



Introduction to Energy Statistics: the core importance of good energy balances

Nikolaos Kordevas, Senior Energy Statistician, Energy Data Centre, IEA

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The importance of energy balances: bringing all information together





"...An accounting **framework** for compilation of data on **all energy products entering**, **exiting**, **and used** within the national territory of a given **country** during a reference period."

Source: International Recommendations on Energy Statistics (IRES), UNSD, 2011





WORLD ENERGY BALANCES (2017 edition) - II.157

2015			People	e s nep	ublic u	n China	a				
2015											
SUPPLY AND	Coal	Crude	01	Illon tonnes Natural	of oil equiv		Geotherm/	Classical at	Flankshik	linet	Total
CONSUMPTION	Coal	oll*	products	gas	Nuclear	Hydro	Solar/ etc.	Waste	Electricity	meat	TOTAL
Production Imports	1868.16	214.76 335.48	53.57	112.62 48.64	44.51	95.84	46.24	113.51	0.53	-	2495.63 546.98
Exports	-9.60	-2.87	-41.22	-2.71					-1.60		-58.01
Intl. marine bunkers	-	-	-9.23			-			-	-	-9.23
Intl. avlation bunkers	-	-	-7.80	-	-	-		-	-	-	-7.80
Stock changes	14.64	-6.24	-2.73	-	-	-	-	-	-	-	5.67
TPES	1981.95	541.14	-7.41	158.54	44.51	95.84	46.24	113.51	-1.07		2973.25
Transfers	-0.97	-1.09	2.49		-						0.43
Statistical differences Electricity plants	-9.24	-0.05	2.20	0.69	-44.51	-95.84	0.00	0.02	-0.01 502.60		-6.41 -628.15
CHP plants	*920.05	-0.13	-2.20	-20.07	-44.01	-90.04	-19.90	-21.92	302.00		4020.10
Heat plants	-121.45	-0.07	-4.63	-5.26	-	-		-1.47	-	95.90	-36.98
Blast fumaces	-103.84	-	-	-	-	-	-	-	-	-	-103.84
Gas works	-4.78	-		1.08	-	-		-	-	-	-3.70
Coke/pat. fuel/BKB/PB plants Oil refineries	-61.14	-533.29	517.38								-61.14
Petrochemical plants		-000.25									-10.01
Liquefaction plants	-3.64	2.19	-	-	-	-	-	-	-	-	-1.46
Other transformation					-	-	-	-			
Energy industry own use Losses	-56.07	-4.40 -0.87	-30.77	-21.72	-	-			-56.42 -25.70	-11.47	-180.86 -29.56
TFC INDUSTRY	700.75	3.42	477.01	105.42 38.51		-	26.26	90.14	419.40	83.28 55.72	1905.68
Industrikt	191.78	2.07	0.96	36.51		- 1	0.21		45.86	5.66	247.85
Chemical and petrochemical	90.58		12.45	11.51					45.00	26.89	188.14
Non-ferrous metals	16.57		1.04	3.33				- 1	47.35	3.50	71.79
Non-metallic minerals	161.98	-	6.13	6.66	-	-	-	-	26.71	0.26	201.73
Transport equipment	2.90	-	0.75	2.54	-	-		-	8.19	1.10	15.48
Machinery Mining and guarrying	12.78	-	2.09	3.82	-	-			35.38	1.05	55.13 20.69
Food and tobacco	23.48		0.89	1.89					9.42	3.62	39.31
Paper, pulp and printing	8.76		0.33	0.85					6.42	4.88	21.25
Wood and wood products	2.76	-	0.27	0.18	-	-	-	-	2.99	0.16	6.35
Construction	4.51	-	7.25	0.18	-	-	-	-	6.01	0.22	18.16
Textle and leather	9.89		0.49	0.66	-	-			16.66	6.89	34.59
Non-specified TRANSPORT	5.45	2.07	19.24	2.42	-	-	0.21		15.66	0.60	45.65
Domestic aviation	2.44		18.00	16.60	-	-	-	2.05	15.45		298.60
Road			218.03	16.29				2.05	10.10		246.47
Rall	2.44	-	3.23		-	-			5.35	-	11.01
Pipeline transport	-	-	0.00	0.31	-	-	-	-	-	-	0.31
Domestic navigation	0.00	-	20.94	-	-	-	-	-	-	-	20.94
Non-specified	104.10	-	69.39	40.33	-	-					483.22
OTHER Residential	104.10 49.18	-	69.39 35.94	40.33 30.10	-		26.05 21.81	88.09 88.09	127.71 65.06	27.56 22.41	483.22 312.60
Comm. and public services	20.18		15.73	10.15			3.56	00.05	26.20	2.16	78.00
Agriculture/forestry	13.64	-	17.72	0.08	-	-	0.64	-	8.94	0.03	41.04
Fishing	-	-	-	-	-	-	-	-	-	-	-
Non-specified	21.09	-	-	-	-	-	0.04	-	27.50	2.96	51.59
NON-ENERGY USE	55.59	1.36	90.80	9.98	-	-	-	-			157.73
In Industry/transf./energy of which: chem./petrochem.	55.59	1.36	66.74 55.38	9.98	-	-		-	-	-	133.67
in transport	- 1	1.30	1.23	9.90	- 1	- 1	- 1	- 1	- 1	- 1	1.23
in other	-	-	22.83	-	-	-		-	-	-	22.83
			Ek	ectricity an	d Heat Out	nut					
Electr, generated - TWh	4108.99		9.68	145.35	170.79	1114.47	231,15	63.73			5844.16
Electricity plants	4108.99	- 2	9.68	145.35	170.79	1114.47	231.15	63.73	- 2	- 2	5844.16
CHP plants		-				-			-	-	
Heat generated - PJ CHP plants	3605.29	-	166.98	198.37	-	-	-	45.40	-	-	4016.05
	3605.29	- 1	166.98	198.37	-	-	-	45.40	-	-	4016.05
Heat plants		-	106.98	196.37	•	-		43.40	-		4016.05

People's Republic of China

1. Includes crude oil, NGL, refinery feedstocks, additives and other hydrocarbons

What is an energy balance?

- Why do we develop energy balances?
- From energy statistics to energy balances
 - Understanding the flows of energy
 - Benefits of energy balances
 - Beyond energy balances

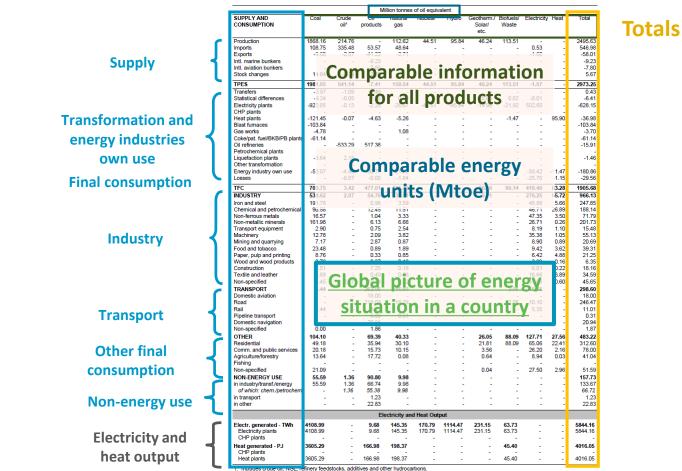




What is an energy balance?

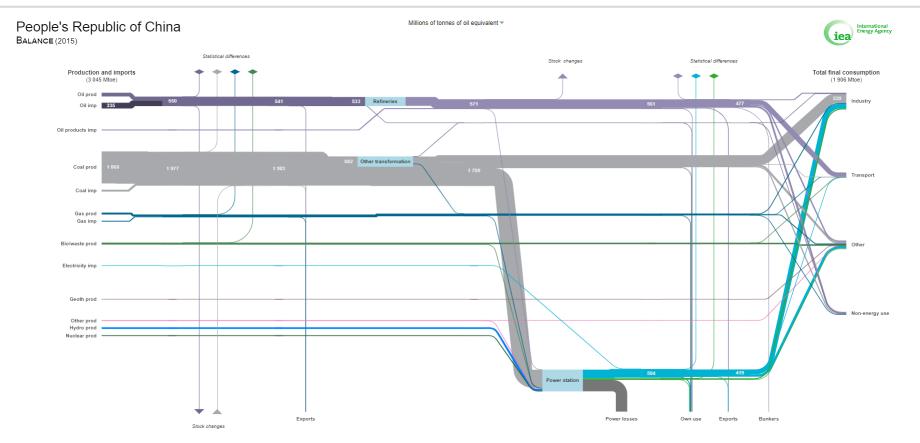
Energy balances are a compact source of information





Energy balance can be depicted as a Sankey chart





http://www.iea.org/Sankey/#?c=People's%20Republic%20of%20China&s=Balance



Why do we develop energy balances?



➢ To understand overall energy use in country, e.g.

- compute the total energy use
- assess relative contribution of different sources in energy mix / different sectors in energy demand
- compute efficiencies of various transformation processes (e.g. electricity generation)

- To estimate high-level indicators (self-sufficiency, intensity, ..) and CO_2 emissions from fuel combustion
- To assess data completeness and check quality of the various energy commodity balances

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Coal*	Crude oil*	Oil products	Natural gas	Nuclear	Hydro	Geothermal, solar, etc.	Biofuels and waste	Electricity	Heat	Total**
1868159	214760	0	112618	44509	95844	46236	113508	0	0	2495635
108753	335483	53573	48640	0	0	0	0	534	0	546982
-9602	-2866	-41220	-2715	0	0	0	0	-1604	0	-58007
0	0	-9228	0	0	0	0	0	0	0	-9228
0	0	-7799	0	0	0	0	0	0	0	-7799
14642	-6238	-2734	0	0	0	0	0	0	0	5670
1981952	541139	-7407	158543	44509	95844	46236	113508	-1070	0	2973254
-971	-1090	2490	0	0	0	0	0	0	0	429
-9244	-52	2198	689	0	0	0	16	-14	0	-6407
-920053	-125	-2253	-26070	-44509	-95844	-19980	-21917	502598	0	-628154
0	0	0	0	0	0	0	0	0	0	0
-121455	-67	-4625	-5263	0	0	0	-1468	0	95903	-36975
-4777	0	0	1078	0	0	0	0	0	0	-3699
0	-533291	517383	0	0	0	0	0	0	0	-15908
-164982	0	0	0	0	0	0	0	0	0	-164982
-3642	2185	0	0	0	0	0	0	0	0	-1457
0	0	0	0	0	0	0	0	0	0	0
-56075	-4404	-30773	-21719	0	0	0	0	-56417	-11472	-180860
0	-872	-4	-1839	0	0	0	0	-25696	-1152	-29562
	1868159 108753 -9602 0 0 14642 1981952 1981952 -92053 -92053 0 -92053 -920555 -920555 -92055 -92055 -92055 -92	Image 1868159 214760 108753 335483 -9602 -2866 0 -2866 0 0 0 0 14642 -6238 1981952 541139 -971 -1090 -92045 -125 -920053 -125 -920053 -125 -121455 -670 -4777 0 -164982 2016 -3642 2185 0 0 -3642 0 -56075 -4407	Idea Idea 1868159 214760 0 108753 335483 53573 108753 335483 53573 19602 -2866 -41220 0 -2866 -41220 0 2-286 -41220 0 2-286 -41220 0 0 -9228 100 2-6233 -2734 198192 541139 -7407 198192 541139 2490 -92043 -1029 2490 -92045 -1125 2253 0 0 0 -92045 -607 4602 -92045 -607 4602 -121455 607 60 -44777 0 0 0 -164982 0 0 0 -3642 2185 0 0 -56075 -4404 -30773 0	Image Image Image Image 1868159 214760 0 112618 108753 335483 53573 44640 -9602 -2866 -41220 -2715 0 2 -2866 -41220 -2715 0 0 -9228 0 0 14642 -6238 -2734 0 0 14642 -6238 -27407 158543 -971 -1090 2490 0 0 -92045 -1255 2198 689 -92053 -1255 -26070 0 0 -92045 -125 -26070 0 0 -92045 -1255 -26070 0 0 -92045 -1255 -26070 0 0 -92045 -1255 -26070 0 0 -121455 0 0 0 0 -14070 0 0 0 0	Introduct Introduct Introduct Introduct Introduct 1868159 214760 0 1112618 44509 108753 335483 553573 448640 0 9602 -2866 -41220 -2715 0 9602 -2866 -41220 -2715 0 0 0 -9228 0 0 0 14642 -6238 -2734 0 0 0 14642 -6238 -2734 0 0 0 198192 541139 -7407 158543 44509 -971 1-109 2490 0 0 0 -920453 -1125 22198 6689 0 0 -920453 -1252 -2253 -26070 44509 -121455 -667 -4625 -56263 0 0 -14477 0 0 0 0 0 0 -14498 2165	Initial Instant In	IntermIntermIntermIntermSolar, etc.1868159214760011126184450995844646236108753335483535734486400009602-2866-41220-271500096042-2866-412202-271500096042-2866-412202-271500096042-2866-412202-2715000146426-623-2734000014642-6238-27341585434450995844446236198192541139-740715854344509000920053-112522198668900000-92045-12553-26070-4450995844-19980-92045-1255-2253-260704450995844-19980-92045-14055-263700000-92045-532915173831008100000-144920010081001000000-16493218500000000-16493000000000-16493000000000-1649300	IndexIndexIndexIndexIndexSolar, etc.wwaste18681592147600.011126184450995844446236111308108753335483535734486400.000.00.096022-2866-41220-27150.00.00.00.096042-2866-41220-27150.00.00.00.00.096042-2866-41220-27150.00.00.00.00.0146426-6238-27340.000.00.00.00.00.014642-6238-27340.000.00.00.00.00.0198192541139-2740715854344509958444462361113508-97141-109224900.000.00.00.00.00.0-920451-1525-2253-260704450995844-19980-21917-920451-1523-260704450995844-19980-21917-920451-1523-26070445090.00.00.00.0-920451-1523-260704450995844-19980-21917-920451-1523-2607044509403.03.03.0-1214553-67673-66793.03.03.03.03.0-144983-173833.03.03.03.03.03.0-	InterfaceInterfaceInterfaceSolar etc.solar etc.wate1868159214760(0.011126184450995844446236111308(0.010875333548353573448640(0.0(0.0(0.0)(0.0)(0.0)(0.0)196022-2866(-41220)(-2715)(0.0)(0.0)(0.0)(0.0)(0.0)(0.0)(0.0)(0.0)(0.0)19604(0.0)(Interm 1988119Interms 19881Interms 19881Solar, etc.waseInterms 198811888159214760Interms4460095844A46236Interms 19881Interms

Columns present the "commodity balances" for all products

>IEA methodology uses **ktoe**

All data are comparable thanks to a common energy unit - Total energy can be defined



From energy statistics to energy balances



➢ To convert mass to energy units, we need...

- Specific gravity
- Calorific value
- Emission factor







Answer



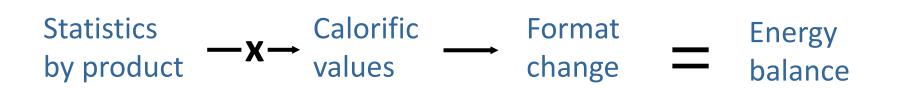
➢ To convert mass to energy units, we need

- Specific gravity
- Calorific value
- Emission factor





Typically in units of energy per mass or per volume



A calorific value -

- is the amount of heat obtained from one unit (mass or volume) of the fuel,
- and is the only way to convert a fuel quantity from natural units (mass or volume) into energy units (e.g. ktoe).

· ie?

Calorific values - the key to data quality



Commodity Bituminous balances coal		Produ	ict 2											
Dalances	kt	m3	Net Calorific	Bituminous	Produ	uct 2								
Production	100		Values	coal TJ/kt TJ/m		Energ balan		Bituminous coal	Product 2					
Import	20		Production	23		exce		TJ	ТJ					
Export	40		Import	25		Produ	iction	2300						
Supply	80		Export	22.5		Impoi		500						
Statistical differences	0					Expor	t	900						
agjerences						Supp	ly	1900						
Input to Electricity	50		Input to Electricity	22		Statis		200						
						Input	to	1100						
Final	30		Final consumption	20		Electr	icity							
consumption			· ·											
Need t qua	Final consu	mption	600											



Understanding the flows of energy

Understanding the flows of energy

	2015 V Indicators	Balances	Coal	Electricity	and Heat	Natural	Gas	Oil Rene	ewables and W	aste		
	Г	Coal*	Crude oil*	Oil products	Natural gas	Nuclear	Hydro	Geothermal, solar, etc.	Biofuels and waste	Electricity	Heat	Total**
	Production	1868159	214760	0	112618	44509	95844	46236	113508	0	0	2495635
	Imports	108753	335483	53573	48640	0	0	0	0	534	0	546982
Supply	Exports	-9602	-2866	-41220	-2715	0	0	0	0	-1604	0	-58007
Sabbiy	International marine bunkers***	0	0	-9228	0	0	0	0	0	0	0	-9228
	International aviation bunkers***	0	0	-7799	0	0	0	0	0	0	0	-7799
	Stock changes	14642	-6238	-2734	0	0	0	0	0	0	0	5670
	TPES	1981952	541139	-7407	158543	44509	95844	46236	113508	-1070	0	2973254
	Transfers	-971	-1090	2490	0	0	0	0	0	0	0	429
	Statistical differences											07
	Electricity plants	1										4
	CHP plants		K	lows	s pre	ser	η ε	energ	gy flo	WS		o
-	Heat plants		_				•					5
Transformation	Heat plants Gas works		а	cros	s the	e va	ario	ous p	rodu	icts		5
Transformation			а	cros	s the	e va	ario	ous p	orodu	icts		5 9 18
Transformation	Gas works	-184982	a	cros	s the	e va	ario °	ous p	orodu	ucts °	0	5 9 18 -164982
Transformation	Gas works Oil refineries	-184982 -3842								0		5 9 08 -164982 -1457
Transformation	Gas works Oil refineries Coal transformation		0	0	0	0	0	0	0	0	0	
Transformation	Gas works Oil refineries Coal transformation Liquefication plants	-3642	0 2185	0	0	0	0	0	0	0	0	-1457
Transformation	Gas works Oil refineries Coal transformation Liquefication plants Other transformation	-3842 0	0 2185 0	0	0	0	0	0	0	0 0 0 -58417	0	-1457 0
Transformation	Gas works Oil refineries Coal transformation Liquefication plants Other transformation Energy industry own use	-3642 0 -56075	0 2185 0 -4404	0 0 -30773	0 0 0 -21719	0 0 0	0 0 0	0	0	0 0 0 -58417	0 0 0 -11472	-1457 0 -180860
Transformation	Gas works Oil refineries Coal transformation Liquefication plants Other transformation Energy industry own use Losses	-3642 0 -56075 0	0 2185 0 -4404 -872	0 0 -30773 -4	0 0 -21719 -1839	0 0 0	0 0 0	0 0 0 0	0 0 0 0	0 0 -56417 -25696 419401	0 0 -11472 -1152	-1457 0 -180860 -29562
Transformation	Gas works Oil refineries Coal transformation Liquefication plants Other transformation Energy industry own use Losses Total final consumption	-3642 0 -56075 0 700754	0 2185 0 -4404 -872 3423	0 0 -30773 -4 477009	0 0 -21719 -1839 105420	0 0 0 0	0 0 0 0 0	0 0 0 0 26256	0 0 0 0 0 90138	0 0 -56417 -25696 419401	0 0 -11472 -1152 83279	-1457 0 -180860 -29562 1905679
Transformation	Gas works Oil refineries Coal transformation Liquefication plants Other transformation Energy industry own use Losses Total final consumption Industry	-3642 0 -56075 0 700754 538623	0 2185 0 -4404 -872 3423 2066 0	0 0 -30773 -4 477009 54758 262056	0 0 -21719 -1839 105420 38506	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 26256 210	0 0 0 0 90138 0 2047	0 0 -58417 -25896 419401 276246 45449	0 0 -11472 -1152 83279 55722 0	-1457 0 -180860 -29562 1905679 966131
	Gas works Oil refineries Coal transformation Liquefication plants Other transformation Energy industry own use Losses Total final consumption Industry Transport	-3642 0 -56075 0 700754 538623	0 2185 0 -4404 -872 3423 2066 0	0 0 -30773 -4 477009 54758 262056	0 0 -21719 -1839 105420 38506	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 26256 210	0 0 0 0 0 90138 0	0 0 -58417 -25896 419401 276246 45449	0 0 -11472 -1152 83279 55722 0	-1457 0 -180860 -29562 1905679 966131
Transformation -	Gas works Oil refineries Coal transformation Liquefication plants Other transformation Energy industry own use Losses Total final consumption Industry Transport Other	-3642 0 -56075 0 700754 538623	0 2185 0 -4404 -872 3423 2066 0	0 0 -30773 -4 477009 54758 262056	0 0 -21719 -1839 105420 38506	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 26256 210	0 0 0 0 90138 0 2047	0 0 -58417 -25896 419401 276246 45449	0 0 -11472 -1152 83279 55722 0	-1457 0 -180860 -29562 1905679 966131
	Gas works Oil refineries Coal transformation Liquefication plants Other transformation Energy industry own use Losses Total final consumption Industry Transport Other Residential	-3642 0 -56075 0 700754 538623	0 2185 0 -4404 -872 3423 2066 0	0 0 -30773 -4 477009 54758 262056	0 0 -21719 -1839 105420 38506	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 26256 210	0 0 0 0 90138 0 2047	0 0 -58417 -25896 419401 276246 45449	0 0 -11472 -1152 83279 55722 0	-1457 0 -180860 -29562 1905679 966131
	Gas works Oil refineries Coal transformation Liquefication plants Other transformation Energy industry own use Losses Total final consumption Industry Transport Other Residential Commercial and public services	-3642 0 -56075 0 700754 538623 2442	0 2185 0 -4404 -872 3423 2066 0 T	0 0 -30773 4 477009 54758 363056	0 0 -21719 -1839 105420 38506 45602 mai	0 0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 26256 210 0 0 0 0 0 0 0 0 0 0	0 0 0 90138 0 2017 Of fl	0 0 -56417 -25696 419401 276246 16449 OWS 8943	0 0 -11472 -1152 83279 55722 0	-1457 0 -180880 -29582 1905679 966131 299596 2 9 8
	Gas works Oil refineries Coal transformation Liquefication plants Other transformation Energy industry own use Losses Total final consumption Industry Transport Other Residential Commercial and public services Agriculture / forestry	-3642 0 -58075 0 700754 538623 2442 13637	0 2185 0 -4404 -872 3423 2066 0 T K	0 0 -30773 -4 477009 54758 262056 DTCEC 17717	0 0 -21719 -1839 105420 38506 46602 mai 79	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 26256 210 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 90138 0 2017 Of fl	0 0 -56417 -25696 419401 276246 15449 OWUS 8943 0	0 0 -11472 -1152 83279 55722 0	-1457 0 -180880 -29582 1905679 966131 399656 2 9 6 1 399656 2 9 6 1 399656 2 9 6 1 1 1 1 1 1 1 1 1 1
	Gas works Oil refineries Coal transformation Liquefication plants Other transformation Energy industry own use Losses Total final consumption Industry Transport Other Residential Commercial and public services Agriculture / forestry Fishing	-3842 0 -56075 0 700754 538623 2442 13837 0	0 2185 0 -4404 3423 2066 0 T C 0 0 0	0 0 -30773 -4 477009 54758 262056 DECE 17717 0	0 0 -21719 -1839 105420 38506 46602 mai 79	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 26256 210 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 90138 0 2017 Of fl	0 0 -56417 -25696 419401 276246 15449 OWUS 8943 0 27499	0 0 -11472 -1152 83279 55722 0 55722 0 55722 0	-1457 0 -180860 -29562 1905679 966131 300596 2 9 6 131 300596 2 9 6 131 300596 2 9 6 131 30050 2 9 6 131 30050 2 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151 151151

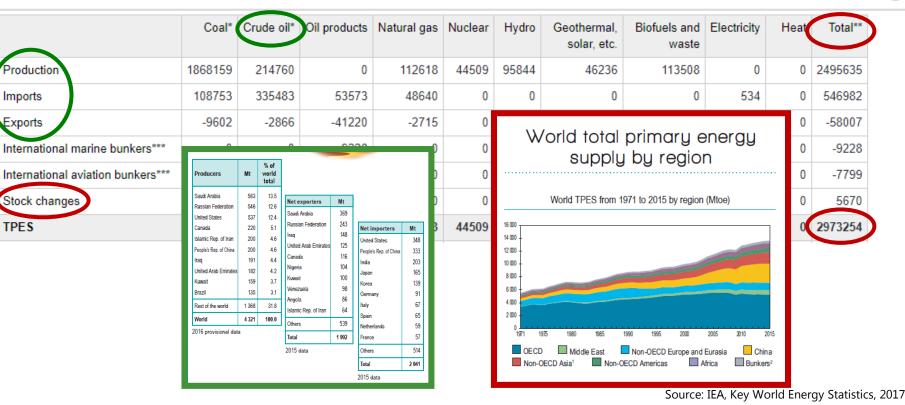
1: Energy supply

		C	oal*	Crude oil*	Oil products	Natural gas	Nuclear	Hydro	Geothermal, solar, etc.	Biofuels and waste	Electricity	Heat	Total*
Production		1868	159	214760	0	112618	44509	95844	46236	113508	0	0	2495635
Imports		108	753	335483	53573	48640	0	0	0	0	534	0	54698
Exports		-9	802	-2866	-41220	-2715	0	0	0	0	-1604	0	-5800
International marine bun	kers***		0	0	-9228	0	0	0	0	0	0	0	-922
International aviation bu	nkers***		0	0	-7799	0	0	0	0	0	0	0	-779
Stock changes	Producers	Mt	% of world total			0	0	0	0	0	0	0	567
TPES	Saudi Arabia Russian Federalic United States Canada Islamic Rep, of Ira People's Rep, of Ch Iraq United Arab Emira Kuwait Brazil Rest of the world 2016 provisional	537 220 in 200 a 200 191 ates 182 159 135 1368 4 321	13.5 12.6 12.4 5.1 4.6 4.4 4.2 3.7 3.1 31.8 100.0	Saudi Arabia Russian Federation Inaq United Arab Emirates Canada Nigeria Kuwait Venezuela Angola Islamic Rep. of Iran Others	148 United States 125 People's Rep, of China 104 Inda 104 Japan 108 Germany 64 Spain 539 Netherlands 982 France	Mt 348 333 203 165 139 91 67 65 59 57 514 344	44509	95844	46236	113508	-1070	0	297325
					Total 2015 data	2 041							

Source: IEA, Key World Energy Statistics, 2017

"High-level" information: **TPES**, **Totals**, etc...

1: Energy supply



"High-level" information: Total primary energy supply, production, trade, etc...

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2: Transformation and energy sectors



	Coal*	Crude oil*	Oil products	Natural gas	Nuclear	Hydro	Geothermal, solar, etc.	Biofuels and waste	-	Heat	Total**
Electricity plants	-920053	-125	-2253	-26070	-44509	-95844	-19980	-21917	502598	0	-628154
CHP plants	0	0	0	0	0	0	0	(0	0	0
Heat plants	-121455	-67	-4625	-5263	٥	0	0	-1468	0	95903	-36975
Gas works	-4777	0	Transf	ormin	g en	erg	y sourc	es	0	0	-3699
Oil refineries	0	-533291			J	Ĵ.	· · ·		0	0	-15908
Coal transformation	-164982	0	0	0	0	0	0	(0	0	-164982
Liquefication plants	-3642	2185	0	0	0	0	0	(0	0	-1457
Other transformation	0	0			Coarm	red pow	er plant 0	(0	0	0
Energy industry own use	Inpu (coa	t al)		Pulverizer		Generator	C	->	Out (elect	put ricit	y)

The concept of efficiency = output / input

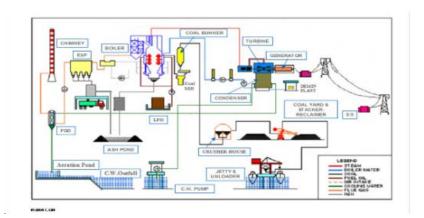


> What is the average efficiency for a **coal electricity-only** power plant?

37%

52%

65%

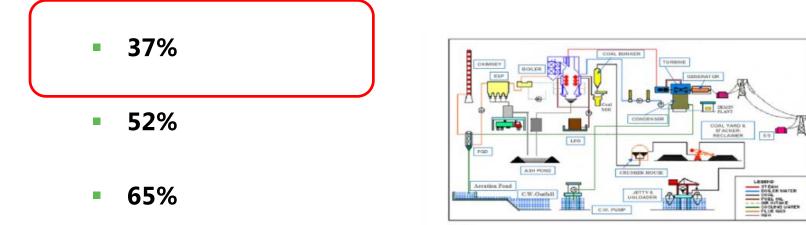


Answer



> What is the average efficiency for a **coal electricity-only** power plant?

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Source: IEA, World Energy Balances, 2017



	Coal*	Crude oil*	Oil products	Natural gas	Nuclear	Hydro	Geothermal, solar, etc.	Biofuels and waste	Electricity	Heat	Total**
Fotal final consumption	700754	3423	477009	105420	0	0	26256	90138	419401	83279	1905679
Industry	538623	2066	54758	38506	0	0	210	0	276246	55722	966131
Transport	2442	0	262056	16602	0	0	0	2047	15449	0	298596
Other	104100	0	69391	40332	0	0	26046	88091	127706	27556	483222
Residential	49185	0	35944	30102	0	0	21807	88091	65061	22409	312599
Commercial and public services	20185	0	15731	10150	0	0	3564	0	26204	2163	77996
Agriculture / forestry	13637	0	17717	79	0	0	640	0	8943	25	41041
Fishing	0	0	0	0	0	0	0	0	0	0	0
Non-specified	21093	0	0	0	0	0	36	0	27499	2959	51586
Non-energy use	55589	1357	90804	9980	0	0	0	0	0	0	157730
-of which chemical/petrochemical	0	1357	55381	9980	0	0	0	0	0	0	66718

Deliveries of energy products to all final consumers

And finally



> What is the largest energy-consuming sector in the world?

- Residential
- Transport
- Industry





Answer



> What is the largest energy-consuming sector in the world?

Residential 3% Industry 9% Transport 29% Transport 8% Residential Industry Commerce and public services 22% Non-energy use 29% Other

Total final consumption by sector in 2015

Source: IEA, World Energy Balances, 2017



Benefits of energy balances





Source: IEA, World Energy Balances, 2017

Coupling energy balances data with various macro-economic variables





0.6 0.5 0.4 0.3 0.2 0.1 0 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015

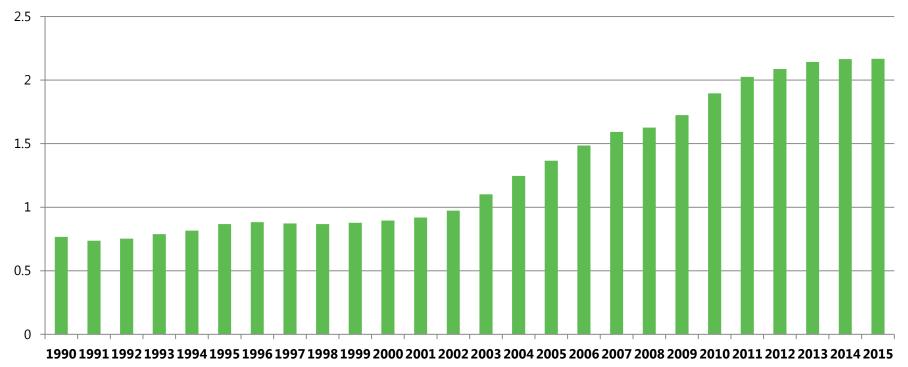
China TPES/GDP (toe per thousand 2010 USD PPP)

Source: IEA World Energy Balances (2017 edition)



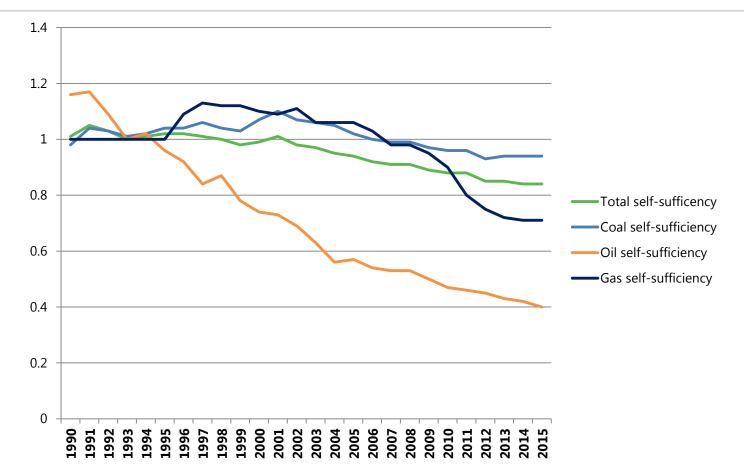


China, TPES/population (toe per capita)



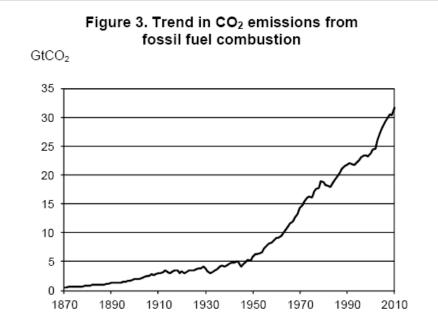
Self-sufficiency – Production/TPES





Estimating CO₂ emissions from fuel combustion



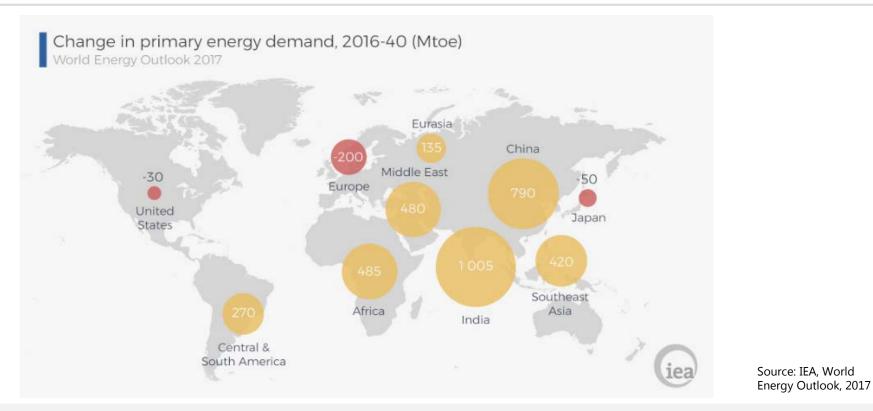


Source: Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, US Department of Energy, Oak Ridge, Tenn., United States.

Source: IEA, World CO₂ Emissions from Fuel Combustion, 2016

Based on energy balances and IPCC methodologies

Projecting energy demand across countries



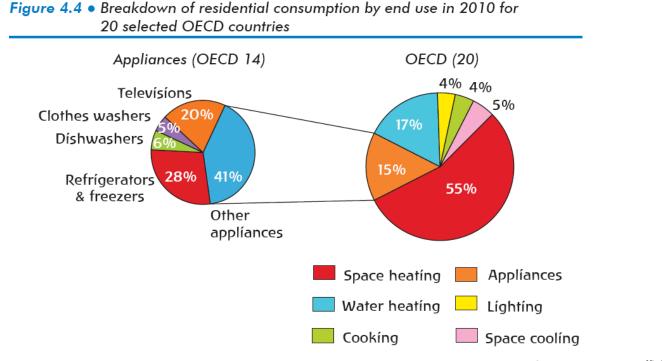
Comparability of energy statistics across countries is key

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Beyond energy balances

Beyond energy balances: monitoring energy efficiency



Note: The breakdown into individual appliances is available only for 14 countries.

Source: IEA, Energy Efficiency Indicators: Fundamentals on Statistics, 2014

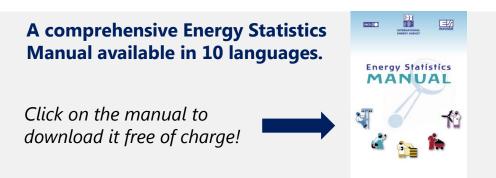
Starting from energy balances and getting more insights in energy efficiency

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Learn more about Energy Statistics

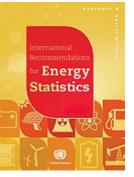


The IEA produced a comprehensive Energy Statistics Manual covering most of our data collection methodologies, consistently with the IRES framework.



Visit the **IEA's Statistics website** to access additional resources, including our questionnaires, glossary and documentation related to our data collection methodologies.

To learn more about the international framework for energy statistics, please refer to the United Nations' International Recommendations for Energy Statistics (IRES).







www.iea.org/statistics