NATIONAL BUREAU OF STATISTICS

The **Compilation** and **Application** of **Environmentally Extended-Supply** and Use **Tables (EE-SUTs)** on **Energy**

(2015)

Report Date: September 2021

Data Source: National Bureau of Statistics (NBS)

CONTENTS

EXECUTIVE SUMMARY

The performance of the economy is measured using Gross Domestic Product (GDP). It accounts for all output generated within the borders of a country. Nevertheless, the GDP is limited in accounting for environmental losses in the course of undertaking economic activities. The System of Environmental Economic Accounting (SEEA) is a statistical system that provides the platform for measuring the contribution of the environment to the economy and the impact of economic activities on the environment.

The Nigerian Energy Accounting Framework is divided into 12 ISIC Industries and 16 energy products. In 2015, the total energy supplied from the environment stood at 16,423 Petajoules, with 7,437 PJs extracted as natural energy input from the environment. A total of 4,253 PJs of residuals flowed back into the environment. Of the residuals, non-renewable waste recorded 477.5 PJs while renewable waste stood at 325.8 PJs. Moreover, a total of 9,917 PJs of energy was supplied into the economy with crude oil as the highest. Domestic production of energy in 2015 stood at 8986 PJs covering agriculture and forestry; mining; manufacturing; electricity, gas, steam and air conditioning supply; water supply, sewerage, waste management and remediation. In terms of consumption, 2216.8 PJs of energy products were used as intermediate consumption across the sectors while household consumption of energy stood at 1,977 PJs. In summary, total energy used was 7925.9 PJs in agriculture, mining, manufacturing, electricity, water supply, construction, transportation, public administration, extra-territorial grounds, services, inventories and exports.

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ACRONYMS

GDP	Gross Domestic Product
GJs	Gigajoule
ISIC	International Standard Industrial Classification
LPG	Liquefied Petroleum Gas
PJs	Peta Joules
SDGs	Sustainable Development Goals
SEEA	System of Environmental Economic Accounting
SEEA-CF	SEEA-Central Framework
SNA	System of National Accounts
UN	United Nations

LIST OF TABLES

LIST OF FIGURES

BACKGROUND

The System of Environmental Economic Accounting (SEEA) is a statistical system that brings together economic and environmental information into a common framework to measure the contribution of the environment to the economy and the impact of the economy on the environment. However, the SEEA was adopted by UN Statistical Commission in 2012 as an international standard in measuring environmental-economic accounting. The SEEA-Central Framework (SEEA-CF) has a similar accounting structure as the System of National Accounts (SNA) based on the similar definition, concepts and classifications.

The Nigerian energy sector is a critical one, as government revenue depends highly on the oil and gas sector of the economy. However, inadequate electricity supply has also had its implications on the environment, and ultimately Nigeria's performance on the Sustainable Development Goals (SDGs) which the SEEA Energy seeks to measure, monitor and evaluate amongst others. The reference year for the Nigerian Energy framework presented in this report is 2015.

Box 1

For better clarity, the Nigerian Energy Accounting Framework is divided into 12 ISIC Industries:

Agriculture and Forestry (ISIC A)	Mining (ISIC B)	Manufacturing (ISIC C)	Electricity, Gas, Steam and Air Conditioning Supply (ISIC D)
Water Supply, Sewerage, Waste Management and Remediation (ISIC E)	Construction (ISIC F)	Transport and Storage (ISIC H)	Public Administration (ISIC O)
Extra-Territorial Organisations (ISIC U)	Services	Others &	Household

Nevertheless, the service industry comprises of (1) accommodation and food services; (2) human health and social welfare; (3) education and (4) trade.

Box 2

Moreover, in Nigeria 16 energy products were identified:

 Crude oil	 Coal	 Naphtha	 Aviation Jet Fuel
 Kerosene	 Petroleum coke	 Refinery Gas/LPG (Buthane Gas)	 Charcoal
 Natural gas (Methane)	 Biogas	 Liquid Biofuel	 Motor gasoline
 Transport diesel	 Electrical energy	 Refined fuel oil	 Wood waste, other biomass (Bagasse)

Other indicators for this account were derived upon the final results:

- Environmental related
- Energy related
- Energy use per capita/Gross Domestic Product (GDP)
- Supply efficiency
- Related to the Sustainable Development Goals (SDGs)

DOMESTIC PRODUCTION OF ENERGY

During the reference year (2015), the total energy supplied from the environment stood at 16,423 Petajoules, while 7,437.4 PJs was extracted as natural input from the environment. However, a total of 4,253 PJs of residuals flowed back into the environment in the same period under study. In terms of extraction of natural inputs, a total of 7,437.4 PJs was extracted from the environment. This covers fossil non-renewable, natural timber resources, solar based renewable, wind based renewable, hydro based renewable and cultivated biomass. Extraction of fossil non-renewable stood at 6,052.9 PJs, the largest product extracted while wind-based renewables recorded the smallest energy extracted at 6.1 PJs.

Non-renewable waste recorded 477.5 PJs while renewable waste stood at 325.8 PJs, third in ranking of a total residual flow of 4253.0 Pjs.

A total of 9,917 PJs of energy was supplied into the economy. This includes the 16 products mentioned earlier. The top five (5) include crude oil recorded at 4459.6 PJs as the highest, followed by 1589.6 PJs of natural gas (methane). Wood waste, other biomass stood at 1326.4 PJs, charcoal was 994.3 PJs and motor gasoline stood at 624.8 Pjs.

Yet, 931 PJs of energy products were imported into the country as well as 5,708 PJs exported. In terms of sectoral domestic energy production, Mining produced 6,053 PJs (67.36%), which stood as the highest. This was followed by Agriculture and forestry, produced at 2270 PJs (25.26%) domestic energy. The least domestic energy produced was 35 PJs by water, waste management and remediation sector.

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THE COMPILATION AND APPLICATION OF ENVIRONMENTALLY EXTENDED-SUPPLY AND USE TABLES (EE-SUTS) ON ENERGY - 2015

Extraction of Natural Energy Input From the Environment

Total

7437.4

UNIT:
Petajoule (10^{15})

Natural Inputs		Environment
Energy Resources	Fossil non-renewable	6052.9
	Natural Timber Resources	1275.6
Renewables	Solar based renewable	25.8
	Wind based renewable	6.1
	Hydro based renwable	26.2
Others	Cultivated Biomass	50.7

THE COMPILATION AND APPLICATION OF ENVIRONMENTALLY EXTENDED-SUPPLY AND USE TABLES (EE-SUTS) ON ENERGY - 2015

Flows of Residuals back to the Environment

Natural inputs	TOTAL	756.6	35.8	1.7	9.2	3449.7	4253.0
	UNIT: Petajoule (10^{15})	Agriculture and forestry (ISIC A)	Manufa-cturing (ISIC C)	Electricity ISIC D)	Water supply (ISIC E)	Enviro-nment	TOTAL
Residuals	Renewable waste	300.6	20.0	1.7	3.5	–	325.8
	Non-renewable waste	456.0	15.8	–	5.7	–	477.5
	Losses during extraction (Flaring)	–	–	–	–	18.4	18.4
	Losses during transmission (electricity)	–	–	–	–	18.0	18.0
	Losses during distribution (electricity)	–	–	–	–	17.0	17.0
	Losses during transformation	–	–	–	–	57.2	57.2
	Energy residuals from end use	–	–	–	–	3088.9	3088.9
	Energy incorporated in products for non-energy use	–	–	–	–	250.3	250.3

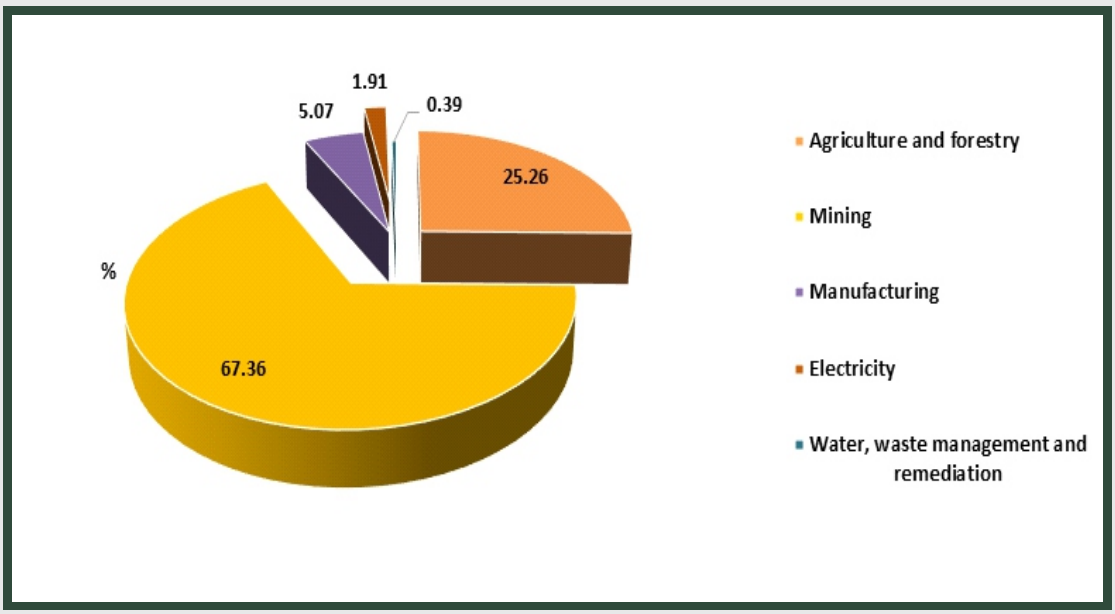
THE COMPILATION AND APPLICATION OF ENVIRONMENTALLY EXTENDED-SUPPLY AND USE TABLES (EE-SUTS) ON ENERGY - 2015

Domestic Production of Energy

	Quantity (PJ)	Percent (%)
Total	8986	100.00%

Economic Sector	Agriculture and forestry	Mining	Manufacturing	Electricity	Water, waste management and remediation
Quantity (PJ)	2270	6053	456	172	35
Percent (%)	25.26%	67.36%	5.07%	1.91%	0.39%

Percentage Distribution of Domestic Energy Production



USE OF INTERMEDIATE CONSUMPTION

A total of 2216.8 PJs of energy products were used as intermediate consumption across the sectors. Of all the 16 products, Motor gasoline recorded the biggest consumption of 536.1PJs (24.18%), while natural gas (Methane) with 448.8 PJs stood second to Motor gasoline. Wood waste, other biomass (Bagasse) accounted for 14.96% of the total intermediate consumption of energy products, ranking third. However, the least product consumed was Refinery gas/LPG (Buthane gas) at 0.17%. No records for Naphtha, Petroleum coke and Liquid Biofuel.

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THE COMPILATION AND APPLICATION OF ENVIRONMENTALLY EXTENDED-SUPPLY AND USE TABLES (EE-SUTS) ON ENERGY - 2015

Intermediate Consumption of Energy Products

	Quantity (PJ)	Percent (%)
Total	2216.8	100.00%

Product	Crude oil	Coal	Naphtha	Aviation Jet Fuel	Kerosene
Quantity (PJ)	34.7	3.7	-----	24.9	7.3
Percent (%)	1.57%	0.17%	-----	1.12%	0.33%

Product	Petroleum coke	Refinery gas/LPG (Buthane gas)	Charcoal	Natural gas (Methane)	Biogas
Quantity (PJ)	-----	3.5	248.6	448.8	20.8
Percent (%)	-----	0.16%	11.21%	20.25%	0.94%

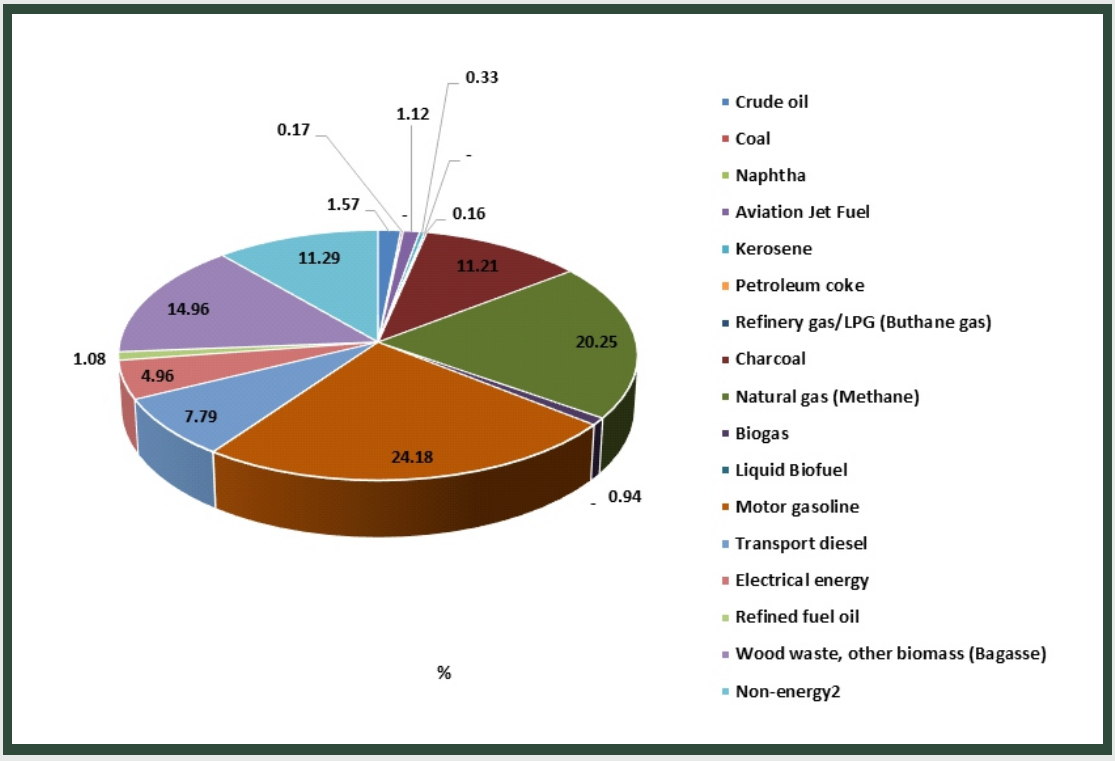
Product	Liquid Biofuel	Motor gasoline	Transport diesel	Electrical energy	Refined fuel oil
Quantity (PJ)	-----	536.1	172.6	110	23.9
Percent (%)	-----	24.18%	7.79%	4.96%	1.08%

THE COMPILATION AND APPLICATION OF ENVIRONMENTALLY EXTENDED-SUPPLY AND USE TABLES (EE-SUTS) ON ENERGY - 2015

Intermediate Consumption of Energy Products

Product	Wood waste, other biomass (Bagasse)	Non-energy[2]
Quantity (PJ)	331.6	250.3
Percent (%)	14.96%	11.29%

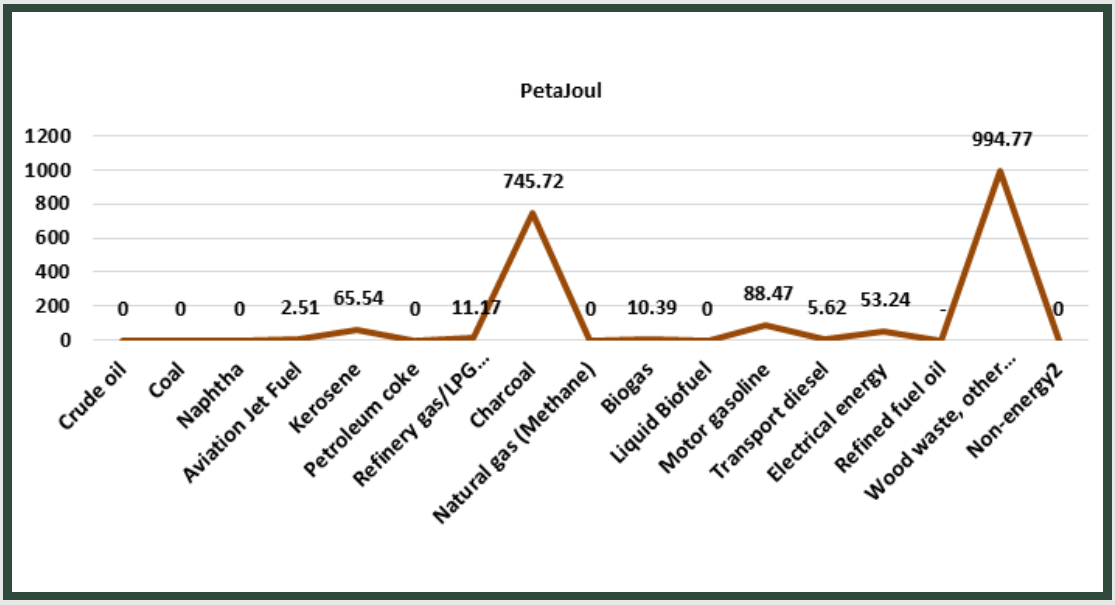
Percentage Distribution of Intermediate Consumption of Energy Products



HOUSEHOLD CONSUMPTION OF ENERGY

Nigerian Household consumption of energy stood at 1,977 PJs in 2015. Interestingly, wood waste, other biomass (Bagasse) was the most consumed product at 994.77 PJs. This represents 50.32% of the total consumption of energy products by households. By ranking, household consumption of charcoal stood second consumed energy product with 745.72 PJs (37.71%). This goes to say that charcoal as energy source is prominent in households particularly at the rural dwellings. However, aviation Jet fuel recorded the least PJs at 2.51 (0.13%) in 2015.

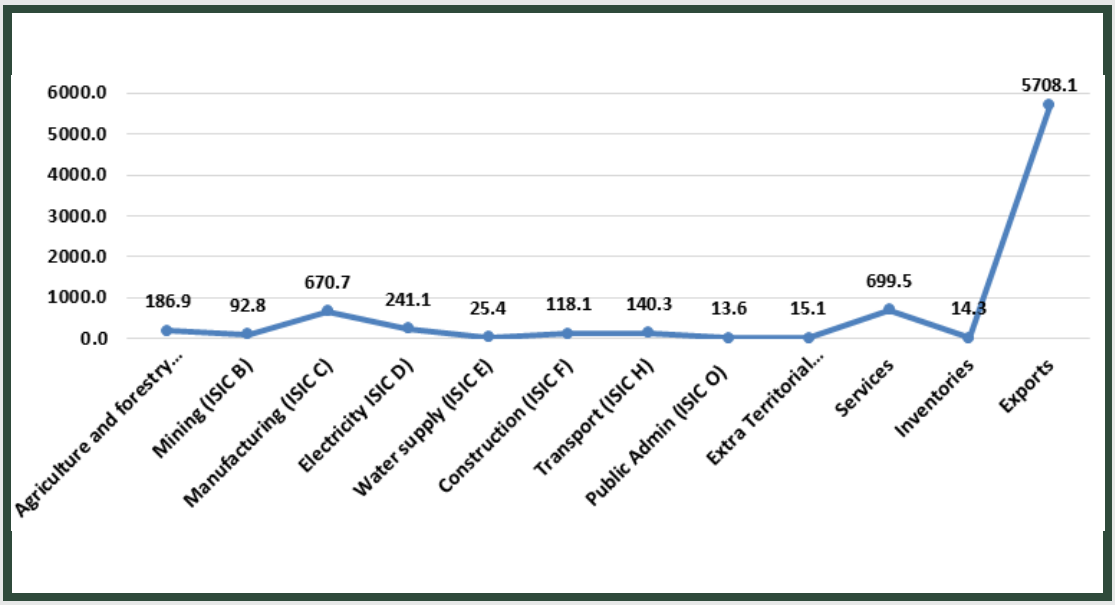
Household Consumption of Energy



TOTAL ENERGY USED

Total energy used was 7925.9 PJs. This cuts across agriculture, mining, manufacturing, electricity, water supply, construction, transportation, public administration, extra-territorial grounds, services, inventories and exports. However, energy exported was massive with 5708.1 PJs. Manufacturing used 670.7 Pjs alone against services with 699.5 PJs. The least energy used sector was public administration at 13.6 PJs.

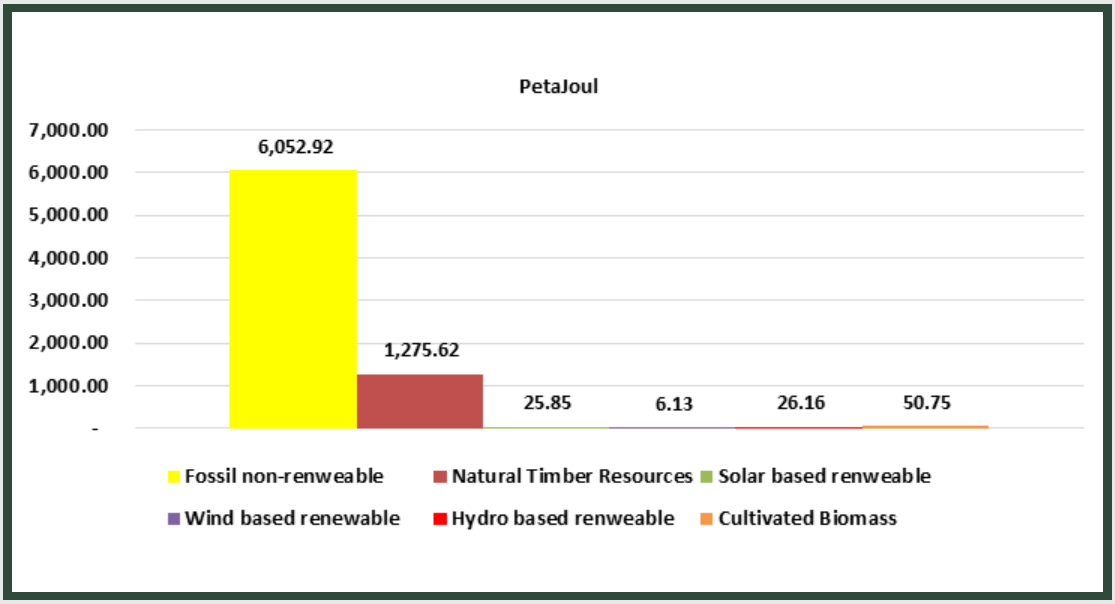
Total Energy Used



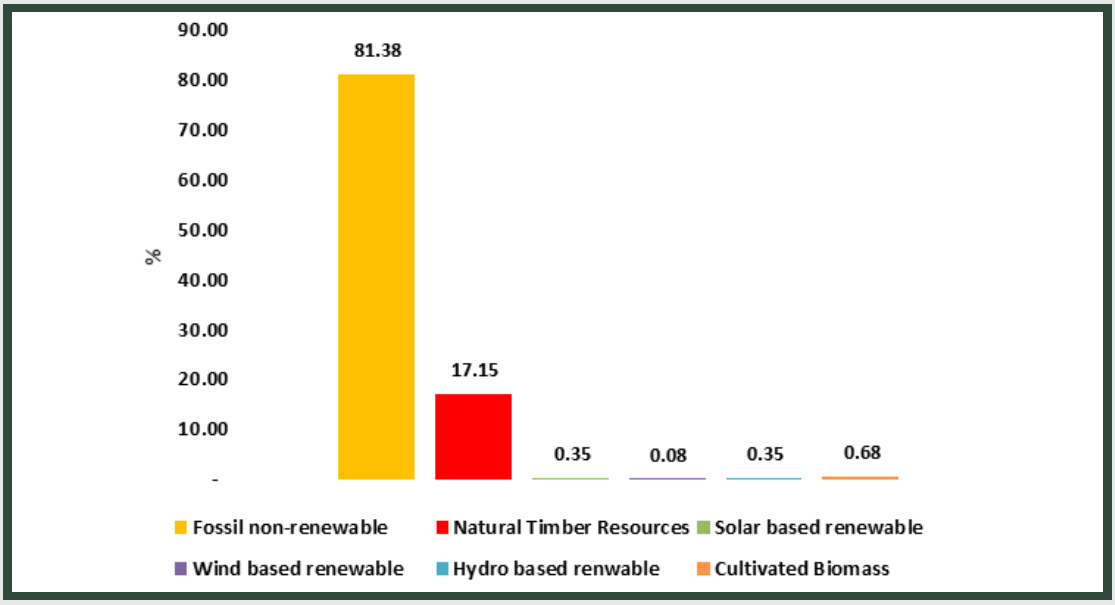
EXTRACTION OF NATURAL INPUTS

Of the natural energy input from the environment (see table 1 above), energy resources accounted for 7328.5 PJs, of which fossil non-renewable was 6,052.9 PJs and natural timber resources was 1,275.6 PJs. Similarly, renewable energy stood at 58.1 PJs, with solar based renewable as 25.85 PJs, wind based renewable as 6.13 PJs and hydro based renewable as 26.16 PJs. Moreover, cultivated biomass which is also a natural energy input was recorded at 50.75 PJs.

Extraction of Natural Energy Inputs



Percentage Distribution of Extraction of Natural Energy Inputs



Fossil non-renewable energy recorded 81.38%, the highest of the six (6) products accounted for. This was followed by natural timber resources at 17.15%. These two (2) products are classified as energy resources. Renewable energy consists of solar based renewables, wind-based renewables and hydro based renewables. Their contribution to natural energy inputs stood at 0.35%, 0.08% and 0.35% respectively. Nevertheless, cultivated biomass had a weight of 0.68% in 2015.

DEFINITION OF TERMS

1. Energy from Natural Inputs

These are physical flows from the environment to the economy that are derived principally from stocks of timber, mineral and energy resources.

2. Energy Residuals

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

3. Energy Products

These are products exclusively or mainly used as a source of energy which have a positive monetary value.

4. Intermediate Consumption

This consists of the value of the goods and services consumed as inputs by the process of production.

5. Household Consumption of Energy

This entails the consumption of Households of energy products purchased or otherwise obtained from suppliers. This includes the energy products produced by the Households themselves for own use.

ANNEXES

Annex 1: Environmental Related

Item	Quantity (PJ)
Energy supplied from the environment	16,423
Extraction of Natural energy inputs from environment	7,437
Flows of the Residuals back to the environment	4,253

Annex 2: Energy Related

Item	Quantity (PJ)
Production of Energy Products across the ISIC Industries	8985
Intermediate Consumption of Energy products across ISIC sectors	2217
Household Consumption of Energy Products	1977

Annex 3: Production of Energy Products across ISIC

	UNIT: Petajoule (10^{15})	Agriculture and forestry (ISIC A)	Mining (ISIC B)	Manufacturing (ISIC C)	Electricity ISIC D)	Water supply (ISIC E)	Total
Energy products	**Total**	**2269.9**	**6052.9**	**456.1**	**171.9**	**34.6**	**8985.5**
Products	Crude oil		4459.6				4459.6
	Coal		3.7				3.7
	Naphtha			1.2			1.2
	Aviation Jet Fuel			0.6			0.6
	Kerosene			7			7
	Petroleum coke			0.033			0
	Refinery gas/LPG (Buthane gas)			105.7			105.7
	Charcoal	994.3					994.3
	Natural gas (Methane)		1589.6				1589.6
	Biogas					34.6	34.6
	Liquid Biofuel						0
	Motor gasoline			12.7			12.7
	Transport diesel			10.8			10.8
	Electrical energy				171.9		171.9
	Refined fuel oil			17			17
	Wood waste, other biomass (Bagasse)	1275.6		50.7			1326.4
	Non-energy[2]			250.3			250.3

Annex 4: Households Consumption of Energy Products

	UNIT: Petajoule (10^{15})	**Households**
Energy products	**Total**	**1977.4**
Products	Crude oil	
	Coal	
	Naphtha	
	Aviation Jet Fuel	2.5
	Kerosene	65.5
	Petroleum coke	
	Refinery gas/LPG (Buthane gas)	11.2
	Charcoal	745.7
	Natural gas (Methane)	0
	Biogas	10.4
	Liquid Biofuel	
	Motor gasoline	88.5
	Transport diesel	5.6
	Electrical energy	53.2
	Refined fuel oil	
	Wood waste, other biomass (Bagasse)	994.8
	Non-energy[2]	

Annex 5: Intermediate Consumption of Energy Products across ISIC

UNIT: Petajoule (10^{15})	Agriculture and forestry (ISIC A)	Mining (ISIC B)	Manufacturing (ISIC C)	Electricity ISIC D)	Water supply (ISIC E)	Construction (ISIC F)	Transport (ISIC H)	Public Admin (ISIC O)	Extra Territorial Organisations (ISIC U)	Services	Other[1]	Total
Total	**186.9**	**92.8**	**670.7**	**241.1**	**25.4**	**118.1**	**140.3**	**13.6**	**15.1**	**699.5**	**13.3**	**2217**
Crude oil		17.7	4.7						12.3			34.7
Coal			3.7									3.7
Aviation Jet Fuel							17.2	4.1	2		1.6	24.9
Kerosene										7.3		7.3
Petroleum coke												0
Refinery gas/LPG (Buthane gas)		0.5	1.2			0.5				1.3		3.5
Charcoal	49.7									198.9		248.6
Natural gas (Methane)		45	198.6	196		9.3				0		448.8
Biogas	5.2		6.9							8.7		20.8
Liquid Biofuel			0									0
Motor gasoline	45	25	75	15	20	85	105	8.1	0.7	147.5	10	536.1
Transport diesel	8.5	4.6	68.7	2.6	3.5	23.3	18.1	1.4	0.1	40.2	1.7	172.6
Electrical energy	14.65		35.3	27.6	2					30.5		110
Refined fuel oil	0		23.9	0								23.9
Wood waste, other biomass (Bagasse)	63.9		2.4	0						265.3		331.6
Non-energy[2]			250.3	0								250.3

Annex 6: Total Energy Used

	UNIT: Petajoule (10^{15})	Agriculture and forestry (ISIC A)	Mining (ISIC B)	Manufacturing (ISIC C)	Electricity ISIC D)	Water supply (ISIC E)	Construction (ISIC F)	Transport (ISIC H)	Public Admin (ISIC O)	Extra Territorial Organistations (ISIC U)	Services	Inventories	Exports
Energy products	**Total**	**186.9**	**92.8**	**670.7**	**241.1**	**25.4**	**118.1**	**140.3**	**13.6**	**15.1**	**699.5**	**14.3**	**5708.1**
Products	Crude oil		17.7	4.7	0	0	0	0	0	12.3			4424.9
	Coal			3.7	0	0	0	0	0				
	Naphtha												1.2
	Aviation Jet Fuel							17.2	4.1	2		3.8	22
	Kerosene										7.3		
	Petroleum coke												
	Refinery gas/LPG (Buthane gas)		0.5	1.2			0.5				1.3	0.1	91
	Charcoal	49.7									198.9		
	Natural gas (Methane)		45	198.6	196		9.3				0		1140.7
	Biogas	5.2		6.9							8.7	3.5	
	Liquid Biofuel			0									
	Motor gasoline	45	25	75	15	20	85	105	8.1	0.7	147.5	0.2	
	Transport diesel	8.5	4.6	68.7	2.6	3.5	23.3	18.1	1.4	0.1	40.2	-14.9	4.9
	Electrical energy	14.65		35.3	27.6	2					30.5		8.6
	Refined fuel oil	0		23.9	0							21.7	14.7
	Wood waste, other biomass (Bagasse)	63.9		2.4	0						265.3		
	Non-energy[2]			250.3	0								

Annex 7: Total Energy Supply

	UNIT: Petajoule (10^{15})	Agriculture and forestry (ISIC A)	Mining (ISIC B)	Manufacturing (ISIC C)	Electricity ISIC D)	Water supply (ISIC E)	Imports	Total
Energy products	**Total**	**2269.9**	**6052.9**	**456.1**	**171.9**	**34.6**	**931.3**	**9916.8**
Products	Crude oil		4459.6					4459.6
	Coal		3.7					3.7
	Naphtha			1.2				1.2
	Aviation Jet Fuel			0.6			52.6	53.2
	Kerosene			7			65.8	72.8
	Petroleum coke			0.033				0.03
	Refinery gas/LPG (Buthane gas)			105.7				105.7
	Charcoal	994.3						994.3
	Natural gas (Methane)		1589.6					1589.6
	Biogas					34.6		34.6
	Liquid Biofuel						1.729E-09	1.729E-09
	Motor gasoline			12.7			612.2	624.8
	Transport diesel			10.8			157.4	168.2
	Electrical energy				171.9			171.9
	Refined fuel oil			17			43.3	60.3
	Wood waste, other biomass (Bagasse)	1275.6		50.7				1326.4
	Non-energy[2]			250.3			0.0000008	250.3

Annex 8: Renewable Share in the Total Final Energy Consumption (SDG 7.2.1)

	UNIT: Petajoule (10^{15})	Agriculture and forestry (ISIC A)	Electricity ISIC D)	Water supply (ISIC E)	Total
Natural inputs	**Total**	**1326.4**	**58.1**	**0**	**1384.5**
Natural inputs	Natural Timber Resources	1275.6			**1275.6**
	Solar based renwable		25.8		**25.8**
	Wind based renewable		6.1		**6.1**
	Hydro based renwable		26.2		**26.2**
	Cultivated Biomass	50.7		0.000171	**50.7**

Annex 9: Energy Used Per capita/GDP

Item	
Energy use per capita	53 GJ/Person
Energy use per unit of GDP	104 GJ/Naira

Annex 10: Supply Efficiency

Item	**PJ**	
Losses during extraction (Flaring)	18	1%
Losses during transmission (electricity)	18	10%
Losses during distribution (electricity)	17	10%
Losses during transformation	57	1%

Annex 11: Renewable Energy Share of Total Energy Consumption

Item	PJ	
Total final energy consumption	9697	
Based on Supply	0.1391902	14
Based on Use	0.1861536	19

Annex 12: Energy Intensity for ISIC Sector

Item	PJ	GJ/Naira
Agriculture and Forestry (ISIC A)	0.000142294	142
Mining (ISIC B)	0.00091284	913
Manufacturing (ISIC C)	0.000107268	107
Electricity (ISIC D)	0.001104759	1,105
Water Supply (ISIC E)	0.000365088	365
Construction (ISIC F)	4.40516E-05	44
Transport (ISIC H)	0.000174203	174
Public Admin (ISIC O)	8.28654E-06	8
Services	4.87937E-05	49

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