

# COUNTRY ANALYSIS BRIEFS

## Kazakhstan

Last Updated: February 2008

### Background

***Kazakhstan is important to world energy markets because it has significant oil and natural gas reserves. After years of foreign investment into the country's oil and natural gas sectors, the landlocked Central Asian state has recently begun to realize its enormous production potential. With sufficient export options, Kazakhstan could become a major world energy producer and exporter over the next decade.***

Kazakhstan has the Caspian Sea region's largest recoverable crude oil reserves, and its production accounts for over half of the roughly 2.8 million barrels per day (bbl/d) currently being produced in the region (including regional oil producers Azerbaijan, Uzbekistan, and Turkmenistan). Kazakhstan oil exports are the foundation of the country's economy and have ensured that average real GDP growth has stayed above 9 percent for the last 6 years. Real GDP growth during 2007 averaged 9.5 percent.



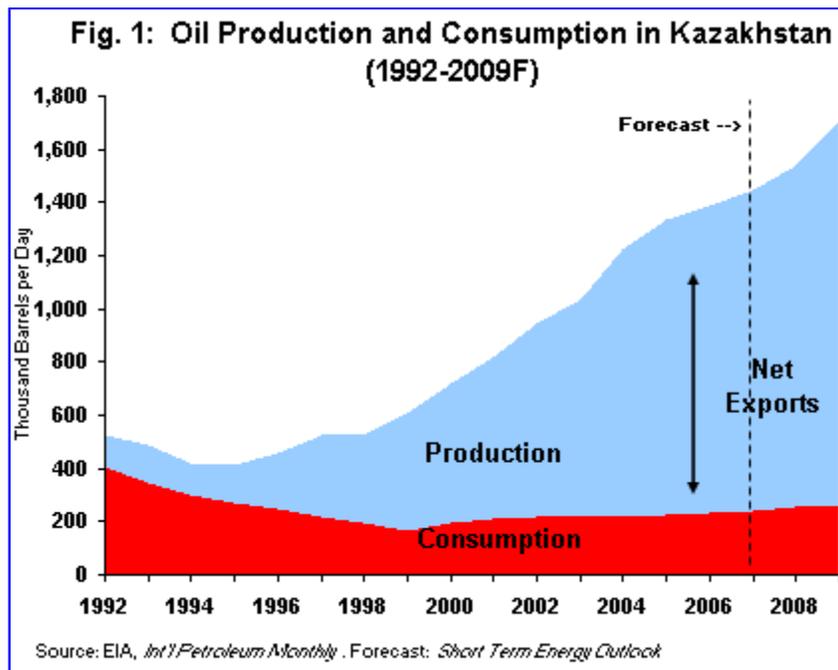
Kazakhstan's growing petroleum industry accounts for roughly 30 percent of the country's GDP and over half of its export revenues. In an effort to reduce Kazakhstan's exposure to price fluctuations for energy and commodities exports, the government created the [National Oil Fund of Kazakhstan](#). Due to high oil prices the international reserves and assets in the oil fund have doubled in the last year to [\\$20 billion](#) in October 2007.

### Oil

***Major oil production growth is expected in the next decade from Kazakhstan. Existing production from the Tengiz field is expected to double, and the Kashagan field will add an additional 1 million bbl/d after 2011. Construction of oil export infrastructure is a critical component of sustained growth from the country.***

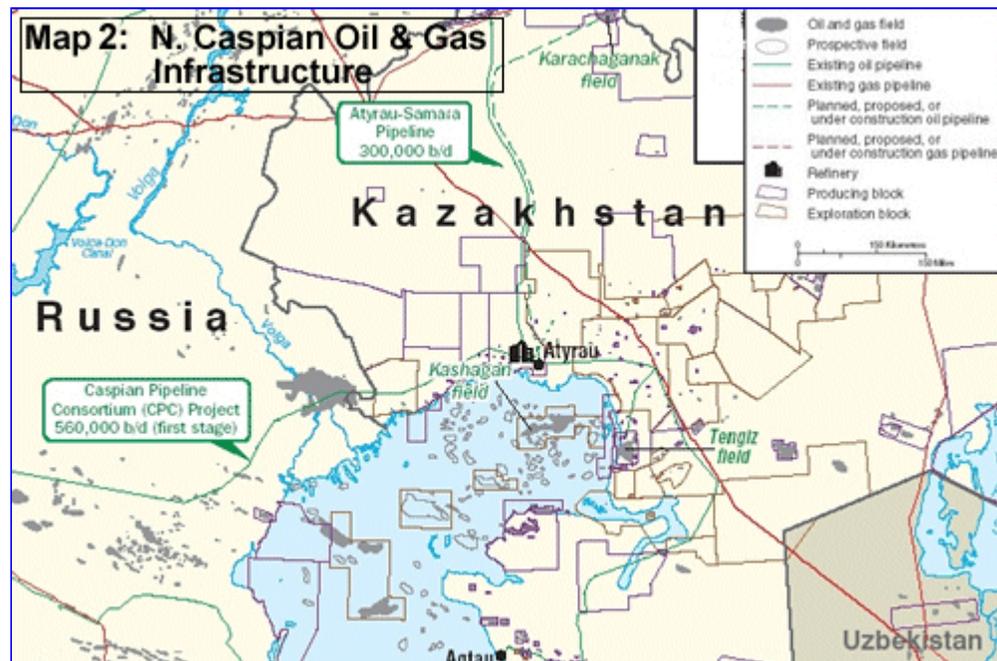
Kazakhstan sits near the northeast portion of the [Caspian Sea](#) and claims most of the Sea's biggest known oil fields. Kazakhstan's combined onshore and offshore proven hydrocarbon reserves have been estimated between 9 and 40 billion barrels (comparable to OPEC members Algeria on the low end and Libya on the high end). Please see the reports by the US Geological Survey (USGS) for an extensive account of the country's [North Caspian](#) and [North Ustyurt](#) basins' oil reserves.

Kazakhstan produced approximately 1.45 million barrels per day (bbl/d) of oil in 2007 and consumed 250,000 bbl/d, resulting in petroleum net exports of around 1.2 million bbl/d. EIA expects oil production in Kazakhstan to average 1.54 and 1.71 million bbl/d in 2008 and 2009, respectively (See [Table 3b](#) of EIA's Short Term Energy Outlook for updated estimates). Major producers include Karachaganak (250,000 bbl/d), Tengiz (280,000 bbl/d), CNPC-Aktobemunaigas (120,000 bbl/d), Uzenmunaigas (135,000 bbl/d), Mangistaumunaigas (115,000 bbl/d), and Kumkol (70,000 bbl/d). These producers account for 1 million bbl/d (or around 70 percent) of liquids production in the country. Other production is centered in smaller fields.



Increased oil production in recent years (see Figure 1) has been the result of an influx of foreign investment into Kazakhstan's oil sector. International projects have taken the form of joint ventures with Kazmunaigaz (formerly Kazakhoil), the national oil company, as well as production-sharing agreements (PSAs), and exploration/field concessions. See EIA's [table of PSAs in Kazakhstan](#) for more information. The country expects the majority of the growth will come from four enormous fields: Tengiz, Karachaganak, Kurmangazy, and Kashagan. See the IMF's [November 2004 report](#) for an expanded discussion of oil production in Kazakhstan.

Slower growth rates from 2005 to 2007 can be attributed to government restrictions on associated gas flaring, field maintenance at Karachaganak and Tengiz, cold weather, and a lack of progress on expanding the Caspian Pipeline Consortium (CPC) pipeline. Further restrictions due to environmental non-compliance, especially at the Tengiz field, may cause the revocation of the operator's PSA and would therefore impede production growth.



### Oil Fields

#### Tengiz

The Tengiz field is located in the swamplands along the northeast shores of the Caspian Sea (see Map 2) and is the largest source of oil production in the country. The field has been developed

since 1993 by the Tengizchevroil (TCO) joint venture. Production averaged almost 280,000 bbl/d during 2007, and recoverable crude oil reserves have been estimated at 6-9 billion barrels by consortium member Chevron. According to Chevron, Tengiz could potentially produce 700,000 bbl/d by the end of the decade with the sour gas injection program fully implemented. Most of the oil from the field is being sent through the Caspian Pipeline Consortium (CPC) pipeline to the Russian Black Sea port of Novorossiysk (see Map 2).

Due to current government regulations against the flaring of associated sour natural gas (see [Natural Gas section](#)), restrictions on flaring hurt production performance from the Tengiz field during 2005 and 2006. Repeated mechanical problems have also hurt output during the first half of 2006. In 2007 the consortium was fined around \$609 million by the Kazakh authorities for environmental violations relating to the storage of over 9 million tonnes of sulfur, a waste product of oil production at the field.

A \$1-billion plan to reinject the sour gas (SGI) is currently being tested and is one factor in the field's increased production during late 2007. Full-scale implementation of SGI, along with newly-drilled wells (called the second generation project) should allow for an increase in oil production to more than 460,000 bbl/d during 2008.

#### *Kashagan*

The Kashagan field, the largest oil field outside the Middle East and the fifth largest in the world (in terms of reserves), is located off the northern shore of the Caspian Sea, near the city of Atyrau (see Map 1). The consortium operating the field, the Agip Kazakhstan North Caspian Operating Company--[Agip KCO](#) has estimated the field's recoverable reserves at 13 billion barrels of oil equivalent, with total reserves-in-place around 38 billion barrels. In late 2007, an Eni spokesman estimated that the field would initially produce around 300,000 bbl/d from the field as early as late 2011. According to Kazmunaigaz, full-scale commercial production is not expected to commence until 2013. The consortium originally estimated peak production at around 1.3 million bbl/d, but this figure may be adjusted under a new ownership structure agreed to in early 2008.

The Kashagan field has presented particular challenges for its developers. ENI, the operator of the consortium, has pushed back the projected startup date from 2005, then to 2008, and then to the end of 2011. Kashagan contains a high proportion of natural gas under very high pressure, the oil contains large quantities of sulfur, and the offshore platforms require construction that can withstand the extreme weather fluctuations in the northern Caspian Sea area. During negotiations over the redistribution of British Gas's (BG's) share, and in light of new government policies introduced at the same time, the project was delayed further.

In September 2007, Kazakhstan requested over \$10 billion in compensation from the multinational consortium that was developing the Kashagan field in Kazakhstan, and the government prohibited further work on the field (in part, because of environmental violations) until the parties come to an agreement. After months of negotiations during 2007 and 2008, the shareholders finally agreed to allow Kazakhstan's Kazmunaigaz (KMG) to raise its stake from 8.33 to 16 percent, paying \$1.87 billion or roughly half their book value. The other shareholders will reduce their respective 18.52 percent stakes and will compensate the Kazakh government for delays. The companies will pay an additional \$2.5-\$4.5 billion to the country, depending on the price of oil. According to the Economist Intelligence Unit, government receipts from the field's production are expected to total \$20 billion through 2041. Large scale production will require completion of the Kazakh pipeline as well as an oil and gas treatment plant with an initial capacity of 300,000 bbl/d.

Shares (%) of Energy Companies in Major Projects in Kazakhstan					
Company	Kashagan (2007)	Kashagan (2008)	Karachaganak	Tengiz	CPC
British Gas (BG)			32.5		2
Chevron			20	50	15
ConocoPhillips	9.26	8.28			
ENI	18.52	16.66	32.5		2
Exxon Mobil	18.52	16.66			
Exxon Mobil CPC				25	7.5
Inpex	8.33	8.28			
Kazakhstan					19
Kazakhstan Pipeline Ventures					1.75
Kazmunaigaz	8.33	16.81		20	
LukArco, BV*				5	12.5
Lukoil*			15		
Oman					7
Oryx					1.75
Rosneft-Shell					7.5
Shell	18.52	16.66			
Total, SA	18.52	16.66			
Russia (Transneft)					24

\*BP owns 46% and LUKoil 54% of Lukarco, Source: Company websites.

Although details of the new 2008 agreement have not been made public, reports indicate ENI will remain responsible for exploration and development of the field but will lose official "operator" status after the field comes online in 2011. Total and Shell, along with Kazmunaigaz, will form a new operating company after the field comes online. Kazakh sources estimate the total cost of the project has increased from \$57 billion to \$136 billion.

The Kashagan area also holds other hydrocarbon prospects. Other discoveries in the Kashagan area include Kashagan SW, Aktote, Kairan and Kalamkas. These offshore fields are large by international standards, but still considerably smaller than the giant Kashagan field. Appraisal programs for these fields are currently underway.

#### *Karachaganak*

The Karachaganak oil and gas/condensate field is located onshore, in northern Kazakhstan, near the border with Russia's Orenburg field (see map 2). In 2007, the field produced over 250,000 bbl/d of natural gas condensate. Karachaganak is being operated by Karachaganak Petroleum (KPO) consortium (see above for shareholders). According to KPO, the field holds reserves of around 8-9 billion barrels of oil and gas condensate and 47 Tcf of natural gas. The consortium members aim to triple output with up to \$10 billion in investment within 6-8 years.

In previous years, almost all of Karachaganak's crude oil production was processed at Russian facilities associated with the Orenburg field located just across the border. In April 2003, a pipeline spur southward to Atyrau was completed that connects the Karachaganak field to Kazakhstan's primary export pipeline, the Caspian Pipeline Consortium (CPC) project. The new connection has enabled increased exports from Karachaganak, and has reduced the consortium members' dependence on Russian buyers.

#### *Other Upstream Prospects: Kurmangazy, Zhemchuzina (Pearls Block), and Kalamkas*

Located on the maritime border between Russia and Kazakhstan, the Kurmangazy field is the least developed of Kazakhstan's upcoming oil field developments. Russia and Kazakhstan signed a new \$23 billion PSA agreement for the 7.33 billion barrel Kurmangazy oil field in July 2005. After some delay on the terms of the agreement, Russian and Kazakh state oil firms Rosneft and Kazmunaigaz signed the deal in the hopes that this would hasten the field's development. The first well was drilled in early 2006 but came up dry. Further drilling could occur in 2008.

In October 2007, Shell discovered hydrocarbons in its Pearls Block (called Zhemchuzina in Kazakh). The Pearls PSA was signed in 2005 by Shell, with a 55% stake, and KazmunaitEniz, an

offshoot of state oil and gas concern Kazmunaigas (KMG), with 25%, and Oman Pearls, a subsidiary of Oman Oil, with 20%. The Pearls block lies just south of the Kalamkas field discovered in 2001 by the Agip KCO consortium. According to a *Nefte Compass* report, Kalamkas, which is in the same contract area as the Kashagan field, contains recoverable reserves of about 500-600 million barrels of sweet, 34° API oil and roughly 3.5 trillion cubic feet (Tcf) of natural gas. The Kalamkas reservoir, which is almost 6,000 feet underground, would be much easier to bring on stream than Kashagan, which is deeper and prone to extreme high pressure. Kalamkas could be producing 100,000-120,000 bbl/d of oil within about four years of starting development.

For a detailed map of the Caspian Region's oil and gas infrastructure please see the [Maps section](#) of the brief.

### Oil Exports

Kazakh oil exports are growing rapidly, with current infrastructure delivering it to world markets via the Black Sea (via Russia), the Persian Gulf (via swaps with Iran), to the north pipeline and rail (through Russia), and now to the East to China.

During 2007, Kazakhstan exported around 1.2 million bbl/d of petroleum on average in all directions:

-408,000 bbl/d northward (via the Russian pipeline system and rail network);

-620,000 bbl/d westward (via the Caspian Pipeline Consortium Project), which does not include an additional 72,000 bbl/d of Russian production.

-70-80,000 bbl/d is sent southward via a swap agreement with Iran.

-85,000 bbl/d eastward to China on the Atasu-Alashankou pipeline route during 2007.

Connections to ports on the Black Sea and the Persian Gulf have allowed some Kazakh oil (or proxy oil from Iran) to be traded on the world market. Efforts are underway to expand the country's export infrastructure (especially to the east) over the next decade as Kazakhstan's oil production increases.

#### *Trans-Caspian Barge Shipments*

In order to facilitate exports of oil from Kashagan during the next decade, Kazakhstan is developing an internal "Kazakhstan Caspian Transportation System" (KCTS), which will include the construction of a 500,000 bbl/d pipeline from Eskene in western Kazakhstan to the port of Kuryk. From Kuryk and the current nearby working port of Aktau, oil will be shipped via barge across the Caspian to the BTC pipeline. Current trans-Caspian shipments are expected to double at Aktau to around 400,000 bbl/d, and will augment a new 760,000-bbl/d oil terminal at Kuryk, just south of the Aktau port. Kazmunaigaz has not yet decided on the exact site for the port. Expansions of the oil terminals in Baku and Kuryk and the pipeline's construction could cost at least \$1.5 billion. Kazakhstan has also taken an interest in sending oil via rail (and the port of Batumi) to the Black Sea and then onwards to the reversed [Odessa-Brody](#) pipeline.

#### *Caspian Pipeline Consortium (CPC)*

The 980-mile long CPC pipeline connects Kazakhstan's Caspian Sea area oil deposits with Russia's Black Sea port of Novorossiysk. The governments of Russia, Kazakhstan, and Oman developed the CPC project in conjunction with a [consortium](#) of international oil companies. See the table above for the consortium members.

The pipeline is an extension of the existing oil transit infrastructure surrounding the Caspian Sea. Newly constructed components of the line run from the Russian town of Komsomolskaya straight westward to Novorossiysk. The pipeline is supplied with Kazakh oil through the Soviet-era links surrounding the Sea, which the consortium members have refurbished.

The CPC pipeline exported around 690,000 bbl/d of crude oil in 2007, and the consortium has plans for a \$1.5 billion expansion project to increase the pipeline's peak capacity to 1.34 million bbl/d. With the completion of the two pipeline spurs from Kenkiyok and Karachaganak to the CPC at Atyrau (see Map 1) and the usage of additives, CPC transport levels have increased from around 600,000 bbl/d in 2005 to a monthly peak of 800,000 bbl/d in February 2007.

In September 2007 consortium members reached a major milestone in agreeing to raise the transport tariff to \$38/thousand tonnes (mt) from \$30.24/mt, effective in October 2007. The shareholders also agreed to cut the interest rate on CPC loans to 6 percent/year from the previous rate of 12.66 percent. The decisions followed several meetings among the project partners this year as they attempted to resolve financing issues, which have held back expansion

of the link. Consortium members are also awaiting the formulation of the Bourgas-Alexandroupolis pipeline route, which would keep incremental CPC volumes from further crowding the [Turkish Straits](#).

#### *Kazakhstan-China Pipeline*

The 613-mile-long, 813 mm, and 200,000-bbl/d capacity pipeline from Atasu, in northwestern Kazakhstan, to Alashankou in China's northwestern Xinjiang region is exporting Caspian oil to serve China's growing energy needs. PetroChina's ChinaOil is the exclusive buyer of the crude oil on the Chinese side and the commercial operator of the pipeline is a joint venture of CNPC and Kaztransoil. In addition to around 85,000 bbl/d of Kazakh crude that flowed through the pipeline during 2007, Gazpromneft and TNK-BP have received around 12,000 bbl/d each in allocations for their crude oil exports during the first quarter of 2008.

The source of Kazakh oil for the pipeline comes from CNPC's Aktobe field and from CNPC and Kazmunaigaz's Kumkol fields. Securing long term crude oil supply for the pipeline's capacity is the current priority so plans to expand the pipeline to 400,000 bbl/d are now of lower concern. The quantity of crude oil supplied to China through this route will still represent only a small percentage (i.e. less than 5%) of China's expected oil demand by the time the project reaches completion.

The first stage of the project was completed in 2003 and runs westward across Western Kazakhstan from the oil fields of the Aktobe region to the oil hub of Atyrau near the Caspian Sea. This line will be reversed when all stages are complete. Construction began on the second section of the Kazakhstan-China pipeline in late September 2004 and was completed during 2006. Crude oil reached the Chinese side on July 29, 2006, around two months behind schedule, and was then pumped to the Dushanzi refinery. Pricing issues were the main reason behind the delay, but China and Kazakhstan eventually came to a compromise. The final stage of the project, scheduled to be complete around 2009, will connect Kenkiyak and Kumkol at a cost of around \$1 billion, will connect the first two sections, and will theoretically double the pipeline capacity to 400,000 bbl/d. The speed of this final leg will in part also be dependent on the availability of Kashagan crude oil.

**Map 3: Kazakhstan – China Pipeline Route**



Source: US government, DI Cartography Center

#### *Atyrau-Samara*

Kazakhstan's other major oil export pipeline, from Atyrau to Samara, is a northbound link to the Russian distribution system. The line was recently upgraded through pumping and heating stations additions and has a capacity of approximately 600,000 bbl/d. Before the completion of the CPC pipeline at the end of 2001, Kazakhstan exported almost all of its oil through this system.

But, since Kazakhstan desired more independence from the Russian transit systems, it favored the development of transport alternatives. In June 2002, Kazakhstan and Russia signed a 15-year oil transit agreement under which Kazakhstan will export 340,000 bbl/d of oil annually via the Russian pipeline system. Russia's trade ministry also pledged to increase the capacity of the line to around 500,000 bbl/d.

### Government Energy Policy

During 2007, Kazakh authorities announced they would review all energy and mineral resources contracts in a bid to generate more revenue and diversify the sources of investment. President Nursultan Nazarbayev signed an amendment into law in October 2007 that allows the government to unilaterally break contracts with oil companies, possibly motivated in part by frustration over delays with the Kashagan project. The new law, effective in November 2007, gives Kazakhstan two paths to terminate contracts with energy companies. One option forces the company into negotiations with the government, and the other option allows for the repudiation of the contract with a notice period of only two months.

In response to concern about Kazakhstan's investment climate, the Tax Ministry proposed reforming the foreign investment structure. Within one month, however, the government decided to drop a proposal that would have turned the PSA regimes into a concession-type system, allowing the country to change tax rates and contract terms more easily. According to the director of the Ministry's Tax Department the PSAs should be replaced because of a lack of transparency, the inability to monitor and adjust subsoil users' expenditures, and the lack of a clause to redistribute interests in the agreement. Oftentimes, the PSA terms are generally undisclosed, and the taxation structure is fixed for the entirety of the project, even in the event of a change in ownership.

The government has successfully implemented other reforms in the past. The introduction of a new tax structure in January 2004 included a so-called "rent tax" on exports, a progressive tax that increases as oil prices grow. The amendment raised the government's share of oil income to a range of 65 to 85 percent, and it removed a clause guaranteeing investors a static tax rate throughout the duration of the contract. The new structure includes an excess profit tax, and limits foreign participation to 50 percent in each offshore project with no guarantees of operatorship. The remaining share will belong to KazMunaiGaz.

In 2005, Kazakhstan amended the subsoil law to preempt the sale of oil assets in the country. These changes helped the state's case to buy part of British Gas (BG's) share of the Kashagan project. Another amendment to the country's subsoil law in 2005 extended the government's power to buy back energy assets by limiting the transfer of property rights to strategic assets in Kazakhstan. This helped legitimize the government's bid to acquire a 33 percent share in Canadian-based PetroKazakhstan after it agreed to a takeover deal with CNPC. For more information on the subsoil law changes please see the [fact sheet](#) from the American Chamber of Commerce and from the [Central Asia Caucasus Institute](#).

### Downstream/Refining

In contrast to the upstream sector, the refining sector has remained largely in the state's possession. The refining sector in Kazakhstan has not received high levels of FDI like other parts of the oil and gas production sector. Since domestic prices for refined products have remained low, oil producers have more incentive to export crude oil to international markets instead of refining it locally.

The refining sector in Kazakhstan has three major oil refineries supplying the northern region (at Pavlodar), western region (at Atyrau), and southern region (at Shymkent), with total crude oil refining capacity of 345,093 bbl/d. Refinery runs increased by around 2 percent during 2007, showing that the facilities are still improving their profitability. Around 193,000 bbl/d of refined products were produced during 2007, up from around 191,000 bbl/d in 2006.

The refinery at Pavlodar is supplied mainly by a crude oil pipeline from western Siberia (since Russian reserves are well placed geographically to serve that refinery); the Atyrau refinery runs solely on domestic crude from northwest Kazakhstan; and the Shymkent refinery currently uses oil from Kazakh fields at Kumkol, Aktyubinsk, and Makatinsk, although it is linked by pipeline to Russia.

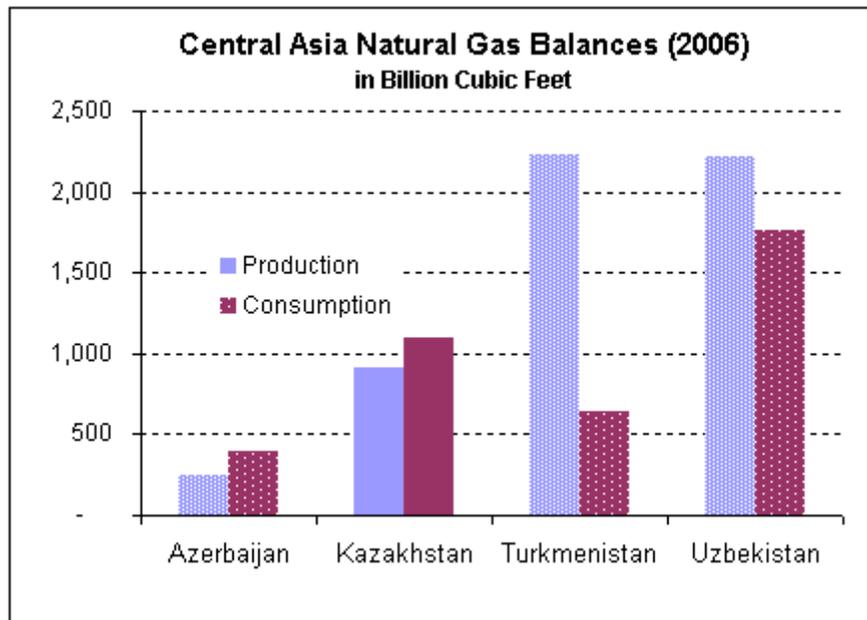
## Natural Gas

Kazakhstan produces about as much natural gas as it consumes, and following maintenance at Tengiz and Karachaganak in the last couple years, the country is poised to become a net exporter in 2008. The Kazakhstan Energy Ministry estimated that production during 2007 totaled 1,037

***With large amounts of associated natural gas at its oil fields, Kazakhstan has the***

**potential to become a net exporter in upcoming years. However, the lack of available gas export infrastructure will limit export growth.**

billion cubic feet (Bcf), over 70 percent of which was produced by international consortia at the Tengiz and Karachaganak fields. Gas production increased by over 8 percent from the previous year.



In 2007, the *Oil and Gas Journal* revised upwards its estimate of proved natural gas reserves in Kazakhstan to 100 trillion cubic feet (Tcf), putting the country on par with Turkmenistan. Most of Kazakhstan's natural gas reserves are located in the west of the country, with roughly 25 percent of proven reserves situated in the Karachaganak field. This oil and gas condensate field reportedly has proven natural gas reserves of 48 Tcf. The consortium developing Karachaganak expects to produce 900 Bcf by 2012.

Natural gas in Kazakhstan is almost entirely "associated" gas. Several fields including Karachaganak reinject significant quantities of gas into the ground to maintain crude wellhead pressure for liquids extraction. In the long term, when the liquids are exhausted, this gas can be recovered.

The largest source of natural gas in the country is the Karachaganak natural gas and condensate field which produced 503 Bcf during 2007, up over 18 percent from the previous year. The [consortium](#) estimates that the field contains over 47 Tcf (1.35 Tcm) of natural gas reserves. Further information on the export of natural gas from this field and expansion plans are explained below.

#### **Natural Gas Flaring**

A World Bank commissioned study conducted by the National Oceanic and Atmospheric Administration (NOAA) [estimated](#) that Kazakhstan was flaring as much as 286 Bcf (8.1 Bcm) in 2006, making it the fifth-largest flarer worldwide. Official figures are around two-thirds less, and some overstatement occurs because of the inclusion of gas venting in the figures (especially in the case of Russia). Still, the [report](#) indicates that gas flaring in Kazakhstan increased by over 170 Bcf since 1995. Since a May 2005 government order to all 34 oil producing firms to reduce oil production to levels that would avoid natural gas flaring, flaring has declined slightly. Many of the companies that produce associated gas have made pledges to develop ways to use the gas (such as for electricity generation). New environmental legislation allows the government to fine any company that carries out unauthorized natural gas flaring.

The Tengiz field, which produced 248 bcf in 2007, is one of the largest contributors to natural gas flaring in the country. In 2005, the company was forced to shut down some production and release sour gas into the atmosphere after the emergency halt of its five energy generators. After four years of planning and construction, the Sour Gas Reinjection (SGI) Project will help increase both oil and gas production from the field and will help reduce the amount of gas flaring. The project began operating in limited amounts in October 2006.

#### **Natural Gas Exports**

Since Kazakh natural gas is a potential competitor with Russian natural gas, several new natural gas export pipelines from the Caspian Sea region also are in development or under consideration, potentially opening up new markets for Kazakh natural gas. The two branches of the Central Asia

Center (CAC) gas pipeline, the main gas export pipeline from Central Asia, meet in the southwestern Kazakh city of Beyneu before crossing into Russia at Alexandrov Gay and feeding into the Russian pipeline system. Therefore, Kazakhstan is a major transit route for gas from Turkmenistan to Russia and on to other markets across the territory of the former Soviet Union

#### *Turkmenistan-Kazakhstan-China Pipeline*

In December 2007, CNPC pledged to invest \$2.2 billion in a 1.06 Tcf (30 bcm) natural gas pipeline that would run from Turkmenistan through Uzbekistan and Kazakhstan to China. According to the construction plan, the pipeline is expected to start at Gedaim on the border of Turkmenistan and Uzbekistan and extend 1,100 miles. About 325 miles would run through Uzbekistan and the rest in Kazakhstan to reach Khorgos in China's northwestern Xinjiang region. In August, Turkmenistan and China signed a 30-year supply agreement for the gas that would fill the pipeline. CNPC has set up two entities to oversee the Turkmen upstream project and the development of a second pipeline that will cross China from the Xinjiang region to demand centers in southeast China. The total cost of the entire project is expected to be \$7.31 billion. Also, Russia is planning [a natural gas pipeline](#) to China.

#### **Kazakhstan-China Gas Pipeline Routes**



Source: Kazakhstan Energy Ministry ([click to enlarge](#))

#### *Central Asia Center Pipeline Expansion*

In December 2007, Russia, Kazakhstan and Turkmenistan announced the signing of an agreement to carry Central Asian natural gas from Turkmenistan to Russia via the existing Central Asia Center gas pipeline. After the pipeline's completion in 2012, the route will have a capacity of 2.6 Tcf (80 Bcm), up from around 2.1 Tcf (60 Bcm). The agreement stipulates that each country will be responsible for building the section of new pipeline in each of their respective territories. Russia's agreement with the two countries was reportedly contingent on a Russian pledge to increase its buying price of Central Asian gas, but the exact price is still undetermined.

#### *Natural Gas Distribution*

Because of Kazakhstan's divided distribution network, Karachaganak's natural gas is exported northward to Russia's Orenburg processing plant, as opposed to being delivered to Kazakh consumers in the south. Under a 15-year agreement signed during the summer of 2006, Gazprom will pay \$3.96 per thousand cubic feet (mcf), or \$140 per thousand cubic meters, for Kazakh gas imports while Kazakhstan will get a 50 percent stake in a new unit of the Orenburg gas processing plant just across the Russian-Kazakhstan border. Gas output from the Karachaganak field will be shipped to Orenburg for refining, with volumes expected to reach at least 530 Bcf per year. Gazprom and Kazmunaigaz will each have a 50 percent stake in KazRosGas, the joint venture which will purchase the gas and expand the Orenburg plant. Current deliveries of Karachaganak gas to the Orenburg plant, located 84 miles from the field, are estimated at 250 Bcf/y. Gazprom is reportedly expected to begin to receive gas deliveries from the field in 2012

Efforts are also underway to export Karachaganak's gas condensate and other liquids through the CPC pipeline system. The Karachaganak Integrated Organization, which is developing the field, has thus far focused its efforts primarily on extraction of the field's liquid condensate reserves. Several of the country's other oil fields, Tengiz and Kashagan for example, also contain associated natural gas (a by-product of oil extraction). See the [maps section](#) of the country brief for more geographical detail.

Kazakhstan has two separate domestic natural gas distribution networks, one in the west which services the country's producing natural gas fields, and one in the south which mainly delivers imported natural gas to the southern consuming regions. The lack of internal pipelines connecting Kazakhstan's natural gas-producing areas to the country's industrial belt (between Almaty and Shymkent) has hampered the development of natural gas resources. However, as stated above, the development of the Amangeldy gas field will help Kazakhstan's southern region cease importing Uzbek gas. Kazmunaigaz, the state oil and natural gas company, operates Kazakhstan's main natural gas pipelines.

Southern Kazakhstan receives its natural gas supplies from Uzbekistan via the Tashkent-Bishkek-Almaty pipeline. In 2008 Uzbekistan will supply a small amount of gas to Kazakhstan's southern regions, including the area around Almaty, for \$100 per 1,000 cubic meters, a price unchanged from 2007. This pipeline snakes through Uzbekistan before reaching Shymkent, crosses Kyrgyzstan, and terminates in Almaty. Dependence on imported natural gas for its southern regions has at times been problematic since erratic pricing and supplies from Uzbekistan, combined with illegal tapping of the pipeline by Kyrgyzstan, have resulted in significant supply disruptions to Almaty in the middle of the heating season.

## Coal

***Kazakhstan contains Central Asia's largest recoverable coal reserves, and is the second largest coal producer in the Former Soviet Union after Russia.***

Kazakhstan contains Central Asia's largest recoverable coal reserves, with 34.5 billion short tons of mostly anthracitic and bituminous coal. Kazakhstan produced 106 million short tons (Mmst) in 2006, while consuming 78 Mmst, resulting in net exports of 28 Mmst. Russia is the largest importer of Kazakh coal, followed by Ukraine. State estimates show production fell by around 1.9 percent annually in 2007.

Coal production in Kazakhstan has fallen by roughly 35 percent since independence. Much of the decline has been due to mine problems (over 30 people died in mining accidents during 2004) and problems obtaining outside foreign investment to maintain their economic viability. EIA data show a modest upswing in coal production in 2000 and 2001 (see [Country Energy Profile for Kazakhstan](#)), and the country's production again grew by over 10 percent last year. According to the Kazakh Ministry of Energy and Natural Resources, the country aims to be producing 100 million-105 Mmst annually by 2015.

During 2007, the Arcelor-Mittal Group pledged to invest \$500 million to increase coal production in the Karaganda region by around 5 million tonnes. Kazakhstan's largest coal producer, Bogatyr Access Komir, which accounts for roughly 35 percent of the country's coal output, is a subsidiary of Access Industries Incorporated (U.S.A.). Bogatyr Access Komir develops northern Kazakhstan's Bogatyr and Severny coal fields and is the country's largest exporter to Russia. Russian firms are also stake holders in the Kazakh coal industry and roughly 16 Mmst are transited annually from Kazakhstan northward via rail to power plants in southern Russia.

Kazakh coal consumption fell from 97 Mmst in 1992 to a low of 58 Mmst in 1999 (see Figure 3). But in the last decade, manufacturing sector growth has provided incentives for increased coal consumption. Kazakhstan gets over 80 percent of its electricity production from coal. The country's largest power generator, AES-owned Ekibastuz No. 1 is located in north-central Kazakhstan.

## Electricity

***Kazakhstan's large size, key geographic situation, and relatively progressive power market structure make the country an ideal hub for region-wide electricity trade. International financial institutions are actively working to upgrade deteriorating transmission and generation infrastructure.***

Kazakhstan has 71 power plants, including five hydroelectric power stations, giving the country an overall installed generating capacity of 17 gigawatts (GW), 80 percent of which are coal fired, and 12 percent of which are hydroelectric. Almost 85 percent of the country's power generation comes from coal-fired plants located in the northern coal producing regions. Kazakhstan's hydroelectric facilities are located primarily along the Irtys river, which flows from China across northeast Kazakhstan.

The production and consumption of electricity in Kazakhstan fell significantly following independence. However, robust economic growth since 2000 has helped boost generation to 64.2 billion kilowatthours (BkWh) in 2006 and consumption to 58 BkWh. Transmission issues necessitate that Kazakhstan continue to import electricity in the southern part of the country, as the country's northern generating units are connected to a separate transmission grid (see below). In 2006 the Kazakh energy ministry expects 8 percent annual growth in electricity production to levels of 73 billion KWh, and consumption levels of 71 billion KWh. The latest statistics indicate that Kazakhstan exported roughly 4 billion kWh of electricity to Russia in 2005.

Although Kazakhstan technically generates almost enough electricity to meet its demand, the country has suffered from frequent power shortages since 1992 due to the sector's deteriorating

infrastructure. Kazakhstan incurs large electricity losses during transmission and distribution over its 285,000 miles of distribution lines. According to Kazakh Minister of Energy and Natural Resources Vladimir Shkolnik, an average of 15 percent of the electricity generated in Kazakhstan is lost before it reaches consumers due to the widespread deterioration of Kazakhstan's power infrastructure.

### Electricity Infrastructure in Kazakhstan



Source: US Trade and Development Agency, (click image above for higher resolution)

Energy officials in Kazakhstan estimate that electricity demand may outpace supply as early as 2008. Kazakhstan Electricity Grid Operating Company (KEGOC) President Kanat Bozumbayev estimates that over \$3.0 billion will be needed to build roughly 1,500 MW of new power plants and to repair old ones in the next decade.

### Transmission and Distribution

Due to the large geographical distance between cities across the vast Kazakh steppe, the country's electricity distribution system consists of three disconnected networks rather than a unified system. The two in the north are connected to Russia, and the one in the south is connected to the Unified Energy System of Central Asia. The northern networks, which service the coal-fired power plants that make up most of the country's installed capacity, have recently begun exporting electricity to Russia. In January 2003, the Ekibastuz Power Plant No. 2, located in the northern Pavlodar region, began exporting electricity northward. Conversely, the southern network, which is connected to the Unified Energy System of Central Asia, is forced to import electricity from neighboring Kyrgyzstan and Uzbekistan because of its lack of installed generating capacity.

Because Kazakhstan's southern regions are largely dependent on expensive imported electricity supplies, in 2004 KEGOC proposed a project to construct a second North-South power line to complement the existing, 600-MW-capacity line, thereby making it possible to supply the country's southern regions fully with energy generated in Kazakhstan (see map below). The line would also help connect Russia to other more electrically isolated countries in Central Asia. For example, it will enable Tajikistan, which plans to export up to 700 million KWh in 2005, to export electricity via Kyrgyzstan and Kazakhstan to Russia.

### North-South Transmission Line Project



Source: US Trade and Development Agency

In 2003, the European Bank for Reconstruction and Development (EBRD) helped finance KEGOC's implementation of the \$148 million first phase of the 690-mile transmission project. The second and third phases will complete the remaining 530 miles of the transmission line, continue the upgrading of the Ekibastutzkaya and Agadyr substations, and will provide for the purchasing of new distribution equipment. Total funding for the project will amount to \$347 million. The EBRD and World Bank are also funding KEGOC's purchase of high voltage, telecommunication and information technologies equipment under a \$180 million loan. More detail on these projects is available at the following pages maintained by [KEGOC](#) and by the [EBRD](#).

### Industry Organization – Deregulation Status

Kazakhstan has privatized all of its power plants, but the sale of regional electricity distribution companies has proceeded more slowly. Also, the majority of the distribution networks has not yet been privatized. KEGOC has granted management rights to several private companies, but KEGOC maintains control over high-voltage transmission lines, substations, and the central dispatching apparatus.

Non-payment of electricity bills, an inadequate collection system, and a lack of market-based transportation tariffs are all obstacles to further large-scale investment in Kazakhstan's transmission and distribution sector. Under the former Soviet Union, Kazakhstan utilized a system of fixed electricity tariffs that were unrelated to production costs and investment needs. Kazakhstan's State Anti-Monopoly Committee is working to bring electricity tariffs in line with those in other countries and to allow the market to determine transmission tariffs.

### Nuclear Power

Kazakhstan has the second largest uranium reserves in the world, at around 1.5 million tons, which represents almost 20 percent of the world's supply. Kazakhstan will soon join Canada and Australia as a principal source of mine-based uranium supplies. In 2006, Kazakhstan produced approximately 5,280 tons of uranium, and the country has plans to increase production to 15,000 tons by 2010.

In April 2005 South Korea and Kazakhstan established a joint mining venture for uranium, scheduled to begin operations in 2008 with an eventual annual output of 1,000 tons. In April 2006 Kazakhstan and Japan signed a civil nuclear cooperation agreement under which Japan will import uranium for power generation from Kazakhstan. Other foreign companies investing in Kazakhstan's uranium industry include Canada's SXR Uranium One Inc., Japan's Marubeni Corp.,

China's Guangdong Nuclear Power Group, Britain's New Power Systems Ltd. and the U.S. uranium trading company Nukem. For more information on the nuclear industry in Kazakhstan please consult the [IAEA](#).

## Maps and Tables

### Tables

[Producer Sharing Agreements \(PSA\) – Updated October 2006](#)

**Central Asian Oil and Gas Infrastructure (please click below for full map)**



Source: Petroleum Economist

**Bosphorus Bypass Options (please click below for a full map)**



(Source: CIA/DI Cartography Center)

[Caspian Sea Region Fields Map \(click for a high resolution version\)](#)



(Source: CIA/DI Cartography Center)

#### Other Maps:

[Oil Pipelines to China](#)

[Gas Pipelines to China](#)

#### Other Non-U.S. Government Maps:

[University of Texas: Perry-Castaneda Map Collection: Link to Detailed Map of Caspian Sea \(North Region\)](#)

[University of Texas: Perry-Castaneda Map Collection: Link to Detailed Map of Caspian Sea \(South Region\)](#)

[University of Texas: Perry-Castaneda Map Collection: Link to Detailed Map of Caspian Sea \(Legend\)](#)

## Links

### EIA Links

[EIA: Country Information on Azerbaijan](#)

[EIA: Country Information on Iran](#)

[EIA: Country Information on Russia](#)

[EIA: Country Information on Central Asia \(Turkmenistan, Uzbekistan\)](#)

### U.S. Government

[U.S. Agency for International Development](#)

[U.S. Department of Commerce, Business Information Service for the Newly Independent States \(BISNIS\)](#)

[U.S. Department of Commerce, Country Commercial Guides](#)

[U.S. Department of Commerce, Trade Compliance Center: Market Access Information](#)  
[CIA World Factbook](#)  
[U.S. Department of Energy, Office of Fossil Energy: International Affairs](#)  
[US Embassy, Astana](#)  
[U.S. International Trade Administration, Energy Division](#)  
[Library of Congress Country Study on Iran](#)  
[Library of Congress Country Study on the former Soviet Union](#)  
[Radio Free Europe/Radio Liberty \(RFE/RL\)](#)  
[RFE/RL: Energy Politics in the Caspian and Russia](#)  
[U.S. Department of State: Background Notes](#)  
[U.S. Department of State, International Information Programs](#)  
[U.S. Trade and Development Agency](#)  
[U.S. Treasury Department's Office of Foreign Assets Control](#)

### **General Information**

[Agip Kazakhstan North Caspian Operating Company--Agip KCO \(formerly known as OKIOC\)](#)  
[Amnesty International: Human Rights on the Line--The Baku-Tbilisi-Ceyhan Pipeline Project](#)  
[Azerbaijan International](#)  
[Azerbaijan Internet Links](#)  
[Caspian Development and Export page](#)  
[Caspian Pipeline Consortium](#)  
[Caspian Sea News](#)  
[Central Asia-Caucasus Institute of The Johns Hopkins University](#)  
[Chevron](#)  
[Embassy of the Russian Federation in the United States](#)  
[Energy Russia: website of the Centre for Energy Policy in Moscow, Russia](#)  
[ENI](#)  
[EurasiaNet.org--News and Analysis from Central Asia and the Caucasus](#)  
[European Bank for Reconstruction and Development](#)  
[IATP Central Asia](#)  
[International Center for Caspian Studies](#)  
[International Monetary Fund – Azerbaijan](#)  
[Interfax News Agency](#)  
[International Atomic Energy Agency Country Report -- Kazakhstan](#)  
[Kazakhstan Information](#)  
[KEGOC: Kazakhstan Electricity Grid Operating Company](#)  
[Kazakhstan, Official Site of the President](#)  
[News Central Asia](#)  
[Permanent Mission of the Islamic Republic of Iran to the United Nations](#)  
[The Times of Central Asia](#)  
[TRACECA](#)  
[United Nations Framework Convention on Climate Change and the Kyoto Protocol](#)  
[The Washington Post](#)  
[World Bank](#)

### **Associations and Institutions**

[Columbia University: Russia Subject Index](#)  
[Harvard University: Caspian Studies Program](#)  
[University of Texas: Perry-Castaneda Map Collection: Link to Detailed Map of Caspian Sea \(North Region\)](#)  
[University of Texas: Perry-Castaneda Map Collection: Link to Detailed Map of Caspian Sea \(South Region\)](#)  
[University of Texas: Perry-Castaneda Map Collection: Link to Detailed Map of Caspian Sea \(Legend\)](#)

### **Sources**

Agence France Presse  
BBC Monitoring Central Asia Unit  
Central Asia & Caucasus Business Report  
Caspian News Agency  
Caspian Business Report  
CIA World Factbook  
The Economist  
Environment News Service  
The Financial Times

FSU Oil and Gas Monitor  
Global Insight  
Hart's European Fuels News  
IMF  
Interfax News Agency  
The Moscow Times  
Nefte Compass  
PR Newswire  
Radio Free Europe/Radio Liberty  
Reuters  
RosBusinessConsulting Database  
The Times of Central Asia  
Turkish Business News  
Stratfor  
U.S. Department of Energy  
U.S. Energy Information Administration  
U.S. Department of State  
World Markets Research Centre- Global Insight

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