Karen Tréanton
Head of Energy Balances, Prices and Emissions
Energy Data Centre

ENERGY STATISTICS

From Basic Energy Statistics to Energy Balances

Joint Rosstat – IEA Energy Statistics Workshop

Moscow, 14-16 February 2012

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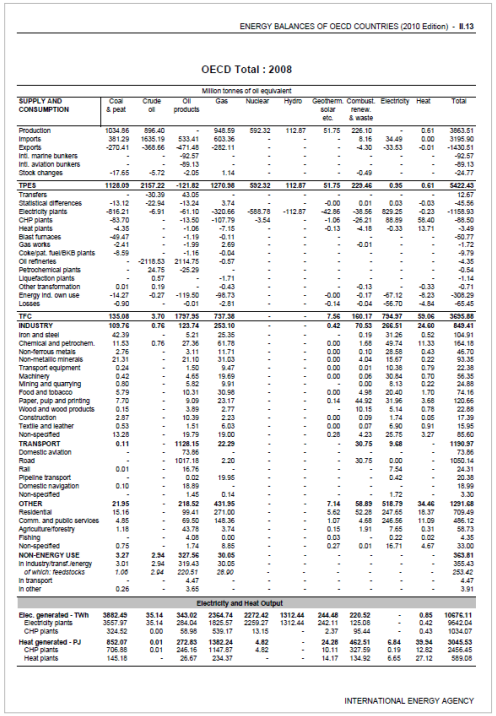
International Energy Agency

Energy balances



ENERGY BALANCES OF OECD COUNTRIES (2010 Edition) - II.13

OECD Total : 2008

Million tonnes of oil equivalent

SUPPLY AND CONSUMPTION	Coal & peat	Crude oil	Oil products	Gas	Nuclear	Hydro	Geotherm. solar etc.	Combust. renew. & waste	Electricity	Heat	Total
Production	1034.86	896.40	-	948.59	592.32	112.87	51.75	226.10	-	0.61	3863.51
Imports	361.29	1635.19	533.41	603.36	-	-	-	8.16	34.49	0.00	3195.90
Exports	-270.41	-368.66	-471.48	-282.11	-	-	-	-4.30	-33.53	-0.01	-1430.51
Intl. marine bunkers	-	-	-92.57	-	-	-	-	-	-	-	-92.57
Intl. aviation bunkers	-	-	-89.13	-	-	-	-	-	-	-	-89.13
Stock changes	-17.65	-5.72	-2.05	1.14	-	-	-	-0.49	-	-	-24.77
TPES	**1128.09**	**2157.22**	**-121.82**	**1270.98**	**592.32**	**112.87**	**51.75**	**229.46**	**0.95**	**0.61**	**5422.43**
Transfers	-	-30.39	43.05	-	-	-	-	-	-	-	12.67
Statistical differences	-13.12	-22.94	-13.24	3.74	-	-	-0.00	0.01	0.03	-0.03	-45.56
Electricity plants	-816.21	-6.91	-61.10	-320.66	-568.78	-112.87	-42.56	-38.56	829.25	-0.23	-1159.93
CHP plants	-53.70	-	-13.50	-107.79	-3.54	-	-1.06	-26.21	86.89	58.40	-65.50
Heat plants	-4.35	-	-1.06	-7.15	-	-	-0.13	-4.18	-0.33	13.71	-3.49
Blast furnaces	-49.47	-	-1.19	-0.11	-	-	-	-	-	-	-50.77
Gas works	-2.41	-	-1.99	2.69	-	-	-	-0.01	-	-	-1.72
Coke/pat. fuel/BKB plants	-8.59	-	-1.16	-0.04	-	-	-	-	-	-	-9.79
Oil refineries	-	-2116.53	2114.75	-0.57	-	-	-	-	-	-	-4.35
Petrochemical plants	-	24.75	-25.29	-	-	-	-	-	-	-	-0.54
Liquefaction plants	-	0.57	-	-1.71	-	-	-	-	-	-	-1.14
Other transformation	0.01	0.19	-	-0.43	-	-	-	-0.13	-	-0.33	-0.71
Energy ind. own use	-14.27	-0.27	-119.50	-98.73	-	-	-0.00	-0.17	-57.12	-8.23	-306.29
Losses	-0.90	-	-0.01	-2.81	-	-	-0.14	-0.04	-56.70	-4.84	-65.45
TFC	**135.08**	**3.70**	**1797.35**	**737.38**	**-**	**-**	**7.56**	**160.17**	**794.97**	**58.06**	**3655.88**
INDUSTRY	**109.74**	**0.76**	**123.74**	**253.16**	**-**	**-**	**0.42**	**70.53**	**266.51**	**24.60**	**849.47**
Iron and steel	42.39	-	5.21	25.35	-	-	-	0.19	31.26	0.52	104.91
Chemical and petrochem.	11.53	0.76	27.36	61.78	-	-	0.00	1.66	49.74	11.33	164.16
Non-ferrous metals	2.76	-	3.11	11.71	-	-	0.00	0.10	28.58	0.43	46.70
Non-metallic minerals	21.31	-	21.10	31.03	-	-	0.00	4.04	15.67	0.22	93.35
Transport equipment	0.24	-	1.50	9.47	-	-	0.00	0.01	10.38	0.79	22.38
Machinery	0.42	-	4.55	19.69	-	-	0.00	0.26	30.84	0.70	56.35
Mining and quarrying	0.80	-	5.52	9.91	-	-	-	0.00	5.13	0.22	24.88
Food and tobacco	5.79	-	10.31	30.96	-	-	0.00	4.96	20.40	1.70	74.16
Paper, pulp and printing	7.70	-	9.09	23.17	-	-	0.14	44.92	31.96	3.68	120.66
Wood and wood products	0.15	-	3.89	2.77	-	-	-	10.15	5.14	0.78	22.88
Construction	2.87	-	10.39	2.23	-	-	0.00	0.09	1.74	0.05	17.39
Textile and leather	0.53	-	1.51	6.03	-	-	0.00	0.07	6.90	0.91	15.95
Non-specified	13.28	-	19.79	19.00	-	-	0.28	4.23	25.75	3.27	85.60
TRANSPORT	**0.11**	**-**	**1128.15**	**22.29**	**-**	**-**	**-**	**30.75**	**9.68**	**-**	**1190.97**
Domestic aviation	-	-	73.86	-	-	-	-	-	-	-	73.86
Road	-	-	1017.18	2.20	-	-	-	30.75	0.00	-	1050.14
Rail	0.01	-	16.76	-	-	-	-	-	7.54	-	24.31
Pipeline transport	-	-	0.02	19.96	-	-	-	-	0.42	-	20.39
Domestic navigation	0.10	-	18.89	-	-	-	-	-	-	-	18.99
Non-specified	-	-	1.45	0.14	-	-	-	-	1.72	-	3.30
OTHER	**21.95**	**-**	**218.52**	**431.95**	**-**	**-**	**7.14**	**58.89**	**518.79**	**34.46**	**1291.68**
Residential	15.16	-	99.41	271.00	-	-	5.62	52.26	247.65	16.37	709.49
Comm. and public services	4.85	-	69.50	148.36	-	-	1.07	4.68	246.56	11.09	486.12
Agriculture/forestry	1.18	-	43.76	3.74	-	-	0.15	1.91	7.65	0.31	58.73
Fishing	-	-	4.08	0.00	-	-	0.03	-	0.22	0.02	4.35
Non-specified	0.75	-	1.74	8.85	-	-	0.27	0.01	16.71	4.67	33.00
NON-ENERGY USE	**3.27**	**2.94**	**327.56**	**30.65**	**-**	**-**	**-**	**-**	**-**	**-**	**363.81**
In industry/transf./energy	3.01	2.94	319.43	30.05	-	-	-	-	-	-	355.43
of which: feedstocks	1.06	2.94	220.51	28.90	-	-	-	-	-	-	253.42
In transport	-	-	4.47	-	-	-	-	-	-	-	4.47
In other	0.26	-	3.65	-	-	-	-	-	-	-	3.91
Electricity and Heat Output											
Elec. generated - TWh	**3682.45**	**35.14**	**343.02**	**2364.74**	**2272.42**	**1312.44**	**244.48**	**220.52**	**-**	**0.85**	**10676.11**
Electricity plants	3557.97	35.14	284.04	1835.57	2259.27	1312.44	242.11	125.08	-	0.42	9642.04
CHP plants	324.52	0.00	58.98	539.17	13.15	-	2.37	95.44	-	0.43	1034.07
Heat generated - PJ	**852.07**	**0.01**	**272.83**	**1382.24**	**4.82**	**-**	**24.26**	**462.51**	**6.84**	**35.34**	**3045.53**
CHP plants	706.88	0.01	246.16	1147.87	4.82	-	10.11	327.59	0.19	12.82	2456.45
Heat plants	145.18	-	26.67	234.37	-	-	14.17	134.92	6.65	27.12	589.09

INTERNATIONAL ENERGY AGENCY

- Why calculate an energy balance?
- Energy balance principles
- IEA energy balance layout
- Balance builder

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Why calculate an energy balance?

The energy balance is a way of reporting energy data in a common unit and with products aggregated by category: coal, oil, oil products, gas, biofuels, etc.

Advantages:

- It allows comparison of the shares of each source in the energy supply of a country and in each sector of economic activity
- With an energy balance it is possible to analyse energy efficiency
- A country can determine its dependence on energy imports or exports
- Different countries can be compared when they are calculated with the same methodology
- Good for quality control: can check inputs/outputs in the transformation sector and discrepancies can be queried

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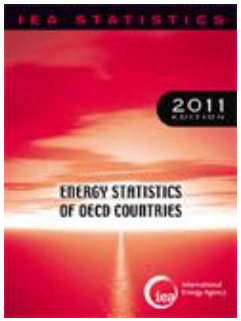
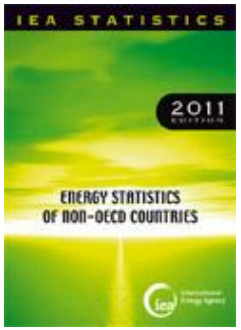
IEA energy balance system

5 IEA/Eurostat/UNECE Annual Questionnaires OR National publications, websites

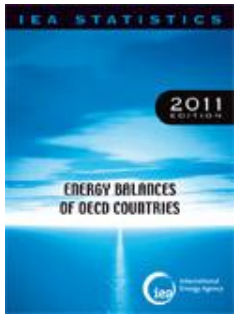
- Coal
- Oil
- Gas
- Renewables + Waste
- Electricity + Heat

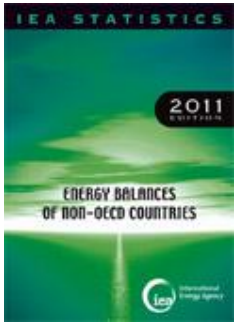
Original Units



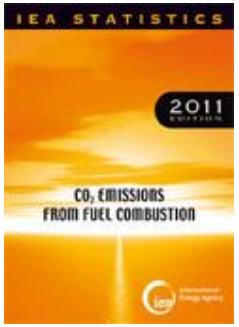


Mtoe





Mt of CO_2



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Energy balance principles

- choice of unit
- net vs. gross calorific values
- choice of conversion factors
- choice of primary energy form for energy that is not combusted
- physical energy content vs. substitution method
- temperature adjustments
- fiscal year vs. calendar year

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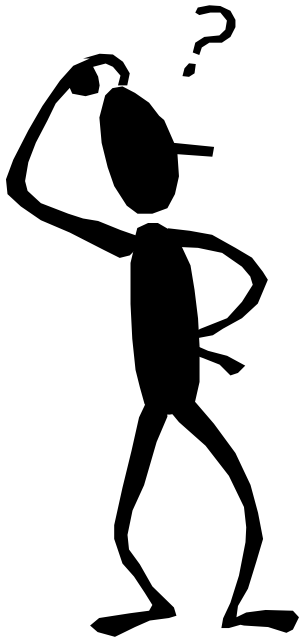
What units?

MBtu

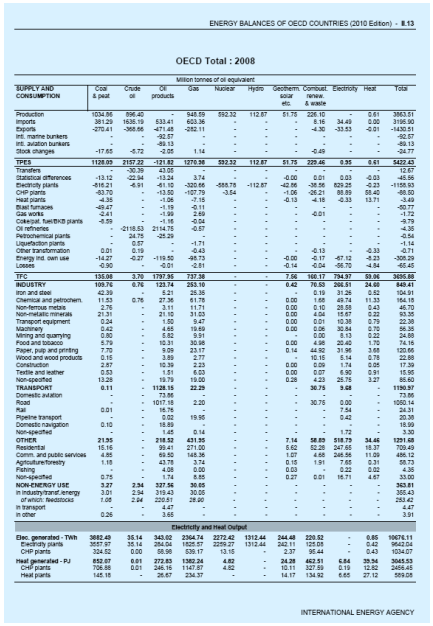
kilowatt-hours

Mtoe



Mtce

terajoules



ENERGY BALANCES OF OECD COUNTRIES (2010 Edition) - II.13

OECD Total : 2008

Million tonnes of oil equivalent

SUPPLY AND CONSUMPTION	Coal & peat	Crude oil	Oil products	Gas	Nuclear	Hydro	Geotherm. solar etc.	Combust. renew. & waste	Electricity	Heat	Total
Production	1034.86	896.40	-	948.59	592.32	112.87	51.75	226.10	-	0.61	3863.51
Imports	361.29	1638.19	533.41	603.38	-	-	-	6.16	34.49	0.00	3186.90
Exports	-270.41	-366.86	-471.48	-262.11	-	-	-	-4.30	-33.53	-0.01	-1430.51
Int. marine bunkers	-	-	-92.57	-	-	-	-	-	-	-	-92.57
Int. aviation bunkers	-	-	-89.13	-	-	-	-	-	-	-	-89.13
Stock changes	-17.65	-0.72	-2.05	1.14	-	-	-	-0.49	-	-	-24.77
TPES	1109.09	2167.02	-121.82	1270.98	592.32	112.87	51.75	229.46	0.95	0.61	5422.43
Transfers	-	-30.39	43.06	-	-	-	-	-	-	-	12.67
Statistical differences	-13.12	-22.94	-13.24	3.74	-	-	-0.00	0.01	0.03	-0.03	-45.56
Electricity plants	-816.21	-6.91	-61.10	-320.66	-555.78	-112.87	-42.66	-36.56	829.26	-0.23	-1155.93
CHP plants	-53.70	-	-13.50	-107.79	-3.64	-	-1.06	-26.21	89.89	66.40	-68.50
Heat plants	-4.35	-	-1.06	-7.15	-	-	-0.13	-4.16	-2.33	13.71	-3.49
Blast furnaces	-49.47	-	-1.19	-0.11	-	-	-	-	-	-	-50.77
Gas works	-2.41	-	-1.99	2.69	-	-	-	-0.01	-	-	-1.72
Coke/pat. fuel/BKB plants	-8.59	-	-1.16	-0.04	-	-	-	-	-	-	-9.79
Oil refineries	-	-2118.53	2114.75	-0.57	-	-	-	-	-	-	-4.35
Petrochemical plants	-	24.75	-25.29	-	-	-	-	-	-	-	-0.54
Liquefaction plants	-	0.57	-	-1.71	-	-	-	-	-	-	-1.14
Other transformation	0.01	0.19	-	-0.43	-	-	-	-0.13	-	-0.33	-0.71
Energy ind. own use	-14.27	-0.27	-119.50	-95.73	-	-	-0.00	-0.17	-57.12	-5.23	-309.29
Losses	-0.90	-	-0.01	-2.81	-	-	-0.14	-0.04	-56.70	-4.84	-65.45
TFC	135.08	3.70	1797.95	737.58	-	-	7.56	166.17	794.97	69.06	3695.89
INDUSTRY	109.76	0.76	123.74	253.16	-	-	6.42	76.53	262.51	24.60	849.41
Iron and steel	42.39	-	5.21	25.36	-	-	-	0.19	31.26	0.52	104.91
Chemical and petrochem.	11.53	0.76	27.36	61.78	-	-	0.00	1.68	49.74	11.33	164.18
Non-ferrous metals	2.76	-	3.11	11.71	-	-	0.00	0.10	25.58	0.43	46.70
Non-metallic minerals	21.31	-	21.10	31.03	-	-	0.00	4.04	15.67	0.22	93.35
Transport equipment	0.24	-	1.50	9.47	-	-	0.00	0.01	10.38	0.79	22.38
Machinery	0.42	-	4.65	19.69	-	-	0.00	0.56	30.84	0.70	56.35
Mining and quarrying	0.80	-	5.82	9.91	-	-	-	0.00	8.13	0.22	24.88
Food and tobacco	5.79	-	10.31	30.98	-	-	0.00	4.98	20.40	1.70	74.16
Paper, pulp and printing	7.70	-	9.09	23.17	-	-	0.14	44.92	31.96	3.68	120.66
Wood and wood products	0.15	-	3.89	2.77	-	-	-	10.15	6.14	0.78	22.88
Construction	2.87	-	10.39	2.23	-	-	0.00	0.09	1.74	0.05	17.39
Textile and leather	0.53	-	1.51	6.03	-	-	0.00	0.07	6.92	0.91	15.95
Non-specified	13.28	-	19.79	19.00	-	-	0.28	4.23	25.76	3.27	85.60
TRANSPORT	0.11	-	1128.18	22.29	-	-	-	30.75	9.68	-	1190.97
Domestic aviation	-	-	73.86	-	-	-	-	-	-	-	73.86
Road	-	-	1017.18	2.20	-	-	-	30.75	0.00	-	1050.14
Rail	0.01	-	16.76	-	-	-	-	-	7.54	-	24.31
Pipeline transport	-	-	0.02	19.95	-	-	-	-	0.42	-	20.38
Domestic navigation	0.10	-	18.89	-	-	-	-	-	-	-	18.99
Non-specified	-	-	1.45	0.14	-	-	-	-	1.72	-	3.30
OTHER	21.95	-	218.52	431.55	-	-	7.14	58.89	518.79	34.46	1291.69
Residential	15.16	-	99.41	271.00	-	-	5.62	52.28	247.65	18.37	709.49
Comm. and public services	4.85	-	69.50	148.36	-	-	1.07	4.68	248.56	11.09	486.12
Agriculture/forestry	1.18	-	43.78	3.74	-	-	0.15	1.91	7.66	0.31	58.73
Fishing	-	-	4.09	0.00	-	-	0.03	-	0.22	0.02	4.36
Non-specified	0.75	-	1.74	8.85	-	-	0.27	0.01	16.71	4.67	33.00
NON-ENERGY USE	3.27	2.94	327.56	30.65	-	-	-	-	-	-	363.81
in industry/transf./energy	3.01	2.94	319.43	30.05	-	-	-	-	-	-	355.43
of which: feedstocks	1.06	2.94	220.61	28.60	-	-	-	-	-	-	253.42
in transport	-	-	4.47	-	-	-	-	-	-	-	4.47
in other	0.26	-	3.65	-	-	-	-	-	-	-	3.91
Electricity and Heat Output											
Elec. generated - TWh	3882.49	35.14	343.02	2364.74	2272.42	1312.44	244.48	220.52	-	0.85	10676.11
Electricity plants	3557.97	35.14	254.04	1825.57	2259.27	1312.44	242.11	125.08	-	0.42	9642.04
CHP plants	324.52	0.00	58.98	539.17	13.16	-	2.37	95.44	-	0.43	1034.07
Heat generated - PJ	852.07	0.01	272.83	1382.24	4.82	-	24.28	462.51	6.84	35.34	3045.53
CHP plants	706.68	0.01	246.16	1147.07	4.82	-	10.11	327.59	0.19	12.82	2455.45
Heat plants	145.18	-	26.67	234.37	-	-	14.17	134.92	6.65	27.12	589.08

INTERNATIONAL ENERGY AGENCY

IEA opted for Mtoe

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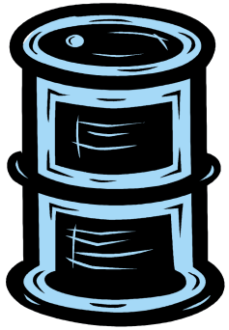
Net vs. Gross Calorific Values?

Difference between NCV and GCV is the latent heat of vaporisation of the water produced during combustion

5%



5%

10%

IEA uses Net Calorific Values

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Conversion to energy units (1)

COAL

Physical units (tonnes) are converted to energy units using NCV [kJ/kg], reported in the questionnaires (varies over time)

Specific NCV for Production, Imports, Exports, Inputs to Power Plants, Coal used in Coke Ovens, Blast Furnaces and Industry

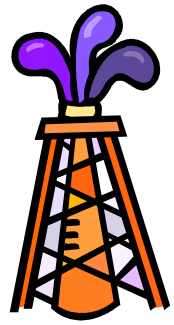
Average NCV for all other flows

CRUDE OIL AND OIL PRODUCTS

Using NCV [kJ/kg]

Primary oil - Specific NCV for Production, Imports and Exports, reported in the questionnaires (varies over time)

Oil products - region specific default values



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Conversion to energy units (2)

NATURAL GAS

Figures collected in Mm^3 and gross TJ (energy unit). They are converted to net TJ (0.9·gross TJ) and then to Mtoe (1 PJ = 0.02388 Mtoe)

OTHER GASES

Data collected in gross TJ, then converted to net TJ (0.9·gross TJ) and then to Mtoe (1 PJ = 0.02388 Mtoe)

ELECTRICITY

Figures collected in TWh, then electricity production is converted to Mtoe (1 TWh = 0.086 Mtoe)

Gross electricity production is shown and the own use and losses are shown separately

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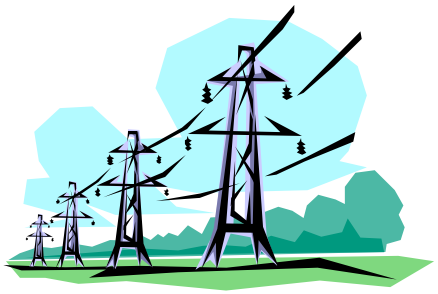
Choice of primary energy form

First energy form downstream for which multiple energy uses are practical

Heat

- nuclear heat and electricity production
- geothermal heat and electricity production
- solar heat production

Electricity



- hydro
- wind
- wave/ocean
- photovoltaic solar electricity production

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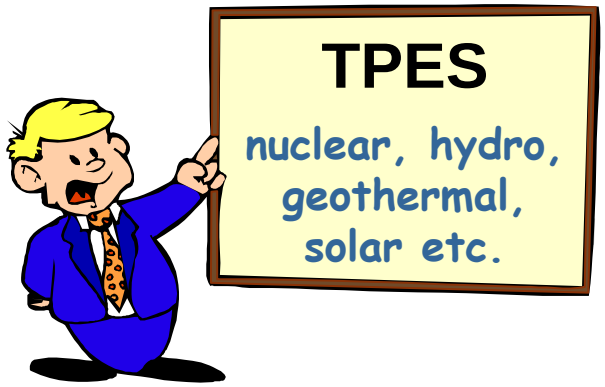
Choice of method for calculating primary energy equivalent



IEA opted for

Partial substitution method

- represents the amount of energy necessary in conventional thermal plants
- difficult to choose efficiency
- not relevant for countries with a high share of hydro

Physical energy content method

- uses physical energy content of the primary energy source
- nuclear 33%
- geothermal 10%
- solar, wind, etc. 100%

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Physical energy content vs. partial substitution

Using physical energy content method

Renewables = 35.2%

Energy Balance of Statisland

Million tonnes of oil equivalent

SUPPLY	Coal & peat	Crude oil	Oil products	Gas	Nuclear	Hydro	Geotherm. solar etc.	Combust. renew. & waste	Electricity	Heat	Total
Production	0.19	-	-	-	13.04	5.60	0.22	9.50	-	0.27	28.82
Imports	1.54	19.55	7.37	1.11	-	-	-	-	1.18	-	30.75
Exports	-0.19	-0.38	-11.70	-	-	-	-	-	-0.78	-	-13.05
Intl. marine bunkers	-	-	-2.09	-	-	-	-	-	-	-	-2.09
Intl. aviation bunkers	-	-	-0.73	-	-	-	-	-	-	-	-0.73
Stock changes	-0.03	0.32	-0.51	-	-	-	-	-	-	-	-0.21
TPES	**1.51**	**19.49**	**-7.66**	**1.11**	**13.04**	**5.60**	**0.21**	**0.01**	**0.40**	**0.27**	**43.49**
Electricity and Heat Output											
Elec. generated - TWh	1.63	-	1.07	1.29	50.02	65.12	2.49	11.92	-	-	133.54
Heat generated - PJ	15.14	-	8.01	11.34	-	-	-	127.21	0.64	19.73	182.06

Nuclear Hydro Wind Solar

Using partial substitution method

Renewables = 48.3%

Million tonnes of oil equivalent

SUPPLY	Coal & peat	Crude oil	Oil products	Gas	Nuclear	Hydro	Geotherm. solar etc.	Combust. renew. & waste	Electricity	Heat	Total
Production	0.19	-	-	-	11.17	14.55	0.57	9.50	-	0.27	36.25
Imports	1.54	19.55	7.37	1.11	-	-	-	-	1.18	-	30.75
Exports	-0.19	-0.38	-11.70	-	-	-	-	-	-0.78	-	-13.05
Intl. marine bunkers	-	-	-2.09	-	-	-	-	-	-	-	-2.09
Intl. aviation bunkers	-	-	-0.73	-	-	-	-	-	-	-	-0.73
Stock changes	-0.03	0.32	-0.51	-	-	-	-	-	-	-	-0.21
TPER	**1.51**	**19.49**	**-7.66**	**1.11**	**11.17**	**14.55**	**0.56**	**0.01**	**0.40**	**0.27**	**50.92**
Electricity and Heat Output											
Elec. generated - TWh	1.63	-	1.07	1.29	50.02	65.12	2.49	11.92	-	-	133.54
Heat generated - PJ	15.14	-	8.01	11.34	-	-	-	127.21	0.64	19.73	182.06

Nuclear Hydro Wind Solar

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Physical energy content vs. partial substitution

Energy Balance of Russia : 2009

Using physical energy content method

Renewables = 3.4%

Thousand tonnes of oil equivalent

SUPPLY AND CONSUMPTION	Coal & peat	Crude oil*	Oil products	Natural gas	Nuclear	Hydro	Geotherm. solar etc.	Biofuels & waste	Electricity	Heat	Total
Production	153640	493641	-	469561	42959	14980	[illegible]	6410	-	-	1181589
Imports	14530	1793	808	6675	-	-		-	264	-	24071
Exports	-68671	-250141	-101135	-131210	-	-	-	-	-1541	-	-552699
Intl. marine bunkers	-	-	-	-	-	-	-	-	-	-	-
Intl. aviation bunkers	-	-	-5858	-	-	-	-	-	-	-	-5858
Stock changes	-4228	-1635	451	5268	-	-	-	-43	-	-	-187
TPES	95271	243658	-105734	350295	42959	14980	399	6367	-1278	-	646915
Electricity and Heat Output											
Elec. generated - GWh	164112	17	16004	469034	163584	174183	468	2643	-	-	990045
Heat generated - TJ	1086565	27296	302519	3805801	13730	-	299725	118008	-	-	5653644

Nuclear 42959 · Hydro 14980 · Geo-thermal 399 · Solar 0.34

Using partial substitution method

Renewables = 6.8%

Thousand tonnes of oil equivalent

SUPPLY AND CONSUMPTION	Coal & peat	Crude oil*	Oil products	Natural gas	Nuclear	Hydro	Geotherm. solar etc.	Biofuels & waste	Electricity	Heat	Total
Production	153640	493641	-	469561	36869	38908	105	6410	-	-	1199134
Imports	14530	1793	808	6675	-	-	-	-	264	-	24071
Exports	-68671	-250141	-101135	-131210	-	-	-	-	-1541	-	-552699
Intl. marine bunkers	-	-	-	-	-	-	-	-	-	-	-
Intl. aviation bunkers	-	-	-5858	-	-	-	-	-	-	-	-5858
Stock changes	-4228	-1635	451	5268	-	-	-	-43	-	-	-187
TPES	95271	243658	-105734	350295	36869	38908	105	6367	-1278	-	664461
Electricity and Heat Output											
Elec. generated - GWh	164112	17	16004	469034	[illegible]	[illegible]	[illegible]	[illegible]	-	-	990045
Heat generated - TJ	1086565	27296	302519	3805801	13730	-	299725	118008	-	-	5653644

Nuclear 36869 · Hydro 38908 · Geo-thermal 104 · Solar 0.89

TPES

TPER

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IEA energy balance layout: compact source of information

Supply

Transformation and energy industries own use

Final consumption

Industry

Transport

Other final consumption

Non-energy use

Electricity and heat output

Totals

Comparable information for all products

Comparable energy units (Mtoe)

Global picture of energy situation in a country

Statisland

Million tonnes of oil equivalent

SUPPLY AND CONSUMPTION	Coal & peat	Crude oil	Oil products	Natural gas	Nuclear	Hydro	Geotherm. solar etc.	Biofuels & waste	Electricity	Heat	Total
Production	0.21	-	-	-	13.60	5.66	0.22	10.38	-	0.27	30.35
Imports	1.54	19.59	7.37	1.10	-	-	-	-	1.18	-	30.79
Exports	-0.19	-0.38	-11.68	-	-	-	-	-	-0.78	-	-13.03
Intl. marine bunkers	-	-	-2.09	-	-	-	-	-	-	-	-2.09
Intl. aviation bunkers	-	-	-0.71	-	-	-	-	-	-	-	-0.71
Stock changes	0.36	0.32	-0.58	-	-	-	-	-	-	-	0.11
TPES	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	**0.27**	**45.41**
Transfers	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-	-	0.09
Statistical differences	0.06	0.27	-0.02	0.02	-	-	-	-	-	-	0.33
Electricity plants	-	[illegible]	-0.03	[illegible]	-13.60	-5.66	-0.21	-	10.38	-	-9.13
CHP plants	-0.66	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-	-3.76	1.37	2.81	-0.97
Heat plants	-0.05	-	-0.09	[illegible]	-	-	-	-1.16	-0.14	1.39	-0.07
Blast furnaces	[illegible]									-	-0.41
Gas works	0.02	-	-0.01	-0.00	-	-	-	-	-	-	0.00
Coke/pat. fuel/BKB plants	-0.29	-	-0.01	-	-	-	-	-	-	-	-0.29
Oil refineries	-	-20.85	20.46	-	-	-	-	-	-	-	-0.39
Petrochemical plants	-	-	-	-	-	-	-	-	-	-	-
Liquefaction plants	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-	-	-	-
Other transformation	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-	-	-	-
Energy industry own use	-0.09	-	-0.84	-0.00	-	-	[illegible]	-	-0.55	-	-1.48
Losses	-0.04	-	[illegible]	[illegible]	[illegible]	[illegible]	-	-	-0.85	-0.21	-1.10
TFC	**0.47**	-	[illegible]	[illegible]	[illegible]	-	**0.01**	**5.45**	**10.61**	**4.26**	**31.98**
INDUSTRY	**0.44**	-	**1.06**	**0.41**	-	-	-	**4.03**	**4.42**	**0.38**	**10.74**
Iron and steel	0.17	-	0.21	0.03	-	-	-	-	0.31	-	0.73
Chemical and petrochem.	0.01	-	0.06	0.18	-	-	-	0.01	0.38	-	0.64
Non-ferrous metals	0.04	-	0.03	0.01	-	-	-	-	0.20	-	0.27
Non-metallic minerals	0.15	-	0.11	0.04	-	-	-	-	0.08	-	0.38
Transport equipment	0.01	-	0.02	0.01	-	-	-	-	0.15	-	0.19
Machinery	-	-	0.05	0.01	-	-	-	-	0.18	-	0.24
Mining and quarrying	0.06	-	0.06	-	-	-	-	-	0.21	-	0.33
Food and tobacco	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.41
Paper, pulp and printing	0.01	-	0.34	0.01	-	[illegible]	-	3.64	1.92	[illegible]	5.92
Wood and wood products	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.54
Construction	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.09
Textile and leather	-	-	0.01	0.00	-	-	-	-	0.01	[illegible]	0.03
Non-specified	0.00	-	0.07	0.01	-	-	-	0.02	0.50	[illegible]	0.98
TRANSPORT	-	[illegible]	[illegible]	[illegible]	-	[illegible]	-	[illegible]	**0.21**	[illegible]	**7.67**
Domestic aviation	-	-	0.14	-	-	-	-	-	-	[illegible]	0.14
Road	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	7.19
Rail	-	-	0.00	-	-	-	-	-	0.21	-	0.21
Pipeline transport	-	-	-	-	-	-	-	-	-	-	-
Domestic navigation	-	-	0.13	-	-	-	-	-	-	-	0.13
Non-specified	-	-	-	-	-	-	-	-	-	-	-
OTHER	**0.01**	-	**0.84**	**0.14**	-	-	**0.01**	**1.05**	**5.98**	**3.88**	**11.91**
Residential	0.01	-	0.08	0.07	-	-	0.01	0.68	3.52	2.58	6.95
Comm. and public services	0.01	-	0.55	0.05	-	-	-	0.05	2.30	1.29	4.23
Agriculture/forestry	-	-	0.18	0.02	-	-	-	0.32	0.16	0.01	0.68
Fishing	-	-	0.03	-	-	-	-	-	-	-	0.03
Non-specified	-	-	0.01	-	-	-	-	-	-	-	0.01
NON-ENERGY USE	**0.01**	-	**1.64**	-	-	-	-	-	-	-	**1.65**
in industry/transf./energy	0.01	-	1.59	-	-	-	-	-	-	-	1.60
of which: feedstocks	-	-	*1.08*	-	-	-	-	-	-	-	*1.08*
in transport	-	-	0.06	-	-	-	-	-	-	-	0.06
in other	-	-	-	-	-	-	-	-	-	-	-
Electricity and Heat Output											
Elec. generated - TWh	**1.60**	-	**0.73**	**1.55**	**52.17**	**65.85**	**2.49**	**12.20**	-	-	**136.59**
Electricity plants	-	-	0.16	-	52.17	65.85	2.49	-	-	-	120.68
CHP plants	1.60	-	0.57	1.55	-	-	-	12.20	-	-	15.91
Heat generated - PJ	**17.90**	-	**6.12**	**16.38**	-	-	-	**####**	**0.63**	**19.52**	**187.15**
CHP plants	16.17	-	2.55	15.94	-	-	-	83.05	0.29	5.44	123.44
Heat plants	1.73	-	3.57	0.44	-	-	-	43.55	0.34	14.09	63.71

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IEA balance builder

- **Available at** http://www.iea.org/stats/questionnaire/index.asp

- **Two options:**
  - 1) Shows links from basic energy statistics (“commodity balances”) to the energy balance
  - 2) shows links from the five annual questionnaires to the energy balance (via the basic energy statistics)

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IEA balance builder: what is it for?

- Shows a country what their data will look like in the IEA format (so how did you go from our questionnaires to your publication???)
- Assists in the construction of an energy balance (shows what data are needed and where they should be reported)
- Highlights the importance of various elements (e.g. the NCVs)

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International Energy Agency

IEA Balance Builder

2011, Version 1.02

The main purpose of this tool is to build a country energy balance following the IEA methology.

This can be done by having the IEA load data from the current databases, by automatically loading data from the IEA data questionnnaires (2010 data requested in July 2011) or by filling by hand the "Data in physical units" and "Conversion factors" worksheets.

1. Select your country name from the drop down list or type it in manually

Country:

2. Select the year for which the balance should be built

Year:

3. Follow the instructions for A. automatic upload or B. manual data input

4. Check the "Data in physical units" worksheet and in "Conversion factors" worksheet to see if any problems are highlighted in yellow.

Certain cells must always be negative (i.e. exports and bunkers).
Certain cells must always be positive (i.e. production, other sources, imports and all the sub-elements for transformation processes, energy industry own use, losses, industry, transport, other and non-energy use)

Sub-totals will be highlighted if they are not equal to the sum of the sub-elements.

Final consumption will check to see that sums are correct both from the top-down and the bottom-up.
FC = Dom. supply - Transformation processes - Energy industry own use - Losses + Transfers + Stat. Diff.
FC = Industry + Transport + Other + Non-energy use

For the conversion factors, make sure that there are no zeroes in the table to ensure that all flows are converted to energy units.

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A. Automatic upload

Use the buttons below to load the IEA data questionnaires into the balance builder worksheets "Data in physical units" and "Conversion factors".

load coal	coal questionnaire file path
load oil	oil questionnaire file path
load gas	gas questionnaire file path
load ren	renewables questionnaire file path
load ele	electricity and heat questionnaire file path

The aggregated and disaggregated balance worksheets are automatically calculated.

Notes:

Due to the current questionnaire format non-energy use is double-counted for oil and oil products. To avoid this issue it is necessary to adjust the transformation, energy sector own use and detailed final consumption sectors in the "Data in physical units" worksheet. Checks on row 108 of the worksheet will highlight the products that need to be adjusted.

The IEA uses a model to allocate part of the blast furnaces fuel inputs to transformation processes and part to iron and steel consumption. This model is not implemented in the balance builder, for this reason the blast furnaces transformation row and iron and steel row might differ from our published data.

B. Manual data input

Insert data in the "Data in physical units" worksheet for individual products (e.g. natural gas, crude oil, hydro) and by flow (e.g. indigenous production, imports, electricity generation)

Update the conversion factors on the "Conversion Factors" worksheet as appropriate (colored cells should be filled in)

The aggregated and disaggregated balance worksheets are automatically calculated.

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Worksheets index

The following links can be used to reach the different sheets

Definitions	IEA product and flow definitions
Conversion Factors	conversion factors used to convert data from physical to energy units
Exceptions	country specific formulas (for information only)
Data in physilcal units	filled by hand or automatically loaded data from the IEA questionnnaires
Disaggregated balance	all fuels converted to a common energy unit from the data in physical units
Aggregated balance	energy balance grouped by main fuel source

Help / Further Information

- Consult the IEA definitions worksheet to understand what is covered by individual products or flows. Where applicable, row or column headings of the "data in physical units" and balances worksheets are linked directly to the appropriate definition.
- Please ensure macros are enabled.
- The country-specific exceptions listed in the "Exceptions" worksheet are automatically copied to the disaggregated balance when necessary. This worksheet should not be modified, it is made available for information. When "Disaggregated Balance" cells are modified their font color is changed to red.
- The disaggregated and aggregated balance worksheets are protected to prevent involuntary changes. To unprotect them select the desired worksheet and do the following

Excel 2003 - Tools -> Protection -> Unprotect Sheet
Excel 2007 - Review -> Unprotect Sheet

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In conclusion, good (hopefully harmonized) energy balances:

- Are a compact source of energy information (convenient!)
- Require good quality statistics (data, calorific values)
- Enable accurate checks of energy statistics (efficiencies…)
- Are the foundation for basic energy indicators, energy accounts and for CO_2 emissions estimates
- …Are not necessary, but highly recommended!

BALANCES@iea.org

Thank you

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