

18 KAZAKHSTAN



18.1 Summary of Coal Industry

Kazakhstan is the ninth-largest coal producer in the world and home to over 25.6 billion tonnes of coal reserves (see Table 18-1). Kazakhstan has an estimated coalbed methane (CBM) resource base of 23 to 31 trillion cubic feet (Tcf) distributed across four coal basins: Karaganda, Ekibastuz, Zavialov, and Samarskiy. Despite its abundant coal reserves and extensive CBM resources, the country must still overcome many barriers before being able to commercially exploit its CBM and coal mine methane (CMM) reserves. These barriers include geologic conditions that make degasification collection difficult, competition from abundant Russian natural gas supplies, a lack of technological wherewithal, and a legal framework that does not sufficiently clarify and simplify procedures for CMM ownership and project development.

Table 18-1. Kazakhstan's Coal Reserves and Production

Indicator	Anthracite & Bituminous (million tonnes)	Sub-bituminous & Lignite (million tonnes)	Metallurgical (million tonnes)	Total (million tonnes)	Global Rank (# and %)
Estimated Proved Coal Reserves (2017)*	25,605	–	–	25,605	9 (2.5%)
Annual Coal Production (2016)**	75.4	12.2	15.5	103.1	10 (1.3%)

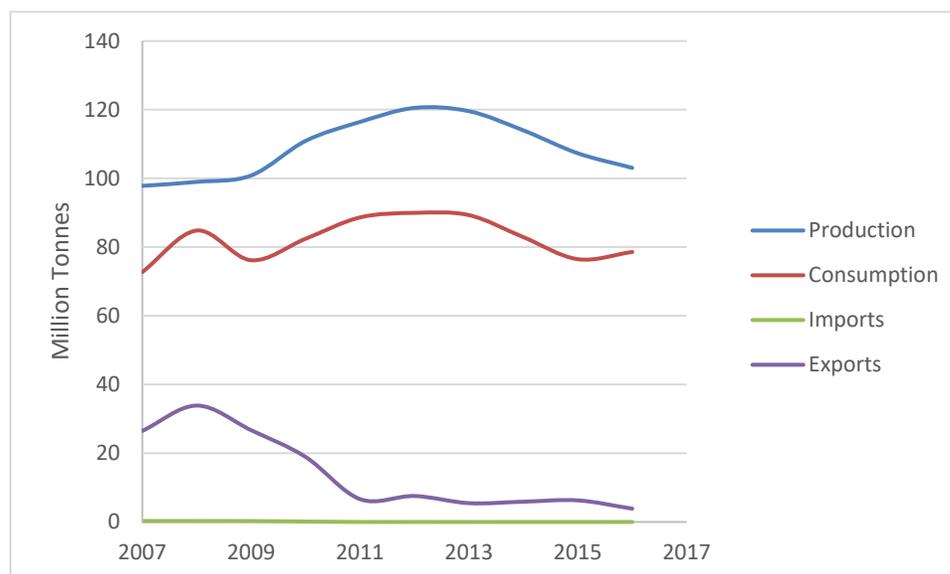
Sources: * BP (2018), ** EIA (2019).

18.1.1 ROLE OF COAL IN KAZAKHSTAN

- Coal accounts for 53.7 percent of Kazakhstan's total primary energy consumption.
- Coal production increased 13.5 percent between 2007 and 2016 (Figure 18-1). Coal and lignite production increased 6% between 2017 and 2018 (Table 18-2).
- Coal consumption increased 16.4 percent during the same period (Figure 18-1).

- Kazakhstan's electricity generation in 2017 was 53.7 percent coal, 21.7 percent oil, 20.8 percent natural gas, 3.7 percent hydroelectric, and 0.1 percent renewables (BP, 2018).

Figure 18-1. Kazakhstan Annual Coal Production



Source: EIA (2019).

Table 18-2. Kazakhstan's Coal Production by Type

Coal and Lignite Mining: 2017–2018* (million tonnes)			
	2017	2018	Annual Growth
Coal, Including Lignite and Coal Concentrate	111.1	117.8	6.0%
Hard Coal, Including Lignite	106.7	113.7	6.5%
Hard Coal	101.6	107.3	5.6%
Coking Coal (also used for blast smelting)	10.7	10.8	1.1%
Thermal Coal (also used for heating)	82.5	87	5.4%
Other Coal	8.4	9.5	13.0%
Brown Coal Lignite	5.2	6.4	24.30%
Coal Concentrate	4.4	4.1	-6.50%

* Operational data.

Source: capital.kz (2019).

- Kazakhstan has over 400 coal deposits located in the central and northern regions of the country, with the largest coalfields being in the Karaganda, Ekibastuz, Maykubinsky, and Kushokinskoe basins (GBR, 2015) (Figure 18-3).

18.1.2 STAKEHOLDERS

- Table 18-3 presents a summary of key stakeholders in Kazakhstan’s CMM industry.
- As of 2017, there were approximately 220 registered coal enterprises in Kazakhstan (Chadwick, 2017).

Table 18-3. Key Stakeholders in Kazakhstan’s CMM/CBM Industry

Stakeholder Category	Stakeholder	Role
Coal-Producing Enterprise	<ul style="list-style-type: none"> ▪ JSC ArcelorMittal Termirtau ▪ Bogatyr Komir, Ltd. ▪ ERG Eurasian Group ▪ Maykuben-West LLP ▪ Zamma Group LLP “Gamma” 	Project hosts
Developer	<ul style="list-style-type: none"> ▪ KazTransGas JSC ▪ Social enterprise company Saryarka See: https://www.epa.gov/cmop/network-contacts	Project opportunities for CBM from virgin seams
Engineering or Consultancy Services	<ul style="list-style-type: none"> ▪ Azimut Energy Services, Ltd. ▪ Promelektronika-K LLC. ▪ Kar-Metan LLC. See: https://www.epa.gov/cmop/network-contacts	Technical assistance
Universities and Research Centers	<ul style="list-style-type: none"> ▪ Methane Center, Kazakhstan ▪ Karaganda State Technical University 	Technical assistance
Other	<ul style="list-style-type: none"> ▪ National Agency for Technological Development ▪ Zhasyl Damu state company (emissions trade system) ▪ National Geological Exploration Company “Kazgeologiya” (assessment of CMM/CBM resources) 	
Government Groups	<ul style="list-style-type: none"> ▪ Ministry of Energy ▪ Ministry of National Economy ▪ Ministry of Investment and Development (geology and energy efficiency) ▪ Kazakh Scientific Research Institute for Ecology and Climate (KazNIIEC) 	Drafting of legislation, implementation of laws, government oversight

Sources: KazNIIMOSK (2002), Alekseev (2010), Energy Charter Secretariat (2013), Kerimkhanov (2019).

18.1.3 STATUS OF COAL AND THE COAL MINING INDUSTRY

- Kazakhstan's coal mining industry was restructured and largely privatized between 1995 and 1997 (DoS, 2005). The Karaganda and Ekibastuz mining associations were dissolved, the mines were put up for sale or lease, and many of the coal mining enterprises were closed or reorganized (KazNIIMOSK, 2002; USGS, 2010).
- The two largest coal basins in Kazakhstan are Ekibastuz and Karaganda—the former produces 90 percent of the country's coal from opencast mines while the latter utilizes underground mining techniques in seams that are among the gassiest in the world (Roshchanka et al., 2017).
- Kazakhstan has traditionally sent 90 percent of its exported coal to Russia; however, Russia has phased out Kazakhstani imports, causing Kazakhstan coal exports to drop 85.4 percent since 2007 (EIU, 2015; EIA, 2019).

18.2 Overview of CMM Emissions and Development Potential

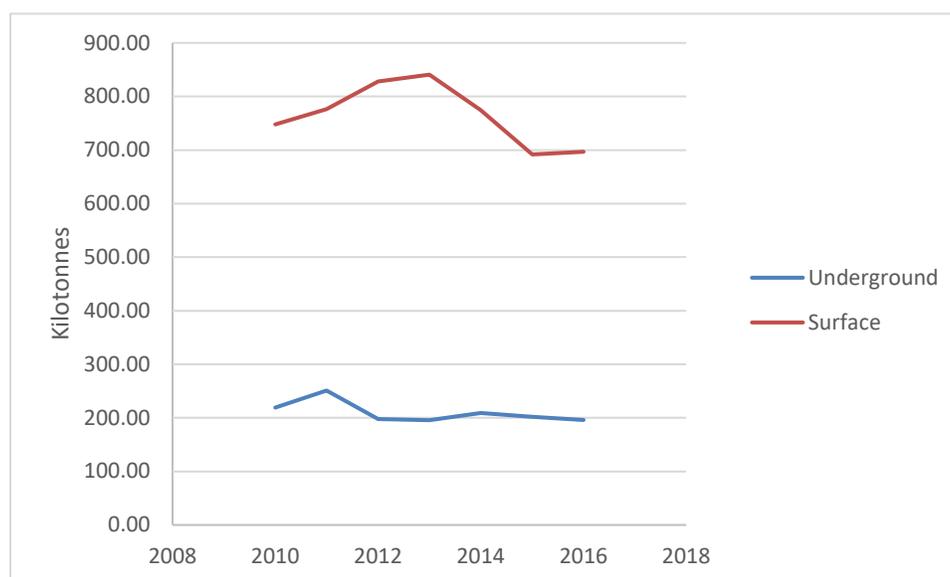
- Kazakhstan's first CMM utilization project was commissioned in November 2011 and developed by ArcelorMittal at the Lenina Mine, where it has produced over 8.7 million kilowatt-hours of electricity and prevented 32.8 metric tonnes of carbon dioxide equivalent emissions to date (GMI-ArcelorMittal, 2015).
- Under the auspices of the Global Methane Initiative (GMI), the U.S. Environmental Protection Agency funded a pre-feasibility study at the ArcelorMittal Coal Mines in the Karaganda Coal Basin in 2013:
 - Six mines were studied in the Karaganda Basin: Kuzembaeva, Saranskaya, Abayskaya, Kazakhstanskaya, Lenina, and Tentekskaya.
 - An assessment of gas resources indicated there was enough gas available for up to 40 megawatts of onsite power production.
- Despite a historical lack of CMM capture projects, preliminary research is being conducted for CMM and CBM project development in the Karaganda Basin, which holds over 10 Tcf in unconventional CBM reserves (OGJ, 2018).

18.2.1 CMM EMISSIONS FROM OPERATING MINES

- The methane content of coal seams in Kazakhstan ranges from 12 to 53 cubic meters per tonne (m³/tonne) of coal mined, with the average value of sampled mines being 30 m³/tonne of coal mined (Roshchanka et al., 2017).

- Despite a decrease in coal production, Kazakhstan's underground CMM emissions have remained relatively constant (Figure 18-2).
- Kazakhstan's coal sector emits more methane per tonne of produced coal than any other large-scale coal-producing country, but captures only 2 percent of all emissions (Roshchanka et al., 2017).
- Current drained mine methane emissions are estimated to be approximately 130 million m³ (Alekseev, 2010).

Figure 18-2. Kazakhstan Annual Coal Methane Emissions



Source: UNFCCC (2018).

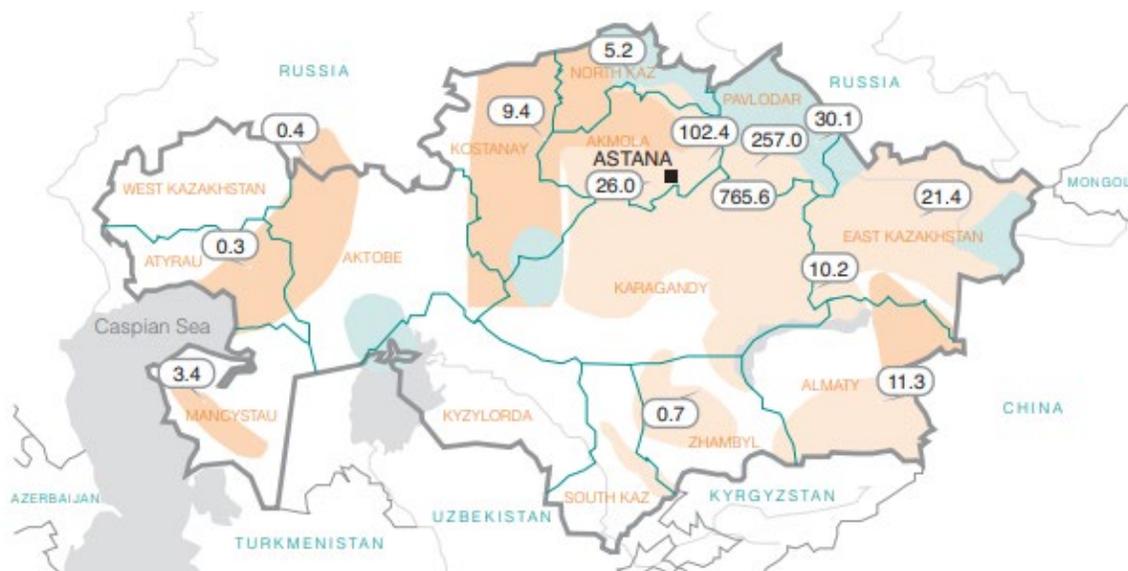
18.2.2 CMM EMISSIONS FROM ABANDONED COAL MINES

- At least 20 underground coal mines in Kazakhstan have been abandoned since 1991. All are considered gassy and every abandoned mine is classified as a high hazard for coal and gas outbreaks (IEA, 2011; PNNL, 2015).
- Starting in May 2001, measurement and data processing for gas drain pipes at abandoned shafts, pit-holes, and boreholes have been implemented at 12 abandoned mines in the Karaganda and Abay-Shakhtinsk districts.
- Over 3,000 measurements of methane flow rate and concentration are taken each year and have proven useful in understanding methane released during and after coal mining. No recovery projects have been recorded (CoMeth, 2010).

18.2.3 CBM FROM VIRGIN COAL SEAMS

- Kazakhstan has an estimated 31 Tcf of untapped CBM reserves (World Coal, 2014).
- The majority of these reserves are located in the northeastern portion of the country and 84 percent of these resources are located in the Karaganda Basin (IEA, 2011; Figure 18-3).

Figure 18-3. Kazakhstan's CBM Reserves in Billion m³ (predicted reserves have increased since this figure was created, but the distribution remains the same)



Source: IEA (2011).

18.3 Opportunities and Challenges to Greater CMM Recovery and Use

18.3.1 MARKET AND INFRASTRUCTURE FACTORS

- Kazakhstan is currently encouraging privatization even further, reducing the government share of the economy from more than 40 percent to 15 percent by 2020, particularly in the energy production sector (which includes the national power generating company and coal producer, Samruk Energy), opening the door for investment (Akhmetova, 2018; FDI, 2018).

- Since independence, Kazakhstan has opened its markets to foreign investment, which totaled 161.7 billion United States dollars in 2018, predominantly in the hydrocarbon industry. Despite institutional and legal reforms, concerns remain about corruption, bureaucracy, and arbitrary law enforcement, especially at regional and local levels (DoS, 2018).
- In November 2015, KazTransGas, the state-owned natural gas pipeline operator, completed construction of the Beinu-Bozoi-Shymkent pipeline, linking the oilfields and CBM/CMM rich coal basins of the northwest to Kazakhstan’s population centers in the south (EIA, 2019). The pipeline also connects to Chinese population centers.
- Kazakhstan’s natural gas production in 2017 was 27.1 billion cubic meters and has grown 71.5 percent over the past decade. Similarly, its natural gas exports have grown 35.3 percent in the past decade and the country was a net exporter of 7.2 billion cubic meters in 2017 (BP, 2018; EIA, 2019). With the addition of the new pipeline, which reached full capacity in February 2019, CMM has the potential to fill a growing natural gas demand in Kazakhstan and greater central Asia.

18.3.2 GOVERNMENT POLICY AND REGULATORY INFORMATION

- Kazakhstan is a signatory to the United Nations Framework Convention on Climate Change (UNFCCC), the Kyoto Protocol, and the Paris Agreement (see Table 18-4).
- New CMM projects in Kazakhstan are eligible to earn and sell emissions reduction credits through the Clean Development Mechanism. Until Kazakhstan is a member of Annex B of the UNFCCC, its domestic emissions trading system can only affect its domestic market (EDF, 2014).
- Kazakhstan’s National Emissions Trading System regulates emissions for all major companies in the energy sector and sets emissions caps for 129 companies (WB, 2018).
- Investment for CMM projects could also come from the National Innovation Fund, mine operators, and foreign investors (Zhasyl Damu, 2014).

Table 18-4. Kazakhstan’s Climate Change Mitigation Commitment

Agreement	Signature	Ratification
UNFCCC*	June 8, 1992	May 17, 1995
Kyoto Protocol**	March 12, 1999	March 26, 2009
Paris Agreement***	August 2, 2016	December 5, 2016

Sources: * UN (1992), ** UN (1997), *** UN (2015).

- The Government owns all subsurface gas and minerals but has allocated coal and CMM reserves to private mine operators as part of its agreements with contracted coal operators. Abandoned mine methane, however, has no clear legal definition and is viewed as a waste resource rather than a commercial one. Updates to the Kazakhstan Law of Subsoil and Subsoil Use in 2018 still leaves the status of abandoned mine methane ambiguous (PNNL, 2015; Deloitte Legal, 2018).
- Kazakhstan has a single system of laws that applies to both oil and gas and mining industries, and does not differentiate between conventional natural gas and CBM/CMM. The principal governing act is the Law of Subsoil and Subsoil Use dated 27 December 2017, No. 291-IV (Chentsova et al., 2018).
- The new Law of Subsoil and Subsoil Use came into effect June 2018, so it is still unclear whether any one ministry regulates CBM/CMM in its entirety; however, the Department for Coal Industry Development in the Ministry of Energy has traditionally been charged with CBM development (Roshchanka et al., 2017).
- The new code allows for CMM to be extracted from coalbeds during coal production without applying for an exploration contract; however, the gas must be used onsite at the mine and cannot be commercially sold. A contract of exploration from the government must be issued to sell CMM commercially (RoK, 2017).

18.4 References

Akhmetova, A. (2018): How Kazakhstan Is Trying to Reform Itself to Become a Regional Economic Hub, April 16, <http://voicesoncentralasia.org/how-kazakhstan-is-trying-to-reform-itself-to-become-a-regional-economic-hub/>.

Alekseev, E. (2010): personal communication with Evgeny Alekseev, Deputy Director of Methane Center PA in Kazakhstan.

BP (2018): BP Statistical Review of World Energy, 67th edition, June, <https://www.bp.com/content/dam/bp/business-sites/en/global/corporate/pdfs/energy-economics/statistical-review/bp-stats-review-2018-full-report.pdf>.

capital.kzКС (2019): Добыча угля достигла почти 118 млн тонн, January 31, <https://kapital.kz/economic/75532/dobycha-uglya-dostigla-pochti-118-mln-tonn.html>.

Chadwick, J. (2017): Vibrant Mining Industry in Kazakhstan, International Mining, February 24, <https://im-mining.com/2017/02/24/kazakhstan-mining-scene/>.

Chentsova, O., N. Braynina, Y. Manayenko (2018): Kazakhstan Subsoil Code: What's the Outcome?, Petroleum #2,

http://www.aequitas.kz/upload/files/2018/Kazakhstan_Subsoil_Code-What_s_the_Outcome_en.pdf.

CoMeth (2010): Report on the WP7, Potential Analysis for CMM Utilization in Kazakhstan and Concepts for CMM Utilization, March 15,
https://www.cometh.info/downloads/218935_Del-7.pdf.

Deloitte Legal (2018): What's New in Subsoil Use Regulation: Subsoil and Subsoil Use Code,
https://www2.deloitte.com/content/dam/Deloitte/kz/Documents/legal/LegalAlert/180417_Newsletter_Code%20On%20the%20Subsoil%20and%20Subsoil%20Use_ENG.PDF.

DoS (2005): 2005 Investment Climate Statement – Kazakhstan, U.S. Department of State.

DoS (2018): 2018 Investment Climate Statements: Kazakhstan, U.S. Department of State,
<https://www.state.gov/e/eb/rls/othr/ics/2018/sca/281702.htm>.

EDF (2014): Kazakhstan: The World's Carbon Markets: A Case Study Guide to Emissions Trading. Environmental Defense Fund and International Emissions Trading Association, Washington, DC, March, <http://www.edf.org/sites/default/files/Kazakhstan-ETS-Case-Study-March-2014.pdf>.

EIA (2019): Kazakhstan: Executive Summary, January 7,
<https://www.eia.gov/beta/international/analysis.php?iso=KAZ>.

EIU (2015): Kazakhstan Seeks New Coal Export Markets, The Economist Intelligence Unit, February 4, <http://www.eiu.com/industry/article/272799611/kazakhstan-seeks-new-coal-export-markets/2015-02-05>.

Energy Charter Secretariat (2013): Investment Climate and Market Structure Review in the Energy Sector of Kazakhstan, Energy Charter Secretariat,
https://energycharter.org/fileadmin/DocumentsMedia/ICMS/ICMS-Kazakhstan_2013_en.pdf.

FDI (2018): Kazakhstan Pushes on with Major Privatisation Programme, October 10,
<https://www.fdiintelligence.com/Companies/Kazakhstan-pushes-on-with-major-privatisation-programme>.

GBR (2015): Kazakhstan's Mining Industry, Global Business Reports Engineering and Mining Journal, September, https://www.gbreports.com/wp-content/uploads/2015/09/Kazakhstan_Mining2015.pdf.

GMI-ArcelorMittal (2015): Coal Mine Methane Success Story, Lenina Mine Pilot CMM Power Plant, JSC ArcelorMittal Temirtau Coal Division, Karaganda Coal Basin, Republic of Kazakhstan, Global Methane Initiative and Arcelor Mittal,
https://www.globalmethane.org/expo-docs/posters/CoalMines/CM_KZ_Success_AM-Lenina_FINAL.pdf.

- IEA (2011): Prospects for Coal and Clean Technologies in Kazakhstan, December, IEA Clean Coal Centre,
https://www.usea.org/sites/default/files/122011_Prospects%20for%20coal%20and%20clean%20coal%20technologies%20in%20Kazakhstan_ccc192.pdf.
- KazNIIMOSK (2002): Kazakhstani GNG Emissions Inventory from Coal Mining and Road Transportation – Final Project Report, Kazakh Research Institute for Environment Monitoring and Climate (KazNIIMOSK), Almaty, July.
- Kerimkhanov, A. (2019): Coal Mining in Kazakhstan Hits over 117 Million Tons, January 31,
<https://www.azernews.az/region/144900.html>.
- OGJ (2018): Kazakhstan's Karaganda Basin Offers CBM Development Prospects, January 1, Oil & Gas Journal, <https://www.ogj.com/articles/print/volume-116/issue-1/exploration-development/kazakhstan-s-karaganda-basin-offers-cbm-development-prospects.html>.
- PNNL (2015): personal communication with Karagandalikvidshakht, Pacific Northwest National Laboratory.
- RoK (2017): On Subsoil and Subsoil Use, Code of the Republic of Kazakhstan dated December 27, No. 125-VI, <http://adilet.zan.kz/eng/docs/K1700000125>.
- Roshchanka, V., M. Evans, F. Ruiz, and N. Kholod (2017): A Strategic Approach to Selecting Policy Mechanisms for Addressing Coal Mine Methane Emissions: A Case Study on Kazakhstan, *Environmental Science and Policy* 78:185–192,
<https://www.epa.gov/sites/production/files/2017-11/documents/cmm-emissions-case-study-kazakhstan.pdf>.
- UN (1992): Chapter XXVII Environment, 7. United Nations Framework Convention on Climate Change, United Nations Treaty Collection, May 9,
https://treaties.un.org/Pages/ViewDetailsIII.aspx?src=IND&mtdsg_no=XXVII-7&chapter=27&Temp=mtdsg3&clang=en.
- UN (1997): Chapter XXVII Environment, 7. a Kyoto Protocol to the United Nations Framework Convention on Climate Change, United Nations Treaty Collection, December 11,
https://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-7-a&chapter=27&clang=en.
- UN (2015): Chapter XXVII, Environment, 7. D Paris Agreement, United Nations Treaty Collection, December 12,
https://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-7-d&chapter=27&clang=en.

- UNFCCC (2018): National Inventory Submissions 2018, United Nations Framework Convention on Climate Change, <https://unfccc.int/process/transparency-and-reporting/reporting-and-review-under-the-convention/greenhouse-gas-inventories-annex-i-parties/national-inventory-submissions-2018#fn2>.
- USGS (2010): The Mineral Industry of Kazakhstan, 2007 Minerals Yearbook, U.S. Geological Survey, By R.M. Levine, M. Brininstool, and G.J. Wallace, July, <http://minerals.usgs.gov/minerals/pubs/country/2007/myb3-2007-kz.pdf>.
- WB (2018): Kazakhstan Launches Online Platform for Monitoring and Reporting Greenhouse Gases, The World Bank Group, February 5, <https://www.worldbank.org/en/news/press-release/2018/02/05/kazakhstan-launched-online-platform-for-ghg-reporting>.
- World Coal (2014): Coal Bed Methane in Kazakhstan, <https://www.worldcoal.com/cbm/23072014/developing-the-coalbed-methane-industry-in-kazakhstan-cbm83/>.
- Zhasyl Damu (2014): Information on the Kazakhstan CO₂ Trading Scheme, <http://zhasyldamu.kz/en/activities/greenhouse-gases/activities.html>.