



United Nations Statistics Division

Energy Balances & Energy SDG Indicators

Leonardo Rocha Souza

SEMINAR ON

**Mainstreaming Energy Sustainable Development Goals
(SDGs), Targets and Indicators into Statistical
Programmes in Select African Countries**

27-29 June 2016

Addis Ababa, Ethiopia



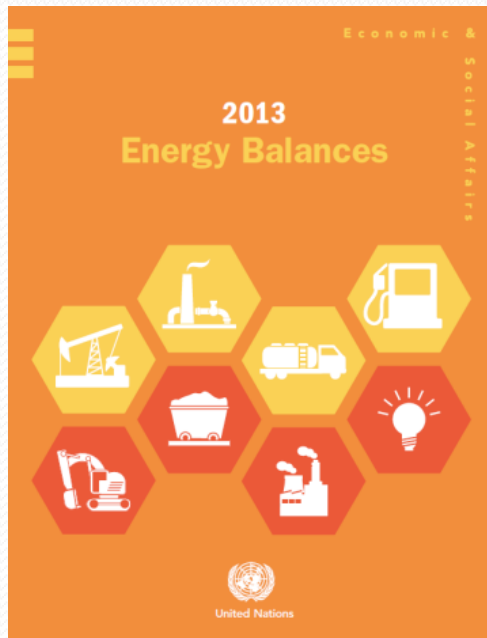
Energy balance methodology

The energy balance is an overview of all flows of energy products in an area (country) in a period of time (year).

It is presented in a common unit – terajoules, for example – and with products aggregated by category: coal, oil, petroleum products, gas, biomass, etc.

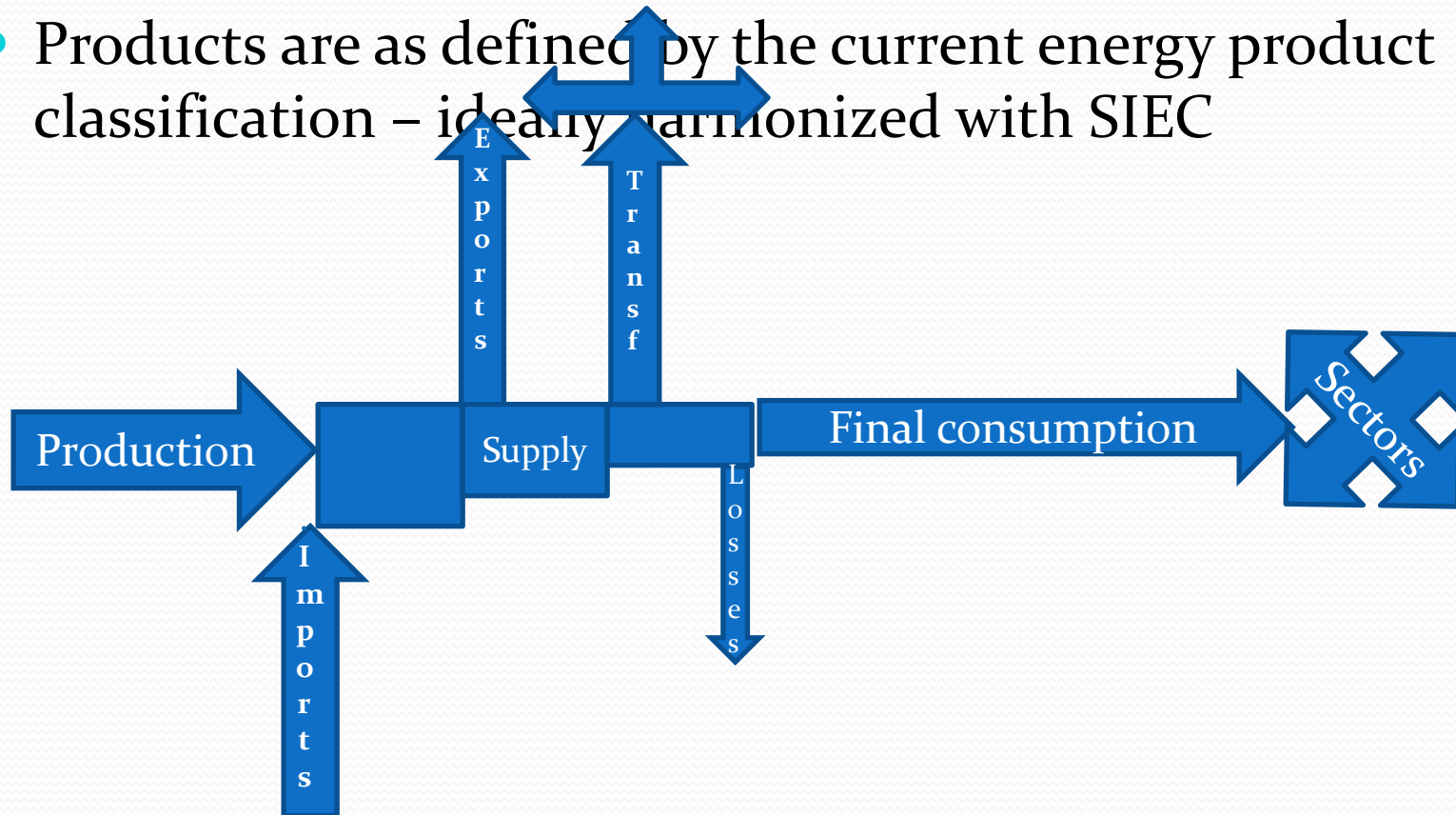
Some advantages:

- It allows to compare the share of each source in the energy supply of a country and in each sector of the economic activity.
- With an energy balance it is possible to analyse the efficiency of energy industries in a country.
- Many relevant energy indicators can be drawn from an energy balance.
- It provides a very effective 'extra check' on the data



Commodity balances

- A commodity balance describes all flows of a single energy product, where supply and uses can be measured and compared.
- Products are as defined by the current energy product classification – ideally harmonized with SIEC



Commodity balances – supply and use

Gas Oil/ Diesel Oil (DL); Metric tons, thousand		2007	2008	2009	2010	2011	2012
DL01	Production	31223	30875	30428	30880	30177	31547
DL022	Receipts from other sources	1	11	16	235	361	433
DL03	Imports	1527	3316	1578	696	1677	763
DL04	Exports	7048	7768	7607	6967	6335	8097
DL051	International marine bunkers	56	54	35	45	27	23
DL06	Stock changes	8	158	-169	121	190	83
DLGA	Total energy supply	25639	26222	24549	24678	25663	24540
DL07	Transfers and recycled products	-1368	-234	-247	-551	-888	-1476
DLSD	Statistical differences	-917	-1395	-829	-2830	-2932	-2570
DL08	Transformation	274	224	228	229	215	238
DL088	Transf in electricity, CHP and heat plants	274	224	228	229	215	238
DL09	Energy industries own use	29	13	13	16	26	36
DL0925	Oil refineries	29	13	13	16	26	36
DLNA	Final consumption	27621	27614	25384	27814	29242	28312
DL11	Non-energy uses	4	3	0	0	0	0
DL12	Final energy consumption	27617	27611	25384	27814	29242	28312
DL121	Manufacturing, construction	4372	4377	3900	4564	4798	4708
DL122	Transport	15686	16396	15594	17137	17891	17694
DL123	Other	7559	6838	5890	6113	6553	5910

- Statistical differences: balance b/w supply & use – the smaller the better, but it should not be made zero artificially as it indicates data problems

UNSD Energy Stats Questionnaire

QUESTIONNAIRE ON ENERGY STATISTICS UNITED NATIONS STATISTICS DIVISION

Country/Area: Brazil (76)

Hard Coal (CL); Metric tons, thousand (WSR)		Unit	2007 fn	2008 fn	2009 fn	2010 fn	2011 fn	2012 fn
CL01	Production	WSR	5965	6611	5061	5415	5505	6617
CL03	Imports	WSR	14864	15311	12462	15909	18007	16486
CL04	Exports	WSR					71	0
CL06	Stock changes	WSR	-86	1100	-145	-383	574	-515
CLGA	Total energy supply	+CL0 WSR	20915	20822	17668	21707	22867	23618
CLSD	Statistical differences	-CL08 WSR	5	174	51	6	-4	-1
CL08	Transformation	+CL0 WSR	15554	15166	13233	15706	15936	17048
CL088	Transformation in electricity, CHP and heat plants	WSR	5173	4821	3952	4753	4585	6207
CL08811	Electricity plants - Main activity producers	WSR	5075	4511	3860	4412	4295	5907 *
CL08812	Electricity plants - Autoproducers	WSR	98	310	92	341	290	300 *
CL081	Coke ovens	WSR	10381	10345	9281	10953	11351	10841
CL101	Losses	WSR	30	0	48	40	80	19
CLNA	Final consumption	+CL1 WSR	5326	5482	4336	5955	6855	6552
CL12	Final energy consumption	+CL1 WSR	5326	5482	4336	5955	6855	6552
CL121	Manufacturing, construction and non-fuel mining industry	+CL1 WSR	5326	5482	4336	5955	6855	6552
CL1211	Iron and steel	WSR	3406	3601	2773	3114	3378	3253
CL1213	Chemical and petrochemical	WSR	155	208	160	281	236	333
CL1214	Other manuf., const. and non-fuel min. ind.	WSR	1765	1673	1403	2560	3241	2966
Coke Oven Coke (OK); Metric tons, thousand (WSR)		Unit	2007 fn	2008 fn	2009 fn	2010 fn	2011 fn	2012 fn
OK01	Production	WSR	8315	8286	7259	9189	9683	9683
OK03	Imports	WSR	1576	1900	434	1801	2142	1591
OK04	Exports	WSR	2	1				
OK06	Stock changes	WSR	120	325	-15	82	-82	-328
OKGA	Total energy supply	+OK0 WSR	9769	9860	7708	10908	11907	11602
OKSD	Statistical differences	-OK0 WSR	9	112	-1	-1	0	0
OK101	Losses	WSR	26	33	15	15	10	10
OKNA	Final consumption	+OK1 WSR	9734	9715	7694	10894	11897	11592
OK12	Final energy consumption	+OK1 WSR	9734	9715	7694	10894	11897	11592
OK121	Manufacturing, construction and non-fuel mining industry	+OK1 WSR	9734	9715	7694	10894	11897	11592
OK1211	Iron and steel	WSR	9310	9287	7334	10523	11371	10997
OK1214	Other manuf., const. and non-fuel min. ind.	WSR	424	428	360	371	526	595
Conventional crude oil (CR); Metric tons, thousand (WSR)		Unit	2007 fn	2008 fn	2009 fn	2010 fn	2011 fn	2012 fn
CR01	Production	WSR	78944	82954	89823	95043	97550	95652
CR03	Imports	WSR	21081	19335	19020	17182	16831	17495
CR04	Exports	WSR	21373	21970	26660	32028	30660	27051

Commodity balances

Commodity balances (and the UNSD energy stats questionnaire) display basic energy statistics only

- Basic energy statistics comprised of combinations of products and flows

- All flows relevant to a given commodity are grouped under the commodity header

What are the limitations of basic energy statistics?

- Different reporting units and different calorific values make statistics between commodities incomparable.

Hard Coal (CL); Metric tons, thousand		2011	2012
CL01	Production	34621	35375
CL03	Imports	9184	7821
CL04	Exports	33552	34648
CL06	Stock changes	-167	-138
CLGA	Total energy supply	10420	8686
CLSD	Statistical differences	-41	-1412
CL08	Transformation	8093	7730
CL088	Transformation in electricity, CHP and heat	4391	4037
CL0881	Electricity plants - Main activity producer	4390	4036
CL08812	Electricity plants - Autoproducers	1	1
CL081	Coke ovens	3702	3693

Motor Gasoline (MO); Metric tons, thousand		2011	2012
MO01	Production	28587	29584
MO03	Imports	4092	2938
MO04	Exports	5579	6086
MO06	Stock changes	-21	-96
MOGA	Total energy supply	27121	26532
MO12	Final energy consumption	30687	31676
MO122	Transport	30687	31676
MO1221	Road	30687	31676

Fuelwood (FW); Cubic metres, thousand		2011	2012
FW01	Production	31200	30094
FW03	Imports	320	384
FW04	Exports	2555	2854
FW088	Transformation in electricity, CHP and heat	8532	8531
FW08812	Electricity plants - Autoproducers	8532	8531
FW1231	Households	11334	11569

Energy Balances

- The energy balance describes all the physical flows of energy that are embodied in energy products.
- These flows are expressed in a same energy unit (e.g., terajoule, tons of oil equivalent).
- It shows all relevant commodity balances together (grouped by types of products), displaying their interrelationships.
 - After some presentational rearrangements
- Flows are defined by the current energy classification (be it particular to a country or common to the members of an organization)
 - The work of InterEnerStat and the International Recommendations for Energy Statistics (IRES) constituted a huge step towards harmonization of these classifications.
- While for the country the energy balance is mostly an energy policy tool, it can also be a tool for checking data consistency, because laws of Physics should be observed in the measured energy flows.

Energy balance

Conversion to energy units

- Physical units (tons or m³) are converted to energy units using Net calorific values (NCV) [kJ/kg], which ideally are measured frequently for different processes and sources and then averaged for the country/flow.
 - Specific NCV for different flows, when available (most importantly, Production and Imports)
 - Weighted-average NCV for all other flows (if only NCVs for Production and Imports are available).
 - Default NCV if no information available (undesirable case)
- If commodities are reported in energy units (such as kWh for electricity or TJ for natural gas), the appropriate conversion to a common unit must be made

Products grouped into types

Togo								
Terajoules								
	All Coal	All Oil	Natural Gas	Primary biofuels / Waste	Charcoal	Electricity	Total energy	of which: renewables
2013								
Primary production	107224	..	320	107544	107544
Imports	..	25009	..	..	..	3629	28637	..
Exports
International marine bunkers	..	-688	..	..	..	..	-688	..
International aviation bunkers	..	-3263	..	..	..	..	-3263	..
Stock changes	..	1833	..	..	..	..	1833	..
Total energy supply	..	22390	..	107224	..	3949	134064	107544
Statistical Difference	..	-84	..	0	0	47	-37	0
Transfers
Transformation	..	-260	..	-67126	19234	79	*-48075	*-47894
Electricity plants	..	-260	..	* 38	..	79	-219	*-38
Charcoal plants	*-67090	19234	..	*-47856	*-47856
Other transformation	..	0	..	0	..	..	0	0
Energy industries own use	-32	-32	..
Losses	-345	-345	..
Final consumption	..	22715	..	*40096	19234	3600	85645	*59330
Final energy consumption	..	22594	..	*40096	19234	3600	85524	*59330
Manufacturing, const., mining	..	1985	..	..	..	..	3155	*321
Transport	..	17738	..	..	..	..	17738	..
Road	..	17738	..	..	..	..	17738	..
Domestic aviation
Domestic navigation
Other transport
Other	..	2871	..	*39775	19234	3750	*64631	*59009
Agriculture, forestry, fishing
Commerce and public services	*6370	874	471	*7822	*7344
Households	..	2871	..	1095	..	..	*50607	*50607
Other consumers	*1282	*1059
Non-energy use	..	271	..	..	..	..	121	..

Primary production only

Secondary production reported here, together with inputs to transformation (net value)

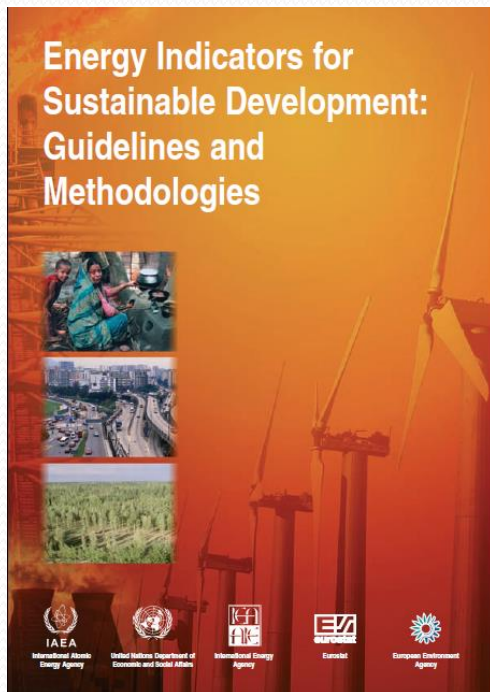
Final energy consumption with Negative: fuel burned to generate electricity into charcoal

Positive: electricity generated from primary oil products
Positive: Charcoal generated from wood
Positive: fuelwood transformed into charcoal

Energy indicators – economic dimension

Economic dimension:

- Overall Use: Energy use per capita
- Overall intensity: Energy use per unit of GDP
- Supply Efficiency: Efficiency of energy conversion and distribution
- Production: Reserves (/resources)-to-production ratio
- End Use:
 - Industrial energy intensities
 - Agricultural energy intensities
 - Service/ commercial energy intensities
 - Household energy intensities
 - Transport energy intensities
- Diversification (Fuel Mix):
 - Fuel shares in energy and electricity
 - Non-carbon energy share in energy and electricity
 - Renewable energy share in energy and electricity
- Imports: Net energy import dependency



SDG 7 - Ensure access to affordable, reliable, sustainable and modern energy for all

Target	Indicator
7.1 By 2030, ensure universal access to affordable, reliable and modern energy services	7.1.1 Proportion of population with access to electricity
	7.1.2 Proportion of population with primary reliance on clean fuels and technology
7.2 By 2030, increase substantially the share of renewable energy in the global energy mix	7.2.1 Renewable energy share in the total final energy consumption
7.3 By 2030, double the global rate of improvement in energy efficiency	7.3.1 Energy intensity measured in terms of primary energy and GDP
7.a By 2030, enhance international cooperation... (means of implementation)	7.a.1 Mobilized amount of US\$...
7.b By 2030, expand infrastructure and upgrade technology... (means of implementation)	7.b.1 Investments in energy efficiency ...

Overall use/intensity

- Extra info (not found in the balance of payments): **GDP** for intensity.

ECO1: Energy use per capita

Brief Definition	Energy use in terms of total primary energy supply (TPES), total final consumption (TFC) and final electricity use per capita
Units	Energy: tonnes of oil equivalent (toe) per capita Electricity: kilowatt-hours (kWh) per capita
Alternative Definitions	None
Agenda 21	Chapter 4: Consumption and production patterns

ECO2: Energy use per unit of GDP

Brief Definition	Ratio of total primary energy supply (TPES), total final consumption (TFC) and electricity use to gross domestic product (GDP)
Units	Energy: tonnes of oil equivalent (toe) per US dollar Electricity: kilowatt-hours (kWh) per US dollar
Alternative Definitions	Sectoral energy intensities
Agenda 21	Chapter 4: Consumption and production patterns

Kenya Terajoules

	Electricity	Heat	Total energy
2013			
Primary production	16019	64112	*718514
Imports	178	..	182060
Exports	-131	..	-1576
International marine bunkers	..	..	-1656
International aviation bunkers	..	..	-24312
Stock changes	..	..	0
Total energy supply	16064	64112	*873029
Statistical difference			
Transfers			
Transformation			
Electricity plants	● ● ●		
CHP plants	● ● ●		
Energy industries own use			
Losses			
Final consumption	26266	..	490234
Final energy consumption	26266	..	483119
Manufacturing, const., mining	15977	..	64165
Iron and steel	..	..	..
Other	10289	..	339841
Agriculture, forestry, fishing	..	..	833
Commerce, public services	3593	..	3593
Households	6012	..	332630
Other consumers	684	..	2785
Non-energy use	..	..	7115

SDG indicator 7.3.1: energy intensity

Supply Efficiency: Efficiency of energy conversion and distribution

ECO3: Efficiency of energy conversion and distribution

Brief Definition	Efficiency of energy conversion and distribution, including fossil fuel efficiency for electricity generation, efficiency of oil refining and losses occurring during electricity transmission and distribution, and gas transportation and distribution
Units	Percentage
Alternative Definitions	None
Agenda 21	Chapter 4: Consumption and production patterns

Cameroon

Terajoules

	Primary coal and peat	Coal and peat products	Primary Oil	Oil Products	Natural Gas	Biofuels and waste	Nuclear	Electricity	Heat	Total energy
2013										
Total energy supply	100336	-26603	16034	200053	..	17478	..	307298
Statistical difference	0	0	0	*-1	..	0	..	*-1
Transfers	-26	..	..	..	..	..	-26
Transformation	-100336	86665	-5934	*-5137	..	7178	..	-17563
Electricity plants	-15139	-5934	*-637	..	7178	..	-14531
CHP plants
Heat plants
Coke ovens
Briquetting plants
Liquefaction plants
Gas works
Blast furnaces
NGI plants & gas blending
Oil refineries	100336	101104	..	..	..	..	..	1469
Other transformation	*-4500	..	..	..	*-4500
Energy industries own use	-2675	-6894	..	..	-3265	..	-12834
Losses	-2712	3107	..	..	-2413	..	-8402
Final consumption	54589	..	*194917	..	18968	..	*268474

Refinery input, output, losses (efficiency indirectly derived): $101804/100336 = 101.5\%$
 (data to be investigated!!!)

Refinery fuel

Final consumption

Transmission & distribution losses; generate electricity

Positive: electricity generated from transformation losses; efficiency can be assessed:
 Negative: fuel burned to combustible fuels
 $7178/(15139+5934+637) = 33.1\%$

Production: Reserves (/resources)-to-production ratio

- Extra info (not found in the balances): reserves and resources of primary fossil fuels.

ECO5: Resources-to-production ratio

ECO4: Reserves-to-production ratio

Brief Definition	Ratio of energy reserves remaining at the end of a year to the production of energy in that year. Also, lifetime of proven energy reserves or the production life index
Units	years
Alternative Definitions	Total reserves Depletion rate of reserves
Agenda 21	Chapter 4: Consumption and production patterns

Ratio of the energy resources remaining at the end of a year to the production of energy in that year Also, lifetime of proven energy resources
years
Total resources Depletion rate of resources
Chapter 4: Consumption and production patterns

Zambia					
Terajoules					
	Primary coal and peat	Coal and peat products	Primary Oil	Oil Products	Nat G
2013					
Primary production	4351	..	..	..	..

Ghana					
Terajoules					
	Primary coal and peat	Coal and peat products	Primary Oil	Oil Products	Nat G
2013					
Primary production	222773	..	..

End-use intensities

ECO6: Industrial energy intensities

Brief Definition	Energy use per unit of value added in the industrial sector and by selected energy-intensive industries
Units	Energy: tonnes of oil equivalent (toe) per US dollar Electricity: kilowatt-hours (kWh) per US dollar
Alternative Definition	Energy use per unit of physical output in the industrial sector and by selected energy-intensive industries

ECO7: Agricultural energy intensities

Brief Definition	Final energy use per unit of agricultural value added
Units	Energy: tonnes of oil equivalent (toe) per US dollar Electricity: kilowatt-hours (kWh) per US dollar
Alternative Definition	Energy use per unit of agricultural output

ECO8: Service/commercial energy intensities

Agenda 21	Brief Definition	Final energy use per unit of service and commercial value added or per floor area	Consumption and production patterns
------------------	-------------------------	---	-------------------------------------

ECO9: Household energy intensities

Brief Definition	Amount of total residential energy used per person or household or unit of floor area. Amount of energy use by residential end use per person or household or appliance
-------------------------	---

(toe) for final energy and electricity per US dollar
US dollars (purchasing power parity) per square metre of floor area

ECO10: Transport energy intensities

Units	Tonnes of oil equivalent (toe) per tonne-km kilowatt-hour per passenger-km household or unit of floor area; kWh of electricity per household or unit of floor area; kWh for water consumption	Brief Definition	Energy use per unit of freight-kilometre (km) hauled and per unit of passenger-km travelled by mode
Alternative Definitions	None	Units	Freight: tonnes of oil equivalent (toe) per tonne-km Travel: toe per passenger-km
Agenda 21	Chapter 4: Consumer Policy	Alternative Definitions	Overall average fuel consumption for all modes per passenger-km or tonne-km
		Agenda 21	Consumption and production patterns

End-use intensities

(disaggregation of SDG indicator 7.3.1)

- Possible additional data (not in the balances):
 - Agricultural, commercial, industrial value added;
 - Commercial or residential floor area;
 - Population or number of households;
 - Freight-kilometre hauled; passenger-km transported.
- Info from the balance: final energy/electricity consumption per sector

End-use intensities

Ethiopia		
Terajoules	2013	
	Electricity	Total energy
Final consumption	21913	*1287554
Final energy consumption	21913	*1284298
Manufacturing, const., mining	7315	51498
Transport	..	54190
Road	..	51456
Domestic aviation	..	2734
Domestic navigation	..	..
Other transport	..	..
Other	14598	*1178610
Agriculture, forestry, fishing	..	4515
Commerce and public services	5897	21194
Households	8550	*1148234
Other consumers	151	4666
Non-energy use	..	3256

- Final consumption breakdown by sector is available from the energy balance.
- Detailed data on this breakdown makes for more accurate indicators.

End-use intensities

Sierra Leone

Terajoules

2013

Electricity

Total energy

	Electricity	Total energy
Final consumption	248	*56106
Final energy consumption	248	*55905
Manufacturing, const., mining	104	*1549
Transport	..	*6826
Road	..	*6826
Domestic aviation	..	..
Domestic navigation	..	..
Other transport	..	..
Other	144	*47529
Agriculture, forestry, fishing	..	..
Commerce and public services	111	111
Households	32	*30176
Other consumers	..	17242
Non-energy use	..	*201

- Final consumption breakdown by sector is available from the energy balance.

Diversification (Fuel mix)

ECO11: Fuel shares in energy and electricity

Brief Definition	The structure of energy supply in terms of shares of energy fuels in total primary energy supply (TPES), total final consumption (TFC) and electricity generation and generating capacity
-------------------------	---

Units ECO12: Non-carbon energy share in energy and electricity

Alternative	Brief Definition	The share of non-carbon energy sources in primary energy supply (TPES) and in electricity generation and generating capacity
Agenda 21		

Units ECO13: Renewable energy share in energy and electricity

Alternative	Brief Definition	The share of renewable energy in total primary energy supply (TPES), total final consumption (TFC) and electricity generation and generating capacity (excluding non-commercial energy)
Agenda 21		
	Units	Percentage
	Alternative Definitions	None
	Agenda 21	Chapter 4: Changing consumption and production patterns

SDG indicator 7.2.1: renewable share in TFC

Rwanda

Terajoules

	All Coal	All Oil	Natural Gas	Primary biofuels / Waste	Charcoal	Electricity	Total energy
2012							
Primary production	*20	*80029	..	654	*80704
Imports	..	11168	..	..	..	327	11495
Exports	..	0	..	..	..	-10	-10
International marine bunkers
International aviation bunkers	..	*-864	..	..	..	..	*-864
Stock changes	..	0	..	..	..	..	0
Total energy supply	..	10303	*20	*80029	..	971	*91324
Statistical Difference	..	0	0	0	0	0	0
Transfers
Transformation	..	*-2305	..	*-31528	*16968	760	*-16104
Electricity plants	..	*-2305	..	..	..	760	*-1544

Gambia

Terajoules

	All Coal	All Oil	Natural Gas	Primary biofuels / Waste	Charcoal	Electricity	Total energy	of which: renewables
Final consumption	..	*4937	*92	*3141	*1891	*897	*10957	*5032
Final energy consumption	..	*4937	*92	*3141	*1891	*897	*10957	*5032
Manufacturing, const., mining	..	*170	..	..	..	*127	*296	..
Transport	..	*3323	..	..	..	..	*3323	..
Road	..	*3323	..	..	..	..	*3323	..
Domestic aviation
Domestic navigation
Other transport
Other	..	*1444	*92	*3141	*1891	*770	*7338	*5032
Agriculture, forestry, fishing
Commerce and public services
Households	..	*920	..	*3141	*1891	..	*5952	*5032
Other consumers	..	*525	*92	..	..	*770	*1386	..
Non-energy use

Uganda

Terajoules

Final consumption	4438	*35638	..	*358320	17698	7452	*423547	*376018
Final energy consumption	4438	*35200	..	*358320	17698	7452	*423109	*376018
Manufacturing, const., mining	4438	*4839	..	*14070	..	4856	*28203	*14070
Transport	..	26519	..	..	..	..	26519	..
Road	..	26519	..	..	..	..	26519	..
Domestic aviation	..	..	..	..	..	..	..	..
Domestic navigation	..	..	..	..	..	..	..	..
Other transport	..	..	..	..	..	..	..	..
Other	..	*3842	..	*344250	17698	2596	*368387	*361949
Agriculture, forestry, fishing	..	*1423	..	..	..	0	*1423	..
Commerce and public services	..	*213	..	..	..	921	1134	..
Households	..	*2206	..	*344250	17698	1675	*365830	*361949
Other consumers	..	..	..	..	..	0	0	..
Non-energy use	..	*438	..	..	..	..	*438	..

Diversification (Fuel mix)

- Total Energy Supply (TPES) and Total Final Consumption (TFC) rows as shown above
- For these indicators, a more detailed disaggregation by products/sources allows a better analysis:
 - So that different electricity sources can be identified;
 - Renewables (and wastes) can be distinguished from non-renewables;
 - Non-carbon (nuclear + renewables) can be distinguished from carbon energy;
 - Ideally as part of a more detailed energy balance

More detailed fuel mix - Cameroon

Tableau 17. 26: Consommation finale d'énergie en unité physique (en 103 tonnes métriques sauf électricité en GWH)

Sources d'énergie	2004	2005	2006	2007	2008	2009	2010 ^e	2011 ^e
Biomasse								
Bois de feu	9 949,13	10 234,69	10 442,73	10 655,01	10 871,60	11 372,95	10966,52	11070,36
Charbon de bois	187,34	192,72	196,64	200,64	204,71	214,16	206,5	208,46
Sciure et copeaux	264,18	271,76	277,29	282,92	288,67	301,99	291,19	293,95
Produits pétroliers								
GPL	35,39	36,17	50,39	48,16	52,08	50,89	///	///
Super	286,31	313,07	319,98	326,81	340,6	348,85	///	///
Gasoil	316,82	311,44	329,72	341,09	342,95	441,57	///	///
Pétrole lampant	130,02	111,21	96,25	95,02	91,67	90,46	///	///
Jet A1	16,76	13,75	8,29	10,91	11,53	11,83	///	///
Avgaz 100 LL	0,02	7,42	9,67	0	1	2	///	///
FO 1500	57,65	65,91	53,44	59,07	63,25	87,22	///	///
Lubrifiant	12,67	10,73	11,45	11,26	11,3	11	///	///
Bitumes	5,41	6,66	8,31	9,05	8,5	12,3	///	///
Huile régénérée	0	0	0	6,59	6,56	5,13	///	///
Électricité							///	///
Électricité	3 901,51	4 101,02	4 291,23	4 219,13	4 658,58	4 662,79	///	///

Source : MINEE, annuaire 2010

- Diversification - for electricity generation and capacity, underlying statistics better than energy balance (Kenya)

ELECTRICITY
Installed Capacity by type of Power, 2006 2014

Table 94 MW*

	2006	2007	2008	2009	2010	2011	2012	2013	2014**
Type of power									
Hydro	677.3	677.3	719.0	730.0	728.0	735.0	769.9	766.6	797.0
Thermal	369.8	389.3	418.9	421.5	469.2	582.7	610.6	693.2	712.6
Geothermal	128.0	128.0	128.0	158.0	189.0	190.6	199.6	236.5	558.0
Cogeneration	2.0	2.0	2.0	2.0	26.0	26.0	26.0	21.5	21.5
Total	1,177.1	1,196.6	1,267.9	1,311.5	1,412.2	1,534.3	1,606.1	1,717.8	2,089.1

Source: Kenya Power and Lighting Co.Ltd.

Note: Estimates for own production are not included

* 1Megawatt = Million Watts = 1,000 Kilowatts

** Provisional

ELECTRICITY
Generation by type and Imports, 2006 - 2014

Table 95 Million KWh

	2006	2007	2008	2009	2010	2011	2012	2013	2014*
Generated									
Type of power									
Hydro	3,025	3,592	3,267	2,160	3,224	3,217	4,016	4,435	3,569
Thermal	1,819	1,736	2,145	2,997	2,201	2,801	2,200	2,162	2,585
Geothermal	1,046	989	1,039	1,293	1,442	1,444	1,516	1,781	2,917
Cogeneration	6	8	4	50	92	81	105	56	50
Wind					17	18	14	15	17
Sub Total	5,895	6,325	6,455	6,500	6,976	7,560	7,851	8,448	9,139
Imported									
From Uganda and Tanzania	11	23	25	39	30	34	39	49	158
Total Generated and Imported	5,906	6,347	6,480	6,539	7,006	7,594	7,890	8,497	9,297

Source: Kenya Power and Lighting Co.Ltd.

Note: Estimates for own production are not included

* Provisional

Net energy import dependency

ECO15: Net energy import dependency

Brief Definition	The ratio of net import to total primary energy supply (TPES) in a given year in total and by fuel type such as oil and petroleum products, gas, coal and electricity
Units	Percentage
Alternative Definitions	Net energy imports
Agenda 21	Chapter 4: Consumption and production patterns

Thailand

Terajoules

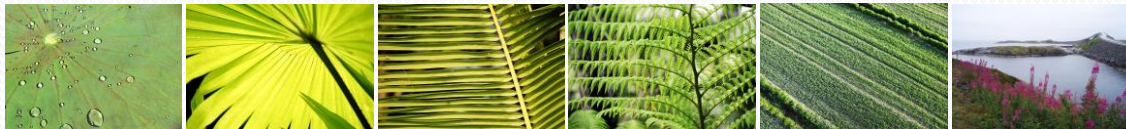
	Primary coal and peat	Coal and peat products	Primary Oil	Oil Products	Natural Gas	Biofuels and waste	Nuclear	Electricity	Heat	Total energy
2012										
Primary production	219357	..	*709525	..	*1199596	*1016730	..	30445	36	*3175790
Imports	484282	1015	1845547	108003	344828	4101	..	37897	..	2825673
Exports	0	..	-90866	-444322	..	-7255	..	*-6743	..	-549186
International marine bunkers	..	..	..	..	..	..	..	..	..	..
International aviation bunkers	..	..	..	..	..	..	..	..	..	..
Stock changes	4791	0	*-30364	*-36208	..	2985	..	..	..	*-58796
Total energy supply	708430	1015	2433842	-372526	*1544523	*1016561	..	61600	36	5393481

Oil energy dependency: $(1,845,547 + 108,003) - (90,866 + 444,322) / (2,433,842 - 372,526) = 68.8\%$

Total energy dependency: $(2,825,673 - 549,186) / 5,393,481 = 42.2\%$



United Nations Statistics Division



Thank you.

<http://unstats.un.org/unsd/energy/>