



Samoa

Energy Accounts

2023





Government of Samoa

Samoa Bureau of Statistics

Foreword

This report presents the information on the physical flow accounts for energy in Samoa's economy for the year 2023. The report is the 4th version of the Energy Accounts for Samoa. The first three were compiled for the years 2016 (as an experimental energy account), 2020 and 2022.

These accounts record energy flows in physical units (i.e. joules) from its extraction (i.e. the capture of energy from natural inputs from the environment) into the economy, the flows within the economy in the form of supply and use of energy products by industries and households, and finally, the flows of energy back to the environment as energy residuals.

The physical supply and use of energy accounts for Samoa was compiled according to the United Nation's System of Environmental-Economic Accounting Central Framework 2012 (SEEA CF 2012) and the System of Environmental-Economic Accounting for Energy 2019 (SEEA-Energy 2019).

The SEEA Central Framework is designed to measure the environment and its relationship with the economy and it's used to organize different environmental and economic information to produce energy indicators that are relevant to environmental and economic issues.

The report provides useful and basic energy statistics, aggregates and energy-related climate change indicators that can be used for the formulation of energy policies and to monitor the progress of national and international goals such as the Sustainable Development Goals (SDG).

I am hopeful that this report will provide the necessary statistical information to assist in future energy policy formulation and strategic planning for Samoa.

I would like to express my sincere gratitude to all our valued energy partners for their ongoing support and contribution by providing the data and information for our Energy Accounts compilation. A special acknowledgement for Mr. Sokol Vako of UN-SIAP and Ms. Lisa Green of SPC for their expert knowledge and technical support for this work.



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Abbreviations and Acronyms

\$	Samoaan Tālā
\$m	million Tālā
ADO	Automotive Diesel Oil
COICOP	Classification of Individual Consumption According to Purpose
Com.	Commercial
Dom.	Domestic
DPK	Dual Purpose Kerosene
Ele.	Electricity
EPC	Electric Power Corporation
GDP	Gross Domestic Product
Gov't.	Government
HIES	Household Income and Expenditure Survey
Hot.	Hotels
Ind.	Industry
IPCC	Intergovernmental Panel on Climate Change
LPG	Liquefied Petroleum Gas
MCR	Ministry of Customs and Revenue
MOF	Ministry of Finance
MWTI	Ministry of Works, Transport and Infrastructure
NDEU	Net Domestic Energy Use
NEID	Net Energy Import Dependency
PPS	Petroleum Products Supply
PSUTS	Physical Supply and Use Tables
Rel.	Religion
SBS	Samoa Bureau of Statistics
Sch.	School
SDG	Sustainable Development Goals
SEEA	System of Environmental-Economic Accounting
SI	The International System of Units
SPC	The Pacific Community
SSC	Samoa Shipping Corporation
TJ	Terajoule
ULP	Unleaded Petrol
UN	United Nations
UN ESCAP	United Nations Economic and Social Commission for Asia Pacific
UN SIAP	United Nations Statistical Institute for Asia and the Pacific

Executive Summary

This publication is the 4th Energy Accounts for Samoa, and is one of the environmental-economic accounts compiled by the bureau, using the United Nation's System of Environmental--Economic Accounting Central Framework 2012 (SEEA CF 2012) and the System of Environmental-Economic Accounting for Energy 2019 (SEEA-Energy 2019).

The Energy Account, Samoa 2023 presents estimates on physical supply and use of energy (in joules¹) for Samoa. It also presents physical supply and use of energy for a time series of eight consecutive years from 2016 to 2023.

The 2023 account continues to compile the same energy statistics and indicators as previously published with the additional four new indicators namely; *Net Energy Imports Dependency*, *Degree of Energy Self-sufficiency*, *Energy-related CO₂ Emissions* and lastly, the *Share of Household Income Spent on Energy Related Items*. The last one was estimated using the 2023 Household Income and Expenditure Survey. Listed below are some of the energy indicators produced by the Energy Accounts;

- Total Energy Supply
- Total Energy Use²
- Share of Fossil Fuels in Total Energy Use
- Share of Renewable Energy in Total Energy Use (**SDG 7.2.1**)
- Total Energy Intensity of Production Activities of National Economy (**SDG 7.3.1**)
- Energy Use by Households per capita
- Share of Renewable Electricity to Total Electricity Production
- *Net Energy Imports Dependency*
- *Degree of Energy Self-Sufficiency*
- *Energy-related CO₂ Emissions*
- *Share of Household Income Spent on Energy Related Items*

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) under Key Priority Areas 18: Sustainable Energy Development Enhanced. The Energy Account provides statistics to assess and monitor the progress of this national goal.

¹ **Joules:** a recommended unit of energy in the International System of Units (SI) for the SEEA Energy Accounts. The figures in this report are presented in Terajoules (TJ) which is equivalent to trillion joules.

² Also refers to as the **Net Domestic Energy Use**, which is the total end use of energy less re-exports of energy. Refer **Appendix A4**.

Key Energy Statistics

In 2023 compared with 2022,

- Samoa’s Total Energy Supply increased by 19.7% to 6,039.7 TJ
- Samoa’s Total Energy Use also increased by 15.8% to 5,766.2 TJ
- Total Imported Energy Products increased by 25.5% to 4,697.5 TJ
- Household energy end use increased by 11.4% to 3,091.8 TJ
- Industry energy end use increased by 26.8% to 1,739 TJ
- Re-exported energy products increased by 71.6% to 685.1 TJ
- Share of Renewable energy to total energy use decrease from 26.2% in 2022 to 23.3% in 2023
- Net Energy Import Dependency increased from 67.2% in 2022 to 69.6% in 2023

Table 1: Key Energy Statistics, Samoa 2016-2023

Key Energy Statistics	UNIT	2016	2017	2018	2019	2020	2021	2022	2023
Total Energy Supply	TJ	6,074.2	5,778.7	5,560.4	6,227.0	5,281.8	5,621.5	5,047.4	6,039.7
Total Energy Use	TJ	5,375.0	5,054.4	4,953.3	5,377.1	4,985.7	4,985.8	4,979.5	5,766.2
Total Imported Energy Products	TJ	4,417.1	4,287.3	4,006.8	4,634.8	3,688.8	4,229.4	3,743.0	4,697.5
Re-exports	TJ	552.66	590.34	611.27	674.07	348.47	189.66	399.2	685.1
Renewable Energy Share	%	30.8	29.5	31.4	29.6	32.0	27.9	26.2	23.3
Net Energy Import Dependency ³	%	71.9	73.1	68.6	73.6	67.0	81.0	67.2	69.6
Degree of Energy Self-sufficiency ⁴	%	30.8	29.5	31.4	29.6	32.0	27.9	26.2	23.3

Source: Samoa Bureau of Statistics

³ **Net Energy Import Dependency** is the extent of which a country relies on imported energy to meet its needs. It is calculated as net energy imports minus exports, divided by total primary energy supply

⁴ **Degree of Energy Self Sufficiency** is the proportion of Samoa’s energy needs that are met by domestic energy resources. It is calculated as the ratio of primary energy production to domestic end use of energy.

1. Energy Supply

Energy Supply: includes all energy made available for use. Total Energy Supply for Samoa refers to Energy from Natural Inputs plus Imported energy products. **Figure 1** summarises all components of Samoa’s Energy Supply for 2023.

Figure 1: Total Energy Supply, Samoa 2023



In 2023 ⁵, Samoa’s total energy supply of 6,039.7 TJ was supplied from:

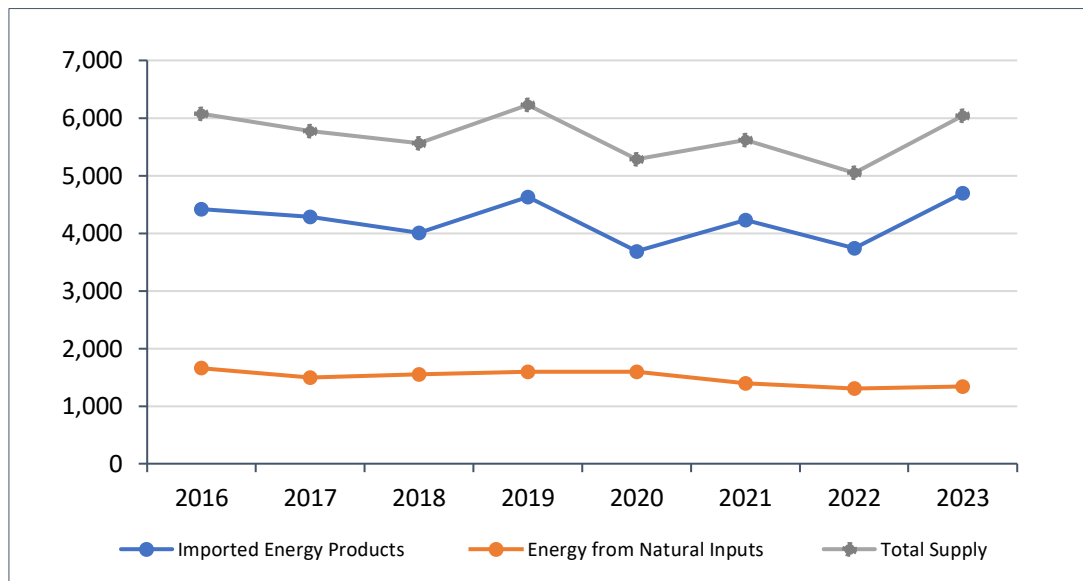
- Imported Energy Products, 4,697.5 TJ (77.8%)
- Energy from Natural Inputs (environment), 1,342.2 TJ (22.2%)

As depicted in **Chart 1**, Samoa’s total energy supply trend is evidently dominated by the supply of imported energy products. Total energy supply in 2023 increased by 19.7% compared to 5,047.4 TJ in 2022.

The increase of 954.5TJ of imported products contributed 96.2% to the increase in total energy supply between 2022 and 2023. (Refer Table 1)

⁵ Refer **Appendix A1 & A2** for the 2023 Physical Supply and Use Tables (PSUT)

Chart 1: Total Energy Supply, Samoa 2016-2023 (TJ)



Source: EPC, PPS, MOF, MWTI & SBS

Table 1: Total Energy Supply, Samoa 2016-2023 (TJ)

Year	Imported Energy Products	Energy from Natural Inputs	Total Energy Supply
2016	4,417.1	1,657.1	6,074.2
2017	4,287.3	1,491.4	5,778.7
2018	4,006.8	1,553.6	5,560.4
2019	4,634.8	1,592.2	6,227.0
2020	3,688.8	1,593.0	5,281.8
2021	4,229.4	1,392.1	5,621.5
2022	3,743.0	1,304.4	5,047.4
2023	4,697.5	1,342.2	6,039.7

Source: EPC, PPS, MOF, MWTI & MCR

1.1 Imported Energy Products

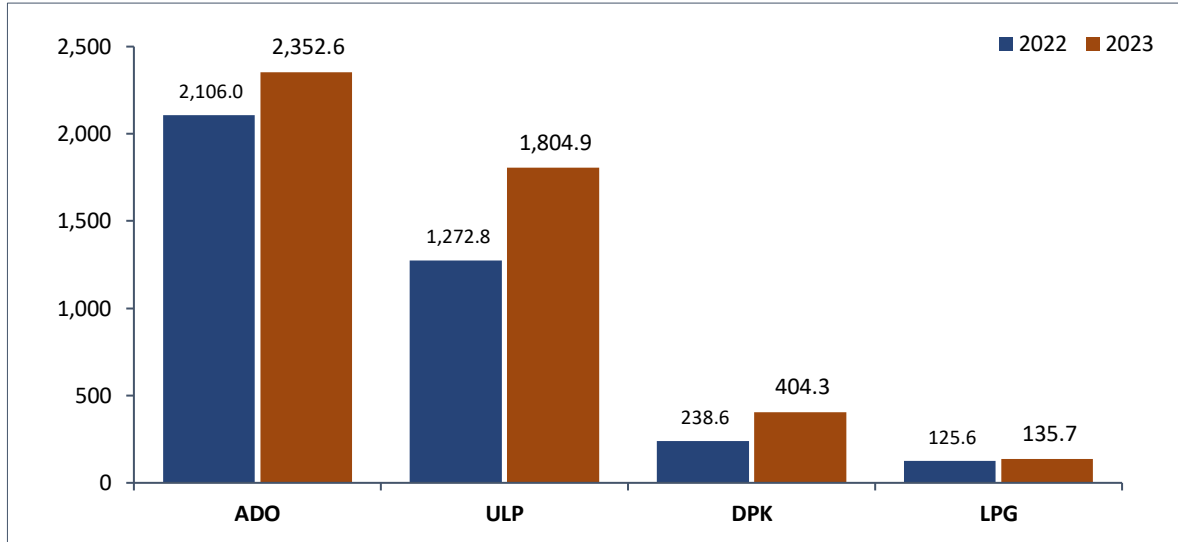
In 2023, the total imported energy products of 4,697.5 TJ were mainly;

- Automotive Diesel Oil (ADO) 2,352.6 TJ (50.1%)
- Unleaded Petrol (ULP) 1,804.9 TJ (38.4%)
- Dual Purpose Kerosene (DPK) 404.3 TJ (8.6%)
- Liquefied Petroleum Gas (LPG) 135.7 TJ (2.9%)

Automotive Diesel Oil (ADO) was the main imported energy product with 2,352.6 TJ or 50.1% while liquefied petroleum gas (LPG) the least imported fuel, constituting around 135.7 TJ or 2.9%.

As shown in **Chart 2**, all imported energy products have increased in 2023, contributing to an overall increase of 25.5% in total imports from 3,743.0 TJ in 2022 to 4,697.5 TJ in 2023.

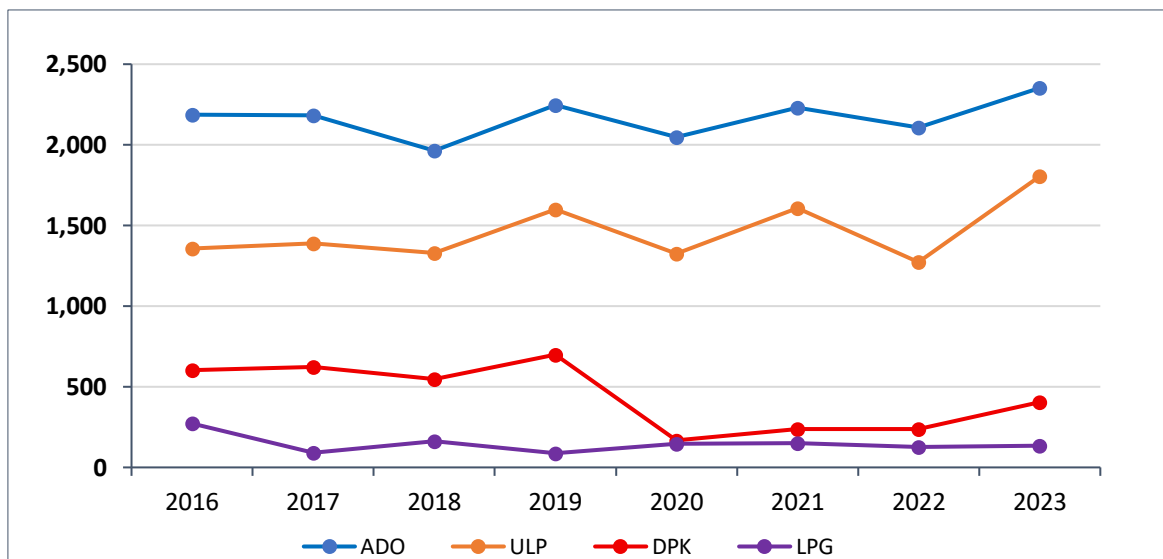
Chart 2: Imported Energy Products, Samoa 2022-2023 (TJ)



Source: PPS & MCR

ADO is consistently the main imported energy product throughout the years. Dual Purpose Kerosene or jet fuel increased significantly by 69.4% in 2023 compared to 2022. The increase is attributed to an increase in demand for jet fuel as full operation of domestic and international flights returned to normal in late July 2022 since the COVID-19 lockdown in March 2020. For instance, the total number of international flights landed at Faleolo International Airport soaring to a 273.7% increase from 319 in 2022 to 1,192 in 2023 (**Chart 3 & Table 2**)

Chart 3: Imported Energy Products, Samoa 2016-2023 (TJ)



Source: PPS & MCR

Table 2: Imported Energy Products, 2016-2023 (TJ)

Year	ADO	ULP	DPK	LPG	Total Imports
2016	2,185.5	1,356.5	602.9	272.1	4,417.1
2017	2,181.3	1,390.0	623.8	92.1	4,287.3
2018	1,963.6	1,331.4	548.5	163.3	4,006.8
2019	2,248.3	1,599.4	699.2	87.9	4,634.8
2020	2,048.1	1,327.2	167.8	145.8	3,688.8
2021	2,231.6	1,607.7	239.4	150.7	4,229.4
2022	2,106.0	1,272.8	238.6	125.6	3,743.0
2023	2,352.6	1,804.9	404.3	135.7	4,697.5

Source: PPS & MCR

Note: Totals may not add up due to rounding

1.2 Energy from Natural Inputs

In 2023, the main sources of energy from natural inputs were;

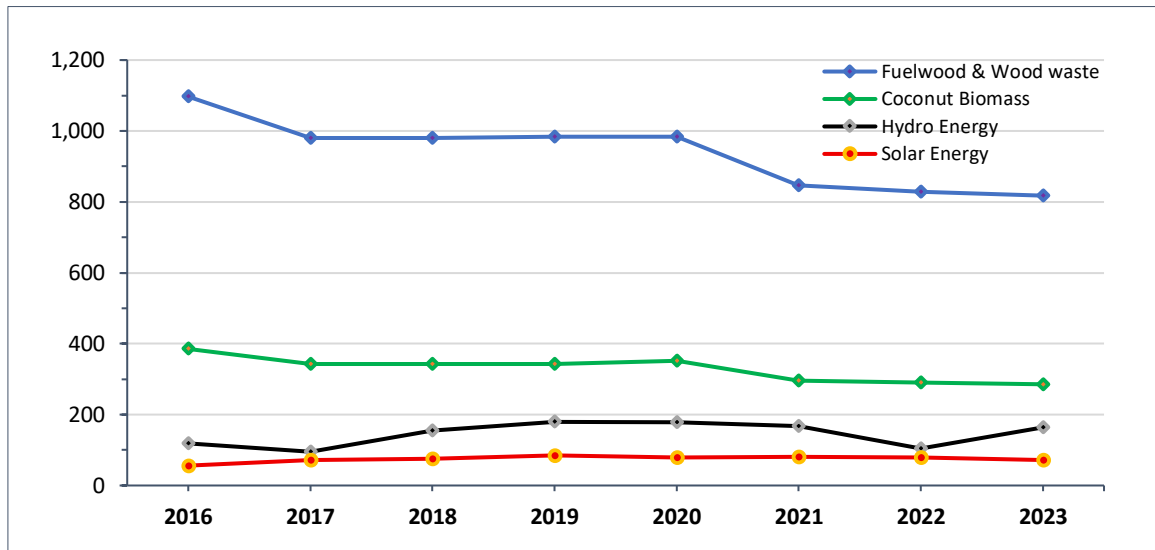
- (a) Natural Resource Inputs
 - Fuelwood and Wood-waste, 817.6 TJ (60.9%)
- (b) Energy Inputs from cultivated biomass
 - Biomass, 285.5 TJ (21.3%)
- (c) Inputs of Energy from Renewable Sources
 - Hydro energy, 163.9 TJ (12.2%)
 - Solar energy, 71.2 TJ (5.3%)
 - Wind energy, 0.7 TJ (0.1%)
 - Others⁶, 3.2 TJ (0.2%)

Fuelwood and wood waste continued to dominate sources of energy from natural inputs despite its continuous decline from previous years.

Hydro energy alone recorded a significant increase of 57.0% from 104.4 TJ in 2022 to 163.9 TJ in 2023. Hydro energy remains the main contributor to the total renewable electricity production for Samoa every year, contributing to more than 60.0% of total renewable energy production (Refer **Chart 4 & Table 3**)

⁶ Others refer to biogas energy from animal waste and other electricity and heat from solar water heaters

Chart 4: Energy Supply from Natural Inputs, Samoa 2016-2023 (TJ)



Source: EPC & MOF

Note: Other sources are not shown due to their insignificant values.

Table 3: Energy from Natural Inputs, 2016-2023 (TJ)

Year	Fuelwood & Wood Waste	Biomass	Hydro	Solar	Wind	Others	Total
2016	1,096.9	385.2	118.2	56.0	0.7	-	1,657.1
2017	979.7	343.4	95.1	72.7	0.6	-	1,491.4
2018	979.7	343.3	154.1	75.9	0.5	-	1,553.6
2019	983.9	343.3	179.3	84.9	0.8	-	1,592.2
2020	983.8	351.3	178.2	79.1	0.7	-	1,593.0
2021	845.7	296.4	168.4	81.2	0.3	0.1	1,392.1
2022	829.0	291.0	104.4	79.2	0.7	0.1	1,304.4
2023	817.6	285.5	163.9	71.2	0.7	3.2	1,342.2

Source: EPC, MOF, MWTI

Note -: zero or not available

Totals may not add up due to rounding

2. End Use of Energy

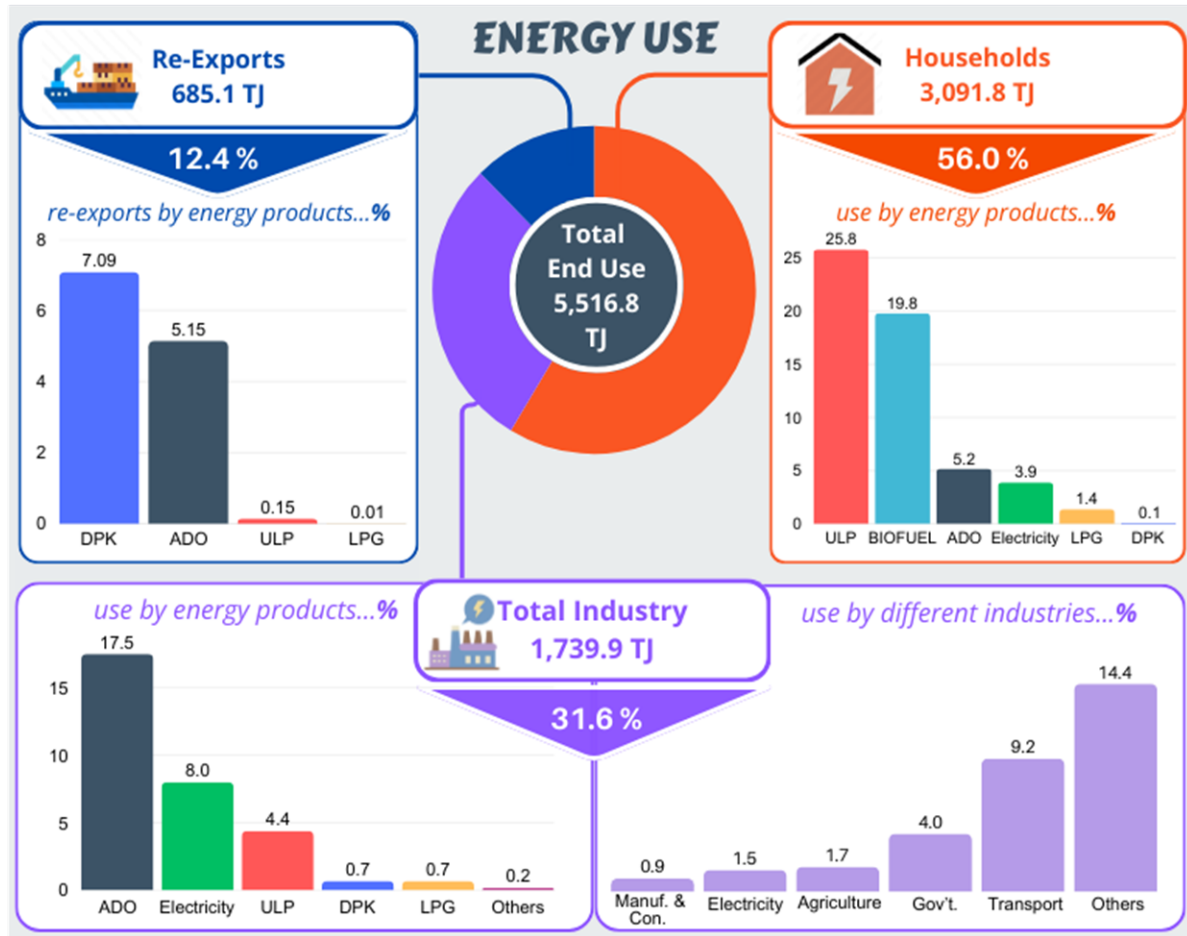
End use⁷ of energy refer to the final transformation stage of energy use. i.e. the energy is no longer available for use in the respective accounting period. End use occurs where an energy

⁷ Refer **Appendix A3**

product can no longer be used for energy purposes. End use of energy does not include changes in inventories and energy losses. **Figure 2** summarizes the End Use of Energy for Samoa, 2023.

In 2023, total end use of energy was calculated to be 5,516.8 TJ. Households constituted the largest amount of total end use with 3,091.8 TJ or 56.0% while industries accounted for 31.6% or 1,739.9 TJ. Re-exported energy products accounted for the remaining 685.1 TJ or 12.4%.

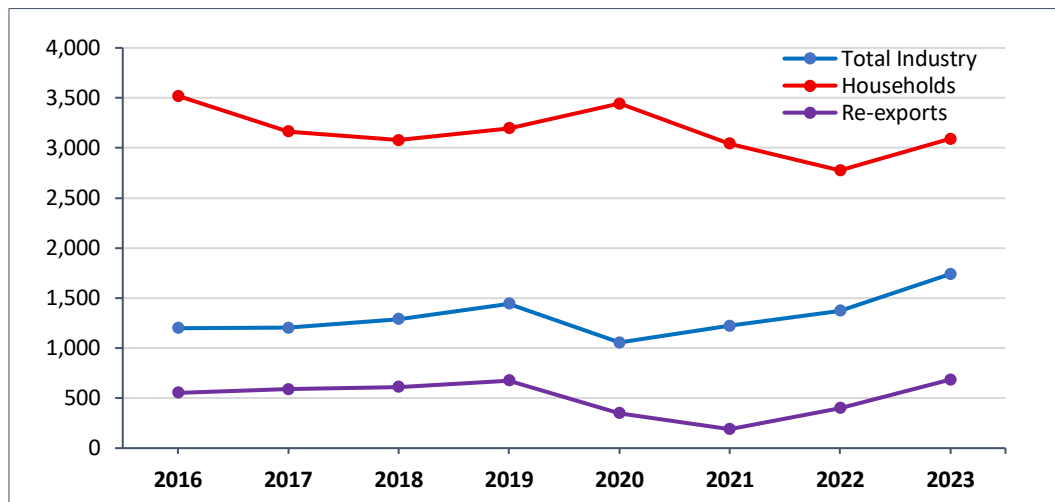
Figure 2: End Use of Energy, Samoa 2023



2.1 End Use by Total Industry, Households and Re-exports

As depicted in **Chart 5**, energy end use by total industry, households and re-exported energy products have all increased in 2023 compared to 2022.

Chart 5: End Use by Total Industry, Households, and Re-exports, Samoa 2016-2023 (TJ)



Source: EPC, MOF, MWTI, PPS, SSC & SBS

Total industry end use of energy increased by 367.4 TJ or 26.8%. Households recorded an increase of 16.4% or 456.1 TJ while re-exported energy products also increased by 71.6% or 285.9 TJ. These have all contributed to an overall increase of 21.3% or 969.1 TJ of total end use of energy in 2023 compared to the last accounting period, 2022.

Table 5: End Use by Total Industry, Households and Re-exports, Samoa 2016-2023 (TJ)

YEAR	Total Industry	Households	Re-Exports	Total ¹
2016	1,200.2	3,520.2	552.7	5,273.1
2017	1,203.0	3,163.8	590.3	4,957.1
2018	1,289.7	3,077.2	611.3	4,978.2
2019	1,443.1	3,197.8	674.1	5,315.0
2020	1,056.3	3,441.7	348.5	4,846.4
2021	1,223.8	3,041.3	189.7	4,454.7
2022	1,372.4	2,776.0	399.2	4,547.7
2023	1,739.9	3,091.8	685.1	5,516.8

Source: EPC, MOF, MWTI, PPS, SSC & SBS

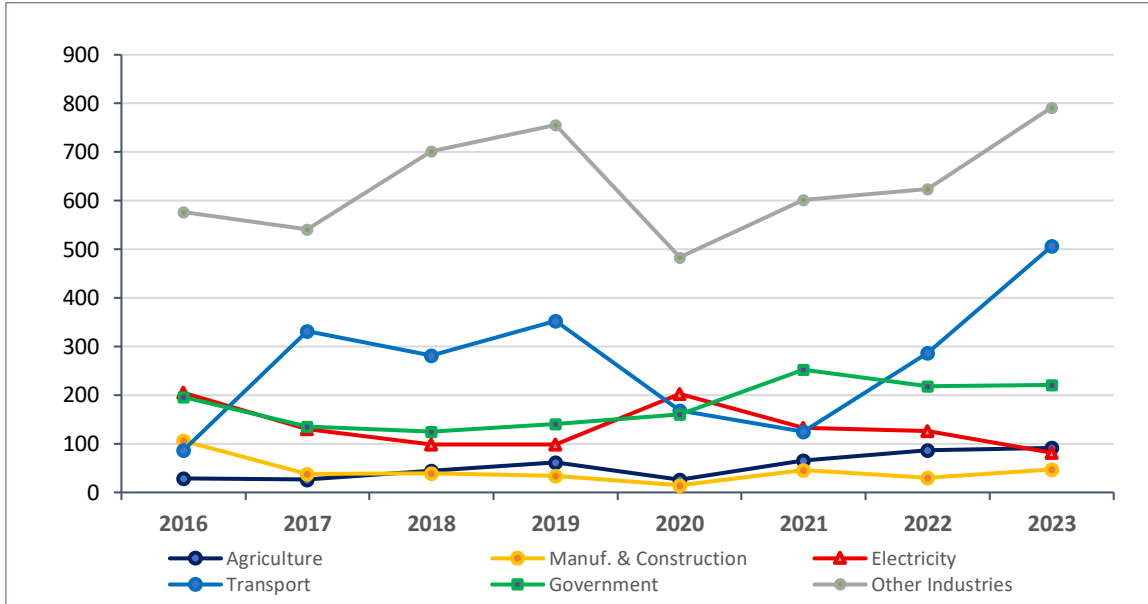
Note: 1-Not including changes in inventories and losses. Totals rounded to one decimal place.

2.2 End Use by SEEA-Energy Industries

As shown in **Chart 6** and **Table 6**, Transport Industry energy use recorded a significant increase of 76.4% from 286.9 TJ in 2022 to 506.3 TJ in 2023. One possible reason for this increase was due to the increase in fuel used by domestic marine transport and increased transport services. This was due to the economic rebound resulting from lifting of the Covid-19 pandemic travel restrictions in late July 2022.

For instance, fuel use (mainly ADO) for marine transport recorded a significant increase of 106.2% from 175 TJ in 2022 to 361 TJ in 2023. Furthermore, the number of domestic trips between Mulifanua and Salelologa also increased by more than 600 trips in 2023 (2023 Samoa Energy Review Report, 13th Edition).

Chart 6: End Use by SEEA-Energy Industries, Samoa 2016-2023 (TJ)



Source: SBS

Table 6: End Use by SEEA-Industries, Samoa 2016-2023 (TJ)

YEAR	Agriculture	Manuf. & Construction	Electricity	Transport	Gov't.	Other Industries	Total
2016	29.3	105.9	204.8	86.7	196.4	577.0	1,200.2
2017	26.7	38.5	130.1	331.0	135.8	540.7	1,203.0
2018	44.2	38.8	99.2	281.1	125.0	701.3	1,289.7
2019	61.1	34.4	99.2	352.3	140.8	755.3	1,443.1
2020	26.8	14.7	202.5	168.1	160.6	483.6	1,056.3
2021	66.1	45.5	132.9	125.5	252.3	601.6	1,223.9
2022	86.9	30.2	126.3	286.9	218.2	623.9	1,372.4
2023	91.5	47.5	81.5	506.3	221.3	791.8	1,739.9

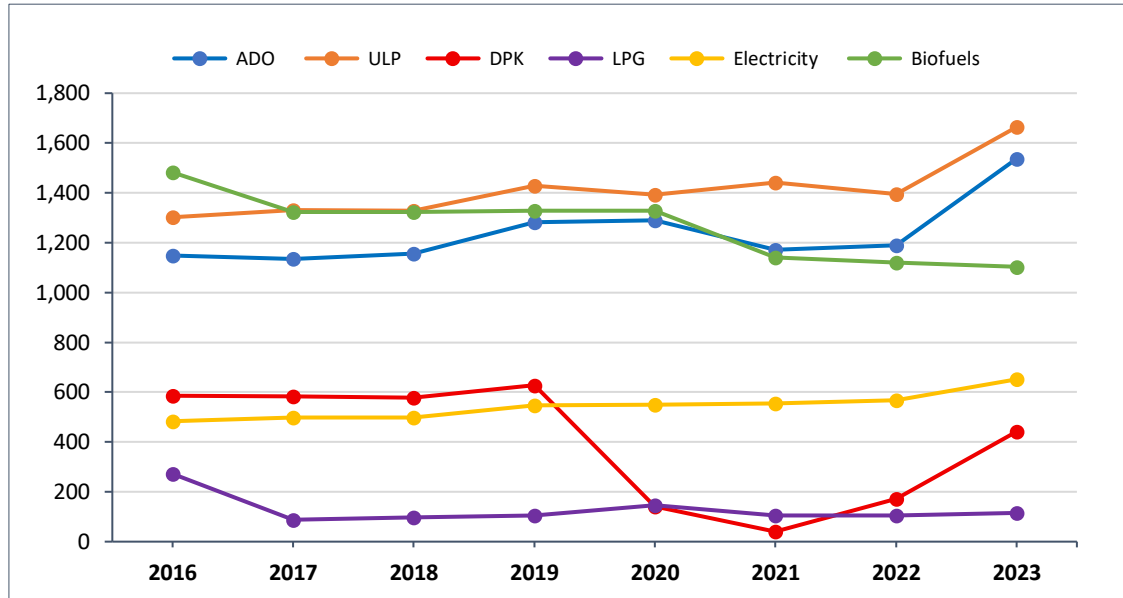
Source: SBS

2.3 End Use by Energy Products

Energy use by energy products was dominated by unleaded petrol (ULP) followed by diesel fuel (ADO) then by biofuel. **Chart 7** and **Table 7** portrays Energy Use by energy product between

2016 and 2023. As shown, all energy products used in 2023 have increased from 2022, except for Biofuel.

Chart 7: End Use by Energy Products, Samoa 2016-2023 (TJ)



Source: EPC, PPS, MOF, MWTI, SSC, MCR & SBS

Note: Heat is not included in the graph due to insignificant values.

The most notable increase between 2022 and 2023 was the significant increase in DPK or jet fuel by 156.1% from 172.2 TJ to 441.1 TJ. As previously mentioned, the resumption of usual operation of air transport services contributed to this increase. 88.8% or 391.9 TJ of total DPK in 2023 was re-exported as jet fuel. ADO recorded an increase of 29.3% from 1,189.1 TJ in 2022 to 1,537.1 TJ in 2023 while ULP increased by 19.4 % from 1,394.2 TJ in 2022 to 1,664.2 TJ in 2023.

Table 7: End Use by Energy Products, Samoa 2016-2023 (TJ)

YEAR	ULP	Biofuel	ADO	Electricity	DPK	LPG	Heat ¹	Total ²
2016	1,302.1	1,482.1	1,147.2	483.4	586.2	272.1	-	5,273.1
2017	1,331.4	1,323.0	1,134.6	498.2	582.0	87.9	-	4,957.1
2018	1,327.2	1,323.0	1,155.6	498.3	577.8	96.3	-	4,978.2
2019	1,427.7	1,327.2	1,281.2	546.3	628.0	104.7	-	5,315.0
2020	1,392.4	1,328.6	1,289.1	549.4	141.1	145.8	-	4,846.4
2021	1,440.3	1,141.8	1,172.3	555.4	40.3	104.7	0.1	4,454.7
2022	1,394.2	1,120.1	1,189.1	567.3	172.2	104.7	-	4,547.7
2023	1,664.2	1,103.3	1,537.1	651.7	441.1	116.4	3.0	5,516.8

Source: EPC, PPS, MOF, MWTI, SSC, MCR & SBS

Note: - 1: New data provided for 2023

2: not including changes in inventories and energy losses

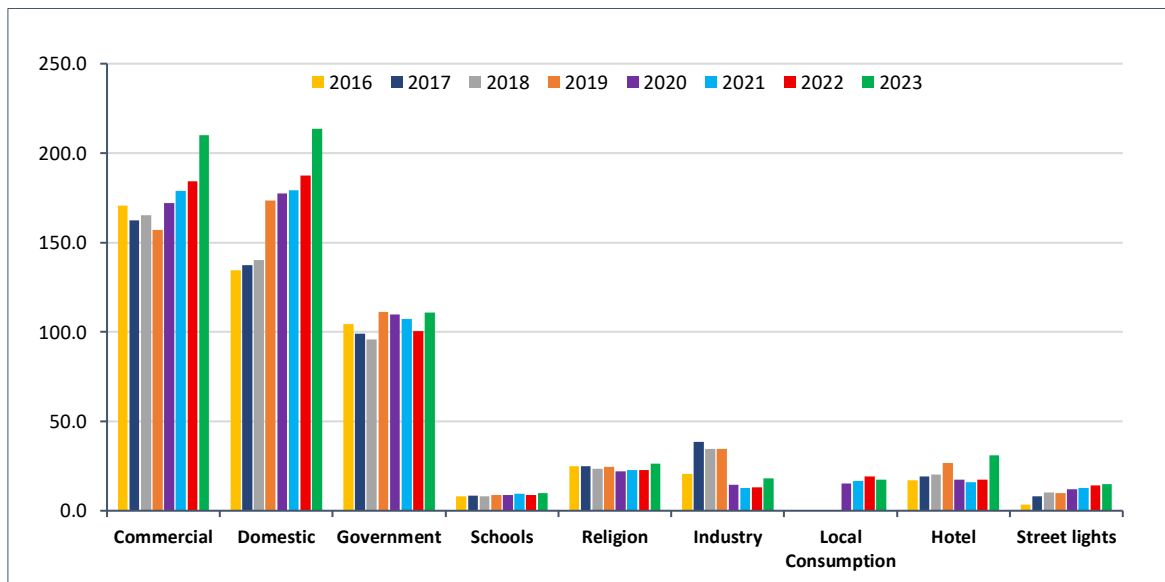
3. Electricity Use

Electricity use was classified according to the Electric Power Corporation (EPC) end-use sectors. Sectors are different from what industries are classified according to the SEEA-Industry based on ISIC Rev.4. The following tables and charts exclude off-grid electricity generated and use that is not connected to the EPC grid, such as solar lightings at home.

3.1 Electricity Use by Sectors

Both Commercial and Domestic (households) electricity use has gradually increased since 2019, as shown in **Chart 8** and **Table 8**.

Chart 8: Electricity Use by End Use Sectors, Samoa 2016-2023 (TJ)



Source: EPC

Table 8: Electricity Use by End Use Sectors, Samoa 2016-2023 (TJ)

YEAR	Com.	Dom.	Gov't	Sch.	Rel.	Ind.	Hot.	S/lights	EPC	TOTAL
2016	170.8	134.5	104.4	8.0	24.8	20.5	17.1	3.4	-	483.4
2017	162.4	137.2	99.1	8.6	25.0	38.5	19.1	8.2	-	498.2
2018	165.3	140.3	95.9	8.2	23.5	34.7	20.1	10.3	-	498.3
2019	157.2	173.5	111.3	8.6	24.5	34.4	26.9	9.9	-	546.3
2020	172.0	177.3	109.7	8.7	22.1	14.7	17.3	12.1	15.3	549.4
2021	178.7	179.2	107.3	9.3	22.6	12.8	15.9	12.8	16.7	555.4
2022	184.3	187.6	100.3	8.9	22.6	13.1	17.2	14.2	19.1	567.3
2023	210.0	213.7	110.8	9.8	26.3	17.9	31.1	14.7	17.3	651.7

Source: EPC

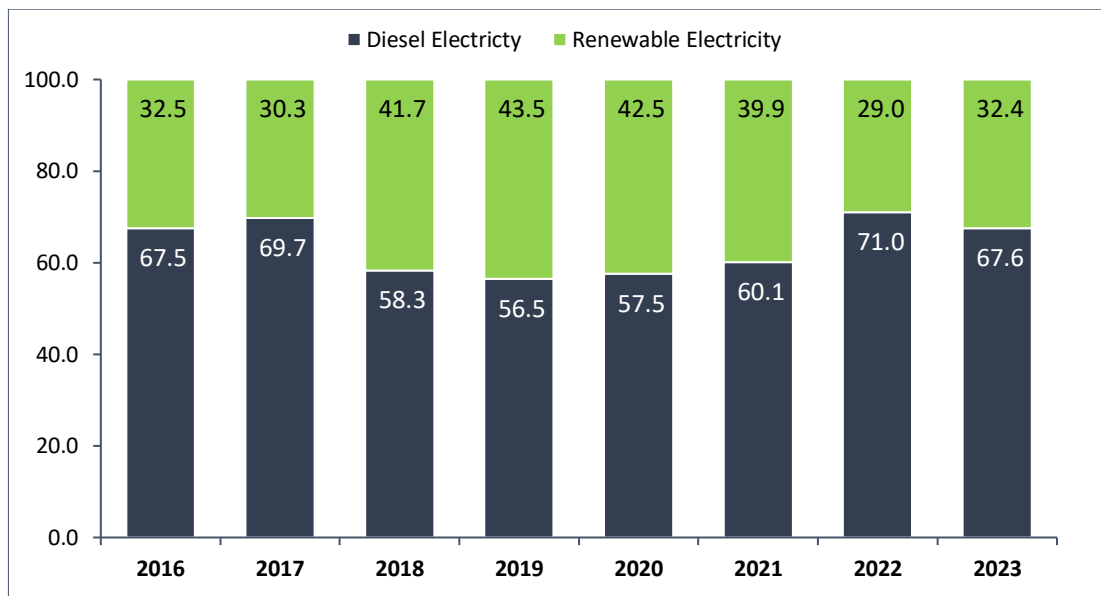
Note: Domestic refers to Households Electricity Use

Domestic, Commercial and Government are the largest end use sectors of electricity, using more than 80% of total electricity in 2023.

3.2 Renewable Electricity Share in Total Electricity Production

The share of renewable electricity in total electricity production increased from 29.0 % in 2022 to 32.4% in 2023. The main contributing factor to this increase was a 57.0% increase in hydro power electricity production from 104.4 TJ in 2022 to 163.9 TJ in 2023, contributed to the total increase in renewable electricity share (Refer **Chart 9 & Table 9**).

Chart 9: Renewable Electricity Share in Total Electricity Production, Samoa 2016-2023



Source: EPC

Table 9: Renewable Electricity Share in Total Electricity Production, Samoa 2016-2023 (TJ)

YEAR	Diesel electricity (TJ)	%	Renewable electricity (TJ)	%	Total electricity (TJ)	%
2016	363.0	67.5	175.0	32.5	538.0	100
2017	387.4	69.7	168.4	30.3	555.8	100
2018	322.1	58.3	230.6	41.7	552.7	100
2019	344.4	56.5	265.0	43.5	609.4	100
2020	350.4	57.5	258.5	42.5	608.9	100
2021	373.2	60.1	248.1	39.9	621.3	100
2022	452.0	71.0	184.2	29.0	636.2	100
2023	492.0	67.6	235.9	32.4	727.9	100

Source: EPC

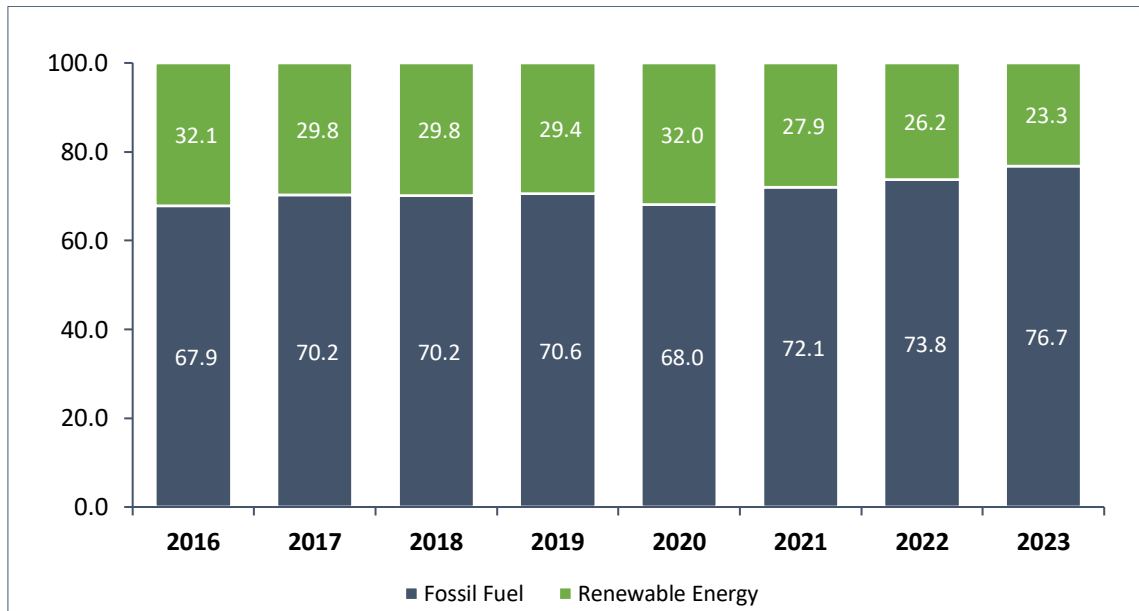
4. Samoa’s Renewable Energy Goal & Other Energy Indicators

National Energy Goal: Samoa through its Pathway for the Development of Samoa Strategy (PDS, 2021/22-2025/26) is committed to achieving one of its Key Priority Areas; KPA 18 – ‘Sustainable Energy Development Enhanced’, with the goal of achieving **’70.0% Renewable Energy Use by the End of 2031’**.

4.1 Samoa’s Renewable Energy Share

In 2023, the share of renewable energy in total energy use was calculated to be 23.3%, which is the lowest since its first compilation and calculation by the bureau since 2016. (Refer **Chart 10**).

Chart 10: Share of Renewable Energy in Total Energy Use, Samoa 2016-2023



Source: SBS

Fossil fuel refers to Diesel, Unleaded Petrol, Dual Purpose Kerosene and LPG gas.

4.2 Degree of Energy Self-Sufficiency

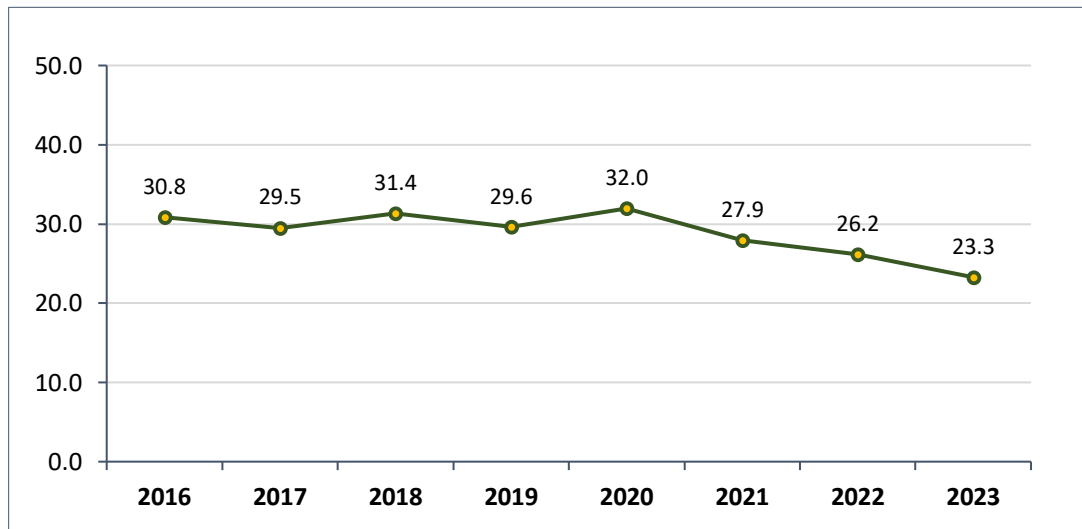
An important indicator for understanding energy security is the Degree of Energy Self-sufficiency. This indicator reflects the proportion of Samoa’s energy needs that are met by domestic energy resources.

Samoa depends on imports of oil and other fossil fuels and as a result, the degree of self-sufficiency in 2023 was calculated to be 23.3 %. This implies that only 23.3 % of Samoa’s energy needs are met by domestic energy resources.

The degree of energy self-sufficiency for Samoa decreased by 7.5 percentage points from 30.8% in 2016 to 23.3% in 2023. This implies that Samoa has continue to heavily rely on the importation of energy products (Refer **Chart 11 & Table 10**).

It should be noted that for Samoa, all energy products that come from domestic resources are from renewable sources such as solar and hydro. As a result, the degree of self-sufficiency is the same as the share of renewable energy.

Chart 11: Degree of Energy Self-Sufficiency, Samoa 2016-2023 (%)



Source: SBS

Table 10: Degree of Energy Self-sufficiency, Samoa 2016-2023

YEAR	Total Primary Energy Production (TJ)	Net Domestic Energy Use (TJ)	Degree Of Energy Self Sufficiency (%)
2016	1,657.1	5,375.0	30.8
2017	1,491.4	5,054.4	29.5
2018	1,553.6	4,953.3	31.4
2019	1,592.2	5,377.1	29.6
2020	1,593.0	4,985.7	32.0
2021	1,392.1	4,985.8	27.9
2022	1,304.4	4,979.5	26.2
2023	1,342.2	5,766.2	23.3

Source: SBS

4.3 Net Energy Import Dependency (NEID)

Net energy import dependency is the extent to which Samoa relies on imported energy products to meet its needs, calculated as net energy imports minus exports, divided by total primary energy supply.

Note that, total primary energy supply is calculated by total energy from natural inputs plus imports, minus exports and plus changes in inventories, which is the same as Net Domestic Energy Use. A high percentage implies that a country is dependent on the importation of energy products.

In 2023, Samoa's NEID was calculated to be 69.6% compared to 67.2% calculated for 2022 (**Table 11**).

Table 11: Net Energy Import Dependency, Samoa 2016-2023

YEAR	Imports (TJ)	Re-Exports (TJ)	Total Primary Energy Supply (TJ)	NET ENERGY IMPORTS DEPENDENCY (%)
2016	4,417.1	552.7	5,375.0	71.9
2017	4,287.3	590.3	5,054.4	73.1
2018	4,006.8	611.3	4,953.3	68.6
2019	4,634.8	674.1	5,377.1	73.7
2020	3,688.8	348.5	4,985.7	67.0
2021	4,229.4	189.7	4,985.8	81.0
2022	3,743.0	399.2	4,979.5	67.2
2023	4,697.5	685.1	5,766.2	69.6

Source: SBS

4.4 Energy-related Air Emissions

To calculate energy-related air emissions, the global default emission factors⁸ from IPCC are used. Only CO₂ emissions⁹ are being calculated for the use of fossil fuel namely ADO, ULP, DPK and LPG; and are excluding other greenhouse gases such as methane (this is because the amount of methane emitted due to the combustion of the energy products we have is quite small relative to CO₂). Emissions due to biomass use are also excluded.

Table 12 summarises CO₂ emissions generated by Industries and Households for fossil fuel used in 2016-2023. In 2023, the total CO₂ emissions generated was calculated to be 318.48 kTonnes CO₂, which was the highest recorded since 2016. Furthermore, Total Industry generated more CO₂ emissions than Households since 2017 except for 2020.

⁸ https://www.ipccnggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf Refer **Appendix 6** for the selected energy products' default emission factors used.

⁹ CO₂ emissions by energy accounts specifically measure carbon dioxide released from burning fossil fuels within economic industries or sectors, usually focusing on direct energy consumption. Greenhouse Gas Emissions include other warming gases – including methane and nitrous oxide.

Table 12: CO₂ Emissions Generated by Industries and Households, Samoa 2016-2023 (kTonnes CO₂)

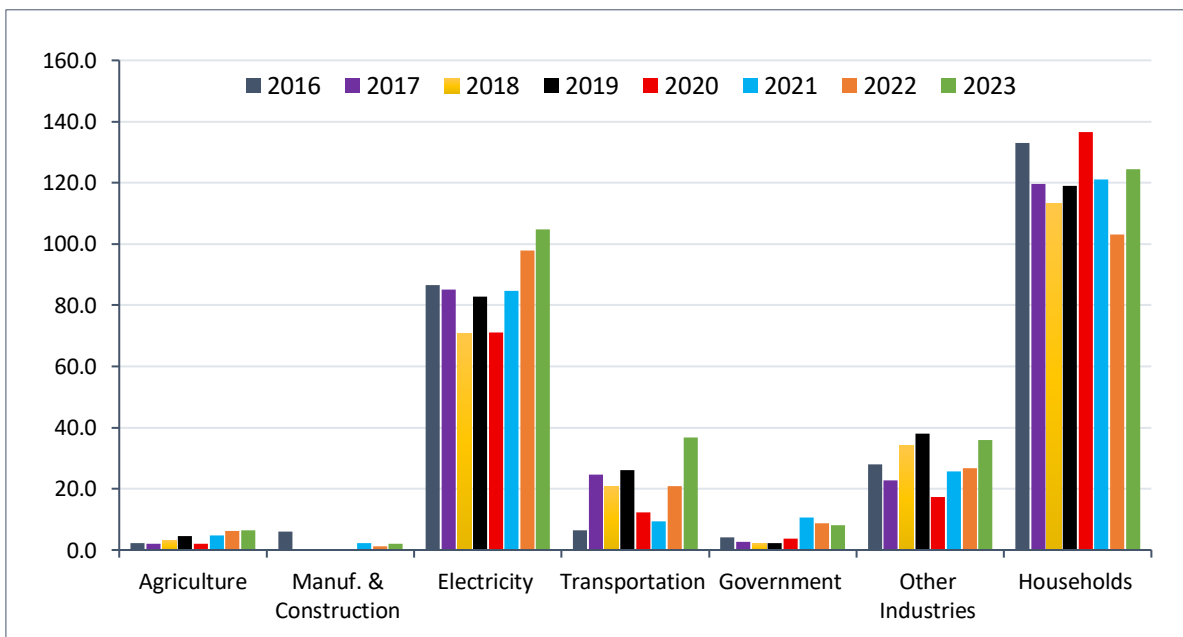
Industries	2016	2017	2018	2019	2020	2021	2022	2023
Agriculture	2.15	1.95	3.27	4.48	1.98	4.72	6.27	6.39
Manuf. & Construction	5.99	-	0.31	-	-	2.23	1.23	1.96
Electricity	86.53	85.03	70.64	82.74	71.12	84.62	97.90	104.79
Transportation	6.35	24.53	20.83	26.10	12.33	9.27	20.77	36.85
Government	4.03	2.70	2.14	2.16	3.75	10.71	8.63	8.06
Other Industries	27.96	22.82	34.00	37.93	17.34	25.66	26.65	35.96
Total Industry	133.02	137.03	131.19	153.40	106.52	137.22	161.46	194.03
Households	133.11	119.61	113.28	119.04	136.47	121.01	103.12	124.46
Total	266.13	256.63	244.47	272.44	243.00	258.23	264.58	318.48

Source: SBS

Note: Emissions = energy use (EU) * emission factor (EF)

During the eight-year period from 2016 to 2023, Households and Electricity Industry are the main contributors to the CO₂ emissions throughout the years.

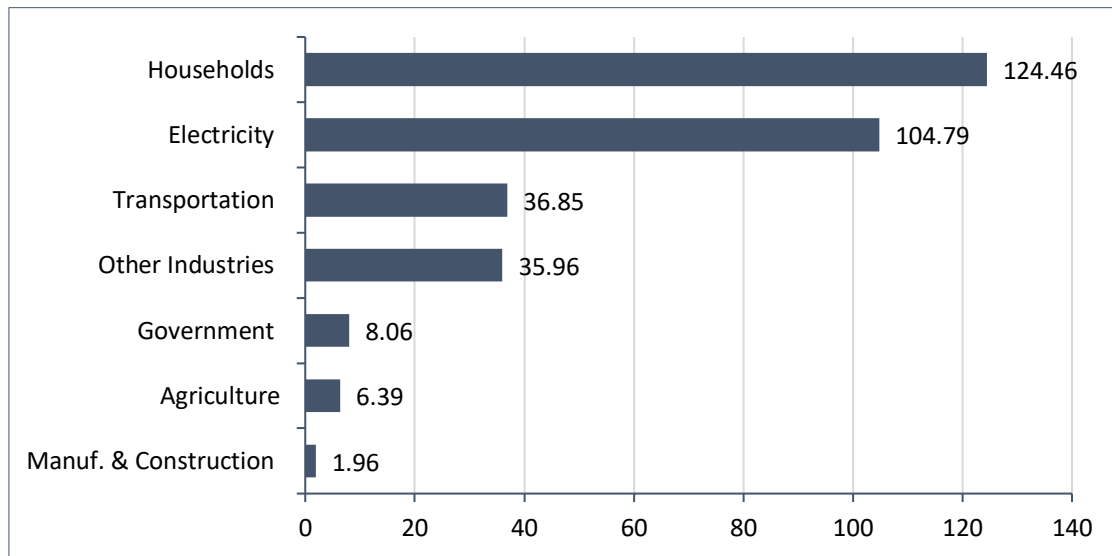
Chart 12: CO₂ Emissions Generated by Industries and Households, Samoa 2016-2023 (kTonnes CO₂)



Source: SBS

Chart 13 reveals that Households are the main generator of CO₂ emissions in 2023 with 124.46 kTonnes CO₂ (39.1%) followed by Electricity Industry with 104.79 kTonnes CO₂ or 32.9%.

Chart 13: CO₂ Emissions generated by Industries and Households, Samoa 2023 (kTonnes CO₂)



Source: SBS

4.5 Share of Household Income Spent on Energy Related Items

Based on the results of Samoa’s HIES conducted in 2023, it was estimated that total household income was reported to be \$2.03 billion. From this total, \$132,643,655 or 6.53% of total household income was spent on energy related items. **Table 13** highlights the share of household income spent on some of the energy related items such as electricity, gas and fuel.

Fuels and lubricants for transport accounted for the largest share of household income with 3.90%, while solid fuels represented the smallest share with 0.02%.

Table 13: Percentage Share of Household Income Spent on Energy Related Items

Energy Related Items By COICOP ¹⁰	Household Expenditure	% of Household Income Spent
Electricity	\$29,946,868	1.48
Gas	\$22,230,280	1.10
Liquid Fuels ¹¹	\$846,837	0.04
Solid Fuels ¹²	\$504,701	0.02
Fuels & Lubricants for Transport	\$79,114,969	3.90
TOTAL	\$132,643,655	6.53

Source: Samoa 2023 Household Income and Expenditure Survey.

¹⁰ Classification of Individual Consumption According to Purpose (COICOP)

¹¹ Liquid fuels refer to fuel used for lighting and cooking

¹² Solid fuel refers to firewood and charcoal

5. Energy Related Climate Change Indicators and SDGs

Table 10: Energy Related Climate Change Indicators, Samoa 2016-2023

	Unit	2016	2017	2018	2019	2020	2021	2022	2023
GDP (Nominal GDP)	\$m.	2,232.0	2,252.2	2,313.2	2,417.2	2,209.6	2,292.4 ^R	2,517.9 ^R	3,118.7 ^R
Population (a)	No.	195,979	197,611	199,243	200,874	202,506	205,557	207,473	209,388
Indicators									
Total Energy Use or NDEU (b)	TJ	5,375.0	5,054.4	4,953.3	5,377.1	4,985.7	4,985.8	4,979.5	5,766.2
Total Industries End Use	TJ	1,200.2	1,203.0	1,289.7	1,443.1	1,056.3	1,223.8	1,372.4	1,739.9
Total Households End Use	TJ	3,520.2	3,163.8	3,077.2	3,197.8	3,441.7	3,041.3	2,776.0	3,091.8
Renewable Electricity Share in Total Electricity Production	%	32.5	30.3	41.7	43.5	42.5	39.9	29.0	32.4
Share Of Fossil Fuels in Total Energy Use (c)	%	69.2	70.5	68.6	70.4	68.0	72.1	73.8	76.7
Renewable Energy Share in Total Energy Use [SDG 7.2.1]	%	30.8	29.5	31.4	29.6	32.0	27.9	26.2	23.3
Total Energy Intensity of Production Activities [SDG 7.3.1] (d)	MJ/\$	0.75	0.84	0.81	0.90	0.70	0.85	0.88	0.86
Energy Use by Households Per Capita (e)	GJ /Person	18.9	16.0	15.4	15.9	17.0	14.8	14.4	14.8

Source: Samoa Bureau of Statistics

Note:

- R: Revised figures based on GDP Production, September 2025 Quarter
- a. Population projection except for Population Census Years 2016 and 2021.
- b. NDEU - Net Domestic Energy Use. Refers to the amount of energy that is end used minus re-exports. Refer **Appendix A4**
- c. Fossil fuel for Energy Account Samoa refers to ADO, ULP, DPK and LPG
- d. Expresses the energy used by production activities in terms of GDP. Calculated by immediate consumption of energy products by industries divided by total nominal GDP
- e. Refers to the total end use of energy by households divided by resident population

6. 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.

Degree of Energy Self-Sufficiency indicates the proportion of electricity demand that is covered by domestic energy resource.

Dual Purpose Kerosene (DPK) is a refined product from crude oil and is used mainly by aircrafts and for lighting and heating.

Energy from Natural Inputs denotes physical flows from the environment to the economy that are derived principally from stocks of timber and mineral and energy resources.

Energy Intensity is ratio measure of how much energy is needed for every unit of value added or GDP

Energy Losses include energy losses during extraction, distribution, storage and transformation.

Energy Residuals are flows of energy from the economy to the environment and comprise energy losses as well as other energy residuals

Energy Supply includes all energy made available for use. Total Energy Supply for Samoa refers to Energy from Natural Inputs plus imported energy products.

Energy Use includes all final use including exports and inventory changes.

Fossil Fuels refers to diesel, motor gasoline or unleaded petrol, dual purpose kerosene and LPG.

Household Consumption of energy entails the consumption by households of energy products purchased or otherwise obtained from energy suppliers. All such consumption reflects the end use of energy. Household consumption also includes the energy products produced by the households themselves for own use, for example, energy produced from fuelwood gathered by households.

Hydropower is a process in which flowing water is used to spin a turbine connected to a generator

Industry consists of a group of establishments engaged in the same, or similar kinds of activity

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 (Total Energy Use by National Economy) refers to the end use of energy products less exports of energy products plus all losses of energy.

Net Energy Import Dependency is the extent to which a country relies on imported energy products to meet its needs, calculated as net energy imports minus exports, divided by total primary energy supply.

Physical Flows The movement and use of energy.

Products Are goods and services that result from a process or production.

Renewable Energy refers to energy resources that are naturally replenishing. These include biomass, hydropower, solar and wind.

Residence Principle assigns flows of energy to the country of residence of the producing or consuming unit.

Solar Power Photovoltaic conversion generates electric power directly from sunlight in a photovoltaic cell.

Wind Power refers to the conversion of wind energy into electricity using wind turbines.

Tonnes of CO₂ (carbon dioxide) is a standard unit for measuring greenhouse gas emissions, representing 1, 000 kilograms of CO₂ gas

Fuelwood and wood waste refers to wood and wood waste used to produce energy, usually through burning.

7. Industries Classification

The bureau classified establishments according to relevant industry based on the International Standard Classification of Industries, Revision 4 (ISIC, Rev.4). However, with different data sources and classification used, this task was not without challenges. Hence, the bureau classified energy users and suppliers according to the following industries and with the exception of Government, the following industries closely followed the SEEA-Energy Account Industries Classification.

Agriculture Includes Agriculture, Forestry and Fishing

Manufacturing and Construction Includes Manufacturing, Mining and Quarrying and Construction

Electricity: Includes Electricity, Gas and Air Conditioning Supply

Transportation: Includes Transportation and Storage

Government: Includes Government Ministries and Corporations

Other Industries: All Other Industries not classified under any other industries such as Wholesale and Retail, Accommodation and Food Service Activities, Financial and Insurance activities, Education etc.

8. Units of Measurements

J	Joule	
KJ	Kilojoules	(Thousand joules)
MJ	Megajoules	(Million joules)
GJ	Gigajoules	(Billion joules)
TJ	Terajoules	(Trillion joules)
kTonnes CO₂	Kilo tonnes of CO ₂	(1,000 tonnes)

9. Accounts Produced

The report is an annual compilation of physical supply and use of energy for Samoa in the year 2023. However, the report also includes compilation of a time series of eight consecutive years from 2016 to 2023.

10. Accounts Methodology

The Energy Accounts 2023 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 (TJ) 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 A5** and it is extracted from Samoa Energy Review 2023.

10.1 Key Standards and Guidelines

- UN System of Environmental-Economic Accounting Central Framework (SEEA-CF) 2012.
- UN System of Environmental-Economic Accounting for Energy (SEEA-Energy) 2019.
- Energy Statistics Manual 2004
- International Recommendation for Energy Statistics (IRES) 2018
- The Standard International Energy Product Classification (SIEC)
- Physical Energy Flow Accounts (PEFA) Manual 2014
- International Standard Industrial Classification Revision 4 (ISIC Rev.4)

10.2 Key Data Sources and Analysis

- *Electric Power Corporation (EPC)*

EPC provided the electricity production by source of electricity and electricity sales by month and by end use sectors. All the raw data provided in kilowatt hour (kWh). They were converted into the recommended SI unit, TJ using the conversion factors used by the Ministry of Finance Energy Review Reports 2023 for the energy account's purpose.

- *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 Liquefied 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.

- *Import and Export Data from Ministry of Customs and Revenue (ASYCUDA Database)*

SBS continue to receive important export data from the Ministry of Customs and Revenue's ASYCUDA database. The information and data are also imported into the

bureau's PC Green database for further processing. The data are then extracted and analyzed for energy account purpose using excel.

- *Ministry of Works, Transport and Infrastructure (MWTI)*

Ministry of Works, Transport and Infrastructure houses the Energy Division formerly under the Ministry of Finance and they have a wealth of energy data and information from its energy partners. They also compiled the latest 13th edition of 'Samoa Energy Review Report' for the year 2023.

- *Ministry of Finance (MOF)*

The ministry is responsible for the operation of the Government Gas Station and they compile a Fuel Summary Report for all fuel use of the government ministries. State owned enterprises and corporations are not included.

- *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.

- *Ministry of Natural Resources and Environment (MNRE).*

The ministry provided the information on 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.

The bureau will continue to work collaboratively with the relevant stakeholders on how to account for the other sources of energy not included in this report.

11. Next Steps

Continue to strengthen and enhanced the sharing of information and data on a timely manner with relevant partners and stakeholders.

With the technical assistance provided by SPC, it is envisaged that the bureau will assess the possibility of producing other climate change statistics and indicators based on the UN Global Set of Climate Change Statistics and Indicators in the future.

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 feedback on any issue or account related matters, for future improvements and should be directed to:

Mr. Papalii Benjamin Sila

benjamin.sila@sbs.gov.ws

ACEO- Social Statistics Division

Samoa Bureau of Statistics

FMFM II Building, PO Box 1151

Apia, Samoa

13. Appendices

A1: Physical Supply Table 2023

PHYSICAL SUPPLY TABLE (unit: TJ)	Production (incl.household own account) & generation of residuals							Households	Inventories	Flows from the Rest of the World (Imports)	Flows from the Environment	TOTAL SUPPLY
	Industries (by ISIC)											
	Agriculture, Forestry & Fishery (ISIC A)	Manufacturing & Construction (ISIC C & F)	Electricity, gas, steam & air conditioning supply (ISIC D)	Transportation & Storage (ISIC H)	Government (ISIC O)	Other Industries	Total Industry					
1. Energy from Natural Inputs:												
Natural Resource inputs												
<i>Fuelwood & Woodwaste</i>											817.6	817.6
Inputs of energy from renewable sources												
<i>Hydro</i>											163.9	163.9
<i>Solar</i>											71.2	71.2
<i>Wind</i>											0.7	0.7
<i>Other Electricity and Heat</i>											3.0	3.0
Other Natural Inputs												
<i>Energy inputs to cultivated biomass</i>											285.5	285.5
<i>Biofuel</i>											0.2	0.2
Total Energy from Natural Inputs											1,342.2	1,342.2
2. Energy Products:												
Production of energy products												
ADO	-	-	-	-	-	-	-			2,352.6		2,352.6
ULP	-	-	-	-	-	-	-			1,804.9		1,804.9
DPK	-	-	-	-	-	-	-			404.3		404.3
LPG	-	-	-	-	-	-	-			135.7		135.7
Electricity	-	-	651.7	-	-	-	651.7			-		651.7
Heat	-	-	3.0	-	-	-	3.0			-		3.0
Biofuel	1,103.3	-	-	-	-	-	1,103.3			-		1,103.3
Waste	-	-	-	-	-	-	-			-		-
Total Energy Products	1,103.3	-	654.7	-	-	-	1,758.0			4,697.5		6,455.5
3. Energy Residuals:												
Losses during transforamtion	-	-	858.3	-	-	-	858.3	-				858.3
Losses during distribution	-	-	76.2	-	-	-	76.2	-				76.2
Losses during transmission	-	-	-	-	-	-	-	-				-
Other Residuals	91.5	47.5	81.5	506.3	221.3	791.8	1,739.9	3,091.8				4,831.7
Total Energy Residuals	91.5	47.5	1,016.1	506.3	221.3	791.8	2,674.4	3,091.8				5,766.2
4. Other Residual Flows:												
Residuals from end-use for non-energy purposes												-
Energy From Solid Waste												-
6. TOTAL SUPPLY (Gross)	1,194.8	47.5	1,670.7	506.3	221.3	791.8	4,432.4	3,091.8	-	4,697.5	1,342.2	13,563.9
7. TOTAL SUPPLY (Net)										4,697.5	1,342.2	6,039.7

A2: Physical Use Table 2023

PHYSICAL USE TABLE (unit: TJ)	Immediate Consumption, use of energy resources, receipt of energy							Final Consumption	Inventories	Flows to the Rest of the World (Exports)	Flows to the Environment	TOTAL USE	
	Industries (by ISIC)							Households					
	Agriculture, Forestry & Fishery (ISIC A)	Manufacturing & Construction (ISIC C & F)	Electricity, gas, steam & air conditioning supply (ISIC D)	Transportation & Storage (ISIC H)	Government (ISIC O) ²	Other Industries	Total Industry						
1. Energy from Natural Inputs:													
Natural Resource inputs													
Fuelwood & Woodwaste	817.6						817.6					817.6	
Inputs of energy from renewable sources													
Hydro	-	-	163.9	-	-	-	163.9					163.9	
Solar	-	-	71.2	-	-	-	71.2					71.2	
Wind	-	-	0.7	-	-	-	0.7					0.7	
Other Electricity and Heat	-	-	3.0	-	-	-	3.0					3.0	
Other Natural Inputs													
Energy inputs to cultivated biomass	285.5	-	-	-	-	-	285.5					285.5	
Biofuel	0.2	-	-	-	-	-	0.2					0.2	
Total Natural Inputs	1,103.3	-	238.9	-	-	-	1,342.2					1,342.2	
2. Energy Products:													
Transformaton of energy products													
ADO	-	-	1,350.29	-	-	-	1,350.3					1,350.29	
ULP	-	-	-	-	-	-	-					-	
DPK	-	-	-	-	-	-	-					-	
LPG	-	-	-	-	-	-	-					-	
Electricity	-	-	-	-	-	-	-					-	
Heat	-	-	-	-	-	-	-					-	
Biofuel	-	-	-	-	-	-	-					-	
Waste	-	-	-	-	-	-	-					-	
End-use of energy products													
ADO	17.4	25.9	59.7	361.4	80.4	421.5	966.2	286.4	-	534.8	284.5	1,002.3	
ULP	73.4	0.5	4.6	105.4	30.4	30.4	244.6	1,411.1	-	140.7	8.4	1,804.9	
DPK	0.2	0.1	-	38.5	0.0	2.1	41.0	8.2	-	36.8	391.9	404.3	
LPG	-	-	-	-	-	39.2	39.2	76.9	-	19.3	0.3	135.7	
Electricity	0.4	17.9	17.3	1.0	110.5	291.3	438.4	213.2	-	-	-	651.7	
Heat	-	-	-	-	-	3.0	3.0	0.0	-	-	-	3.0	
Biofuel	0.0	3.0	-	-	-	4.4	7.4	1,095.9	-	-	-	1,103.3	
End-use of energy products for non-energy purposes	-	-	-	-	-	-	-	-	-	-	-	-	
3. Energy Residuals:													
Losses during transforamtion											858.3	858.3	
Losses during distribution											76.2	76.2	
Losses during transmission											-	-	
Other Residuals											4,831.7	4,831.7	
Total Energy Residuals											5,766.2	5,766.2	
4. Other Residual flows:													
Residuals from end-use for non-energy purposes												-	
Energy From Solid Waste												-	
6. TOTAL USE (Gross)	1,194.8	47.5	1,670.7	506.3	221.3	791.8	4,432.4	3,091.8	-	411.6	685.1	5,766.2	13,563.9
7. TOTAL USE (Net)	91.5	47.5	81.5	506.3	221.3	791.8	1,739.9	3,091.8	-	411.6	685.1	934.5	6,039.7

A3: Total End Use of Energy, Samoa 2023 (TJ)

Energy Products	Agriculture	Manufacturing & Construction	Electricity	Transportation & Storage	Government	Other Industries	Total Industry	Households	Re-Exports	SUM OF ROW
ADO	17.4	25.9	59.7	361.4	80.4	451.5	966.2	286.4	284.5	1,537.1
ULP	73.4	0.5	4.6	105.4	30.4	30.4	244.6	1,411.1	8.4	1,664.2
DPK	0.2	0.1	-	38.5	0.0	2.1	41.0	8.2	391.9	441.1
LPG	-	-	-	-	-	39.2	39.2	76.9	0.3	116.4
Electricity	0.4	17.9	17.3	1.0	110.5	291.3	438.4	213.2	-	651.7
Heat	-	-	-	-	-	3.0	3.0	0.0	-	3.0
Biofuels	0.0	3.0	-	-	-	4.0	7.4	1,095.9	-	1,103.3
Total EU	88.6	43.2	54.9	622.2	208.1	722.8	1,739.9	3,091.8	685.1	5,516.8

Source: EPC, MOF, MWTI, PPS, SSC, MCR & SBS

A4: Net Domestic Energy Use, Samoa 2023 (TJ)

Energy Products	Agriculture	Manufacturing & Construction	Electricity	Transportation & Storage	Government	Other Industries	Total Industry	Households	Flows To Environment	SUM OF ROW
ADO	14.6	21.6	33.0	477.3	67.2	352.5	966.2	286.4		1,252.6
ULP	73.4	0.5	4.6	105.4	30.4	30.4	244.6	1,411.1		1,655.8
DPK	0.2	0.1	-	38.5	0.0	2.1	41.0	8.2		49.2
LPG	-	-	-	-	-	39.2	39.2	76.9		116.1
Electricity	0.4	17.9	17.3	1.0	110.5	291.3	438.4	213.2		651.7
Heat	0.0	3.0	-	-	-	3.0	3.0	0.0		3.0
Biofuels	-	-	-	-	-	4.0	7.4	1,095.9		1,103.3
Losses									934.5	-
TOTAL NDEU	88.6	43.2	54.9	622.2	208.1	722.8	1,739.9	3,091.8	934.5	5,766.2

Source: EPC, MOF, MWTI, PPS, SSC, MCR & SBS

A5: Energy Conversion Factors

Liquid Fuels	Megajoules Per Litre	Megajoules Per Kg	Litres Per Tonne
Unleaded Petrol (ULP)	34.2	46.4	1,340.0
Dual-Purpose Kerosene (DPK)	36.8	46.4	1,260.0
Automotive Diesel Oil (ADO)	38.6	45.6	1,182.0
Electricity	Megajoules per kWh		
Electricity	3.60		

Source: MWTI, 2023

A6: Energy Emission Factors (kg CO₂/TJ)

ENERGY PRODUCT	CO ₂ EMISSION FACTOR
ADO	74,100
ULP	69,300
DPK	71,900
LPG	63,100

Source: IPCC

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