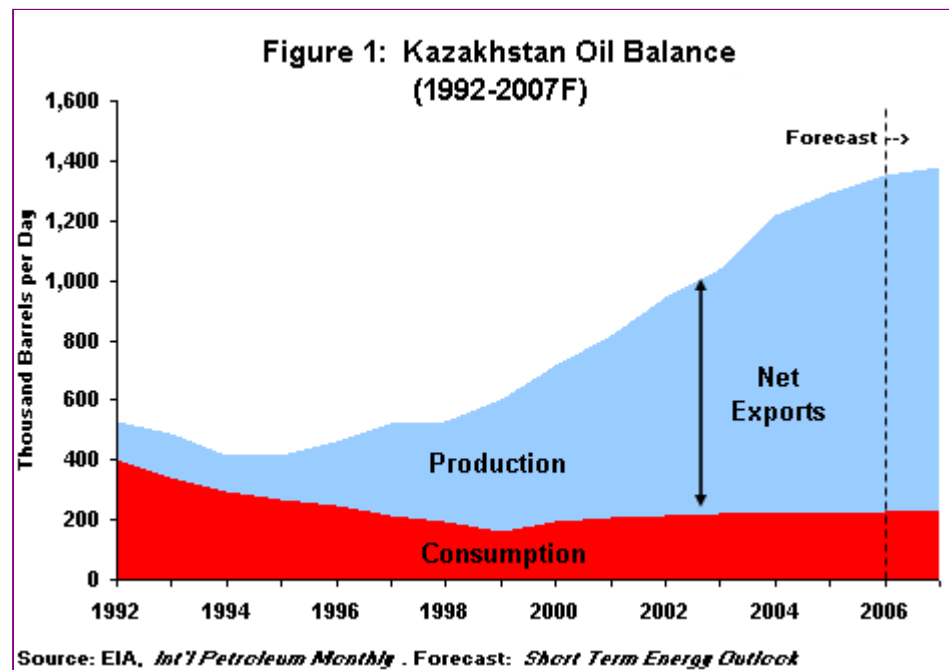


growth is expected in the next decade from Kazakhstan. Existing production is expected to double from the 400,000 barrel per day (bbl/d) Tengiz field, and the Kashagan field will add an additional 1 million bbl/d after 2010. Growth depends on the development of more oil export infrastructure.

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.

The country is no longer a minor world oil exporter as it was during the late 1990s, and it is poised to become an even more significant player in world oil markets over the next decade. According to Kazmunaigaz, Kazakhstan's state oil and gas company, total investment levels in offshore areas of the Caspian Sea are expected to rise from \$3.8 billion for 2003-2005 to \$16.8 billion for 2011-2015.

Kazakhstan produced approximately 1.29 million barrels per day (bbl/d) of oil in 2005 and consumed just 222,000 bbl/d, resulting in net exports of over 1 million bbl/d. The Kazakh government hopes to increase production levels to around 3.5 million bbl/d by 2015. This would include approximately 1 million bbl/d from Kashagan, 700,000 bbl/d from Tengiz, 600,000 bbl/d from Kurmangazy, and 500,000 bbl/d from Karachaganak. Other smaller fields would account for the balance.



Between 1999 and 2004, Kazakhstan's oil production grew by about 15 percent every year, resulting in nearly a doubling (roughly) of oil production (see Figure 1). Increased oil production in recent years 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.

During 2005 and 2006, slower growth rates can be attributed to government restrictions on associated gas flaring, field maintenance at Karachaganak and Tengiz, and cold weather. 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.

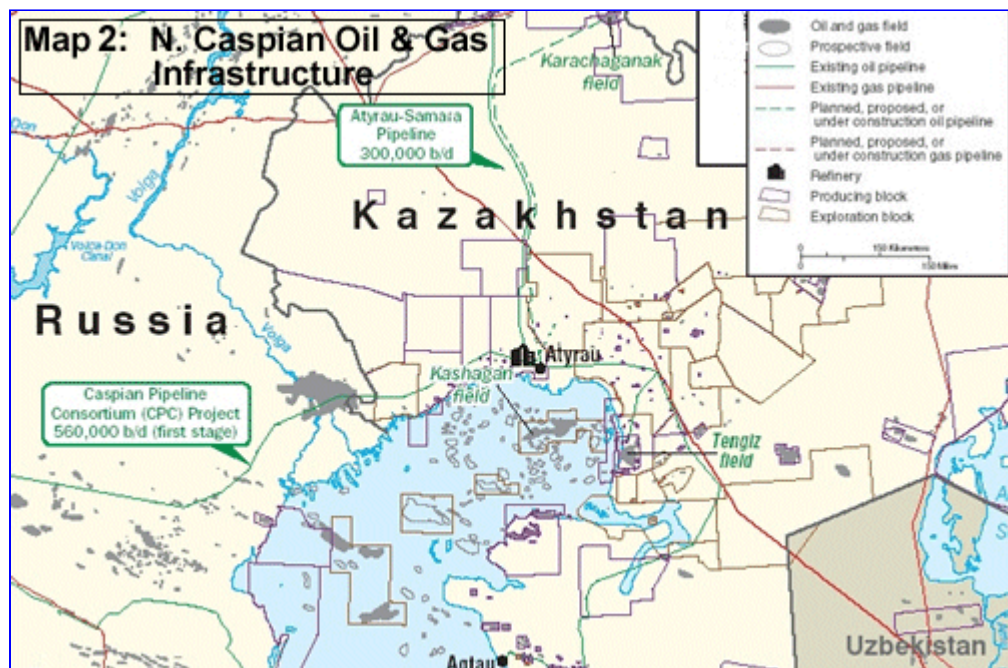
Government Energy Policy

In June 2003, the government of Kazakhstan announced a new Caspian Sea development program, which called for new offshore blocks to be auctioned beginning in 2004. However,

during 2005, the government introduced new restrictions to newly-inked PSAs. For example, the government-owned oil and gas company KazMunaiGaz must now own at least half of any PSA and will act as contractor in all new offshore PSAs in Kazakhstan. Also, 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 has 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.

Although the government is clear in its intent to raise oil and gas output in the long term, it is still unclear how the state will utilize additional revenues from higher output.



Oil Fields

Tengiz

The Tengiz field is located in the swamplands along the northeast shores of the Caspian Sea (see Map 2). Recoverable crude oil reserves have been estimated at 6-9 billion barrels by consortium member Chevron. Tengiz has been developed by the Tengizchevroil (TCO) joint venture (ChevronTexaco 50%, ExxonMobil 25%, Kazmunaigaz 20%, LukArco 5%) since 1993. For the first half of 2005, the consortium produced 271,000 bbl/d of crude oil and condensate, or approximately 21 percent of Kazakhstan's daily crude oil and condensate production. According to Chevron, Tengiz could potentially produce 700,000 bbl/d by the end of the decade. 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 have hurt production performance from the Tengiz field during 2005 and 2006, but repeated mechanical problems have also beleaguered output during the first half of 2006. A four-year \$1 billion plan to reinject the sour gas is due to come online at the end of September 2006. Gas reinjection will allow for an increase in oil production to around 450,000 bbl/d.

Karachaganak

The Karachaganak oil and gas/condensate field is located onshore, in northern Kazakhstan, near the border with Russia's Orenburg field (see map). Karachaganak is being operated by Karachaganak Petroleum (KPO), a consortium including BG Group and Eni of Italy (each with a 32.5% interest), Chevron (20%), and LUKOIL (15%) According to KPO, the field holds reserves of around 8-9 billion barrels of oil and gas condensate and 47 Tcf of natural gas, recoverable over the 40-year life of the project. Oil and condensate production from Karachaganak averaged above 200,000 bbl/d during 2005, representing almost 20 percent of total Kazakh production. 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.

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). Although the field is still being appraised, in June 2002 the consortium operating the field, the Agip Kazakhstan North Caspian Operating Company--Agip KCO (formerly known as OKIOC), estimated the field's recoverable reserves at 7-9 billion barrels of oil equivalent, with further potential totaling 9 to 13 billion barrels using secondary recovery techniques (gas injection, for example).

Costing approximately \$29 billion to develop, the Kashagan field has presented particular challenges for its developers. 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. A new tax structure was introduced by the government this year, so the ownership rights of the field remained unclear for almost two years after British Gas (BG) decided to sell its 16.7 percent share of the field. Only recently, after drawn-out negotiations, consortium members decided to redistribute BG's share, giving half to themselves and half to Kazmunaigaz. While the share was being negotiated, little progress was made on the field's development, thereby extending the field's online date. The project has also been delayed due to complicated natural and geological conditions and equipment and service price hikes.

Although the consortium members have not ruled out export of oil from the northern Caspian seaport of Aktau, requiring a doubling of the port's capacity, the primary oil export route for Kashagan oil will run 590 miles from nearby Eskene to the south to the port of Kuryk (on the eastern shore of the Caspian Sea). Oil will then be transported by tanker to the BTC pipeline. Expansions of the oil terminals in Baku and Kuryk and the pipeline's construction could cost at least \$1.5 billion. AgipKCO expects to produce 140,000-260,000 bbl/d from the field as early as 2009, and then 1.0-1.2 million bbl/d after 2010. Large scale production will require completion of the Kazakh pipeline as well as an oil and gas treatment plant with a capacity of 450,000 bbl/d. Work on the pipelines running from Kashagan to this plant is underway.

Kurmangazy

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. France's Total had sought a 25 percent share of the project but has since suspended talks over its participation after the disappointing drilling results. A second well could be drilled in 2008. A bilateral agreement signed by Kazakhstan and Russia in May 2002 delineated the Kazakh and Russian sectors of the Caspian seabed and defined the development of Kurmangazy and two other disputed offshore fields that are situated near the Kazakh/Russian border. More information on the legal status of the Caspian Sea is available on EIA's Caspian Sea Region Analysis Brief.

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 2005, Kazakhstan's exported on average 1.1 million bbl/d in three directions: northward (via the Russian pipeline system and rail network); westward (via the Caspian Pipeline Consortium Project and barge to Azerbaijan); and southward (via swaps with Iran). Kazakhstan also exported approximately 30,000 bbl/d eastward to China via the Alashankoy rail crossing in 2005. The majority of Kazakh oil is exported via pipeline through Russia and other neighboring countries. 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. When the [BTC](#) pipeline transported its first commercial oil during Summer 2006, Kazakhstan announced that shipments of Tengiz oil to BTC could begin as early as 2008. Oil volumes from the Kashagan project would help fill the pipeline once the field comes online. Overseas shipments on the Caspian to Baku are expected to grow from around 145,000 bbl/d to around 400,000 bbl/d. 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.

In January 2004, Kazakhstan started taxing crude oil exports for the first time. Now, oil producers must pay taxes on oil exports in increasing magnitude as the world oil price fluctuates. The tax ranges from 1 percent when oil prices are around \$19/bbl to 33 percent if prices rise as high as \$40/bbl or more. All exporters except those in fixed price production-sharing agreements are liable to pay the tax.

Caspian Pipeline Consortium (CPC)

The 980-mile long CPC connects Kazakhstan's Caspian Sea area oil deposits with Russia's Black Sea port of Novorossiysk (see [BG project](#) page). The governments of Russia, Kazakhstan, and Oman developed the CPC project in conjunction with a consortium of international oil companies. It is actually 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 first crude oil was loaded onto a tanker in Novorossiysk on October 15, 2001, and the pipeline was officially opened on November 27, 2001. Initial capacity of the CPC pipeline is 560,000 bbl/d, 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 by 2009. The pumping tariff will rise by 34¢/bbl to \$4.21/bbl. No timetable for implementation of the new tariff has been set.

With the completion of the two pipeline spurs from Kenkiyak and Karachaganak to the CPC at Atyrau (see [Map 1](#)) and the usage of additives, CPC transport levels in 2005 increased 34% percent to 613,000 bbl/d.

Russian oil companies TNK-BP and Rosneft have begun to use CPC more due to constraints on the Russian pipeline system. According to Transneft, Russia's pipeline monopoly, Russian oil producers used the CPC for approximately 85,000 bbl/d in May 2005.

One of the hurdles to reaching a final agreement on CPC expansion is Russia's desire for Transneft to handle the 24 percent stake in the consortium. Oil producers, which hold 50 percent in CPC, are against this decision since there could be a conflict of interest between state and private pipeline systems.

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. As the CPC project grows with Kazakh production, absolute volumes

though Atyrau-Samara are expected to grow, but this pipeline will become relatively less significant.

Kazakhstan-China Pipeline

The 613-mile-long, 813 mm, 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. 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.

A spokesman of Petrochina estimated that flows on the pipeline are currently 200,000 bbl/d. 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. The source of oil for the pipeline will be produced at CNPC's Aktobe field (34 degrees API, sour, high mercaptans) and from CNPC and Kazmunaigaz's Kumkol fields (42 degrees API, sweet). 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 final stage of the project will connect Kenkiyak and Kumkol, connecting the first two sections, and is scheduled to begin in 2011.

Map 3: Kazakhstan – China Pipeline Route



Source: DI CartographyCenter

Other Routes

In addition to the CPC and Atyrau-Samara, Kazakhstan exports via swaps to Iran, by rail to Russia, and across the Caspian by barge. The swap agreement between Iran and Kazakhstan entails approximately 30,000 bbl/d, and the agreement also includes immediate plans to build two oil terminals in Iran. In September 2006, Kazmunagaz signed a JV with the Batumi, Georgia oil terminal in order to transport Kazakh oil via tanker over the Caspian Sea and then via rail to

Batumi. The port also receives rail oil exports from Azerbaijan and Turkmenistan and expects to handle up to 240,000 bbl/d of crude oil and refined products in 2006, but this quantity is expected to decline with the commencement of BTC exports. Also, the Russian Ministry of Energy lowered rail tariffs by half in August 2006 to encourage shipment of Kazakh and Turkmen oil to transit from the Caspian Sea port of Makhachkala to the Caspian port of Novorossiysk.

Another proposed export route under consideration is a subsea trans-Caspian pipeline connecting from Aktau to the Baku-Tbilisi-Ceyhan (BTC) project. However, Russia and Iran oppose this proposal on environmental grounds, and Kazakh president Nazarbaev reiterated he in June 2004 that he preferred an oil export pipeline to the Persian Gulf through Iran over a connection to BTC, through China, or through Russia.

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. Consequently, this has affected refinery performance, and Kazakhstan's refineries currently operate at only 51 percent of their nameplate capacity.

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. 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.

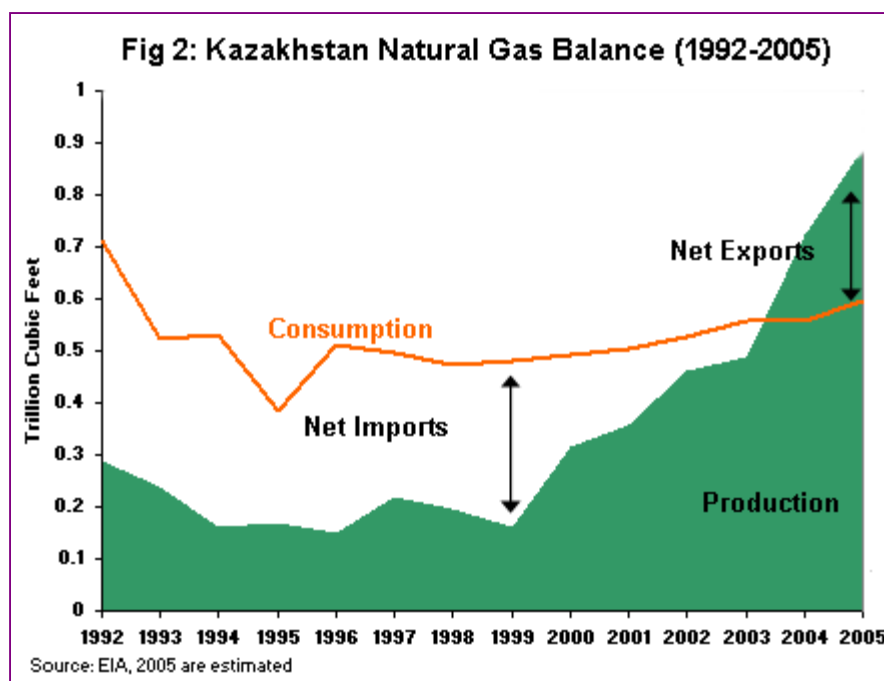
Refinery runs increased almost 20 percent during 2005, showing that the facilities are becoming more profitable. A \$370 million repairs and reconstruction effort at the Atyrau refinery by Marubeni Corporation (Japan) began in 2004 and was completed in September 2006. The upgrading will allow the refinery to produce oil products to European standards.

Oil producers' lack of incentive to provide the domestic market with refined products has created severe problems for the agricultural sector, which is largely dependent on government support and subsidized inputs for its survival. Because of the shortages, the Kazakh government has frequently imposed a ban on product exports.

Natural Gas

Despite Kazakhstan's sizeable proven natural gas reserves, which range from 65-100 trillion cubic feet (Tcf), the country spent most of the time following independence as a net natural gas importer. By 2003, however, Kazakhstan's production had reached parity with its consumption level (approximately 550 Bcf), and the country had 40 Tcf in net exports of natural gas during the first half of 2005. Although natural gas production increased around 15 percent in 2005 compared to 2004, gas production during 2006 has remained largely constant year-over-year. Most of Kazakhstan's natural gas imports come from Uzbekistan and Turkmenistan and are redistributed into the Russian natural gas pipeline system.

Kazakhstan became a net natural gas exporter in 2004. Lack of available gas export infrastructure will be the primary inhibitor to larger scale exports. Development of internal gas distribution lines connecting the northern and southern areas of the country will also help with natural gas development.



Natural gas production in Kazakhstan has increased significantly since 1999 (see Fig. 2). In August 1999, the Kazakh government passed a law requiring subsoil users (such as oil companies) to include natural gas utilization projects in their development plans. As a result, natural gas production has been on a steady increase since 1999, and by 2000 it eclipsed its pre-independence production levels. According to the 15-year strategy of the Kazakh Ministry for Energy and Mineral Resources, the country plans to increase its natural gas production to 1.7 Tcf by 2010, and to 1.84 Tcf by 2015. Kazakh energy officials estimate that internal consumption of around 900 Bcf in 2010 will leave 700 Bcf for export.

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 16-20 Tcf. The consortium developing Karachaganak expects to produce 900 Bcf by 2012.

Natural gas in Kazakhstan is almost entirely "associated" gas. For this reason, 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. Flaring has declined steadily, but in May 2005 the government ordered all 34 oil producing firms to reduce oil production to levels that would avoid natural gas flaring. Many of the companies that produce associated gas have made pledges to develop ways to use the gas (such as for electricity generation).

The Tengiz field, which produced 202 bcf in 2005, 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 is expected to begin operating in October 2006.

Another important natural gas field, Amangeldy, is situated in the south of the country, near Zhambyl. Exploratory drilling in 2001 indicated reserves of up to 1.8 Tcf. The field is being developed primarily by Kazmunaigas, and the company expects initial production of roughly 35 Bcf/y after initial developments. The Amangeldy fields that have been developed are producing approximately 10.6 bcf/y. The new commissioning of wells at the Amangeldy field have provided a large share of the natural gas production increases over the last year. Plans to build a 120-mile pipeline connecting to the rest of the natural gas distribution structure will help lessen the southern region's import dependency.

Natural Gas Exports

Kazakhstan-China Pipeline

In August 2005 Kazmunaigaz and CNPC signed an agreement to construct a gas pipeline to China from Kazakhstan. The route is still undetermined (see map below), but the parties agreed to design the pipeline for throughput of at least 1060 bcf per year (30 billion cubic meters) and with initial flows of 350 bcf per year. Turkmenistan is considering a separate pipeline route from eastern Turkmenistan, possibly through Kazakhstan or Uzbekistan to Guandun province, located on the southern Pacific coast of China. Kazakh energy officials are reportedly studying the integration of these routes. Also, Russia is planning a natural gas pipeline to China.

Kazakhstan-China Gas Pipeline Routes



Source: Kazakhstan Energy Ministry (click to enlarge)

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 an 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 from the Karachaganak field in north-western Kazakhstan. Gas output from the Karachaganak field will be shipped to Orenburg for refining, with volumes expected to reach at least 530 Bcf per year. Current deliveries of Karachaganak gas to the Orenburg plant, located 84 miles from the field, are estimated at 250 Bcf/y.

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.

Natural Gas Distribution

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.

In the north, Kazakhstan is developing its ability to export its natural gas through Russia's natural gas pipeline system. Natural gas from the Karachaganak field is sent northward to Russia's

Orenburg gas processing plant; however, efforts are currently underway to expand that link and boost export capacity. Some of the gas being sent to Orenburg will then be routed for marketing in the Russian system and some will be sent back to Kazakhstan. In July 2002, Kazmunaigaz, working in conjunction with Gazprom (Russia) under the joint venture KazRosGas, began a \$500 million program to upgrade Kazakhstan's natural gas pipeline network. The program, which is being developed with the financial backing of several international banks, will increase Kazakhstan's export capacity in the north, beginning in 2005.

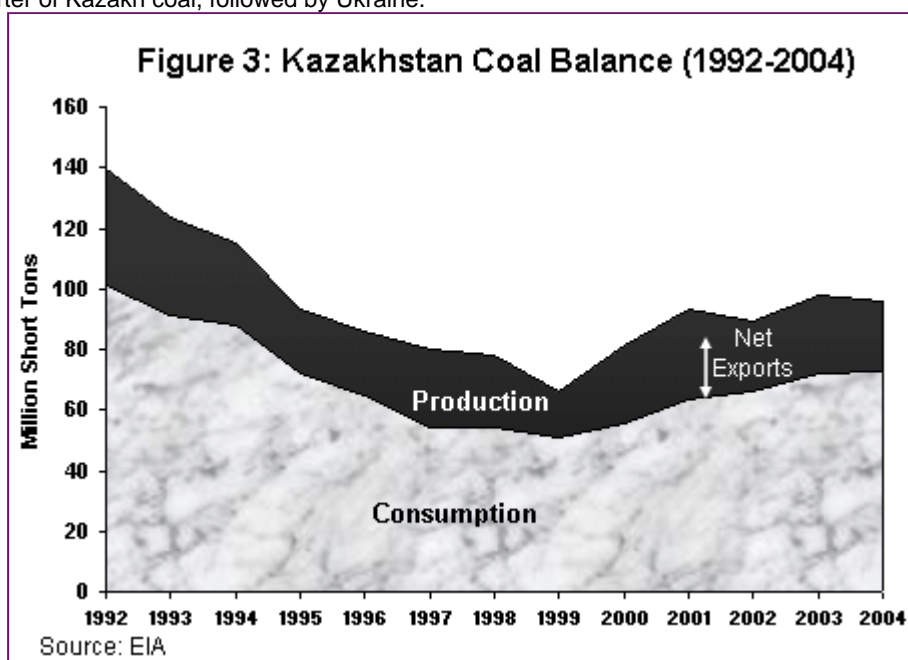
Southern Kazakhstan receives its natural gas supplies from Uzbekistan via the Tashkent-Bishkek-Almaty pipeline. This pipeline snakes through Uzbekistan before reaching Shymkent, crosses Kyrgyzstan, and terminates in Almaty. Dependence on imported natural gas for its southern regions has at times been 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. As a result, Kazakhstan is determined to end its dependence on imported supplies for its southern regions. Although Kazakhstan has considered the construction of an internal north-south pipeline, thereby alleviating import dependency, the prohibitive cost (at least \$1 billion) of such a pipeline has delayed any decision to proceed with the project.

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-Centre (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

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 96 million short tons (Mmst) in 2004, while consuming 73 Mmst, resulting in net exports of 23 Mmst. Russia is the largest importer of Kazakh coal, followed by Ukraine.



Coal production in Kazakhstan, which was the Soviet Union's third-largest producer behind Russia and Ukraine, has fallen by roughly 35 percent since independence. EIA data show a modest upswing in coal production in 2000 and 2001 (see graph); however, 2003 and 2004 estimates indicate that output fell again over the past two years. According to the Kazakh Ministry of Energy and Natural Resources, the country aims to be producing 100 million-105 Mmst annually by 2015. Much of the decline in the last decade since independence 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. This latter factor will be crucial in

obtaining the government's long term production targets.

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.

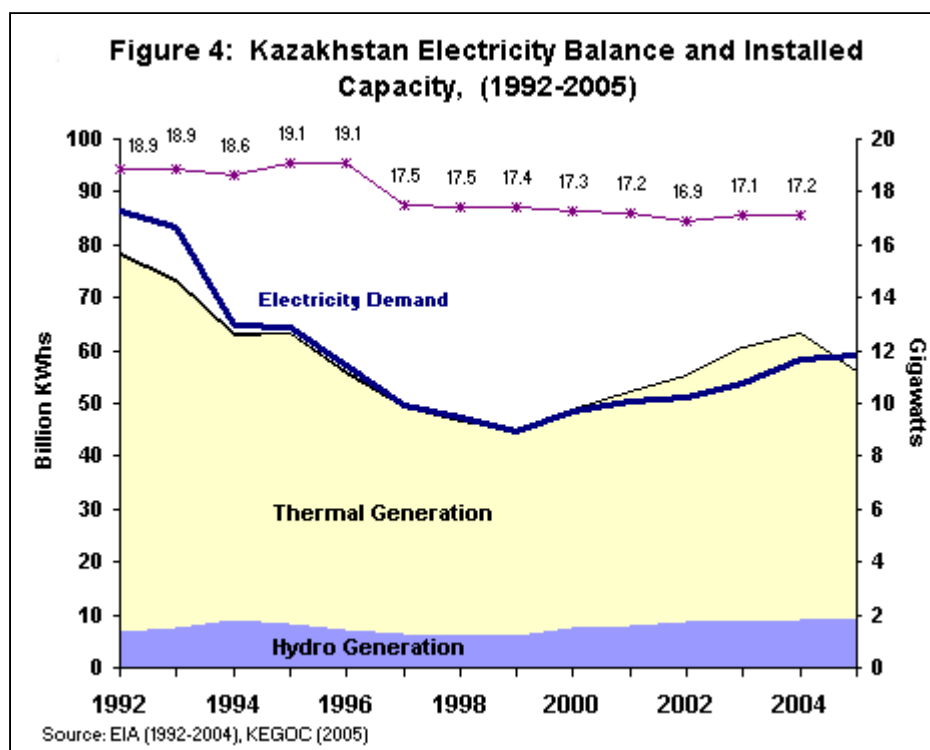
Since independence, Kazakh coal consumption has fallen from 97 Mmst in 1992 to a low of 58 Mmst in 1999 (see Figure 3). Since then, manufacturing sector growth has provided incentives for increased coal production. Kazakhstan gets over 80 percent of its electricity production from coal. The country's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

In September 2006, an explosion of Methane killed more than 40 miners at a mine operated by a subsidiary of the world's largest steel producer Mittal Steel. As a result, workers went on strike demanding higher pay and safety standards. The company and the workers came to an agreement in October 2006 after a small reduction in steel output from the facility.

Electricity

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 Irtysh river, which flows from China across northeast Kazakhstan.

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.



The production and consumption of electricity in Kazakhstan fell significantly following independence. However, robust economic growth since 2000 has helped boost generation to 66.5 billion kilowatthours (BkWh) in 2003 and consumption to 59.2 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 2003.

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.

Map 4: 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

Kazakhstan's electricity transmission and distribution system is divided into three networks. 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. However, these transmission systems are not well integrated, and they remain owned by the government. 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.

Map 5: North-South Transmission Line Project



Source: US Trade and Development Agency

The 690-mile line (dashed line in red) would cost an estimated \$300 million to build and is scheduled for completion in 2009. In 2003, the European Bank for Reconstruction and Development (EBRD) helped finance KEGOC's implementation of the first phase of the project, which cost roughly \$90 million and is now complete. The second and third phases will complete the remaining 530 miles of the transmission line, will continue the upgrading of the Ekibastuzkaya and Agadyr substations, and will provide for the purchasing of new distribution equipment. Discussions between the World Bank, EBRD, and KEGOC have been finalized for the second phase, and in late March 2006 funding for the third phase was also finalized. 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. Ninety percent of electricity sales are made in the bilateral forward market, and there is also a day-ahead spot market and a real-time balancing market. Generators and load submit schedules for balancing energy three hours ahead and the system operator controls the settlement.

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. Although the government plans to further privatize the grid, the likely success of these utilities' privatization remains questionable. For example, in 2000 Tractebel (Belgium), the owner of the Almaty electricity utility, left the country and resold the utility to the state gas pipeline operator. After four years, Tractebel had turned the Almaty electricity company around by cutting delinquency rates of more than 75 percent down to just 12 percent. However, following the April 1999 monetary devaluation, the government froze electricity prices to control inflation after previously pledging to raise rates. The Kazakh regulators complained that the company failed to meet certain investment commitments and employed corrupt business practices; Tractebel, in turn, claimed that the Kazakh government hindered the grid's development by not allowing sufficient rate recovery. The resulting dispute with Tractebel led the Belgian company to leave Kazakhstan.

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. Effective July 1, 2001, KEGOC increased electricity transmission rates across the country by an average of 23.7 percent. Rates have continued to increase during 2003 and 2004, forcing some manufacturers to halt production.

Nuclear Power

Kazakhstan has large quantities of uranium, with reserves of around 1.5 million tons representing almost 20 percent of the world's supply. The country will soon join Canada and Australia as a principal source of mine-based uranium supplies. In 2004, Kazatomprom produced approximately 4,000 tons of uranium, and the company has plans to increase production to 15,000 tons by 2010.

According to press reports, the Kazakh government is still considering the construction of a new 1,500 MW nuclear plant in the southeast, near Lake Balkash. This project was first announced in 1998, but later shelved in September 2002 because of safety concerns. However, due to rising power demand in the south, support for the construction of the plant has received new momentum. It is expected that a tender for the power plant will be issued by 2007 and that the plant will be operational by 2012-2015. Please see the [IAEA's \(Int'l Atomic Energy Agency\) page](#) on Kazakhstan for more information.

Kazakhstan's sole nuclear power plant, the 90 MW Mangyshlak Nuclear Power Plant at Aqtau, has been shut down since April 1999. It was sold in April 2003 by the government of Kazakhstan to Kazatomprom, the national nuclear power company. Kazatomprom, which has exclusive rights to the production and sale of Kazakh plutonium, plans to maintain and run the plant's thermal generators and water distribution facilities for regional consumption.

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 \(Legend\)](#)

Profile

Country Overview

Chief of State	Nursultan Nazarbaev
Prime Minister	Danial Akhmetov
Location	Central Asia, northwest of China; a small portion west of the Ural River in eastern-most Europe
Independence	16 December 1991 (from the Soviet Union)
Population (2005E)	15,185,844

Economic Overview

Minister of Economy	Aslan Musin
Currency/Exchange Rate (10/12/06)	\$1= 122.240 Kazakhstan Tenge
Inflation Rate (2005E)	7.6%
Nominal Gross Domestic Product (2005E)	\$56 Billion
Real GDP Growth Rate (2005)	9.5%
Unemployment Rate (2005E)	8.1%
External Debt (2005E)	\$41.5 Billion
Exports (2005E)	\$28.3 Billion
Exports - Commodities	oil and oil products 58%, ferrous metals 24%, chemicals 5%, machinery 3%, grain, wool, meat, coal (2001)
Exports - Partners (2004E)	Russia 13.5%, Bermuda 13.4%, China 10.4%, Germany 9.2%, Switzerland 9.1%, France 6.7%
Imports (2005E)	\$18.0 Billion
Imports - Commodities	machinery and equipment 41%, metal products 28%, foodstuffs 8% (2001)
Imports - Partners (2004E)	Russia 33.9%, China 13.6%, Germany 9.6%, France 6.8%
Current Account Balance (2005E)	-\$486 Million

Energy Overview

Minister of Energy	Baktykozha Izmukhambetov
Proven Oil Reserves (January 1, 2006E)	9 billion barrels (Oil and Gas Journal)
Oil Production (2006E)	1,310 thousand barrels per day, of which 80% was crude oil.
Oil Consumption (2005E)	222.3 thousand barrels per day
Crude Oil Distillation Capacity (2006E)	345.1 thousand barrels per day
Proven Natural Gas Reserves (January 1, 2006E)	65 trillion cubic feet (Oil and Gas Journal)
Natural Gas Production (2004E)	700 billion cubic feet
Natural Gas Consumption (2004E)	556.2 billion cubic feet
Recoverable Coal Reserves (2003E)	34.5 billion short tons
Coal Production (2004E)	95.7 million short tons
Coal Consumption (2004E)	72.9 million short tons
Electricity Installed	17.2 gigawatts

Capacity (2004E)

Electricity Production (2004E)	63.3 billion kilowatt hours
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Electricity Consumption (2004E)	58.3 billion kilowatt hours
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Total Energy Consumption (2004E)	2.3 quadrillion Btus*, of which Coal (52%), Natural Gas (25%), Oil (19%), Hydroelectricity (4%), Nuclear (0%), Other Renewables (0%)
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Total Per Capita Energy Consumption (2003E)	135.4 million Btus
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Energy Intensity (2004E)	12,726 Btu per \$2000-PPP**
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Environmental Overview

Energy-Related Carbon Dioxide Emissions (2003E)	150 million metric tons, of which Coal (64%), Oil (18%), Natural Gas (18%)
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Per-Capita, Energy-Related Carbon Dioxide Emissions (2003E)	9.7 metric tons
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Carbon Dioxide Intensity (2004E)	0.9 Metric tons per thousand \$2000-PPP**
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Environmental Issues	radioactive or toxic chemical sites associated with former defense industries and test ranges scattered throughout the country pose health risks for humans and animals; industrial pollution is severe in some cities; because the two main rivers which flowed into the Aral Sea have been diverted for irrigation, it is drying up and leaving behind a harmful layer of chemical pesticides and natural salts; these substances are then picked up by the wind and blown into noxious dust storms; pollution in the Caspian Sea; soil pollution from overuse of agricultural chemicals and salination from poor infrastructure and wasteful irrigation practices
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Major Environmental Agreements	party to: Air Pollution, Biodiversity, Climate Change, Desertification, Endangered Species, Hazardous Wastes, Ozone Layer Protection, Ship Pollution signed, but not ratified: Climate Change-Kyoto Protocol
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Oil and Gas Industry

Organization	Kazakhoil formed in 1997 with 100% state ownership, while transportation firm TransportNefteGaz was formed in 2001 on the basis of the assets of state-owned oil and gas transportation companies KazTransOil and KazTransGaz. In 2002, Kazakhoil was merged with TransportNefteGaz to form Kazmunaigaz, which will hold a 51% stake on behalf of the government in all new projects and joint ventures established in the country.
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Major Oil/Gas Ports	Aktau (200,000 bbl/d), Atyrau, Kuryk (100,000 bbl/d)
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Foreign Company Involvement	Chevron, Total, CNPC, BG Group, Lukoil, ExxonMobil, Shell, ENI, See PSA factsheet for more information.
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Major Oil Fields	Tengiz, Karachaganak, Aktobe, Kumkol
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Major Pipelines (capacity, Mmcf/d)	Caspian Pipeline Consortium (CPC), Atyrau-Samara
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Major Refineries (capacity, bbl/d)	Pavlodar (140,000 bbl/d), Shymkent (120,000 bbl/d), Atyrau (86,000 bbl/d)
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* The total energy consumption statistic includes petroleum, dry natural gas, coal, net hydro, nuclear, geothermal, solar, wind, wood and waste electric power. The renewable energy consumption statistic is based on International Energy Agency (IEA) data and includes hydropower, solar, wind, tide, geothermal, solid biomass and animal products, biomass gas and liquids, industrial and municipal wastes. Sectoral shares of energy consumption and carbon emissions are also based on IEA data.

**GDP figures from OECD estimates based on purchasing power parity (PPP) exchange rates.

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](#)
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[US Embassy, Astana](#)
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[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](#)
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[U.S. Trade and Development Agency](#)
[U.S. Treasury Department's Office of Foreign Assets Control](#)

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[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](#)
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[KEGOC: Kazakhstan Electricity Grid Operating Company](#)
[Kazakhstan, Official Site of the President](#)
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[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 \(South Region\)](#)
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