USGS
science for a changing world

2016 Minerals Yearbook

MONGOLIA

U.S. Department of the Interior
U.S. Geological Survey

December 2021

The Mineral Industry of Mongolia

By Meralis Plaza-Toledo

Mongolia, a country located in northeast Asia, is bordered on the north by Russia and on the south by China. Historically, Mongolia's economy relied on herding and agricultural practices, but it has become increasingly reliant on the mining sector. Mongolia has approximately 3,000 deposits and occurrences of 50 different minerals. The country also has extensive deposits of coal, copper, fluorspar, gold, iron ore, petroleum, tungsten, uranium, and zinc. In 2016, Mongolia was estimated to be the world's third-ranked producer of fluorspar, accounting for 3.4% of world production and with reserves of 22 million metric tons (Mt) (8% of the world's reserves). In 2016, the rate of growth of Mongolia's gross domestic product (GDP) decreased to 1% from 2.4% in 2015 owing to declining exports, low commodity prices, changes brought about by parliamentary elections, and slower growth in exports to China (International Monetary Fund, 2017, p. vi, 4; Mineral Resources and Petroleum Authority of Mongolia, 2017a, p. 8; Singerling, 2018).

Minerals in the National Economy

In 2016, the mining sector accounted for approximately 17% of Mongolia's GDP and 88% of its exports. GDP growth in the mineral sector decreased to an estimated 0.7% in 2016 from 14% in 2015. In 2016, mining activity was relatively slow throughout most of the year; however, coal output increased significantly owing to supply disruptions and shifts away from coal production in China. In 2016, the mining sector employed approximately 25,392 people compared with 22,973 in 2015 (Mineral Resources Authority of Mongolia, 2016, p. 25; International Monetary Fund, 2017, p. vi, 4; Mineral Resources and Petroleum Authority of Mongolia, 2017a, p. 9, 45).

In 2015, the Parliament of Mongolia amended Mongolia's minerals law to provide that the Government's share in mineral deposits of strategic importance (not specified) could be replaced by a royalty payment. In addition, license holders receiving the Government share must pay a royalty based on a percentage approved by the Government (Ashid Advocates, LLP, 2015, p. 1).

Production

In 2016, production of gold increased by 27%; tungsten, by 26%; iron ore, by 18%; and copper, by 8%. Production of coal and metallurgical coke increased by an estimated 45% and 20%, respectively, in response to higher coal demand from China. Steel production decreased by 62% owing to a decline in demand; crushed stone production decreased by 28%, and that of fluorspar, by 13%. Mineral production data are in table 1 (International Monetary Fund, 2017, p. 13; National Statistical Office of Mongolia, 2017, p. 12).

Structure of the Mineral Industry

Table 2 lists Mongolia's major mineral industry facilities. Most of the producing mining companies in Mongolia were owned by the state or by joint ventures between international companies and the Government of Mongolia, although a few companies were wholly owned by foreign investors (table 2).

Commodity Review

Metals

Copper.—The Oyu Tolgoi porphyry copper-gold-molybdenum deposits, located in the South Gobi region, represented the largest high-grade group of Paleozoic porphyry deposits in the world. Oyu Tolgoi LLC (OT LLC) and Erdenet Mining Corp. were two large-scale copper mining operators in Mongolia in 2016. OT LLC was jointly owned by Turquoise Hill Resources Ltd. of Canada, which owned 66% of the shares, and Erdenes Oyu Tolgoi LLC (on behalf of the Government of Mongolia), with 34%. Turquoise Hill Resources, in which Rio Tinto plc held a 50.8% stake, managed the Oyu Tolgoi Mine on behalf of all shareholders. As of 2016, OT LLC was an open pit operation with a concentrator and support infrastructure capable of processing 100,000 metric tons per day of ore. Measured plus indicated resources at OT LLC were 2.2 billion metric tons (Gt) containing 21.2 Mt of copper and 772,900 kilograms (kg) of gold. In 2015, OT LLC shareholders signed the Underground Mine Development and Financing Plan to start the development of one of the Oyu Tolgoi underground deposits. In May 2016, work began on the underground development at Oyu Tolgoi, and first production was expected by 2020. The underground production would come from the Hugo Dummett North deposit, which contained probable ore reserves of 464 Mt at an average grade of 1.66% copper (more than three times higher than the open pit) and 0.34 gram per metric ton gold. It was expected that the underground deposit would be fully ramped up by 2027 and would be able to produce more than 500,000 metric tons per year (t/yr) of copper (Mineral Resources Authority of Mongolia, 2016, p. 32, 38–41; Porter, 2016; Oyu Tolgoi LLC, 2017b; Rio Tinto plc, 2017, p. 36, 37, 133, 221, 222, 224).

In 2016, the Oyu Tolgoi open pit mine produced 201,300 metric tons (t) of copper compared with 202,000 t in 2015 and 44,167 kg of silver compared with 38,040 kg in 2015. In 2017, Oyu Tolgoi was expected to produce between 130,000 and 160,000 t of copper (Oyu Tolgoi LLC, 2017a; Rio Tinto plc, 2017, p. 222).

Fluorspar.—In 2016, Mongolia produced 202,000 t of fluorspar compared with 231,000 t in 2015. In 2016, Mongolrostsvetmet LLC (a fluorspar mining and production company) mined fluorite ore from the Bor-Undur underground mine and three open pits. The fluorite ore from these mines was processed at the concentration plant at the Bor-Undur mining complex, which was the largest fluorspar-concentrate-processing

plant in Mongolia. Bor-Undur produced acid-grade fluorspar (FF–97 and FF–95) and metallurgical-grade fluorspar (FK–75) as final products (Mineral Resources Authority of Mongolia, 2016, p. 48–49; Mongolrostsvetmet LLC, 2017).

Gold.—In 2016, the Government of Mongolia adopted a resolution to develop the Gold II national program, which would be led by the Minister of Mining and Heavy Industry, to further increase gold production. The Gold II program was expected to increase gold extraction by 2 to 3 t/yr, gradually reaching 25 t/yr by 2020. The program was expected to begin in 2017 (Mineral Resources and Petroleum Authority of Mongolia, 2017a, p. 39, 71).

In 2016, OT LLC produced 9,331 kg of gold compared with 20,323 kg in 2015; the decrease was the result of lower gold ore grades. Oyu Tolgoi Phase 2 would involve the extraction and processing of ore from the currently operating open pit along with the construction and operation of the underground mine (CEE Bankwatch Network, 2016, p. 4; Rio Tinto plc, 2017, p. 221).

Mineral Fuels and Related Materials

Coal.—Mongolia has approximately 160 coal deposits and 276 occurrences in 15 basins. As of 2016, Mongolia had coal reserves of 37.4 Gt with 171 entities holding 296 coal mining licenses. In 2016, coal production in Mongolia increased to 35.1 Mt from 24.1 Mt in 2015. In 2016, 25.8 Mt of coal was exported compared with 14.5 Mt in 2015 (Mineral Resources Authority of Mongolia, 2016, p. 49; Mineral Resources and Petroleum Authority of Mongolia, 2017a, p. 42; National Statistical Office of Mongolia, 2017, p. 73).

Mongolian Mining Corp., Mongolyn Alt Group (MAK), and South Gobi Resources Ltd., were the major producers and exporters of coal in Mongolia. Mongolian Mining Corp., through its wholly owned subsidiary Energy Resources LLC, operated the Ukhaa Khudag and the Baruun Naran open pit coking coal mines located in South Gobi Province. As of 2016, Ukhaa Khudag had 680 Mt of Joint Ore Reserves Committee (JORC)-compliant coal resources (measured, indicated, and inferred], whereas Baruun Naran had 330 Mt of JORC-compliant resources (measured, indicated, and inferred) (Dolgorsuren, 2015, p. 1; Mongolian Mining Corp., 2017, p. 22, 24).

Petroleum.—In 2016, more than 90% of the oil production in Mongolia came from the Tamsag basin located in eastern Mongolia. Mongolia's Mesozoic basins are divided into 32 petroleum exploration blocks. In 2016, production-sharing contracts (PSCs) were approved for 27 exploration blocks and 25 of them were implementing PSCs. Twenty-one companies were conducting petroleum exploration and production activities in Mongolia; 6 of the companies were from Mongolia, 6 were from China, and the others were from Australia, Canada, and Switzerland. In 2016, Mongolia produced more than 8.3 million barrels (Mbbl) of crude petroleum compared with about 8.8 Mbbl in 2015; 8.06 Mbbl were exported (Mineral Resources and Petroleum Authority of Mongolia, 2017a, p. 47, 49; 2017b).

Uranium.—Uranium exploration in Mongolia was initiated in the 1940s under a bilateral agreement between Mongolia and the Soviet Union. In 2009, the Government-owned company MonAtom LLC was created to survey and explore for uranium and other radioactive minerals in Mongolia. According to the Mineral Resources and Petroleum Authority of Mongolia (MRPAM), uranium geologic resources were estimated to be 180,780 t of elemental uranium in 12 deposit areas. As of 2016, feasibility studies for eight uranium deposits had been completed and approved by the Government (International Atomic Energy Agency, 2015; Mavag, 2017).

Areva Mines LLC (a joint-venture of AREVA Mongol LLC, 66%, and MonAtom LLC, 34%) conducted uranium mining activities in Mongolia. In 2015, Cogegobi LLC (Areva Mongol's exploration subsidiary) was granted mining licenses for the Dulaan Uul and the Zoovch Ovoo deposits. In 2016, these mining licenses were transferred to Areva Mines, which was to begin detailed technical and economic studies and develop a pilot-plant site at Zoovch Ovoo using in situ recovery (ISR) technology (Areva Mongol LLC, 2017a; 2017b, p. 63).

Outlook

Mongolia has abundant mineral resources, and mineral output accounted for up to 88% of total exports and 17% of the GDP in 2016. Mongolia was once considered the fastest growing economy in the world; however, the rate of economic growth decreased in 2015 to 2.4% and then to 1% in 2016 following a sharp decline in commodity prices. As of 2016, the Government was trying to establish a favorable investment environment in the mining sector to improve Mongolia's competitiveness in international minerals markets. The Government also announced a series of measures to accelerate the development of very large projects, including new railways and power stations, to assist the commodity sector and improve the economy. It is expected that the next stage in the development of the Oyu Tolgoi copper and gold mine will account for more than 30% of Mongolia's GDP when the underground mine becomes operational by 2020. Given Mongolia's vast mineral resources, mining is expected to remain a key sector of the economy (International Monetary Fund, 2017, p. 2, 3, 8; Mineral Resources and Petroleum Authority of Mongolia, 2017a, p. 9, 17).

References Cited

Areva Mongol LLC, 2017a, AREVA in Mongolia: Ulaanbaatar, Mongolia, Areva Mongol LLC. (Accessed February 5, 2017, at http://mongolia.areva.com/EN/mongolie-94/enabout-usorganizationorganization-homepage.html.)

Areva Mongol LLC, 2017b, Reference document 2016: Ulaanbaatar, Mongolia, Areva Mongol LLC, 338 p. (Accessed June 23, 2017, at http://www.sa.areva.com/finance/liblocal/docs/doc-ref-2016/AREVA_DDR2016_EN_2.pdf.)

Ashid Advocates, LLP, 2015, The amendments of 2013, 2014 and 2015 to the law of Mongolia on minerals (2006): Ulaanbaatar, Mongolia, Ashid Advocates, LLP, 3 p. (Accessed February 5, 2018, at http://www.ashidadvocates.mn/files/publications/Minerals%20law%20%20final%20pdf2.pdf.)

CEE Bankwatch Network, 2016, Oyu Tolgoi phase 2—Plans, issues and risks: CEE Bankwatch Network, 56 p. (Accessed June 23, 2017, at https://bankwatch.org/sites/default/files/OyuTolgoi-Phase2.pdf.)

Dolgorsuren, Dorj, 2015, Mongolian coking coal export dynamics—Opportunities and challenges: International Conference on Perspectives on the Development of Energy and Mineral Resources, Honolulu, Hawaii, February 11–13, 2015, 22 p. (Accessed June 23, 2017, at http://socialsciences.hawaii.edu/conference/demr2015/_papers/dolgorsuren-dorj.pdf.)

International Atomic Energy Agency, 2015, Uranium exploration, mining and cooperation with local communities in Mongolia: Vienna, Austria, International Atomic Energy Agency, 31 p. (Accessed June 23, 2017, at https://www.iaea.org/OurWork/ST/NE/NEFW/Technical-Areas/NFC/documents/uranium/TM-Public-Uranium-2015/Presentations/16_Tserendorj_Mongolia.pdf.)

International Monetary Fund, 2017, Article IV consultation and request for an extended arrangement under the extended fund facility; press release; and statement by the Executive Director for Mongolia: Washington, DC, International Monetary Fund Country Report no. 17/140, 111 p.

Mavag, C., 2017, Current status of uranium activities in Mongolia: Proceedings of the AusIMM International Uranium Conference 2017, Adelaide, South Australia, Australia, June 7. (Accessed May 29, 2018, at http://www.uranium.ausimm.com.au/Media/uranium/presentations/1150_Mavag.pdf.)

Mineral Resources and Petroleum Authority of Mongolia, 2017a, The annual report 2016: Mineral Resources and Petroleum Authority of Mongolia, 148 p. (Accessed June 23, 2017, at https://www.mrpam.gov.mn/public/pages/66/MPRAMreport2016EN.pdf.)

Mineral Resources and Petroleum Authority of Mongolia, 2017b, The investment guide, petroleum: Mineral Resources and Petroleum Authority of Mongolia. (Accessed June 23, 2017, at http://invest.mrpam.gov.mn/detail/108.)

Mineral Resources Authority of Mongolia, 2016, Annual bulletin of mining and geology, Mongolia 2016: Mineral Resources Authority of Mongolia, 60 p. (Accessed June 23, 2017, at http://www.bgr.bund.de/EN/Themen/Zusammenarbeit/TechnZusammenarb/Downloads/mongolei_MRAM_AnnualBulletin2016.pdf?__blob=publicationFile&v=2Mongolia's Gross Domestic.)

Mongolian Mining Corp., 2017, Annual report 2016: Ulaanbaatar, Mongolia, Mongolian Mining Corp., 234 p. (Accessed June 23, 2017, at http://www.mmc.mn/upload/2017-04-27_e101.pdf.)

Mongolrostsvetmet LLC, 2017, Production units & properties: Ulaanbaatar, Mongolia, Mongolrostsvetmet LLC. (Accessed June 23, 2017, at http://mongolros.mn/index.php?option=com_content&view=article&id=73&Itemid=76&lang=en.)

National Statistical Office of Mongolia, 2017, Monthly bulletin of statistics: National Statistical Office of Mongolia—December 2016, 171 p.

Oyu Tolgoi LLC, 2017a, Oyu Tolgoi announces 2016 performance update: Ulaanbaatar, Mongolia, Oyu Tolgoi LLC press release, March 29. (Accessed June 23, 2017, at http://ot.mn/oyu-tolgoi-announces-2016-performance-update/.)

Oyu Tolgoi LLC, 2017b, Oyu Tolgoi—Our company: Ulaanbaatar, Mongolia, Oyu Tolgoi LLC. (Accessed June 23, 2017, at http://ot.mn/our-company-en/?eoi.)

Porter, T.M., 2016, The geology, structure and mineralisation of the Oyu Tolgoi porphyry copper-gold-molybdenum deposits, Mongolia—A review: Geoscience Frontiers, v. 7, no. 3, May, 33 p.

Rio Tinto plc, 2017, Rio Tinto annual report 2016: London, United Kingdom, Rio Tinto plc, 256 p. (Accessed June 23, 2017, at http://www.riotinto.com/documents/RT_2016_Annual_report.pdf.)

Singerling, S.A., 2018, Fluorspar: U.S. Geological Survey Mineral Commodity Summaries 2018, p. 60–61.

TABLE 1

MONGOLIA: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons, gross weight, unless otherwise specified)

Commodity[2]		2012	2013	2014	2015	2016
METALS						
Copper, Cu content:						
Mine production, concentrate		121,660	186,655	249,200	311,745	337,000 e
Leaching, electrowon		2,282	2,344	3,500 r, e	6,600 r, e	10,600 e
Fluorspar:						
Acid grade[3]	thousand metric tons	157	76	72 r	47 e	34
Submetallurgical and other grades	do.	484	162 r	303 r	184 r	168
Total	do.	641	238 r	375	231	202
Gold, mine production, Au content	kilograms	5,995	7,244 r	11,504	14,556	18,435
Iron and steel, raw steel		68,100	56,600 r	64,400	43,731 r	16,800
Iron ore, mine production:						
Gross weight	thousand metric tons	7,561	6,794 r	7,558 r	6,061 r	7,146
Fe content	do.	4,537	4,076 r	4,535 r	3,637 r	4,228
Molybdenum, mine production, Mo content		1,904	1,819	1,999 r	2,557	2,444
Silver, mine production, Ag content	kilograms	27,982	42,931	51,451 r	71,800 e	74,500 e
Tungsten, mine production, W content, concentrate		66	274 r	557 r	600 r	753
Zinc, mine production, Zn content		59,600 r	52,100 r	46,600	44,800 r	48,000
INDUSTRIAL MINERALS						
Cement, hydraulic	thousand metric tons	349	259	411	410	429
Lime, hydrated and quicklime	do.	68	57	58	52	53
Salt, mine production		2,461	2,179	1,852	1,686 r	1,750 e
Stone, crushed, unspecified	thousand metric tons	233	230	240	141	101
MINERAL FUELS AND RELATED MATERIALS						
Coal:						
Bituminous		6,866,000	7,579,600	6,285,000	8,656,000	7,400,000 e
Lignite		6,604,000	6,978,000	7,016,000	6,344,000	11,900,000 e
Metallurgical		12,940,900	13,991,000	11,549,000	11,681,000	15,700,000 e
Coke, metallurgical, mine production		111,600	91,600	94,300	91,471	109,471
Petroleum, crude	thousand 42-gallon barrels	3,636	5,129	7,405	8,769	8,249

eEstimated. rRevised. do. Ditto.

[1]Table includes data available through November 29, 2017. All data are reported unless otherwise noted. Estimated data are rounded to no more than three significant digits.

[2]In addition to the commodities listed, crude construction materials, such as gypsum, sand and gravel, and varieties of stone, such as limestone, may have been

[3]Flotation concentrate, includes some material less than 97%.

TABLE 2
MONGOLIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2016

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities[1]	Annual capacity[e]
Calcium oxide		Qinhua MAK Naryn Sukhait LLC (Mongolia-China joint venture)	316 km from Ulaanbaatar at the Olon Ovoot station of the Trans-Mongolian railway	50
Cement		Khutul Cement and Lime JSC	Darhan, Darhan-Uul Aimag	1,000
Coal		Baganuur Joint Stock Co. (Government, 51%, and public, 49%)	Baganuur Mine, Tov Aimag	3,000
Do.		Government, 95%, and public, 10%	Shivee Ovoo Mine, Dornogovi Aimag and Govisumber Aimag, 20 km from Choir City	2,000
Do.		SouthGobi Resources Ltd. (Turquoise Hill Resources Ltd., 58%, and China Investment Corp. 13.5%)	Ovoot Tolgoi Mine, Omnogovi (South Gobi) Aimag	4,600
Do.		do.	Tsagaan Tolgoi, Dornogovi Aimag, 95 km north of the China border	3,000
Do.		Mongolian Mining Corp., 100% (Energy Resources LLC)	Ukhaa Khudag Mine, Omnogovi (South Gobi) Aimag, 61 km east of Dalanzadgad	8,600
Do.		Mongolyn Alt (MAK) Group, 100%	Naryn Sukhait Mines, Gurvantes Soum, Omnogovi Aimag	3,000
Do.		Terra Energy LLC (TerraCom Ltd., 100%)	Baruun Noyon Uul (BNU) coking coal mine, Omnogovi Aimag, 80 km east of Naryn Sukhait Mines	1,000
Do.		Mongolian Mining Corp., 100%	Baruun Naran Mine, Omnogovi (South Gobi) Aimag, 61 km east of Dalanzadgad	3,000
Copper, Cu in concentrate		Samsung Corp., 51%, and Erdenet Mining Corp. (Mongolia-Russia Governments joint venture), 49%	Erdenet Ovoo open pit mine and processing plant, Orkhon Aimag, 180 km west of Darkhan City	140
Do.		Turquoise Hill Resources Ltd., 66%, and Government, 34%	Oyu Tolgoi Mine, Omnogovi (South Gobi) Aimag, 80 km north of the China border	150
Do.		Mongolyn Alt (MAK) Group, 100%	Tsagaan Suvarga Mine, Omnogovi (South Gobi) Aimag, 560 km southeast of Ulaanbaatar	70
Copper, Cu in cathodes		Erdenet Mining Corp. (Mongolia-Russia Governments joint venture), 51%, and Strand Holdings Ltd., 49%	Erdmin solvent extraction-electrowinning plant, 180 km west of Darkhan City	3
Fluorspar		Mongolrostsvetmet LLC	Bor-Undur Mine and processing plant, Hentiy Aimag, 310 km southeast of Ulaanbaatar; 2 underground and 3 open pit mines	450 [2]
Do.		do.	Urgen Mine, Dornogovi Aimag, 535 km from Ulaanbaatar	100 [2]
Gold, Au in concentrate		Zinjin Mining Group Co. Ltd., 70%	Nari Tolgoi Mine, Jierigron Sumu, Tov Aimag	90 [2]
Do.		North Asia Resources Holdings Ltd.	Khar Yamaat placer mine, 180 km north of Ulaanbaatar	NA
Do.		Mongolian Resource Corp. Ltd., 90%	Blue Eyes Mine, Bornuur Soum, Tov Aimag	36 [2]
Do.	thousand cubic meters	Mongolrostsvetmet LLC	Zaamar placer gold operation, Tov Aimag, 240 km southwest of Ulaanbaatar	300
Do.	do.	do.	Zeregtsee placer mine, 240 km southwest of Ulaanbaatar	500 [2]
Do.	kilograms	Turquoise Hill Resources Ltd., 66%, and Government, 34%	Oyu Tolgoi Mine, Omnogovi (South Gobi) Aimag, 80 km north of the China border	19,000
Iron ore, Fe in concentrate		Lung Ming Mining Co. Ltd., 66.7%, and China Investment Corp., 33.3%	Eruu Gol Mine	2,500
Iron and steel		Darkhan metallurgy plant	Darhan, Darhan-Uul Aimag	100
Lead		Shandong Xianglong Co. Ltd.	Tsav Mine, Dornod Aimag, Ulaanbaatar	117
Limestone		Mongolyn Alt (MAK) Group, 100%	14 km from the Olon Ovoot station of the Trans Mongolia railway	NA

See footnotes at end of table.

TABLE 2—Continued
MONGOLIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2016

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities[1]	Annual capacity[e]
Molybdenum	metric tons	Erdenet Mining Corp. (Mongolia-Russia Governments joint venture)	Erdenet Ovoo open pit mine and processing plant, Bulgan Aimag, 180 km east of Darkhan City	3,000
Do.		Turquoise Hill Resources Ltd., 66%, and Government, 34%	Omnogovi (South Gobi) Aimag, 80 km north of the China border	NA
Petroleum, crude	thousand 42-gallon barrels	PetroChina Company Limited Daching Tamsag-Mongolia (PetroChina)	Tamsag Basin	NA
Do.	do.	Sinopec	Southeast Gobi Basin	NA
Silver	kilograms	Turquoise Hill Resources Ltd., 66%, and Government, 34%	Omnogovi (South Gobi) Aimag, 80 km north of the China border	30,000
Tungsten	metric tons	Samsung Corp., 51%, and Erdenet Mining Corp. (Mongolia-Russia Governments joint venture), 49%	Erdenet Ovoo open pit mine and processing plant, Bulgan Aimag, 180 km west of Darkhan City	140
Zinc		Tsairt Minerals Co. Ltd. (China-Mongolia joint venture)	Sukhe Bator, Suhbaatar Aimag	70
Do.		Shandong Xianglong Co. Ltd.	Tsav Mine, Dornod Aimag Ulaanbaatar	117 [2]
Do.		China Nonferrous Metals Group, 51%, and Government, 49%	Tumurtiin Ovoo Mine, Sukhe Bator, 180 km southwest of Choibalsan	34

[e]Estimated. Do., do. Ditto. NA Not available.
[1]Abbreviations used for units of measure include the following: km—kilometer.
[2] Gross weight of ore processed by mill capacity.