA = not applicable, NE = not estimated, NO = not occurring, IE = Included Elsewhere

UNFCCC Table 2. Samoa's National greenhouse gas inventory of anthropogenic emissions of HFCs, PFCs and SF6 (2015)

Greenhouse gas source and sink categories CO2	HFCs(Gg)						PFCs(Gg)			SF_4
	HFC-32	HFC-134a	R404A	HFC-407C	HFC-507A	R410A	CF_4	C_2F_4	Other	
Total National Emissions and Removals	**NE**	**4.412200**	**5.644405**	**0.000000**	**0.106163**	**3.598895**	**NO**	**NO**	**NO**	**NO**
1 ENERGY										
1A Fuel Combustion Activities										
1B Fugitive Emissions from Fuels										
1C Carbon Dioxide Transport and Storage										
2 INDUSTRIAL PROCESSES AND PRODUCT USE	**NE**	**4.412200**	**5.644405**	**0.000000**	**0.106163**	**3.598895**	**NO**	**NO**	**NO**	**NO**
2A Mineral Industry										
2B Chemical Industry										
2C Metal Industry										
2D Non-Energy Products from Fuels and Solvent Use										
2E Electronics Industry										
2F Product Uses as Substitutes for Ozone Depleting Substances	NE	4.412200	5.644405	0.000000	0.106163	3.598895	NO	NO	NO	NO
2F1 Refrigeration and Air Conditioning	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F2 Foam Blowing Agents	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F3 Fire Protection	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F4 Aerosols	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F5 Solvents	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F6 Other Applications	NE	4.4122	5.6444045	0	0.1061625	3.5988945	NE	NE	NE	NE
2G Other Product Manufacture and Use										
2H Other (please specify)										
3 AGRICULTURE, FORESTRY AND OTHER LAND USE										
3A Livestock										
3B Land										
3C Aggregate Sources and Non-CO2 Emissions Sources on Land										
3D Other										
4 WASTE										
4A Solid Waste Disposal										
4B Biological Treatment of Solid Waste										
4C Incineration and Open Burning of Waste										
4D Wastewater Treatment and Discharge										
4E Other (please specify)										
5 OTHER										
5A Indirect N2O Emissions from the Atmospheric Deposition of Nitrogen in NOx and NH3										
5B Other (please specify)										
Memo items(5)										
International Bunkers (subtotal)										
International Aviation (International Bunkers)										
International Water-borne Transport (International Bunkers)										
Multilateral Operations										

UNFCCC Reporting Table 1. Samoa's National greenhouse gas inventory of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol and greenhouse gas precursors (2014)

Greenhouse gas source and sink categories	CO_2 Emissions (Gg)	CO_2 Removals (Gg)	CH_4 (Gg)	N_2O (Gg)	CO (Gg)	NO_x (Gg)	NMVOC (Gg)	SO_2 (Gg)
Total National Emissions and Removals	**192.13**	**-850.57**	**247.80**	**15.23**	**0.13**	**0.06**	**0.08**	**4.37**
1 ENERGY	**192.13**		**0.22**	**0.42**	**0.13**	**0.06**	**0.08**	**4.37**
1A Fuel Combustion Activities	192.13		0.22	0.42	0.13	0.06	**0.08**	4.37
1A1 Energy Industries (electricity y generation)	66.46		0.0753	0.1426	0.0145	0.0583	0.0007	0.0417
1A2 Manufacturing Industries and Construction	17.43		0.0198	0.0374	0.0153	0.0002	0.0109	0.0379
1A3 Transport (subtotal)	106.13		0.126	0.239	0.098	0.001	0.070	0.283
1A3a Civil Aviation (Domestic Aviation)	NE		NE	NE	NE	NE	NE	NE
1A3b Road Transport	106.07		0.13	0.24	0.10	0.00	0.07	0.28
1A3c Waterborne Navigation (Domestic Shipping)	0.07		0.0001	0.0001	0.0001	0.0000	0.0000	0.0064
1A4 Other Sectors (subtotal)	2.10		0.0024	0.0045	0.0018	0.0000	0.0013	4.0038
1A4 a Commercial/Institutional	NE		NE	NE	NE	NE	NE	NE
1A4 b Residential	NE		NE	NE	NE	NE	NE	NE
1A4 c Agriculture/ Forestry/ Fishing/ Fish Farms	2.10		0.0024	0.0045	0.0018	0.0000	0.0013	4.0038
1A5 Non-Specified	NO		NO	NO	NO	NO	NO	NO
1B Fugitive Emissions from Fuels	NO		NO	NO	NO	NO	NO	NO
1C Carbon Dioxide Transport and Storage	NO				NO	NO	NO	NO
2 INDUSTRIAL PROCESSES AND PRODUCT USE	**0.00**		**NE**	**NE**	**NE**	**NE**	**NE**	**NE**
2A Mineral Industry	NE		NO	NO	NO	NO	NO	NO
2B Chemical Industry	NE		NO	NO	NO	NO	NO	NO
2C Metal Industry	NE		NO	NO	NO	NO	NO	NO
2D Non-Energy Products from Fuels and Solvent Use	0.00		NE	NE	NE	NE	NE	NE
2D1 Lubricant Use	0.00				NE	NE	NE	NE
2D2 Paraffin Wax Use	0		NE	NE	NE	NE	NE	NE
2D3 Solvent Use	NE		NE	NE	NE	NE	NE	NE
2D4 Other (please specify)	NE		NE	NE	NE	NE	NE	NE
2E Electronics Industry	NE		NO	NO	NO	NO	NO	NO
2F Product Used as Substitutes for Ozone Dep. Subst.	NA		NA	NA	NA	NA	NA	NA
2G Other Product Manufacture and Use	NA		NA	NA	NA	NA	NA	NA
2G1 Electrical Equipment	NO		NO	NO	NO	NO	NO	NO
2G2 SF6 and PFCs from Other Product Uses	NO		NO	NO	NO	NO	NO	NO
2G3 N2O from Product Uses (medical uses)	NA		NE	NE	NE	NE	NE	NE
2G4 Other	NO		NO	NO	NO	NO	NO	NO

Greenhouse gas source and sink categories CO2	CO_2 Emissions (Gg)	CO_2 Removals (Gg)	CH_4 (Gg)	N_2O (Gg)	CO (Gg)	NO_x (Gg)	NMVOC (Gg)	SO_2 (Gg)
2H Other (please specify)	NA		NA	NA	NA	NA	NA	NA
2H1 Pulp and Paper Industry	NO		NO	NO	NO	NO	NO	NO
2H2 Food and Beverages Industry	NA		NE	NE	NE	NE	NE	NE
2H3 Other (Ammonia Use)	NA		NA	NA	NA	NA	NA	NA
3 AGRICULTURE, FORESTRY AND OTHER LAND USE	**NA**	**-850.57**	**156.37**	**15.23**	**NA**	**NA**	**NA**	**NA**
3A Livestock			156.37	NE				
3A1 Enteric Fermentation			78.32					
3A2 Manure Management			78.05	5.70858635				
3B Land	NA	NE	NE	NE	NA	NA	NA	NA
3B1 Forest Land	NA	-850.568	NE	NE	NA	NA	NA	NA
3B2 Cropland	NA	NE	NE	NE	NA	NA	NA	NA
3B3 Grassland	NA	NE	NE	NE	NA	NA	NA	NA
3B4 Wetlands	NA	NE	NE	NE	NA	NA	NA	NA
3B5 Settlements	NA	NE	NE	NE	NA	NA	NA	NA
3B6 Other Land	NA	NE	NE	NE	NA	NA	NA	NA
3C Aggregate Sources and Non-CO2 Emissions Sources on Land	NA		NE	9.519	NA	NA	NA	NA
3C1 Biomass Burning	NA		**NE**	**NE**	NA	NA	NA	NA
3C2 Liming	NA							
3C3 Urea Application	NA							
3C4 Direct N2O Emissions from Managed Soils				9.52				
3C5 Indirect N2O Emissions from Managed Soils				NE				
3C6 Indirect N2O Emissions from Manure Management				NE				
3C7 Rice Cultivations			NO				NO	
3C8 Other (please specify)	NO		NO	NO	NO	NO	NO	NO
3D Other	NO		NO	NO	NO	NO	NO	NO
4 WASTE	**0.00**		**91.20**	**NA**	**NA**	**NA**	**NA**	**NA**
4A Solid Waste Disposal	NA		57.02		NA		NA	
4A1 Managed Waste Disposal Sites	NA		57.02		NA		NA	
4A2 Unmanaged Waste Disposal Sites	NA		NE	NA	NA	NA	NA	NA
4A3 Uncategorised Waste Disposal Sites	NA		NE	NA	NA	NA	NA	NA
4B Biological Treatment of Solid Waste	NA		NE	NA	NA	NA	NA	NA
4C Incineration and Open Burning of Waste	0.00		NE	NA	NA	NA	NA	NA

Greenhouse gas source and sink categories CO2	CO_2 Emissions (Gg)	CO_2 Removals (Gg)	CH_4 (Gg)	N_2O (Gg)	CO (Gg)	NO_x (Gg)	NMVOC (Gg)	SO_2 (Gg)
4C1 Waste Incineration	0		NE	NA	NA	NA	NA	NA
4C2 Open Burning of Waste	NE		NE	NA	NA	NA	NA	NA
4D Wastewater Treatment and Discharge	NA		34.18	NA	NA	NA	NA	NA
4D1 Domestic Wastewater Treatment and Discharge	NA		34.18	NA	NA	NA	NA	NA
4D2 Industrial Wastewater Treatment and Discharge	NA		NE	NA	NA	NA	NA	NA
4E Other (please specify)	NO		NO	NO	NO	NO	NO	NO
5 OTHER	**NA**		**NA**	**NE**	**NA**	**NA**	**NA**	**NA**
5A Indirect N2O Emissions from the Atmospheric Deposition of Nitrogen in NOx and NH3	NA		NA	NE	NA	NA	NA	NA
5B Other (please specify)	NO		NO	NO	NO	NO	NO	NO
Memo items(5)								
International Bunkers (subtotal)	47.82		0.0555	0.1051	0.0107	0.0430	0.0005	0.0307
International Aviation (International Bunkers)	38.22		0.0447	0.0845	0.008612289	0.034555482	0.000425298	0.02472046
International Water-borne Transport (International Bunkers)	9.60		0.0109	0.02060	0.002098847	0.008421299	0.000103647	0.006024468
Multilateral Operations	NO		NO	NO	NO	NO	NO	NO

Key: NA = not applicable, NE = not estimated, NO = not occurring, IE = Included Elsewhere

UNFCCC Table 2. Samoa's National greenhouse gas inventory of anthropogenic emissions of HFCs, PFCs and SF6 (2014)

Greenhouse gas source and sink categories CO2	HFCs(Gg)						PFCs(Gg)			SF_4
	HFC-32	HFC-134a	R404A	HFC-407C	HFC-507A	R410A	CF_4	C_2F_4	Other	
Total National Emissions and Removals	**NE**	**3.67965**	**5.3762805**	**0.02761**	**0.00000**	**3.24410**	**NO**	**NO**	**NO**	**NO**
1 ENERGY										
1A Fuel Combustion Activities										
1B Fugitive Emissions from Fuels										
1C Carbon Dioxide Transport and Storage										
2 INDUSTRIAL PROCESSES AND PRODUCT USE	**NE**	**3.67965**	**5.3762805**	**0.02761**	**0.00000**	**3.24410**	**NO**	**NO**	**NO**	**NO**
2A Mineral Industry										
2B Chemical Industry										
2C Metal Industry										
2D Non-Energy Products from Fuels and Solvent Use										
2E Electronics Industry										
2F Product Uses as Substitutes for Ozone Depleting Substances	NE	3.67965	5.3762805	0.02761	0.00000	3.24410	NE	NE	NE	NE
2F1 Refrigeration and Air Conditioning	NE	NE	NE	NE	NE	NE	NO	NO	NO	NO
2F2 Foam Blowing Agents	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F3 Fire Protection	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F4 Aerosols	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F5 Solvents	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F6 Other Applications	NE	3.679650	5.376281	0.027608	0.00000	3.244101	NE	NE	NE	NE
2G Other Product Manufacture and Use										
2H Other (please specify)										
3 AGRICULTURE, FORESTRY AND OTHER LAND USE										
3A Livestock										
3B Land										
3C Aggregate Sources and Non-CO2 Emissions Sources on Land										
3D Other										
4 WASTE										
4A Solid Waste Disposal										
4B Biological Treatment of Solid Waste										
4C Incineration and Open Burning of Waste										
4D Wastewater Treatment and Discharge										
4E Other (please specify)										
5 OTHER										
5A Indirect N2O Emissions from the Atmospheric Deposition of Nitrogen in NOx and NH3										
5B Other (please specify)										
Memo items(5)										
International Bunkers (subtotal)										
International Aviation (International Bunkers)										
International Water-borne Transport (International Bunkers)										
Multilateral Operations										

UNFCCC Reporting Table 1. Samoa's National greenhouse gas inventory of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol and greenhouse gas precursors (2013)

Greenhouse gas source and sink categories	CO_2 Emissions (Gg)	CO_2 Removals (Gg)	CH_4 (Gg)	N_2O (Gg)	CO (Gg)	NO_x (Gg)	NMVOC (Gg)	SO_2 (Gg)
Total National Emissions and Removals	**185.16**	**-850.57**	**239.03**	**14.56**	**0.04**	**0.17**	**0.00**	**0.12**
1 ENERGY	**184.97**		**0.22**	**0.41**	**0.04**	**0.17**	**0.00**	**0.12**
1A Fuel Combustion Activities	184.97		0.22	0.41	0.04	0.17	0.00	0.12
1A1 Energy Industries (electricity y generation)	61.88		0.0702	0.1328	0.0135	0.0543	0.0007	0.0388
1A2 Manufacturing Industries and Construction	17.02		0.0193	0.0366	0.0037	0.0149	0.0002	0.0107
1A3 Transport (subtotal)	103.30		0.123	0.232	0.024	0.095	0.001	0.068
1A3a Civil Aviation (Domestic Aviation)	NO		NO	NO	NO	NO	NO	NO
1A3b Road Transport	103.26		0.12	0.23	0.02	0.09	0.00	0.07
1A3c Waterborne Navigation (Domestic Shipping)	0.04		0.0000	0.0001	0.0000	0.0000	0.0000	0.0000
1A4 Other Sectors (subtotal)	2.76		0.0031	0.0059	0.0006	0.0024	0.0000	0.0017
1A4 a Commercial/Institutional	IE		IE	IE	IE	IE	IE	IE
1A4 b Residential	IE		IE	IE	IE	IE	IE	IE
1A4 c Agriculture/ Forestry/ Fishing/ Fish Farms	2.76		0.0031	0.0059	0.0006	0.0024	0.0000	0.0017
1A5 Non-Specified	IE		IE	IE	IE	IE	IE	IE
1B Fugitive Emissions from Fuels	NO		NO	NO	NO	NO	NO	NO
1C Carbon Dioxide Transport and Storage	NO				NO	NO	NO	NO
2 INDUSTRIAL PROCESSES AND PRODUCT USE	**0.19**		**NE**	**NE**	**NE**	**NE**	**NE**	**NE**
2A Mineral Industry	NE		NO	NO	NO	NO	NO	NO
2B Chemical Industry	NE		NO	NO	NO	NO	NO	NO
2C Metal Industry	NE		NO	NO	NO	NO	NO	NO
2D Non-Energy Products from Fuels and Solvent Use	0.19		NE	NE	NE	NE	NE	NE
2D1 Lubricant Use	0.19				NE	NE	NE	NE
2D2 Paraffin Wax Use	0		NE	NE	NE	NE	NE	NE
2D3 Solvent Use	NE		NE	NE	NE	NE	NE	NE
2D4 Other (please specify)	NE		NE	NE	NE	NE	NE	NE
2E Electronics Industry	NE		NO	NO	NO	NO	NO	NO
2F Product Used as Substitutes for Ozone Dep. Subst.	NA		NA	NA	NA	NA	NA	NA
2G Other Product Manufacture and Use	NA		NA	NA	NA	NA	NA	NA
2G1 Electrical Equipment	NO		NO	NO	NO	NO	NO	NO
2G2 SF6 and PFCs from Other Product Uses	NO		NO	NO	NO	NO	NO	NO
2G3 N2O from Product Uses (medical uses)	NA		NE	NE	NE	NE	NE	NE
2G4 Other	NO		NO	NO	NO	NO	NO	NO

Greenhouse gas source and sink categories CO2	CO_2 Emissions (Gg)	CO_2 Removals (Gg)	CH_4 (Gg)	N_2O (Gg)	CO (Gg)	NO_x (Gg)	NMVOC (Gg)	SO_2 (Gg)
2H Other (please specify)	NA		NA	NA	NA	NA	NA	NA
2H1 Pulp and Paper Industry	NO		NO	NO	NO	NO	NO	NO
2H2 Food and Beverages Industry	NA		NE	NE	NE	NE	NE	NE
2H3 Other (Ammonia Use)	NA		NA	NA	NA	NA	NA	NA
3 AGRICULTURE, FORESTRY AND OTHER LAND USE	**NA**	**-850.57**	**151.01**	**15.23**	**NA**	**NA**	**NA**	**NA**
3A Livestock			151.01	NE				
3A1 Enteric Fermentation			74.68					
3A2 Manure Management			76.33	5.539715089				
3B Land	NA	NE	NE	NE	NA	NA	NA	NA
3B1 Forest Land	NA	-850.568	NE	NE	NA	NA	NA	NA
3B2 Cropland	NA	NE	NE	NE	NA	NA	NA	NA
3B3 Grassland	NA	NE	NE	NE	NA	NA	NA	NA
3B4 Wetlands	NA	NE	NE	NE	NA	NA	NA	NA
3B5 Settlements	NA	NE	NE	NE	NA	NA	NA	NA
3B6 Other Land	NA	NE	NE	NE	NA	NA	NA	NA
3C Aggregate Sources and Non-CO2 Emissions Sources on Land	NA		NE	9.025	NA	NA	NA	NA
3C1 Biomass Burning	NA		**NE**	**NE**	NA	NA	NA	NA
3C2 Liming	NA							
3C3 Urea Application	NA							
3C4 Direct N2O Emissions from Managed Soils				9.02				
3C5 Indirect N2O Emissions from Managed Soils				NE				
3C6 Indirect N2O Emissions from Manure Management				NE				
3C7 Rice Cultivations			NO				NO	
3C8 Other (please specify)	NO		NO	NO	NO	NO	NO	NO
3D Other	NO		NO	NO	NO	NO	NO	NO
4 WASTE	**0.00**		**87.80**	**NA**	**NA**	**NA**	**NA**	**NA**
4A Solid Waste Disposal	NA		53.79		NA		NA	
4A1 Managed Waste Disposal Sites	NA		53.79		NA		NA	
4A2 Unmanaged Waste Disposal Sites	NA		NE	NA	NA	NA	NA	NA
4A3 Uncategorised Waste Disposal Sites	NA		NE	NA	NA	NA	NA	NA
4B Biological Treatment of Solid Waste	NA		NE	NA	NA	NA	NA	NA
4C Incineration and Open Burning of Waste	0.00		NE	NA	NA	NA	NA	NA

Greenhouse gas source and sink categories CO2	CO_2 Emissions (Gg)	CO_2 Removals (Gg)	CH_4 (Gg)	N_2O (Gg)	CO (Gg)	NO_x (Gg)	NMVOC (Gg)	SO_2 (Gg)
4C1 Waste Incineration	0		NE	NA	NA	NA	NA	NA
4C2 Open Burning of Waste	NE		NE	NA	NA	NA	NA	NA
4D Wastewater Treatment and Discharge	NA		34.01	NA	NA	NA	NA	NA
4D1 Domestic Wastewater Treatment and Discharge	NA		34.01	NA	NA	NA	NA	NA
4D2 Industrial Wastewater Treatment and Discharge	NA		NE	NA	NA	NA	NA	NA
4E Other (please specify)	NO		NO	NO	NO	NO	NO	NO
5 OTHER	**NA**		**NA**	**NE**	**NA**	**NA**	**NA**	**NA**
5A Indirect N2O Emissions from the Atmospheric Deposition of Nitrogen in NOx and NH3	NA		NA	NE	NA	NA	NA	NA
5B Other (please specify)	NO		NO	NO	NO	NO	NO	NO
Memo items(5)								
International Bunkers (subtotal)	44.01		0.0510	0.0966	0.009845057	0.039501773	0.000486176	0.028258961
International Aviation (International Bunkers)	33.56		0.0392	0.0742	0.007562029	0.030341474	0.000373434	0.021705824
International Water-borne Transport (International Bunkers)	10.44		0.0118	0.02241	0.002283028	0.009160299	0.000112742	0.006553137
Multilateral Operations	NO		NO	NO	NO	NO	NO	NO

Key: NA = not applicable, NE = not estimated, NO = not occurring, IE = Included Elsewhere

UNFCCC Table 2. Samoa's National greenhouse gas inventory of anthropogenic emissions of HFCs, PFCs and SF6 (2013)

Greenhouse gas source and sink categories CO2	HFCs(Gg)						PFCs(Gg)			SF_4
	HFC-32	HFC-134a	R404A	HFC-407C	HFC-507A	R410A	CF_4	C_2F_4	Other	
Total National Emissions and Removals	**NE**	**3.171350**	**4.426018**	**0.156716**	**0.286080**	**3.099876**	**NO**	**NO**	**NO**	**NO**
1 ENERGY										
1A Fuel Combustion Activities										
1B Fugitive Emissions from Fuels										
1C Carbon Dioxide Transport and Storage										
2 INDUSTRIAL PROCESSES AND PRODUCT USE	**NE**	**3.171350**	**4.426018**	**0.156716**	**0.286080**	**3.099876**	**NO**	**NO**	**NO**	**NO**
2A Mineral Industry										
2B Chemical Industry										
2C Metal Industry										
2D Non-Energy Products from Fuels and Solvent Use										
2E Electronics Industry										
2F Product Uses as Substitutes for Ozone Depleting Substances	NE	3.171350	4.426018	0.156716	0.286080	3.099876	NE	NE	NE	NE
2F1 Refrigeration and Air Conditioning	NE	NE	NE	NE	NE	NE	NO	NO	NO	NO
2F2 Foam Blowing Agents	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F3 Fire Protection	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F4 Aerosols	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F5 Solvents	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F6 Other Applications	NE	3.171350	4.426018	0.156716	0.286080	3.099876	NE	NE	NE	NE
2G Other Product Manufacture and Use										
2H Other (please specify)										
3 AGRICULTURE, FORESTRY AND OTHER LAND USE										
3A Livestock										
3B Land										
3C Aggregate Sources and Non-CO2 Emissions Sources on Land										
3D Other										
4 WASTE										
4A Solid Waste Disposal										
4B Biological Treatment of Solid Waste										
4C Incineration and Open Burning of Waste										
4D Wastewater Treatment and Discharge										
4E Other (please specify)										
5 OTHER										
5A Indirect N2O Emissions from the Atmospheric Deposition of Nitrogen in NOx and NH3										
5B Other (please specify)										
Memo items(5)										
International Bunkers (subtotal)										
International Aviation (International Bunkers)										
International Water-borne Transport (International Bunkers)										
Multilateral Operations										

UNFCCC Reporting Table 1. Samoa's National greenhouse gas inventory of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol and greenhouse gas precursors (2012)

Greenhouse gas source and sink categories	CO_2 Emissions (Gg)	CO_2 Removals (Gg)	CH_4 (Gg)	N_2O (Gg)	CO (Gg)	NO_x (Gg)	NMVOC (Gg)	SO_2 (Gg)
Total National Emissions and Removals	**178.52**	**-850.57**	**229.55**	**13.90**	**0.04**	**0.16**	**0.00**	**0.11**
1 ENERGY	**178.52**		**0.21**	**0.39**	**0.04**	**0.16**	**0.00**	**0.11**
1A Fuel Combustion Activities	178.52		0.21	0.39	0.04	0.16	0.00	0.11
1A1 Energy Industries (electricity y generation)	54.66		0.0620	0.1173	0.0119	0.0479	0.0006	0.0343
1A2 Manufacturing Industries and Construction	18.70		0.0212	0.0402	0.0041	0.0164	0.0002	0.0118
1A3 Transport (subtotal)	101.92		0.121	0.229	0.023	0.094	0.001	0.067
1A3a Civil Aviation (Domestic Aviation)	NO		NO	NO	NO	NO	NO	NO
1A3b Road Transport	101.88		0.12	0.23	0.02	0.09	0.00	0.07
1A3c Waterborne Navigation (Domestic Shipping)	0.04		0.0000	0.0001	0.0000	0.0000	0.0000	0.0000
1A4 Other Sectors (subtotal)	3.07		0.0035	0.0066	0.0007	0.0027	0.0000	0.0019
1A4 a Commercial/Institutional	IE		IE	IE	IE	IE	IE	IE
1A4 b Residential	IE		IE	IE	IE	IE	IE	IE
1A4 c Agriculture/ Forestry/ Fishing/ Fish Farms	3.07		0.0035	0.0066	0.0007	0.0027	0.0000	0.0019
1A5 Non-Specified	IE		IE	IE	IE	IE	IE	IE
1B Fugitive Emissions from Fuels	NO		NO	NO	NO	NO	NO	NO
1C Carbon Dioxide Transport and Storage	NO				NO	NO	NO	NO
2 INDUSTRIAL PROCESSES AND PRODUCT USE	**0.16**		**NE**	**NE**	**NE**	**NE**	**NE**	**NE**
2A Mineral Industry	NE		NO	NO	NO	NO	NO	NO
2B Chemical Industry	NE		NO	NO	NO	NO	NO	NO
2C Metal Industry	NE		NO	NO	NO	NO	NO	NO
2D Non-Energy Products from Fuels and Solvent Use	0.16		NE	NE	NE	NE	NE	NE
2D1 Lubricant Use	0.16				NE	NE	NE	NE
2D2 Paraffin Wax Use	0.001127157		NE	NE	NE	NE	NE	NE
2D3 Solvent Use	NE		NE	NE	NE	NE	NE	NE
2D4 Other (please specify)	NE		NE	NE	NE	NE	NE	NE
2E Electronics Industry	NE		NO	NO	NO	NO	NO	NO
2F Product Used as Substitutes for Ozone Dep. Subst.	NA		NA	NA	NA	NA	NA	NA
2G Other Product Manufacture and Use	NA		NA	NA	NA	NA	NA	NA
2G1 Electrical Equipment	NO		NO	NO	NO	NO	NO	NO
2G2 SF6 and PFCs from Other Product Uses	NO		NO	NO	NO	NO	NO	NO
2G3 N2O from Product Uses (medical uses)	NA		NE	NE	NE	NE	NE	NE
2G4 Other	NO		NO	NO	NO	NO	NO	NO

Greenhouse gas source and sink categories CO2	CO_2 Emissions (Gg)	CO_2 Removals (Gg)	CH_4 (Gg)	N_2O (Gg)	CO (Gg)	NO_x (Gg)	NMVOC (Gg)	SO_2 (Gg)
2H Other (please specify)	NA		NA	NA	NA	NA	NA	NA
2H1 Pulp and Paper Industry	NO		NO	NO	NO	NO	NO	NO
2H2 Food and Beverages Industry	NA		NE	NE	NE	NE	NE	NE
2H3 Other (Ammonia Use)	NA		NA	NA	NA	NA	NA	NA
3 AGRICULTURE, FORESTRY AND OTHER LAND USE	**NA**	**-850.57**	**145.65**	**13.90**	**NA**	**NA**	**NA**	**NA**
3A Livestock			145.65	NE				
3A1 Enteric Fermentation			71.04					
3A2 Manure Management			74.61	5.370843829				
3B Land	NA	NE	NE	NE	NA	NA	NA	NA
3B1 Forest Land	NA	-850.568	NE	NE	NA	NA	NA	NA
3B2 Cropland	NA	NE	NE	NE	NA	NA	NA	NA
3B3 Grassland	NA	NE	NE	NE	NA	NA	NA	NA
3B4 Wetlands	NA	NE	NE	NE	NA	NA	NA	NA
3B5 Settlements	NA	NE	NE	NE	NA	NA	NA	NA
3B6 Other Land	NA	NE	NE	NE	NA	NA	NA	NA
3C Aggregate Sources and Non-CO2 Emissions Sources on Land	NA		NE	8.531	NA	NA	NA	NA
3C1 Biomass Burning	NA		**NE**	**NE**	NA	NA	NA	NA
3C2 Liming	NA							
3C3 Urea Application	NA							
3C4 Direct N2O Emissions from Managed Soils				8.53				
3C5 Indirect N2O Emissions from Managed Soils				NE				
3C6 Indirect N2O Emissions from Manure Management				NE				
3C7 Rice Cultivations			NO				NO	
3C8 Other (please specify)	NO		NO	NO	NO	NO	NO	NO
3D Other	NO		NO	NO	NO	NO	NO	NO
4 WASTE	**0.00**		**83.70**	**NA**	**NA**	**NA**	**NA**	**NA**
4A Solid Waste Disposal	NA		50.05		NA		NA	
4A1 Managed Waste Disposal Sites	NA		50.05		NA		NA	
4A2 Unmanaged Waste Disposal Sites	NA		NE	NA	NA	NA	NA	NA
4A3 Uncategorised Waste Disposal Sites	NA		NE	NA	NA	NA	NA	NA
4B Biological Treatment of Solid Waste	NA		NE	NA	NA	NA	NA	NA
4C Incineration and Open Burning of Waste	0.00		NE	NA	NA	NA	NA	NA

Greenhouse gas source and sink categories CO2	CO_2 Emissions (Gg)	CO_2 Removals (Gg)	CH_4 (Gg)	N_2O (Gg)	CO (Gg)	NO_x (Gg)	NMVOC (Gg)	SO_2 (Gg)
4C1 Waste Incineration	0		NE	NA	NA	NA	NA	NA
4C2 Open Burning of Waste	NE		NE	NA	NA	NA	NA	NA
4D Wastewater Treatment and Discharge	NA		33.65	NA	NA	NA	NA	NA
4D1 Domestic Wastewater Treatment and Discharge	NA		33.65	NA	NA	NA	NA	NA
4D2 Industrial Wastewater Treatment and Discharge	NA		NE	NA	NA	NA	NA	NA
4E Other (please specify)	NO		NO	NO	NO	NO	NO	NO
5 OTHER	**NA**		**NA**	**NE**	**NA**	**NA**	**NA**	**NA**
5A Indirect N2O Emissions from the Atmospheric Deposition of Nitrogen in NOx and NH3	NA		NA	NE	NA	NA	NA	NA
5B Other (please specify)	NO		NO	NO	NO	NO	NO	NO
Memo items(5)								
International Bunkers (subtotal)	53.98		0.0625	0.1183	0.012055032	0.048368957	0.00059531	0.034602407
International Aviation (International Bunkers)	37.81		0.0442	0.0836	0.00852003	0.034185305	0.000420742	0.024455641
International Water-borne Transport (International Bunkers)	16.17		0.0183	0.03470	0.003535002	0.014183652	0.000174568	0.010146766
Multilateral Operations	NO		NO	NO	NO	NO	NO	NO

Key: NA = not applicable, NE = not estimated, NO = not occurring, IE = Included Elsewhere

UNFCCC Table 2. Samoa's National greenhouse gas inventory of anthropogenic emissions of HFCs, PFCs and SF6 (2012)

Greenhouse gas source and sink categories CO2	HFCs(Gg)						PFCs(Gg)			SF_4
	HFC-32	HFC-134a	R404A	HFC-407C	HFC-507A	R410A	CF_4	C_2F_4	Other	
Total National Emissions and Removals	**NE**	**1.535300**	**2.172593**	**0.129108**	**0.286080**	**1.529747**	**NO**	**NO**	**NO**	**NO**
1 ENERGY										
1A Fuel Combustion Activities										
1B Fugitive Emissions from Fuels										
1C Carbon Dioxide Transport and Storage										
2 INDUSTRIAL PROCESSES AND PRODUCT USE	**NE**	**1.535300**	**2.172593**	**0.129108**	**0.286080**	**1.529747**	**NO**	**NO**	**NO**	**NO**
2A Mineral Industry										
2B Chemical Industry										
2C Metal Industry										
2D Non-Energy Products from Fuels and Solvent Use										
2E Electronics Industry										
2F Product Uses as Substitutes for Ozone Depleting Substances	NE	1.535300	2.172593	0.129108	0.286080	1.529747	NE	NE	NE	NE
2F1 Refrigeration and Air Conditioning	NE	NE	NE	NE	NE	NE	NO	NO	NO	NO
2F2 Foam Blowing Agents	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F3 Fire Protection	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F4 Aerosols	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F5 Solvents	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F6 Other Applications	NE	1.5353	2.172593	0.129108	0.28608	1.5297465	NE	NE	NE	NE
2G Other Product Manufacture and Use										
2H Other (please specify)										
3 AGRICULTURE, FORESTRY AND OTHER LAND USE										
3A Livestock										
3B Land										
3C Aggregate Sources and Non-CO2 Emissions Sources on Land										
3D Other										
4 WASTE										
4A Solid Waste Disposal										
4B Biological Treatment of Solid Waste										
4C Incineration and Open Burning of Waste										
4D Wastewater Treatment and Discharge										
4E Other (please specify)										
5 OTHER										
5A Indirect N2O Emissions from the Atmospheric Deposition of Nitrogen in NOx and NH3										
5B Other (please specify)										
Memo items(5)										
International Bunkers (subtotal)										
International Aviation (International Bunkers)										
International Water-borne Transport (International Bunkers)										
Multilateral Operations										

UNFCCC Reporting Table 1. Samoa's National greenhouse gas inventory of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol and greenhouse gas precursors (2011)

Greenhouse gas source and sink categories	CO_2 Emissions (Gg)	CO_2 Removals (Gg)	CH_4 (Gg)	N_2O (Gg)	CO (Gg)	NO_x (Gg)	NMVOC (Gg)	SO_2 (Gg)
Total National Emissions and Removals	**183.87**	**-850.57**	**220.62**	**13.31**	**0.04**	**0.17**	**0.00**	**0.12**
1 ENERGY	**183.87**		**0.21**	**0.40**	**0.04**	**0.17**	**0.00**	**0.12**
1A Fuel Combustion Activities	183.87		0.21	0.40	0.04	0.17	0.00	0.12
1A1 Energy Industries (electricity y generation)	58.30		0.0661	0.1251	0.0127	0.0511	0.0006	0.0366
1A2 Manufacturing Industries and Construction	19.31		0.0219	0.0415	0.0042	0.0170	0.0002	0.0121
1A3 Transport (subtotal)	102.87		0.122	0.231	0.024	0.094	0.001	0.068
1A3a Civil Aviation (Domestic Aviation)	NO		NO	NO	NO	NO	NO	NO
1A3b Road Transport	102.83		0.12	0.23	0.02	0.09	0.00	0.07
1A3c Waterborne Navigation (Domestic Shipping)	0.05		0.0001	0.0001	0.0000	0.0000	0.0000	0.0000
1A4 Other Sectors (subtotal)	3.06		0.0035	0.0066	0.0007	0.0027	0.0000	0.0019
1A4 a Commercial/Institutional	IE		IE	IE	IE	IE	IE	IE
1A4 b Residential	IE		IE	IE	IE	IE	IE	IE
1A4 c Agriculture/ Forestry/ Fishing/ Fish Farms	3.06		0.0035	0.0066	0.0007	0.0027	0.0000	0.0019
1A5 Non-Specified	IE		IE	IE	IE	IE	IE	IE
1B Fugitive Emissions from Fuels	NO		NO	NO	NO	NO	NO	NO
1C Carbon Dioxide Transport and Storage	NO				NO	NO	NO	NO
2 INDUSTRIAL PROCESSES AND PRODUCT USE	**0.33**		**NE**	**NE**	**NE**	**NE**	**NE**	**NE**
2A Mineral Industry	NE		NO	NO	NO	NO	NO	NO
2B Chemical Industry	NE		NO	NO	NO	NO	NO	NO
2C Metal Industry	NE		NO	NO	NO	NO	NO	NO
2D Non-Energy Products from Fuels and Solvent Use	0.33		NE	NE	NE	NE	NE	NE
2D1 Lubricant Use	0.33				NE	NE	NE	NE
2D2 Paraffin Wax Use	0.001183435		NE	NE	NE	NE	NE	NE
2D3 Solvent Use	NE		NE	NE	NE	NE	NE	NE
2D4 Other (please specify)	NE		NE	NE	NE	NE	NE	NE
2E Electronics Industry	NE		NO	NO	NO	NO	NO	NO
2F Product Used as Substitutes for Ozone Dep. Subst.	NA		NA	NA	NA	NA	NA	NA
2G Other Product Manufacture and Use	NA		NA	NA	NA	NA	NA	NA
2G1 Electrical Equipment	NO		NO	NO	NO	NO	NO	NO
2G2 SF6 and PFCs from Other Product Uses	NO		NO	NO	NO	NO	NO	NO
2G3 N2O from Product Uses (medical uses)	NA		NE	NE	NE	NE	NE	NE
2G4 Other	NO		NO	NO	NO	NO	NO	NO

Greenhouse gas source and sink categories CO2	CO_2 Emissions (Gg)	CO_2 Removals (Gg)	CH_4 (Gg)	N_2O (Gg)	CO (Gg)	NO_x (Gg)	NMVOC (Gg)	SO_2 (Gg)
2H Other (please specify)	NA		NA	NA	NA	NA	NA	NA
2H1 Pulp and Paper Industry	NO		NO	NO	NO	NO	NO	NO
2H2 Food and Beverages Industry	NA		NE	NE	NE	NE	NE	NE
2H3 Other (Ammonia Use)	NA		NA	NA	NA	NA	NA	NA
3 AGRICULTURE, FORESTRY AND OTHER LAND USE	**NA**	**-850.57**	**141.36**	**13.31**	**NA**	**NA**	**NA**	**NA**
3A Livestock			141.36	NE				
3A1 Enteric Fermentation			67.48					
3A2 Manure Management			73.89	5.274791358				
3B Land	NA	NE	NE	NE	NA	NA	NA	NA
3B1 Forest Land	NA	-850.568	NE	NE	NA	NA	NA	NA
3B2 Cropland	NA	NE	NE	NE	NA	NA	NA	NA
3B3 Grassland	NA	NE	NE	NE	NA	NA	NA	NA
3B4 Wetlands	NA	NE	NE	NE	NA	NA	NA	NA
3B5 Settlements	NA	NE	NE	NE	NA	NA	NA	NA
3B6 Other Land	NA	NE	NE	NE	NA	NA	NA	NA
3C Aggregate Sources and Non-CO2 Emissions Sources on Land	NA		NE	8.036	NA	NA	NA	NA
3C1 Biomass Burning	NA		**NE**	**NE**	NA	NA	NA	NA
3C2 Liming	NA							
3C3 Urea Application	NA							
3C4 Direct N2O Emissions from Managed Soils				8.04				
3C5 Indirect N2O Emissions from Managed Soils				NE				
3C6 Indirect N2O Emissions from Manure Management				NE				
3C7 Rice Cultivations			NO				NO	
3C8 Other (please specify)	NO		NO	NO	NO	NO	NO	NO
3D Other	NO		NO	NO	NO	NO	NO	NO
4 WASTE	**0.00**		**79.04**	**NA**	**NA**	**NA**	**NA**	**NA**
4A Solid Waste Disposal	NA		45.75		NA		NA	
4A1 Managed Waste Disposal Sites	NA		45.75		NA		NA	
4A2 Unmanaged Waste Disposal Sites	NA		NE	NA	NA	NA	NA	NA
4A3 Uncategorised Waste Disposal Sites	NA		NE	NA	NA	NA	NA	NA
4B Biological Treatment of Solid Waste	NA		NE	NA	NA	NA	NA	NA
4C Incineration and Open Burning of Waste	0.00		NE	NA	NA	NA	NA	NA

Greenhouse gas source and sink categories CO2	CO_2 Emissions (Gg)	CO_2 Removals (Gg)	CH_4 (Gg)	N_2O (Gg)	CO (Gg)	NO_x (Gg)	NMVOC (Gg)	SO_2 (Gg)
4C1 Waste Incineration	0		NE	NA	NA	NA	NA	NA
4C2 Open Burning of Waste	NE		NE	NA	NA	NA	NA	NA
4D Wastewater Treatment and Discharge	NA		33.29	NA	NA	NA	NA	NA
4D1 Domestic Wastewater Treatment and Discharge	NA		33.29	NA	NA	NA	NA	NA
4D2 Industrial Wastewater Treatment and Discharge	NA		NE	NA	NA	NA	NA	NA
4E Other (please specify)	NO		NO	NO	NO	NO	NO	NO
5 OTHER	**NA**		**NA**	**NE**	**NA**	**NA**	**NA**	**NA**
5A Indirect N2O Emissions from the Atmospheric Deposition of Nitrogen in NOx and NH3	NA		NA	NE	NA	NA	NA	NA
5B Other (please specify)	NO		NO	NO	NO	NO	NO	NO
Memo items(5)								
International Bunkers (subtotal)	45.13		0.0524	0.0991	0.010100912	0.040528351	0.00049881	0.028993359
International Aviation (International Bunkers)	34.90		0.0408	0.0772	0.007862579	0.031547385	0.000388276	0.022568514
International Water-borne Transport (International Bunkers)	10.24		0.0116	0.02197	0.002238333	0.008980966	0.000110535	0.006424845
Multilateral Operations	NO		NO	NO	NO	NO	NO	NO

Key: NA = not applicable, NE = not estimated, NO = not occurring, IE = Included Elsewhere

UNFCCC Table 2. Samoa's National greenhouse gas inventory of anthropogenic emissions of HFCs, PFCs and SF6 (2011)

Greenhouse gas source and sink categories CO2	HFCs(Gg)						PFCs(Gg)			SF_4
	HFC-32	HFC-134a	R404A	HFC-407C	HFC-507A	R410A	CF_4	C_2F_4	Other	
Total National Emissions and Removals	NE	NE	NE	NE	NE	NE	NO	NO	NO	NO
1 ENERGY										
1A Fuel Combustion Activities										
1B Fugitive Emissions from Fuels										
1C Carbon Dioxide Transport and Storage										
2 INDUSTRIAL PROCESSES AND PRODUCT USE	NE	NE	NE	NE	NE	NE	NO	NO	NO	NO
2A Mineral Industry										
2B Chemical Industry										
2C Metal Industry										
2D Non-Energy Products from Fuels and Solvent Use										
2E Electronics Industry										
2F Product Uses as Substitutes for Ozone Depleting Substances	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F1 Refrigeration and Air Conditioning	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F2 Foam Blowing Agents	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F3 Fire Protection	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F4 Aerosols	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F5 Solvents	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F6 Other Applications	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2G Other Product Manufacture and Use										
2H Other (please specify)										
3 AGRICULTURE, FORESTRY AND OTHER LAND USE										
3A Livestock										
3B Land										
3C Aggregate Sources and Non-CO2 Emissions Sources on Land										
3D Other										
4 WASTE										
4A Solid Waste Disposal										
4B Biological Treatment of Solid Waste										
4C Incineration and Open Burning of Waste										
4D Wastewater Treatment and Discharge										
4E Other (please specify)										
5 OTHER										
5A Indirect N2O Emissions from the Atmospheric Deposition of Nitrogen in NOx and NH3										
5B Other (please specify)										
Memo items(5)										
International Bunkers (subtotal)										
International Aviation (International Bunkers)										
International Water-borne Transport (International Bunkers)										
Multilateral Operations										

UNFCCC Reporting Table 1. Samoa's National greenhouse gas inventory of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol and greenhouse gas precursors (2010)

Greenhouse gas source and sink categories	CO_2 Emissions (Gg)	CO_2 Removals (Gg)	CH_4 (Gg)	N_2O (Gg)	CO (Gg)	NO_x (Gg)	NMVOC (Gg)	SO_2 (Gg)
Total National Emissions and Removals	**181.43**	**-850.57**	**209.04**	**12.58**	**0.04**	**0.16**	**0.00**	**0.12**
1 ENERGY	**181.12**		**0.21**	**0.40**	**0.04**	**0.16**	**0.00**	**0.12**
1A Fuel Combustion Activities	181.12		0.21	0.40	0.04	0.16	0.00	0.12
1A1 Energy Industries (electricity y generation)	52.83		0.0599	0.1134	0.0115	0.0463	0.0006	0.0332
1A2 Manufacturing Industries and Construction	19.60		0.0222	0.0421	0.0043	0.0172	0.001	0.0123
1A3 Transport (subtotal)	104.89		0.124	0.236	0.024	0.096	0.001	0.069
1A3a Civil Aviation (Domestic Aviation)	NO		NO	NO	NO	NO	NO	NO
1A3b Road Transport	104.86		0.12	0.24	0.02	0.10	0.00	0.07
1A3c Waterborne Navigation (Domestic Shipping)	0.03		0.0001	0.0001	0.0000	0.0000	0.0000	0.0000
1A4 Other Sectors (subtotal)	3.80		0.0035	0.0082	0.0008	0.0033	0.0000	0.0024
1A4 a Commercial/Institutional	IE		IE	IE	IE	IE	IE	IE
1A4 b Residential	IE		IE	IE	IE	IE	IE	IE
1A4 c Agriculture/ Forestry/ Fishing/ Fish Farms	3.80		0.0043	0.0082	0.0008	0.0033	0.0000	0.0024
1A5 Non-Specified	IE		IE	IE	IE	IE	IE	IE
1B Fugitive Emissions from Fuels	NO		NO	NO	NO	NO	NO	NO
1C Carbon Dioxide Transport and Storage	NO				NO	NO	NO	NO
2 INDUSTRIAL PROCESSES AND PRODUCT USE	**0.31**		**NE**	**NE**	**NE**	**NE**	**NE**	**NE**
2A Mineral Industry	NE		NO	NO	NO	NO	NO	NO
2B Chemical Industry	NE		NO	NO	NO	NO	NO	NO
2C Metal Industry	NE		NO	NO	NO	NO	NO	NO
2D Non-Energy Products from Fuels and Solvent Use	0.31		NE	NE	NE	NE	NE	NE
2D1 Lubricant Use	0.31				NE	NE	NE	NE
2D2 Paraffin Wax Use	0.001836335		NE	NE	NE	NE	NE	NE
2D3 Solvent Use	NE		NE	NE	NE	NE	NE	NE
2D4 Other (please specify)	NE		NE	NE	NE	NE	NE	NE
2E Electronics Industry	NE		NO	NO	NO	NO	NO	NO
2F Product Used as Substitutes for Ozone Dep. Subst.	NA		NA	NA	NA	NA	NA	NA
2G Other Product Manufacture and Use	NA		NA	NA	NA	NA	NA	NA
2G1 Electrical Equipment	NO		NO	NO	NO	NO	NO	NO
2G2 SF6 and PFCs from Other Product Uses	NO		NO	NO	NO	NO	NO	NO
2G3 N2O from Product Uses (medical uses)	NA		NE	NE	NE	NE	NE	NE
2G4 Other	NO		NO	NO	NO	NO	NO	NO

Greenhouse gas source and sink categories CO2	CO_2 Emissions (Gg)	CO_2 Removals (Gg)	CH_4 (Gg)	N_2O (Gg)	CO (Gg)	NO_x (Gg)	NMVOC (Gg)	SO_2 (Gg)
2H Other (please specify)	NA		NA	NA	NA	NA	NA	NA
2H1 Pulp and Paper Industry	NO		NO	NO	NO	NO	NO	NO
2H2 Food and Beverages Industry	NA		NE	NE	NE	NE	NE	NE
2H3 Other (Ammonia Use)	NA		NA	NA	NA	NA	NA	NA
3 AGRICULTURE, FORESTRY AND OTHER LAND USE	**NA**	**-850.57**	**134.92**	**12.58**	**NA**	**NA**	**NA**	**NA**
3A Livestock			134.92	NE				
3A1 Enteric Fermentation			63.75					
3A2 Manure Management			71.17	5.033101308				
3B Land	NA	NE	NE	NE	NA	NA	NA	NA
3B1 Forest Land	NA	-850.568	NE	NE	NA	NA	NA	NA
3B2 Cropland	NA	NE	NE	NE	NA	NA	NA	NA
3B3 Grassland	NA	NE	NE	NE	NA	NA	NA	NA
3B4 Wetlands	NA	NE	NE	NE	NA	NA	NA	NA
3B5 Settlements	NA	NE	NE	NE	NA	NA	NA	NA
3B6 Other Land	NA	NE	NE	NE	NA	NA	NA	NA
3C Aggregate Sources and Non-CO2 Emissions Sources on Land	NA		NE	7.542	NA	NA	NA	NA
3C1 Biomass Burning	NA		**NE**	**NE**	NA	NA	NA	NA
3C2 Liming	NA							
3C3 Urea Application	NA							
3C4 Direct N2O Emissions from Managed Soils				7.54				
3C5 Indirect N2O Emissions from Managed Soils				NE				
3C6 Indirect N2O Emissions from Manure Management				NE				
3C7 Rice Cultivations			NO				NO	
3C8 Other (please specify)	NO		NO	NO	NO	NO	NO	NO
3D Other	NO		NO	NO	NO	NO	NO	NO
4 WASTE	**0.00**		**73.91**	**NA**	**NA**	**NA**	**NA**	**NA**
4A Solid Waste Disposal	NA		40.80		NA		NA	
4A1 Managed Waste Disposal Sites	NA		40.80		NA		NA	
4A2 Unmanaged Waste Disposal Sites	NA		NE	NA	NA	NA	NA	NA
4A3 Uncategorised Waste Disposal Sites	NA		NE	NA	NA	NA	NA	NA
4B Biological Treatment of Solid Waste	NA		NE	NA	NA	NA	NA	NA
4C Incineration and Open Burning of Waste	0.00		NE	NA	NA	NA	NA	NA

Greenhouse gas source and sink categories CO2	CO_2 Emissions (Gg)	CO_2 Removals (Gg)	CH_4 (Gg)	N_2O (Gg)	CO (Gg)	NO_x (Gg)	NMVOC (Gg)	SO_2 (Gg)
4C1 Waste Incineration	0		NE	NA	NA	NA	NA	NA
4C2 Open Burning of Waste	NE		NE	NA	NA	NA	NA	NA
4D Wastewater Treatment and Discharge	NA		33.12	NA	NA	NA	NA	NA
4D1 Domestic Wastewater Treatment and Discharge	NA		33.12	NA	NA	NA	NA	NA
4D2 Industrial Wastewater Treatment and Discharge	NA		NE	NA	NA	NA	NA	NA
4E Other (please specify)	NO		NO	NO	NO	NO	NO	NO
5 OTHER	**NA**		**NA**	**NE**	**NA**	**NA**	**NA**	**NA**
5A Indirect N2O Emissions from the Atmospheric Deposition of Nitrogen in NOx and NH3	NA		NA	NE	NA	NA	NA	NA
5B Other (please specify)	NO		NO	NO	NO	NO	NO	NO
Memo items(5)								
International Bunkers (subtotal)	49.51		0.0575	0.1089	0.011098126	0.044529519	0.000548056	0.031855733
International Aviation (International Bunkers)	41.02		0.0479	0.0907	0.009241441	0.037079857	0.000456367	0.026526359
International Water-borne Transport (International Bunkers)	8.49		0.0096	0.01822	0.001856685	0.007449662	9.16882E-05	0.005329374
Multilateral Operations	NO		NO	NO	NO	NO	NO	NO

Key: NA = not applicable, NE = not estimated, NO = not occurring, IE = Included Elsewhere

UNFCCC Table 2. Samoa's National greenhouse gas inventory of anthropogenic emissions of HFCs, PFCs and SF6 (2010)

Greenhouse gas source and sink categories CO2	HFCs(Gg)						PFCs(Gg)			SF_4
	HFC-32	HFC-134a	R404A	HFC-407C	HFC-507A	R410A	CF_4	C_2F_4	Other	
Total National Emissions and Removals	NE	NE	NE	NE	NE	NE	NO	NO	NO	NO
1 ENERGY										
1A Fuel Combustion Activities										
1B Fugitive Emissions from Fuels										
1C Carbon Dioxide Transport and Storage										
2 INDUSTRIAL PROCESSES AND PRODUCT USE	NE	NE	NE	NE	NE	NE	NO	NO	NO	NO
2A Mineral Industry										
2B Chemical Industry										
2C Metal Industry										
2D Non-Energy Products from Fuels and Solvent Use										
2E Electronics Industry										
2F Product Uses as Substitutes for Ozone Depleting Substances	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F1 Refrigeration and Air Conditioning	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F2 Foam Blowing Agents	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F3 Fire Protection	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F4 Aerosols	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F5 Solvents	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2F6 Other Applications	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2G Other Product Manufacture and Use										
2H Other (please specify)										
3 AGRICULTURE, FORESTRY AND OTHER LAND USE										
3A Livestock										
3B Land										
3C Aggregate Sources and Non-CO2 Emissions Sources on Land										
3D Other										
4 WASTE										
4A Solid Waste Disposal										
4B Biological Treatment of Solid Waste										
4C Incineration and Open Burning of Waste										
4D Wastewater Treatment and Discharge										
4E Other (please specify)										
5 OTHER										
5A Indirect N2O Emissions from the Atmospheric Deposition of Nitrogen in NOx and NH3										
5B Other (please specify)										
Memo items(5)										
International Bunkers (subtotal)										
International Aviation (International Bunkers)										
International Water-borne Transport (International Bunkers)										
Multilateral Operations										

Annexure 12: List of People interviewed – Mitigation

Sector	Names	Organization
Energy	Toiata Uili	Toiata Uili MNRE - RED
	Heremoni Suapaia	MOF
	Lilian Penaia	MOF
	Iosefa Aiolupotea	EPC
	Leilani Galuvao	MWTI - LTA
	Yvonne Mariner	MWTI - Aviation
	Sonny Brown	MWTI - Maritime
Waste	Setoa Apo	MNRE- Waste
	Fiasosoitamalii Siaosi	MNRE- Waste
AFOLU	Dr Ramona Suifoa	MAF
	Moafanua Tolusina	MNRE - Forestry
IPPU	Tumua Neru	MNRE - Ozone
	Rodney Lui Yen	MCR

Annexure 13: List of projects supported by climate finance during the years 2012-2022

SN	Project Name	Development Partner:	Currency	Total Funding	Timeframe	Responsible Division/Focal Point	Project Status	% Delivery rate to date	Implementing Agency	Executing Agencies	Focus of support (Mitigation Adaptation, Cross-cutting, EA)
1	Economy Wide Integration of Climate Change (EWACC) Project	GEF / UNDP	USD	1,23,22,936	2015 - 2021	GEF / Climate Change Division	Completed	100%	UNDP	MNRE and MoF	Adaptation
2	Third National Communication Report and First Biennial Report (2020-2024)	GEF / UNDP	USD	10,02,000	2020-2024	GEF / Climate Change Division	Ongoing	7%		MNRE	Cross-cutting
3	Pilot Program on Climate Resilience (PPCR)– IDA/World Bank	World Bank	USD	58,01,060	2013-2021	GEF & CC/ DEC/ WRD/ WSCU	Completed	100%	World Bank	MoF	Adaptation
4	Pacific Adaptation to Climate Change Resilience Building Project (PACRES)	EU/SPREP	EUR	1,00,000	2020-2022	GEF & CC/ WSCU/FRD	Ongoing	57%	EU	MNRE, SPREP and MAF	Adaptation
5	Improving Performance and Reliability of Renewable Energy Power Systems in Samoa (IMPRESS) Project	GEF/UNDP	USD	61,25,828	2017 - 2022	Renewable Energy Division	Ongoing	80%	UNDP	Ministry of Natural Resources & Environment (MNRE)	Mitigation
6	EDF10 ACP EU Building Safety and Resilience in the Pacific	European Union through SPC	EUR	5,40,000	2014 - 2018	Disaster Management Office (DMO)	Completed	100%			Adaptation
7	Fagalii Ridge to Reef (R2R) Project	GEF/SPC	USD	2,00,000	2016 - 2019	Water Resources Division	Completed	100%			Adaptation
8	LDCF Project - Economy Wide Integration of Climate Change, DRR/DRM to reduce Climate Vulnerability of Communities in Samoa	GEF	USD	4,00,00,000	2015-2020		Ongoing	40%	UNDP		Adaptation

SN	Project Name	Development Partner:	Currency	Total Funding	Timeframe	Responsible Division/Focal Point	Project Status	% Delivery rate to date	Implementing Agency	Executing Agencies	Focus of support (Mitigation Adaptation, Cross-cutting, EA)
9	Enhancing Resilience of Coastal Communities to Climate Change - Adaptation Fund	GEF / UNDP	USD	80,50,000	2013- 2017	MNRE	Completed	100%	UNDP	MNRE	Adaptation
10	Enhancing Climate Resilience of Coastal Resources & Communities (PPCR Project)	World Bank	USD	1,46,00,000	2013 - 2019	MNRE & MOF	Completed	100%	UNDP	MNRE	Adaptation
11	Strengthening Multi Sector Management of Critical Landscapes (SMSMCL) Project	GEF / UNDP	USD	47,36,363	2014 - 2019	Land Management Division	Completed	100%	UNDP	MNRE	Cross-cutting
12	Integrated Flood Management to Enhance Climate Resilience of the Vaisigano River Catchment in Samoa" Specific MNRE Component: GCF - Output 2.2 - Implement ecosystem responses upstream for decreased flows during extreme weather events	Green Climate Fund (GCF) / UNDP	USD	5,77,17,748	2017 - 2022	Environment Sector Coordination Division, Water Resources Division, Land Management, Forestry Division, Climate Change/GEF 2017 - 2022	Ongoing	76.10%	UNDP	MoF	Adaptation
13	Pacific Islands Renewable Energy Investment Program	GCF	USD	2,92,00,000	2016-2023		Ongoing	57%	ADB		Cross-cutting
14	Building National and Regional Capacity to Implement MEAs by Strengthening Planning, and State of Environment Assessment and Reporting in the Pacific Islands	GEF	USD	43,19,635	2016	GEF / Climate Change Division	Ongoing	93%	UNEP		Cross-cutting
15	Enhancing the Resilience of Tourism-reliant Communities to Climate Change Risks	GEF	USD	19,50,000	2013-2017	GEF / Climate Change Division	Completed	100%	UNDP	STA	Cross-cutting
16	Soil Management for Farm Resilience in the Pacific Islands	GoA - ACIAR	AUD	66,264	2017-2021		Completed	100%	MAF		Adaptation
17	Aligning Genetics Resources, Production and Post Harvest Systems to Market Opportunities for Pac Isl and Aust Cocoa	GoA - ACIAR	AUD	1,62,710	2016-2021		Completed	100%	MAF		Adaptation
18	E-Phyto Sanitary Certification System	GoA - ACIAR	AUD	2,11,163	2019-2021		Completed	100%	MAF		Adaptation
19	Reef Colonization and Socioeconomic impacts from trochus colonization	GoA - ACIAR	AUD	91,531	2017-2019		Completed	100%	MAF		Adaptation
20	Samoa Agribusiness Support project	GoA - ACIAR	USD	7,50,000	2014-2023		Ongoing	26%	MOF		Adaptation
21	Sectoral analysis and investment requirements for improving Fiji and Samoa small ruminant sector	GoA - ACIAR	AUD	18,700	2021		Ongoing	37%	MAF		Adaptation

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9	Enhancing Resilience of Coastal Communities to Climate Change - Adaptation Fund	GEF / UNDP	USD	80,50,000	2013- 2017	MNRE	Completed	100%	UNDP	MNRE	Adaptation
10	Enhancing Climate Resilience of Coastal Resources & Communities (PPCR Project)	World Bank	USD	1,46,00,000	2013 - 2019	MNRE & MOF	Completed	100%	UNDP	MNRE	Adaptation
11	Strengthening Multi Sector Management of Critical Landscapes (SMSMCL) Project	GEF / UNDP	USD	47,36,363	2014 - 2019	Land Management Division	Completed	100%	UNDP	MNRE	Cross-cutting
12	Integrated Flood Management to Enhance Climate Resilience of the Vaisigano River Catchment in Samoa" Specific MNRE Component: GCF - Output 2.2 - Implement ecosystem responses upstream for decreased flows during extreme weather events	Green Climate Fund (GCF) / UNDP	USD	5,77,17,748	2017 - 2022	Environment Sector Coordination Division, Water Resources Division, Land Management, Forestry Division, Climate Change/GEF 2017 - 2022	Ongoing	76.10%	UNDP	MoF	Adaptation
13	Pacific Islands Renewable Energy Investment Program	GCF	USD	2,92,00,000	2016-2023		Ongoing	57%	ADB		Cross-cutting
14	Building National and Regional Capacity to Implement MEAs by Strengthening Planning, and State of Environment Assessment and Reporting in the Pacific Islands	GEF	USD	43,19,635	2016	GEF / Climate Change Division	Ongoing	93%	UNEP		Cross-cutting
15	Enhancing the Resilience of Tourism-reliant Communities to Climate Change Risks	GEF	USD	19,50,000	2013-2017	GEF / Climate Change Division	Completed	100%	UNDP	STA	Cross-cutting
16	Soil Management for Farm Resilience in the Pacific Islands	GoA - ACIAR	AUD	66,264	2017-2021		Completed	100%	MAF		Adaptation
17	Aligning Genetics Resources, Production and Post Harvest Systems to Market Opportunities for Pac Isl and Aust Cocoa	GoA - ACIAR	AUD	1,62,710	2016-2021		Completed	100%	MAF		Adaptation
18	E-Phyto Sanitary Certification System	GoA - ACIAR	AUD	2,11,163	2019-2021		Completed	100%	MAF		Adaptation
19	Reef Colonization and Socioeconomic impacts from trochus colonization	GoA - ACIAR	AUD	91,531	2017-2019		Completed	100%	MAF		Adaptation
20	Samoa Agribusiness Support project	GoA - ACIAR	USD	7,50,000	2014-2023		Ongoing	26%	MOF		Adaptation
21	Sectoral analysis and investment requirements for improving Fiji and Samoa small ruminant sector	GoA - ACIAR	AUD	18,700	2021		Ongoing	37%	MAF		Adaptation

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22	Enhanced Fruit Production & Postharvest Handling Systems Project	GoA - ACIAR	AUD	3,01,635	2016-2021		Completed	100%	MAF		Adaptation
23	Building Case for Investment in Coconut Industry	GoA - ACIAR	AUD	9,975	2021		Ongoing	100%	MAF		Adaptation
24	PIRAS SAFPROM	GoA - DFAT	USD	4,15,000	2021-2024		Ongoing	0%	MAF		Adaptation
25	Samoa China Agriculture Techincal Aid Project (SCATAP)	PRC					Ongoing		MAF		Adaptation
26	Samoa Agriculture & Fishery Productivity and Marketing Project	World Bank	USD	1,99,50,000	2019-2025		Ongoing	6%	MAF		Adaptation
27	Samoa Agribusiness Support Project	ADB	USD	57,50,000	2014-2023		Ongoing	96%	MAF		Adaptation
28	Samoa Agriculture & Fishery Productivity and Marketing Project	IFAD	USD	36,00,000	2019-2025		Ongoing	6%	MAF		Adaptation
29	PIRAS SAFPROM	IFAD	USD	3,85,000	2021-2022		Ongoing	79%	MAF		Adaptation
30	Circular Economy for recovery of Waste Program (CERO)	UNDP	USD	75,000	2021-2022		Ongoing	71%	SROS		Adaptation
31	Covid19 Prepared-ness and Recovery and diversification of Economic sector	UNDP	USD	1,60,000	2021-2022		Ongoing	59%	SROS		Adaptation
32	ACIAR - Improving ruminant production and supply in Samoa	FAO	AUD	2,06,381	2019-2023		Ongoing	32%	MAF		Adaptation
33	Agromet program in Samoa	FAO	SAT	26,300	2020		Completed	100%	MAF		Adaptation
34	Strengthening of Fisheries Info Management	FFA	SAT	6,79,089	2008-Conitnual		Ongoing	44%	MAF		Adaptation
35	Fisheries Development Project for small-scale pelagic fisheries	FFA	USD	3,82,390	2017-Continual		Ongoing	80%	MAF		Adaptation
36	US Treaty on Economic Development Fund	FFA	USD	20,87,886	2019-Continual		Ongoing	100%	MAF		Adaptation
37	Fisheries Covid19 Pandemic Stimulus package	FFA	USD	85,000	2020-2025		Ongoing	100%	MAF		Adaptation
38	Responding to emerging pests and threats to Horticulture in the Pacific	SPC	AUD	2,46,015	2019-2023		Ongoing	49%	MAF		Adaptation
39	Safeguarding and Deploying Coconut Diversity for Improving Livelihoods in the Pacific	SPC	AUD	51,081	2020-2024		Ongoing	9%	MAF		Adaptation
40	Samoa Tourism Growth Partnership (NZ)	GoNZ - MFAT	NZD	9,30,000	2017-2020		Completed	100%	STA		Adaptation
41	Samoa Tourism Growth Partnership Interim Arrangement (NZ)	GoNZ - MFAT	NZD	30,00,000	2020-2022		Ongoing	67%	STA		Adaptation
42	Samoa Renewable Energy Partnership (NZ)	GoNZ - MFAT	NZD	15,00,000	2017-2021		Completed	100%	EPC		Mitigation
43	Samoa's EPC 400	Japan/PIFS	JPY					100%	EPC		Mitigation

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44	Energy Bill and Sustainable Bioenergy Samoa	EU / GIZ	EUR						MOF		Mitigation
45	In country Co-ordinator to support Technical & Financial	EU/GIZ	EUR				Completed		MOF		Cross-cutting
46	Petroleum Bulk Storage Facility Project	OPEC	USD	1,20,00,000	2011-2022		Ongoing	82%	MOF		Adaptation
47	Appliance Labelling and Standards for Samoa (PALS)	SPC	SAT		2017-2018		Completed	100%	MOF		Mitigation
48	Enhanced Roads Access Project (ERAP)	GoA - DFAT	USD	58,79,008	2018-2021		Completed	100%	LTA		Adaptation
49	Enhanced Roads Access Project (ERAP)	World Bank	USD	2,00,00,000	2013-2022		Ongoing	100%	LTA		Adaptation
50	Modular Panel Bridges	GoA - DFAT	AUD	14,04,000	2016-2017		Completed	100%	LTA		Adaptation
51	Construction of Emergency Bailey Bridges	GoA - DFAT	AUD	10,00,000	2018-2020		Completed	100%	LTA		Adaptation
52	Enhancing the Climate Resilience of West Coast Road (ECRWCR)	World Bank	USD	18,00,000	2013-2020		Ongoing	0%	LTA		Adaptation
53	Samoa Aviation Investment Project (SAIP)	World Bank	USD	4,44,70,000	2016-2020		Ongoing	0%	SAA		Adaptation
54	Samoa Climate Resilient Transport Project (SCRTP)	World Bank	USD	3,57,50,000	2018-2024		Ongoing	3%	LTA/MWTI/ MNRE/MOF		Adaptation
55	Samoa Port Development Project: PDA	ADB	USD	30,00,000	2018-2021		Completed	70%	SPA/MCR		Adaptation
56	Enhancing Safety, Security, and Sustainability of Apia Port Project (ESSSAP)	ADB	USD	6,22,60,000	2019-2024		Ongoing	16%	SPA/MCR		Adaptation
57	Central Cross Island Road Upgrade Project (CCIRUP)	ADB	USD	4,06,00,000	2020-2029		Ongoing	1%	LTA		Adaptation
58	Samoa Land Transport Sector Development Project (SLTSDP)	ADB	USD	50,00,000	2021-2024		Ongoing	0%	LTA		Adaptation
59	Construction of Apia Waterfront Early Development Project	GoNZ - MFAT	USD	65,33,000	2017-2022		Ongoing	100%	LTA		Adaptation
60	Friendship Park	PRC	CNY	65,33,000	2021		Ongoing		MWTI		Adaptation
61	Construction of the New Vessel	Japan	JPY	2,50,00,00,000			Ongoing		SSC		Cross-cutting
62	Samoa Oceans Acidification Project	KIOST	USD	70,263	2019-2021		Completed	100%	MNRE		Adaptation
63	Policy Development coastal typography survey	YEOSU Korea Foundation	USD	22,000	2015-2017		Completed	100%	MNRE		Adaptation

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64	Pacific Resilience Project under Pacific Resilience Program (PREP)	World Bank	USD	1,62,93,000	2015-2024		Ongoing	32%	MNRE/ MOF		Adaptation
65	Review of the National Implementation plan (NIP)	GEF/UNDP	USD	1,79,155	2014-2020				MNRE		Cross-cutting
66	Technical Support on Agrometeorology and Pest & Disease	FAO	SAT	36,820	2019-2020			30%	MNRE		Adaptation
67	Disaster Risk Management Project	NZ MCDEM	NZD	88,71,387	2016-2019		Completed	100%	MNRE		Adaptation
68	The Project for Provision of Emergency Rescue Equipment to SFESA	Japan	USD	1,40,120	2021-2022		Ongoing	100%	SFESA		Adaptation
69	Water and Sanitation Policy Support Programme	EU	EUR	14,04,000					MNRE/ SWA/ MOF		Adaptation
70	Programmatic Preparation Advance No. IDA V202	World Bank	USD	48,00,000	2018-2022		Ongoing	9%	MOF		Adaptation
71	Grassroots Grants Program (GGP)	Japan	JPY				Ongoing		Multi-sectoral		Adaptation
72	6 MegaWatts(MW) Battery Energy Storage System	JICA	USD	69,53,057	2017	EPC	Completed	100%	EPC		Mitigation
73	6 MegaWatts(MW) Battery Energy Storage System	Australian Aid	USD	11,828	2017	EPC	Completed	100%	EPC		Mitigation
74	6 MegaWatts(MW) Battery Energy Storage System	ADB Grant	USD	11,828	2017	EPC	Completed	100%	EPC		Mitigation
75	6 MegaWatts(MW) Battery Energy Storage System	ADB Loan	USD	3,24,933	2017	EPC	Completed	100%	EPC		Mitigation
76	2.2MW RaceCourse, 250kilowatt(kw) Gym3 roof, 125kw Savaii	NZ Govt MFAT	NZD	96,94,619	2014	EPC	Completed	100%	EPC		Mitigation
77	Rehabilitations of Alaoa, Fale-o-le-Fee, Samasoni Hydro stations	NZ Govt MFAT	NZD	10,30,015	2017	EPC	Completed	100%	EPC		Mitigation
78	Rehabilitations of Alaoa, Fale-o-le-Fee, Samasoni Hydro stations	ADB	USD	14,87,148	2017	EPC	Completed	100%	EPC		Mitigation
79	Fuluasou Hydro Station	NZ Govt MFAT	NZD	6,12,850	2017	EPC	Completed	100%	EPC		Mitigation
80	Fuluasou Hydro Station	EU	USD	47,04,641	2017	EPC	Completed	100%	EPC		Mitigation
81	Fuluasou Hydro Station	ADB	USD	7,56,186	2017	EPC	Completed	100%	EPC		Mitigation
82	Tafitoala/Fausaga, Faleatā Hydro Stations	NZ Govt MFAT	NZD	6,62,515	2019	EPC	Completed	100%	EPC		Mitigation
83	Tafitoala/Fausaga, Faleatā Hydro Stations	ADB	USD	58,27,996	2019	EPC	Completed	100%	EPC		Mitigation
84	Technical Supports/Consultancy Services	ADB	USD	94,00,341	2021	EPC	Completed	100%	EPC		Mitigation