



CDM PROJECT OPPORTUNITIES SAMOA



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Cover photo: Bus in Samoa. Curtsey to Helen Pippard.

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ABBREVIATIONS

ACP	African, Caribbean and Pacific countries
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CO₂e	Carbon Dioxide equivalent
DNA	Designated National Authority
EB	CDM Executive Board
EEZ	Exclusive Economic Zone
ENSO	El Nino South Oscillation
EPC	Electric Power Corporation
GDP	Gross Domestic Product
GHG	Greenhouse Gas
KP	Kyoto Protocol
kW	Kilowatt
LDC	Least Developed Country
LOA	Letter of Approval
MEAs	Multilateral Environmental Agreements
MNRE	Ministry of Natural Resource and Environment
MW	Megawatt
MWh	Megawatt-hour
NGHGAS	National GHG Abatement Strategy
SIDS	Small Island Developing State
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change

1. ABOUT SAMOA

1.1. Location, Population, and Climate Conditions

Location

Samoa has a total land area of 2,934 km² and an exclusive economic zone (EEZ) of 12,000 km². It forms the western part of the 500km long Samoan Archipelago with American Samoa forming the eastern end. It is a South Pacific Island country located between latitudes 130 15' S and 140 5' S and longitudes 1710 23' W and 1720 48' W, hence, it lies in the tropical cyclone region. As it is closely enveloped on all sides by its adjacent neighbors, Tonga, Wallis and Futuna, Tokelau Islands and American Samoa, thus it has the smallest EEZ in the whole Pacific Region. The main topographical features of Samoa are rugged mountains of volcanic origin, surrounded by flat and rolling coastal plains. All the islands of Samoa were formed by volcanic activity. Savai'i is regarded as still volcanically active with its most recent eruption producing lava flows between 1905 and 1911. A large percentage of Samoan soils are porous, shallow and clay in texture.



Figure 1: Map of Samoa

Source: Map courtesy of the CIA World Factbook, 2007

Population

At the time of the 2006 census, there were 180,741 persons in Samoa, which is a 2.2% (an additional 4,031 persons) increase from the last census in 2001. 76% of the Samoa people live in Upolu and 21% in Savai'i) According to the Statistics Department, 52% of the population is male and 48% is female. The population is estimated to have grown at a rate of 0.3% to 0.9% per year between 1971 and 2007. Since Samoa's independence in 1962, significant levels of emigration have slowed the overall rate of population

growth. The New Zealand quota scheme is a contributing factor. The net migration rate estimated for Samoa is 1.6% to 2.2% per annum. Samoa has a relatively young population. The working age group is between 15 and 64 years, and the dependent age group is from infancy to 14 years.

Climate

Samoa's climate is typical of small tropical islands, geographically isolated from big landmasses.

The climate is tropical and characterized by distinct wet and warm (November –April) and dry and cool (May – October) seasons. Temperatures typically range from 24 – 32°C daily and generally uniform throughout the year with little seasonal variation due to Samoa's near-equatorial location. The country is generally humid, with plentiful rainfall. Its average annual rainfall is about 3,000mm, with approximately 66% of the precipitation occurring during the wet season. Samoa experiences southeast trade winds almost throughout the year. However severe tropical cyclones occur during the summer months of December to February. Samoa is also vulnerable to anomalously long dry spells that coincide with the El Nino South Oscillation (ENSO) phenomena.

1.2. Economic and energy profile

Key Economic Sectors

Samoa's economy depends largely on its natural resources, foreign aid and remittances, although there have been recent contributions from the tourism and manufacturing industries. Traditional exports from Samoa have been mainly agriculture-based with a recent rise in significance of manufacturing and fisheries products. Samoan exports are always vulnerable to constraints generated by external factors such as price instabilities, high transport costs of overseas markets, and harsh weather. Foreign aid and remittances are also prominent features of Samoa's economy. Subsistence living is still regarded as a norm for a large percentage of the population, particularly in the rural communities. This life style will continue to be a salient feature of Samoa's economy in the future.

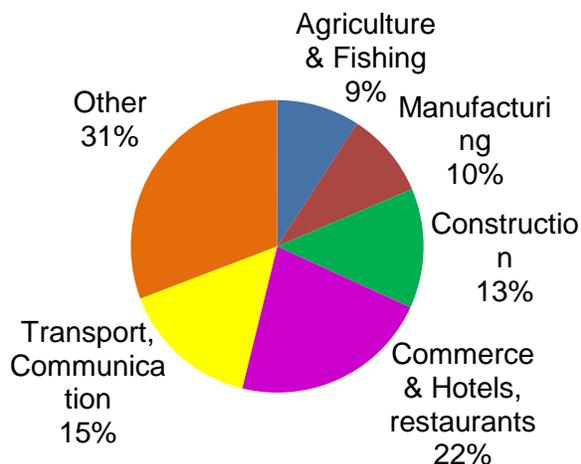


Figure 2: GDP by Sectors

Energy Consumption

Throughout the 1990s, Samoa has undergone a rapid transformation towards a commercial energy supply based on imported petroleum and hydropower-generated electricity. The transformation has been driven primarily by rapidly increasing demand for electricity as well as ground and sea transport. Total energy demand for Samoa is met by 3 main sources, biomass, fossil fuels and hydro. The estimated final consumption of energy with all sources combined was equivalent to around 130,000 tonnes of oil in 2000. Of this demand, 47% is met by biomass, 45% by petroleum products while the remaining 8% was supplied by Hydropower. Biomass is used mainly for household cooking whereas the major part of petroleum products is used by the transport sector and electricity generation. The largest energy consuming categories are transport (land, sea and air) and household consuming 36% and 30% of total energy end-use respectively.

Electrification

Electricity is classified as a secondary energy source that is generated from primary sources such as petroleum, hydro, solar and biofuel. Percentage of contribution from each source varies during the wet and dry seasons. Electricity generation, transmission and distribution are exclusively under the authority of the Electric Power Corporation which is a government-owned monopoly. The 2009 Population Census identified that 96% of the whole population in Samoa is electrified.

2. CLIMATE CHANGE AND CDM IN SAMOA

2.1. Main sectors for GHG emissions

In 2007, Samoa's GHG emissions totaled approximately 352.03 Gg CO₂-e. The country's CO₂ removals in forests and on croplands totaled 785.07 Gg in 2007. A summary of Samoa's GHG emissions for the years 1994, 2000 and 2007 is presented in Table 1.

Table 1 Summary of Samoa's GHG emissions for 1994, 2000 and 2007

Sector	Gg CO ₂ -e		
	1994	2000	2007
Energy	102.83	142.74	174.35
Industrial Processes & Product Use	not available	4.59	9.51
Agriculture, Forestry & Other Land Use (excluding removals)	37.92	86.06	135.37
Waste	24.88	33.09	32.81
Total Emissions	165.63	266.48	352.04
Estimated CO₂ Removals			

Agriculture, Forestry & Other Land Use	-658.56	-1,150.04	-785.07
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The energy sector is the main source of GHG emissions, accounting for 50% of the national total in 2007 (Figure 2). This is followed by the Agriculture, Forestry and Other Land Use (AFOLU) sector, which accounted for 38% of emissions. Emissions from the Waste and Industrial Processes and Product Use (IPPU) sectors make up 9% and 3% of total CO₂e emissions respectively.

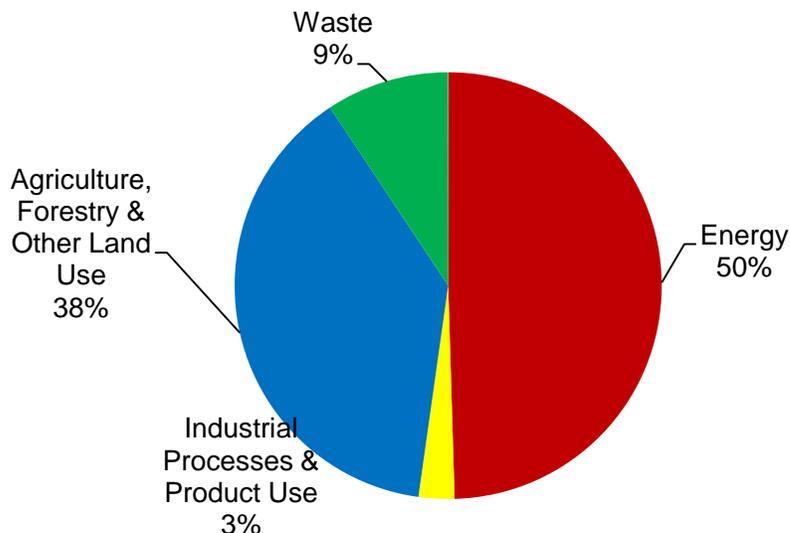


Figure 3: Sources of GHG emissions in Samoa, 2007

2.2. Mitigation of Greenhouse Gases

The following sectors are considered strategic to GHG reduction in Samoa:

- **Power Generation through Renewable Resources:** Samoa is well endowed with renewable energy sources such as hydro, solar, biomass, wind, and coconut bio-fuel. These resources offer considerable potential to provide Samoa with a diverse energy supply sources and reduce its dependence on imported fossil fuels.
- **Energy Efficiency and Conservation in transport, lighting, buildings, industries and supply side energy efficiency:** Energy efficiency is an area where Samoa can make immediate, low-cost emissions reductions.
- **Biofuel usage in Transport:** Samoa is heavily dependent on petroleum fuels for all its transportation needs. Government of Samoa under National Energy Policy aims to promote and encourage research, development and sustainable use of biofuels in transportation.

2.3. Clean Development Mechanism (CDM) in Samoa

Samoa is classified as a non-Annex I country under the United Nations Framework Convention on Climate Change (UNFCCC). The country has ratified the Kyoto Protocol in 2001. The Government of Samoa has appointed a Designated National Authority (DNA) to fulfil its obligations under the Kyoto Protocol, thereby supporting the implementation of investment projects in Samoa under the Clean Development Mechanism (CDM) that will lead to the reduction of greenhouse gases regulated by the Kyoto Protocol. Samoa has decided to establish a Designated National Authority (DNA) to facilitate national participation in the Clean Development Mechanism (CDM) of the Kyoto Protocol (KP) mainly by issuing Letters of Approval (LOA) for CDM projects that comply with the established sustainability criteria of Samoa. The DNA will be established in the Ministry of Finance (MOF). The CEO of the Ministry of Finance has been appointed by the as the DNA of Samoa

3. POTENTIAL CDM PROJECT OPPORTUNITIES

Under the ACP MEA project, Samoa had been invited to participate in the 5 regional CDM capacity building workshops in the Pacific. The country has also received some support to facilitate the establishment of a CDM DNA, and advising support for the formulation and adaptation of CDM project approval procedures and rules. In addition, three voluntary carbon market projects have been identified by the government. Local consultant and international consultant have developed Project Idea Notes (PINs) for three potential CDM projects to boost renewable energy development and use in the country. The PDD of one of these three projects is currently under development. The three PINs and one PDD are developed using the CDM PIN and PDD templates, so that the project proponents and investors have the flexibility to register these projects for CDM after Samoa formally establishes a CDM DNA.

These PINs are available for free downloading at the ACP MEA project website, www.acp-cd4cdm.org. Below is summary about these potential CDM and voluntary carbon market projects. All the three potential projects are expected to be implemented by Samoan Electric Power Corporation (EPC), and the detailed contact information is provided at end of this booklet.

3.1. Coconut oil based power generation in Samoa

Background

Samoa is currently dependent on the import of diesel fuel for a significant part of its power generation. Therefore, the Samoan Electric Power Corporation (EPC) is looking into viable and cleaner alternatives that make use of an abundant local resource: the coconut. As coconut-based exporting agro industries are struggling, it is also very timely to develop a new domestic market for coconuts.

Also in the Pacific, recently has there been renewed interest in the use of coconut oil as a biofuel. The need to substitute for diesel imports, safeguard the local agricultural

industry and reduce the impact of diesel exhaust on the environment, has led to a range of initiatives using coconut oil as an alternative to diesel.



Figure 4: Coconut Trees in Samoa

Project Description

The proposed Coconut Oil Fuelled 1 MW power plant is planned to be built next to, or as part of the planned new EPC power station in Savai'i.

- The location offers following benefits:
- High rural unemployment in Savai'i
- Good coconut resource and limited commercial coconut market
- Higher landed cost of fuel for EPC in Savai'i
- Fits well into the plans to build a new power station
- Good infrastructure (ring road) for collection of nuts It is estimated for the production of 660,000 litres of coconut fuel approximately 1,011 tonnes of copra or 5 million nuts will be required. Training will be arranged and human capacity building will be done locally.

CDM Aspect

In absence of the project activity baseline scenario would be use of diesel for power generation resulting in GHG emissions into the atmosphere. The proposed project is automatically addition as it a Micro-scale project activity as per "Guidelines for demonstrating additionally of Micro-scale project activities" EB 63 (version 3)". According to this EB decision, project activities up to 5 MW that employ renewable energy technology are additional if the geographic location of the project activity is in LDC/SID or special underdeveloped zone of the host country identified by the Government before 28 May 2010.

Expected CER Generation and Project Schedule

The project's estimated annual emission reduction is 1,771 and the total expected CERs over its 10-year fixed crediting period is 17,710 CERs. The project is expected to be operational by 2015. The first CER delivery is expected in 2016.

3.2. Biomass Gasification Power Plant in Samoa

Background

Samoa's National Energy Policy goal is "To increase the contribution of Renewable Energy for energy services and supply by 20% by the year 2030". Renewable Energy is one of the five strategic areas of the Samoa National Energy Policy with the objective to "successfully shift from fossil fuel dependency to Renewable Energy investment". Further scientific research shows that fossil fuels are depleting at a faster rate than anticipated, consequently the government of Samoa realizes that there is a need to promote and increase renewable energy investment options and generation across the country. The electricity comes from a diesel power generator based on Lughanville and from the Sarakata Hydro Power Station. Recent studies have shown that there is an adequate potential of biomass gasification, biogas, wind, biodiesel and biofuels in Samoa.

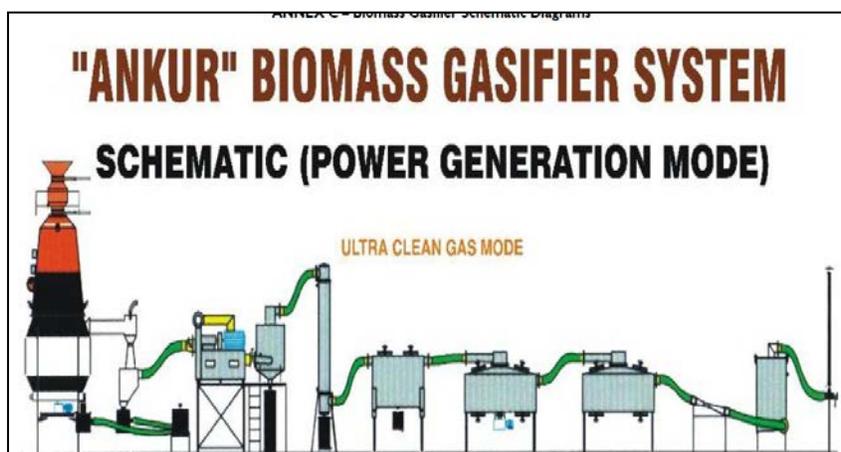


Figure 5: Schematic Diagram of the 'ANKUR' Biomass Gasifier System

Project Description

The Government of Samoa through the Ministry of Natural Resource and Environment (MNRE) and the Government of Australia signed an agreement to implement the Greenhouse Gas (GHG) Abatement pilot project through renewable energy technology (biomass gasification technology) as a priority in the National GHG Abatement Strategy (NGHGAS) 2008-2018. The responsibility for implementation of the gasification technology program has been assigned to the Renewable Energy Division of the MNRE. Biomass gasification power generation offers scope for MNRE, EPC and Samoan consumers to develop an additional source of electricity at a cost that is competitive with current diesel generated power systems. For Samoa to gain experience with biomass gasification technology, biomass growing, harvesting and processing a demonstration project of capacity 500 KWe is planned initially at sites already identified by MNRE. In case of budget constraints a smaller 250 KWe capacity may be implemented

CDM Aspect

- Reduced diesel based electricity generation

- Reduction in associated CO₂ emissions
- Project additionally will be demonstrated as per “Guidelines for Demonstrating Additionally of Micro-Scale Project Activities” (EB 63, version 03).
- As per the guidelines Project activities up to 5 MW that employ renewable energy technology in LDCs/SIDs are considered additional.
- According to the United Nations, Samoa is classified both as a Least Developed Country (LDC) and Small Island Developing State (SIDS).

Expected CER Generation and Project Schedule

The project's estimated annual emission reduction is 2,803 tCO₂e and its expected CER outputs for its 10-year fixed crediting period is 28,030 CERs. The project is expected to be operational by 2015. The first CER delivery is expected in 2016.

3.3. Upolu Wind Power Project, Samoa

Background

Demand for energy has increased in Samoa over the last decade, thus reliable, affordable and environmentally sound energy services and supply is crucial to meeting this demand. The electricity sub-sector is largely managed by the Electric Power Corporation (EPC), a State Owned Enterprise, which is a combine generator, transmission/distribution network operator, and retailer. Electricity in Samoa is primarily generated from diesel engine generators. According to Samoa Energy Sector Plan 2012-2016 the strategic direction of the Electricity Sub-sector is dominated by the potential for an immediate step change to a substantially. The objective of the proposed project activity is to generate electrical energy in sustainable means using wind, a clean source of energy.

Project Description

The grid connected Upolu Wind Power Project entails installation of seven Vergnet GEV MP 275 kW wind turbines with expected annual electricity generation to the order of 3,626 MWh annually. The Government of Samoa, the power utility Electric Power Corporation (EPC), the Secretariat of the Pacific Islands Applied Geoscience Commission (SOPAC) and the United Nations Development Program (UNDP) are currently doing a wind resource assessment project for Upolu Island, Samoa. The project is planned on Upolu Island around the Afulio mast.

CDM Aspect

The baseline scenario for the project activity is generation of electricity using diesel fired gensets. The share of renewable energy in electricity generation in Samoa is estimated at 13% for 2011 (Source: Samoa Energy Sector Plan Masyer Draft.) As per the ‘Guidelines for Demonstrating Additionality of Micro-scale Project Activities’ all renewable energy projects up-to 5MW and emission reduction of less than 20,000 tCO₂e in LDC/SIDS are considered additional.

Expected CER Generation and Project Schedule

The project's estimated annual emission reduction is 2,900 tCO₂e and its expected CER outputs for its 10-year fixed crediting period is 29,000 CERs. The project is expected to be operational by 2015. The first CER delivery is expected in 2016.

4. KEY CONTACTS FOR CDM PROJECTS IN SAMOA

5. Samoa CDM Designated National Authority (DNA)

Mr. Lavea Tupa'imatuna Iulai Lavea

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6. Ms. Heremoni Suapaia - Ah Hoy

DNA Secretariat
Energy Coordinator
Ministry of Finance
Tel: (685) 34341,34403
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Address: Ministry of Finance, Central Bank Building
Private Mail Bag
Apia, SAMOA
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7. Electric Power Corporation of Samoa (EPC)

EPC is the power utility of Samoa, is the main organization for all the three potential renewable energy projects with PINs summaries in Section 3. The contact details of EPC are:

Tologata Galumalemana Lupematasila Tagaloatele Tile Leia

Electric Power Corporation of Samoa (EPC)
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Photo: National CDM capacity building workshop in Samoa during 20-31 August, 2012

<http://acp-cd4cdm.org/>

