

Challenges in Energy Security and Sustainable Use of Energy in North and Central Asia¹: regional cooperation opportunities

¹ According to the UNESCAP classification, the region includes Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Russian Federation, Tajikistan, Turkmenistan, and Uzbekistan

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Introduction

In the 21st century, energy security has become the main criterion and measure of success for the world energy sector. The concept that emerged in its original sense after the oil crisis of the 70's and was incorporated in the national security systems of many countries was intended to ensure a steady supply of energy. 'International energy security' existed in its original meaning for over 30 years, remaining a subject of discussion mainly in countries importing energy resources.

But in the early 21st century, the net exporting countries had raised, at the highest level, the problems faced by energy producers resulting from the lack of steady demand. During the Group of Eight Summit in St. Petersburg in 2006, the member countries of the Group adopted a final document which stated that global energy security is only possible if both the supply and demand for energy are stable².

However, this very adequate but too wide concept reflecting the global nature of energy security and implying intense and stable energy trade did not provide answers to all questions related to issues such as security of society and individuals. The United Nations has declared 2012 the Year of Sustainable Energy for All. The world energy development goals have been announced, including provision of comprehensive access to energy for the entire population of the planet by 2030.

Thus, the concept of energy security has transformed from a purely national, state-wide issue, to a subject existing at the international level and embracing the aspect of individual security.

Definition of energy security

There are several definitions of energy security. The World Energy Council defines it as "confidence in uninterrupted availability of energy in the amount and of the quality needed in given economic conditions". In the "Energy Technology Policy" published in 1985, the IEA defines energy security as "adequate supply of energy at an affordable price". The European Commission (1990) gives a more comprehensive definition: "the ability to ensure that future essential energy needs can be met, both by means of adequate domestic

² Chair's summary, Group of Eight Summit 2006. Accessed at <http://en.g8russia.ru/docs/25.html> on 07.01.2013

resources worked under economically acceptable conditions or maintained as strategic reserves, and by calling upon accessible and stable external sources supplemented where appropriate by strategic stocks”.

Institute of Energy Strategy under the Ministry of Energy of the Russian Federation defines energy security as a state of protection of citizens, society, country, and economy from the threat of deficit by meeting their energy needs with economically affordable energy resources of acceptable quality. Where the state of protection is the state which, in normal conditions, implies full satisfaction of justified needs for energy and, in extreme conditions, guaranteed satisfaction of the minimum required needs.

The International Energy Agency defines energy security as “the uninterrupted physical availability at a price which is affordable, while respecting environmental concerns”³.

Energy security in the understanding of the *United Nations (UN)* is primarily linked to sustainable development, and as to the importance, ranks with the issues such as food security, climate change and socio-economic development of the least developed countries and regions⁴.

The Energy Strategy of the Russian Federation until 2030 defines energy security as “the state of protection of the country, its people, society, state and economy from the threats emerging for reliable fuel and energy supply. These threats are caused by external (geopolitical, macroeconomic, market) factors, as well as by the condition and operation of the energy sector of the country”.

Energy security depends on the resource availability, economic affordability, environmental and technological permissibility. The resource availability determines the physical ability to supply energy free of deficit to the national economy and the population; the economic affordability determines the profitability of such supply at appropriate market prices; environmental and technological permissibility determine the possibility of extraction, production and consumption of energy resources within the technological and environmental constraints existing at each stage, which determine the safety of energy facilities.

³ http://www.iea.org/media/freepublications/2011/moses_paper.pdf, page 9

⁴ Oslo, Norway, 10 October 2011 - Secretary-General's remarks at Conference on Energy for All: Financing Access for the Poor / <http://www.un.org/sg/statements/index.asp?nid=5591>

The economic aspect of the energy security concept

The position held by energy buyers with respect to energy security largely depends on whether or not they can get enough energy in a given period of time required for the normal functioning of the economy and to sustain the population, and the prices at which these energy resources can be obtained. Interruptions in the supply and / or price increases adversely affect the well-being of the buyers. Sellers, in turn, are concerned about the prospects of stable sales of the resources they produce. Their requests for purchase guarantees gain larger weight due to aggravation of production conditions associated with the depletion of easily accessible reserves and appreciation of the development of new deposits, which require significant financial investments. Lower prices for the product they sell is often a larger problem for the net exporting countries than just a lower return on investment. Since revenues from selling the energy abroad for most net exporting countries make up the major portion of the state budget, the stability of export is a significant factor in the safe existence of the state.

The issue of fair prices for energy resources, particularly oil, is one of the most politically charged and discussed economic issues of the global energy sector. What buyers are concerned with is the upper limit of the price, above which it would create unacceptable economic difficulties for the buyer; sellers, respectively, are concerned about the lower limits. Both those and others, in a mutually acceptable price environment, are interested in uninterrupted commodity exchange; that is, to have the demand always met by the supply. Continuous supply meeting demand at all times at a price acceptable to the exporters and importers can be safely called energy security. Thus, *for the purposes of this report*, the term ‘energy security’ shall be used in the following interpretation: **energy security is the state of security of the country, its people, society, government and the economy from the threats to fuel and energy supply, which is ensured by a stable balance of supply and demand for fuel and energy resources at a price acceptable to both producers and consumers.**

CHAPTER I. Key Figures for the North and Central Asia

North and Central Asia (NCA) is the region uniting nine countries including Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, the Russian Federation, Tajikistan, Turkmenistan and Uzbekistan. NCA shares borders in the East with the US and Japan (sea borders), in the South-East with China, Mongolia and Democratic People's Republic of Korea (DPRK), in the South with Iran and Afghanistan, in the South-West with Turkey, in the West with Ukraine, Poland, Belarus, Lithuania, Latvia, Estonia, Finland and Norway. The region's total area is 21.3 million square kilometers (Table 1).

The total population of North and Central Asia is 226 million people. Country populations vary considerably across the region from 3.2 million people in Armenia to 142.9 million people in the Russian Federation (Table 1). Population densities range significantly as well, from six people per square kilometre in Kazakhstan to 110 people per square kilometer in Armenia. Current total population growth rate of the region is 1.3 per cent a year (between the beginning of 2010 and the beginning of 2011) ranging from 0.4 per cent in Armenia to 4 per cent in Uzbekistan.

Table 1 - Selected statistics for area and population of the North and Central Asia

Regional Member	Country Area thousand square kilometers	Population million people, estimates as of 01.01.2012	Population Change 01.01.2011 against 01.01.2010	Population Density* people per square kilometer, as of 01.01.2012
Armenia	29.7	3.263	0.40%	110
Azerbaijan	86.6	9.111	1.26%	105
Georgia	69.7	4.469	0.74%	64
Kazakhstan	2724.9	16.442	1.46%	6
Kyrgyzstan	199.9	5.478	1.09%	27
Russian Federation	17098.2	142.900	0.70%	8
Tajikistan	143.1	7.616	1.15%	53
Turkmenistan	488.1	...	...	...
Uzbekistan	447.4	29.123	4.01%	65
Total/average:	21,287,736	226.021**	1.28%**	11**

Source: UNSD Demographic Yearbook, 2009-2010 (for area); Interstate Statistical Committee of the CIS (CIS Stat), National Statistics Agencies Data (for population estimates)

*Figures are estimates of population divided by surface area and are not to be considered either as reflecting density in the urban sense or as indicating the supporting power of a territory's land and resources

...Data not available. Turkmenistan's latest available data is 01.01.2007 estimate published by CIS Stat (population - 6.746 million people; density - 14 people per square kilometer)

**calculated by author at the assumption of Turkmenistan's population growing between 2007 and 2012 at the same average yearly rates as between 1992 and 2003 (widest available comparable data range for Turkmenistan as an independent country, obtained from United Nations Statistics Division online database) and the resulting estimates up to 2012

Economic performance of North and Central Asian countries, both in terms of absolute and weighted values, is uneven with the subregion as a whole developing at stable positive dynamics.

As seen from Table 2, in 2011 the North and Central Asia total GDP at the official exchange rate equalled 2.2 trillion USD, with country GDPs varying from almost 6 billion in Kyrgyzstan to nearly 1860 billion in the Russian Federation. The second largest value was registered in Kazakhstan at 186 billion dollars, and the third – over 63 billion dollars – in Azerbaijan. The 2011 NCA per capita GDP average by country equalled 4935 dollars, varying from slightly over 850 dollars in Tajikistan to 13015 dollars in the Russian Federation. Average 2011 GDP growth was 6.6 per cent, and ranged from 0.1 per cent in Azerbaijan to 14.7 per cent in Turkmenistan, while decade-long yearly averages varied from 3.9 in Kyrgyzstan to 17.3 in Azerbaijan. The NCA by country average of the reviewed parameter registered at 8 per cent. In 2011, NCA country inflation rates ranged from 2 per cent in Georgia to 16.6 per cent in Kyrgyzstan with the subregional average equalling 7.8 per cent. Current account balance as per cent share of GDP averaged 0.8 in the subregion, varying from -11.8 in Tajikistan to 27.1 in Azerbaijan. General government gross debt as per cent share of GDP ranged from 9.1 in Uzbekistan to 52.4 per cent in Kyrgyzstan and averaged 23.5 per cent for the subregion.

Table 2 – Key economic indicators for the North and Central Asia, 2011

Regional Member	GDP ^a	GDP per capita ^d	GDP growth		Inflation ^b	Current account balance ^c	General government gross debt ^b
	billion USD	USD	per cent change ^a	2001-2011 ^e average yearly per cent change	per cent change	per cent of GDP	per cent of GDP
Armenia	10.1	3107.3	4.7 ^c	6.3	7.7	-10.9	35.1
Azerbaijan	63.3	6947.4	0.1	17.3	7.9	27.1	10.2
Georgia	14.4	3215.4	7.0	6.4 ^f	2.0	-11.7	33.9
Kazakhstan	186.3	11327.8	7.5	7.8	7.4	7.6	10.9
Kyrgyzstan	5.9	1081.3	5.7	3.9	16.6	-6.4	52.4
Russian Federation	1859.8	13014.9	4.3	4.3	6.1	5.3	9.6
Tajikistan	6.5	856.4	7.4	7.1	9.4	-11.8	35.3
Turkmenistan	25.7 ^b	3379.0	14.7	10.9	5.8	1.8 ^b	15.4
Uzbekistan	43.3 ^{c,1}	1487.3	8.3	7.7	7.6	5.8 ^b	9.1

Total/average²:	2215.4	4935.2	6.6	8.0	7.8	0.8	23.5
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Sources: As listed below.

^a Interstate Statistical Committee of the Commonwealth of Independent States (CIS Statcommittee) online data (if not elsewhere specified), accessed at www.cisstat.com on 16.08.2012

^b International Monetary Fund World Economic Outlook database: April 2012 Edition, accessed at <http://www.imf.org/external/pubs/ft/weo/2012/01/weodata/index.aspx> on 16.08.2012

^c Country source(s)' data, including that of national statistics agencies' and specialized state finance and monetary institutions' (if not elsewhere specified), accessed at the respective web pages on 16.08.2012

^d Calculated by author based on this table's GDP data and country sources' population data

^e Calculated by author based on CIS Statcommittee data

^f Average calculated from CIS Statcommittee data for 2001 to 2003 and National Statistics Office of Georgia data for 2004 to 2011 (accessed at http://geostat.ge/index.php?action=page&p_id=119&lang=eng on the 15.08.2012)

Notes:

¹ Data available only in UZS. Converted to USD by author at the 27.12.2011 official rate of the Central Bank of Uzbekistan (1 USD = 1795 UZS)

² Total for GDP, average for all other values

Social development of the North and Central Asia countries, assessed through the value of the Human Development Index (HDI), varied from medium to high with top three HDI rank positions held in 2011 by the Russian Federation, Kazakhstan and Georgia (Table 3).

The average subregional HDI in 2011 was 0.689, which corresponded to the medium level of development. Life expectancy at birth varied from 65 years in Turkmenistan to 74.2 years in Armenia, with NCA's average being 69.2. Average mean years of schooling – an index representing number of years of education received by people aged 25 and older – in the NCA equalled 10.1 years. The country values ranged from 8.6 in Azerbaijan to 12.1 in Georgia. Expected years of schooling values varied from 11.4 in Tajikistan to 15.1 in Kazakhstan and averaged at 12.6 years in the region. Gross national income per capita values ranged from 1937 dollars at purchasing power parity in Tajikistan to 14561 dollars in the Russian Federation with the subregion's average equalling 6447 dollars. Gross national income (GNI) per capita rank minus HDI ranks, where negative value means that the country is better ranked by GNI than by the HDI, varied from -13 in the Russian Federation to 36 in Georgia, with the subregion's average being 10. Ranking the subregional members by non-income HDI puts Georgia in first place, Armenia in second, and Kazakhstan in third, with the Russian Federation taking the fourth place.

Table 3 – North and Central Asia Human Development Index and its components, 2011a

HDI world rank	Regional member	Human Development Index (HDI)	Life expectancy at birth	Mean years of schooling	Expected years of schooling	Gross National Income (GNI) per capita	GNI per capita rank minus HDI rank	Nonincome HDI
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		value	HDI group	years	years	years	Constant 2005 PPPS	value	value
86	Armenia	0.716	High	74.2	10.8	12.0	5 188	22	0.806
91	Azerbaijan	0.700	High	70.7	8.6 ²	11.8	8 666	-10	0.733
75	Georgia	0.733	High	73.7	12.1 ¹	13.1	4 780	36	0.843
68	Kazakhstan	0.745	High	67.0	10.4	15.1	10 585	4	0.786
126	Kyrgyzstan	0.615	Medium	67.7	9.3	12.5	2 036	19	0.734
66	Russian Federation	0.755	High	68.8	9.8	14.1	14 561	-13	0.777
127	Tajikistan	0.607	Medium	67.5	9.8	11.4	1 937	20	0.726
102	Turkmenistan	0.686	Medium	65.0	9.9 ³	12.5 ⁴	7 306	-7	0.724
115	Uzbekistan	0.641	Medium	68.3	10.0 ¹	11.4	2 967	19	0.736
Average:		0.689	Medium	69.2	10.1	12.6	6 447	10	0.763

Source: UNDP Human Development Report 2011 - Sustainability and Equity: A Better Future for All

Notes:

^a Data refer to 2011 or the most recent year available.

¹ Based on data from UNICEF (2000–2010).

² Based on UNESCO (2011) estimates of education attainment distribution.

³ Based on data on years of schooling of adults from household surveys from World Bank (2010).

⁴ Based on cross-country regression.

Definitions:

Human Development Index (HDI): A composite index measuring average achievement in three basic dimensions of human development—a long and healthy life, knowledge and a decent standard of living.

Life expectancy at birth: Number of years a newborn infant could expect to live if prevailing patterns of age-specific mortality rates at the time of birth stay the same throughout the infant's life.

Mean years of schooling: Average number of years of education received by people ages 25 and older, converted from education attainment levels using official durations of each level.

Expected years of schooling: Number of years of schooling that a child of school entrance age can expect to receive if prevailing patterns of age-specific enrolment rates persist throughout the child's life.

Gross national income (GNI) per capita: Aggregate income of an economy generated by its production and its ownership of factors of production, less the incomes paid for the use of factors of production owned by the rest of the world, converted to international dollars using purchasing power parity (PPP) rates, divided by midyear population.

GNI per capita rank minus HDI rank: Difference in rankings by GNI per capita and by the HDI. A negative value means that the country is better ranked by GNI than by the HDI.

Nonincome HDI: Value of the HDI computed from the life expectancy and education indicators only.

Main Data Sources (as listed in the original UNDP source):

Column 1: HDRO calculations based on data from UNDESA (2011), Barro and Lee (2010), UNESCO Institute for Statistics (2011), World Bank (2011), UNSD (2011) and IMF (2011).

Column 2: UNDP Human Development Report 2011 - Sustainability and Equity: A Better Future for All

Column 3: UNDESA (2011).

Column 4: HDRO updates of Barro and Lee (2010) estimates based on UNESCO Institute for Statistics data on education attainment (2011) and Barro and Lee (2010) methodology.

Column 5: UNESCO (2011).

Column 6: HDRO calculations based on data from World Bank (2011), IMF (2011) and UNSD (2011).

Column 7: Calculated based on data in columns 1 and 5.

Column 8: Calculated based on data in columns 2, 3 and 4.

Current energy situation in North and Central Asia

Reserves

The North and Central Asia (NCA) region is richly endowed with energy reserves. NCA possesses over 7 per cent of the world's oil resources, more than 35 per cent of the world's gas reserves and around 22 per cent of the global coal reserves. There is large potential for hydropower generation, wind and solar energy in NCA.

Table 4 provides data for the fossil fuel reserves endowment of the countries of North and Central Asia. The region's **oil** endowment is to a large extent situated in the Russian Federation, which has over 12 billion tonnes of the fuel, or around 70 per cent of the subregion's total. Kazakhstan's reserves are estimated at 3.9 billion tonnes, which equals to about 23 per cent of the subregional total. Azerbaijan's reserves comprise 1 billion tonnes or 5.6 per cent of North and Central Asia reserves. Turkmenistan and Uzbekistan are endowed with oil to a lesser extent with 0.5 per cent of the subregional total value each.

The vast **gas** reserves of the subregion are concentrated in the Russian Federation, which has almost 45 trillion cubic meters of gas, or 60.5 per cent of the North and Central Asian total, and Turkmenistan is enriched with 24.3 trillion cubic meters of gas, or 33 per cent of the subregional total. Azerbaijan, Kazakhstan and Uzbekistan together account for 6.5 per cent of the NCA's endowment.

With the territory of Turkmenistan being less than 3 per cent of the territory of the Russian Federation, the country's fourth largest gas reserves in the world are more than a half of those in the Russian Federation

The largest **coal** reserves of the subregion are situated in Kazakhstan and in the Russian Federation with the latter disposing of more than 82 per cent of the total in NCA.

Table 4 – North and Central Asia Fossil Fuels Reserves

	Oil. Gt	share of NCA	Gas. Tm3	share of NCA	Coal. Gt	share of NCA
Azerbaijan	1.0	5.6%	1.3	1.7%		
Kazakhstan	3.9	22.9%	1.9	2.6%	33.6	17.6%
Russian Federation	12.1	70.5%	44.6	60.5%	157.0	82.4%
Turkmenistan	0.1	0.5%	24.3	33.0%		
Uzbekistan	0.1	0.5%	1.6	2.2%		
Total World	234.3		208.4		860.9	
share of world	7.3%		35.3%		22.1%	

Source: BP Statistical Review of World Energy, June 2012

The **hydropower** generation potential of the subregion is estimated at almost 3500 terawatt hours per year, and economically feasible resources at over 1000 terawatt hours per year, the values making up 9 and 11 per cent of the world's total. Table 5 provides by country values of potential, technical and economically feasible hydropower resources in NCA. The Russian Federation has over 68 per cent of the economically feasible hydropower resources in the subregion, with the second and the third largest potentials situated in Tajikistan and Kyrgyzstan (21.3 and 4.4 per cent correspondingly). Potential hydropower resources are more than three times larger than the economically feasible ones: the Russian Federation's share slightly exceeds 66 per cent with Tajikistan accounting for the second largest value of 15 per cent, Kazakhstan and Kyrgyzstan nearly reaching 5 per cent and Georgia – the sound 3.9 per cent.

Table 5 – Hydropower resources in North and Central Asia
TWh/year

	Potential	Share in NCA potential resources	Economically feasible	Share in NCA economically feasible resources
Armenia	21,8	0,6%	3,5	0,3%
Azerbaijan	43,5	1,3%	7,0	0,6%
Georgia	135,8	3,9%	15,2	1,2%
Kazakhstan	170,0	4,9%	28,5	2,3%
Kyrgyzstan	142,5	4,7%	55,2	4,4%
Russian Federation	2295,0	66,2%	852,0	68,6%
Tajikistan	527,0	15,2%	264,0	21,3%
Turkmenistan	23,9	0,7%	1,7	0,1%
Uzbekistan	88,0	2,5%	15,0	14,2%
Total NCA	3467,5	9,0%*	1004,5	14,2% *
Total World	38606		8771	

Source: Hydropower and Dams, World Atlas 2009

Notes: * Share of the subregion resources in the world resources

There is significant **wind** energy generation potential in the subregion that has a total estimated value of technically possible production of over 9 thousand terawatt hours yearly. Table 6 contains information on the estimates for technical wind power resources in the countries of North and Central Asia. The largest resources are located in the Russian Federation where more than 6 thousand terawatt hours could be generated yearly (the value comprising 66 per cent of the subregional total), Kazakhstan (over 1.8 thousand terawatt hours yearly or 20 per cent of NCA) and Turkmenistan (over a thousand terawatt hours a year or 12 per cent of the subregion's total).

The subregion possesses reasonable **solar** power resources with the average possible yearly energy output of 1350 to 1700 kilowatt hours per square meter. Turkmenistan disposes of the largest per territory solar resources in North and Central Asia with around a half of the country capable of yielding from 1700 to 2100 kilowatt hours per square meter a year⁵.

Table 6 – Wind energy resources in North and Central Asia
TWh/year

	Technically recoverable, TWh/year	Share in NCA
Armenia	44	0,5%
Azerbaijan	13	0,1%
Georgia	83	0,9%
Kazakhstan	1820	19,7%
Kyrgyzstan	22	0,2%
Russian Federation	6132	66,3%
Tajikistan	33	0,4%
Turkmenistan	1095	11,8%
Uzbekistan	n/a	n/a
Total NCA	9242	

Sources: Renewable Energy and Energy Efficiency Partnership online database (accessed on 7.09.2012); independent analyses

Notes: Wind energy potential data varies significantly depending on the source and is highly fragmented. No prevailing source of standardized estimates are existent so far.

The subregion possesses moderate potential for **solar** power generation; the average possible annual production may make up from 1350 to 1700 kilowatt-hours per square meter. Turkmenistan possesses the largest solar energy resources per unit area. In North and Central Asia, there is significant potential for energy generation from **biomass**, which currently is largely possessed by Georgia (according to the energy balance data, see Figure 1), and moderate potential for energy generation from **geothermal energy**.

Production and consumption

Total energy production in North and Central Asia (NCA) in 2009⁶ equalled 1550 million tonnes of oil equivalent, total consumption – 835 million tonnes of oil equivalent. Thus net exports of NCA as a whole comprised 715 million tonnes of oil equivalent. However, only five out of nine countries in the subregion are net-exporters. They are the largest energy producers in the subregion – the Russian Federation, Kazakhstan, Azerbaijan, Uzbekistan and Turkmenistan. Armenia, Georgia, Tajikistan and Kyrgyzstan are net-

⁵ Global Energy Network Institute Data (accessed at <http://www.geni.org/globalenergy/library/renewable-energy-resources/solarbig.shtml> on 7.09.2012

⁶ Latest complete official data available at the moment of the study submission

importers of energy. Table 7 provides information on production, consumption, net imports, import dependence and exports to production ratios in the countries of NCA.

Self-sufficiencies of the net-importing countries range from 17 per cent in Armenia (as of 2009) to 63 per cent in Tajikistan. Steady upward progress of this value between 2006 and 2009 is registered only in Georgia, which has both rising production and declining consumption. Exporting potentials of the net-exporters (as the share value of outward trade to production) vary from 20 per cent in Uzbekistan to 78 per cent in Azerbaijan with the latter having gained considerable 16 per cent of the parameter between 2006 and 2009.

Table 7 – Key energy balance values in North and Central Asia

			2006	2007	2008	2009	share of 2009 values in NCA total
Armenia	Production	mtoe	0,4	0,4	0,4	0,4	0,0%
	Consumption	mtoe	2	3	3	2	0,3%
	Net Imports	mtoe	2	2	2	2	
	Import Dependence	%	83	85	87	83	
Azerbaijan	Production	mtoe	39	55	63	69	4,4%
	Consumption	mtoe	15	14	17	15	1,8%
	Net Exports	mtoe	24	40	46	53	
	Exports share in prod.	%	62	74	73	78	
Georgia	Production	mtoe	1	1	1	1	0,1%
	Consumption	mtoe	3	3	3	3	0,4%
	Net Imports	mtoe	3	2	2	2	
	Import Dependence	%	73	69	68	63	
Kazakhstan	Production	mtoe	134	140	152	158	10,2%
	Consumption	mtoe	63	74	77	76	9,1%
	Net Exports	mtoe	71	66	75	82	
	Exports share in prod.	%	53	47	49	52	
Kyrgyzstan	Production	mtoe	1	1	1	1	0,1%
	Consumption	mtoe	3	3	3	3	0,4%
	Net Imports	mtoe	1	2	2	2	
	Import Dependence	%	46	55	58	63	
Russian Federation	Production	mtoe	1262	1273	1288	1209	78,0%
	Consumption	mtoe	686	687	703	658	78,8%
	Net Exports	mtoe	576	586	586	550	
	Exports share in prod.	%	46	46	45	46	
Tajikistan	Production	mtoe	2	2	1	2	0,1%
	Consumption	mtoe	3	3	3	2	0,3%
	Net Imports	mtoe	1	1	1	1	
	Import Dependence	%	39	41	42	37	
Turkmenistan	Production	mtoe	66	72	75	44	2,9%
	Consumption	mtoe	20	24	24	21	2,5%
	Net Exports	mtoe	46	49	51	23	
	Exports share in prod.	%	69	67	68	53	
Uzbekistan	Production	mtoe	64	66	70	67	4,3%
	Consumption	mtoe	53	53	58	53	6,4%
	Net Exports	mtoe	11	12	13	13	

Exports share in prod.	%	17	19	18	20
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Source: United Nations 2009 Energy Balances and Electricity Profiles (see annex 1 for details); author's estimates

Notes:

mtoe – million tonnes of oil equivalent

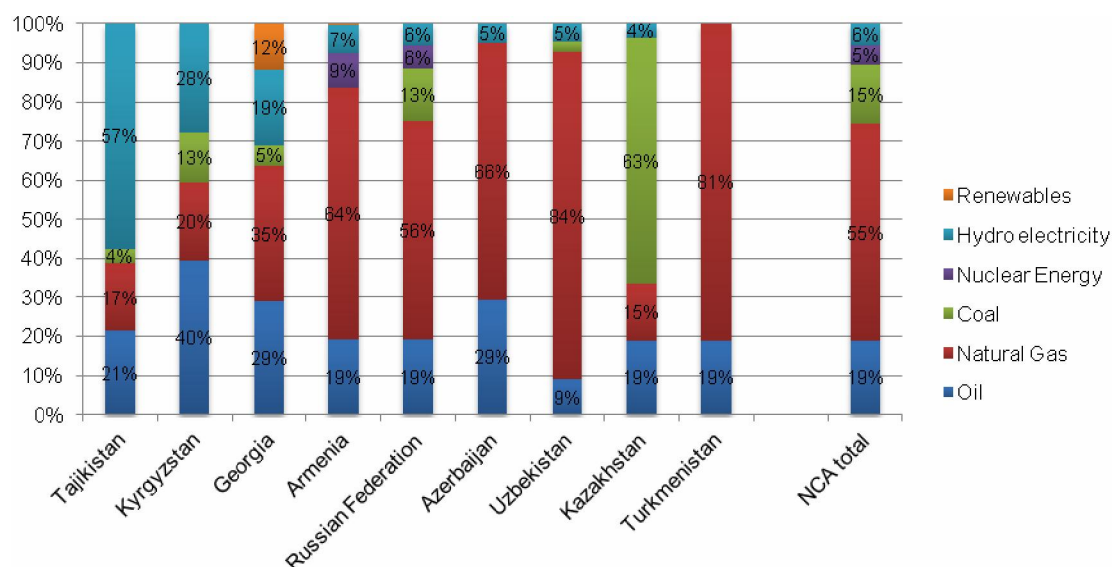
Values are converted from TJ to mtoe using 0,00002388 conversion factor

Colour marks the net energy exporting countries

More than a half of the North and Central Asia total **energy mix** consists of natural gas. Oil and coal comprise 19 and 15 per cent correspondingly. Nuclear energy and hydropower power make up for 5 and 6 per cent, while the current renewable share is negligible. Figure 1 and Table 1 of annex 2 provide for graphic and numeric representation of the energy mix in NCA.

Natural gas, the most widely used fuel in the region, comprises from 15 per cent of energy mix in Kazakhstan to over 80 per cent in Turkmenistan and Uzbekistan. Coal's share varies from zero values in Turkmenistan and Azerbaijan and nearly zero in Armenia to almost 63 per cent in Kazakhstan. Oil share ranges from 9 per cent in Uzbekistan to 40 per cent in Kyrgyzstan. Hydropower power is a widespread source of energy in NCA, especially in its mountainous countries – Tajikistan, Kyrgyzstan and Georgia – where hydropower generation provides for 57, 28 and 19 per cent of energy mix correspondingly. Nuclear power accounts for 9 per cent of the energy mix in Armenia and 6 per cent in the Russian Federation. Renewable energy potential in the countries of NCA is practically untapped with 12 per cent of the energy mix share in Georgia's consumption coming from biomass consumed primarily by households.

Figure 1 – Energy mix of the countries of North and Central Asia



Source: Annex 2 Table 1

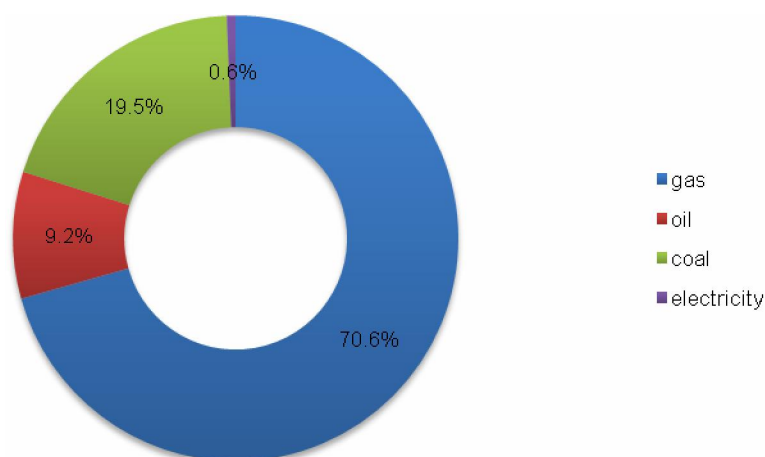
Energy trade

Total energy trade of North and Central Asian countries as a sum of imports and exports in 2011 comprised 747 million tonnes of oil equivalent. Exports constituted 693 million tonnes or almost 93 per cent of the total traded volume with the Russian Federation accounting for 74 per cent of all exports. Energy trade within NCA comprised 108 million tonnes of oil equivalent. All imports to NCA countries occurred from other NCA members the total imported value being 54 million tonnes of oil equivalent which also make up 8 per cent of all NCA exports.

Figure 2 provides graphic representation of shares of resources in total energy trade volumes within North and Central Asia in 2011. Annex 2 Table 2 provides for detailed data on the energy trade of NCA countries in 2011.

100 % of energy imports to North and Central Asia (NCA) countries in 2011 originated from NCA itself depicting the importance of subregional cooperation.

Figure 2 – Share of resources in total energy trade volumes within North and Central Asia, 2011



Source: Annex 2 Table 2

CHAPTER II. Major challenges relevant to enhancing energy security and the sustainable use of energy

Major sustainable development challenges

The 1987 Report of the United Nations World Commission on Environment and Development (Brundtland Report) has formulated the basis for the sustainable development concept which is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains within it two key concepts:

- the concept of 'needs', in particular the essential needs of the world's poor, to which overriding priority should be given; and
- the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs.

The United Nations 2005 World Summit Outcome Document has elaborated on the key provisions of the concept developing the standard for the components of sustainable development: "interdependent and mutually reinforcing pillars" of sustainable development as economic development, social development, and environmental protection.

The *economic* situation in NCA is characterized by low to middle levels of development with the major challenge being to dramatically boost growth in order to reach at least average world levels in all countries, with particular progress to be achieved in Kyrgyzstan, Tajikistan and Uzbekistan that currently experience lowest per capita production and incomes. The countries of the region are significantly influenced by the common Soviet past with its centralized economy, subsequent drastic collapse of established patterns of governance, industry management, trade connections and behavioural patterns. One of the major economic challenges in North and Central Asia is attracting foreign investment. The major concern in this regard is the legislation and law enforcement that have to allow both the governments and the businesses the perception of safety in terms of sovereignty control and investment returns. The overall deteriorated state of industry development, the lack of innovation and intellectual property potential result in falling behind in the competition with the leading world producers, and reliance on industrial and high-tech imports while the major exports – mineral resources and agricultural products – are available only to some countries in the region. This poses the question of a growth

driver, the advantage that will allow regional members to experience increasing development rates.

The prospects of *social* development within the subregion significantly depend on the levels of income. Regarded through human development index (HDI), social prosperity depends on a) economic conditions, i.e. per capita gross national income (GNI), b) life expectancy and c) education. UNDP data (see table 3) suggests that the majority of the NCA countries have higher world ranks in HDI than in GNI which stipulates that social development is restrained by economic conditions – which is especially relevant to Georgia, Armenia, Tajikistan, Uzbekistan and Kyrgyzstan. The income conditions in the Russian Federation, Turkmenistan and Uzbekistan, on the other hand, are relatively better than non-income conditions with the major challenge for Azerbaijan being low mean and expected years of schooling; for Turkmenistan – short life expectancy at birth; and for the Russian Federation – both the short life expectancy and low mean years of schooling. Overall, Tajikistan, Kyrgyzstan, Uzbekistan and Turkmenistan are experiencing the major social development challenges – both in terms of economic and non-economic aspects – with poverty being one of the most serious problems in Tajikistan where, according to the UNEP/UNDP Poverty-Environment Initiative, 53% of the population lives below the poverty line and 17.1 % are in absolute poverty⁷.

The main *environmental* energy-related issues in North and Central Asia include the need to reduce the climate change impact of carbon dioxide emissions from the burning of fossil fuels. With the existing differences in the assessment of the effect of CO₂ emissions on global warming, it should be noted that the average temperature rise in North and Central Asia varies from 1 to 3 degrees Celsius a century, which is a consequence of, among other things, the increase in the greenhouse gases emissions⁸. According to the 2007/2008 UNDP Human Development Report, the warming has resulted in 46 glaciers shrinking in Central Asia.⁹

⁷ UNDP/UNEP Poverty-Environment Initiative. *The context of poverty-environment mainstreaming in Tajikistan*. Retrieved from http://www.unpei.org/index.php?option=com_content&view=article&id=138&Itemid=182

⁸ Intergovernmental Panel on Climate Change data, accessed at http://www.ipcc.ch/publications_and_data/ar4/wg2/en/ch10s10-2-2.html on 7.09.2012

⁹ Perelet R. (2007). *Central Asia: Background Paper on Climate Change*. United Nations Development Programme. Retrieved from http://hdr.undp.org/en/reports/global/hdr2007-2008/papers/perelet_renat.pdf

One of the most urgent problems in the region is the need to ensure sustainable use of water resources, including provision of sufficient amounts for electricity generation, irrigation systems, and filling the natural reservoirs with fresh water.

A major environmental challenge in the NCA region is the need to ensure safety in offshore development of the Caspian Sea, and the transportation of energy resources.

Major sustainable development challenges in North and Central Asia are connected with the need to assure dynamic economic growth and social development in a manner that will meet “the needs of the present without compromising the ability of the future generations to meet their own needs”¹⁰ and thus require close attention to environmental protection.

Major energy challenges

Electricity in North and Central Asia: Current status and prospects

The vast interdependent electricity systems of the North and Central Asian states stretch from Georgia, Armenia and Azerbaijan on the Black and Caspian Seas to Kyrgyzstan and Tajikistan on the Chinese border, and from the Russian border in the north down to the borders of Turkey, Iran and Afghanistan in the south.

The energy systems of the North and Central Asia Region were formed as the constituent parts of the united Trans-Caucasus and Central Asian energy systems (with the Interregional Dispatching Offices in Tbilisi and Tashkent respectively). In turn, Trans-Caucasus and Central Asian energy systems were parts of the Unified Energy System of the USSR. The regional power systems are combinations of electric power facilities, maintenance and management facilities, interconnected by the unified process of production, transmission and distribution of electricity.

For instance, in the 1980s Georgia compensated for an electricity energy deficit at the expense of large-scale inflow of base energy from Russia and Armenia (more than 4bn kWh per annum). On the other hand, though on a smaller scale, Georgia supplied the neighbor-states with power from its hydroelectric stations during the peak load hours. Whereby, the mentioned and the other cross-republic energy flows were efficiently managed by the centralized dispatching service, generally providing reliability and quality enhancement,

¹⁰ United Nations World Commission on Environment and Development (WCED) (1987). *Our Common Future*. London: Oxford University Press. Retrieved from <http://www.un-documents.net/wced-ocf.htm>

necessary power reserve reduction and substantive funds saving for all parties involved in the cooperation.

The Central Asian interlinked mono-system of hydropower-energy and irrigative agriculture can be another example. The system allows for the balance of seasonal swings of electricity demand and needs for water as an irrigation resource with fluctuations of the water supply in the mountain rivers. During winter, Kyrgyzstan and Tajikistan accumulated water in reservoirs while receiving energy and energy recourses (coal and natural gas) from Kazakhstan, Turkmenistan and Uzbekistan. In summertime, Kyrgyzstan and Tajikistan released water to Uzbekistan and Kazakhstan for the needs of irrigative agriculture. Thereunto, Kyrgyzstan and Tajikistan supplied the neighboring republics with hydropower produced at levels above domestic consumption demands.

With the collapse of the Soviet Union and emergence of severe political and economic crises in the republics of North and Central Asia, the cooperation developed over many years almost entirely ceased. The absence of a common policy and concerted actions led to the destabilization of the system functioning and drastic decreases in energy security. Energy systems of the countries degraded both economically and technically.

For the most part, the re-emergence of the power sector has only been underway for eleven or twelve years, and in that time a remarkable amount of necessary market reform has been achieved. But that was only the first step, and the current state of the power sector is characterized by a large degree of instability and resistance to reform. But it is also characterized by a large degree of economic opportunity.

Recent trends in the republics of the region suggest that the following are and will continue to be the major issues facing the electricity sector in the coming decade:

- Continuing reform of the emerging market systems for electricity towards the establishment of fully privatized competition;
- Reconciliation of various degrees of market emergence towards the establishment of a common power market between all countries of the region;
- Integration of the irregular and inefficient power transmission system to facilitate the creation of an intraregional power market;
- Urgently needed repair, refurbishment, and replacement of ageing and obsolete power transmission and distribution equipment;

- Feasibility of new interconnections and refurbishment of existing ones to other power systems, such as the EU, East and South Asia, towards establishing a successful power export market;
- Construction of new power generating facilities and upgrading existing capacity towards guaranteeing year-round power surpluses, both to meet growing demand within the region and to expedite export market development;
- Reform of electricity sector regulation to decrease direct government involvement and to allow more market-driven tariff policies to guide energy pricing;
- Reducing market and geopolitical risk to attract much-needed private sector investment in generation, transmission, and refurbishment projects;
- Reducing dependence on fossil fuel generation and investing in renewable energy, both to decrease environmental impact and to alleviate risk from fluctuating hydrocarbon prices;
- Diversifying sources of international development assistance and investment in order to prevent unnecessary tension over energy competition between large countries like the United States, Russia, and China.

Access to modern energy services

Access to modern energy services (such as access to electrical power grids and access to domestic gas distribution network) is a primary factor of development in the modern world and is the basis of providing for inclusive energy security.

Although access to energy services is not the primary energy-related challenge in North and Central Asia, there are concerns associated with it in the region especially in some countries. For instance, 98% of the population of Kyrgyzstan has access to the electrical grid; but there are forced blackouts and rationing when hydropower gets low during the winter¹¹. Over 1 million people in Tajikistan, of a population of less than 7 million, have little or no access to an adequate energy supplies, particularly during the winter¹².

¹¹ Abdyrasulova N, Kravsov N. (2009). *Electricity Governance in Kyrgyzstan: An Institutional Assessment*. Kyrgyzstan: Civic Environmental Foundation UNISON. Retrieved from http://electricitygovernance.wri.org/files/egi/Kyr_EGI_FINAL_5.6.10.pdf

¹² UNDP/UNEP Poverty-Environment Initiative (201?). *The context of poverty-environment mainstreaming in Tajikistan*. Retrieved from http://www.unpei.org/index.php?option=com_content&view=article&id=138&Itemid=182

Energy Efficiency

Energy efficiency is the goal of efforts to reduce the amount of energy required to provide products and services. Thus, energy efficiency may be defined as a state of maximum productivity gained at the use of minimal amounts of energy.

Although, energy efficiency is a term that is usually applied to describe technical characteristics of a system or a process, the more generic comprehension includes economy energy intensities as such. Acknowledging that each process within an economy has its own energy intensity and that the overall situation depends significantly on the structure of an output, energy intensities may provide the first approach to the energy efficiency problem, serving as proxy, and describe the efficiency of economy itself if GDP is to be considered the primary indicator of development.

Energy intensities in NCA ranged in 2009 from 0.3 tons of oil equivalent per one thousand USD of GDP produced in Armenia to 2.7 tons in Uzbekistan. The three least energy intensive economies in the region were Armenia, Georgia (0.4) and Azerbaijan (0.6); the three most energy intensive economies were Uzbekistan, Turkmenistan (1.1) and Kazakhstan (1.1).

Further analysis requires sector-decomposition of consumption. Available data demonstrates that in 2009 industry intensities varied from 0.04 tons of oil equivalent per one thousand USD value of output in Azerbaijan to 1.8 in Uzbekistan. Highest industry intensities were registered in Uzbekistan, Tajikistan (1.4) and Kyrgyzstan (1.4) while the lowest were found in Azerbaijan, Turkmenistan (0.1) and Georgia (0.3).

Housing sector intensities varied in 2009 from 0.02 tons of oil equivalent consumed per capita in Tajikistan to 0.8 in the Russian Federation. The three most energy intensive housing sectors were those of the Russian Federation, Uzbekistan (0.6) and Azerbaijan (0.4); the three least energy intensive were those of Tajikistan, Kyrgyzstan (0.02) and Turkmenistan (0.03).

Both energy intensities in industrial and housing sectors vary substantially across the region – top-bottom differences reaching 42 and 34 times correspondingly. Industrial sector index varieties (attributed to the structure of the production and energy efficiency of the processes) and housing sector index varieties (attributed to services levels – given, first of all, different climate conditions – and energy efficiency) imply significant challenges for

North and Central Asia in addressing energy efficiency. The challenges are divided into two major groups – those connected with the need to reduce energy waste and those related to measuring efficiency itself (for instance, lack of data does not allow comparable macro indices for transportation sectors).

Energy efficiency challenges include low performance factors of generating facilities connected with out-dated technologies and obsolete equipment, losses during transportation and consumption waste due to inefficiencies. Measuring challenges implicate problems faced by stakeholders connected with barriers to assess energy efficiency at macro level and to track changes.

Energy inefficiency is one of the major problems in North and Central Asia and should be targeted at production, distribution and consumption stages. Even moderate estimates suggest that, given the current state of technology, an average of 30 per cent of energy is currently wasted in the countries of North and Central Asia due to inefficiency. This implies that around 250 million tons of oil equivalent or \$180 billion¹³ is lost yearly.

Renewable energy

Even cautious estimates indicate that the potential for renewable generation in North and Central Asia is comparable with the current total energy consumption in the region. However, presently the share of renewables in the energy mix is nearly negligible (not regarding traditional hydropower generation). The major challenge of promoting renewables in the region is connected with the current pricing and providing enough incentives for large-scale development.

Energy trade

Energy trade is one of the central issues to improving energy security and sustainable use of energy in North and Central Asia. Currently, all energy imports to NCA countries originate from inside the region. Armenia, Georgia, Kyrgyzstan and Tajikistan significantly rely on imports of energy, and have dependence levels ranging from 37 per cent in Tajikistan to 83 per cent in Armenia (Table 7, Chapter I).

Energy trade is essential for developing energy systems that are not only secure but also economically viable. In the region where development is one of the top priorities, if progress were to be achieved in economic competition, energy trade should be regarded as

¹³ assuming the price of oil is one hundred USD per barrel

one of the major directions of cooperation. Presently, North and Central Asia faces trends that negatively affect sustainability and the development potential.

One of the major concerns is the deteriorating state of the interconnected post-Soviet infrastructure and the out-dated system of its management. World Bank estimations show that investment requirements for the North and Central Asia electricity sector alone are over \$600 billion through 2030, with \$90 billion required in five countries of Central Asia¹⁴. However, even with the present interconnections and economic incentives, trade can be challenged if the hardware is not supported with an adequate system of cooperation.

Securing the political and financial commitment of participating countries will be one of the main challenges to improving the potential for subregional energy cooperation. A common vision and strategic plan will be extremely important in achieving this, and extensive multilateral and bilateral negotiations will be necessary in order to clearly identify and share the responsibilities, risks and rewards among stakeholders. Countries will need a clear understanding of the type and degree of cooperation, keeping in mind that such cooperation shall complement national projects, as well as that different international initiatives may and should support each other.

Raising substantial investment for the region's energy sector will require the expertise, resources and cooperation of international organizations and financial institutions.

Energy prices, subsidies and taxation

Pricing is one of the major tools of public policy influencing the development of the energy sector, economic progress and social wellbeing. North and Central Asia governments exercise full control over energy tariffs, which are considered a very socially-sensitive issue. As a result, in NCA they tend to be quite low and, according to some estimates, lower than in any country of the European Union¹⁵.

Table 8 provides estimates of electricity tariffs and the share of electricity bill payments related to population average incomes in several countries of NCA. The table

¹⁴ The International Bank for Reconstruction and Development / The World Bank (2010). *Lights out? : the outlook for energy in Eastern Europe and the former Soviet Union*, 40. Washington DC: Author. Retrieved from http://siteresources.worldbank.org/ECAEXT/Resources/258598-1268240913359/Full_report.pdf

¹⁵ Petrov G. (2012). *Review of the current status and prospects of improving economic instruments for pricing of fuel and energy resources in the context of sustainable development in North and Central Asia* (report to ESCAP).

suggests that the electricity cost load on a person in the regarded countries does not exceed 6.5 per cent of the average pension.

Table 8 – Electricity tariffs and population income

	Average tariff (cent/kWh)	Share of electricity bills payment to (per cent):			
		Average salary (total population)	Average salary (employed)	Average pension	Minimal salary
Kazakhstan	6.0	0.37	0.75	1.45	1.80
Kyrgyzstan	2.2	1.66	3.81	4.52	35.14*
The Russian Federation	9.0	1.21	2.58	3.8	-
Tajikistan	2.3	0.62	2.11	2.88	3.60
Uzbekistan	5.2	1.51	3.69	6.50	-
Azerbaijan	7.6	0.95	2.00	3.15	-

Source: Petrov G. (2012). *Review of the current status and prospects of improving economic instruments for pricing of fuel and energy resources in the context of sustainable development in North and Central Asia* (report to ESCAP).

Notes: * – expected value

-- not available

only countries with available data are included

Economic theory asserts that in a free market economy the market price reflects interaction between supply and demand: the price is set so as to equate the quantity being supplied and that being demanded. Free systems ensure constant market signals flow between producers and consumers, and the self-regulation of supply and demand misbalances.

However, due to the critical importance of energy for social and economic development and considering a political component of energy-related decisions, energy prices (especially on such socially-significant goods as residential electricity and natural gas) in many countries tend to be fixed, very often below production cost levels. This implies that producers have limited or no opportunity to function without outside support that comes in the form of either direct or indirect governmental subsidies. With regards to the economies of North and Central Asia, the Soviet system of centralized planning of economic processes has been left in the energy sectors of the newly independent states in a nearly intact condition. Governments have and continue to play a central role in the operational control of the enterprises of the energy sector where companies act rather not as business entities but more as state services providers.

The advantage of providing lower-cost energy services to the population comes at a certain price. First of all, costs of supply at the utility enterprises must be covered through financing from state budgets, hence a certain amount of tax and other income funds that could be allocated alternatively have to be regularly reserved. Secondly, governments become responsible for the development of the energy sector since intensive investments

that are required to assure long-term continuity of the processes must, to a large proportion, come from budgets as well. Security and sustainable development in the energy sphere could thus be achieved only if the financial system of a state is ready to regularly cover costs of production and development. The current condition of the energy infrastructure in North and Central Asia and the need for long-awaited large-scale investments indicates that there are challenges in this sphere that have to be faced. The major question policy-makers should answer in this regard is to what extent should energy be subsidized.

Linkages between sustainable development and energy challenges

Sustainable development, as development that meets the needs of the present without compromising the ability of future generations to meet their own needs, is directly connected with energy challenges through the major sustainable development “pillars” – economic growth, social progress and environmental protection.

Civilization is unimaginable without energy, and modern civilization requires modern energy. Increasing populations and economic activities put high pressure on energy supplies and deplete the finite reserves of traditional fossil energy carriers, thus potentially undermining the abilities of future generations to satisfy their needs if fossil fuels fail to be gradually replaced by renewable energy sources. This formulates the first link between energy and sustainable development – *the need to ensure the ability of future generations to have sufficient energy supply in the view of the finiteness of traditional burning hydrocarbons.*

Considerable hydrocarbon reserves in the countries of North and Central Asia (the reserves to production ratio in 2011 was 161, against 83 in the world¹⁶) stipulates that the region is very well endowed with fossil fuels. Moreover, over the last decade the rates of proved reserve increases for oil matched the growth of production; for gas the proved reserves grew even faster than production, while only for coal did the reserves remain almost in line, with production growing considerably. Table 9 depicts the changes in R/P ratios in North and Central Asia between 2001 and 2011. Oil R/P ratio remained 26, gas ratio increased from 78 to 97 and coal ratio decreased by 125 still well above 400 in 2011.

¹⁶ Reserves to production ratio indicates the number of years fossil fuels reserves would last a country (subregion, region etc.) if it continued production at current rates and no increase in proved reserves occurred. Calculated by author based on BP Statistical Review of World Energy, June 2012

Table 9 – Reserves to production ratios in North and Central Asia

	2001	2011
Oil	26	26
Gas	78	97
Coal	549	424
Total	190	161

Source: calculated by author based on BP Statistical Review of World Energy, June 2012

With these figures in mind, it is rightful to say that the amount of conventional energy reserves is not the most critical issue of sustainable development for North and Central Asia, even in the longer term. However, with the economic, social and environmental concerns in consideration it is necessary to determine the priorities of energy policies in the region.

Another link between energy and sustainable development challenges could be formulated as *the need to optimize energy policies for maximizing sustained economic performance*. Energy being one of the factors of production influences the costs of output and either reduces the profit margins of producers of final goods or increases by unit expenses to consumers, decreasing the volume of their consumption. Thus, an economic approach stipulates that energy prices should be decreased so that more value could be added. In this regard, governments should be aiming at promoting the most cost-effective solutions.

The social component determines another energy link to the sustainable development challenge and that is the need *to optimize energy policies to foster social development*. Consisting of three major elements – per capita income, education and health – social development depends on energy as regards income levels through the mechanism described in the previous paragraph. Education is influenced majorly through energy access, which is required for illuminating study zones and for powering educational equipment. While health issues are connected to energy through a) pollution caused by energy production and consumption; and b) through energy access determining possibilities of applying powered medical equipment to treatment.

The environmental side of sustainable development is tightly linked to energy consumption as burning of hydrocarbons emits air pollutants and greenhouse gases, while production and transportation is associated with possible industrial incidents and catastrophes on the one hand, and regular impacts such as soil erosion and deforestation on

the other. One of the major discussed energy-related environmental issues is anthropogenic global warming commonly and generally associated with carbon dioxide emissions from the consumption of fossil fuels, primarily coal. The environmental link of energy to sustainable development challenges could be formulated as *the need to minimize the environmental impact of energy related activities*.

Thus the major linkages between sustainable development and energy challenges are:

- *the need to ensure the ability of future generations to provide for affordable energy in the view of the finiteness of fossil fuels;*
- *the need to optimize energy policies for maximizing and sustaining economic performance;*
- *the need to optimize energy policies to foster social development; and*
- *the need to minimize the environmental impact of energy related activities.*

The pursuit of meeting the above challenges requires prioritizing since they are, to some extent, mutually exclusive. Energy policies and strategies should find balances between economic growth, social development, environmental safety, energy security and addressing the finiteness of fossil fuels.

CHAPTER III. Opportunities for North and Central Asia to enhance energy security and optimize energy strategies

Driving forces that could remove barriers

Energy security, as the state of protection against disruptions in energy supply, is one of the ultimate targets of energy policies and strategies of states. The other targets include maximizing economic performance, fostering social development, ensuring environmental safety and addressing finiteness of fossil fuels for the sake of future generations.

Countries of North and Central Asia should rank the above targets in order to formulate relevant strategies. However, the global international competition approach and current energy security, economic, social and energy-related ecological challenges suggest that economic progress should be given top-priority, balanced by energy security concerns, followed by social and ecological challenges and mineral fuel finiteness problems. The appropriate strategies should be developed based on the economic practicality and energy security considerations with respect to social and ecological concerns, and ensuring availability of energy resources for future generations.

Energy, being a resource factor of production, has to be available and, preferably, the least expensive (having said that, the author assumes market pricing). The extreme economic approach in this regard would advocate the use of the most cost-effective energy source available in the region by all regional consumers. The extreme energy security approach on the other hand would stand for a maximum distribution of supply with a 100 per cent import independence for each regional member. The realistic approach stipulates the use of existing infrastructure and its development to optimise costs of energy production and transportation within the region. In any case, targets should be set to identify the aspired energy architecture for the region, having overcome one of the major barriers of the regional energy system – and that is the lack of a common vision.

Meanwhile, the misbalances of the once centralized energy system have already resulted in serious accidents such as the one that happened in 2009 in Tajikistan. Due to the automated emergency cessation of the modules of the Nurekskaya hydropower station, a

blackout was caused in the southern part of the Tajik energy system. As a result, Tajikistan and the southern part of Uzbekistan were left without electricity for 24 hours¹⁷.

Existing initiatives

Northern and Central Asia hosts 11 subregional initiatives – excluding 14 global and Asian initiatives – of which 6 are intergovernmental and 3 are programmes (Table 10). APEC, ECNEA and SCO focus on energy in general and have working groups tackling specific subsectors. Others focus specifically on hydropower (CAREC, SPECA), energy efficiency (ECO, ECT), fossil fuels (CAREC, SECSA, BSEC) or renewable energy (RDI).

Table 10 - Energy Initiatives in North and Central Asia

<i>Initiative</i>	<i>Acronym</i>	<i>Type</i>	<i>Energy Subsector</i>
1. Asia-Pacific Economic Cooperation	APEC	Intergovernmental	Electric power, fossil fuels
2. Central Asia Regional Economic Cooperation	CAREC	Programme	Electric power, energy efficiency, fossil fuels
3. Economic Cooperation Organization	ECO	Intergovernmental	Electric power, energy efficiency, fossil fuels
4. Energy Charter Treaty	ECT	Intergovernmental	Electric power, energy efficiency
5. Eurasian Economic Cooperation	EurAsEC	Intergovernmental	
6. Intergovernmental Collaborative Mechanism on Energy Cooperation in North-East Asia	ECNEA	Intergovernmental	
7. Organization of the Black Sea Economic Cooperation	BSEC	Intergovernmental	Fossil fuels
8. Renewable Development Initiative	RDI	Programme	Renewable energy
9. Shanghai Cooperation Organization	SCO	Intergovernmental	
10. Subregional Economic Cooperation in South and Central Asia	SECSA	Programme	Fossil fuels
11. United Nations Special Programme for the Economies of Central Asia	SPECA	Intergovernmental	Electric power

Source: ESCAP, 2008. Energy Security and Sustainable Development in Asia and the Pacific

In order to benefit from the new initiatives, the region should carefully consider and incorporate the existing formats. For example, activities under UN SPECA and its water and energy working group could be looked into for the development of a more profound energy action plan in Central Asia.

Goals that could be addressed through regional cooperation

Regional economic cooperation is an important vehicle for enhancing national development strategies of the participating countries and realizing the countries' immense development potential. Infrastructure is a key pillar supporting the participating countries' drive for development through cooperation, where energy infrastructure is vital in ensuring overall economic growth and prosperity.

¹⁷ Tomberg I. (2012). Energy system in Central Asia: problems and prospects. *Russian International Affairs Council*. Retrieved from http://russiancouncil.ru/inner/?id_4=324

The long term vision of the region's energy sector is to ensure: energy security through the balanced development of the region's energy infrastructure and institutions; stronger integration of the region's energy markets to make available adequate volumes of commercial energy (and energy services of acceptable quality) to all physical and juridical persons in a reliable, affordable, financially sustainable and environmentally sound manner; and economic growth through energy trade. Regional energy cooperation is driven by the need to overcome, through increasing integration of the energy markets, the impact of unevenly distributed energy resources among the NCA countries, and the need to optimize existing energy interrelationships and achieve least-cost solutions to energy constraints.

The following areas could be addressed at the regional cooperation level:

- energy trade and security;
- financial viability of energy supply entities and the sustainability of energy services;
- social protection in the energy sector;
- sector restructuring and commercialization;
- sector regulation;
- promotion of private sector participation;
- cooperation in international river basins;
- littoral agreements;
- energy efficiency and initiatives;
- alternative and renewable energy options.

Energy trade and security

Energy trade could be pursued to increase the available forms and sources of energy to complement in an effective and reliable manner the domestic energy resources of the NCA countries, thus enhancing energy security, and/or to develop energy export potential as a driver of economic growth.

Financial viability of energy supply entities and sustainability of energy services

Regional energy trade could be sustainable only when it takes place among financially viable and solvent entities. The financial viability of energy entities could be ensured through adjusting tariffs to cover costs, including cost of capital; reducing losses to

minimize costs and improve efficiency of supply; improving system and consumer metering, billing and collection practices to industry standards; and adopting least cost planning, construction and operation.

Social protection in the energy sector

Efforts to develop adequate social protection systems for energy consumption could continue by improving the targeting of the compensation mechanisms to the needy and eliminating non-payments and discounts to a wide range of privileged consumers. Realistically designed and efficiently implemented lifeline tariffs could be the second best option.

Sector restructuring and commercialization

Wherever feasible, sector restructuring and commercialization, as well as improvement of management systems, could be pursued to enhance energy trade through independent and solvent transmission businesses separated from generation and distribution businesses; transmission service charges to all system users on the basis of a reasonable return on transmission investments; and regulated or open third party access to transmission (subject to technical availability and capacity).

Littoral agreements

Further expansion of the scope of the littoral agreements could be pursued among the Caspian Sea countries to enhance opportunities for exploration and protection of seabed resources and laying gas and oil pipelines under the sea.

Energy Efficiency

Energy efficiency improvements allow for rational and economic use and trade of energy resources, the introduction of advanced technology and infrastructure, and the improvement of the financial viability of energy utilities. Policies for promoting energy efficiency, energy conservation and carbon finance mechanisms need to be adopted.

CHAPTER IV. Recommendations to be reflected in the Ministerial Declaration and the Action Plan as a conclusion of APEF

The critical elements that the NCA countries would like to see reflected in the ministerial declaration to be adopted at the end of the Asian and Pacific Energy Forum in Vladivostok should be the distinctive features most specific to the subregion in the field of energy and energy efficiency; the key issues and goals, which, if addressed, will impact the overall situation in the Asia-Pacific region; and those that require regional cooperation, or which should be considered in the broader context of the APR's fuel and energy systems development.

The basis for the provisions to be included in the ministerial declaration from the region's standpoint could be the Joint Communiqué of the Third Forum "Energy for Sustainable Development", held in September 2012 in Kyrgyzstan. For the text of Communiqué, please refer to Annex 3.

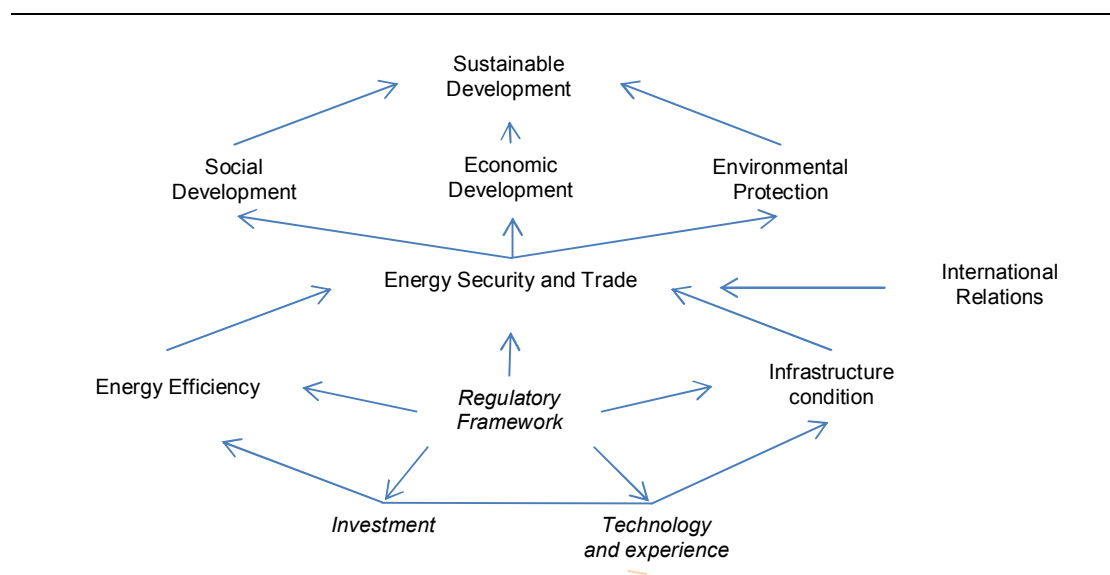
CHAPTER V. Proposed Actions

Prioritizing challenges and opportunities

Prioritizing challenges and opportunities is essential to identifying a common strategy for energy cooperation in North and Central Asia and establishing a relevant action plan. The region faces a number of energy security, economic, social and environmental challenges. The first prioritizing step would be to rank these challenges with special attention paid to balancing economic development and energy security aspects. Although technical issues of energy security (for example, the state of infrastructure) and economic feasibility are easily aligned, political priorities do not always match economic incentives. Acknowledging the will of states to provide for national security by different measures including sometimes reduction of energy import dependence, it is important to stress that the use of the most cost-effective energy choices available is the major economic target for the countries of the region. Energy trade serves as the facilitator of reaching this target. Social and ecological aspects should be considered within the economic development paradigm.

Figure 3 provides for a schematic representation of energy related targets and action areas in NCA. The ultimate goal is sustainable development, stemming from the economic and social development, while ensuring the environmental protection. Ensuring the energy security balance with energy trade is a central task, fulfilment of which will impact economic and social development and environmental security. Energy security and trade depend, in turn, on the condition of the regulatory framework and its functioning; energy infrastructure and quality of processes associated with its use; energy efficiency; and the context of international relations. Energy efficiency and infrastructure are impacted by the availability and quality of investment, technology and experience in implementation of projects, and the condition of the regulatory framework.

Figure 3 – Energy Related Targets and Action Areas Scheme for North and Central Asia



Note: arrows represent only major and most direct interconnections

Proposed actions

Selection and prioritising of specific policy measures in listed action areas should be appropriate to the context of each country. The central areas of international cooperation should be regulatory cooperation (in areas such as energy security and energy trade, energy efficiency, infrastructure development, investment, advanced technology and experience exchange); implementation of mechanisms for sufficient investment; technology transfer; and application of best practices in the implementation of infrastructure projects and energy efficiency improvement.

A detailed system of actions to enhance energy security and improve energy efficiency in the context of opportunities for international cooperation in the North and Central Asia is presented below:

1. Promote mutual understanding in the region on issues related to enhancement of energy security;
 - 1.1. Converge approaches of the countries in the region to the understanding of the energy security concept;

- 1.2. Implement a regional mechanism to formulate a common approach for importers and exporters to ensure functioning of fuel and energy systems without power interruptions, and maintain the long-term balance of energy demand and supply at reasonable prices;
 - 1.3. Strengthen political confidence within the region as a basis to maintain and enhance energy security within a cost-optimal structure of FEC;
 - 1.4. Account for existing approaches to the concept of energy security in developing energy strategies of the countries;
2. Structure and optimize the region's FEC
 - 2.1. Formulate regional cooperation mechanisms to optimize the systems of supply and use of energy in view of maximizing economic efficiency and enhancement of energy security in the region, including as part of:
 - 2.1.1. Structuring the supply systems in the following areas:
 - 2.1.1.1. Identification of a target energy mix with due account of:
 - Existing and future resourcing of the region and the demand for energy (taking into account the task to optimize the use)
 - Maximizing the use of intra-regional energy trade opportunities
 - The need to gradually increase with proper economic justification the share of renewable energy sources in the energy mix
 - 2.1.1.2. Modernization and creation of infrastructure to meet targets for energy mixes, with due account of:
 - Possible integration of existing transmission systems functioning irregularly and inefficiently
 - Urgent needs for repair, restoration and replacement of worn-out and obsolete equipment for power transmission and distribution

- Technical and economic opportunities to create new and restructure the existing links to other power systems (the EU, East and South Asia)
- The need to construct new and modernize the existing generating facilities for guaranteed power supply during average and peak loads
- The need to improve the efficiency of processes of extraction, processing/production and transportation/transmission of energy/electricity
- Advanced technologies and the economic feasibility of their implementation

2.1.1.3. Ensuring quality of access to modern energy services

2.1.2. Optimization of energy consumption, including by means of:

2.1.2.1. improving Energy Efficiency:

- in industries
- in the residential sector (including the possibility of developing and approving an appropriate labelling system)
- in the transport sector

2.1.2.2. ensuring energy conservation

2.1.3. Development and coordination of plans to create backup generation facilities and strategic energy reserves

2.2. Establish regional mechanisms to improve and create the legal framework necessary for the functioning of the FEC in view of the need to strengthen market mechanisms and enhance energy security, including by means of:

2.2.1. Provision of regional rules of trade, consistent with the objectives of development of countries in the region and enhancement of their energy security

2.2.2. Improving and developing a regulatory framework aimed at increasing the efficiency both in energy consumption and production

- 2.2.3. Development and implementation of a tariff reform that would meet the objectives of socio-economic development and the development of the fuel and energy complex in the region
 - 2.2.4. Provision of mechanisms to attract investment in the modernization and creation of regional energy infrastructure
- 3. Cooperate in the exchange of best practices, including by means of:
 - 3.1. Improvement of technical standards
 - 3.2. Providing qualified consulting and services
 - 3.3. Qualitative evaluation of projects
- 4. Educate and train highly qualified personnel
 - 4.1. Establish regional mechanisms to support existing and create new educational centers with a focus on energy
- 5. Maintain the existing mechanisms and platforms for regional cooperation and use them actively to achieve the goals of energy security and socio-economic development of the region

Annex 1 - NCA Energy Balances

Source: United Nations 2009 Energy Balances and Electricity Profiles

Armenia

Terajoules

Energy sources and products	Hard coal, lignite and peat	Briquettes and cokes	Crude petroleum and NGL	Light petroleum products	Heavy petroleum products	Other petroleum products	LPG and refinery gas	Natural gas	Derived gases	Electricity	Primary biomass energy	Derived biomass energy	Other energy sources	Total energy	Energy sources and products
Production and utilisation															Production and utilisation
2006															2006
1 Production of primary energy	..	..	..	..	..	..	..	..	..	16074	576	..	..	16650	1 Production of primary energy
2 Imports	29	33	..	10912	4802	3011	683	64693	..	1278	9	18	..	85469	2 Imports
3 Exports	0	0	..	0	..	-5	..	-829	..	-2714	-1	..	..	-3549	3 Exports
4 Marine / aviation bunkers	..	..	..	-3370	..	..	..	..	..	..	..	..	..	-3370	4 Marine / aviation bunkers
5 Stock change	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5 Stock change
6 Total energy requirements	29	33	..	7543	4802	3007	683	63864	..	14638	584	18	..	95200	6 Total energy requirements
7 Energy converted	..	..	..	..	..	..	..	-17893	..	5314	..	..	2006	-10573	7 Energy converted
8 Briquetting plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	8 Briquetting plants
9 Coke ovens and coke plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	9 Coke ovens and coke plants
10 Gasworks	..	..	..	..	..	..	..	..	..	..	..	..	..	..	10 Gasworks
11 Blastfurnaces	..	..	..	..	..	..	..	..	..	..	..	..	..	..	11 Blastfurnaces
12 Petroleum refineries	..	..	..	..	..	..	..	..	..	..	..	..	..	..	12 Petroleum refineries
13 NGL processing plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	13 NGL processing plants
14 Electric power plants	..	..	..	..	..	..	..	-17587	..	5314	..	1759	..	-10514	14 Electric power plants
15 Heating plants	..	..	..	..	..	..	..	..	..	..	..	247	..	247	15 Heating plants
16 Other conversion industries	..	..	..	..	..	..	..	-306	..	..	..	..	..	-306	16 Other conversion industries
17 Net transfers	..	..	..	..	..	..	..	..	..	..	..	..	..	..	17 Net transfers
18 Consumption by energy sector	..	..	..	..	..	..	..	..	..	-1220	..	..	-526	-1746	18 Consumption by energy sector
19 Losses in transport and distribution	..	..	..	..	..	..	..	..	..	-2430	..	..	..	-2430	19 Losses in transport and distribution
20 Cons. for non-energy uses	..	..	..	..	..	-2991	..	..	..	..	..	..	..	-2991	20 Cons. for non-energy uses
21 Statistical differences	0	33	..	-19	0	15	0	0	..	0	9	-156	0	-117	21 Statistical differences
22 Final consumption	29	..	..	7561	4802	..	683	45971	..	16301	*576	173	1480	77577	22 Final consumption
23 By industry and construction	..	..	..	..	..	..	..	28458	..	3740	..	..	804	33002	23 By industry and construction
24 Iron and steel industry	..	..	..	..	..	..	..	..	..	126	..	..	..	126	24 Iron and steel industry
25 Chemical industry	..	..	..	..	..	..	..	..	..	749	..	..	..	749	25 Chemical industry
26 Other industry and construction	..	..	..	..	..	..	..	28458	..	2866	..	..	804	32128	26 Other industry and construction
27 By transport	..	..	..	7561	..	..	..	2784	..	414	..	..	..	10759	27 By transport
28 Road	..	..	..	7561	..	..	..	2784	..	..	..	..	..	10345	28 Road
29 Rail	..	..	..	..	..	..	..	..	..	245	..	..	..	245	29 Rail
30 Air	..	..	..	..	..	..	..	..	..	..	..	..	..	..	30 Air
31 Inland and coastal waterways	..	..	..	..	..	..	..	..	..	..	..	..	..	..	31 Inland and coastal waterways
32 By other modes of transportation	..	..	..	..	..	..	..	..	..	169	..	..	..	169	32 By other modes of transportation
33 By households and other consumers	29	..	..	0	4802	..	683	14729	..	12146	*576	173	676	33815	33 By households and other consumers
34 Households	29	..	..	0	..	..	..	13993	..	6149	..	173	676	21020	34 Households
35 Agriculture	..	..	..	..	..	..	..	..	..	817	..	..	..	817	35 Agriculture
36 Other consumers	..	..	..	..	4802	..	683	736	..	5180	*576	..	..	11977	36 Other consumers
2007															2007
1 Production of primary energy	..	..	..	..	..	..	..	..	..	15872	365	..	..	16238	1 Production of primary energy
2 Imports	80	80	..	12422	5146	4614	519	77436	..	1508	7	2	..	101815	2 Imports
3 Exports	0	0	..	0	..	0	..	-980	..	-1624	-2	..	..	-2606	3 Exports
4 Marine / aviation bunkers	..	..	..	-4977	..	..	..	..	..	..	..	..	..	-4977	4 Marine / aviation bunkers
5 Stock change	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5 Stock change
6 Total energy requirements	80	80	..	7446	5146	4614	519	76456	..	15757	370	2	..	110470	6 Total energy requirements
7 Energy converted	..	..	..	..	..	..	..	-21421	..	5360	..	..	2460	-13601	7 Energy converted
8 Briquetting plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	8 Briquetting plants
9 Coke ovens and coke plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	9 Coke ovens and coke plants
10 Gasworks	..	..	..	..	..	..	..	..	..	..	..	..	..	..	10 Gasworks
11 Blastfurnaces	..	..	..	..	..	..	..	..	..	..	..	..	..	..	11 Blastfurnaces
12 Petroleum refineries	..	..	..	..	..	..	..	..	..	..	..	..	..	..	12 Petroleum refineries
13 NGL processing plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	13 NGL processing plants
14 Electric power plants	..	..	..	..	..	..	..	-21055	..	5360	..	..	2165	-13530	14 Electric power plants
15 Heating plants	..	..	..	..	..	..	..	..	..	..	..	295	..	295	15 Heating plants
16 Other conversion industries	..	..	..	..	..	..	..	-366	..	..	..	..	..	-366	16 Other conversion industries
17 Net transfers	..	..	..	..	..	..	..	..	..	..	..	..	..	..	17 Net transfers
18 Consumption by energy sector	..	..	..	..	..	..	..	..	..	-1170	..	..	-651	-1821	18 Consumption by energy sector
19 Losses in transport and distribution	..	..	..	..	..	..	..	..	..	-2790	..	..	..	-2790	19 Losses in transport and distribution
20 Cons. for non-energy uses	..	..	..	..	..	-4605	..	..	..	..	..	..	..	-4605	20 Cons. for non-energy uses
21 Statistical differences	0	80	..	22	0	10	0	0	..	0	4	*-143	0	-27	21 Statistical differences
22 Final consumption	80	..	..	7424	5146	..	519	55035	..	17158	*365	*144	1809	87681	22 Final consumption
23 By industry and construction	..	..	..	..	..	..	..	23180	..	4356	..	..	983	28519	23 By industry and construction
24 Iron and steel industry	..	..	..	..	..	..	..	..	..	144	..	..	..	144	24 Iron and steel industry
25 Chemical industry	..	..	..	..	..	..	..	..	..	990	..	..	..	990	25 Chemical industry
26 Other industry and construction	..	..	..	..	..	..	..	23180	..	3222	..	..	983	27385	26 Other industry and construction
27 By transport	..	..	..	7424	..	..	..	10768	..	443	..	..	..	18635	27 By transport
28 Road	..	..	..	7424	..	..	..	10768	..	..	..	..	..	18192	28 Road
29 Rail	..	..	..	..	..	..	..	..	..	256	..	..	..	256	29 Rail
30 Air	..	..	..	..	..	..	..	..	..	..	..	..	..	..	30 Air
31 Inland and coastal waterways	..	..	..	..	..	..	..	..	..	..	..	..	..	..	31 Inland and coastal waterways
32 By other modes of transportation	..	..	..	..	..	..	..	..	..	187	..	..	..	187	32 By other modes of transportation
33 By households and other consumers	80	..	..	0	5146	..	519	21087	..	12359	*365	*144	826	40527	33 By households and other consumers
34 Households	80	..	..	0	..	..	..	20062	..	6361	..	*144	826	27474	34 Households
35 Agriculture	..	..	..	..	..	..	..	..	..	652	..	..	..	652	35 Agriculture
36 Other consumers	..	..	..	..	5146	..	519	1025	..	5346	*365	..	..	12402	36 Other consumers

Armenia

Terajoules

Energy sources and products	Hard coal, lignite and peat	Briquettes and cokes	Crude petroleum and NGL	Light petroleum products	Heavy petroleum products	Other petroleum products	LPG and refinery gas	Natural gas	Derived gases	Electricity	Primary biomass energy	Derived biomass energy	Other energy sources	Total energy	Energy sources and products
Production and utilisation															Production and utilisation
2008															2008
1 Production of primary energy	..	..	..	..	..	..	..	..	..	15336	365	..	..	15701	1 Production of primary energy
2 Imports	59	73	..	13539	5523	3699	410	84975	..	1217	5	0	..	109500	2 Imports
3 Exports	0	0	..	0	..	0	..	-1206	..	-1296	-6	..	..	-2508	3 Exports
4 Marine / aviation bunkers	..	..	..	-4838	..	..	..	..	..	..	..	..	..	-4838	4 Marine / aviation bunkers
5 Stock change	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5 Stock change
6 Total energy requirements	59	73	..	8700	5523	3699	410	83769	..	15257	364	0	..	117855	6 Total energy requirements
7 Energy converted	..	..	..	..	..	..	..	-20606	..	6674	..	..	1854	-12078	7 Energy converted
8 Briquetting plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	8 Briquetting plants
9 Coke ovens and coke plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	9 Coke ovens and coke plants
10 Gasworks	..	..	..	..	..	..	..	..	..	..	..	..	..	..	10 Gasworks
11 Blastfurnaces	..	..	..	..	..	..	..	..	..	..	..	..	..	..	11 Blastfurnaces
12 Petroleum refineries	..	..	..	..	..	..	..	..	..	..	..	..	..	..	12 Petroleum refineries
13 NGL processing plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	13 NGL processing plants
14 Electric power plants	..	..	..	..	..	..	..	-20606	..	6674	..	..	1854	-12078	14 Electric power plants
15 Heating plants	..	..	..	..	..	..	..	..	..	..	..	..	0	0	15 Heating plants
16 Other conversion industries	..	..	..	..	..	..	..	0	..	..	..	..	0	0	16 Other conversion industries
17 Net transfers	..	..	..	..	..	..	..	..	..	..	..	..	..	..	17 Net transfers
18 Consumption by energy sector	..	..	..	..	..	..	..	..	..	-1206	..	..	-361	-1567	18 Consumption by energy sector
19 Losses in transport and distribution	..	..	..	..	..	..	..	..	..	-3096	..	..	..	-3096	19 Losses in transport and distribution
20 Cons. for non-energy uses	..	..	..	..	..	-3680	..	..	..	..	..	..	..	-3680	20 Cons. for non-energy uses
21 Statistical differences	0	73	..	-4	0	19	0	0	..	-18	-1	*-144	0	-75	21 Statistical differences
22 Final consumption	59	..	..	8704	5523	..	410	63163	..	17647	*365	*144	1493	97509	22 Final consumption
23 By industry and construction	..	..	..	..	..	..	..	26627	..	4216	..	..	806	31649	23 By industry and construction
24 Iron and steel industry	..	..	..	..	..	..	..	..	..	209	..	..	..	209	24 Iron and steel industry
25 Chemical industry	..	..	..	..	..	..	..	..	..	745	..	..	..	745	25 Chemical industry
26 Other industry and construction	..	..	..	..	..	..	..	26627	..	3262	..	..	806	30695	26 Other industry and construction
27 By transport	..	..	..	8704	..	..	..	12967	..	432	..	..	..	22103	27 By transport
28 Road	..	..	..	8704	..	..	..	12967	..	..	..	..	..	21671	28 Road
29 Rail	..	..	..	..	..	..	..	..	..	241	..	..	..	241	29 Rail
30 Air	..	..	..	..	..	..	..	..	..	..	..	..	..	..	30 Air
31 Inland and coastal waterways	..	..	..	..	..	..	..	..	..	..	..	..	..	..	31 Inland and coastal waterways
32 By other modes of transportation	..	..	..	..	..	..	..	..	..	191	..	..	..	191	32 By other modes of transportation
33 By households and other consumers	59	..	..	0	5523	..	410	23569	..	13000	*365	*144	687	43757	33 By households and other consumers
34 Households	59	..	..	0	..	..	..	22223	..	6451	..	*144	687	29564	34 Households
35 Agriculture	..	..	..	..	..	..	..	..	..	803	..	..	..	803	35 Agriculture
36 Other consumers	..	..	..	..	5523	..	410	1346	..	5746	*365	..	..	13390	36 Other consumers
2009															2009
1 Production of primary energy	..	..	..	..	..	..	..	..	..	16261	365	..	..	16627	1 Production of primary energy
2 Imports	13	11	..	10627	5042	3700	342	65601	..	1063	8	0	..	86408	2 Imports
3 Exports	0	0	..	-44	-2	0	..	-1192	..	-1169	-3	..	..	-2410	3 Exports
4 Marine / aviation bunkers	..	..	..	-2506	..	..	..	..	..	..	..	..	..	-2506	4 Marine / aviation bunkers
5 Stock change	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5 Stock change
6 Total energy requirements	13	11	..	8077	5040	3700	342	64409	..	16155	371	0	..	98118	6 Total energy requirements
7 Energy converted	..	..	..	..	..	..	..	-12781	..	4154	..	..	981	-7646	7 Energy converted
8 Briquetting plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	8 Briquetting plants
9 Coke ovens and coke plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	9 Coke ovens and coke plants
10 Gasworks	..	..	..	..	..	..	..	..	..	..	..	..	..	..	10 Gasworks
11 Blastfurnaces	..	..	..	..	..	..	..	..	..	..	..	..	..	..	11 Blastfurnaces
12 Petroleum refineries	..	..	..	..	..	..	..	..	..	..	..	..	..	..	12 Petroleum refineries
13 NGL processing plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	13 NGL processing plants
14 Electric power plants	..	..	..	..	..	..	..	-12781	..	4154	..	..	981	-7646	14 Electric power plants
15 Heating plants	..	..	..	..	..	..	..	..	..	..	..	..	0	0	15 Heating plants
16 Other conversion industries	..	..	..	..	..	..	..	0	..	..	..	..	..	0	16 Other conversion industries
17 Net transfers	..	..	..	..	..	..	..	..	..	..	..	..	..	..	17 Net transfers
18 Consumption by energy sector	..	..	..	..	..	..	..	..	..	-1062	..	..	-55	-1117	18 Consumption by energy sector
19 Losses in transport and distribution	..	..	..	..	..	..	..	..	..	-3035	..	..	..	-3035	19 Losses in transport and distribution
20 Cons. for non-energy uses	..	..	..	..	..	*-3687	..	..	..	..	..	..	..	*-3687	20 Cons. for non-energy uses
21 Statistical differences	0	11	..	-12	-2	13	0	-1141	..	59	6	*-144	0	-1210	21 Statistical differences
22 Final consumption	*13	..	..	*8089	5042	..	*342	52769	..	16153	*365	*144	926	83844	22 Final consumption
23 By industry and construction	..	..	..	..	..	..	..	19048	..	3632	..	..	500	23180	23 By industry and construction
24 Iron and steel industry	..	..	..	..	..	..	..	..	..	151	..	..	..	151	24 Iron and steel industry
25 Chemical industry	..	..	..	..	..	..	..	..	..	392	..	..	..	392	25 Chemical industry
26 Other industry and construction	..	..	..	..	..	..	..	19048	..	3089	..	..	500	22637	26 Other industry and construction
27 By transport	..	..	..	*8089	..	..	..	11520	..	428	..	..	..	20037	27 By transport
28 Road	..	..	..	*8089	..	..	..	11520	..	..	..	..	..	19609	28 Road
29 Rail	..	..	..	..	..	..	..	..	..	238	..	..	..	238	29 Rail
30 Air	..	..	..	..	..	..	..	..	..	..	..	..	..	..	30 Air
31 Inland and coastal waterways	..	..	..	..	..	..	..	..	..	..	..	..	..	..	31 Inland and coastal waterways
32 By other modes of transportation	..	..	..	..	..	..	..	..	..	191	..	..	..	191	32 By other modes of transportation
33 By households and other consumers	*13	..	..	0	5042	..	*342	22201	..	12092	*365	*144	426	40626	33 By households and other consumers
34 Households	*13	..	..	0	..	..	..	20856	..	6181	..	*144	426	27621	34 Households
35 Agriculture	..	..	..	..	..	..	..	..	..	446	..	..	..	446	35 Agriculture
36 Other consumers	..	..	..	..	5042	..	*342	1345	..	5465	*365	..	..	12559	36 Other consumers

Azerbaijan

Terajoules

Energy sources and products	Hard coal, lignite and peat	Briquettes and cokes	Crude petroleum and NGL	Light petroleum products	Heavy petroleum products	Other petroleum products	LPG and refinery gas	Natural gas	Derived gases	Electricity	Primary biomass energy	Derived biomass energy	Other energy sources	Total energy	Energy sources and products
Production and utilisation															Production and utilisation
2006															2006
1 Production of primary energy	1377635	..	..	..	..	255073	..	9065	639	..	..	1642413	1 Production of primary energy
2 Imports	0	..	5463	674	..	172898	..	6358	..	..	..	185393	2 Imports
3 Exports	-1049886	-24189	-98519	-5417	-2095	-2536	..	-3164	..	..	..	-1185807	3 Exports
4 Marine / aviation bunkers	-17582	..	..	..	..	..	..	..	..	..	-17582	4 Marine / aviation bunkers
5 Stock change	8460	788	3261	0	-46	-9365	..	..	-46	..	..	3053	5 Stock change
6 Total energy requirements	336209	-40983	-89795	-4742	-2141	416070	..	12258	594	..	..	627470	6 Total energy requirements
7 Energy converted	-329357	89737	129989	12455	15492	-203763	..	79286	..	..	23660	-182500	7 Energy converted
8 Briquetting plants	8 Briquetting plants
9 Coke ovens and coke plants	9 Coke ovens and coke plants
10 Gasworks	10 Gasworks
11 Blastfurnaces	11 Blastfurnaces
12 Petroleum refineries	-316658	89737	209336	-244	15492	..	..	..	..	..	..	-2336	12 Petroleum refineries
13 NGL processing plants	-12699	..	..	12699	..	..	..	..	..	..	..	0	13 NGL processing plants
14 Electric power plants	-54613	..	..	-203763	..	79286	..	..	23660	-155430	14 Electric power plants
15 Heating plants	15 Heating plants
16 Other conversion industries	-24734	..	..	..	..	..	..	..	..	-24734	16 Other conversion industries
17 Net transfers	17 Net transfers
18 Consumption by energy sector	-2792	..	0	..	-6156	-43312	..	-7261	..	..	-4812	-64333	18 Consumption by energy sector
19 Losses in transport and distribution	-4061	..	..	..	..	-24036	..	-13590	..	..	-461	-42148	19 Losses in transport and distribution
20 Cons, for non-energy uses	-12003	..	-7713	..	0	..	..	..	..	..	-19716	20 Cons, for non-energy uses
21 Statistical differences	0	0	0	0	455	0	..	0	0	..	0	455	21 Statistical differences
22 Final consumption	36750	40194	0	6741	144959	..	70693	594	..	18387	318318	22 Final consumption
23 By industry and construction	648	3239	0	410	33317	..	16596	..	..	16863	71073	23 By industry and construction
24 Iron and steel industry	43	42	..	..	893	..	526	..	..	..	1504	24 Iron and steel industry
25 Chemical industry	605	502	..	0	19196	..	1915	..	..	9443	31661	25 Chemical industry
26 Other industry and construction	0	2695	0	410	13228	..	14155	..	..	7420	37908	26 Other industry and construction
27 By transport	35023	35688	..	3552	..	..	2340	0	..	..	76603	27 By transport
28 Road	31696	28260	..	3552	..	..	..	..	..	..	63508	28 Road
29 Rail	7428	..	..	..	..	1246	..	..	..	8674	29 Rail
30 Air	3326	..	..	..	..	..	..	..	..	..	3326	30 Air
31 Inland and coastal waterways	31 Inland and coastal waterways
32 By other modes of transportation	1094	0	..	..	1094	32 By other modes of transportation
33 By households and other consumers	1080	1267	..	2778	111642	..	51757	594	..	1524	170642	33 By households and other consumers
34 Households	0	0	..	2778	108788	..	49662	0	..	1126	162354	34 Households
35 Agriculture	43	1059	..	..	1500	..	1836	0	..	..	4439	35 Agriculture
36 Other consumers	1037	207	..	0	1354	..	259	594	..	398	3849	36 Other consumers
2007															2007
1 Production of primary energy	1858657	..	..	..	..	421780	..	8505	3334	..	..	2292276	1 Production of primary energy
2 Imports	0	..	2127	1011	..	0	..	1972	..	..	..	5111	2 Imports
3 Exports	-1471194	-28808	-96146	-6425	-2095	-71003	..	-2829	..	..	..	-1678499	3 Exports
4 Marine / aviation bunkers	-16459	..	..	..	..	..	..	..	..	..	-16459	4 Marine / aviation bunkers
5 Stock change	-423	122	-5813	-169	91	7207	..	..	0	..	..	1014	5 Stock change
6 Total energy requirements	387040	-45145	-99831	-5583	-2004	357984	..	7648	3334	..	..	603444	6 Total energy requirements
7 Energy converted	-373292	93981	142407	14081	15845	-204467	..	70139	..	..	20935	-220372	7 Energy converted
8 Briquetting plants	8 Briquetting plants
9 Coke ovens and coke plants	9 Coke ovens and coke plants
10 Gasworks	-1168	..	..	..	..	..	-1168	10 Gasworks
11 Blastfurnaces	11 Blastfurnaces
12 Petroleum refineries	-316531	93981	186733	-42681	15845	..	..	..	..	..	..	-62652	12 Petroleum refineries
13 NGL processing plants	-56762	..	..	56762	..	..	..	..	..	..	..	0	13 NGL processing plants
14 Electric power plants	-44119	..	..	-175934	..	70139	..	..	19011	-130903	14 Electric power plants
15 Heating plants	1924	15 Heating plants
16 Other conversion industries	-207	..	..	-27365	..	..	..	..	..	-27572	16 Other conversion industries
17 Net transfers	17 Net transfers
18 Consumption by energy sector	-6749	..	-7328	-16144	..	-7528	..	..	-4793	-43345	18 Consumption by energy sector
19 Losses in transport and distribution	-21673	..	-12355	..	..	-529	-37010	19 Losses in transport and distribution
20 Cons, for non-energy uses	-9353	..	-8415	..	-2118	..	..	..	..	..	-19886	20 Cons, for non-energy uses
21 Statistical differences	10490	611	591	41	91	750	..	483	0	..	0	13058	21 Statistical differences
22 Final consumption	38873	35235	42	6422	112832	..	57421	3334	..	15613	269772	22 Final consumption
23 By industry and construction	1171	2648	42	91	14298	..	10658	3	..	13625	42535	23 By industry and construction
24 Iron and steel industry	0,00	290	..	..	2002	..	1267	..	..	486	4045	24 Iron and steel industry
25 Chemical industry	648	168	..	..	2064	..	1442	..	..	6352	10719	25 Chemical industry
26 Other industry and construction	523	2190	42	46	10232	..	7949	3	..	6787	27771	26 Other industry and construction
27 By transport	37052	23838	..	2232	..	..	1761	13	..	..	64895	27 By transport
28 Road	34114	13896	..	2232	..	..	..	..	..	..	50242	28 Road
29 Rail	7604	..	..	..	..	1643	..	..	..	9248	29 Rail
30 Air	2938	..	..	..	..	..	..	..	..	..	2938	30 Air
31 Inland and coastal waterways	2337	..	..	..	..	..	..	..	..	2337	31 Inland and coastal waterways
32 By other modes of transportation	117	13	..	..	130	32 By other modes of transportation
33 By households and other consumers	650	8749	..	4099	98534	..	45003	3319	..	1989	162342	33 By households and other consumers
34 Households	347	680	..	3644	96648	..	30003	2649	..	1195	135185	34 Households
35 Agriculture	0,00	7606	..	..	623	..	2196	17	..	9	10451	35 Agriculture
36 Other consumers	303	463	..	455	1263	..	12803	652	..	785	16726	36 Other consumers

Azerbaijan

Terajoules

Energy sources and products	Hard coal, lignite and peat	Briquettes and cokes	Crude petroleum and NGL	Light petroleum products	Heavy petroleum products	Other petroleum products	LPG and refinery gas	Natural gas	Derived gases	Electricity	Primary biomass energy	Derived biomass energy	Other energy sources	Total energy	Energy sources and products
Production and utilisation															Production and utilisation
2008															2008
1 Production of primary energy	1987969	..	..	..	..	636091	..	8036	3192	..	..	2635288	1 Production of primary energy
2 Imports	0	..	1823	1180	..	0	..	777	..	..	..	3781	2 Imports
3 Exports	-1559093	-25685	-92698	-9053	-4509	-204826	..	-2922	..	..	..	-1898786	3 Exports
4 Marine / aviation bunkers	-18533	..	..	..	..	..	..	..	..	..	-18533	4 Marine / aviation bunkers
5 Stock change	-3680	-1428	287	-82	-410	-8831	..	..	50	..	..	-14115	5 Stock change
6 Total energy requirements	425196	-45645	-90608	-7956	-4919	422434	..	5891	3242	..	..	707635	6 Total energy requirements
7 Energy converted	-415974	105315	141161	20636	18333	-231471	..	69877	..	..	24413	-267710	7 Energy converted
8 Briquetting plants	8 Briquetting plants
9 Coke ovens and coke plants	9 Coke ovens and coke plants
10 Gasworks	-2453	..	..	..	..	..	-2453	10 Gasworks
11 Blastfurnaces	11 Blastfurnaces
12 Petroleum refineries	-310947	105315	160298	-84391	18333	..	..	..	..	..	..	-111392	12 Petroleum refineries
13 NGL processing plants	-105027	..	..	105027	..	..	..	..	..	..	..	0	13 NGL processing plants
14 Electric power plants	-19013	..	..	-196259	..	69877	..	..	22155	-123239	14 Electric power plants
15 Heating plants	2258	2258	15 Heating plants
16 Other conversion industries	-124	..	..	-32759	..	..	..	..	..	-32883	16 Other conversion industries
17 Net transfers	17 Net transfers
18 Consumption by energy sector	-635	..	-5709	..	..	-17409	..	-7613	..	..	-4112	-44565	18 Consumption by energy sector
19 Losses in transport and distribution	-2411	..	..	..	..	-28378	..	-11387	..	..	-606	-42782	19 Losses in transport and distribution
20 Cons. for non-energy uses	-13283	-290	-12094	..	-2472	..	..	..	..	..	-28140	20 Cons. for non-energy uses
21 Statistical differences	6176	740	980	502	-137	1203	..	441	0	..	0	9906	21 Statistical differences
22 Final consumption	45647	43573	84	4463	141501	..	56328	3242	..	19695	314533	22 Final consumption
23 By industry and construction	1210	3012	84	46	19142	..	11421	4	..	16894	51812	23 By industry and construction
24 Iron and steel industry	0	373	..	..	2220	..	1296	..	..	490	4380	24 Iron and steel industry
25 Chemical industry	1037	83	..	..	3115	..	..	..	..	9235	15011	25 Chemical industry
26 Other industry and construction	174	2555	84	46	13807	..	8584	4	..	7168	32421	26 Other industry and construction
27 By transport	43829	29945	..	501	..	..	1749	6	..	..	76031	27 By transport
28 Road	41324	22863	..	501	..	..	..	..	..	..	64688	28 Road
29 Rail	4532	..	..	..	..	1633	..	..	..	6165	29 Rail
30 Air	2506	..	..	..	..	..	..	..	..	..	2506	30 Air
31 Inland and coastal waterways	2550	..	..	..	..	..	..	..	..	2550	31 Inland and coastal waterways
32 By other modes of transportation	116	6	..	..	122	32 By other modes of transportation
33 By households and other consumers	607	10616	..	3917	122359	..	43158	3232	..	2801	186690	33 By households and other consumers
34 Households	433	637	..	3826	120073	..	26797	2489	..	1398	155653	34 Households
35 Agriculture	0	9475	..	..	467	..	2304	32	..	14	12292	35 Agriculture
36 Other consumers	174	504	..	91	1819	..	14057	711	..	1389	18745	36 Other consumers
2009															2009
1 Production of primary energy	2225783	..	..	..	..	635683	..	8318	2755	..	..	2872519	1 Production of primary energy
2 Imports	42	..	381	1221	..	0	..	396	10	..	..	2051	2 Imports
3 Exports	-1875244	-21729	-68469	-6386	-5055	-228449	..	-1367	..	..	..	-2206699	3 Exports
4 Marine / aviation bunkers	-13046	..	..	..	..	..	..	..	..	..	-13046	4 Marine / aviation bunkers
5 Stock change	5372	-1046	116	42	228	-24484	..	..	13	..	..	-19759	5 Stock change
6 Total energy requirements	355954	-35821	-67972	-5123	-4828	382730	..	7347	2778	..	..	635066	6 Total energy requirements
7 Energy converted	-348509	91985	106810	18593	20348	-198732	..	59611	..	..	15798	-234096	7 Energy converted
8 Briquetting plants	8 Briquetting plants
9 Coke ovens and coke plants	9 Coke ovens and coke plants
10 Gasworks	-1752	..	..	..	..	..	-1752	10 Gasworks
11 Blastfurnaces	11 Blastfurnaces
12 Petroleum refineries	-255323	91985	112498	-74593	20348	..	..	..	..	..	..	-105085	12 Petroleum refineries
13 NGL processing plants	-93187	..	..	93187	..	..	..	..	..	..	..	0	13 NGL processing plants
14 Electric power plants	-5481	..	..	-171748	..	59611	..	..	13394	-104224	14 Electric power plants
15 Heating plants	2404	2404	15 Heating plants
16 Other conversion industries	-207	..	..	-25232	..	..	..	..	..	-25439	16 Other conversion industries
17 Net transfers	17 Net transfers
18 Consumption by energy sector	-804	..	-1670	..	..	-12133	..	-7221	..	..	-3154	-36540	18 Consumption by energy sector
19 Losses in transport and distribution	-2157	..	..	..	..	-46273	..	-14761	..	..	-515	-63706	19 Losses in transport and distribution
20 Cons. for non-energy uses	-9267	-207	-12885	..	-1277	..	..	..	..	..	-23637	20 Cons. for non-energy uses
21 Statistical differences	4484	747	1861	544	-228	725	..	370	-1	..	0	8502	21 Statistical differences
22 Final consumption	46150	35100	42	4190	123590	..	44606	2779	..	12129	268586	22 Final consumption
23 By industry and construction	173	1298	42	273	12721	..	7436	1	..	9127	34071	23 By industry and construction
24 Iron and steel industry	424	..	..	222	..	936	..	..	321	1603	24 Iron and steel industry
25 Chemical industry	130	0	..	228	2402	..	1396	..	..	5914	10069	25 Chemical industry
26 Other industry and construction	43	4174	42	46	10097	..	5104	1	..	2892	22399	26 Other industry and construction
27 By transport	45717	17167	..	1321	..	..	1580	6	..	..	65792	27 By transport
28 Road	43038	13684	..	1321	..	..	..	..	..	..	58043	28 Road
29 Rail	466	..	..	..	..	1451	..	..	..	1918	29 Rail
30 Air	2678	..	..	..	..	..	..	..	..	..	2678	30 Air
31 Inland and coastal waterways	3017	..	..	..	..	..	..	..	..	3017	31 Inland and coastal waterways
32 By other modes of transportation	129	6	..	..	136	32 By other modes of transportation
33 By households and other consumers	261	13634	..	2596	110869	..	35589	2772	..	3002	168723	33 By households and other consumers
34 Households	174	510	..	2596	108964	..	21050	2025	..	1539	136858	34 Households
35 Agriculture	12578	234	..	2291	64	..	16	15182	35 Agriculture
36 Other consumers	87	546	..	0	1671	..	12248	682	..	1448	16683	36 Other consumers

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Energy sources and products	Hard coal, lignite and peat	Briquettes and cokes	Crude petroleum and NGL	Light petroleum products	Heavy petroleum products	Other petroleum products	LPG and refinery gas	Natural gas	Derived gases	Electricity	Primary biomass energy	Derived biomass energy	Other energy sources	Total energy	Energy sources and products
Production and utilisation															Production and utilisation
2006															2006
1 Production of primary energy	270	..	2707	..	..	..	..	757	..	19404	15630	..	..	38767	1 Production of primary energy
2 Imports	368	1424	338	15838	14436	590	956	73399	..	2801	..	..	..	110149	2 Imports
3 Exports	-74	..	-2538	0	0	..	-46	..	..	-346	..	..	..	-3003	3 Exports
4 Marine / aviation bunkers	..	..	..	-1814	..	..	..	..	..	..	..	..	..	-1814	4 Marine / aviation bunkers
5 Stock change	..	..	0	..	..	..	..	-126	..	..	..	..	..	-126	5 Stock change
6 Total energy requirements	564	1424	508	14024	14436	590	911	74030	..	21859	15630	..	..	143974	6 Total energy requirements
7 Energy converted	..	..	-550	..	-684	334	..	-21269	..	7952	..	..	1371	-12845	7 Energy converted
8 Briquetting plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	8 Briquetting plants
9 Coke ovens and coke plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	9 Coke ovens and coke plants
10 Gasworks	..	..	..	..	..	..	..	..	..	..	..	..	..	..	10 Gasworks
11 Blastfurnaces	..	..	..	..	..	..	..	..	..	..	..	..	..	..	11 Blastfurnaces
12 Petroleum refineries	..	..	-550	..	166	334	..	..	..	..	..	..	..	-50	12 Petroleum refineries
13 NGL processing plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	13 NGL processing plants
14 Electric power plants	..	..	..	..	-850	..	..	-21269	..	7952	..	..	1371	-12796	14 Electric power plants
15 Heating plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	15 Heating plants
16 Other conversion industries	..	..	..	..	..	..	..	..	..	..	..	..	..	..	16 Other conversion industries
17 Net transfers	..	..	..	..	..	..	..	..	..	..	..	..	..	..	17 Net transfers
18 Consumption by energy sector	..	..	-254	..	..	..	..	-7243	..	-4306	..	..	-49	-11851	18 Consumption by energy sector
19 Losses in transport and distribution	..	..	..	..	..	..	..	-7244	..	-3737	..	..	-116	-11097	19 Losses in transport and distribution
20 Cons, for non-energy uses	..	..	..	..	..	-924	..	-8081	..	..	..	..	..	-9005	20 Cons, for non-energy uses
21 Statistical differences	172	0	-296	0	3484	0	0	9930	..	1361	5	..	0	14654	21 Statistical differences
22 Final consumption	392	*1424	..	14024	10268	..	911	20263	..	20408	15624	..	1206	84521	22 Final consumption
23 By industry and construction	196	*1424	..	0	749	..	..	6992	..	2441	0	..	452	12254	23 By industry and construction
24 Iron and steel industry	0	*1424	..	..	..	..	..	209	..	1238	..	..	113	2985	24 Iron and steel industry
25 Chemical industry	..	..	..	..	..	..	..	1130	..	338	..	..	113	1581	25 Chemical industry
26 Other industry and construction	196	..	..	0	749	..	..	5653	..	864	..	..	226	7688	26 Other industry and construction
27 By transport	0	..	..	14024	7012	..	..	1005	..	1181	..	..	0	23221	27 By transport
28 Road	..	..	..	14024	7012	..	..	586	..	..	..	..	..	21622	28 Road
29 Rail	0	..	..	..	..	..	..	..	..	1181	..	..	..	1181	29 Rail
30 Air	..	..	..	..	..	..	..	..	..	..	..	..	..	..	30 Air
31 Inland and coastal waterways	0	..	..	..	..	..	..	..	..	..	..	..	..	0	31 Inland and coastal waterways
32 By other modes of transportation	..	..	..	..	..	..	..	419	..	0	..	..	0,00	419	32 By other modes of transportation
33 By households and other consumers	196	..	..	..	2507	..	911	12266	..	16787	15624	..	754	49045	33 By households and other consumers
34 Households	196	..	..	..	85	..	911	8415	..	9781	13782	..	0	33170	34 Households
35 Agriculture	0	..	..	..	2337	..	..	2428	..	4	837	..	151	5757	35 Agriculture
36 Other consumers	0	..	..	..	85	..	..	1423	..	7002	1005	..	603	10118	36 Other consumers
2007															2007
1 Production of primary energy	466	..	2707	..	..	..	..	623	..	24538	16504	..	..	44837	1 Production of primary energy
2 Imports	1372	2479	592	18782	14822	632	820	66492	..	1559	..	..	..	107550	2 Imports
3 Exports	-123	..	-2453	0	0	..	0	..	..	-2250	..	..	..	-4826	3 Exports
4 Marine / aviation bunkers	..	..	..	-1901	..	..	..	..	..	..	..	..	..	-1901	4 Marine / aviation bunkers
5 Stock change	..	..	85	..	..	..	..	-335	..	..	..	..	..	-250	5 Stock change
6 Total energy requirements	1715	2479	931	16881	14822	632	820	66779	..	23846	16504	..	..	145409	6 Total energy requirements
7 Energy converted	..	..	-1777	..	-310	1087	..	-27089	..	6350	..	..	1591	-20148	7 Energy converted
8 Briquetting plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	8 Briquetting plants
9 Coke ovens and coke plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	9 Coke ovens and coke plants
10 Gasworks	..	..	..	..	..	..	..	..	..	..	..	..	..	..	10 Gasworks
11 Blastfurnaces	..	..	..	..	..	..	..	..	..	..	..	..	..	..	11 Blastfurnaces
12 Petroleum refineries	..	..	-1777	..	539	1087	..	..	..	..	..	..	..	-150	12 Petroleum refineries
13 NGL processing plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	13 NGL processing plants
14 Electric power plants	..	..	..	..	-850	..	..	-27089	..	6350	..	..	1591	-19998	14 Electric power plants
15 Heating plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	15 Heating plants
16 Other conversion industries	..	..	..	..	..	..	..	..	..	..	..	..	..	..	16 Other conversion industries
17 Net transfers	..	..	..	..	..	..	..	..	..	..	..	..	..	..	17 Net transfers
18 Consumption by energy sector	..	..	..	..	..	..	..	-6385	..	-4428	..	..	-48	-10861	18 Consumption by energy sector
19 Losses in transport and distribution	..	..	..	..	..	..	..	-6385	..	-3852	..	..	-111	-10348	19 Losses in transport and distribution
20 Cons, for non-energy uses	..	..	..	..	..	-1719	..	-3224	..	..	..	..	..	-4943	20 Cons, for non-energy uses
21 Statistical differences	539	0	-846	6	1317	0	6	2302	..	925	0	..	76	4314	21 Statistical differences
22 Final consumption	1176	*2479	..	16881	13194	..	820	21394	..	20992	16504	..	1356	94796	22 Final consumption
23 By industry and construction	49	*2479	..	0	998	..	..	7620	..	2509	0	..	544	14200	23 By industry and construction
24 Iron and steel industry	0	*2479	..	..	..	..	..	251	..	1274	..	..	126	*4131	24 Iron and steel industry
25 Chemical industry	..	..	..	..	..	..	..	1340	..	349	..	..	167	1856	25 Chemical industry
26 Other industry and construction	49	..	..	6	998	..	..	6029	..	886	..	..	251	8213	26 Other industry and construction
27 By transport	441	..	..	16881	8967	..	..	1172	..	1213	..	..	0	28674	27 By transport
28 Road	..	..	..	16881	8967	..	..	670	..	..	..	..	..	26518	28 Road
29 Rail	0	..	..	..	..	..	..	..	..	1213	..	..	..	1213	29 Rail
30 Air	..	..	..	..	..	..	..	..	..	..	..	..	..	..	30 Air
31 Inland and coastal waterways	0	..	..	..	..	..	..	..	..	..	..	..	..	0	31 Inland and coastal waterways
32 By other modes of transportation	441	..	..	..	..	..	..	502	..	0	..	..	0,00	943	32 By other modes of transportation
33 By households and other consumers	686	..	..	..	3230	..	820	12602	..	17269	16504	..	812	51922	33 By households and other consumers
34 Households	221	..	..	..	127	..	820	8750	..	10062	14619	..	407	35006	34 Households
35 Agriculture	343	2975	2554	..	4	0	..	126	6001	35 Agriculture
36 Other consumers	123	127	1298	..	7204	1885	..	279	10915	36 Other consumers

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Energy sources and products	Hard coal, lignite and peat	Briquettes and cokes	Crude petroleum and NGL	Light petroleum products	Heavy petroleum products	Other petroleum products	LPG and refinery gas	Natural gas	Derived gases	Electricity	Primary biomass energy	Derived biomass energy	Other energy sources	Total energy	Energy sources and products
Production and utilisation															Production and utilisation
2008															2008
1 Production of primary energy	1421	..	2200	..	..	..	..	483	..	25906	15832	..	..	45841	1 Production of primary energy
2 Imports	4092	2374	1565	20398	15580	674	501	57166	..	2336	..	..	..	104686	2 Imports
3 Exports	-98	..	-1481	0	-207	..	0	..	..	-2448	..	..	..	-4234	3 Exports
4 Marine / aviation bunkers	..	..	..	-2506	..	..	..	..	..	..	..	..	..	-2506	4 Marine / aviation bunkers
5 Stock change	..	..	-127	..	..	..	..	335	..	..	..	..	..	208	5 Stock change
6 Total energy requirements	5415	2374	2157	17892	15373	674	501	57983	..	25794	15832	..	..	143995	6 Total energy requirements
7 Energy converted	..	..	-2453	..	-144	1379	..	-14486	..	4478	..	..	2052	-9174	7 Energy converted
8 Briquetting plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	8 Briquetting plants
9 Coke ovens and coke plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	9 Coke ovens and coke plants
10 Gasworks	..	..	..	..	..	..	..	..	..	..	..	..	..	..	10 Gasworks
11 Blastfurnaces	..	..	..	..	..	..	..	..	..	..	..	..	..	..	11 Blastfurnaces
12 Petroleum refineries	..	..	-2453	..	705	1379	..	..	..	..	..	..	..	-369	12 Petroleum refineries
13 NGL processing plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	13 NGL processing plants
14 Electric power plants	..	..	..	..	-850	..	..	-14486	..	4478	..	..	2052	-8806	14 Electric power plants
15 Heating plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	15 Heating plants
16 Other conversion industries	..	..	..	..	..	..	..	..	..	..	..	..	..	..	16 Other conversion industries
17 Net transfers	..	..	..	..	..	..	..	..	..	..	..	..	..	..	17 Net transfers
18 Consumption by energy sector	..	..	0	..	..	..	..	-3768	..	-4536	..	..	-62	-8366	18 Consumption by energy sector
19 Losses in transport and distribution	..	..	..	..	..	..	..	-3770	..	-3942	..	..	-144	-7856	19 Losses in transport and distribution
20 Cons. for non-energy uses	..	..	..	..	..	-2053	..	-3391	..	..	..	..	..	-5444	20 Cons. for non-energy uses
21 Statistical differences	2475	0	-296	0	2762	0	0	7658	..	306	0	..	0	12905	21 Statistical differences
22 Final consumption	2940	*2374	..	17892	12466	..	501	24910	..	21488	15832	..	1846	100250	22 Final consumption
23 By industry and construction	1103	*2374	..	0	1247	..	..	8331	..	2560	0	..	795	16409	23 By industry and construction
24 Iron and steel industry	0	*2374	..	..	..	..	..	1507	..	1303	..	..	167	5351	24 Iron and steel industry
25 Chemical industry	..	..	..	..	..	..	..	2386	..	356	..	..	167	2909	25 Chemical industry
26 Other industry and construction	1103	..	..	0	1247	..	..	4438	..	900	..	..	461	8148	26 Other industry and construction
27 By transport	613	..	..	17892	8244	..	..	1298	..	1246	..	..	0	29293	27 By transport
28 Road	..	..	..	17892	8244	..	..	754	..	..	..	..	..	26891	28 Road
29 Rail	0	..	..	..	..	..	..	..	..	1246	..	..	..	1246	29 Rail
30 Air	..	..	..	..	..	..	..	..	..	..	..	..	..	..	30 Air
31 Inland and coastal waterways	0	..	..	..	..	..	..	..	..	..	..	..	..	0	31 Inland and coastal waterways
32 By other modes of transportation	613	..	..	..	..	..	..	544	..	0	..	..	0,00	1156	32 By other modes of transportation
33 By households and other consumers	1225	..	..	..	2975	..	501	15281	..	17683	15832	..	1051	54548	33 By households and other consumers
34 Households	343	..	..	..	127	..	501	8960	..	10300	13865	..	430	34526	34 Households
35 Agriculture	270	..	..	..	2720	..	..	3014	..	7	0	..	251	6261	35 Agriculture
36 Other consumers	613	..	..	..	127	..	..	3307	..	7376	1968	..	370	13761	36 Other consumers
2009															2009
1 Production of primary energy	4141	..	2242	..	..	..	..	420	..	25758	15997	..	..	48557	1 Production of primary energy
2 Imports	907	1899	212	22904	18012	548	455	45928	..	918	..	..	..	91783	2 Imports
3 Exports	-98	..	-2538	0	-208	..	0	..	..	-2696	..	..	..	-5541	3 Exports
4 Marine / aviation bunkers	..	..	..	-2462	..	..	..	..	..	..	..	..	..	-2462	4 Marine / aviation bunkers
5 Stock change	..	..	0	..	..	..	..	0	..	..	..	..	..	0	5 Stock change
6 Total energy requirements	4949	1899	-85	20442	17803	548	455	46348	..	23980	15997	..	..	132337	6 Total energy requirements
7 Energy converted	..	..	-635	..	-2597	334	..	-19092	..	3636	..	..	1794	-16559	7 Energy converted
8 Briquetting plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	8 Briquetting plants
9 Coke ovens and coke plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	9 Coke ovens and coke plants
10 Gasworks	..	..	..	..	..	..	..	..	..	..	..	..	..	..	10 Gasworks
11 Blastfurnaces	..	..	..	..	..	..	..	..	..	..	..	..	..	..	11 Blastfurnaces
12 Petroleum refineries	..	..	-635	..	207	334	..	..	..	..	..	..	..	-93	12 Petroleum refineries
13 NGL processing plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	13 NGL processing plants
14 Electric power plants	..	..	..	..	-2805	..	..	-19092	..	3636	..	..	1794	-16467	14 Electric power plants
15 Heating plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	15 Heating plants
16 Other conversion industries	..	..	..	..	..	..	..	..	..	..	..	..	..	..	16 Other conversion industries
17 Net transfers	..	..	..	..	..	..	..	..	..	..	..	..	..	..	17 Net transfers
18 Consumption by energy sector	..	..	0	..	..	..	..	-3560	..	-3845	..	..	-179	-7584	18 Consumption by energy sector
19 Losses in transport and distribution	..	..	..	..	..	..	..	-2700	..	-3892	..	..	-81	-6673	19 Losses in transport and distribution
20 Cons. for non-energy uses	..	..	..	..	..	-882	..	-3411	..	..	..	..	..	-4293	20 Cons. for non-energy uses
21 Statistical differences	-2818	0	-719	0	-212	0	0	-4187	..	-1210	0	..	-140	-9286	21 Statistical differences
22 Final consumption	7767	*1899	..	20442	15419	..	455	21772	..	21089	*15997	..	1674	106514	22 Final consumption
23 By industry and construction	1715	*1899	..	0	2075	..	..	8415	..	4723	0	..	879	19706	23 By industry and construction
24 Iron and steel industry	368	*1899	..	..	..	..	..	1758	..	2023	..	..	167	6215	24 Iron and steel industry
25 Chemical industry	..	..	..	..	..	..	..	2889	..	324	..	..	628	3841	25 Chemical industry
26 Other industry and construction	1348	..	..	0	2075	..	..	3768	..	2376	..	..	84	9650	26 Other industry and construction
27 By transport	1372	..	..	20442	12919	..	..	963	..	2372	..	..	0	38068	27 By transport
28 Road	..	..	..	20442	12919	..	..	0	..	..	..	..	..	33361	28 Road
29 Rail	98	..	..	..	..	..	..	..	..	1253	..	..	..	1351	29 Rail
30 Air	..	..	..	..	..	..	..	..	..	..	..	..	..	..	30 Air
31 Inland and coastal waterways	147	..	..	..	..	..	..	..	..	..	..	..	..	147	31 Inland and coastal waterways
32 By other modes of transportation	1127	..	..	..	..	..	..	963	..	1120	..	..	0,00	3210	32 By other modes of transportation
33 By households and other consumers	4680	..	..	..	425	..	455	12394	..	13993	*15997	..	795	48739	33 By households and other consumers
34 Households	686	..	..	..	425	..	455	9337	..	10494	*13903	..	419	35719	34 Households
35 Agriculture	613	0	1717	..	749	0	..	293	3371	35 Agriculture

36	Other consumers	3381	0	1340	..	2750	*2094	..	83	9648	36	Other consumers
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Kazakhstan

		Terajoules															
Energy sources and products		Hard coal, lignite and peat	Briquettes and cokes	Crude petroleum and NGL	Light petroleum products	Heavy petroleum products	Other petroleum products	LPG and refinery gas	Natural gas	Derived gases	Electricity	Primary biomass energy	Derived biomass energy	Other energy sources	Total energy	Energy sources and products	
Production and utilisation																Production and utilisation	
2006																2006	
1	Production of primary energy	1769769	..	2780470	..	..	..	..	1029452	..	27965	632	..	..	5608289	1	Production of primary energy
2	Imports	5446	22895	272370	36222	18813	16981	182	431762	..	14980	0	..	..	819651	2	Imports
3	Exports	-528761	0	-2040214	-10478	-92740	-469542	-36526	-588043	..	-11974	..	..	..	-3778278	3	Exports
4	Marine / aviation bunkers	..	..	..	-10713	..	..	..	..	..	..	..	..	..	-10713	4	Marine / aviation bunkers
5	Stock change	0	0	..	-3744	-7048	..	-547	..	..	..	..	..	..	-11338	5	Stock change
6	Total energy requirements	1246454	22895	1012626	11287	-80975	-452561	-36891	873171	..	30971	632	..	..	2627611	6	Total energy requirements
7	Energy converted	-1055977	71428	-961317	117086	272252	467286	109877	-124463	..	229986	..	..	395386	-478454	7	Energy converted
8	Briquetting plants	..	2110	..	..	..	..	..	..	..	..	..	..	..	2110	8	Briquetting plants
9	Coke ovens and coke plants	-132185	69318	..	..	..	..	..	..	..	..	..	..	..	-62867	9	Coke ovens and coke plants
10	Gasworks	..	..	..	..	..	..	..	..	..	..	..	..	..	..	10	Gasworks
11	Blastfurnaces	..	..	..	..	..	..	..	..	..	..	..	..	..	..	11	Blastfurnaces
12	Petroleum refineries	..	..	-479386	117086	303543	-14644	109877	..	..	..	..	..	..	36476	12	Petroleum refineries
13	NGL processing plants	..	..	-481931	..	..	481931	..	..	..	..	..	..	..	0	13	NGL processing plants
14	Electric power plants	-923792	..	..	..	-31291	..	..	-124463	..	229986	..	..	395386	-454173	14	Electric power plants
15	Heating plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	15	Heating plants
16	Other conversion industries	..	..	..	..	..	..	..	..	..	..	..	..	..	..	16	Other conversion industries
17	Net transfers	..	..	..	..	0	..	..	..	..	..	..	..	..	..	17	Net transfers
18	Consumption by energy sector	..	..	..	..	0	..	-59506	-149439	..	-59969	..	..	..	-268914	18	Consumption by energy sector
19	Losses in transport and distribution	-33960	..	..	-923	-788	..	-3644	-4724	..	-24397	..	..	-46074	-114511	19	Losses in transport and distribution
20	Cons, for non-energy uses	-5816	-19150	..	-608	-166	..	-20617	0	..	..	..	..	..	-46356	20	Cons, for non-energy uses
21	Statistical differences	-12	0	51310	-86	-6248	-24901	46	-106	..	0	0	..	0	20002	21	Statistical differences
22	Final consumption	150714	75174	..	126929	196571	19009	9792	594651	..	176591	*632	..	349312	1699374	22	Final consumption
23	By industry and construction	150714	73064	..	4136	120048	..	5374	41406	..	106330	..	..	170813	671884	23	By industry and construction
24	Iron and steel industry	..	73064	..	..	20166	..	..	..	..	29833	..	..	..	123063	24	Iron and steel industry
25	Chemical industry	..	..	..	..	19133	..	..	..	..	7070	..	..	..	26204	25	Chemical industry
26	Other industry and construction	150714	..	..	4136	80749	..	5374	41406	..	69426	..	..	170813	522618	26	Other industry and construction
27	By transport	..	..	..	122145	26160	..	364	..	..	7571	..	..	..	156240	27	By transport
28	Road	..	..	..	118256	12621	..	364	..	..	..	..	..	..	131242	28	Road
29	Rail	..	..	..	..	12871	..	..	..	..	3514	..	..	..	16385	29	Rail
30	Air	..	..	..	3889	..	..	..	..	..	..	..	..	..	3889	30	Air
31	Inland and coastal waterways	..	..	..	..	*127	..	..	..	..	..	..	..	..	*127	31	Inland and coastal waterways
32	By other modes of transportation	..	..	..	..	539	..	..	..	..	4057	..	..	..	4597	32	By other modes of transportation
33	By households and other consumers	..	*2110	..	648	50363	19009	4053	553245	..	62690	*632	..	178499	871250	33	By households and other consumers
34	Households	..	*2110	..	..	7607	..	..	..	..	23893	..	..	84883	118493	34	Households
35	Agriculture	..	..	..	..	35762	..	..	..	..	22234	..	..	..	57995	35	Agriculture
36	Other consumers	..	..	..	648	6995	19009	4053	553245	..	16564	*632	..	93616	694762	36	Other consumers
2007																2007	
1	Production of primary energy	1810912	..	2873690	..	..	..	..	1153500	..	29416	453	..	..	5867971	1	Production of primary energy
2	Imports	6874	23845	298215	37802	27857	60620	592	249025	..	11768	0	..	..	716599	2	Imports
3	Exports	-493268	-1952	-1958744	-10375	-110553	-527387	-46409	-303341	..	-13018	..	..	..	-3465046	3	Exports
4	Marine / aviation bunkers	..	..	..	-13176	..	..	..	..	..	..	..	..	..	-13176	4	Marine / aviation bunkers
5	Stock change	-16143	-211	..	-1774	-586	..	-501	..	..	..	..	..	..	-19215	5	Stock change
6	Total energy requirements	1308376	21682	1213161	12478	-83282	-466766	-46318	1099184	..	28166	453	..	..	3087133	6	Total energy requirements
7	Energy converted	-962050	77943	-1052633	133333	270250	539752	121756	-57678	..	246420	..	..	391102	-291804	7	Energy converted
8	Briquetting plants	..	*791	..	..	..	..	..	..	..	..	..	..	..	*791	8	Briquetting plants
9	Coke ovens and coke plants	-267641	77152	..	..	..	..	..	..	..	..	..	..	..	-190489	9	Coke ovens and coke plants
10	Gasworks	..	..	..	..	..	..	..	..	..	..	..	..	..	..	10	Gasworks
11	Blastfurnaces	..	..	..	..	..	..	..	..	..	..	..	..	..	..	11	Blastfurnaces
12	Petroleum refineries	..	..	-516652	133333	289755	3772	121756	..	..	..	..	..	..	31964	12	Petroleum refineries
13	NGL processing plants	..	..	-535981	..	..	535981	..	..	..	..	..	..	..	0	13	NGL processing plants
14	Electric power plants	-694409	..	..	..	-19505	..	..	-57678	..	246420	..	..	391102	-134070	14	Electric power plants
15	Heating plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	15	Heating plants
16	Other conversion industries	..	..	..	..	..	..	..	..	..	..	..	..	..	..	16	Other conversion industries
17	Net transfers	..	..	..	..	..	..	..	..	..	..	..	..	..	..	17	Net transfers
18	Consumption by energy sector	..	..	..	..	0	..	-64280	-161776	..	-88877	..	..	..	-314932	18	Consumption by energy sector
19	Losses in transport and distribution	-38915	..	..	-659	-124	..	-137	-4770	..	-27544	..	..	-42729	-114879	19	Losses in transport and distribution
20	Cons, for non-energy uses	-5017	-13268	..	*-1170	-373	-45154	0	..	..	..	..	..	..	-64982	20	Cons, for non-energy uses
21	Statistical differences	172703	0	160529	-6962	-39602	18310	-4645	141665	..	-5778	0	..	14243	450462	21	Statistical differences
22	Final consumption	129691	86358	..	150943	226072	9523	15667	733295	..	163944	*453	..	334130	1850075	22	Final consumption
23	By industry and construction	129691	85566	..	5481	137323	..	6422	236812	..	106808	..	..	175045	883148	23	By industry and construction
24	Iron and steel industry	..	85566	..	..	17914	..	..	..	..	42386	..	..	..	145867	24	Iron and steel industry
25	Chemical industry	..	..	..	..	711	..	..	..	..	8680	..	..	..	9391	25	Chemical industry
26	Other industry and construction	129691	..	..	5481	118697	..	6422	236812	..	55742	..	..	175045	727890	26	Other industry and construction
27	By transport	..	..	..	..	..	..	..	..	..	8968	..	..	..	190017	27	By transport
28	Road	..	..	..	144511	36492	..	46	..	..	..	..	..	..	161567	28	Road
29	Rail	..	..	..	140061	21460	..	46	..	..	..	..	..	..	20639	29	Rail
30	Air	..	..	..	4450	..	..	..	..	..	6361	..	..	..	4450	30	Air
31	Inland and coastal waterways	..	..	..	..	297	..	..	..	..	..	..	..	..	297	31	Inland and coastal waterways
32	By other modes of transportation	..	..	..	..	456	..	..	..	..	2606	..	..	..	3063	32	By other modes of transportation
33	By households and other consumers	..	*791	..	950	52257	9523	9200	496483	..	48168	*453	..	159085	776911	33	By households and other consumers
34	Households	..	*791	..	..	31914	..	..	..	..	27896	..	..	94655	155257	34	Households
35	Agriculture	..	..	..	..	19886	..	..	..	..	2833	..	..	..	22719	35	Agriculture

36	Other consumers	950	456	9523	9200	496483	..	17438	*453	..	64430	598934	36	Other consumers
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Kazakhstan

Terajoules

Energy sources and products	Hard coal, lignite and peat	Briquettes and cokes	Crude petroleum and NGL	Light petroleum products	Heavy petroleum products	Other petroleum products	LPG and refinery gas	Natural gas	Derived gases	Electricity	Primary biomass energy	Derived biomass energy	Other energy sources	Total energy	Energy sources and products
Production and utilisation															Production and utilisation
2008															2008
1 Production of primary energy	2045088	..	3024163	..	..	..	..	1283362	..	26856	453	..	..	6379922	1 Production of primary energy
2 Imports	5129	20205	134810	52933	31182	28418	1093	241873	..	10037	0	..	..	525680	2 Imports
3 Exports	-608133	-6199	-2071812	-6987	-115596	-526393	-47275	-243438	..	-8939	..	..	..	-3634770	3 Exports
4 Marine / aviation bunkers	..	..	..	-9288	..	..	..	..	..	..	..	..	..	-9288	4 Marine / aviation bunkers
5 Stock change	-2003	-580	..	-15922	-13810	..	-1002	..	..	..	..	..	..	-33317	5 Stock change
6 Total energy requirements	1440081	13426	1087162	20736	-98224	-497975	-47184	1281797	..	27954	453	..	..	3228227	6 Total energy requirements
7 Energy converted	-803275	70901	-1057848	127835	294483	563174	130844	-99926	..	262318	..	..	393798	-117697	7 Energy converted
8 Briquetting plants	..	0	..	..	..	..	..	..	..	..	..	..	..	0	8 Briquetting plants
9 Coke ovens and coke plants	-159053	70901	..	..	..	..	..	..	..	..	..	..	..	-88153	9 Coke ovens and coke plants
10 Gasworks	..	..	..	..	..	..	..	..	..	..	..	..	..	..	10 Gasworks
11 Blastfurnaces	..	..	..	..	..	..	..	..	..	..	..	..	..	..	11 Blastfurnaces
12 Petroleum refineries	..	..	-514410	127835	318885	19737	130844	..	..	..	..	..	..	82890	12 Petroleum refineries
13 NGL processing plants	..	..	-543437	..	..	543437	..	..	..	..	..	..	..	0	13 NGL processing plants
14 Electric power plants	-644222	..	..	..	-24402	..	..	-99926	..	262318	..	..	393798	-112434	14 Electric power plants
15 Heating plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	15 Heating plants
16 Other conversion industries	..	..	..	..	..	..	..	..	..	..	..	..	..	..	16 Other conversion industries
17 Net transfers	..	..	..	..	..	..	..	..	..	..	..	..	..	..	17 Net transfers
18 Consumption by energy sector	..	..	..	..	0	..	*-69724	-219290	..	-67036	..	..	..	-356049	18 Consumption by energy sector
19 Losses in transport and distribution	-20803	..	..	-132	-673	..	-228	*-3501	..	-25607	..	..	-50091	-101035	19 Losses in transport and distribution
20 Cons, for non-energy uses	-1468	-10472	..	*-390	-456	-26135	0	..	..	..	..	..	..	-38920	20 Cons, for non-energy uses
21 Statistical differences	-440753	7755	29314	87924	-19783	31637	-2004	-89045	..	-64994	0	..	3779	-456172	21 Statistical differences
22 Final consumption	1055288	66100	..	60126	214912	7428	15713	1048125	..	262624	*453	..	339928	3070698	22 Final consumption
23 By industry and construction	1055288	66100	..	42327	139476	..	8562	*236310	..	202619	..	..	198928	1949611	23 By industry and construction
24 Iron and steel industry	..	66100	..	..	29312	..	..	..	..	85140	..	..	..	180552	24 Iron and steel industry
25 Chemical industry	..	..	..	..	504	..	..	..	..	8129	..	..	..	8633	25 Chemical industry
26 Other industry and construction	1055288	..	..	42327	109660	..	8562	*236310	..	109350	..	..	198928	1760426	26 Other industry and construction
27 By transport	..	..	..	10499	38780	..	547	..	..	12157	..	..	..	61982	27 By transport
28 Road	..	..	..	5012	11899	..	547	..	..	..	..	..	..	17457	28 Road
29 Rail	..	..	..	..	7899	..	..	..	..	7175	..	..	..	15074	29 Rail
30 Air	..	..	..	5487	..	..	..	..	..	..	..	..	..	5487	30 Air
31 Inland and coastal waterways	..	..	..	..	18401	..	..	..	..	..	..	..	..	18401	31 Inland and coastal waterways
32 By other modes of transportation	..	..	..	..	581	..	..	..	..	4982	..	..	..	5563	32 By other modes of transportation
33 By households and other consumers	..	0	..	*7301	36656	7428	6604	811815	..	47848	*453	..	*141000	1059105	33 By households and other consumers
34 Households	..	0	..	..	8074	..	..	..	..	26730	..	..	..	*132804	34 Households
35 Agriculture	..	..	..	..	18437	..	..	..	..	2588	..	..	..	21026	35 Agriculture
36 Other consumers	..	..	..	*7301	10145	7428	6604	811815	..	18529	*453	..	*43000	905275	36 Other consumers
2009															2009
1 Production of primary energy	1854003	..	3322464	..	..	..	..	1402492	..	24764	2220	..	..	6605943	1 Production of primary energy
2 Imports	3269	17620	255027	43226	11414	23018	410	84070	..	6156	0	..	..	444210	2 Imports
3 Exports	-552645	-897	-2269860	-7677	-171124	-529973	-63989	-258188	..	-8564	..	..	..	-3862918	3 Exports
4 Marine / aviation bunkers	..	..	..	-7473	..	..	..	..	..	..	..	..	..	-7473	4 Marine / aviation bunkers
5 Stock change	-1026	633	6091	-219	4531	-5104	-91	..	..	..	..	..	..	4815	5 Stock change
6 Total energy requirements	1303602	17356	1313721	27856	-155179	-512060	-63671	1228374	..	22356	2220	..	..	3184576	6 Total energy requirements
7 Energy converted	-976524	67314	-1100275	131719	303352	602017	90398	-118125	..	258592	..	..	390963	-350570	7 Energy converted
8 Briquetting plants	..	0	..	..	..	..	..	..	..	..	..	..	..	0	8 Briquetting plants
9 Coke ovens and coke plants	-121947	67314	..	..	..	..	..	..	..	..	..	..	..	-54634	9 Coke ovens and coke plants
10 Gasworks	..	..	..	..	..	..	..	..	..	..	..	..	..	..	10 Gasworks
11 Blastfurnaces	..	..	..	..	..	..	..	..	..	..	..	..	..	..	11 Blastfurnaces
12 Petroleum refineries	..	..	-499986	131719	322525	1728	90398	..	..	..	..	..	..	46384	12 Petroleum refineries
13 NGL processing plants	..	..	-600289	..	..	600289	..	..	..	..	..	..	..	0	13 NGL processing plants
14 Electric power plants	-854577	..	..	..	-19173	..	..	-118125	..	258592	..	..	390963	-342321	14 Electric power plants
15 Heating plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	15 Heating plants
16 Other conversion industries	..	..	..	..	..	..	..	..	..	..	..	..	..	..	16 Other conversion industries
17 Net transfers	..	..	..	..	..	..	..	..	..	..	..	..	..	..	17 Net transfers
18 Consumption by energy sector	-73605	..	-26057	..	0	..	-11516	-409763	..	0	..	..	..	-520940	18 Consumption by energy sector
19 Losses in transport and distribution	-20502	..	-24619	-352	-3145	..	-182	-3001	..	-23242	..	..	-46440	-121481	19 Losses in transport and distribution
20 Cons, for non-energy uses	-1475	-17198	..	-2054	-841	-15691	0	-4740	..	..	..	..	..	-41998	20 Cons, for non-energy uses
21 Statistical differences	23785	-1635	162770	0	-1125	63001	0	98675	..	0	0	..	4235	349705	21 Statistical differences
22 Final consumption	207712	69107	..	157169	145313	11265	15030	594070	..	257706	*2220	..	340288	1799881	22 Final consumption
23 By industry and construction	163125	69107	..	0	73941	..	*7469	*236620	..	178067	..	..	164192	892522	23 By industry and construction
24 Iron and steel industry	..	69107	..	..	7760	..	..	..	..	0	..	..	..	76867	24 Iron and steel industry
25 Chemical industry	..	..	..	..	6310	..	..	..	..	..	..	..	..	6310	25 Chemical industry
26 Other industry and construction	163125	..	..	0	59872	..	*7469	*236620	..	178067	..	..	164192	809345	26 Other industry and construction
27 By transport	..	..	..	148875	27018	..	0	..	..	17406	..	..	..	193299	27 By transport
28 Road	..	..	..	145073	13174	..	0	..	..	..	..	..	..	158246	28 Road
29 Rail	..	..	..	..	13384	..	..	..	..	0	..	..	..	13384	29 Rail
30 Air	..	..	..	3802	..	..	..	..	..	..	..	..	..	3802	30 Air
31 Inland and coastal waterways	..	..	..	..	170	..	..	..	..	..	..	..	..	170	31 Inland and coastal waterways
32 By other modes of transportation	..	..	..	..	290	..	..	..	..	17406	..	..	..	17696	32 By other modes of transportation
33 By households and other consumers	44587	0,00	..	8294	44354	11265	7560	357450	..	62233	*2220	..	176096	714059	33 By households and other consumers
34 Households	44587	0	..	..	6162	..	..	42866	..	30362	..	..	85754	209731	34 Households
35 Agriculture	..	..	..	..	31008	..	..	..	..	8377	..	..	..	39385	35 Agriculture

36	Other consumers	8294	7183	11265	7560	314584	..	23494	+2220	..	90342	464943	36	Other consumers
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Kyrgyzstan

TeraJoules

Energy sources and products	Hard coal, lignite and peat	Briquettes and cokes	Crude petroleum and NGL	Light petroleum products	Heavy petroleum products	Other petroleum products	LPG and refinery gas	Natural gas	Derived gases	Electricity	Primary biomass energy	Derived biomass energy	Other energy sources	Total energy	Energy sources and products
Production and utilisation															Production and utilisation
2006															2006
1 Production of primary energy	3957	..	2999	..	..	..	..	741	..	53593	164	..	..	61455	1 Production of primary energy
2 Imports	16707	0	0	26778	4870	1571	..	29265	..	0	..	..	..	79192	2 Imports
3 Exports	-557	..	0	-3758	0	..	..	..	..	-9076	..	..	..	-13391	3 Exports
4 Marine / aviation bunkers	..	..	..	-13349	..	..	..	..	..	..	..	..	..	-13349	4 Marine / aviation bunkers
5 Stock change	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5 Stock change
6 Total energy requirements	20107	0	2999	9672	4870	1571	..	30006	..	44518	164	..	..	113907	6 Total energy requirements
7 Energy converted	-6169	..	-3003	431	2451	..	..	-18795	..	7902	..	..	7441	-9743	7 Energy converted
8 Briquetting plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	8 Briquetting plants
9 Coke ovens and coke plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	9 Coke ovens and coke plants
10 Gasworks	..	..	..	..	..	..	..	..	..	..	..	..	..	..	10 Gasworks
11 Blastfurnaces	..	..	..	..	..	..	..	..	..	..	..	..	..	..	11 Blastfurnaces
12 Petroleum refineries	..	..	-3003	431	2451	..	..	..	..	..	..	..	..	-122	12 Petroleum refineries
13 NGL processing plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	13 NGL processing plants
14 Electric power plants	-6169	..	..	..	..	..	..	-18795	..	7902	..	..	7441	-9621	14 Electric power plants
15 Heating plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	15 Heating plants
16 Other conversion industries	..	..	..	..	..	..	..	..	..	..	..	..	..	..	16 Other conversion industries
17 Net transfers	..	..	..	..	..	..	..	..	..	..	..	..	..	..	17 Net transfers
18 Consumption by energy sector	..	..	..	..	..	..	..	..	..	-428	..	..	..	-428	18 Consumption by energy sector
19 Losses in transport and distribution	..	..	..	..	..	..	..	..	..	-14749	..	..	..	-14749	19 Losses in transport and distribution
20 Cons, for non-energy uses	..	..	..	..	..	-1571	..	..	..	..	..	..	..	-1571	20 Cons, for non-energy uses
21 Statistical differences	7	0	-4	-9	13	0	..	0	..	0	0	..	0	7	21 Statistical differences
22 Final consumption	13931	0	..	10111	7308	..	..	11211	..	37242	164	..	7441	87409	22 Final consumption
23 By industry and construction	13931	0	..	..	..	..	..	..	..	12791	..	..	..	26722	23 By industry and construction
24 Iron and steel industry	..	..	..	..	..	..	..	..	..	..	..	..	..	..	24 Iron and steel industry
25 Chemical industry	..	..	..	..	..	..	..	..	..	342	..	..	..	342	25 Chemical industry
26 Other industry and construction	13931	0	..	..	..	..	..	..	..	12449	..	..	..	26380	26 Other industry and construction
27 By transport	..	..	..	10111	..	..	..	0	..	432	..	..	..	10543	27 By transport
28 Road	..	..	..	10111	..	..	..	..	..	..	..	..	..	10111	28 Road
29 Rail	..	..	..	..	..	..	..	..	..	302	..	..	..	302	29 Rail
30 Air	..	..	..	..	..	..	..	..	..	..	..	..	..	..	30 Air
31 Inland and coastal waterways	..	..	..	..	..	..	..	..	..	..	..	..	..	..	31 Inland and coastal waterways
32 By other modes of transportation	..	..	..	..	..	..	..	0	..	130	..	..	..	130	32 By other modes of transportation
33 By households and other consumers	0	..	..	..	7308	..	..	11211	..	24019	164	..	7441	50144	33 By households and other consumers
34 Households	..	..	..	..	..	..	..	..	..	11725	..	..	..	11725	34 Households
35 Agriculture	..	..	..	..	..	..	..	..	..	10120	..	..	..	10120	35 Agriculture
36 Other consumers	0	..	..	..	7308	..	..	11211	..	2174	164	..	7441	28299	36 Other consumers
2007															2007
1 Production of primary energy	4735	..	2898	..	..	..	..	581	..	50213	150	..	..	58577	1 Production of primary energy
2 Imports	16701	0	2453	36792	12945	1699	..	31602	..	0	..	..	..	102192	2 Imports
3 Exports	-557	..	0	-3888	-4802	..	..	..	..	-8564	..	..	..	-17812	3 Exports
4 Marine / aviation bunkers	..	..	..	-13781	..	..	..	..	..	..	..	..	..	-13781	4 Marine / aviation bunkers
5 Stock change	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5 Stock change
6 Total energy requirements	20878	0	5351	19123	8143	1699	..	32183	..	41648	150	..	..	129176	6 Total energy requirements
7 Energy converted	-5909	..	-5372	598	4496	..	..	-20142	..	8240	..	..	7881	-10208	7 Energy converted
8 Briquetting plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	8 Briquetting plants
9 Coke ovens and coke plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	9 Coke ovens and coke plants
10 Gasworks	..	..	..	..	..	..	..	..	..	..	..	..	..	..	10 Gasworks
11 Blastfurnaces	..	..	..	..	..	..	..	..	..	..	..	..	..	..	11 Blastfurnaces
12 Petroleum refineries	..	..	-5372	598	4496	..	..	..	..	..	..	..	..	-278	12 Petroleum refineries
13 NGL processing plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	13 NGL processing plants
14 Electric power plants	-5909	..	..	..	..	..	..	-20142	..	8240	..	..	7881	-9929	14 Electric power plants
15 Heating plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	15 Heating plants
16 Other conversion industries	..	..	..	..	..	..	..	..	..	..	..	..	..	..	16 Other conversion industries
17 Net transfers	..	..	..	..	..	..	..	..	..	..	..	..	..	..	17 Net transfers
18 Consumption by energy sector	..	..	..	..	..	..	..	..	..	-1213	..	..	..	-1213	18 Consumption by energy sector
19 Losses in transport and distribution	..	..	..	..	..	..	..	..	..	-16495	..	..	..	-16495	19 Losses in transport and distribution
20 Cons, for non-energy uses	..	..	..	..	..	-1699	..	..	..	..	..	..	..	-1699	20 Cons, for non-energy uses
21 Statistical differences	8	0	-21	-18	-38	0	..	-4	..	0	0	..	0	-72	21 Statistical differences
22 Final consumption	14961	0	..	19739	12677	..	..	12045	..	32180	150	..	7881	99634	22 Final consumption
23 By industry and construction	14961	0	..	..	..	..	..	..	..	11052	..	..	..	26013	23 By industry and construction
24 Iron and steel industry	..	..	..	..	..	..	..	..	..	..	..	..	..	..	24 Iron and steel industry
25 Chemical industry	..	..	..	..	..	..	..	..	..	299	..	..	..	299	25 Chemical industry
26 Other industry and construction	14961	0	..	..	..	..	..	..	..	10753	..	..	..	25715	26 Other industry and construction
27 By transport	..	..	..	19739	..	..	..	0	..	374	..	..	..	20113	27 By transport
28 Road	..	..	..	19739	..	..	..	..	..	..	..	..	..	19739	28 Road
29 Rail	..	..	..	..	..	..	..	..	..	263	..	..	..	263	29 Rail
30 Air	..	..	..	..	..	..	..	..	..	..	..	..	..	..	30 Air
31 Inland and coastal waterways	..	..	..	..	..	..	..	..	..	..	..	..	..	..	31 Inland and coastal waterways
32 By other modes of transportation	..	..	..	..	..	..	..	0	..	112	..	..	..	112	32 By other modes of transportation
33 By households and other consumers	0	..	..	..	12677	..	..	12045	..	20754	150	..	7881	53507	33 By households and other consumers
34 Households	..	..	..	..	..	..	..	..	..	10130	..	..	..	10130	34 Households
35 Agriculture	8744	8744	35 Agriculture

36	Other consumers	0	12677	12045	..	1879	150	..	7881	34632	36	Other consumers
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Kyrgyzstan

Terajoules

Energy sources and products	Hard coal, lignite and peat	Briquettes and cokes	Crude petroleum and NGL	Light petroleum products	Heavy petroleum products	Other petroleum products	LPG and refinery gas	Natural gas	Derived gases	Electricity	Primary biomass energy	Derived biomass energy	Other energy sources	Total energy	Energy sources and products
Production and utilisation															Production and utilisation
2008															2008
1 Production of primary energy	5953	..	3003	..	..	..	..	663	..	38664	150	..	..	48433	1 Production of primary energy
2 Imports	10141	0	5330	44192	9987	3123	..	28403	..	36	..	..	..	101212	2 Imports
3 Exports	-451	..	-2242	-7169	-4765	..	..	..	..	-1962	..	..	..	-16589	3 Exports
4 Marine / aviation bunkers	..	..	..	-17021	..	..	..	..	..	..	..	..	..	-17021	4 Marine / aviation bunkers
5 Stock change	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5 Stock change
6 Total energy requirements	15642	0	6091	20002	5222	3123	..	29066	..	36738	150	..	..	116035	6 Total energy requirements
7 Energy converted	-6187	..	-5795	571	4998	..	..	-16010	..	4093	..	..	9746	-8584	7 Energy converted
8 Briquetting plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	8 Briquetting plants
9 Coke ovens and coke plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	9 Coke ovens and coke plants
10 Gasworks	..	..	..	..	..	..	..	..	..	..	..	..	..	..	10 Gasworks
11 Blastfurnaces	..	..	..	..	..	..	..	..	..	..	..	..	..	..	11 Blastfurnaces
12 Petroleum refineries	..	..	-5795	571	4998	..	..	..	..	..	..	..	..	-225	12 Petroleum refineries
13 NGL processing plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	13 NGL processing plants
14 Electric power plants	-6187	..	..	..	..	..	..	-16010	..	4093	..	..	9746	-8358	14 Electric power plants
15 Heating plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	15 Heating plants
16 Other conversion industries	..	..	..	..	..	..	..	..	..	..	..	..	..	..	16 Other conversion industries
17 Net transfers	..	..	..	..	..	..	..	..	..	..	..	..	..	..	17 Net transfers
18 Consumption by energy sector	..	..	..	..	..	..	..	..	..	-925	..	..	..	-925	18 Consumption by energy sector
19 Losses in transport and distribution	..	..	..	..	..	..	..	..	..	-13295	..	..	..	-13295	19 Losses in transport and distribution
20 Cons, for non-energy uses	..	..	..	..	..	-3123	..	..	..	..	..	..	..	-3123	20 Cons, for non-energy uses
21 Statistical differences	-6392	0	296	0	0	0	..	0	..	0	0	..	0	-6096	21 Statistical differences
22 Final consumption	15847	0	..	20574	10220	..	..	13056	..	26611	150	..	9746	96204	22 Final consumption
23 By industry and construction	15847	0	..	..	..	..	..	..	..	14796	..	..	..	30643	23 By industry and construction
24 Iron and steel industry	..	..	..	..	..	..	..	..	..	..	..	..	..	..	24 Iron and steel industry
25 Chemical industry	..	..	..	..	..	..	..	..	..	396	..	..	..	396	25 Chemical industry
26 Other industry and construction	15847	0,00	..	..	..	..	..	..	..	14400	..	..	..	30247	26 Other industry and construction
27 By transport	..	..	..	20574	..	..	..	300	..	216	..	..	..	21090	27 By transport
28 Road	..	..	..	20574	..	..	..	..	..	..	..	..	..	20574	28 Road
29 Rail	..	..	..	..	..	..	..	..	..	151	..	..	..	151	29 Rail
30 Air	..	..	..	..	..	..	..	..	..	..	..	..	..	..	30 Air
31 Inland and coastal waterways	..	..	..	..	..	..	..	..	..	..	..	..	..	..	31 Inland and coastal waterways
32 By other modes of transportation	..	..	..	..	..	..	..	300	..	65	..	..	..	365	32 By other modes of transportation
33 By households and other consumers	0	..	..	..	10220	..	..	12756	..	11599	150	..	9746	44472	33 By households and other consumers
34 Households	..	..	..	..	..	..	..	..	..	5551	..	..	..	5551	34 Households
35 Agriculture	..	..	..	..	..	..	..	..	..	6048	..	..	..	6048	35 Agriculture
36 Other consumers	0	..	..	..	10220	..	..	12756	..	0	150	..	9746	32872	36 Other consumers
2009															2009
1 Production of primary energy	7282	..	3173	..	..	..	..	586	..	35676	150	..	..	46866	1 Production of primary energy
2 Imports	8839	0	..	38386	32908	3166	..	25009	..	0	..	..	..	108308	2 Imports
3 Exports	0	..	0	-5918	0	..	..	..	..	-1152	..	..	..	-7070	3 Exports
4 Marine / aviation bunkers	..	..	..	-21038	..	..	..	..	..	..	..	..	..	-21038	4 Marine / aviation bunkers
5 Stock change	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5 Stock change
6 Total energy requirements	16120	0	3173	11430	32908	3166	..	25595	..	34524	150	..	..	127066	6 Total energy requirements
7 Energy converted	-5611	..	-1311	440	840	..	..	-12104	..	4284	..	..	10200	-3263	7 Energy converted
8 Briquetting plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	8 Briquetting plants
9 Coke ovens and coke plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	9 Coke ovens and coke plants
10 Gasworks	..	..	..	..	..	..	..	..	..	..	..	..	..	..	10 Gasworks
11 Blastfurnaces	..	..	..	..	..	..	..	..	..	..	..	..	..	..	11 Blastfurnaces
12 Petroleum refineries	..	..	-1311	440	840	..	..	..	..	..	..	..	..	-32	12 Petroleum refineries
13 NGL processing plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	13 NGL processing plants
14 Electric power plants	-5611	..	..	..	..	..	..	-12104	..	4284	..	..	10200	-3231	14 Electric power plants
15 Heating plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	15 Heating plants
16 Other conversion industries	..	..	..	..	..	..	..	..	..	..	..	..	..	..	16 Other conversion industries
17 Net transfers	..	..	..	..	..	..	..	..	..	..	..	..	..	..	17 Net transfers
18 Consumption by energy sector	..	..	..	..	..	..	..	..	..	-914	..	..	..	-914	18 Consumption by energy sector
19 Losses in transport and distribution	..	..	..	..	..	..	..	..	..	-11952	..	..	..	-11952	19 Losses in transport and distribution
20 Cons, for non-energy uses	..	..	..	..	..	-3166	..	..	..	..	..	..	..	-3166	20 Cons, for non-energy uses
21 Statistical differences	-7135	0	1861	0	0	0	..	0	..	0	0	..	0	-5274	21 Statistical differences
22 Final consumption	17644	0	..	11870	33748	..	..	13491	..	25942	150	..	10200	113044	22 Final consumption
23 By industry and construction	17644	0	..	..	..	..	..	..	..	14580	..	..	..	32224	23 By industry and construction
24 Iron and steel industry	..	..	..	..	..	..	..	..	..	..	..	..	..	..	24 Iron and steel industry
25 Chemical industry	..	..	..	..	..	..	..	..	..	389	..	..	..	389	25 Chemical industry
26 Other industry and construction	17644	0	..	..	..	..	..	..	..	14191	..	..	..	31835	26 Other industry and construction
27 By transport	..	..	..	11870	..	..	..	300	..	216	..	..	..	12386	27 By transport
28 Road	..	..	..	11870	..	..	..	..	..	..	..	..	..	11870	28 Road
29 Rail	..	..	..	..	..	..	..	..	..	151	..	..	..	151	29 Rail
30 Air	..	..	..	..	..	..	..	..	..	..	..	..	..	..	30 Air
31 Inland and coastal waterways	..	..	..	..	..	..	..	..	..	..	..	..	..	..	31 Inland and coastal waterways
32 By other modes of transportation	..	..	..	..	..	..	..	300	..	65	..	..	..	365	32 By other modes of transportation
33 By households and other consumers	0	..	..	..	33748	..	..	13191	..	11146	150	..	10200	68434	33 By households and other consumers
34 Households	..	..	..	..	..	..	..	..	..	5206	..	..	..	5206	34 Households
35 Agriculture	5940	5940	35 Agriculture

36	Other consumers	0	33748	13191	..	0	150	..	10200	57289	36	Other consumers
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Russian Federation

Energy sources and products	Terajoules														Energy sources and products
	Hard coal, lignite and peat	Briquettes and cokes	Crude petroleum and NGL	Light petroleum products	Heavy petroleum products	Other petroleum products	LPG and refinery gas	Natural gas	Derived gases	Electricity	Primary biomass energy	Derived biomass energy	Other energy sources	Total energy	
Production and utilisation															Production and utilisation
2006															2006
1 Production of primary energy	6670776	..	20179749	..	..	..	..	24463654	..	1195870	309050	..	14550	52833649	1 Production of primary energy
2 Imports	649723	1372	98136	308	1162	..	410	270562	..	18414	..	20	..	1040107	2 Imports
3 Exports	-2387760	-48217	-10509224	-277265	-3385710	..	-54061	-7624125	..	-75337	-1827	-173	..	-24363698	3 Exports
4 Marine / aviation bunkers	..	..	..	-229000	..	..	..	..	..	..	..	..	..	-229000	4 Marine / aviation bunkers
5 Stock change	26989	853	-90437	-7693	-81192	..	-1958	-423016	..	..	4275	..	..	-572179	5 Stock change
6 Total energy requirements	4959729	-45992	9678224	-513650	-3465740	..	-55609	16687075	..	1138946	311498	-153	14550	28708878	6 Total energy requirements
7 Energy converted	-4553237	73644	-9557204	2465726	4784306	380837	881590	-9832446	345854	2388989	-189787	2022	6035690	-6774016	7 Energy converted
8 Briquetting plants	-1086	1002	..	..	..	..	..	..	..	..	..	..	..	-84	8 Briquetting plants
9 Coke ovens and coke plants	-1156736	809794	..	..	..	..	..	..	235971	..	..	..	..	-110971	9 Coke ovens and coke plants
10 Gasworks	..	..	..	..	..	..	..	..	..	..	..	..	..	..	10 Gasworks
11 Blastfurnaces	..	-736018	..	..	..	..	..	..	406907	..	..	..	..	-329111	11 Blastfurnaces
12 Petroleum refineries	..	..	-8707751	2465726	5432116	-435833	947660	..	..	..	..	..	..	-298082	12 Petroleum refineries
13 NGL processing plants	..	..	-816670	..	..	816670	..	..	..	..	..	..	..	0	13 NGL processing plants
14 Electric power plants	-2705402	-246	-32783	..	-361581	..	-5611	-6862112	-257094	2388989	-78081	..	2797164	-5116757	14 Electric power plants
15 Heating plants	..	..	..	..	..	..	..	..	..	..	..	..	3238526	3238526	15 Heating plants
16 Other conversion industries	-690013	-888	..	..	-286228	..	-60459	-2970334	-39930	..	-111706	2022	..	^157537	16 Other conversion industries
17 Net transfers	..	..	..	..	..	..	..	..	..	..	..	..	..	..	17 Net transfers
18 Consumption by energy sector	-27501	-106	-11463	..	-168712	..	..	-515334	-26291	-687571	-13423	..	-856528	-2617547	18 Consumption by energy sector
19 Losses in transport and distribution	0	0	-105750	..	..	..	..	-259333	..	-387320	..	..	-436876	-1189279	19 Losses in transport and distribution
20 Cons, for non-energy uses	-11429	-12397	..	-492037	0	-335191	-115636	-1009742	..	..	..	..	..	-1976433	20 Cons, for non-energy uses
21 Statistical differences	-9810	-123	3595	0	0	0	0	0	0,00	0	6662	23	-379730	-379382	21 Statistical differences
22 Final consumption	377372	15272	212	1460039	1149855	45646	399726	5070220	319563	2453044	101626	1846	5136566	16530985	22 Final consumption
23 By industry and construction	124587	14894	212	..	166515	45646	225912	1469775	319563	1272809	15209	..	1977327	5632448	23 By industry and construction
24 Iron and steel industry	74109	0	..	..	38048	..	729	638222	303831	218376	5598	..	338384	1617296	24 Iron and steel industry
25 Chemical industry	1032	237	..	..	8720	..	223140	126222	140821	157219	232	..	570283	1101168	25 Chemical industry
26 Other industry and construction	49446	14657	212	..	119747	45646	2044	705331	1650	897214	9379	..	1068660	2913984	26 Other industry and construction
27 By transport	..	..	..	1456842	640640	..	19311	1561555	..	309157	..	..	..	3987505	27 By transport
28 Road	..	..	..	1226215	465884	..	19311	..	..	..	..	..	..	1711410	28 Road
29 Rail	..	..	..	..	102857	..	0	..	..	165164	..	..	..	268021	29 Rail
30 Air	..	..	..	230627	..	..	..	..	..	..	..	..	..	230627	30 Air
31 Inland and coastal waterways	..	..	..	..	50765	..	..	..	..	..	..	..	..	50765	31 Inland and coastal waterways
32 By other modes of transportation	..	..	..	..	21135	..	..	1561555	..	143993	..	..	..	1726683	32 By other modes of transportation
33 By households and other consumers	252785	378	..	3197	342699	..	154503	2038890	..	871078	86417	1846	3159239	6911031	33 By households and other consumers
34 Households	144556	158	..	3197	128380	..	137179	1840556	..	405097	52147	..	2297998	5009268	34 Households
35 Agriculture	6145	35	..	..	186704	..	4919	9854	..	61373	9854	..	131060	422757	35 Agriculture
36 Other consumers	102084	185	..	..	27615	..	12406	175667	..	404608	24416	1846	730181	1479007	36 Other consumers
2007															2007
1 Production of primary energy	6822121	..	20685326	..	..	..	..	24283317	..	1222247	275578	..	14746	53303335	1 Production of primary energy
2 Imports	604054	4458	113914	659	913	..	0	278603	..	20412	..	58	..	1023071	2 Imports
3 Exports	-2603182	-83773	-10937892	-264076	-3701696	..	-55427	-7210955	..	-66485	-1827	-116	..	-24925427	3 Exports
4 Marine / aviation bunkers	..	..	..	-231074	..	..	..	..	..	..	..	..	..	-231074	4 Marine / aviation bunkers
5 Stock change	-43645	-4071	-29356	-15299	15244	..	-46	-321630	..	..	4051	..	..	-394751	5 Stock change
6 Total energy requirements	4779349	-83386	9831992	-509789	-3685539	..	-55473	17029335	..	1176174	277802	-58	14746	28775154	6 Total energy requirements
7 Energy converted	-4388732	101586	-9699213	2506509	5099233	391327	945350	-10024222	434954	2432952	-158788	2080	5782857	-6574109	7 Energy converted
8 Briquetting plants	-476	404	..	..	..	..	..	..	..	..	..	..	..	-72	8 Briquetting plants
9 Coke ovens and coke plants	-1224643	850757	..	..	..	..	..	..	236088	..	..	..	..	-137798	9 Coke ovens and coke plants
10 Gasworks	..	..	..	..	..	..	..	..	..	..	..	..	..	..	10 Gasworks
11 Blastfurnaces	..	-749207	..	..	..	..	..	..	415753	..	..	..	..	-333454	11 Blastfurnaces
12 Petroleum refineries	..	..	-8788079	2506509	5626635	-490240	1008035	..	..	..	..	..	..	-137140	12 Petroleum refineries
13 NGL processing plants	..	..	-881566	..	..	881566	..	..	..	..	..	..	..	0	13 NGL processing plants
14 Electric power plants	-2486130	0	-29568	..	-259903	..	-3769	-7136000	-201065	2432952	-53411	..	2673269	-5063624	14 Electric power plants
15 Heating plants	..	..	..	..	..	..	..	..	..	..	..	..	3109588	3109588	15 Heating plants
16 Other conversion industries	-677482	-369	..	..	-267500	..	-58916	-2888222	-15822	..	-105377	2080	..	-4011609	16 Other conversion industries
17 Net transfers	..	..	..	..	..	..	..	..	..	..	..	..	..	..	17 Net transfers
18 Consumption by energy sector	-27236	-18	-24111	..	-235928	..	-303477	-651000	-30912	-708257	-3926	..	-749034	-2733899	18 Consumption by energy sector
19 Losses in transport and distribution	0	0	-106300	..	..	..	..	-252000	..	-377478	..	..	-430178	-1165956	19 Losses in transport and distribution
20 Cons, for non-energy uses	-10715	-1266	..	-496538	-5602	-355181	-121830	-1121113	..	..	..	..	..	-2112246	20 Cons, for non-energy uses
21 Statistical differences	-156	26	1861	0	0	0	42	0	0,00	0	3709	0	-347663	-342180	21 Statistical differences
22 Final consumption	352821	16890	508	1500181	1172163	36145	464528	4981000	404042	2523391	111379	2022	4966054	16531125	22 Final consumption
23 By industry and construction	147692	16697	508	..	175616	36145	284976	1249000	404042	1270001	15555	..	1867081	5467312	23 By industry and construction
24 Iron and steel industry	92120	0	..	..	37041	..	319	588000	387916	229198	4840	..	334129	1673562	24 Iron and steel industry
25 Chemical industry	3790	2268	..	..	5886	..	280486	67000	15876	160423	242	..	547223	1083195	25 Chemical industry
26 Other industry and construction	51782	14428	508	..	132688	36145	4172	594000	250	880380	10473	..	985729	2710555	26 Other industry and construction
27 By transport	..	..	..	1496941	578952	..	20905	1626000	..	311926	..	..	..	4034723	27 By transport
28 Road	..	..	..	1264198	415186	..	20905	..	..	..	..	..	..	1700289	28 Road
29 Rail	..	..	..	..	94495	..	0	..	..	167278	..	..	..	261772	29 Rail
30 Air	..	..	..	232743	..	..	..	..	..	..	..	..	..	232743	30 Air
31 Inland and coastal waterways	..	..	..	..	46825	..	..	..	..	..	..	..	..	46825	31 Inland and coastal waterways
32 By other modes of transportation	..	..	..	..	22446	..	..	1626000	..	144648	..	..	..	1793094	32 By other modes of transportation
33 By households and other consumers	205130	193	..	3240	417596	..	158647	2106000	..	941465	95824	2022	3098973	7029090	33 By households and other consumers
34 Households	113688	141	..	3240	139812	..	140503	1806000	..	417348	54096	..	2218476	4893304	34 Households
35 Agriculture	3988	0	..	..	206207	..	3871	44000	..	59220	15109	..	125720	458115	35 Agriculture

36	Other consumers	87454	53	71577	..	14273	256000	..	464897	26619	2022	754777	1677671	36	Other consumers
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Russian Federation

Terajoules

Energy sources and products	Hard coal, lignite and peat	Briquettes and cokes	Crude petroleum and NGL	Light petroleum products	Heavy petroleum products	Other petroleum products	LPG and refinery gas	Natural gas	Derived gases	Electricity	Primary biomass energy	Derived biomass energy	Other energy sources	Total energy	Energy sources and products
Production and utilisation															Production and utilisation
2008															2008
1 Production of primary energy	6999207	..	20613292	..	..	..	..	24878778	..	1188958	258302	..	13726	53952263	1 Production of primary energy
2 Imports	783985	4326	103889	10595	24191	..	6649	297467	..	11178	..	87	..	1242367	2 Imports
3 Exports	-2534057	-79869	-10283045	-196112	-3899801	..	-56065	-7342290	..	-74657	-2508	-58	..	-24468462	3 Exports
4 Marine / aviation bunkers	..	..	..	-246107	..	..	..	..	..	..	..	..	..	-246107	4 Marine / aviation bunkers
5 Stock change	-205769	-1556	-90776	18156	18059	..	-3234	-794775	..	..	2678	..	..	-1057216	5 Stock change
6 Total energy requirements	5043366	-77099	10343360	-413468	-3857550	..	-52649	17039180	..	1125479	258471	29	13726	29422845	6 Total energy requirements
7 Energy converted	-4576579	106457	-10159440	2564388	5322679	409150	968085	-9941485	421911	2556407	-159890	2196	5586123	-6899998	7 Energy converted
8 Briquetting plants	-648	791	..	..	..	..	..	..	..	..	..	..	..	144	8 Briquetting plants
9 Coke ovens and coke plants	-1089140	846220	..	..	..	..	..	..	226573	..	..	..	..	-16346	9 Coke ovens and coke plants
10 Gasworks	..	..	..	..	..	..	..	..	..	..	..	..	..	..	10 Gasworks
11 Blastfurnaces	..	-740028	..	..	..	..	..	..	398062	..	..	..	..	-341966	11 Blastfurnaces
12 Petroleum refineries	..	..	-9373934	2564388	5794912	-345561	1027573	..	..	..	..	..	..	-332622	12 Petroleum refineries
13 NGL processing plants	..	..	-754711	..	..	754711	..	..	..	..	..	..	..	0	13 NGL processing plants
14 Electric power plants	-2833359	0,00	-30794	..	-239867	..	-1884	-7167628	-179489	2556407	-67595	..	2625886	-5338324	14 Electric power plants
15 Heating plants	..	..	..	..	..	..	..	..	..	..	..	2196	2960237	2960237	15 Heating plants
16 Other conversion industries	-653433	-528	..	..	-232366	..	-57603	-2773857	-23235	..	-92295	..	..	-3831122	16 Other conversion industries
17 Net transfers	..	..	..	..	..	..	..	..	..	..	..	..	..	..	17 Net transfers
18 Consumption by energy sector	-29481	0	-24365	..	-194614	..	-304489	-619286	-67193	-676930	-4352	..	-747023	-2667733	18 Consumption by energy sector
19 Losses in transport and distribution	0	0	-99743	..	..	..	..	-245685	..	-393264	..	..	-421869	-1160561	19 Losses in transport and distribution
20 Cons, for non-energy uses	-11444	-352	..	-503864	0	-365361	-125884	-1105104	..	..	..	..	..	-2112008	20 Cons, for non-energy uses
21 Statistical differences	-9390	70	58966	9759	6005	0	452	112	-180	36	-1922	0,00	-326692	-262784	21 Statistical differences
22 Final consumption	435251	28935	846	1637297	1264510	43789	484612	5127508	354898	2611656	96151	2224	4757649	16845328	22 Final consumption
23 By industry and construction	157663	27300	846	..	188655	43789	288026	1401950	354898	1296295	11267	..	1698936	5496925	23 By industry and construction
24 Iron and steel industry	103536	0	..	..	33961	..	501	610365	338499	220144	1524	..	320711	1629240	24 Iron and steel industry
25 Chemical industry	4975	5196	..	..	8208	..	279828	80048	13343	158033	312	..	455533	1005477	25 Chemical industry
26 Other industry and construction	49152	22104	846	..	146486	43789	7697	711537	3056	918119	9431	..	922692	2834908	26 Other industry and construction
27 By transport	..	..	..	1634100	635996	..	16077	1647651	..	299153	..	..	..	4232977	27 By transport
28 Road	..	..	..	1387993	479950	..	16077	..	..	..	..	..	..	1884020	28 Road
29 Rail	..	..	..	..	81977	..	0	..	..	159674	..	..	..	241651	29 Rail
30 Air	..	..	..	246107	..	..	..	..	..	..	..	..	..	246107	30 Air
31 Inland and coastal waterways	..	..	..	..	44057	..	..	..	..	..	..	..	..	44057	31 Inland and coastal waterways
32 By other modes of transportation	..	..	..	..	30012	..	..	1647651	..	139478	..	..	..	1817141	32 By other modes of transportation
33 By households and other consumers	277589	1635	..	3197	439859	..	180509	2077907	..	1016208	84884	2224	3058713	7142725	33 By households and other consumers
34 Households	134767	35	..	3197	145719	..	166782	1856684	..	421682	51210	..	2183732	4963788	34 Households
35 Agriculture	3781	0	..	..	218781	..	1412	38912	..	56858	9402	..	120002	449148	35 Agriculture
36 Other consumers	139041	1600	..	..	75360	..	12315	182331	..	537667	24272	2224	754979	1729789	36 Other consumers
2009															2009
1 Production of primary energy	6432183	..	20821796	..	..	..	..	21850217	..	1224612	268427	..	13730	50610966	1 Production of primary energy
2 Imports	602006	5777	75463	9803	24160	..	319	310620	..	11038	..	29	..	1039214	2 Imports
3 Exports	-2764063	-49008	-10528428	-197870	-4024505	..	-91088	-6105635	..	-64523	-5384	-116	..	-23830620	3 Exports
4 Marine / aviation bunkers	..	..	..	-246409	..	..	..	..	..	..	..	..	..	-246409	4 Marine / aviation bunkers
5 Stock change	-202669	3077	-68822	-11870	32878	..	-1139	245159	..	..	-1808	..	..	-5193	5 Stock change
6 Total energy requirements	4067457	-40154	10300010	-446346	-3967468	..	-91908	16300361	..	1171127	261235	-87	13730	27567957	6 Total energy requirements
7 Energy converted	-4248309	59550	-10188253	2554711	5264251	327095	1246422	-9565431	582632	2346516	-164579	2196	5340189	-6443012	7 Energy converted
8 Briquetting plants	-1019	932	..	..	..	..	..	..	..	..	..	..	..	-87	8 Briquetting plants
9 Coke ovens and coke plants	-1215052	722434	..	..	..	..	..	..	240914	..	..	..	..	-251704	9 Coke ovens and coke plants
10 Gasworks	..	..	..	..	..	..	..	..	..	..	..	..	..	..	10 Gasworks
11 Blastfurnaces	-86053	-663508	..	..	..	..	..	..	548664	..	..	..	..	-200898	11 Blastfurnaces
12 Petroleum refineries	..	..	-9499607	2554711	5744385	-329911	1285992	..	..	..	..	..	..	-244430	12 Petroleum refineries
13 NGL processing plants	..	..	-657006	..	..	657006	..	..	..	..	..	..	..	0	13 NGL processing plants
14 Electric power plants	-2383611	0	-31640	..	-236737	..	-1926	-6791755	-182597	2346516	-70204	..	2509734	-4842220	14 Electric power plants
15 Heating plants	..	..	..	..	..	..	..	..	..	..	..	..	2830455	2830455	15 Heating plants
16 Other conversion industries	-562573	-308	..	..	-243398	..	-37644	-2773676	-24349	..	-94375	2196	..	-3734128	16 Other conversion industries
17 Net transfers	..	..	..	..	..	..	..	..	..	..	..	..	..	..	17 Net transfers
18 Consumption by energy sector	-25824	0,00	-11125	..	-161900	..	-296502	-549348	-63901	-661941	-5628	..	-691342	-2467484	18 Consumption by energy sector
19 Losses in transport and distribution	0	0	-118948	..	..	..	..	-205852	..	-384451	..	..	-418750	-1128001	19 Losses in transport and distribution
20 Cons, for non-energy uses	-7283	-475	..	-528488	0	-281522	-279139	-1223451	..	..	..	..	..	-2320358	20 Cons, for non-energy uses
21 Statistical differences	-462489	176	-18866	0	-807	0	1472	0	0,00	828	-5129	0,00	-299725	-784540	21 Statistical differences
22 Final consumption	248529	18745	550	1579877	1135691	45573	577400	4756279	518731	2470450	96157	*2109	4543552	15993642	22 Final consumption
23 By industry and construction	46026	17039	550	..	155866	45573	419864	1367953	518731	1121101	15394	..	1622481	5330578	23 By industry and construction
24 Iron and steel industry	895	0	..	..	19929	..	364	560138	499786	196049	2438	..	306279	1585878	24 Iron and steel industry
25 Chemical industry	3779	4247	..	..	6174	..	410769	119874	16114	156528	1272	..	435034	1153791	25 Chemical industry
26 Other industry and construction	41352	12793	550	..	129763	45573	8730	687941	2831	768524	11684	..	881168	2590909	26 Other industry and construction
27 By transport	..	..	..	1579877	707121	..	15303	1284709	..	292342	..	..	..	3879351	27 By transport
28 Road	..	..	..	1375069	560947	..	14392	..	..	..	..	..	..	1950408	28 Road
29 Rail	..	..	..	..	74804	..	46	..	..	163634	..	..	..	238484	29 Rail
30 Air	..	..	..	204808	..	..	..	..	..	..	..	..	..	204808	30 Air
31 Inland and coastal waterways	..	..	..	..	44459	..	..	..	..	..	..	..	..	44459	31 Inland and coastal waterways
32 By other modes of transportation	..	..	..	..	26910	..	865	1284709	..	128707	..	..	..	1441191	32 By other modes of transportation
33 By households and other consumers	202503	1706	..	0	272704	..	142234	2103617	..	1057007	80763	*2109	2921071	6783713	33 By households and other consumers
34 Households	86050	18	..	0	56913	..	129573	1939025	..	445705	37224	..	2085464	4779971	34 Households
35 Agriculture	4186	0	..	..	157952	..	3325	41223	..	55343	11637	..	114602	388468	35 Agriculture

36	Other consumers	112267	1688	57839	..	9337	123369	..	555959	31702	*2109	721005	1615274	36	Other consumers
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Tajikistan

Energy sources and products		Terajoules													Energy sources and products		
Production and utilisation		Hard coal, lignite and peat	Briquettes and cokes	Crude petroleum and NGL	Light petroleum products	Heavy petroleum products	Other petroleum products	LPG and refinery gas	Natural gas	Derived gases	Electricity	Primary biomass energy	Derived biomass energy	Other energy sources	Total energy	Production and utilisation	
2006																2006	
1	Production of primary energy	1783	..	1015	..	..	..	..	669	..	60124	..	..	..	63591	1	Production of primary energy
2	Imports	111	26	..	2547	7879	4878	319	24347	..	17424	..	..	..	57532	2	Imports
3	Exports	0	..	-212	-706	..	..	..	..	..	-15232	..	..	..	-16149	3	Exports
4	Marine / aviation bunkers	..	..	..	-173	..	..	..	..	..	..	..	..	..	-173	4	Marine / aviation bunkers
5	Stock change	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5	Stock change
6	Total energy requirements	1895	26	804	1668	7879	4878	319	25016	..	62316	..	..	..	104801	6	Total energy requirements
7	Energy converted	..	..	-804	706	..	..	..	-11699	..	842	..	..	3762	-7192	7	Energy converted
8	Briquetting plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	8	Briquetting plants
9	Coke ovens and coke plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	9	Coke ovens and coke plants
10	Gasworks	..	..	..	..	..	..	..	..	..	..	..	..	..	..	10	Gasworks
11	Blastfurnaces	..	..	..	..	..	..	..	..	..	..	..	..	..	..	11	Blastfurnaces
12	Petroleum refineries	..	..	-804	706	..	..	..	..	..	..	..	..	..	-98	12	Petroleum refineries
13	NGL processing plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	13	NGL processing plants
14	Electric power plants	..	..	..	..	..	..	..	-11699	..	842	..	..	3762	-7095	14	Electric power plants
15	Heating plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	15	Heating plants
16	Other conversion industries	..	..	..	..	..	..	..	..	..	..	..	..	..	..	16	Other conversion industries
17	Net transfers	..	..	..	..	..	..	..	..	..	..	..	..	..	..	17	Net transfers
18	Consumption by energy sector	..	..	..	..	..	..	..	..	..	-608	..	..	..	-608	18	Consumption by energy sector
19	Losses in transport and distribution	..	..	..	..	..	..	..	..	..	-9882	..	..	..	-9882	19	Losses in transport and distribution
20	Cons, for non-energy uses	..	..	..	..	..	-42	..	..	..	..	..	..	..	-42	20	Cons, for non-energy uses
21	Statistical differences	0	0	0	0	0	0	0	0	..	-176	..	..	0	-176	21	Statistical differences
22	Final consumption	1895	26	..	2374	7879	4836	319	13317	..	52844	..	..	3762	87252	22	Final consumption
23	By industry and construction	..	..	..	..	..	..	..	..	..	23983	..	..	..	23983	23	By industry and construction
24	Iron and steel industry	..	..	..	..	..	..	..	..	..	..	..	..	..	..	24	Iron and steel industry
25	Chemical industry	..	..	..	..	..	..	..	..	..	612	..	..	..	612	25	Chemical industry
26	Other industry and construction	..	..	..	..	..	..	..	..	..	23371	..	..	..	23371	26	Other industry and construction
27	By transport	..	..	..	2374	..	..	..	530	..	83	..	..	..	2987	27	By transport
28	Road	..	..	..	2374	..	..	..	..	..	..	..	..	..	2374	28	Road
29	Rail	..	..	..	..	..	..	..	..	..	65	..	..	..	65	29	Rail
30	Air	..	..	..	..	..	..	..	..	..	..	..	..	..	..	30	Air
31	Inland and coastal waterways	..	..	..	..	..	..	..	..	..	..	..	..	..	..	31	Inland and coastal waterways
32	By other modes of transportation	..	..	..	..	..	..	..	530	..	18	..	..	..	548	32	By other modes of transportation
33	By households and other consumers	1895	26	..	..	7879	4836	319	12787	..	28778	..	..	3762	60283	33	By households and other consumers
34	Households	..	..	..	..	..	..	..	..	..	11520	..	..	..	11520	34	Households
35	Agriculture	..	..	..	..	..	..	..	..	..	16128	..	..	..	16128	35	Agriculture
36	Other consumers	1895	26	..	..	7879	4836	319	12787	..	1130	..	..	3762	32635	36	Other consumers
2007																2007	
1	Production of primary energy	3195	..	508	..	..	..	..	551	..	61610	..	..	..	65864	1	Production of primary energy
2	Imports	149	26	..	4041	12307	4915	319	24596	..	15700	..	..	..	62053	2	Imports
3	Exports	0	..	-85	-353	..	..	..	..	..	-15332	..	..	..	-15770	3	Exports
4	Marine / aviation bunkers	..	..	..	-173	..	..	..	..	..	..	..	..	..	-173	4	Marine / aviation bunkers
5	Stock change	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5	Stock change
6	Total energy requirements	3344	26	423	3516	12307	4915	319	25147	..	61978	..	..	..	111974	6	Total energy requirements
7	Energy converted	..	..	-423	353	..	..	..	-11760	..	1368	..	..	3886	-6576	7	Energy converted
8	Briquetting plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	8	Briquetting plants
9	Coke ovens and coke plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	9	Coke ovens and coke plants
10	Gasworks	..	..	..	..	..	..	..	..	..	..	..	..	..	..	10	Gasworks
11	Blastfurnaces	..	..	..	..	..	..	..	..	..	..	..	..	..	..	11	Blastfurnaces
12	Petroleum refineries	..	..	*23	353	..	..	..	..	..	..	..	..	..	-70	12	Petroleum refineries
13	NGL processing plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	13	NGL processing plants
14	Electric power plants	..	..	..	..	..	..	..	-11760	..	1368	..	..	3886	-6506	14	Electric power plants
15	Heating plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	15	Heating plants
16	Other conversion industries	..	..	..	..	..	..	..	..	..	..	..	..	..	..	16	Other conversion industries
17	Net transfers	..	..	..	..	..	..	..	..	..	..	..	..	..	..	17	Net transfers
18	Consumption by energy sector	..	..	..	..	..	..	..	..	..	-608	..	..	..	-608	18	Consumption by energy sector
19	Losses in transport and distribution	..	..	..	..	..	..	..	..	..	-10634	..	..	..	-10634	19	Losses in transport and distribution
20	Cons, for non-energy uses	..	..	..	..	..	-42	..	..	..	..	..	..	..	-42	20	Cons, for non-energy uses
21	Statistical differences	6	0	0	0	0	0	0	0	..	-896	..	..	0	-896	21	Statistical differences
22	Final consumption	3344	26	..	3869	12307	4873	319	13387	..	52999	..	..	3886	95010	22	Final consumption
23	By industry and construction	..	..	..	..	..	..	..	..	..	24055	..	..	..	24055	23	By industry and construction
24	Iron and steel industry	..	..	..	..	..	..	..	..	..	..	..	..	..	..	24	Iron and steel industry
25	Chemical industry	..	..	..	..	..	..	..	..	..	616	..	..	..	616	25	Chemical industry
26	Other industry and construction	..	..	..	..	..	..	..	..	..	23440	..	..	..	23440	26	Other industry and construction
27	By transport	..	..	..	3869	..	..	..	530	..	83	..	..	..	4481	27	By transport
28	Road	..	..	..	3869	..	..	..	..	..	..	..	..	..	3869	28	Road
29	Rail	..	..	..	..	..	..	..	..	..	65	..	..	..	65	29	Rail
30	Air	..	..	..	..	..	..	..	..	..	..	..	..	..	..	30	Air
31	Inland and coastal waterways	..	..	..	..	..	..	..	..	..	..	..	..	..	..	31	Inland and coastal waterways
32	By other modes of transportation	..	..	..	..	..	..	..	530	..	18	..	..	..	548	32	By other modes of transportation
33	By households and other consumers	3344	26	..	..	12307	4873	319	12857	..	28861	..	..	3886	66473	33	By households and other consumers
34	Households	..	..	..	..	..	..	..	..	..	11552	..	..	..	11552	34	Households
35	Agriculture	..	..	..	..	..	..	..	..	..	16175	..	..	..	16175	35	Agriculture

36	Other consumers	3344	26	12307	4873	319	12857	..	1134	3886	38746	36	Other consumers
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Tajikistan

Terajoules

Energy sources and products	Hard coal, lignite and peat	Briquettes and cokes	Crude petroleum and NGL	Light petroleum products	Heavy petroleum products	Other petroleum products	LPG and refinery gas	Natural gas	Derived gases	Electricity	Primary biomass energy	Derived biomass energy	Other energy sources	Total energy	Energy sources and products
Production and utilisation															Production and utilisation
2008															2008
1 Production of primary energy	3530	..	592	..	..	..	..	1349	..	56880	..	..	..	62351	1 Production of primary energy
2 Imports	186	26	..	3910	14106	4187	319	19494	..	19069	..	..	..	61296	2 Imports
3 Exports	-37	..	-85	-441	..	..	..	..	..	-15916	..	..	..	-16479	3 Exports
4 Marine / aviation bunkers	..	..	..	-173	..	..	..	..	..	..	..	..	..	-173	4 Marine / aviation bunkers
5 Stock change	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5 Stock change
6 Total energy requirements	3678	26	508	3295	14106	4187	319	20843	..	60034	..	..	..	106995	6 Total energy requirements
7 Energy converted	..	..	-508	441	..	..	..	-10825	..	1249	..	..	3587	-6055	7 Energy converted
8 Briquetting plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	8 Briquetting plants
9 Coke ovens and coke plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	9 Coke ovens and coke plants
10 Gasworks	..	..	..	..	..	..	..	..	..	..	..	..	..	..	10 Gasworks
11 Blastfurnaces	..	..	..	..	..	..	..	..	..	..	..	..	..	..	11 Blastfurnaces
12 Petroleum refineries	..	..	-508	441	..	..	..	..	..	..	..	..	..	-66	12 Petroleum refineries
13 NGL processing plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	13 NGL processing plants
14 Electric power plants	..	..	..	..	..	..	..	-10825	..	1249	..	..	3587	-5989	14 Electric power plants
15 Heating plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	15 Heating plants
16 Other conversion industries	..	..	..	..	..	..	..	..	..	..	..	..	..	..	16 Other conversion industries
17 Net transfers	..	..	..	..	..	..	..	..	..	..	..	..	..	..	17 Net transfers
18 Consumption by energy sector	..	..	..	..	..	..	..	..	..	-590	..	..	..	-590	18 Consumption by energy sector
19 Losses in transport and distribution	..	..	..	..	..	..	..	..	..	-10289	..	..	..	-10289	19 Losses in transport and distribution
20 Cons. for non-energy uses	..	..	..	..	..	..	..	..	..	..	..	..	..	..	20 Cons. for non-energy uses
21 Statistical differences	0	0	0	0	0	-42	0	0	..	-875	..	..	0	-875	21 Statistical differences
22 Final consumption	3678	26	..	3737	14106	4145	319	10018	..	51278	..	..	3587	90894	22 Final consumption
23 By industry and construction	..	..	..	..	..	..	..	..	..	23270	..	..	..	23270	23 By industry and construction
24 Iron and steel industry	..	..	..	..	..	..	..	..	..	..	..	..	..	..	24 Iron and steel industry
25 Chemical industry	..	..	..	..	..	..	..	..	..	594	..	..	..	594	25 Chemical industry
26 Other industry and construction	..	..	..	..	..	..	..	..	..	22676	..	..	..	22676	26 Other industry and construction
27 By transport	..	..	..	3737	..	..	..	530	..	83	..	..	..	4350	27 By transport
28 Road	..	..	..	3737	..	..	..	..	..	..	..	..	..	3737	28 Road
29 Rail	..	..	..	..	..	..	..	..	..	65	..	..	..	65	29 Rail
30 Air	..	..	..	..	..	..	..	..	..	..	..	..	..	..	30 Air
31 Inland and coastal waterways	..	..	..	..	..	..	..	..	..	..	..	..	..	..	31 Inland and coastal waterways
32 By other modes of transportation	..	..	..	..	..	..	..	530	..	18	..	..	..	548	32 By other modes of transportation
33 By households and other consumers	3678	26	..	..	14106	4145	319	9488	..	27925	..	..	3587	63274	33 By households and other consumers
34 Households	..	..	..	..	..	..	..	..	..	11178	..	..	..	11178	34 Households
35 Agriculture	..	..	..	..	..	..	..	..	..	15649	..	..	..	15649	35 Agriculture
36 Other consumers	3678	26	..	..	14106	4145	319	9488	..	1098	..	..	3587	36447	36 Other consumers
2009															2009
1 Production of primary energy	3511	..	1100	..	..	..	..	1444	..	56880	..	..	..	62935	1 Production of primary energy
2 Imports	242	26	..	3646	13868	3641	319	15450	..	15494	..	..	..	52685	2 Imports
3 Exports	0	..	-169	-838	..	..	..	..	..	-15289	..	..	..	-16297	3 Exports
4 Marine / aviation bunkers	..	..	..	-173	..	..	..	..	..	..	..	..	..	-173	4 Marine / aviation bunkers
5 Stock change	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5 Stock change
6 Total energy requirements	3753	26	931	2635	13868	3641	319	16894	..	57085	..	..	..	99150	6 Total energy requirements
7 Energy converted	..	..	-931	838	..	..	..	-9964	..	1177	..	..	3583	-5296	7 Energy converted
8 Briquetting plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	8 Briquetting plants
9 Coke ovens and coke plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	9 Coke ovens and coke plants
10 Gasworks	..	..	..	..	..	..	..	..	..	..	..	..	..	..	10 Gasworks
11 Blastfurnaces	..	..	..	..	..	..	..	..	..	..	..	..	..	..	11 Blastfurnaces
12 Petroleum refineries	..	..	-931	838	..	..	..	..	..	..	..	..	..	-92	12 Petroleum refineries
13 NGL processing plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	13 NGL processing plants
14 Electric power plants	..	..	..	..	..	..	..	-9964	..	1177	..	..	3583	-5204	14 Electric power plants
15 Heating plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	15 Heating plants
16 Other conversion industries	..	..	..	..	..	..	..	..	..	..	..	..	..	..	16 Other conversion industries
17 Net transfers	..	..	..	..	..	..	..	..	..	..	..	..	..	..	17 Net transfers
18 Consumption by energy sector	..	..	..	..	..	..	..	..	..	-562	..	..	..	-562	18 Consumption by energy sector
19 Losses in transport and distribution	..	..	..	..	..	..	..	..	..	-9781	..	..	..	-9781	19 Losses in transport and distribution
20 Cons. for non-energy uses	..	..	..	..	..	..	..	..	..	..	..	..	..	..	20 Cons. for non-energy uses
21 Statistical differences	0	0	0	0	0	-42	0	0	..	-839	..	..	0	-839	21 Statistical differences
22 Final consumption	3753	26	..	3473	13868	3599	319	6930	..	48758	..	..	3583	84309	22 Final consumption
23 By industry and construction	..	..	..	..	..	..	..	..	..	22126	..	..	..	22126	23 By industry and construction
24 Iron and steel industry	..	..	..	..	..	..	..	..	..	..	..	..	..	..	24 Iron and steel industry
25 Chemical industry	..	..	..	..	..	..	..	..	..	565	..	..	..	565	25 Chemical industry
26 Other industry and construction	..	..	..	..	..	..	..	..	..	21560	..	..	..	21560	26 Other industry and construction
27 By transport	..	..	..	3473	..	..	..	530	..	83	..	..	..	4086	27 By transport
28 Road	..	..	..	3473	..	..	..	..	..	..	..	..	..	3473	28 Road
29 Rail	..	..	..	..	..	..	..	..	..	65	..	..	..	65	29 Rail
30 Air	..	..	..	..	..	..	..	..	..	..	..	..	..	..	30 Air
31 Inland and coastal waterways	..	..	..	..	..	..	..	..	..	..	..	..	..	..	31 Inland and coastal waterways
32 By other modes of transportation	..	..	..	..	..	..	..	530	..	18	..	..	..	548	32 By other modes of transportation
33 By households and other consumers	3753	26	..	..	13868	3599	319	6400	..	26550	..	..	3583	58097	33 By households and other consumers
34 Households	..	..	..	..	..	..	..	..	..	10627	..	..	..	10627	34 Households
35 Agriculture	..	..	..	..	..	..	..	..	..	14879	..	..	..	14879	35 Agriculture

36	Other consumers	3753	26	--	--	13868	3599	319	6400	--	1044	--	--	3583	32591	36	Other consumers
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Turkmenistan

		Terajoules															
Energy sources and products		Hard coal, lignite and peat	Briquettes and cokes	Crude petroleum and NGL	Light petroleum products	Heavy petroleum products	Other petroleum products	LPG and refinery gas	Natural gas	Derived gases	Electricity	Primary biomass energy	Derived biomass energy	Other energy sources	Total energy	Energy sources and products	
Production and utilisation																Production and utilisation	
2006																2006	
1	Production of primary energy	--	--	359125	--	--	--	--	2396479	--	11	91	--	--	2755706	1	Production of primary energy
2	Imports	--	--	--	--	--	--	3644	--	--	--	--	--	--	3644	2	Imports
3	Exports	--	--	-63450	-23519	-99933	--	--	-1705005	--	-4824	--	--	--	-1896732	3	Exports
4	Marine / aviation bunkers	--	--	--	-12787	--	--	--	--	--	--	--	--	--	-12787	4	Marine / aviation bunkers
5	Stock change	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5	Stock change
6	Total energy requirements	--	--	295675	-36306	-99933	--	3644	691474	--	-4813	91	--	--	849831	6	Total energy requirements
7	Energy converted	--	--	-295675	68398	179167	27070	17253	-245087	--	49129	--	--	6590	-193155	7	Energy converted
8	Briquetting plants	--	--	--	--	--	--	--	--	--	--	--	--	--	--	8	Briquetting plants
9	Coke ovens and coke plants	--	--	--	--	--	--	--	--	--	--	--	--	--	--	9	Coke ovens and coke plants
10	Gasworks	--	--	--	--	--	--	--	--	--	--	--	--	--	--	10	Gasworks
11	Blastfurnaces	--	--	--	--	--	--	--	--	--	--	--	--	--	--	11	Blastfurnaces
12	Petroleum refineries	--	--	-268605	68398	179167	--	17253	--	--	--	--	--	--	-3787	12	Petroleum refineries
13	NGL processing plants	--	--	-27070	--	--	27070	--	--	--	--	--	--	--	0	13	NGL processing plants
14	Electric power plants	--	--	--	--	--	--	--	-245087	--	49129	--	--	6590	-189368	14	Electric power plants
15	Heating plants	--	--	--	--	--	--	--	--	--	--	--	--	--	--	15	Heating plants
16	Other conversion industries	--	--	--	--	--	--	--	--	--	--	--	--	--	--	16	Other conversion industries
17	Net transfers	--	--	--	--	--	--	--	--	--	--	--	--	--	--	17	Net transfers
18	Consumption by energy sector	--	--	--	--	--	-27070	-17253	-133065	--	-8856	--	--	--	-186244	18	Consumption by energy sector
19	Losses in transport and distribution	--	--	--	--	--	--	--	--	--	-6865	--	--	--	-6865	19	Losses in transport and distribution
20	Cons, for non-energy uses	--	--	--	--	--	--	--	--	--	--	--	--	--	--	20	Cons, for non-energy uses
21	Statistical differences	--	--	--	0	0	0	0	0	--	0	91	--	0	91	21	Statistical differences
22	Final consumption	--	--	--	32092	79233	--	3644	313322	--	28595	--	--	6590	463476	22	Final consumption
23	By industry and construction	--	--	--	--	--	--	--	17608	--	10282	--	--	--	27890	23	By industry and construction
24	Iron and steel industry	--	--	--	--	--	--	--	--	--	4	--	--	--	4	24	Iron and steel industry
25	Chemical industry	--	--	--	--	--	--	--	--	--	3341	--	--	--	3341	25	Chemical industry
26	Other industry and construction	--	--	--	--	--	--	--	17608	--	6937	--	--	--	24545	26	Other industry and construction
27	By transport	--	--	--	32092	--	--	--	73071	--	731	--	--	--	105894	27	By transport
28	Road	--	--	--	32092	--	--	--	--	--	--	--	--	--	32092	28	Road
29	Rail	--	--	--	--	--	--	--	--	--	731	--	--	--	731	29	Rail
30	Air	--	--	--	--	--	--	--	--	--	--	--	--	--	--	30	Air
31	Inland and coastal waterways	--	--	--	--	--	--	--	--	--	--	--	--	--	--	31	Inland and coastal waterways
32	By other modes of transportation	--	--	--	--	--	--	--	73071	--	--	--	--	--	73071	32	By other modes of transportation
33	By households and other consumers	--	--	--	--	79233	--	3644	222643	--	17582	--	--	6590	329692	33	By households and other consumers
34	Households	--	--	--	--	--	--	--	--	--	6001	--	--	--	6001	34	Households
35	Agriculture	--	--	--	--	--	--	--	--	--	9079	--	--	--	9079	35	Agriculture
36	Other consumers	--	--	--	--	79233	--	3644	222643	--	2502	--	--	6590	314612	36	Other consumers
2007																2007	
1	Production of primary energy	--	--	411747	--	--	--	--	2609794	--	11	91	--	--	3021643	1	Production of primary energy
2	Imports	--	--	--	--	--	--	3644	--	--	--	--	--	--	3644	2	Imports
3	Exports	--	--	-80370	-26289	-111740	--	--	-1799728	--	-5256	--	--	--	-2023382	3	Exports
4	Marine / aviation bunkers	--	--	--	-14299	--	--	--	--	--	--	--	--	--	-14299	4	Marine / aviation bunkers
5	Stock change	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5	Stock change
6	Total energy requirements	--	--	331377	-40588	-111740	--	3644	810066	--	-5245	91	--	--	987605	6	Total energy requirements
7	Energy converted	--	--	-331377	76460	200337	31047	19305	-267177	--	53557	--	--	7184	-210664	7	Energy converted
8	Briquetting plants	--	--	--	--	--	--	--	--	--	--	--	--	--	--	8	Briquetting plants
9	Coke ovens and coke plants	--	--	--	--	--	--	--	--	--	--	--	--	--	--	9	Coke ovens and coke plants
10	Gasworks	--	--	--	--	--	--	--	--	--	--	--	--	--	--	10	Gasworks
11	Blastfurnaces	--	--	--	--	--	--	--	--	--	--	--	--	--	--	11	Blastfurnaces
12	Petroleum refineries	--	--	-300330	76460	200337	--	19305	--	--	--	--	--	--	-4228	12	Petroleum refineries
13	NGL processing plants	--	--	-31047	--	--	31047	--	--	--	--	--	--	--	0	13	NGL processing plants
14	Electric power plants	--	--	--	--	--	--	--	-267177	--	53557	--	--	7184	-206436	14	Electric power plants
15	Heating plants	--	--	--	--	--	--	--	--	--	--	--	--	--	--	15	Heating plants
16	Other conversion industries	--	--	--	--	--	--	--	--	--	--	--	--	--	--	16	Other conversion industries
17	Net transfers	--	--	--	--	--	--	--	--	--	--	--	--	--	--	17	Net transfers
18	Consumption by energy sector	--	--	--	--	--	-31047	-19305	-144909	--	-9655	--	--	--	-204916	18	Consumption by energy sector
19	Losses in transport and distribution	--	--	--	--	--	--	--	--	--	-7484	--	--	--	-7484	19	Losses in transport and distribution
20	Cons, for non-energy uses	--	--	--	--	--	--	--	--	--	--	--	--	--	--	20	Cons, for non-energy uses
21	Statistical differences	--	--	0	0	0	0	0	0	--	0	91	--	0	91	21	Statistical differences
22	Final consumption	--	--	--	35873	88597	--	3644	397980	--	31172	--	--	7184	564450	22	Final consumption
23	By industry and construction	--	--	--	--	--	--	--	20628	--	11210	--	--	--	31838	23	By industry and construction
24	Iron and steel industry	--	--	--	--	--	--	--	--	--	4	--	--	--	4	24	Iron and steel industry
25	Chemical industry	--	--	--	--	--	--	--	--	--	3643	--	--	--	3643	25	Chemical industry
26	Other industry and construction	--	--	--	--	--	--	--	20628	--	7564	--	--	--	28192	26	Other industry and construction
27	By transport	--	--	--	35873	--	--	--	77131	--	796	--	--	--	113799	27	By transport
28	Road	--	--	--	35873	--	--	--	--	--	--	--	--	--	35873	28	Road
29	Rail	--	--	--	--	--	--	--	--	--	796	--	--	--	796	29	Rail
30	Air	--	--	--	--	--	--	--	--	--	--	--	--	--	--	30	Air
31	Inland and coastal waterways	--	--	--	--	--	--	--	--	--	--	--	--	--	--	31	Inland and coastal waterways
32	By other modes of transportation	--	--	--	--	--	--	--	77131	--	--	--	--	--	77131	32	By other modes of transportation
33	By households and other consumers	--	--	--	--	88597	--	3644	300221	--	19166	--	--	7184	418812	33	By households and other consumers
34	Households	--	--	--	--	--	--	--	--	--	6541	--	--	--	6541	34	Households
35	Agriculture	--	--	--	--	--	--	--	--	--	9896	--	--	--	9896	35	Agriculture

36	Other consumers	--	--	--	--	88597	--	3644	300221	--	2729	--	--	7184	402375	36	Other consumers
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Turkmenistan

Terajoules

Energy sources and products	Hard coal, lignite and peat	Briquettes and cokes	Crude petroleum and NGL	Light petroleum products	Heavy petroleum products	Other petroleum products	LPG and refinery gas	Natural gas	Derived gases	Electricity	Primary biomass energy	Derived biomass energy	Other energy sources	Total energy	Energy sources and products
Production and utilisation															Production and utilisation
2008															2008
1 Production of primary energy	--	--	465644	--	--	--	--	2671175	--	11	91	--	--	3136921	1 Production of primary energy
2 Imports	--	--	--	--	--	--	3644	--	--	--	--	--	--	3644	2 Imports
3 Exports	--	--	-101520	-28795	-122407	--	--	-1856562	--	-5314	--	--	--	-2114598	3 Exports
4 Marine / aviation bunkers	--	--	--	-15681	--	--	--	--	--	--	--	--	--	-15681	4 Marine / aviation bunkers
5 Stock change	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5 Stock change
6 Total energy requirements	--	--	364124	-44476	-122407	--	3644	814613	--	-5303	91	--	--	1010285	6 Total energy requirements
7 Energy converted	--	--	-364124	83778	219445	35114	21147	-286668	--	54133	--	--	7261	-229913	7 Energy converted
8 Briquetting plants	--	--	--	--	--	--	--	--	--	--	--	--	--	--	8 Briquetting plants
9 Coke ovens and coke plants	--	--	--	--	--	--	--	--	--	--	--	--	--	--	9 Coke ovens and coke plants
10 Gasworks	--	--	--	--	--	--	--	--	--	--	--	--	--	--	10 Gasworks
11 Blastfurnaces	--	--	--	--	--	--	--	--	--	--	--	--	--	--	11 Blastfurnaces
12 Petroleum refineries	--	--	-329009	83778	219445	--	21147	--	--	--	--	--	--	-4640	12 Petroleum refineries
13 NGL processing plants	--	--	-35114	--	--	35114	--	--	--	--	--	--	--	0	13 NGL processing plants
14 Electric power plants	--	--	--	--	--	--	--	-286668	--	54133	--	--	7261	-225274	14 Electric power plants
15 Heating plants	--	--	--	--	--	--	--	--	--	--	--	--	--	--	15 Heating plants
16 Other conversion industries	--	--	--	--	--	--	--	--	--	--	--	--	--	--	16 Other conversion industries
17 Net transfers	--	--	--	--	--	--	--	--	--	--	--	--	--	--	17 Net transfers
18 Consumption by energy sector	--	--	--	--	--	-35114	-21147	-148317	--	-9756	--	--	--	-214335	18 Consumption by energy sector
19 Losses in transport and distribution	--	--	--	--	--	--	--	--	--	-7564	--	--	--	-7564	19 Losses in transport and distribution
20 Cons, for non-energy uses	--	--	--	--	--	--	--	--	--	--	--	--	--	--	20 Cons, for non-energy uses
21 Statistical differences	--	--	--	0	0	0	0	0	--	0	91	--	0	91	21 Statistical differences
22 Final consumption	--	--	--	39301	97037	--	3644	379628	--	31511	--	--	7261	558382	22 Final consumption
23 By industry and construction	--	--	--	--	--	--	--	20744	--	11333	--	--	--	32077	23 By industry and construction
24 Iron and steel industry	--	--	--	--	--	--	--	--	--	4	--	--	--	4	24 Iron and steel industry
25 Chemical industry	--	--	--	--	--	--	--	--	--	3683	--	--	--	3683	25 Chemical industry
26 Other industry and construction	--	--	--	--	--	--	--	20744	--	7646	--	--	--	28390	26 Other industry and construction
27 By transport	--	--	--	39301	--	--	--	79567	--	803	--	--	--	119671	27 By transport
28 Road	--	--	--	39301	--	--	--	--	--	--	--	--	--	39301	28 Road
29 Rail	--	--	--	--	--	--	--	--	--	803	--	--	--	803	29 Rail
30 Air	--	--	--	--	--	--	--	--	--	--	--	--	--	--	30 Air
31 Inland and coastal waterways	--	--	--	--	--	--	--	--	--	--	--	--	--	--	31 Inland and coastal waterways
32 By other modes of transportation	--	--	--	--	--	--	--	79567	--	--	--	--	--	79567	32 By other modes of transportation
33 By households and other consumers	--	--	--	--	97037	--	3644	279317	--	19375	--	--	7261	406634	33 By households and other consumers
34 Households	--	--	--	--	--	--	--	--	--	6613	--	--	--	6613	34 Households
35 Agriculture	--	--	--	--	--	--	--	--	--	10004	--	--	--	10004	35 Agriculture
36 Other consumers	--	--	--	--	97037	--	3644	279317	--	2758	--	--	7261	390017	36 Other consumers
2009															2009
1 Production of primary energy	--	--	416339	--	--	--	--	1445465	--	11	91	--	--	1861906	1 Production of primary energy
2 Imports	--	--	--	--	--	--	3644	--	--	--	--	--	--	3644	2 Imports
3 Exports	--	--	-84600	-26289	-111740	--	--	-744226	--	-5645	--	--	--	-972499	3 Exports
4 Marine / aviation bunkers	--	--	--	-14299	--	--	--	--	--	--	--	--	--	-14299	4 Marine / aviation bunkers
5 Stock change	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5 Stock change
6 Total energy requirements	--	--	331739	-40588	-111740	--	3644	701239	--	-5634	91	--	--	878751	6 Total energy requirements
7 Energy converted	--	--	-331739	76460	200337	31409	19305	-284874	--	57517	--	--	7715	-223870	7 Energy converted
8 Briquetting plants	--	--	--	--	--	--	--	--	--	--	--	--	--	--	8 Briquetting plants
9 Coke ovens and coke plants	--	--	--	--	--	--	--	--	--	--	--	--	--	--	9 Coke ovens and coke plants
10 Gasworks	--	--	--	--	--	--	--	--	--	--	--	--	--	--	10 Gasworks
11 Blastfurnaces	--	--	--	--	--	--	--	--	--	--	--	--	--	--	11 Blastfurnaces
12 Petroleum refineries	--	--	-300330	76460	200337	--	19305	--	--	--	--	--	--	-4228	12 Petroleum refineries
13 NGL processing plants	--	--	-31409	--	--	31409	--	--	--	--	--	--	--	0	13 NGL processing plants
14 Electric power plants	--	--	--	--	--	--	--	-284874	--	57517	--	--	7715	-219642	14 Electric power plants
15 Heating plants	--	--	--	--	--	--	--	--	--	--	--	--	--	--	15 Heating plants
16 Other conversion industries	--	--	--	--	--	--	--	--	--	--	--	--	--	--	16 Other conversion industries
17 Net transfers	--	--	--	--	--	--	--	--	--	--	--	--	--	--	17 Net transfers
18 Consumption by energy sector	--	--	--	--	--	-31409	-19305	-80259	--	-10364	--	--	--	-141337	18 Consumption by energy sector
19 Losses in transport and distribution	--	--	--	--	--	--	--	--	--	-8035	--	--	--	-8035	19 Losses in transport and distribution
20 Cons, for non-energy uses	--	--	--	--	--	--	--	--	--	--	--	--	--	--	20 Cons, for non-energy uses
21 Statistical differences	--	--	0	0	0	0	0	0	--	0	91	--	0	91	21 Statistical differences
22 Final consumption	--	--	--	35873	88597	--	3644	336106	--	33484	--	--	7715	505418	22 Final consumption
23 By industry and construction	--	--	--	--	--	--	--	29308	--	12042	--	--	--	41350	23 By industry and construction
24 Iron and steel industry	--	--	--	--	--	--	--	--	--	4	--	--	--	4	24 Iron and steel industry
25 Chemical industry	--	--	--	--	--	--	--	--	--	3913	--	--	--	3913	25 Chemical industry
26 Other industry and construction	--	--	--	--	--	--	--	29308	--	8125	--	--	--	37433	26 Other industry and construction
27 By transport	--	--	--	35873	--	--	--	29229	--	853	--	--	--	65955	27 By transport
28 Road	--	--	--	35873	--	--	--	--	--	--	--	--	--	35873	28 Road
29 Rail	--	--	--	--	--	--	--	--	--	853	--	--	--	853	29 Rail
30 Air	--	--	--	--	--	--	--	--	--	--	--	--	--	--	30 Air
31 Inland and coastal waterways	--	--	--	--	--	--	--	--	--	--	--	--	--	--	31 Inland and coastal waterways
32 By other modes of transportation	--	--	--	--	--	--	--	29229	--	--	--	--	--	29229	32 By other modes of transportation
33 By households and other consumers	--	--	--	--	88597	--	3644	277569	--	20588	--	--	7715	398113	33 By households and other consumers
34 Households	--	--	--	--	--	--	--	--	--	7027	--	--	--	7027	34 Households
35 Agriculture	--	--	--	--	--	--	--	--	--	10631	--	--	--	10631	35 Agriculture

36	Other consumers	--	--	--	--	88597	--	3644	277569	--	2930	--	--	7715	380455	36	Other consumers
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Uzbekistan

		Terajoules															
Energy sources and products		Hard coal, lignite and peat	Briquettes and cokes	Crude petroleum and NGL	Light petroleum products	Heavy petroleum products	Other petroleum products	LPG and refinery gas	Natural gas	Derived gases	Electricity	Primary biomass energy	Derived biomass energy	Other energy sources	Total energy	Energy sources and products	
Production and utilisation																Production and utilisation	
2006																2006	
1	Production of primary energy	37297	--	241445	--	--	--	--	2370882	--	32976	201	--	--	2682801	1	Production of primary energy
2	Imports	2370	--	--	--	--	--	--	41568	--	42541	--	--	--	86479	2	Imports
3	Exports	-361	--	--	-1319	-8287	-3118	--	-478031	--	-42851	--	--	--	-533967	3	Exports
4	Marine / aviation bunkers	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4	Marine / aviation bunkers
5	Stock change	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5	Stock change
6	Total energy requirements	39306	--	241445	-1319	-8287	-3118	--	1934419	--	32666	201	--	--	2235313	6	Total energy requirements
7	Energy converted	-29201	--	-234677	73837	66166	25994	8349	-594462	--	150336	--	--	102594	-431064	7	Energy converted
8	Briquetting plants	--	--	--	--	--	--	--	--	--	--	--	--	--	--	8	Briquetting plants
9	Coke ovens and coke plants	--	--	--	--	--	--	--	--	--	--	--	--	--	--	9	Coke ovens and coke plants
10	Gasworks	--	--	--	--	--	--	--	--	--	--	--	--	--	--	10	Gasworks
11	Blastfurnaces	--	--	--	--	--	--	--	--	--	--	--	--	--	--	11	Blastfurnaces
12	Petroleum refineries	--	--	-148811	74225	105801	-59012	7483	--	--	--	--	--	--	-20314	12	Petroleum refineries
13	NGL processing plants	--	--	-85865	--	--	85007	865	--	--	--	--	--	--	7	13	NGL processing plants
14	Electric power plants	-29156	--	--	--	-37062	--	--	-520821	--	150336	--	--	55431	-381272	14	Electric power plants
15	Heating plants	--	--	--	--	--	--	--	--	--	--	--	--	47163	47163	15	Heating plants
16	Other conversion industries	-45	--	--	-389	-2573	--	--	-73641	--	--	--	--	--	-76648	16	Other conversion industries
17	Net transfers	--	--	--	--	--	--	--	--	--	--	--	--	--	--	17	Net transfers
18	Consumption by energy sector	-68	--	-381	--	-622	-45	-7119	-84524	--	-15660	--	--	--	-108419	18	Consumption by energy sector
19	Losses in transport and distribution	-372	--	-2411	--	--	-452	--	-73933	--	-16150	--	--	--	-93318	19	Losses in transport and distribution
20	Cons, for non-energy uses	--	--	--	-475	--	-20553	--	-18675	--	--	--	--	--	-39703	20	Cons, for non-energy uses
21	Statistical differences	0	--	3976	0	4440	0	0	0	--	0	0	--	0	8417	21	Statistical differences
22	Final consumption	9664	--	--	72042	52817	1826	1230	1162825	--	151193	*201	--	102594	1554392	22	Final consumption
23	By industry and construction	3831	--	--	3330	5224	1359	--	293627	--	57917	--	--	--	365287	23	By industry and construction
24	Iron and steel industry	--	--	--	--	--	--	--	--	--	--	--	--	--	--	24	Iron and steel industry
25	Chemical industry	--	--	--	--	--	--	--	--	--	--	--	--	--	--	25	Chemical industry
26	Other industry and construction	3831	--	--	3330	5224	1359	--	293627	--	57917	--	--	--	365287	26	Other industry and construction
27	By transport	--	--	--	64582	14321	--	364	64530	--	4975	--	--	--	148773	27	By transport
28	Road	--	--	--	54688	11176	--	364	2850	--	--	--	--	--	69079	28	Road
29	Rail	--	--	--	--	3145	--	--	--	--	605	--	--	--	3750	29	Rail
30	Air	--	--	--	9894	--	--	--	--	--	--	--	--	--	9894	30	Air
31	Inland and coastal waterways	--	--	--	--	--	--	--	--	--	--	--	--	--	--	31	Inland and coastal waterways
32	By other modes of transportation	--	--	--	--	--	--	--	61680	--	4370	--	--	--	66050	32	By other modes of transportation
33	By households and other consumers	5834	--	--	4131	33271	467	865	804668	--	88301	*201	--	102594	1040332	33	By households and other consumers
34	Households	463	--	--	87	212	42	410	664630	--	27428	--	--	--	693273	34	Households
35	Agriculture	124	--	--	1880	27961	42	--	7104	--	49154	--	--	--	86267	35	Agriculture
36	Other consumers	5247	--	--	2163	5098	382	455	132934	--	11718	*201	--	102594	260792	36	Other consumers
2007																2007	
1	Production of primary energy	40005	--	219082	--	--	--	--	2463465	--	23040	210	--	--	2745802	1	Production of primary energy
2	Imports	2257	--	--	--	--	--	--	49882	--	40896	--	--	--	93035	2	Imports
3	Exports	-384	--	--	-1363	-7522	-2823	--	-555498	--	-41191	--	--	--	-608781	3	Exports
4	Marine / aviation bunkers	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4	Marine / aviation bunkers
5	Stock change	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5	Stock change
6	Total energy requirements	41878	--	219082	-1363	-7522	-2823	--	1957849	--	22745	210	--	--	2230056	6	Total energy requirements
7	Energy converted	-28073	--	-212906	74342	58981	23673	7542	-621240	--	153180	--	--	103130	-441372	7	Energy converted
8	Briquetting plants	--	--	--	--	--	--	--	--	--	--	--	--	--	--	8	Briquetting plants
9	Coke ovens and coke plants	--	--	--	--	--	--	--	--	--	--	--	--	--	--	9	Coke ovens and coke plants
10	Gasworks	--	--	--	--	--	--	--	--	--	--	--	--	--	--	10	Gasworks
11	Blastfurnaces	--	--	--	--	--	--	--	--	--	--	--	--	--	--	11	Blastfurnaces
12	Petroleum refineries	--	--	-136079	74688	86082	-52386	6768	--	--	--	--	--	--	-20928	12	Petroleum refineries
13	NGL processing plants	--	--	-76827	--	--	76059	774	--	--	--	--	--	--	6	13	NGL processing plants
14	Electric power plants	-28028	--	--	--	-25400	--	--	-546532	--	153180	--	--	55869	-390911	14	Electric power plants
15	Heating plants	--	--	--	--	--	--	--	--	--	--	--	--	47261	47261	15	Heating plants
16	Other conversion industries	-45	--	--	-346	-1701	--	--	-74708	--	--	--	--	--	-76800	16	Other conversion industries
17	Net transfers	--	--	--	--	--	--	--	--	--	--	--	--	--	--	17	Net transfers
18	Consumption by energy sector	-68	--	-338	--	-415	-45	-6449	-79766	--	-15055	--	--	--	-102136	18	Consumption by energy sector
19	Losses in transport and distribution	-384	--	-2200	--	--	-407	--	-74828	--	-15520	--	--	--	-93338	19	Losses in transport and distribution
20	Cons, for non-energy uses	--	--	--	-432	--	-18650	--	-5106	--	--	--	--	--	-24188	20	Cons, for non-energy uses
21	Statistical differences	0	--	3638	0	3112	0	0	0	--	0	0	--	0	6750	21	Statistical differences
22	Final consumption	13354	--	--	72547	47932	1748	1093	1176909	--	145350	*210	--	103130	1562272	22	Final consumption
23	By industry and construction	4857	--	--	3374	4715	1323	--	297183	--	55678	--	--	--	367130	23	By industry and construction
24	Iron and steel industry	--	--	--	--	--	--	--	--	--	--	--	--	--	--	24	Iron and steel industry
25	Chemical industry	--	--	--	--	--	--	--	--	--	--	--	--	--	--	25	Chemical industry
26	Other industry and construction	4857	--	--	3374	4715	1323	--	297183	--	55678	--	--	--	367130	26	Other industry and construction
27	By transport	--	--	--	65258	13089	--	273	65312	--	4784	--	--	--	148716	27	By transport
28	Road	--	--	--	56271	10242	--	273	2885	--	--	--	--	--	69670	28	Road
29	Rail	--	--	--	--	2847	--	--	--	--	583	--	--	--	3430	29	Rail
30	Air	--	--	--	8987	--	--	--	--	--	--	--	--	--	8987	30	Air
31	Inland and coastal waterways	--	--	--	--	--	--	--	--	--	--	--	--	--	--	31	Inland and coastal waterways
32	By other modes of transportation	--	--	--	--	--	--	--	62427	--	4201	--	--	--	66628	32	By other modes of transportation
33	By households and other consumers	8496	--	--	3915	30128	425	820	814414	--	84888	*210	--	103130	1046426	33	By households and other consumers
34	Households	485	--	--	87	212	42	364	672680	--	26363	--	--	--	700234	34	Households
35	Agriculture	124	--	--	1881	25327	42	--	7190	--	47261	--	--	--	81825	35	Agriculture

36	Other consumers	7887	1947	4589	340	455	134544	..	11264	*210	..	103130	264367	36	Other consumers
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Uzbekistan

Terajoules

Energy sources and products	Hard coal, lignite and peat	Briquettes and cokes	Crude petroleum and NGL	Light petroleum products	Heavy petroleum products	Other petroleum products	LPG and refinery gas	Natural gas	Derived gases	Electricity	Primary biomass energy	Derived biomass energy	Other energy sources	Total energy	Energy sources and products
Production and utilisation															Production and utilisation
2008															2008
1 Production of primary energy	38567	..	214683	..	..	..	..	2653428	..	40896	201	..	..	2947775	1 Production of primary energy
2 Imports	2934	..	..	..	..	..	..	39906	..	41270	..	..	..	84110	2 Imports
3 Exports	-361	..	..	-1407	-7224	-2781	..	-566835	..	-41569	..	..	..	-620178	3 Exports
4 Marine / aviation bunkers	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4 Marine / aviation bunkers
5 Stock change	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5 Stock change
6 Total energy requirements	41140	..	214683	-1407	-7224	-2781	..	2126499	..	40597	201	..	..	2411707	6 Total energy requirements
7 Energy converted	-28321	..	-208718	76936	57313	23062	7416	-566447	..	136944	..	..	98603	-403212	7 Energy converted
8 Briquetting plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	8 Briquetting plants
9 Coke ovens and coke plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	9 Coke ovens and coke plants
10 Gasworks	..	..	..	..	..	..	..	..	..	..	..	..	..	..	10 Gasworks
11 Blastfurnaces	..	..	..	..	..	..	..	..	..	..	..	..	..	..	11 Blastfurnaces
12 Petroleum refineries	..	..	-131891	77282	76530	-52997	6642	..	..	..	..	..	..	-24435	12 Petroleum refineries
13 NGL processing plants	..	..	-76827	..	..	76059	774	..	..	..	..	..	..	6	13 NGL processing plants
14 Electric power plants	-28276	..	..	..	-18096	..	..	-490618	..	136944	..	..	49980	-350086	14 Electric power plants
15 Heating plants	..	..	..	..	..	..	..	..	..	..	..	..	48623	48623	15 Heating plants
16 Other conversion industries	-45	..	..	-346	-1120	..	..	-75829	..	..	..	..	..	-77340	16 Other conversion industries
17 Net transfers	..	..	..	..	..	..	..	..	..	..	..	..	..	..	17 Net transfers
18 Consumption by energy sector	-68	..	-338	..	-290	-45	-6323	-82608	..	-15196	..	..	..	-104869	18 Consumption by energy sector
19 Losses in transport and distribution	-372	..	-2115	..	..	-407	..	-77494	..	-15656	..	..	..	-96044	19 Losses in transport and distribution
20 Cons, for non-energy uses	..	..	..	-432	..	-18227	..	-82215	..	..	..	..	..	-100874	20 Cons, for non-energy uses
21 Statistical differences	0	..	3511	163	3863	0	0	98892	..	0	0	..	0	106429	21 Statistical differences
22 Final consumption	12379	..	74935	45935	1602	1093	1218843	146689	*201	..	..	..	98603	1600280	22 Final consumption
23 By industry and construction	5496	..	..	3506	4504	1177	..	307772	..	56189	..	..	..	378643	23 By industry and construction
24 Iron and steel industry	..	..	..	..	..	..	..	..	..	..	..	..	..	..	24 Iron and steel industry
25 Chemical industry	..	..	..	..	..	..	..	..	..	..	..	..	..	..	25 Chemical industry
26 Other industry and construction	5496	..	..	3506	4504	1177	..	307772	..	56189	..	..	..	378643	26 Other industry and construction
27 By transport	..	..	..	67555	12579	..	182	67639	..	4828	..	..	..	152783	27 By transport
28 Road	..	..	..	58776	9859	..	182	2988	..	..	..	..	..	71806	28 Road
29 Rail	..	..	..	..	2720	..	..	..	..	587	..	..	..	3307	29 Rail
30 Air	..	..	..	8779	..	..	..	..	..	..	..	..	..	8779	30 Air
31 Inland and coastal waterways	..	..	..	..	..	..	..	..	..	..	..	..	..	..	31 Inland and coastal waterways
32 By other modes of transportation	..	..	..	..	..	..	..	..	..	..	..	..	..	..	32 By other modes of transportation
33 By households and other consumers	6883	..	..	3873	28853	425	911	843432	..	85673	*201	..	98603	1068853	33 By households and other consumers
34 Households	463	..	..	87	212	42	364	696648	..	26600	..	..	..	724418	34 Households
35 Agriculture	124	..	..	1925	24222	42	..	7446	..	47704	..	..	..	81463	35 Agriculture
36 Other consumers	6296	..	..	1861	4419	340	547	139338	..	11369	*201	..	98603	262973	36 Other consumers
2009															2009
1 Production of primary energy	41967	..	207118	..	..	..	..	2503446	..	33588	201	..	..	2786319	1 Production of primary energy
2 Imports	2257	..	..	..	..	..	..	31925	..	41688	..	..	..	75870	2 Imports
3 Exports	-417	..	..	-1539	-7522	-2697	..	-574393	..	-41990	..	..	..	-628558	3 Exports
4 Marine / aviation bunkers	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4 Marine / aviation bunkers
5 Stock change	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5 Stock change
6 Total energy requirements	43806	..	207118	-1539	-7522	-2697	..	1960978	..	33286	201	..	..	2233631	6 Total energy requirements
7 Energy converted	-28615	..	-201365	82971	62467	22262	7161	-609300	..	146052	..	..	99786	-418581	7 Energy converted
8 Briquetting plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	8 Briquetting plants
9 Coke ovens and coke plants	..	..	..	..	..	..	..	..	..	..	..	..	..	..	9 Coke ovens and coke plants
10 Gasworks	..	..	..	..	..	..	..	..	..	..	..	..	..	..	10 Gasworks
11 Blastfurnaces	..	..	..	..	..	..	..	..	..	..	..	..	..	..	11 Blastfurnaces
12 Petroleum refineries	..	..	-129057	83316	76038	-49323	6433	..	..	..	..	..	..	-12593	12 Petroleum refineries
13 NGL processing plants	..	..	-72308	..	..	71585	729	..	..	..	..	..	..	6	13 NGL processing plants
14 Electric power plants	-28570	..	..	..	-12866	..	..	-532182	..	146052	..	..	52938	-374627	14 Electric power plants
15 Heating plants	..	..	..	..	..	..	..	..	..	..	..	..	46848	46848	15 Heating plants
16 Other conversion industries	-45	..	..	-346	-705	..	..	-77118	..	..	..	..	..	-78214	16 Other conversion industries
17 Net transfers	..	..	..	..	..	42	..	..	..	..	..	..	..	42	17 Net transfers
18 Consumption by energy sector	-79	..	-338	..	-290	-45	-6114	-76418	..	-15347	..	..	..	-98632	18 Consumption by energy sector
19 Losses in transport and distribution	-417	..	-2030	..	..	-362	..	-71688	..	-15808	..	..	..	-90305	19 Losses in transport and distribution
20 Cons, for non-energy uses	..	..	..	-432	..	-17593	..	-76055	..	..	..	..	..	-94080	20 Cons, for non-energy uses
21 Statistical differences	0	..	3384	0	6764	0	0	0	..	0	0	..	0	10148	21 Statistical differences
22 Final consumption	14695	..	..	81000	47890	1608	1048	1127517	..	148183	*201	..	99786	1521927	22 Final consumption
23 By industry and construction	3908	..	..	3727	4674	1183	..	284711	..	56758	..	..	..	354960	23 By industry and construction
24 Iron and steel industry	..	..	..	..	..	..	..	..	..	..	..	..	..	..	24 Iron and steel industry
25 Chemical industry	..	..	..	..	..	..	..	..	..	..	..	..	..	..	25 Chemical industry
26 Other industry and construction	3908	..	..	3727	4674	1183	..	284711	..	56758	..	..	..	354960	26 Other industry and construction
27 By transport	..	..	..	73355	13259	..	91	62571	..	4878	..	..	..	154154	27 By transport
28 Road	..	..	..	64843	10412	..	91	2764	..	..	..	..	..	78110	28 Road
29 Rail	..	..	..	..	2847	..	..	..	..	594	..	..	..	3441	29 Rail
30 Air	..	..	..	8512	..	..	..	..	..	..	..	..	..	8512	30 Air
31 Inland and coastal waterways	..	..	..	..	..	..	..	..	..	..	..	..	..	..	31 Inland and coastal waterways
32 By other modes of transportation	..	..	..	..	..	..	..	59807	..	4284	..	..	..	64091	32 By other modes of transportation
33 By households and other consumers	10787	..	..	3918	29958	425	956	780235	..	86548	*201	..	99786	1012814	33 By households and other consumers
34 Households	519	..	..	87	212	42	364	644449	..	26867	..	..	..	672541	34 Households
35 Agriculture	135	..	..	2057	25157	42	..	8888	..	48197	..	..	..	82476	35 Agriculture

36	Other consumers	10132	1774	4589	340	592	128898	..	11484	*201	..	99786	257796	36	Other consumers
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Annex 2

NCA Energy mix, trade, intensities

Annex 2 Table 1 - Energy mix of the countries of North and Central Asia

per cent	Oil	Natural Gas	Coal	Nuclear Energy	Hydro electricity	Renewables
Armenia	19	64	0	9	7	0
Azerbaijan	29	66	0	0	5	0
Georgia	29	35	5	0	19	12
Kazakhstan	19	15	63	0	4	0
Kyrgyzstan	40	20	13	0	28	0
Russian Federation	19	56	13	6	6	0
Tajikistan	21	17	4	0	57	0
Turkmenistan	19	81	0	0	0	0
Uzbekistan	9	84	3	0	5	0
NCA total	19	55	15	5	6	0

Source: United Nations 2009 Energy Balances and Electricity Profiles (see annex 1 for details); author's calculations

Annex 2 Table 2 – North and Central Asia Trade Movements 2011

Natural Gas

Billion cubic metres		From					
To	Azerbaijan	Kazakhstan	Russian Federation	Turkmenistan	Uzbekistan	Iran	Total imports
Armenia	..	..	1,46	..	..	0,45	1,91
Azerbaijan	..	..	..	..	..	0,25	0,25
Georgia	1,68	..	0,17	..	..	..	1,85
Kazakhstan	..	..	3,35	..	1,70	..	5,05
Kyrgyzstan	..	0,10	..	..	0,18	..	0,28
Russian Federation	1,36	11,45	..	10,14	7,15	..	30,09
Tajikistan	..	..	..	..	0,16	..	0,16
China	..	..	0,33**	14,25	..	..	30,87
Iran	0,39	..	..	10,20	..	..	10,59
Turkey	3,75	..	23,52	..	..	8,35	41,84
Europe	..	..	178,55	..	..	..	n/a
Other ESCAP APR	..	..	14,05	..	..	..	n/a
Total exports	7,18	11,55	221,43	34,59	9,19	9,05	..

Notes: **LNG movements

Table continued on the next pages and includes four sections in total – natural gas, oil, coal and electricity trade movements. Sources and general notes information after electricity trade section.

Crude Oil

Thousand tonnes

From

To	Azer- bajan	Georgia	Kazakh- stan	Kyrgyz- stan	Russian Federa- tion	Total imports
Georgia	6,45	..	..	..	..	6,45
Kazakhstan	..	..	..	..	4013,75	4013,75
Kyrgyzstan	..	..	..	..	14,66	14,66
Russian Federation	..	..	1246,37	..	..	1246,37
Uzbekistan	..	..	458,92	..	..	458,92
China	546,33	..	9730,66	..	12837,43	239308,70
Iran	..	..	502,78	..	..	502,78
Turkey	..	..	487,38	..	2926,06	16873,39
Europe	19482,01	52,28	48302,77	3,05	182276,12	n/a
Africa	140,56	..	..	..	140,04	n/a
Northern America	3513,04	4,52	3935,99	..	8194,51	n/a
S. & C. America & Caribb.	..	..	569,03	..	240,22	n/a
Other Western Asia	3000,28	..	2233,27	..	660,24	n/a
Other ESCAP APR	5234,57	..	..	..	22781,82	n/a
Total exports	31916,78	56,80	67467,17	3,05	234087,50	

Coal

Thousand tonnes

From

To	Georgia	Kazakh- stan	Kyrgyz- stan	Russian Federa- tion	Iran	Turkey	Europe	Northern America	S. & C. America & Caribbean	Other ESCAP APR	Total imports
Armenia	4,10	..	..	..	0,09	..	..	..	..	..	4,2
Azerbaijan	0,50	0,28	0,01	..	..	..	..	0,8
Georgia	..	8,50	..	1,69	..	0,07	..	..	..	..	10,3
Kazakhstan	0,21	115,72	..	..	..	..	..	..	115,9
Kyrgyzstan	..	1003,33	..	17,82	..	..	..	..	..	..	1021,2
Russian Federation	..	15935,39	..	..	..	..	135,79	63,00	46,49	3,34	16184,0
Tajikistan	..	0,55	0,30	..	..	..	..	..	..	..	0,9
Uzbekistan	..	2,75	6,18	0,06	..	..	..	..	..	..	9,0
China	10694,88	..	..	..	..	..	..	10694,9
Iran	..	0,33	..	0,01	..	..	..	..	..	..	0,3
Turkey	..	45,80	..	10953,73	..	..	..	..	..	..	10999,5
Europe	10,39	1250,07	..	71224,77	..	..	..	..	..	..	n/a
Africa	1331,16	..	..	..	..	..	..	n/a
Northern America	122,00	..	..	..	..	..	..	n/a
S. & C. America & Caribb.	402,91	..	..	..	..	..	..	n/a
Other Western Asia	1194,22	..	..	..	..	..	..	n/a
Other ESCAP APR	19621,35	..	..	..	..	..	..	n/a
Total exports	14,5	18246,7	6,7	115686,3	0,37	0,08	n/a	n/a	n/a	n/a	

Electricity
MW/h

To	From											Other ESCAP APR	Total imports
	Armenia	Azer- bajan	Georgia	Kazakh- stan	Kyrgyz- stan	Russian Federa- tion	Tajik- istan	Uzbeki- stan	Iran	Turkey	Europe		
Armenia	89,45	..	..	..	..	..	224,68	..	..	..	314,1
Azerbaijan	14,34	..	..	17,83	..	..	63,40	0,35	88,22	20,73	204,9
Georgia	..	3,23	..	..	..	211,94	..	..	..	..	..	..	215,2
Kazakhstan	1634,74	501,10	..	..	..	..	..	..	2135,8
Kyrgyzstan	13,32	0,17	..	..	..	..	13,5
Russian Federation	..	181,19	1117,12	439,08	..	..	..	..	..	..	..	..	1737,4
Tajikistan	0,0
China	1,16	983,24	..	..	..	..	..	..	984,4
Iran	757,23	69,64	..	..	..	..	..	..	..	..	..	..	826,9
Turkey	..	137,97	303,37	..	..	..	..	..	..	..	..	..	441,3
Europe	17014,85	..	..	..	..	..	..	17014,9
Other ESCAP APR	213,84	..	..	..	..	..	..	n/a
Areas NES**	118,41	..	..	..	..	..	..	n/a
Total exports	757,2	392,0	1524,3	439,1	1635,9	19061,2	13,3	0,2	288,1	0,4	n/a	n/a	

Source: UNComtrade database, accessed on 26.07.2012; natural gas trade movements from BP statistical review of world energy, June 2011

Notes: Data taken from exporter reports' UNComtrade data but for italicized figures which are taken from or include importer reports' UNComtrade data as they are not listed or specified elsewhere.

Annex 2 Table 3 - Energy intensities in North and Central Asia

	Economy intensities				Industrial sector intensities	Housing sector intensities
	toe/\$K of GDP	toe/\$K of GDP	toe/\$K of GDP	toe/\$K of GDP	toe/\$K of GDP	toe per capita
	2006	2007	2008	2009	2009	2009
Armenia	0,361	0,475	0,445	0,345	0,273	0,214
Azerbaijan	0,842	0,629	0,689	0,557	0,043	0,361
Georgia	0,428	0,381	0,372	0,387	0,258	0,195
Kazakhstan	0,997	1,078	1,086	1,059	0,779	0,316
Kyrgyzstan	1,183	1,090	1,005	0,977	1,360	0,024
Russian Federation	0,830	0,766	0,745	0,756	0,514	0,798
Tajikistan	1,217	1,130	1,050	0,673	1,370	0,023
Turkmenistan	1,449	1,566	1,365	1,126	0,100	0,034
Uzbekistan	3,431	3,133	3,146	2,659	1,828	0,592

Sources: calculated by author based on UN National Accounts Main Aggregates Database for GDP (constant 2005 prices), accessed at <http://unstats.un.org/unsd/snaama/dnllist.asp> on 19.09.2012; United Nations 2009 Energy Balances and Electricity Profiles (see annex 1 for details); ESCAP statistical database for industry output and 2009 population values, accessed at <http://www.unescap.org/stat/data/statdb/DataExplorer.aspx> on 19.09.2012.

Notes:

toe/\$K of GDP – tons of oil equivalent per one thousand USD of GDP produced

toe per capita – tons of oil equivalent consumed per capita

Annex 3

Resolution of the Third International Forum: Energy for Sustainable Development

Kyrgyzstan, Issyk Kul Lake

12-14 September 2012

We, the participants of the Third International Forum: Energy for Sustainable Development. Capacity building for energy efficiency and access to cleaner energy in Central Asia and neighbouring regions:

1. Consider the Third International Forum: Energy for Sustainable Development, which follows the International Energy Efficiency Fora held in Astana, Kazakhstan in 2010 and in Dushanbe, Tajikistan in 2011, to be a substantive input into capacity building for sustainable use of energy, including access to energy, energy efficiency and cleaner energy production in Central Asia and neighbouring regions.
2. Acknowledge the pivotal role of governments and national and regional policy in promoting sustainable use of energy, improving energy efficiency and providing wider access to cleaner energy in Central Asia and neighbouring regions and call upon governments to strengthen control over implementation of existing strategic programmes in the areas of energy efficiency and renewable energy.
3. Underline the critical role of the private sector in implementing projects, including those within public-private partnerships, in the area of sustainable use of energy, energy efficiency and access to cleaner energy.
4. Acknowledge the importance of public participation in the development and implementation of the energy efficiency projects and necessity of multilateral dialogue and cooperation, including with non-governmental organizations, scientific institutions and other stakeholders.
5. Emphasize the special role that the United Nations system and in particular the United Nations Economic Commission for Europe (UNECE), the United Nations Social and Economic Commission for Asia and the Pacific (ESCAP), and the United Nations Development Programme (UNDP) play in promoting sustainable development in Central Asia and neighbouring regions and in this context welcome the United Nations Secretary-General's initiative "Sustainable Energy for All" and its objectives of ensuring universal access to modern energy, doubling the global rate of improvement in energy efficiency and doubling the share of renewable energy in the global energy mix to be achieved by 2030.
6. Underscore the significant role of international financial institutions, in particular of the World Bank, the Asian Development Bank, the Eurasian Development Bank, the European Bank for Reconstruction and Development, the Islamic Development Bank, international organizations and donor countries, in attaining progress in sustainable use of energy, energy efficiency and wider access to cleaner energy.
7. Reaffirm the critical role that energy plays in the development process and call upon all stakeholders to strengthen international cooperation in the energy field in Central Asia and neighbouring regions in line with the "Future We Want" Rio+20 Conference on Sustainable Development outcome document.
8. Acknowledge the significance of further improving the investment climate in the countries of Central Asia and neighbouring regions, including through the development of financial mechanisms stimulating implementation of the projects in sustainable use of energy, energy efficiency and wider access to cleaner energy, and facilitation of their application, as well as ensuring transparency in the distribution of financial resources.
9. Stress the importance of ensuring an appropriate energy mix in the countries of Central Asia and neighbouring regions through measures that include increased use of cost-effective renewable energy and more efficient consumption of fossil fuels, among others, with the view to reducing greenhouse gas emissions and negative environmental impacts.
10. Consider that multilateral experience exchange in the field of sustainable development is a meaningful direction of international cooperation in Central Asia and neighbouring regions. In this regard we underline the substantiality of creating open information resources including data on legal and regulatory frameworks, public participation, financial mechanisms, public-private partnerships, successful projects implementation aimed at promoting sustainable use of energy, energy efficiency and providing wider access to cleaner energy.
11. Recognize that improving energy efficiency in the housing sector, one of the most energy intensive sectors, with direct impact on households, may become one of the main directions of international cooperation

due to the similarity of problems in this area faced by the countries of Central Asia and neighbouring regions as well as stable and reliable power supply of cities and other inhabited areas.

12. Note a fast-paced urbanization in the region and related increase in energy consumption by cities, and subsequently, an important role of the cities in practical implementation of the energy conservation programmes and mitigating climate change impacts. Creating action plans on sustainable energy development by the governments and local authorities will help improving energy efficiency in the cities.

13. Stress the significance of setting forth the tariff systems flexibly responding to current social and economic trends due to special role of pricing mechanisms in promoting sustainable use of energy, improving energy efficiency and providing wider access to cleaner energy taking into account the particular importance of the energy sector for the social and economic development of the countries in Central Asia and neighbouring regions.

14. Underline that sustainable use of energy, improved energy efficiency and wider access to cleaner energy are an important component of energy security and we express confidence that widening a continued international dialogue in Central Asia and neighbouring regions will facilitate solution of common problems in energy sector and related areas. In this regard we support the Resolution of the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) on convening, in 2013 in Vladivostok, the Russian Federation, the Asian and Pacific Energy Forum (APEF) at the ministerial level and invite ESCAP Member States to actively participate in this important event with the aim of establishing a comprehensive and holistic Asia-Pacific region-wide energy agenda for the future.

15. Are convinced that education and training of skilled professionals in the energy area are indispensable prerequisites for sustainable development, including creating favourable environment for innovation and providing a driving force for progress towards improved energy efficiency and wider access to cleaner energy.

16. Express gratitude for the warm welcome and the excellent organization of the Forum to the Government of the Kyrgyz Republic and also in this regard note the important role of the United Nations Economic Commission for Europe (UNECE), the United Nations Social and Economic Commission for Asia and the Pacific (ESCAP) and the United Nations Development Programme (UNDP).

We, the participants of the Forum

considering the importance of promoting sustainable development in Central Asia and neighbouring regions,

with a view to foster implementation of international programmes and projects in capacity building for sustainable use of energy, energy efficiency, access to cleaner energy and exchange of experience in Central Asia and neighbouring regions

call upon UNECE, ESCAP and UNDP to continue holding such Fora on a regular basis,

and recommend to convene the next Forum in 2013.

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