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Head of Energy Balances, Prices and Emissions Section

From Basic Energy Statistics to Energy Balances

International Workshop on Energy Statistics

Mexico, 2-5 December 2008

Energy Balances

ENERGY BALANCES OF OECD COUNTRIES, 1997-1998 - **II.17**

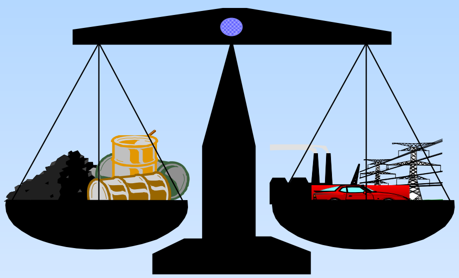
OECD Total / OCDE Total : 1998

Million tonnes of oil equivalent / *Million de tonnes d'équivalent pétrole*

SUPPLY AND CONSUMPTION / ***APPROVISIONNEMENT ET DEMANDE***	Coal / *Charbon*	Crude Oil / *Pétrole brut*	Petroleum Products / *Produits pétroliers*	Gas / *Gaz*	Nuclear / *Nucléaire*	Hydro / *Hydro*	Geotherm. Solar etc. / *Géotherm. solaire etc.*	Combust. Renew. & Waste / *En. ren. combust. & déchets*	Electricity / *Electricité*	Heat / *Chaleur*	Total / *Total*
Indigenous Production	1005.64	1046.05	-	874.91	553.58	111.08	30.05	168.64	-	0.35	3790.32
Imports	259.97	1564.37	380.85	345.32	-	-	-	0.45	23.99	0.00	2574.95
Exports	-213.37	-436.86	-322.09	-159.46	-	-	-	-0.00	-23.18	-0.00	-1154.95
Intl. Marine Bunkers	-	-	-81.23	-	-	-	-	-	-	-	-81.23
Stock Changes	-5.30	-3.44	-10.31	-13.08	-	-	-	0.02	-	-	-32.11
TPES	**1046.95**	**2170.13**	**-32.78**	**1047.69**	**553.58**	**111.08**	**30.05**	**169.11**	**0.81**	**0.35**	**5096.97**
Transfers	-	-28.22	29.41	-	-	-	-	-0.10	-	-	1.09
Statistical Differences	21.96	-2.82	2.01	-8.02	-	-	-	-0.12	-	-	13.02
Electricity Plants	-732.43	-9.72	-122.39	-185.21	-553.55	-111.08	-27.56	-19.27	702.95	-	-1058.25
CHP Plants	-112.92	-0.77	-9.07	-94.42	-0.04	-	-0.43	-44.25	75.95	38.40	-147.54
Heat Plants	-6.42	-	-1.57	-4.77	-	-	-0.37	-4.55	-0.42	13.82	-4.27
Gas Works	-2.76	-	-3.18	3.32	-	-	-	-	-	-	-2.62
Petroleum Refineries	-	-2150.86	2153.22	-	-	-	-	-0.96	-	-	1.40
Coal Transformation	-68.19	-	-3.09	-0.23	-	-	-	-0.13	-	-	-71.64
Liquefaction	-	-	-	-	-	-	-	-	-	-	-
Other Transformation	-	25.72	-26.12	-0.44	-	-	-	-0.05	-	-	-0.89
Own Use	-12.85	-1.02	-129.95	-89.41	-	-	-	-0.03	-63.88	-3.25	-300.39
Distribution Losses	-0.59	-	-0.14	-2.96	-	-	-0.08	-0.00	-51.92	-4.22	-59.91
TFC	**132.75**	**2.43**	**1856.36**	**665.56**	**-**	**-**	**1.62**	**99.64**	**663.49**	**45.11**	**3466.96**
INDUSTRY SECTOR	**109.57**	**2.43**	**335.40**	**275.30**	**-**	**-**	**0.42**	**43.95**	**261.61**	**12.98**	**1041.66**
Iron and Steel	48.81	-	7.71	28.30	-	-	-	0.00	29.34	0.28	114.44
Chemical and Petrochemical	7.57	2.43	215.47	96.21	-	-	-	1.06	48.13	4.47	375.33
of which: Feedstocks	-	*2.27*	*196.01*	*21.24*	-	-	-	-	-	-	*219.51*
Non-Ferrous Metals	2.90	-	5.02	12.50	-	-	-	0.11	24.52	0.12	45.18
Non-Metallic Minerals	25.50	-	19.78	26.57	-	-	-	0.73	13.49	0.10	86.17
Transport Equipment	0.44	-	2.65	6.19	-	-	-	0.00	10.68	0.44	20.40
Machinery	1.36	-	6.32	18.85	-	-	-	0.01	25.26	0.34	52.15
Mining and Quarrying	0.96	-	5.32	3.38	-	-	-	0.00	8.92	0.07	18.65
Food and Tobacco	6.46	-	12.53	27.43	-	-	-	4.57	18.01	0.81	69.81
Paper, Pulp and Printing	6.11	-	10.70	26.46	-	-	-	21.83	32.39	1.36	98.84
Wood and Wood Products	0.27	-	3.81	1.96	-	-	-	13.19	4.95	0.15	24.33
Construction	1.37	-	10.77	0.71	-	-	-	0.01	1.24	0.03	14.13
Textile and Leather	0.75	-	6.23	7.51	-	-	-	0.10	9.82	0.43	24.84
Non-specified	7.08	-	29.09	19.23	-	-	0.42	2.34	34.86	4.37	97.40
TRANSPORT SECTOR	**0.10**	**-**	**1134.52**	**20.92**	**-**	**-**	**-**	**1.75**	**9.13**	**-**	**1166.42**
International Civil Aviation	-	-	67.20	-	-	-	-	-	-	-	67.20
Domestic Air Transport	-	-	85.22	-	-	-	-	-	-	-	85.22
Road	-	-	942.09	0.54	-	-	-	1.75	-	-	944.37
Rail	0.01	-	16.42	-	-	-	-	-	7.64	-	24.07
Pipeline Transport	-	-	0.02	20.36	-	-	-	-	0.44	-	20.82
Internal Navigation	0.09	-	20.98	-	-	-	-	-	-	-	21.07
Non-specified	-	-	2.59	0.02	-	-	-	-	1.06	-	3.67
OTHER SECTORS	**22.12**	**-**	**263.44**	**369.34**	**-**	**-**	**1.20**	**53.95**	**392.75**	**32.13**	**1134.92**
Agriculture	1.39	-	55.85	5.16	-	-	0.06	0.84	6.63	0.29	70.22
Comm. and Publ. Services	3.35	-	74.09	111.32	-	-	0.05	1.89	181.17	7.24	379.12
Residential	16.58	-	130.13	240.84	-	-	1.07	49.50	203.20	21.75	663.06
Non-specified	0.80	-	3.37	12.02	-	-	0.01	1.72	1.74	2.84	22.51
NON-ENERGY USE	**0.95**	**-**	**123.01**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**123.96**
in Industry/Transf./Energy	0.77	-	112.62	-	-	-	-	-	-	-	113.39
in Transport	-	-	7.65	-	-	-	-	-	-	-	7.65
in Other Sectors	0.18	-	2.73	-	-	-	-	-	-	-	2.91
Electricity Generated - GWh	***3508315***	**-**	***660661***	***1280305***	***2124071***	***1291618***	***49471***	***142536***	**-**	**-**	***9056977***
Electricity Plants	*3145869*	-	*582057*	*905927*	*2124071*	*1291618*	*48664*	*75608*	-	-	*8173814*
CHP plants	*362446*	-	*78604*	*374378*	-	-	*807*	*66928*	-	-	*883163*
Heat Generated - TJ	***918598***	**-**	***197120***	***645482***	***1558***	**-**	***21325***	***376256***	***13485***	***27513***	***2201337***
CHP plants	*703118*	-	*131231*	*533902*	*1558*	-	*5985*	*232052*	*2174*	*5284*	*1615304*
Heat Plants	*215480*	-	*65889*	*111580*	-	-	*15340*	*144204*	*11311*	*22229*	*586033*

> Why calculate an energy balance?

> Energy balance principles



> IEA energy balance layout

> Using the energy balance with economic indicators

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, petroleum products, gas, biomass, etc.

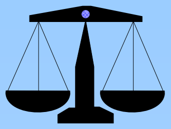
Advantages:

- 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

Energy Balance Principles

- Choice of unit
- Net versus gross
- Choice of conversion factors
- Choice of primary energy form for energy that is not combusted
- Calculation of primary energy equivalent of electricity from non-combustion processes

Units



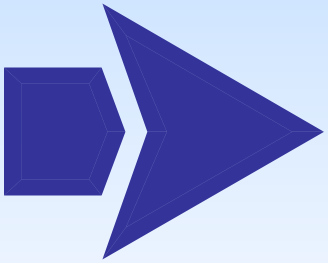
MBtu

kilowatt-hours

Mtoe

Mtce

terajoules



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Exports	-213.37	-436.86	-322.09	-159.46	-	-	-	-0.00	-23.18	-0.00	-1154.95
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CHP Plants	-112.92	-0.77	-9.07	-94.42	-0.04	-	-0.43	-44.25	75.95	38.40	-147.54
Heat Plants	-6.42	-	-1.57	-4.77	-	-	-0.37	-4.55	-0.42	13.82	-4.27
Gas Works	-2.76	-	-3.18	3.32	-	-	-	-	-	-	-2.62
Petroleum Refineries	-	-2150.86	2153.22	-	-	-	-	-0.96	-	-	1.40
Coal Transformation	-68.19	-	-3.09	-0.23	-	-	-	-0.13	-	-	-71.64
Liquefaction	-	-	-	-	-	-	-	-	-	-	-
Other Transformation	-	25.72	-26.12	-0.44	-	-	-	-0.05	-	-	-0.89
Own Use	-12.85	-1.02	-129.95	-89.41	-	-	-	-0.03	-63.88	-3.25	-300.39
Distribution Losses	-0.59	-	-0.14	-2.96	-	-	-0.08	-0.00	-51.92	-4.22	-59.91
TFC	**132.75**	**2.43**	**1856.36**	**665.56**	**-**	**-**	**1.62**	**99.64**	**663.49**	**45.11**	**3466.96**
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of which: Feedstocks	-	*2.27*	*196.01*	*21.24*	-	-	-	-	-	-	*219.51*
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Non-Metallic Minerals	25.50	-	19.78	26.57	-	-	-	0.73	13.49	0.10	86.17
Transport Equipment	0.44	-	2.65	6.19	-	-	-	0.00	10.68	0.44	20.40
Machinery	1.36	-	6.32	18.85	-	-	-	0.01	25.26	0.34	52.15
Mining and Quarrying	0.96	-	5.32	3.38	-	-	-	0.00	8.92	0.07	18.65
Food and Tobacco	6.46	-	12.53	27.43	-	-	-	4.57	18.01	0.81	69.81
Paper, Pulp and Printing	6.11	-	10.70	26.46	-	-	-	21.83	32.39	1.36	98.84
Wood and Wood Products	0.27	-	3.81	1.96	-	-	-	13.19	4.95	0.15	24.33
Construction	1.37	-	10.77	0.71	-	-	-	0.01	1.24	0.03	14.13
Textile and Leather	0.75	-	6.23	7.51	-	-	-	0.10	9.82	0.43	24.84
Non-specified	7.08	-	29.09	19.23	-	-	0.42	2.34	34.86	4.37	97.40
TRANSPORT SECTOR	**0.10**	**-**	**1134.52**	**20.92**	**-**	**-**	**-**	**1.75**	**9.13**	**-**	**1166.42**
International Civil Aviation	-	-	67.20	-	-	-	-	-	-	-	67.20
Domestic Air Transport	-	-	85.22	-	-	-	-	-	-	-	85.22
Road	-	-	942.09	0.54	-	-	-	1.75	-	-	944.37
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Pipeline Transport	-	-	0.02	20.36	-	-	-	-	0.44	-	20.82
Internal Navigation	0.09	-	20.98	-	-	-	-	-	-	-	21.07
Non-specified	-	-	2.59	0.02	-	-	-	-	1.06	-	3.67
OTHER SECTORS	**22.12**	**-**	**263.44**	**369.34**	**-**	**-**	**1.20**	**53.95**	**392.75**	**32.13**	**1134.92**
Agriculture	1.39	-	55.85	5.16	-	-	0.06	0.84	6.63	0.29	70.22
Comm. and Publ. Services	3.35	-	74.09	111.32	-	-	0.05	1.89	181.17	7.24	379.12
Residential	16.58	-	130.13	240.84	-	-	1.07	49.50	203.20	21.75	663.06
Non-specified	0.80	-	3.37	12.02	-	-	0.01	1.72	1.74	2.84	22.51
NON-ENERGY USE	**0.95**	**-**	**123.01**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**123.96**
in Industry/Transf./Energy	0.77	-	112.62	-	-	-	-	-	-	-	113.39
in Transport	-	-	7.65	-	-	-	-	-	-	-	7.65
in Other Sectors	0.18	-	2.73	-	-	-	-	-	-	-	2.91
Electricity Generated - GWh	***3508315***	***-***	***660661***	***1280305***	***2124071***	***1291618***	***49471***	***142536***	***-***	***-***	***9056977***
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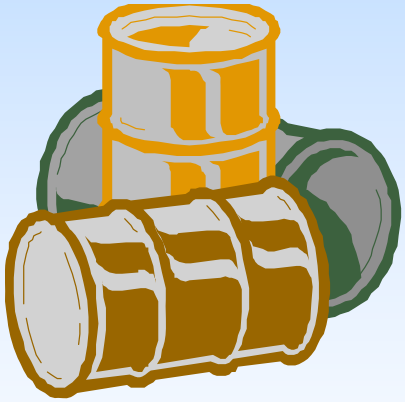
Heat Plants	*215480*	-	*65889*	*111580*	-	-	*15340*	*144204*	*11311*	*22229*	*586033*

Mtoe

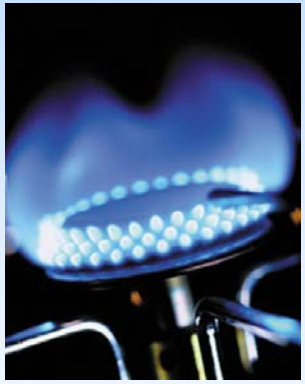
Net vs. Gross Calorific Values

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

5 %



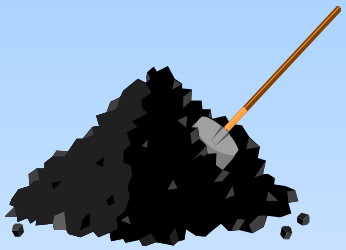
5 %



9-10 %

IEA uses Net Calorific Values

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 Public Power Plants, Coal used in Coke Ovens, Blast Furnaces and Industry

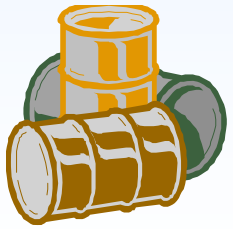
Average NCV for all other flows

OIL AND PETROLEUM PRODUCTS

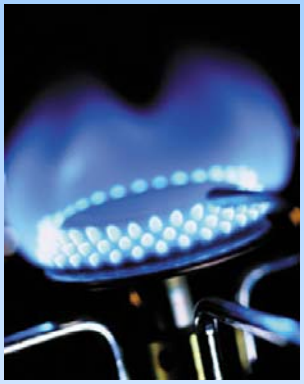
Using NCV [kJ/kg]

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

Petroleum products - region specific default values



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)

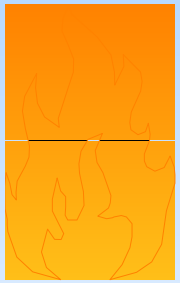
ELECTRICITY

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

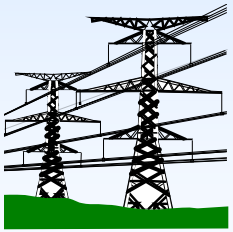
Gross electricity production is shown and the own use and losses are shown separately

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

Choice of Method for Calculating Primary Energy Equivalent

> **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

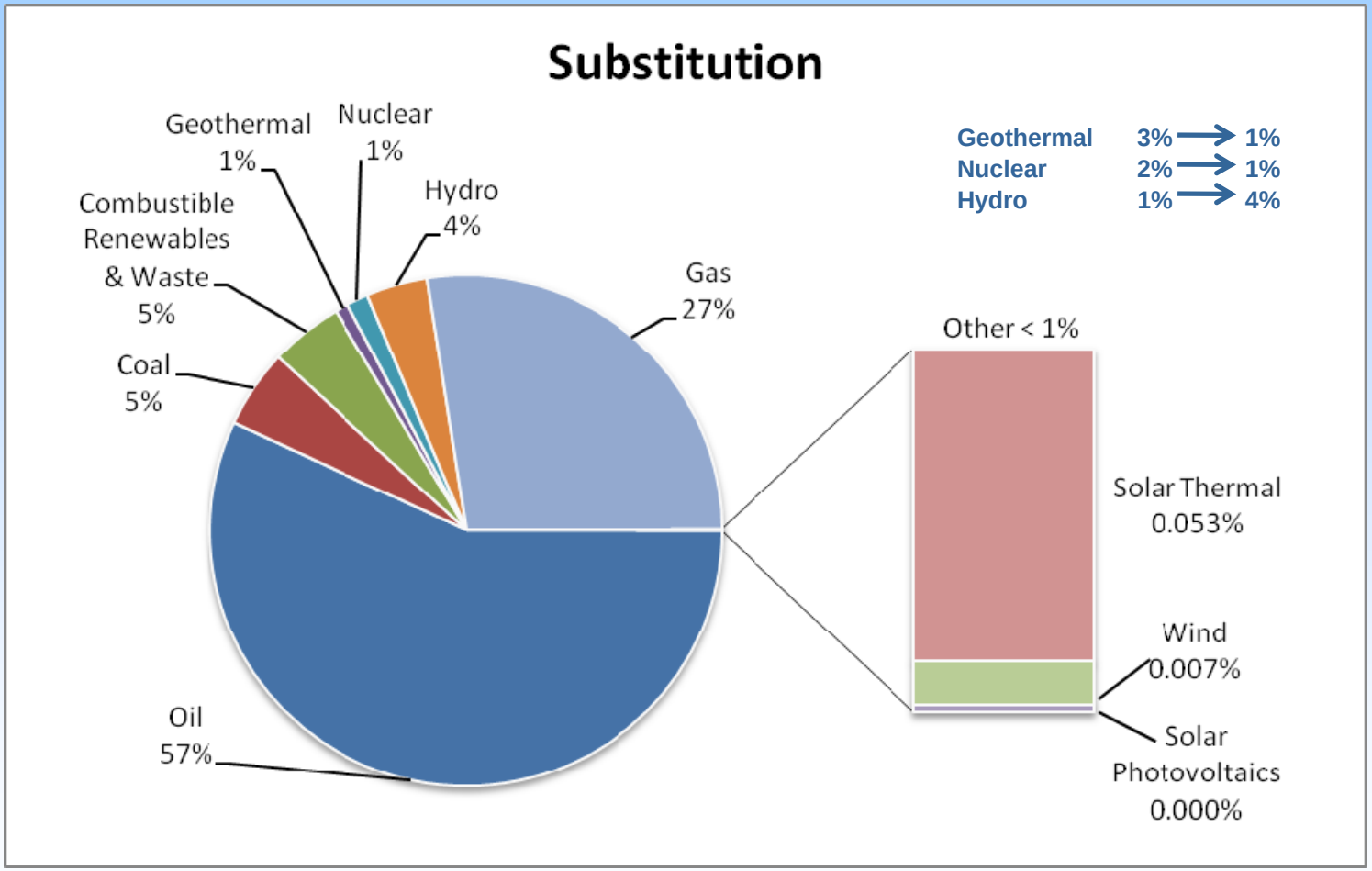
IEA opted for:

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

For nuclear, hydro, geothermal, solar, etc.

Physical Energy Content vs. Partial Substitution

Mexico Example



Geothermal, nuclear and hydro: can be very different shares!

IEA Energy Balances

5 Annual Questionnaires

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

Original Units → **Mtoe** → **Mt of CO_2**

IEA Energy Balance Layout: compact source of information

Mexico / Mexique : 2006

Million tonnes of oil equivalent / *Million de tonnes d'équivalent pétrole*

Flows | **Totals**

SUPPLY AND CONSUMPTION / *APPROVISIONNEMENT ET DEMANDE*	Coal & peat / *Charbon & tourbe*	Crude oil / *Pétrole brut*	Petroleum products / *Produits pétroliers*	Gas / *Gaz*	Nuclear / *Nucléaire*	Hydro / *Hydro*	Geotherm. solar etc. / *Géotherm. solaire etc.*	Combust. renew. & waste / *Comb. ren. & déchets*	Electricity / *Electricité*	Heat / *Chaleur*	Total / *Total*
Production	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-	255.97
Imports	3.90	0.46	[illegible]	8.29	-	-	-	-	0.04	-	31.51
Exports	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-	-108.26
Intl. marine bunkers	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-	-0.88
Stock changes	-0.67	-0.31	-0.03	0.04	-	-	-	-	-	-	-0.91
TPES	8.74	87.43	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	8.16	-0.07	-	**177.43**
Transfers	-	-12.42	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-	-	-	1.31
Statistical differences	0.18	-	-2.57	4.77	[illegible]	[illegible]	[illegible]	-	-	-	2.39
Electricity plants	-7.10	-	-13.80	-26.73	-2.83	-2.61	-5.75	-1.13	21.47	-	-38.49
CHP plants	-	-	-	-	-	-	-	-	-	-	-
Heat plants	-	-	-	-	-	-	-	-	-	-	-
Gas works	-	-	-	-	-	-	-	-	-	-	-
Petroleum refineries	-	-75.00	69.12	-	-	-	-	-	-	-	-5.89
Coal transformation	-0.19	-	-	-	-	-	-	-	-	-	-0.19
Liquefaction plants	-	-	-	-	-	-	-	-	-	-	-
Other transformation	-	-	-	-	-	-	-	-	-	-	-
Own use	-0.02	-	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-1.54	-	-19.68
Distribution losses	-	-	-	-	-	-	-	-	-3.45	-	-3.45
TFC	1.61	-	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	7.04	16.41	-	**113.43**
INDUSTRY SECTOR	1.61	-	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.13	9.55	-	**28.10**
Iron and steel	1.38	-	0.26	3.08	-	-	-	-	0.69	-	5.42
Chemical and petrochem.	-	-	0.40	2.66	-	-	-	-	0.50	-	3.55
Non-ferrous metals	-	-	0.00	0.03	-	-	-	-	0.08	-	0.11
Non-metallic minerals	0.11	-	0.68	0.83	-	-	-	-	0.61	-	2.22
Transport equipment	-	-	-	0.05	-	-	-	-	0.17	-	0.22
Machinery	-	-	0.01	-	-	-	-	-	-	-	0.01
Mining and quarrying	0.12	-	0.31	0.76	-	-	-	-	0.52	-	1.71
Food and tobacco	-	-	0.49	0.29	-	-	-	1.13	0.17	-	2.08
Paper, pulp and printing	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.87
Wood and wood products	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-
Construction	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.23
Textile and leather	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-
Non-specified	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	11.67
TRANSPORT SECTOR	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	**51.00**
International aviation	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2.85
Domestic aviation	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.02
Road	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	45.50
Rail	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.75
Pipeline transport	-	-	-	0.99	-	-	-	-	-	-	0.99
Domestic navigation	-	-	0.89	-	-	-	-	-	-	-	0.89
Non-specified	-	-	-	-	-	-	-	-	-	-	-
OTHER SECTORS	**-**	**-**	**11.95**	**1.06**	**-**	**-**	**0.09**	**5.90**	**6.76**	**-**	**25.76**
Residential	-	-	7.70	0.84	-	-	-	5.90	4.16	-	18.60
Comm. and public service	-	-	1.67	0.22	-	-	0.09	-	1.85	-	3.83
Agriculture/forestry	-	-	2.58	-	-	-	-	-	0.74	-	3.33
Fishing	-	-	-	-	-	-	-	-	-	-	-
Non-specified	-	-	-	-	-	-	-	-	-	-	-
NON-ENERGY USE	**-**	**-**	**6.36**	**2.21**	**-**	**-**	**-**	**-**	**-**	**-**	**8.58**
in industry/transf./energy	-	-	6.36	2.21	-	-	-	-	-	-	8.58
of which: feedstocks	-	-	*5.28*	*2.21*	-	-	-	-	-	-	*7.49*
in transport	-	-	-	-	-	-	-	-	-	-	-
in other sectors	-	-	-	-	-	-	-	-	-	-	-
Elec. generated - TWh	***31.74***	-	***53.84***	***113.61***	***10.87***	***30.39***	***6.75***	***2.45***	-	-	***249.65***
Electricity plants	*31.74*	-	*53.84*	*113.61*	*10.87*	*30.39*	*6.75*	*2.45*	-	-	*249.65*
CHP plants	-	-	-	-	-	-	-	-	-	-	-
Heat generated - PJ	-	-	-	-	-	-	-	-	-	-	-
CHP plants	-	-	-	-	-	-	-	-	-	-	-
Heat plants	-	-	-	-	-	-	-	-	-	-	-

Supply

Transformation and Energy Sectors

Consumption

Industry

Transport

Other Sectors

Non-Energy Use

Electricity and Heat Output

Comparable Information for all Products

Comparable Energy Units of Mtoe

Global picture of energy situation in a country

Energy balance: oil and petroleum products

Mexico			2006 Unit: ktoe
	Crude Oil	Motor Gasoline	Gas/ Diesel Oil
Production	177611	0	0
Net Imports	-103207	7637	2946
International Marine Bunkers	0	0	-774
Stock Changes	-310	82	-157
Total Primary Energy Supply	**74094**	**7719**	**2015**
Transfers	0	3176	0
Statistical Differences	0	-882	-1801
Transformation Sector	**-74094**	**22105**	**17578**
Electricity Plants	0	0	-423
Petroleum Refineries	-74094	22105	18001
Energy Sector	**0**	**-325**	**-713**
Total Final Consumption	**0**	**31793**	**17078**
Industry Sector	0	0	1048
Transport Sector	0	31793	13574
Other Sectors	0	0	2456
Commercial and Public Services	*0*	*0*	*96*
Agriculture/Forestry	*0*	*0*	*2361*
Non-Energy Use	0	0	0

Supply

- Refined products are secondary energy: production is 0

Transformation

- Negative value represents an input, positive value represents an output

- Transformation **losses** appear in the **Total** column as negative figures

Energy balance: electricity production

Mexico		2006 Unit: ktoe
	Gas/Diesel Oil	**Electricity**
Production	0	0
Net Imports	2946	-67
International Marine Bunkers	-774	0
Stock Changes	-157	0
Total Primary Energy Supply	**2015**	**-67**
Transfers	0	0
Statistical Differences	-1801	0
Transformation Sector	**17578**	**21470**
Electricity Plants	-423	21470
Petroleum Refineries	18001	0
Energy Sector	**-713**	**-1542**
Distribution Losses	**0**	**-3449**
Total Final Consumption	**17078**	**16412**
Industry Sector	1048	9551
Transport Sector	13574	102
Other Sectors	2456	6758
Residential	*0*	*4160*
Commercial and Public Services	*96*	*1854*
Agriculture/Forestry	*2361*	*745*
Non-Energy Use	0	0

Supply

- TPES for electricity can be either positive or negative

Transformation

- Negative value represents an input, positive value represents output (incl. hydro, nuclear, solar, etc.)

- Transformation **losses** appear in the **Total** column as negative figures

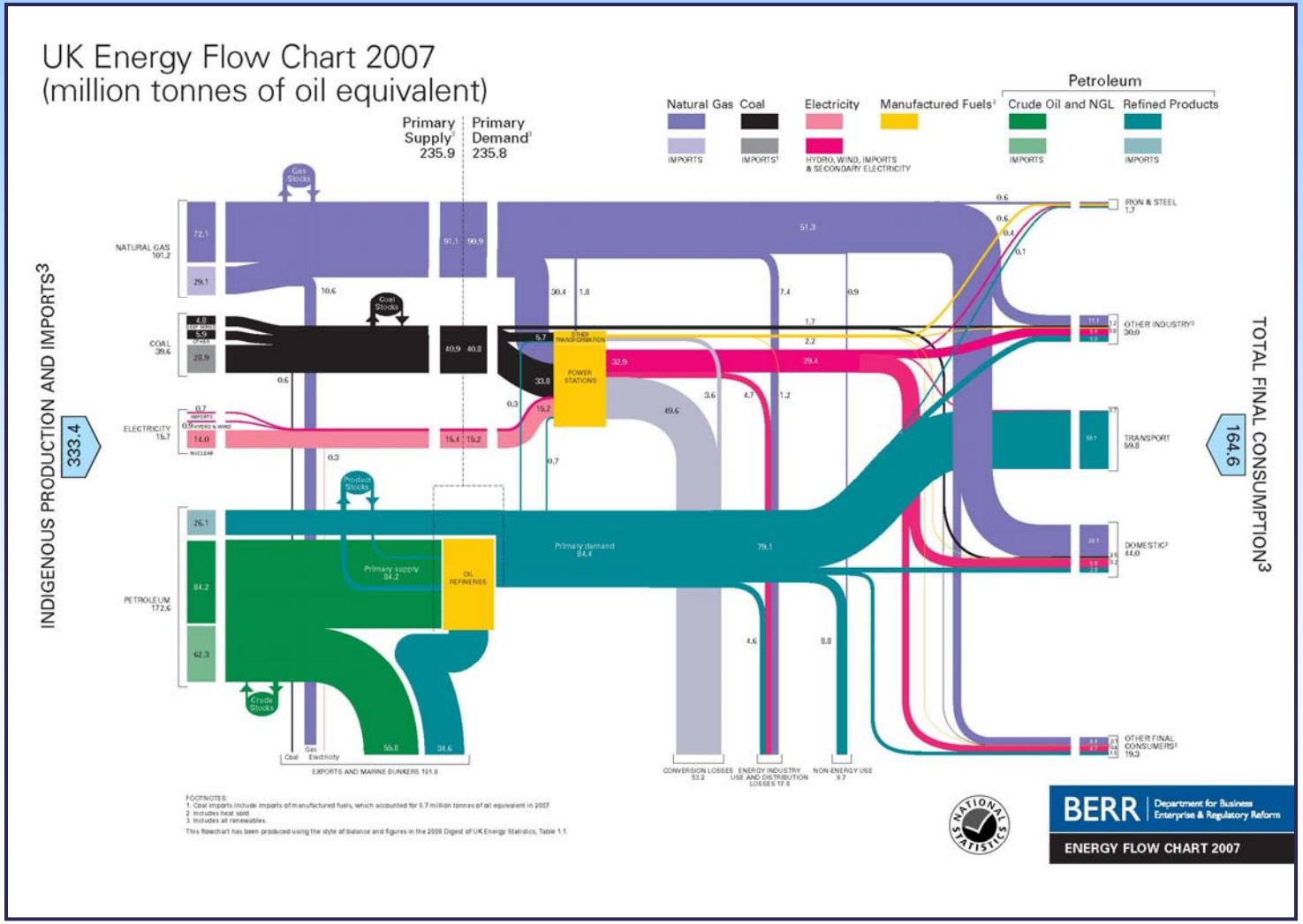
Using the energy balance with economic indicators

Using:

- Population
- GDP (using 2000 exchange rates to US dollars)
- GDP-PPP (using 2000 PPPs to US dollars)

- Energy Production/TPES
- Net Oil Imports/GDP
- TPES/GDP
- TPES/Population
- Oil Supply/GDP
- Oil Supply/Population
- Electricity Consumption/GDP
- Electricity Consumption/Population

Some countries use “flow” charts to visualise their energy balance



In conclusion, a good energy balance:

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