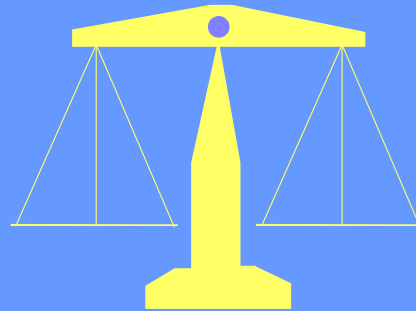




Workshop on Capacity Development for Mainstreaming Energy
SDGs, Targets and Indicators into Statistical Programmes in
Selected LA Countries

Panama City, Panama, 4-6 February 2015.

UNSD Energy Statistics



Energy Balances – Applications (derived indicators)

Alex Blackburn and Leonardo Souza

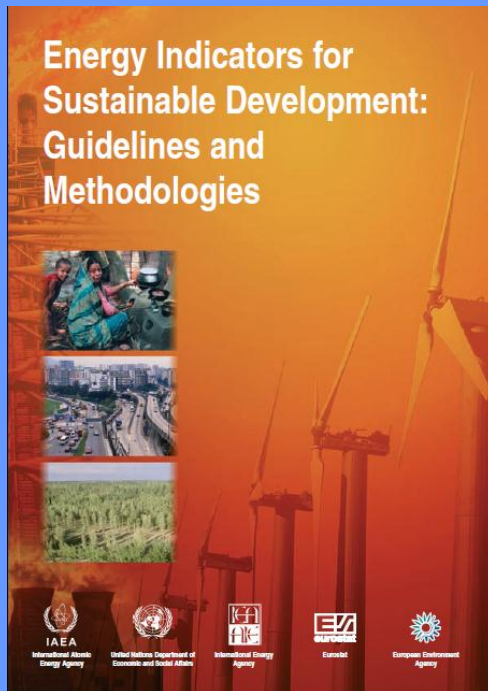
Industrial & Energy Statistics Section - United Nations Statistics Division



Energy indicators – economic dimension

Economic dimension:

- Overall Use: Energy use per capita
- Overall Productivity: 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





Overall use/productivity

➤ Extra info (not found in the main table) for use per capita; **GDP** for use per unit of GDP

Ecuador
Terajoules

Electricity	Total energy
Electricité	Energie totale

		2011	
1	Production of primary energy	31100.	1189333
2	Imports	3143	216508
3	Exports	-36	816172
4	Marine / aviation bunkers	..	-55379
5	Stock changes	..	20437
6	Total energy supply	34207.	554727
7	Transformation	38282	-84368
8	Briquetting plants	..	..
9	Coke ovens	..	..
10	Gas works	..	..
11	Blast furnaces	..	..
12	Oil refineries	..	-4249
13	NGL plants and gas blending	..	222
14	Electric power plants	38282	-78252
15	Heating plants	..	..
16	Other transformation	..	*-2088
17	Net transfers	..	..
18	Energy industries own use	-10822	-25856
19	Losses in transport and distribution	-11844	-14974
20	Cons. for non-energy uses	..	-21829
21	Statistical differences	-889.	1377
22	Final energy consumption	50713	406323
23	By industry and construction	15901	74305
24	Iron and steel industry	..	..
25	Chemical industry	..	..
26	Other industry and construction	15901	74305
27	By transport	40	212763
28	Road	..	180082
29	Rail	..	..
30	Air	..	177
31	Inland and coastal waterways	..	32465
32	By other modes of transportation	40	40
33	By households and other consumers	34772	119254
34	Households	18410	98141
35	Agriculture	..	3887
36	Other consumers	16362	17226

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



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



Efficiency of electricity generation and transmission & distribution

Panama Terajoules								Panama Térajoules							
Energy sources and products →	Hard coal, brown coal and peat	Coal products and peat products	Primary oil	Light oil products	Heavy oil products	Other oil products	LPG, refinery gas, ethane	Natural gas	Manufactured gases	Electricity	Primary biomass/waste	Charcoal	Heat	Total energy	← Sources et produits d'énergie
Production and utilisation ↓	Houille, lignite et tourbe	Produits de charbon et de tourbe	Pétrole brut, LGN, autres hydrocarbures	Produits pétroliers légers	Produits pétroliers lourds	Autres produits pétroliers	GPL, gaz de raffinerie, éthane	Gaz naturel	Gaz manufacturés	Électricité	Biomasse primaire/déchets	Charbon de bois	Chaleur	Energie totale	Production et utilisation
2011															
1 Production of primary energy	14753	16574	..	..	31327	1 Production d'énergie primaire
2 Imports	6946	2228	..	46370	153477	5025	7190	..	..	259	..	..	..	221494	2 Importations
3 Exports	-40	..	..	-29	..	..	..	-74	3 Exportations
4 Marine / aviation bunkers	-17155	-100509	..	..	..	..	..	..	..	..	-117664	4 Soutes
5 Stock changes	3005	22273	-2291	47	..	..	..	..	..	..	23034	5 Variations des stocks
6 Total energy supply	6946	2228	..	32220	75241	2693	7232	..	..	14983	16574	..	..	158117	6 Approv. totaux en énergie
7 Transformation	-6946	..	..	..	-30100	..	..	..	..	13534	-2599	148	..	-25964	7 Transformation
8 Briquetting plants	8 Usines de briquettes
9 Coke ovens	9 Cokeries
10 Gas works	10 Usines de gaz
11 Blast furnaces	11 Hauts fourneaux
12 Oil refineries	12 Raffineries de pétrole
13 NGL plants and gas blending	13 Usines de LGN et mélange de gaz
14 Electric power plants	-6946	..	..	..	-30100	..	..	..	..	13534	-2221	..	..	-25734	14 Centrales électriques
15 Heating plants	278	..	..	..	15 Centrales thermiques
16 Other transformation	148	..	..	16 Autre transformation
17 Net transfers	17 Transferts nets
18 Energy industries own use	18 Consom. propre de l'ind. énergétique
19 Losses in transport and distribution	-3888	..	..	..	-888	19 Pertes trans. et distrib.
20 Cons. for non-energy uses	1097	..	..	..	..	20 Utilis. à fins non énergétiques
21 Statistical differences	0	0	..	3617	-2448	-44	43	..	..	1097	-5	0	..	1659	21 Ecarts statistiques
22 Final energy consumption	..	2228	..	28603	47588	2738	7190	..	..	24102	13980	148	..	116576	22 Consommation d'énergie finale
23 By industry and construction	..	2228	..	2378	20200	2693	2129	..	..	2376	3573	..	..	5576	23 Industries et construction
24 Iron and steel industry	24 Industrie sidérurgique
25 Chemical industry	25 Industrie chimique
26 Other industry and construction	..	2228	..	2378	20200	2693	2129	..	..	2376	3573	..	..	3576	26 Autres industries et construction
27 By transport	25650	25499	40	47	..	..	..	..	..	..	51236	27 Transports
28 Road	25650	25499	..	..	..	..	..	..	..	..	51149	28 Transports routiers
29 Rail	29 Transports ferroviaires
30 Air	30 Transports aériens
31 Inland and coastal waterways	31 Transports fluviaux cabotage
32 By other modes of transportation	40	47	..	..	..	..	..	..	88	32 Autres modes de transport
33 By households and other consumers	579	1889	4	5014	..	..	21726	10408	148	..	39763	33 Ménages et autres consom.
34 Households	89	..	..	4919	..	..	7560	10408	89	..	23063	34 Ménages
35 Agriculture	44	516	..	..	..	..	..	..	..	..	560	35 Agriculture
36 Other consumers	448	1373	4	95	..	..	14166	..	59	..	16140	36 Autres consommateurs

Transmission & distribution losses
Final consumption
Negative: fuel burned to generate electricity

Positive: electricity generated from combustible fuels
Transformation losses; efficiency can be assessed



Efficiency of oil refining

Cuba Terajoules								Cuba Térajoules							
Energy sources and products →	Hard coal, brown coal and peat	Coal products and peat products	Primary oil	Light oil products	Heavy oil products	Other oil products	LPG, refinery gas, ethane	Natural gas	Manufactured gases	Electricity	Primary biomass/waste	Charcoal	Heat	Total energy	← Sources et produits d'énergie
Production and utilisation ↓	Houille, lignite et tourbe	Produits de charbon et de tourbe	Pétrole brut, LGN, autres hydrocarbures	Produits pétroliers légers	Produits pétroliers lourds	Autres produits pétroliers	GPL, gaz de raffinerie, éthane	Gaz naturel	Gaz manufacturés	Électricité	Biomasse primaire/déchets	Charbon de bois	Chaleur	Énergie totale	Production et utilisation
2011															2011
1 Production of primary energy			127408					39801		356	42835			210400	1 Production d'énergie primaire
2 Imports	59	85	207989	42945	85574	643	4399							341694	2 Importations
3 Exports															3 Exportations
4 Marine / aviation bunkers				*-5909	*-1290										4 Soutes
5 Stock changes														*-7199	5 Variations des stocks
6 Total energy supply	59	85	335397	37036	84284	643	4399	39801		356	42835			544894	6 Approv. totaux en énergie
7 Transformation		*-85	*-317927	49061	53073	5413	4048		3976	63576	*-33407	1564		*-170708	7 Transformation
8 Briquetting plants															8 Usines de briquettes
9 Coke ovens															9 Cokeries
10 Gas works		0							3852					3852	10 Usines de gaz
11 Blast furnaces		*-85													11 Hauts fourneaux
12 Oil refineries			*-209893	49061	146312	5413	4048		*124						12 Raffineries de pétrole
13 NGL plants and gas blending															13 Usines de LGN et mélange de gaz
14 Electric power plants			*-108034		*-93239					63576	*-30502			*-16099	14 Centrales électriques
15 Heating plants															15 Centrales thermiques
16 Other transformation											*-2905	1564		*-341	16 Autre transformation
17 Net transfers															17 Transferts nets
18 Energy industries own use											3409			3409	18 Consom. propre de l'ind. énergétique
19 Losses in transport and distribution											-10033			-10033	19 Pertes trans. et distrib.
20 Cons. for non-energy uses														4904	20 Utilis. à fins non énergétiques
21 Statistical differences	0	0	0	50134	-1650	925	1419	5189	0	-13446	-2874	-30		9667	21 Ecarts statistiques
22 Final energy consumption	59	0	*17470	*35963	139007	228	6345	34612	3976	63936	12302	1593		34490	22 Consommation d'énergie finale
23 By industry and construction	59	0	*17470	5111	106580	228	378	34573	494	17212	1215			13319	23 Industries et construction
24 Iron and steel industry		0							*124					*124	24 Industrie sidérurgique
25 Chemical industry															25 Industrie chimique
26 Other industry and construction	59		*17470	5111	06580	228	378	34573	370	17212	1215			33195	26 Autres industries et construction
27 By transport					*20482	8643					914			30040	27 Transports
28 Road					*11740	8643								20383	28 Transports routiers
29 Rail										914				914	29 Transports ferroviaires
30 Air					6528									6528	30 Transports aériens
31 Inland and coastal waterways															31 Transports fluviaux cabotage
32 By other modes of transportation					2215									2215	32 Autres modes de transport
33 By households and other consumers				10370	23784		4967	39	3482	45810	11087	1593		101132	33 Ménages et autres consom.
34 Households				5896	3010		3169		2691	24764	609	590		40730	34 Ménages
35 Agriculture				266	6480					1148	877			8771	35 Agriculture
36 Other consumers				4208	14294		1797	39	791	19897	9601	1003		51631	36 Autres consommateurs

Refinery row summary of inputs and outputs

Refinery input

Refinery output

Transformation losses; efficiency can be assessed



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

➤ Extra info (not found in the balance): 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	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
Units	years	years
Alternative Definitions	Total reserves Depletion rate of reserves	Total resources Depletion rate of resources
Agenda 21	Chapter 4: Consumption and production patterns	Chapter 4: Consumption and production patterns

Guatemala

Terajoules

Energy sources and products →	Hard coal, brown coal and peat Houille, lignite et tourbe	Coal products and peat products Produits de charbon et de tourbe	Primary oil Pétrole brut, LGN, autres hydrocarbures
Production and utilisation ↓			
	2010		
1 Production of primary energy			27537

Ecuador

Terajoules

Natural gas Gaz naturel	19706
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End-use intensities

ECO6: Industrial energy intensities

ECO7: Agricultural energy intensities

Brief Definition	Energy use per unit of value added in the industrial sector and by selected energy-intensive industries	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	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	Alternative Definition	Energy use per unit of agricultural output
ECO8: Service/commercial energy intensities		assumption and production patterns	

Agenda 21	Brief Definition	Final energy use per unit of service and commercial value added or per floor area
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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	Brief Definition	Energy use per unit of freight-kilometre (km) hauled and per unit of passenger-km travelled by mode
Units	Tonnes of oil equivalent (toe) for final energy and electricity per US dollar US dollars (purchasing power parity) per square metre of floor	Units	Freight: tonnes of oil equivalent (toe) per tonne-km Travel: toe per passenger-km
Alternative Definitions	None	Alternative Definitions	Overall average fuel consumption for all modes per passenger-km or tonne-km

ECO10: Transport energy intensities

Agenda 21	Chapter 4: Consumer Policy	Agenda 21	Consumption and production patterns
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End-use intensities

- 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

Costa Rica Terajoules

2011

	Electricity Electricité	Total energy Energie totale
1 Production of primary energy	31785	63158
2 Imports	1018	104718
3 Exports	-1151	-3469
4 Marine / aviation bunkers	..	..
5 Stock changes	..	-987
6 Total energy supply	31652	163420
7 Transformation	3608	-7007
8 Briquetting plants	..	..
9 Coke ovens	..	..
10 Gas works	..	..
11 Blast furnaces	..	*-1173
12 Oil refineries	..	-39
13 NGL plants and gas blending	..	..
14 Electric power plants	3608	-5698
15 Heating plants	..	..
16 Other transformation	..	-97
17 Net transfers	..	28
18 Energy industries own use	-327	-893
19 Losses in transport and distribution	-3816	-3816
20 Cons. for non-energy uses	..	-1697
21 Statistical differences	-106	-649
22 Final energy consumption	31223	150683
23 By industry and construction	6544	34817
24 Iron and steel industry	..	1272
25 Chemical industry	1333	2063
26 Other industry and construction	5212	31481
27 By transport	..	71672
28 Road	..	64381
29 Rail	..	51
30 Air	..	7156
31 Inland and coastal waterways	..	84
32 By other modes of transportation	..	..
33 By households and other consumers	24679	44195
34 Households	12188	26420
35 Agriculture	1120	2763
36 Other consumers	11371	15011

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



Diversification (Fuel Mix):

ECO11: Fuel shares in energy and electricity

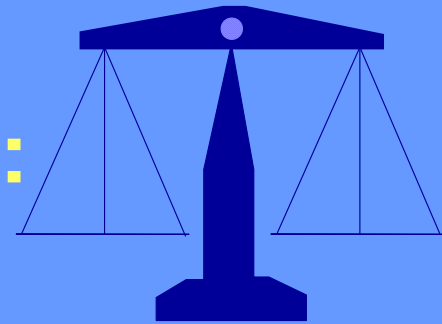
Brief Definition	The structure of energy supply in terms of shares of energy fuels in total primary energy supply (TPES), total final consumption (TFC) and electricity generation and generating capacity
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Units	<u>ECO12: Non-carbon energy share in energy and electricity</u>	
Alternative 1	Brief Definition	The share of non-carbon energy sources in primary energy supply (TPES) and in electricity generation and generating capacity
Agenda 21		

Units	<u>ECO13: Renewable energy share in energy and electricity</u>	
Alternative 1	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



Diversification (Fuel Mix):



- Total Energy Supply (TPES) and Total Final Consumption (TFC) rows as shown before in this presentation
- For these indicators, a more detailed energy balance (disaggregation by products) 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;
 - Current UNSD balance does not allow some of these indicators to be derived, but the forthcoming one (based on IRES recommendations) will allow.



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

Brazil

Terajoules

Energy sources and products →	Hard coal, brown coal and peat Houille, lignite et tourbe	Coal products and peat products Produits de charbon et de tourbe	Primary oil Pétrole brut, LGN, autres hydrocarbures	Light oil products Produits pétroliers légers	Heavy oil products Produits pétroliers lourds	Other oil products Autres produits pétroliers	LPG, refinery gas, ethane GPL, gaz de raffinerie, éthane
2010							
1 Production of primary energy	100719	..	45120	..	..	..	..
2 Imports	485861	55003	726799	327018	342742	183255	79701
3 Exports	..	..	-1354784	-42354	-208925	-11527	-189
4 Marine / aviation bunkers	..	..	..	82202	-167660	..	..
5 Stock changes	7124	-2504	49195	-7761	-60	-6143	1419
6 Total energy supply	593704	52498	3933284	94700	-33904	165585	80930
7 Transformation	-432040	280632	-3907942	1125644	1977920	360984	462389

on patterns

Brésil

Terajoules

Natural gas Gaz naturel	Manufactured gases Gaz manufacturés	Electricity Electricité	Primary biomass/waste Biomasse primaire/déchets	Charcoal Charbon de bois	Heat Chaleur	Total energy Energie totale	← Sources et produits d'énergie
2010							
580681	..	1511960	3322134	..	..	10027570	1 Production d'énergie primaire
489800	..	129262	1608	30	..	2821076	2 Importations
..	..	-4525	-40897	0	..	-1663202	3 Exportations
..	-249863	4 Soutes
..	-33661	..	..	7609	5 Variations des stocks
1070481	..	1636697	3249185	30	..	10943191	6 Approv. totaux en énergie
-307963	62774	344912	-728802	216560	..	-544932	7 Transformation



➤ Thank you for your attention!

➤ ¡Gracias por su atención!