Samoa Bureau of Statistics

Environment Statistics

Energy Accounts, Samoa

2020

Energy Accounts, Samoa 2020
In Collaboration with Energy Partners
www.sbs.gov.ws

1. Introduction

This publication is the 2nd Energy Accounts ever produced, following the compilation of the first Experimental Energy Account for Samoa using the 2016 Samoa Energy Review by the Ministry of Finance. The Energy Accounts 2020 presents estimates on physical supply and use of energy (in joules[1]) for Samoa. **Figure 1** highlights the Physical Energy Flows for Samoa, 2020. The accounts are compiled and developed by closely following the United Nations System of Environmental Economic Accounting (UN SEEA 2012) Central Framework and SEEA Energy 2019.

The first Experimental Energy Accounts 2016 was solely depended on the last available 2016 Energy Balances compiled and produced by the Ministry of Finance (MOF). In contrast, the Energy Accounts 2020 is compiled based on the best available energy datasets and information from various sources with the goal to produce the most recent and updated aggregates and estimates for the energy sector and its interactions with the economy at large.

Fossil fuels and electricity are the main energy components accounted for in this report with some of the oil products like lubricants and greases not included.

The account provides some of the important energy indicators, aggregates and estimates for informed policy decision making and monitoring purposes for the Energy Sector as well as some of the Sustainable Development Goals (SDGs). Some of the energy aggregates and indicators are;

- Total Energy Supply and Use
- Share of Fossil Fuels in Total Energy Use
- Energy Use by Households per capita
- Renewable Energy Share in Total Energy Use (**SDG 7.2.1**)
- Total Energy Intensity of Production Activities of National Economy (**SDG 7.3.1**)
- Share of Renewable Electricity Production

One of Samoa's main goals for the energy sector is to achieve **70.0 % renewable energy use by the end of 2031**, as stipulated in the Pathway for the Development of Samoa (PDS 2021/22- 2025/26). The Energy Account also provides statistics to assess and monitor the progress of that goal.

[1] **Joules**: a recommended unit of energy in the International System of Units (SI) for the SEEA Energy Accounts. Most of the figures are reported in Terajoules (trillion joules).

2. Abbreviation

ADO	Automotive Diesel Oil
DPK	Dual Purpose Kerosene
EPC	Electric Power Corporation
GDP	Gross Domestic Product
LPG	Liquefied Petroleum Gas
MCR	Ministry of Customs and Revenue
MOF	Ministry of Finance
NPISH	Non-Profit Institution Serving Households
PPS	Petroleum Products Supply
SBS	Samoa Bureau of Statistics
SDG	Sustainable Development Goals
SEEA	System of Environmental Economic Accounting
SSC	Samoa Shipping Corporation
STEC	Samoa Trust Estate Corporation
ULP	Unleaded Petrol
UN	United Nations
UNESCAP	United Nations Economic and Social Commission for Asia Pacific

3. Definitions

Biofuel	Refers to any fuel derived directly or indirectly from biomass, i.e., animal waste or plant or algae (IRES, 2018).
Biomass	Refers to all organic matter that comes from plants and animals; Biomass such as wood and wood waste are burned to generate electricity.
Energy Losses	Include energy losses during extraction, distribution, storage and transformation.
Fossil Fuels	Refers to diesel, motor gasoline or unleaded petrol, dual purpose kerosene and LPG.
Natural Inputs	Are all physical inputs that are moved from their location in the environment as part of the economic production processes or are directly used in production.
Net Domestic Energy Use	Is the end use of energy products less exports of energy products plus all losses
Physical Flows	The movement and use of energy.

4. Industries Classification

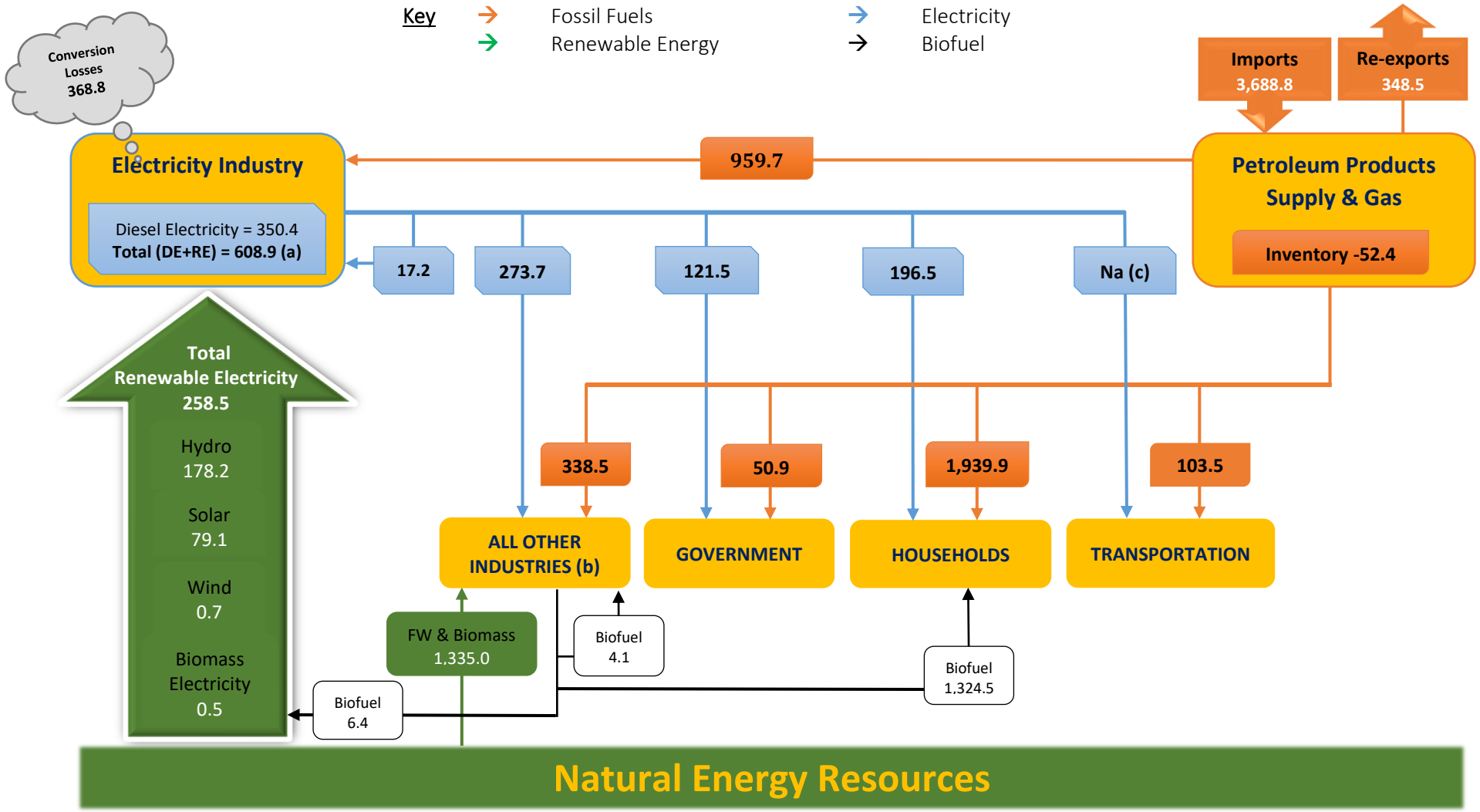
Industries according to SEEA-Energy are groupings of establishments engaged in the same or similar activities. The bureau classified establishments according to relevant Industry based on the International Standard Classification of Industries (ISIC Rev.4). However, with different data sources and classification used, this task was not without challenges. Hence, the following Industries will be used throughout this report as the best available classification that probably suits the context of our industries structure. The classification of industries will be improved with the sustainable compilation of future accounts.

Agriculture	Includes Agriculture, Forestry and Fishing
Commercial	Includes Wholesale and Retails, Financial and Insurance Services, Real Estate, Hotels and Other Services.
Industrial	Includes Manufacturing, Construction and Mining & Quarrying
Transportation	Includes Transportation and Storage
Government	Includes Government Ministries and Corporations
Electricity	Includes Electricity, Gas and Air Conditioning Supply
Other Industries	All Other Industries not classified under any other industries

5. Units of Measurements

J	Joule	
KJ	Kilojoules	(Thousand joules)
MJ	Megajoules	(Million joules)
GJ	Gigajoules	(Billion joules)
TJ	Terajoules	(Trillion joules)

Figure 1: Physical Energy Flows, Samoa 2020 (Terajoules)



Note:

a) Electricity uses include distribution losses (59.5 TJ).
b) All other industries apart from Government and Transportation and Storage
c) Not able to extract the amount with the available information

6. Account Results

Table 1 is a summary of the Energy Supply and Use components for Samoa in 2020. Samoa's energy supply totaled approximately 5,282 TJ where imported energy products accounted for an estimated 69.8 % (3,689 TJ) of total supply while natural inputs from the environment accounted for the remaining 30.2 % (1,593 TJ).

Table 1: Energy Supply and Use Components, Samoa 2020

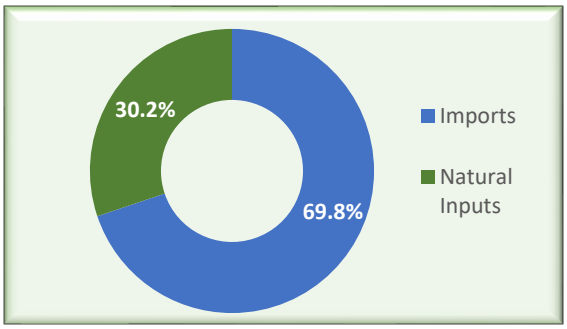
ENERGY SUPPLY	TJ	%		ENERGY USE	TJ	%
Total Energy Supply	5,282	100.0	=	Total Energy Use	5,282	100.0
▪ Imports	3,689	69.8		▪ Households	3,460	65.5
▪ Natural Inputs	1,593	30.2		▪ Industries	1,099	20.8
				▪ Conversion Losses	428	8.1
				▪ Re-exports	349	6.6
				▪ Inventory Changes	-52	-1.0

Source: SBS, 2022.

On the use side, households used the bulk of Samoa's energy accounting for 65.5% (3,460 TJ) followed by industries with 20.8 % (1,099 TJ). Re-exports of energy products accounted for about 6.6 % (349 TJ). The remainder of energy uses were either losses or energy inventories, 8.1 % (428 TJ) and -1.0 % (-52 TJ)[2] respectively.

6.1 Samoa Energy Supply

Chart 1: Total Energy Supply by Source, Samoa 2020



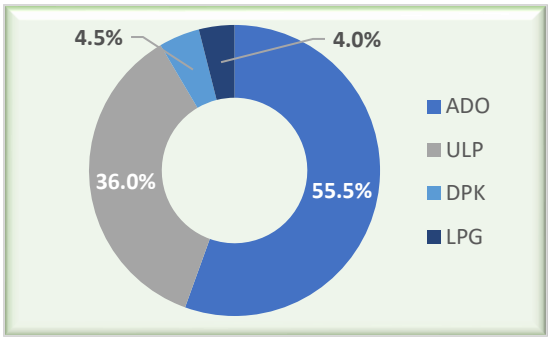
Sources of Supply: Imported energy products mainly fossil fuels, accounted for the bulk of total energy supply at around 69.8 % (3,689 TJ) with the remaining 30.2 % (1,593 TJ) represented by natural inputs abstracted from the environment (Chart 1).

Imports by Energy Products: Fossil Fuel imports is dominated by the Automotive Diesel Oil (ADO) with 55.5% (2,048 TJ) followed by Unleaded Petrol (ULP) with 36.0% (1,327 TJ). Dual purpose kerosene (DPK) accounted for 4.5% (168 TJ) while

[2] The negative value means that 52 TJ of energy were taken out from inventories for use.

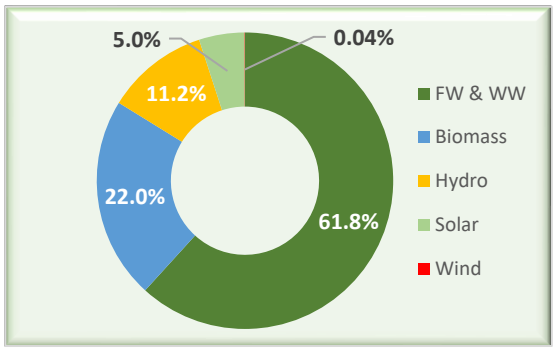
the remaining 4.0% (146 TJ) was by LPG (Chart 2).

Chart 2: Imports Supply by Energy Products, Samoa 2020



Natural Inputs: Fuelwood and wood waste dominated the amount of energy directly abstracted from the environment (natural inputs) with 61.8 % (983 TJ) then followed by Cultivated biomass with 22.0 % (351 TJ) as depicted in Chart 3.

Chart 3: Natural Inputs from the Environment, Samoa 2020



6.2 Supply of Primary Energy Products and Imports

Table 1 summarizes the Supply of Primary Energy Products and Imports for Samoa in 2020. As already mentioned, imports are primarily the major supply of energy products with 69.8 % (3,689 TJ). Biofuels produced from fuelwood & wood waste and cultivated biomass accounted for about 25.3 % (1,335 TJ) of total primary energy products. The remaining 4.9 % (258 TJ) is electricity produced from renewable sources namely hydro, solar, wind and biomass.

Table 1: Supply of Primary Energy Products and Imports, Samoa 2020 (Terajoules)

Primary Energy Products	Agriculture	Electricity	All Other Industries (a)	Imports	Flows from the Environment	Total Primary Energy Supply & Imports
Diesel	-	-	-	2,048.1		**2,048.1**
ULP	-	-	-	1,327.2		**1,327.2**
DPK	-	-	-	167.8		**167.8**
LPG	-	-	-	145.8		**145.8**
Electricity	-	258.0	-	-		**258.0**
Biofuels	1,335.0	-	-	-		**1,335.0**
Waste	-	-	-	-		**-**
Total Energy Products	**1,335.0**	**258.0**	**-**	**3,688.8**		**5,281.8**

Source: Ministry of Finance and Samoa Bureau of Statistics.
Note: (a)Includes all other industries apart from Agriculture and Electricity.

Chart 4: Supply of Primary Energy Products & Imports, Samoa 2016 and 2020 (TJ)

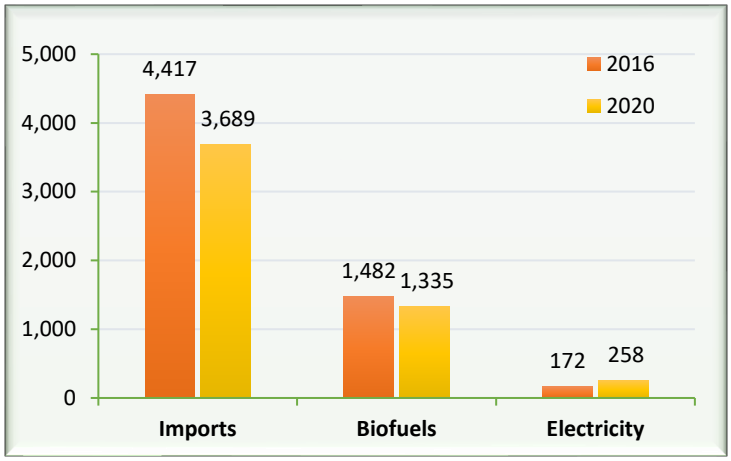


Chart 4 illustrates a decrease of imports and biofuels for the year 2020 compare to 2016. On the other hand, Electricity increases by around 33.0% from 172 TJ in 2016 to 258 TJ in 2020. The COVID 19 pandemic contributed to the overall decrease in imports.

Source: Ministry of Finance and Samoa Bureau of Statistics

6.3 Samoa Energy Use

Table 2 tabulates the Total End Use of Energy Products which is estimated at about 4,853.5 TJ. The difference between the total Supply and Total End Use of energy products is 428.3 TJ, which was accounted for conversion and other losses[3] by the Electricity industry which is not actually used.

Table 2: End Use of Energy Products, Samoa 2020 (Terajoules)

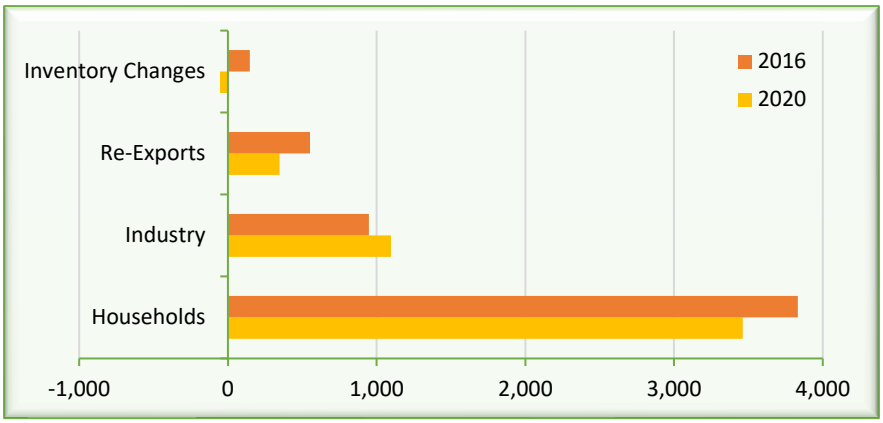
	Agricu lture	Comm- ercial	Indus- trial	Trans- port	Govern -ment	Elect- ricity	Other Indust- ries	House- holds	Invent- ories	Re- Exports	Sum of Row
ADO	25.1	216.7	-	48.5	45.9	187.0	3.1	491.4	(13.8)	271.4	**1,275.3**
ULP	1.7	1.2	-	-	5.0	-	0.1	1,373.7	(65.2)	10.7	**1,316.5**
DPK	-	3.2	-	55.0	-	0.1	-	16.4	26.6	66.4	**101.4**
LPG	-	87.4	-	-	-	-	-	58.4	-	-	**145.8**
Electricity	-	190.6	16.3	-	121.5	17.2	66.8	196.5	-	-	**608.9**
Biofuels	-	4.2	-	-	-	-	-	1,324.5	-	-	**1,328.6**
Total Use	**26.8**	**503.3**	**16.3**	**103.5**	**172.4**	**204.2**	**70.0**	**3,460.9**	**(52.4)**	**348.5**	**4,853.5**

Source: Ministry of Finance and Samoa Bureau of Statistics
Note: - Nil or rounded to zero

[3] **Conversion losses** occur when one energy product is transformed into another. For example, diesel is used to produce electricity. In the conversion process, not all the energy content of diesel is converted to electricity. **Other losses** include losses in distribution; e.g., some electricity is lost on the grid during distribution (technical losses) and non-technical losses such as meter tampering.

As shown in Chart 5, the bulk of total energy use were consumed by households with an estimated 3,461 TJ in 2020, which accounted for almost 71.3% of total end use of energy products. Industry (which includes all industries and government), used 1,097 TJ or around 23.0% with the remaining 348 TJ (7.1%) and -52 TJ (-1.0 %) were exports and inventory respectively.

Chart 5: Total Energy Use, Samoa 2016 and 2020 (TJ)

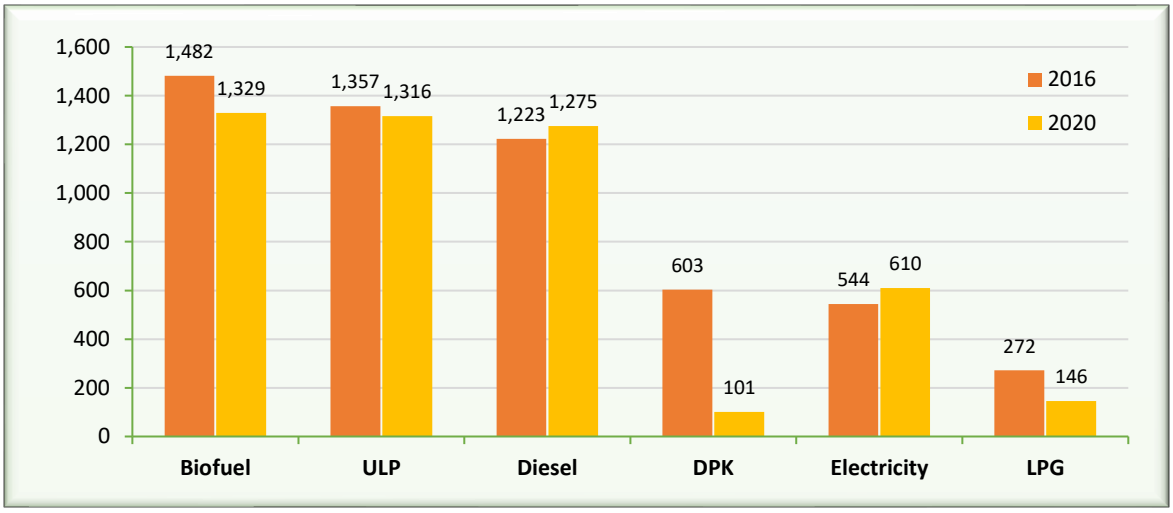


As depicted in Chart 5, household energy use and re-exports in 2020 decreased compared to 2016 while industry energy use increased.

Source: Ministry of Finance and Samoa Bureau of Statistics

As shown in Chart 6, Biofuel, Unleaded Petrol and Diesel generally dominated energy use across the respective time periods. On the contrary, DPK is the least use energy product in 2020 and also the most notable decline of almost 83.3% from 603 TJ in 2016 to 101 TJ in 2020. The decline in DPK or jet fuel was attributed to very limited or no flights at all during the COVID-19 pandemic. On the other hand, Electricity use increased by almost 13.0% from 544 TJ in 2016 to 610 TJ in 2020

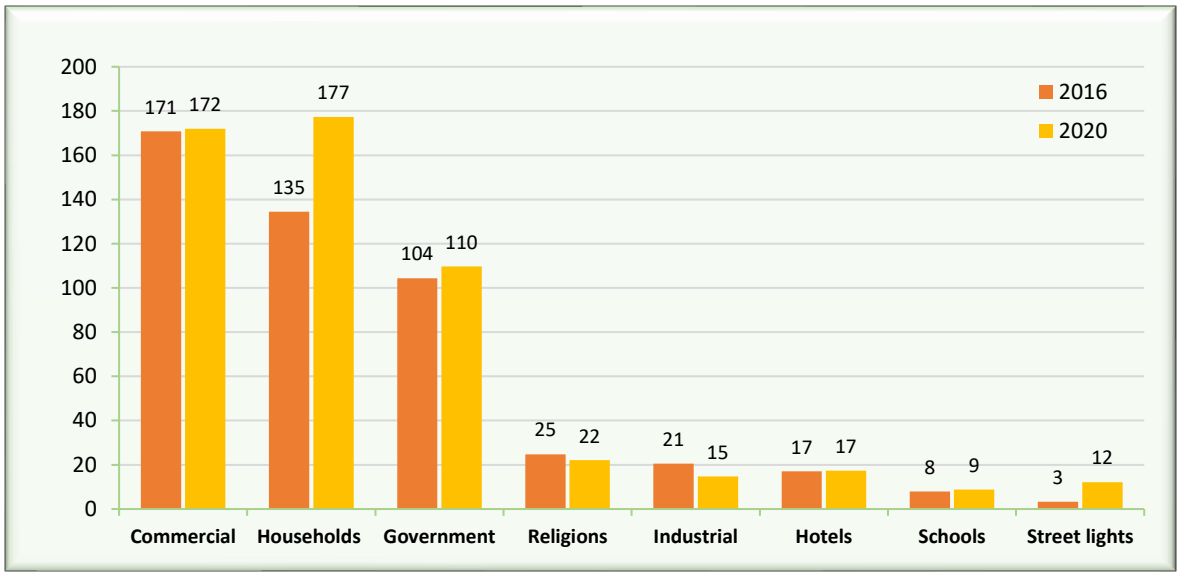
Chart 6: Energy Use by Product Type, Samoa 2016 vs 2020 (TJ)



Source: Samoa Bureau of Statistics

This increase was attributed to an estimated 31.1% increase in households use from 135 TJ in 2016 to 177 TJ in 2020 as shown in Chart 7. Additionally, electricity use across the sectors has ether decreased or remained the same except for households, government and streetlights depicting notable increases.

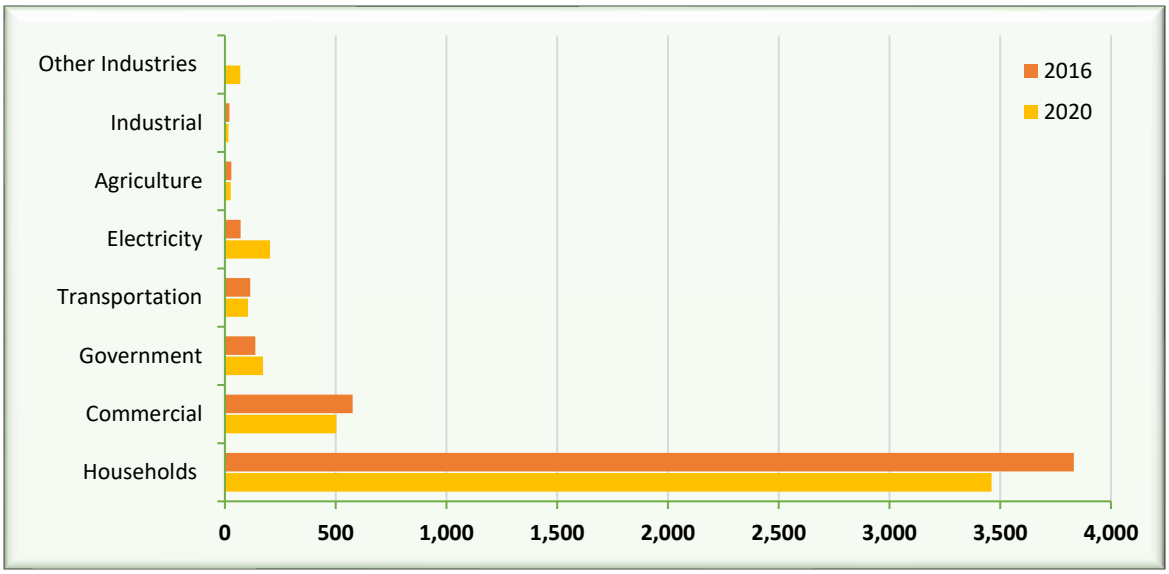
Chart 7: Electricity Use by End Use Sectors, Samoa 2016 and 2020 (Terajoules)



Source: Electric Power Corporation (EPC)
Note: Industries here refer to EPC's own classification of End User Sectors. Domestic refers to Households.

Chart 8 highlights the energy use by individual industries in 2016 and 2020, indicating that households are the main users of energy in both years.

Chart 8: Energy Use by Industry, Samoa 2016 and 2020 (TJ)



Source: Samoa Bureau of Statistics, 2022

7. Energy Accounts and Environment Indicators

Energy accounts can provide indicators for the monitoring of several national development energy and environmental related indicators. One of Samoa's major goals as highlighted in the new National Strategic Plan, the "Pathway for the Development of Samoa 2021/22-2025/26", is achieving the 70.0 % renewable energy use by the end of 2031. The key contributor to the overall renewable energy is the Electricity Industry. Table 3 summarizes electricity generation by sources indicating significant increases in hydropower from 117.2 TJ in 2016 to 178.2 TJ in 2020 and solar electricity from 54.4 TJ in 2016 to 79.1 TJ in 2020, thereby contributing to the overall increase in renewable energy generation.

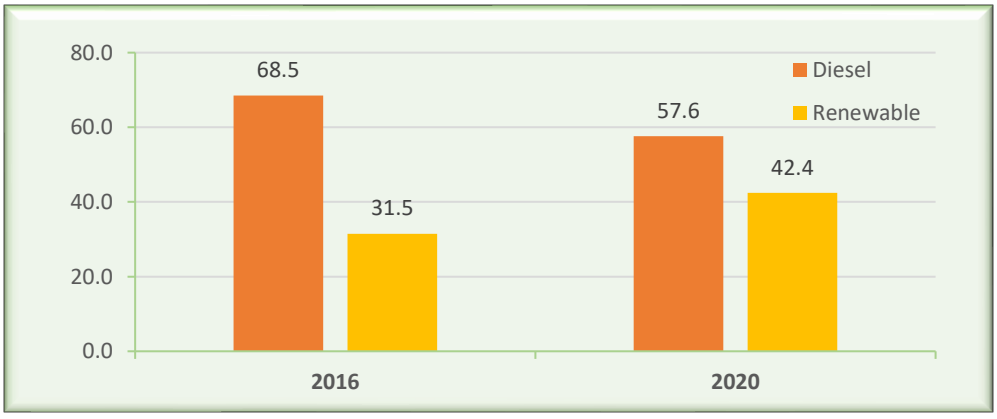
Table 3: Electricity Generation by Source, Samoa 2016 and 2020

Electricity Sources	2016 (TJ)	2020 (TJ)	2016 (%)	2020 (%)
Total Diesel	**372.6**	**350.4**	**68.5**	**57.6**
Total Renewable Electricity	**171.6**	**258.5**	**31.5**	**42.4**
Hydro Electricity	117.2	178.2	21.5	29.2
Solar Electricity	54.4	79.1	10.0	13.0
Wind Electricity	0.0	0.7	0.0	0.1
Biomass Electricity	na	0.5	na	0.1
Total Electricity Production	**544.3**	**608.9**	**100.0**	**100.0**

Source: Electric Power Corporation (EPC)
Note: Biomass electricity commenced in April 2020

Chart 9 highlights the share of renewable sources to electricity generation against diesel generation in 2016 and 2020 whereby the share of electricity generated from Renewable sources increased from 31.5% in 2016 to 42.4% in 2020 whereas Diesel electricity decreased from 68.5% in 2016 to 57.6% in 2020.

Chart 9: Share of Diesel and Renewable Electricity, 2016 and 2020 (%).



Source: Electric Power Corporation

8. Climate Change Indicators & SDG 7

Some of the climate change related indicators can be calculated using information from this report as shown in Table 4.

Table 4: Energy Related Climate Change Indicators, Samoa 2016 and 2020

	Unit	2016 [c]	2020
Population [a]	No.	195,979	202,506
Gross Domestic Product (GDP) [b]	SAT$	2,108,588,000	2,063,100,000
Indicators			
1. Net Domestic Energy Use Refers to the amount of energy that is end used by resident units. End use refers to the final transformation stage of energy use i.e., afterwards the energy is no longer available for human use in the respective accounting period. Exports excluded.	TJ	5,371.7	4,985.7
2. Share of Fossil Fuels in Total Energy Use Share of fossil fuels in the total energy use for Samoa. Fossil fuels include gas, diesel, unleaded petrol and kerosene.	%	69.2	68.0
3. Renewable Energy Share in Total Energy Use by National Economy (SDG 7.2.1) Percentage of renewable energy use in total energy use of the national economy.	%	30.8	32.0
4. Total Energy Intensity of Production Activities of National Economy (SDG 7.3.1) It expresses the energy used by production activities in terms of units of GDP. It can be calculated for the whole economy or for the different industries. Calculated by Immediate consumptions of energy products by industries divided by GDP.	MJ/GDP	0.8 [c]	0.7
5. Energy Use by Resident Households Per Capita It refers to the total use of energy by resident households divided by resident population.	GJ/Person	18.9 [c]	17.1

Source: Samoa Bureau of Statistics
Note:
- **a)** Population census conducted in November 2016
- **b)** GDP In Current Prices
- **c)** Revised figures

Table 5: Physical Supply Table, Samoa 2020 (Terajoules)

Energy Supply 2020	Agriculture, Forestry & Fishing	Commercial Sectors	Industrial (Manu. & Cons.)	Transportation & Storage	Government	Electricity	Other Industries	Households	Inventories	Imports	Flows from the Environment	Total Supply
Energy from Natural Inputs												
Natural Resource Inputs												
Fuelwood & Wood Waste											983.8	983.8
Inputs of Energy from Renewable Energy												
Hydro											178.2	178.2
Solar											79.1	79.1
Wind											0.7	0.7
Other Natural Inputs												
Energy Inputs to Cultivated Biomass											351.3	351.3
Total Energy from Natural Inputs											**1,593.0**	**1,593.0**
Energy Products												
Production of Energy Products												
ADO	-	-	-	-	-	-	-			2,048.1		2,048.1
ULP	-	-	-	-	-	-	-			1,327.2		1,327.2
DPK	-	-	-	-	-	-	-			167.8		167.8
LPG	-	-	-	-	-	-	-			145.8		145.8
Electricity	-	-	-	-	-	608.9	-			-		608.9
Biofuels	1,335.0	-	-	-	-	-	-			-		1,335.0
Waste	-	-	-	-	-	-	-			-		-
Total Energy Products	**1,335.0**	**-**	**-**	**-**	**-**	**608.9**	**-**			**3,688.8**		**5,632.7**
Energy Residuals												
Losses during Extraction	-	-	-	-	-	-	-	-				-
Losses during Transformation	-	-	-	-	-	368.8	-	-				368.8
Losses during Distribution	-	-	-	-	-	59.5	-	-				59.5
Other Energy Residuals	26.8	503.3	16.3	103.5	172.4	204.2	70.0	3,460.9				4,557.7
Total Energy Residuals	**26.8**	**503.3**	**16.3**	**103.5**	**172.4**	**632.5**	**70.0**	**3,460.9**				**4,985.7**
Other Residual Flows												
Residual from end use for non-energy purposes	-	-	-	-	-	-	-	-				-
Energy from solid waste	-	-	-	-	-	-	-	-	-			-
TOTAL SUPPLY	**1,361.8**	**503.3**	**16.3**	**103.5**	**172.4**	**1,241.4**	**70.0**	**3,460.9**	**-**	**3,688.8**	**1,593.0**	**12,211.5**

Note: Dark grey cells are null by definition
-: Nil or rounded to zero

Table 6: Physical Use Table, Samoa 2020 (Terajoules)

Energy Use 2020	Agriculture, Forestry & Fishing	Commercial Sectors	Industrial (Manu. & Cons.)	Transportation & Storage	Government	Electricity	Other Industries	Households	Inventories	Exports	Flows to the Environment	Total Use
Energy from Natural Inputs												
Natural Resource Inputs												
Fuelwood & Wood Waste	983.8	-	-	-	-	-	-					983.8
Inputs of Energy from Renewable Energy												
Hydro	-	-	-	-	-	178.2	-					178.2
Solar	-	-	-	-	-	79.1	-					79.1
Wind	-	-	-	-	-	0.7	-					0.7
Other Natural Inputs												
Energy Inputs to Cultivated Biomass	351.3	-	-	-	-	-	-					351.3
Total Energy from Natural Inputs	**1,335.0**	**-**	**-**	**-**	**-**	**258.0**	**-**					**1,593.0**
Energy Products												
Transformation of Energy Products												
ADO	-	-	-	-	-	772.8	-					772.8
ULP	-	-	-	-	-	-	-					-
DPK	-	-	-	-	-	-	-					-
LPG	-	-	-	-	-	-	-					-
Electricity	-	-	-	-	-	-	-					-
Biofuels	-	-	-	-	-	6.4	-					6.4
Waste	-	-	-	-	-	-	-					-
Total Transformation of Energy Products	-	**-**	**-**	**-**	**-**	**779.2**	**-**					**779.2**
End use of Energy Products												
ADO	25.1	216.7	-	48.5	45.9	187.0	3.1	491.4	-13.8	271.4		1,275.3
ULP	1.7	1.2	-	-	5.0	-	0.1	1,373.7	-65.2	10.7		1,327.2
DPK	-	3.2	-	55.0	-	0.1	-	16.4	26.6	66.4		167.8
LPG	-	87.4	-	-	-	-	-	58.4	-	-		145.8
Electricity	-	190.6	16.3	-	121.5	17.2	66.8	196.5	-	-		608.9
Biofuels	-	4.2	-	-	-	-	-	1,324.5	-	-		1,328.6
Waste	-	-	-	-	-	-	-	-	-	-		-
Total End Use	**26.8**	**503.3**	**16.3**	**103.5**	**172.4**	**204.2**	**70.0**	**3,460.9**	**-52.4**	**348.5**		**4,853.5**
End use of energy products for non-energy purposes	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Energy Residuals												
Losses during Extraction											-	-
Losses during Transformation											368.8	368.8
Losses during Distribution											59.5	59.5
Other Energy Residuals											4,557.4	4,557.4
Total Energy Residuals											**4,985.7**	**4,985.7**
Other Residual Flows												
Residual from end use for non-energy purposes									-			-
Energy from solid waste	-	-	-	-	-	-	-					-
TOTAL USE	**1,361.8**	**503.3**	**16.3**	**103.5**	**172.4**	**1,241.4**	**70.0**	**3,460.9**	**-52.4**	**348.5**	**4,985.7**	**12,211.5**

Note: -: Nil or Not available.

9. Accounts Produced

Due to unavailability of the Energy Balances for the years 2017 to 2019, it was decided to direct focus on the compilation of an updated and most recent Energy Accounts 2020 with the availability of relevant energy datasets, statistics and methodologies.

10. Methodologies and Data Sources

The Energy Accounts 2020 compilation relied on the best available energy datasets, information and methodologies to develop the energy estimates presented in this report. Energy data varies for each data source and are converted into the recommended SI units, Terajoules to allow comparisons between different energy products in various forms and measurement units. Conversion factors used for most of the calculations are summarized in Appendix A1 & A2 and it is extracted from Samoa Energy Review 2016 and Energy Statistics Manual 2004.

The Key Guidelines and Resources Used

- SEEA Central Framework 2012
- SEEA-Energy 2019
- Energy Statistics Manual 2004
- International Recommendation for Energy Statistics (IRES)
- Samoa Energy Review 2016
- The Standard International Energy Product Classification (SIEC)
- Biomass Evaluation Report – Samoa

Key Data Sources and Analysis

- *Electric Power Corporation (EPC)*
  EPC provided the electricity production by different sources in fiscal years (including renewable sources: hydro, solar, wind and biomass) and electricity sales. All these were provided in kilowatt hours (kWh). The raw data were analyzed using excel and converted into the recommended SI unit, Terajoules (Appendix A3-A5).
- *Samoa Trust Estate Corporation (STEC)*

Samoa Trust Estate Corporation runs the new Afolau Gasification Electricity Plant commencing in April 2020. The data on gross generation, electricity exports, own consumption and biomass used for generation was provided for 2020. There were caps as some months data were missing mainly for the gross generation and (Appendix A6).

- *Petroleum Products Supply (PPS)*
  Samoa mainly imports four petroleum products mainly Automotive Diesel Oil (ADO), Unleaded Petrol (ULP), Jet fuel known as Dual Purpose Kerosene (DPK) and Liquified Petroleum Gas (LPG). Three of these are imported into Samoa by Petroleum Products Supplies (PPS). PPS provides the import and re-export data to the bureau (Appendix A7).

- *Imports and Exports Data from Ministry of Revenue (PC Green Database @ Samoa Bureau of Statistics)*
  SBS continue to obtain the imports and exports data from the Ministry of Revenue, and through the PC Green Database, the information is then tabulated in excel format for analysis (Appendix A8).

- *Ministry of Finance (MOF)*
  Ministry of Finance houses a wealth of energy data and information from its energy partners as they have been working closely for years. The electricity datasets, PPS and other gas data were shared with the bureau after seeking the approval of the custodians. The ministry also compiled a Fuel Summary Report for the financial years 2017-18 to 2019-20 for all government ministries.

- *Samoa Shipping Corporation (SSC)*.
  Fuel used by shipping services for sea transport was provided by the corporation as well as fuel used for their vehicle fleet operation (Appendix A9).

- *Secretariat of the Pacific Community (SPC). methodology on estimating biomass production and consumption patterns for Samoa Energy Balances*.
  SPC provided the methodology for estimating biomass production and consumption patterns for Samoa Energy Balances to be used for this compilation.

- *Ministry of Natural Resources and Environment (MNRE)*.
  The ministry provided the information the status of the Biogas Systems in Samoa. Five of the systems have a Daily Gas Production capacity of 5 cubic meters and one with 3 cubic meters. The largest one with 300 cubic meters at Piu is reportedly inactive. The

number of solar panels with specification detail information were not made available by the time of this compilation. This is very crucial information as it will potentially contribute to the overall contribution of renewable energy use in Samoa.

The off grid solar panels could potentially contribute to the overall share of renewable energy in total national energy consumption.

11. Next Steps

Regular and consistent production of energy accounts is the ultimate goal going forward. To achieve this, a collective effort from all relevant partners and stakeholders needs to be strengthen and enhanced to allow the sharing of information and data on a timely manner.

12. Feedback on the Accounts

The accounts will be improved significantly as we keep publishing series of energy accounts over the years and any feedback provided will further enhance this. The bureau will be very pleased to receive any form of feedback on any issue or account related matters, for future improvements and should be directed to:

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13. Acknowledgement

We would like to extend our sincere appreciation to the following partners and stakeholders for their great contribution in providing energy statistics, datasets and energy related information that made this Energy Account possible (EPC, MOF, STEC, SSC, MNRE, PPS and MOR).

Also grateful to our SEEA Experts team namely Mr. Sokol Vako from Statistics Institute for Asia and the Pacific (SIAP) in Japan and Mr. Teerapong and Ms. Ida Katarina Bjoerk from

the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) in Thailand for their usual expert advice and technical support from time to time. We would also like to acknowledge the support from our colleagues at MOF, Ms Heremoni Suapaia and Mr Frank Vukikomoala from the Secretariat for the Pacific Community (SPC) for allowing the bureau to access their datasets on biomass production and consumption.

With all the support and contribution, we hope this will further improve the capacity of the team for future energy accounts compilation.

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15. Appendices

A1: Energy Conversion Factors

Liquid Fuels	Megajoules per litre	Megajoules per kg	Litres per tonne
Unleaded Petrol (ULP)	34.60	46.40	1,340.00
Dual-purpose kerosene (DPK)	36.80	46.40	1,260.00
Automotive diesel oil (ADO)	38.60	45.60	1,182.00
Electricity	**Megajoules per kWh**		
Electricity	3.60		

Source: Ministry of Finance, 2016

A2: Typical Calorific Values for Selected Petroleum Products.

Liquid Fuels	Net Calorific Value	Unit
Propane	46.33	GJ/Tonne
Butane	45.72	GJ/Tonne
Natural Gas (in gaseous state)	45.19	MJ/kg
Liquified Natural Gas	54.40	MJ/kg

Source: Energy Statistics Manual, 2004

A3: Electricity Production, Samoa 2020

2020	Total	Hydro	Diesel	IPP Solar	EPC Solar	Wind	Biomass [a]
			kWh				
Jan	14,830,284.2	4,165,087.5	8,895,212.0	1,471,804.5	281,180.1	17,000.0	-
Feb	13,279,831.1	4,690,872.8	7,264,018.0	1,106,407.0	208,633.3	9,900.0	-
Mar	14,854,121.8	4,498,399.3	8,105,355.0	1,891,920.4	351,647.1	6,800.0	-
Apr	13,527,974.2	3,277,767.2	8,368,303.0	1,584,937.0	282,627.0	7,300.0	7,040.0
May	14,579,700.9	2,685,388.0	9,648,232.0	1,916,231.6	299,337.4	8,600.0	21,912.0
Jun	13,519,689.0	3,039,221.0	8,786,774.0	1,388,738.0	260,743.1	27,500.0	16,713.0
Jul	14,109,207.8	3,986,578.1	8,219,239.0	1,572,466.0	294,876.7	20,100.0	15,948.0
Aug	14,175,656.0	3,506,491.7	8,437,512.0	1,830,032.0	346,927.3	35,700.0	18,993.0
Sep	13,365,201.5	3,714,607.1	7,742,719.0	1,541,868.7	319,363.7	22,800.0	23,843.0
Oct	14,541,931.6	5,474,775.0	7,254,809.0	1,532,502.9	259,244.7	10,400.0	10,200.0
Nov	13,904,146.8	4,950,745.1	7,179,653.0	1,470,819.8	290,456.9	4,400.0	8,072.0
Dec	14,450,963.8	5,522,568.0	7,434,289.0	1,290,664.6	179,628.1	12,400.0	11,414.0
Total	**169,138,708.7**	**49,512,500.7**	**97,336,115.0**	**18,598,392.6**	**3,374,665.4**	**182,900.0**	**134,135.0**

Terajoules [b]							
Jan	53.39	14.99	32.02	5.30	1.01	0.06	-
Feb	47.81	16.89	26.15	3.98	0.75	0.04	-
Mar	53.47	16.19	29.18	6.81	1.27	0.02	-
Apr	48.70	11.80	30.13	5.71	1.02	0.03	0.03
May	52.49	9.67	34.73	6.90	1.08	0.03	0.08
Jun	48.67	10.94	31.63	5.00	0.94	0.10	0.06
Jul	50.79	14.35	29.59	5.66	1.06	0.07	0.06
Aug	51.03	12.62	30.38	6.59	1.25	0.13	0.07
Sep	48.11	13.37	27.87	5.55	1.15	0.08	0.09
Oct	52.35	19.71	26.12	5.52	0.93	0.04	0.04
Nov	50.05	17.82	25.85	5.29	1.05	0.02	0.03
Dec	52.02	19.88	26.76	4.65	0.65	0.04	0.04
Total	**608.90**	**178.24**	**350.41**	**66.95**	**12.15**	**0.66**	**0.48**

Source: Electric Power Corporation

Note:

a) Biomass started in April 2020. There was 0.48 TJ imported by EPC from STEC but total production for biomass electricity was estimated at 0.79 TJ. Hence, Overall Total Electricity Production is estimated at 609.2 TJ (Refer PSUT).

b) Conversion: 1 kWh = 3.6 Megajoules; then divide by 1000,000 to convert into Terajoules; or simply divide the kWh by 277,778 to get Terajoules.

A4: Electricity Use by EPC End Use Sectors, Samoa 2020

End Use Sectors	kWh	TJ
Domestic	49,254,569.4	177.3
Commercial	47,774,858.7	172.0
Government	30,462,657.6	109.7
Religion	6,127,102.1	22.1
Hotel	4,815,683.4	17.3
Electricity	4,251,097.9	15.5
Industrial	4,080,903.7	14.7
Street lights	3,370,393.0	12.1
Schools	2,428,479.5	8.7
Total	**152,565,745.3**	**549.4**

Source: Electric Power Corporation

Note: Electricity Industry own uses and losses.

A5: Electricity Use by Industries, Samoa 2020

Industries	TJ	%
Households	177.3	29.1
Commercial	172.0	28.2
Government	109.7	18.0
Other Industries	60.3	9.9
Electricity	15.5	2.6
Industrial	14.7	2.4
Distribution Losses	*59.5*	*9.8*
Total Use	**608.9**	**100.0**

Source: Electric Power Corporation and Samoa Bureau of Statistics

A6: Biomass Electricity, Samoa 2020

Month	Export (a) (kWh)	Import (b) (kWh)	Gross Generation (kWh)	Local (c) Consumption (kWh)	Biomass (kg)	Generation Rate (kWh/Kg)
Apr	7,040.00	2,249.00	-	-	-	-
May	21,912.00	1,549.00	-	-	-	-
Jun	16,713.00	1,651.00	-	-	-	-
Jul	15,948.00	2,169.00	-	-	-	-
Aug	18,993.00	2,050.00	-	-	60,865.00	-
Sep	23,843.00	2,051.00	-	-	108,030.00	-
Oct	10,200.00	2,180.00	-	-	67,935.00	-
Nov	8,072.00	2,193.00	-	-	39,766.00	-
Dec	11,414.00	1,723.00	19,323.80	7,909.80	52,411.00	0.37
Total (kWh)	**134,135.00**	**17,815.00**	**19,323.80**	**7,909.80**	**329,007.00**	**0.37**

Source: Samoa Trust Estate Corporation.
Note:

a) Export refers to electricity send to EPC grid
b) Import refers to electricity from EPC grid
c) Local consumption is Biomass Gasification Plant own use.
- Not available

A7: Fuel Imports and Re-exports, Samoa 2020

Type of Fuel	Imports		Re-exports	
	Litres	TJ	Litres	TJ
Automotive Diesel Oil (ADO)	53,058,846	2,048.1	7,030,358	271.4
Unleaded Petrol (ULP)	38,357,557	1,327.2	309,200	10.7
Dual Purpose Kerosene (DPK)	4,558,669	167.8	1,804,422	66.4
Total Imports	**95,975,072**	**3,543.0**	**9,143,980**	**348.5**

Source: Petroleum Products and Supply, Ministry of Customs and Revenue & Samoa Bureau of Statistics

A8: Petroleum Gases and Other Gaseous Imports, 2020

Petroleum Gases - Description	Sum of Quantity (kg)	Sum of Quantity (Tonnes)	Terajoules [b] (TJ)
Butanes	1,514,100.0	1,514.1	69.2
Others	713,514.0	713.5	32.2
Petroleum gases & Other Hydrocarbons [a]	429,134.0	429.1	19.4
Liquefied, Natural gas	246,920.0	246.9	13.4
Propane	211,300.0	211.3	9.8
Natural gas in gaseous state	37,310.0	37.3	1.7
Grand Total	**3,152,278.0**	**3,152.3**	**145.8**

Source: Min. of Customs and Revenue & Samoa Bureau of Statistics
Note:
a) Other gaseous hydrocarbons in gaseous state
b) Conversion to TJ using the net calorific values from Energy Statistics Manual 2004 (Appendix 2).

A9: Sea Transport and Samoa Shipping Corporation Fuel Use, 2020

Fuel Use	Diesel Fuel (Litres)	Diesel Fuel (TJ)
Total Sea Transport (a)	1,233,800	47.62
Other Fuel Use (Vehicle)	23,028	0.89

Source: Samoa Shipping Corporation (SSC).
Note: (a) Fuel used by local vessels only