

KAZAKHSTAN'S *BEATING* *HEART*



Debo Adams, IEA Clean Coal Centre, UK, provides an overview of the Kazakh coal industry and notes the commodity's continuing importance to the nation's economy.

Kazakhstan is the largest landlocked, and ninth largest country in the world, with a landmass similar to Western Europe. The country is unusual in that it is landlocked with territory in two continents, Europe and Asia, extending across both sides of the Ural River. It is the largest economy in Central Asia and home to more than 17 million people, almost half of whom live in rural areas.

As a country rich in coal, oil, natural gas and uranium, Kazakhstan's economic focus is firmly on its industrial sector and the extraction and processing of these natural resources. Kazakh coal is currently used to generate 74% of the country's electricity, produce 100% of its metallurgical/chemicals coal, and also meet the needs of the residential sector.



Table 1. Coal production in Kazakhstan, 2006 - 2018 (BP)

Date	Amount (million t)
2018	117.79
2017	112.29
2016	103.07
2015	107.32
2014	113.99
2013	119.57
2012	120.53
2011	116.45
2010	110.93
2009	100.85
2008	111.07
2007	97.83
2006	96.16

Rapid economic growth in the past decade or so has led to a sharp upswing in electricity consumption and power shortages in the winter periods, which have had an adverse impact on regional economic development. The modernisation of existing power facilities, as well as the construction of additional generating capacity, is increasingly necessary to enable sustained economic growth. The demand for electricity is forecast to reach between 120 - 180 TWh by 2030.

About 80% of the country's electricity is produced in the industrial north by power plants located mainly near coal mines. The electricity transmission and distribution system is divided into three networks: two in the north are connected to Russia, and one in the south is connected to the Unified Energy System of Central Asia. Unfortunately, the electricity transmission networks across the country are inefficient, so losses during transmission and distribution have been estimated at roughly 15% of energy produced, although the actual value may be even higher.

Reserves

According to BP, Kazakhstan has vast proven coal reserves of 25.6 Gt, or 2.2% of the world total, making it the eighth largest in the world. Most of the coal is in Central Kazakhstan (Karaganda Oblast) and North Kazakhstan (Pavlodar and Kostanay Oblasts). The country has more than 400 coal deposits. Roughly 63% of the measured reserves consist of bituminous coal, found in the 2000 km² Karaganda, 63 km² Ekibastuz and Teniz-Korzhandkol basins, the Kushokinsk, Borly, Shubarkol and Karazhyr deposits, and elsewhere. The remaining 37% consists of lignite, located mainly in the Turgay, Nizhne-Iliyskiy and Maikuben Basins.

Production

Globally, Kazakhstan is ranked tenth in terms of coal output. It is the Former Soviet Union's (FSU) second largest producer after Russia. Most coal production is

sourced from two main basins in the central part of the country – the Karaganda Basin, which supplies metallurgical coal from underground mining operations, and the Ekibastuz Basin (the third largest coal basin in the FSU), which supplies coal to the power generation sector. The smaller deposits of coal found in the east, southeast and southwest of the country have been poorly exploited to date.

According to BP, Kazakhstan produced 112.3 million t in 2017, of which 80% was consumed domestically for electricity and heat production in thermal power plants; the remainder was exported. Production increased in 2018 to a total of 117.8 million t (Table 1). The Government of Kazakhstan plans to increase coal production to almost 200 million t by 2030.

In 2016, production of bituminous coal was 75.4 million t, up from 54.3 million t in 1997. This includes a period of decline from 2012 - 2016, followed by significant improvement in 2017.

The growth in output in 2017 and 2018 was largely due to the recovery of global coal prices (by an average of 32% in 2017), as well as stronger external demand and accelerated GDP growth (4% in 2017 compared to 1.1% in 2016). The extraction of coal and coal concentrate in Kazakhstan reached 117.8 million t at the end of 2018, up 6% on 2017.

Exports

Historically, Russia has been the primary destination for Kazakhstan's coal, recently having received 81% of all the coal exported from Kazakhstan in 2016. Over the first 11 months of 2017, coal exports grew by 14.7%, to 24.5 million t.

The main trade to Russia is black lignite from the Ekibastuz basin, which is supplied to power plants in the Urals. Russia's metallurgical and other industrial enterprises also buy significant quantities of metallurgical coal from the Karaganda basin.

Other exports include high quality coal from the Shubarkol deposit which is sent to Finland (8.6% of coal exports in 2016). Other destinations for Kazakhstan's coal include Ukraine and Kyrgyzstan and, in smaller amounts, Belarus, China, Japan and Uzbekistan, among other countries.

Mining

Coal mining is concentrated in two key regions: Pavlodar (70.3 million t) and Karaganda (39.1 million t). Large companies such as Bogatyr Komir LLP operate in the Pavlodar region. In the Karaganda region, ERG Eurasian Group and ArcelorMittal Temirtau JSC dominate coal mining. Just over 80% of the coal mined is hard coal, 10% is metallurgical coal, and the remainder is lignite.

Bogatyr Komir is Kazakhstan's largest coal producer, accounting for around 60% and 40% of all coal produced in the Ekibastuz Basin and Kazakhstan respectively. It is one of the largest opencast mining companies in the

world, with balance reserves of 2.75 Gt. Over 1 Gt of coal has been extracted to date. It has a production capacity of 42 million tpy of coal, 32 million t of which comes from the Bogatyr mine, and 10 million t from the Severny mine. Bogatyr Komir is the main employer in the Pavlodar region, providing work for over 7000 people.

Bogatyr Komir plans to increase coal output to 58 million tpy through the reconstruction of the Severny field – this is expected to increase mine capacity to 18 million tpy by 2020. The company also intends to modernise the Bogatyr mine. This will include the introduction of continuous mining technology and the deployment of automated conveyers. This technology is expected to raise output to 50 million tpy, improve the quality of end products and cut mining costs. There are also various projects being implemented by Bogatyr Komir to reduce its impact on the environment, such as:

- Introducing an underground waste disposal system.
- Reducing the number of dump storage areas in the facility from seven in 2000 to one.
- Furnishing the mine with dust capture and aspiration systems to reduce the emission of particulates.

Bogatyr Komir has a loan agreement with the Eurasian Development Bank (EDB), signed in 2018, to finance their investment programme in the modernising of coal production processes at the Bogatyr mine. The EDB will extend a loan facility of €196.6 million for 11 years. The EDB is an international financial institution founded by Russia and Kazakhstan in January 2006 to facilitate the development of market economies, sustainable economic growth, and the expansion of mutual trade and other economic ties in its member states which are all in the area.

This is the third loan agreement from EDB following the opening of loan facilities in December 2011 and November 2013. Then, the Bank extended some US\$50 million and US\$25 million for 7 years, respectively. The EDB estimate that the current project will help to increase production by arranging preparatory construction work to the tune of US\$60.7 million. Over the first 10 years from its launch, the project is expected to boost the value of coal production by an average of US\$75 million/yr and increase mutual trade between EDB countries. This will result from coal exports of US\$27 million/yr on average. It will also help to minimise adverse environmental impacts, as extracted coal will be stored within the mines.

Kazakhstan has a privatisation programme underway. The government plans to reduce its share in the economy to 15%, so aims to sell more than 700 companies by 2020, with assets such as the national oil and mining companies available to foreign investors. The assets up for sale include the national power generating company Samruk Energy, which is likely to have a portion of its shares go public in 2019. Samruk

Energy is the largest energy company in Kazakhstan and the leader in electricity production with a 28% market share, but it also enjoys leading positions in renewable energy and coal production. Its asset, Bogatyr Komir, provides about 34% of the total national coal production.

The Energy Ministry is encouraging the greater use of coal enrichment. An example is the Vostochny plant in the Pavlodar region, which was opened in 2017. This plant produces 17 000 tpy of briquetted coal using South Korean technology. The products are sold to neighbouring Russia.

Samruk also plans to commission a beneficiation plant at the Bogatyr pit in 2024, which will start exporting 1 million tpy of enriched coal. From 2026, export volumes of this beneficiated coal will increase to 3.4 million tpy.

Modernising its coal mining industry

Thus, Kazakhstan has been investing heavily in modernising its coal mining industry since at least 2015. By the early 2020s, more than US\$4 billion will have been pumped into modernisation projects by the Kazakh coal mining industry. Approximately US\$2 billion has been budgeted for modernising coal mines. The country already has the world's largest opencast coal mine.

Kazakhstan's coal industry is moving increasingly towards accelerated diversification and the provision of fuel (that complies with international standards) to both domestic and foreign markets.

The construction of new power plants and the expansion of power transmission and distribution networks are priorities for the government and are likely to be implemented in the medium-term. Ageing plants and equipment need replacing. Roughly 65% of power generating facilities have been in use for more than 20 years, and roughly one-third for more than 30 years. As a result, around US\$1.7 billion will be invested in constructing new coal-fired power plants, as well deploying new technology.

The Chairman of Samruk Energy has stated that Kazakhstan plans to install 14 GW of new power generating capacity by 2030, and the government plans major investment in the power sector. This will reach US\$63 billion over the next 18 years and include US\$37 billion for power generation, US\$9 billion for power distribution networks, and US\$17 billion for regional power distribution organisations.

Conclusion

Coal mining is dynamic in Kazakhstan. There are massive resources, national and international markets, and major investment, both planned and underway, to modernise and improve mining processes and the power generation sector.

The Kazakh President aspires to propel Kazakhstan forward, making it one of the world's 30 most developed nations by 2050. It seems likely that coal will continue to play a major role in any such transition. ^{WC}