



2017–2018 Minerals Yearbook

IRAN [ADVANCE RELEASE]

THE MINERAL INDUSTRY OF IRAN

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Note: In this chapter, information for 2017 is followed by information for 2018.

In 2017, Iran's hydrocarbon sector, which included the production of natural gas and crude petroleum, the refining of crude petroleum, and the distribution of hydrocarbons, played a significant role in the country's economy. Among mineral fuels, Iran was the world's third-ranked producer of natural gas after the United States and Russia, accounting for 6.0% of world output, and the world's fourth-ranked producer of crude petroleum and condensate after the United States, Saudi Arabia, and Russia, accounting for a combined 5.4% of output. Iran was also the world's 2d-ranked producer of mined gypsum, accounting for 11.3% of the world's output; 5th-ranked producer of barite, 6.3%; 6th-ranked producer of feldspar, 4.0%; 7th-ranked producer of bentonite, 2.1%; 8th-ranked producer of molybdenum, 1.2%; and 10th-ranked producer of iron ore, 1.7%, and kaolin, 2.1% (table 1; BP p.l.c., 2019, p. 16, 32; Crangle, 2019; McRae, 2019; Polyak, 2019; Tanner, 2019; Tuck, 2019; West, 2019).

Among those countries for which estimates of reserves were available, Iran was estimated to hold the world's 2d-largest feldspar reserves, the 5th-largest barite reserves, the 8th-largest gypsum reserves, the 9th-largest iron ore reserves, and the 10th-largest fluorspar reserves in 2017. Iran also held the world's second-largest (Russia held the largest) natural gas reserves, accounting for 17.2% of proven worldwide natural gas reserves and the world's fourth-largest crude petroleum reserves, accounting for 9.3% of proven worldwide crude petroleum reserves (BP p.l.c., 2018, p. 12, 26; Crangle, 2018; McRae, 2018; Singerling, 2018; Tanner, 2018; Tuck, 2018).

Minerals in the National Economy

In 2017, the gross domestic product (GDP) of Iran increased by 4.3% in real terms compared with an increase of 12.5% in 2016 after an average decrease of 1.6% between 2012 and 2015. Iran's nominal GDP was \$432 billion. The lifting of international sanctions, a rebound in crude petroleum production and prices, and growth in the construction and service sectors had a positive effect on economic output. The hydrocarbon sector portion of the real GDP was estimated to have increased by 5.2% in 2017 compared with an increase of 61.6% in 2016. The remaining portion of real GDP made up by all other sectors increased by 4.0% in 2017 compared with an increase of 3.3% in 2016 (International Monetary Fund, 2018a, p. 4, 30; 2018b, p. 245; 2018c).

Iran had an extensive nonfuel mineral industry, but its economy remained highly dependent on hydrocarbon production. In 2017, the hydrocarbon sector made up 13.5% of the GDP, whereas the mineral industry accounted for about 5% to 6% of the GDP. The mineral-processing sector, which included the processing and refining of copper and zinc and the production of cement and steel, accounted for an estimated 4% to 5% of the GDP, and the mining sector, an estimated 1%

(Iran International Magazine, 2016, p. 39–40; 2018, p. 27; Central Bank of the Islamic Republic of Iran, 2018, p. 2).

Government Policies and Programs

The Government-owned holding company Iranian Mines and Mining Industries Development and Renovation Organization (IMIDRO) was responsible for the formulation and implementation of the country's policies on mineral exploration and mining, mine and plant construction and development, and royalty rates on mineral production. The Ministry of Industry, Mine, and Trade (MIMT) issued mineral exploration and mining licenses (Iran Ministry of Industry, Mine, and Trade, 2015; Iranian Mines and Mining Industries Development and Renovation Organization, [undated]).

International sanctions on Iran related to uranium enrichment and reprocessing remained partially in place in 2017. The Joint Comprehensive Plan of Action (JCPOA) of July 2015 (commonly known as the "Iran nuclear deal"), which went into effect on January 16, 2016, stipulated the removal of some economic sanctions, such as those that prohibited foreign companies from investing in mineral-related facilities and fields, as well as trade in petroleum and petroleum products and trade in gold and other precious metals, graphite, raw and semifinished metals (such as aluminum and steel), and coal. Secondary sanctions on Iran were removed in 2016; these sanctions applied to foreign companies who wanted to invest, engage in a business with, or otherwise conduct any type of transaction related to the energy and petrochemical sectors of Iran. Despite implementation of the plan, large-scale foreign direct investment into Iran's mineral sector was not expected in the near future owing to ongoing political uncertainty (International Monetary Fund, 2017, p. 64; 2018a, p. 2; U.S. Department of the Treasury and U.S. Department of State, 2018, p. 4, 10).

The Iranian Integrated Petroleum Contract (IPC) was approved by the Iranian Government in 2016. The purpose of the IPC was to attract foreign investment and technology to spur development of upstream crude petroleum and natural gas projects; the Iranian constitution prohibited foreign or private ownership of natural resources. New contract terms were set for a maximum of 20 years, with the possibility of a 5-year extension for enhanced petroleum recovery projects. The IPC required that contracts involving the exploration, development, or production phases have an Iranian ownership of at least 51% (U.S. Energy Information Administration, 2018a, p. 4).

Production

Notable increases in Iran's mineral production in 2017 compared with production in 2016 included that of smelted

primary magnesium, which increased by an estimated 50%; refined primary lead, by 43%; manganese (Mn content), by an estimated 22%; direct-reduced iron (DRI), by 21%; raw steel, by 19%; perlite, by 17%; ammonia, by 13%; and distillate fuel oil and refined secondary lead, by 11% each. The increases in production were owing to an increase in international demand for Iran's exports. Notable decreases in production included mercury, which decreased by 100% (to zero); antimony, by an estimated 40%; refined primary copper, by 28%; and smelted primary copper and iron ore, by 26% each. Data on mineral production are in table 1.

Structure of the Mineral Industry

The Government controlled most large-capacity mineral companies through IMIDRO. The leading IMIDRO subsidiaries were Almahdi Aluminium Co. (aluminum and lime), Esfahan Steel Co. (ESCO) (steel), Iranian Aluminium Co. (IRALCO) (aluminum), Iran Minerals Production and Supply Co. (IMPASCO) (multiple minerals), Iran Zinc Mines Development Co. (lead and zinc), Khouzestan Steel Co. (KSC) (steel), Mobarakeh Steel Co. (MSC) (steel), and National Iranian Copper Industries Co. (NICICO) (copper and molybdenum). The National Iranian Oil Co. (NIOC) was responsible for exploration and production of petroleum and natural gas. The Atomic Energy Organization of Iran (AEOI) was engaged in the exploration, mining, and treatment of uranium. Table 2 is a list of major mineral industry facilities (Iran International Magazine, 2017, p. 34, 46, 50, 90, 102–103; U.S. Energy Information Administration, 2018a, p. 3; World Nuclear Association, 2018).

Mineral Trade

Mineral fuels accounted for about 67% of Iran's total exports of \$98.1 billion in 2017 compared with 66% of the \$84.0 billion total in 2016; the increase in the value of mineral fuel exports and their percentage of total exports was a response to the implementation of the JCPOA and an increase in global petroleum prices. Iran's crude petroleum and condensate exports increased to 2.324 million barrels per day (Mbbbl/d) in 2017 from 2.224 Mbbbl/d in 2016. In 2017, Iran exported 12.5 billion cubic meters of natural gas (mostly to Turkey). Imports of natural gas and petroleum products were valued at \$2.8 billion in 2017 compared with \$1.4 billion in 2016. Iran's total imports were valued at \$75.5 billion in 2017 compared with \$63.1 billion in 2016 (table 1; BP p.l.c., 2018, p. 34; Central Bank of the Islamic Republic of Iran, 2018, p. 7, 13).

Iran's nonfuel mineral exports were valued at \$9 billion in 2017 compared with \$7 billion in 2016. Exports of steel and steel products accounted for a significant share of nonfuel mineral exports and were valued at about \$1.6 billion in 2017, which was an increase of 13% from that of 2016. Other noteworthy minerals that Iran exported included aluminum, cement, copper and copper products, iron ore, lead, stones, and zinc (Financial Tribune, 2017a; Iran-daily.com, 2018a; Mehr News Agency, 2018).

Commodity Review

Metals

Bauxite and Alumina and Aluminum.—In 2017, aluminum production decreased to an estimated 340,000 metric tons (t), which was a 5.6% decrease from the 360,000 t produced in 2016; alumina production decreased to an estimated 240,000 t, which was a 4.0% decrease from an estimated 250,000 t produced in 2016. Iran Alumina Co., which was Iran's only producer of alumina, operated the country's largest (in terms of output) bauxite mine; the mine, which was located at Jajarm, had reserves of 8 million metric tons (Mt) and an annual production capacity of about 900,000 metric tons per year (t/yr) of bauxite. To meet increased domestic bauxite demand, IMIDRO pursued a policy of increasing domestic production and investing in bauxite mining overseas. In 2017, IMIDRO continued with plans to develop the Société des Bauxites de Dabola-Tougué (SBDT) bauxite project in Guinea. In September, IMIDRO's Managing Director and Guinea's Minister of Geology and Mines confirmed and approved a contract for the production and transfer of bauxite to Iran. The project had an estimated 300 Mt (revised) of reserves of bauxite, of which 4 Mt was expected to be produced annually and shipped to Iran until 2040. The Islamic Development Bank and the Africa Development Bank provided financing for the project (table 2; Thomson Reuters, 2015; Financial Tribune, 2016b; Iranian Mines and Mining Industries Development and Renovation Organization, 2016, p. 36–37; Iran-Daily.com, 2017).

In 2017, Iran's total aluminum and alumina production capacity was about 470,000 t/yr and 250,000 t/yr, respectively. IMIDRO planned to increase annual production of aluminum and alumina during the next several years through capacity additions at three projects. In 2015, IMIDRO signed a contract for the construction and gas supply of the South Aluminum Co. (SALCO) aluminum smelter in Bushehr Province, which would have a production capacity of 300,000 t/yr of aluminum ingot upon completion; the first phase of construction was expected to be completed in 2018. IMIDRO also previously signed contracts for the construction of a 200,000-t/yr alumina powder plant as part of the Sarab nepheline syenite project and a 36,000-t/yr aluminum ingot plant at Jajarm, which was also expected to be constructed by 2019. The Sarab project also envisioned the production of 150,000 t/yr of salt from nepheline syenite (table 2; Iranian Mines and Mining Industries Development and Renovation Organization, 2016, p. 36–37, 70, 80–81; Financial Tribune, 2017e).

Copper.—Iran produced 288,900 t of copper content of concentrate in 2017, which was an increase of 4.7% compared with the 275,900 t (revised) produced in 2016. Iran's total copper concentrate production was 1.14 Mt, which was an increase of 6% compared with production in 2016. NICICO's copper concentrate production capacity in 2017 was 1.2 million metric tons per year (Mt/yr) and mostly accounted for by its three largest mines—Miduk (located in Kerman Province), Sarcheshmeh (located in Kerman Province), and Sungun (located in Azerbaijan Province). NICICO noted that it planned to expand its copper concentrate production capacity to 2.5 Mt/yr by 2025; NICOCO also reported that Iran's reserves of copper content were estimated to be 21 Mt. The world's total

reserves of copper content were estimated to be 790 Mt at the end of 2017 (table 2; Flanagan, 2018; Iran-daily, 2018b).

Gold.—Iran's production of gold increased to an estimated at 3,700 kilograms in 2017. The leading gold mine in Iran was the Zarshouran Mine, which began operating in 2014 and had a production capacity of 3,000 kilograms per year (kg/yr) of gold. IMIDRO planned to increase the capacity of the Zarshouran Mine to 6,000 kg/yr during the next several years, which would nearly double the country's overall gold production (Iranian Mines and Mining Industries Development and Renovation Organization, 2016, p. 84, 94).

Iron and Steel.—In 2017, Iran's iron ore production decreased to nearly 34.0 Mt, which was a decrease of 26% from the 45.9 (revised) Mt produced in 2016. The country's total iron ore production capacity was 52 Mt/yr. The two largest mines were the Chadormalu Mine, which had a production capacity of 16 Mt/yr, and the Gol-e-Gohar Mine, which had a production capacity of 14 Mt/yr. In 2017, Iran exported 21.8 Mt of iron ore compared with 17.9 Mt (revised) in 2016. The leading export destination for Iranian iron ore exports in 2017 was China, which accounted for more than 90% of the volume of Iran's iron ore exports. Iran was the sixth-ranked supplier of iron ore to China in 2017 behind Australia, Brazil, India, South Africa, and Ukraine (table 2; Iranian Mines and Mining Industries Development and Renovation Organization, 2016, p. 34; Me-metals.com, 2018; World Steel Association, 2018, p. 102).

In December, two iron ore plants were inaugurated at the Sangan iron ore complex, which was located in Khorasan-e Razavi Province. The first project was a 5-Mt/yr pellet-making plant constructed by Opal Parsian Sangan Mineral and Industrial Company. More than \$260 million was invested in the plant by the partnership between Opal Parsian and IMIDRO. The second project was a 5-Mt/yr iron ore concentrate plant owned by National Industries and Mining Development Co. (NIMCO). NIMCO invested about \$190 million in the plant (Financial Tribune, 2017b).

Iran was the leading steelmaker in the Middle East and North Africa region in 2017, with total steel production of 21.2 Mt; this was an increase of 18.4% compared with the 17.9 Mt produced in 2016. All Iran's steel was continuously cast steel from electric arc furnaces. Iran also produced 19.40 Mt of DRI compared with 16.01 Mt in 2016 and 2.29 Mt of pig iron compared with 2.25 Mt in 2016. The increases in production were owing to an increase in the international demand for Iran's exports. Iran had a total steel production capacity of about 30 Mt/yr. NISCO's subsidiary, Mobarakeh Steel Co., was the country's leading steel producer with an annual production capacity of more than 7 Mt/yr of steel; the company was located in Esfahan Province in central Iran. NISCO's second- and third-ranked steel producers were ESCO (also located in Esfahan Province) and KSC (located in Khuzestan Province in southwestern Iran), each with an annual capacity of about 3.6 Mt/yr of steel. Kish South Kaveh Steel Co. (SCS) had an annual capacity of 1.2 Mt/yr of steel; however, the company had plans to expand capacity to 2.4 Mt/yr of steel under the second phase of an expansion project in 2020. SCS noted in January 2017 that although it was operating at a utilization rate of less than 50%, it would proceed with expansion plans

owing to expectations of an increase in steel exports. In the Government's 2025 Vision Plan, Iran's steel production capacity had a target of 55 Mt/yr by 2025, which would make it among the world's top 10 producers of steel (table 2; Financial Tribune, 2017d; Metals News, 2017; World Steel Association, 2018, p. 2, 4, 10, 52, 89, 95; South East Iron and Steel Institute, 2019).

Lead and Zinc.—In 2017, lead (Pb content) production was estimated to have increased slightly to 48,000 t (estimated) and zinc (Zn content) production to have increased slightly to 140,000 t. The two leading zinc and lead mines in Iran were (in order of reserves) the Mehdi Abad Mine and the Angouran Mine. The Mehdi Abad Mine had reserves of 75 Mt of ore at an average grade of 6% zinc and 2.7% lead. The Angouran Mine had reserves of 16 Mt of ore at an average grade of 26% zinc and 6% lead. In March, IMIDRO announced that it had signed a \$1 billion agreement with a consortium of six private companies, led by Iran's Mobin Mining and Construction Co., to further develop the Mehdi Abad Mine by expanding it to reach a production capacity of 800,000 t/yr of zinc concentrate and 80 t/yr of lead and silver concentrate. The project to expand the Mehdi Abad Mine had been under consideration since the 1990s but had faced multiple delays. The Mehdi Abad Mine was expected to become the main supplier of zinc and lead after zinc deposits in the Angouran Mine become depleted, and Mehdi Abad was expected to be in operation for about 20 years (Angel, 2017; Iran International Magazine, 2017, p. 52–53, 102–103).

Industrial Minerals

Cement.—Iran had about 70 cement plants in operation with a total production capacity of 85.0 Mt/yr; of these 70 plants, the majority were gray cement plants with a total (combined) production capacity of 83.2 Mt/yr, and the remaining ones were white cement plants with a total (combined) production capacity of 1.8 Mt/yr. The country's cement kilns were relatively new, as 65% of the kilns had been commissioned since 2000. In 2017, cement production was estimated to be 55 Mt, which was unchanged from that in 2016. The leading cement producers in Iran were Fars and Khuzestan Cement, which had a production capacity of about 27 Mt/yr (or about 32% of the total) of cement; Cement Investment and Development Company, which had a production capacity of 8.0 Mt/yr of cement; and Ghadir Investment Company, which had a production capacity of 7.3 Mt/yr of cement. Ghadir Investment planned to build another plant at Mondashti with a production capacity of 1.2 Mt/yr. In June, the Iran Chamber of Commerce, Industries, Mines, and Agriculture reported that Iran could increase its cement production by increasing cement exports to satisfy increasing demand in Russia. Officials noted that Russian demand was expected to increase owing to a buildout of infrastructure for projects, including the FIFA 2018 World Cup. Other potential locations for export growth were Oman and countries in Africa and Asia. Key export destinations in the past were Afghanistan, Iraq, Kuwait, and Qatar. The Government hoped to increase cement exports to 32 Mt/yr from an estimated 15 to 20 Mt/yr by 2025 based on targets set by the 2025 Vision Plan (Global Cement, 2017a, b).

Gypsum.—Iran's production of gypsum decreased to 16.0 Mt (estimated) in 2017, which was a decrease of 2.3% compared

with the 16.4 Mt produced in 2016. The leading Province for gypsum production in Iran was Semnan Province (located in north-central Iran), which was estimated to produce nearly 10 Mt/yr of gypsum. The country's other leading Provinces for gypsum production were Fars Province and Hormozgan Province in southern Iran, which together were estimated to produce nearly 6 Mt/yr (table 2; Semnan Gypsum Co., 2017; Financial Tribune, 2019; Jonoub Gypsum Co., [undated]).

Mineral Fuels, Related Materials, and Other Sources of Energy

Iran's primary energy supply sources for consumption continued to be natural gas (67.0%) and crude petroleum and petroleum products (30.7%) in 2017. Coal, hydroelectricity, and nuclear energy sources accounted for the remaining 2.3% of the country's energy supply (BP p.l.c., 2018, p. 9).

Coal.—In 2017, Iran's bituminous coal production was estimated to be 1.5 Mt, which was unchanged from that of 2016, and the country's production capacity remained at 2.7 Mt/yr. According to Iran International Magazine, Iran's coal reserves were estimated to be 1.1 billion metric tons. The Tabas region in eastern Iran accounted for the largest share of the coal reserves, with nearly 78% of the reserves, or about 867 Mt. The Central Alborz region in north-central Iran accounted for 12%, or about 134 Mt of coal reserves. The Kerman region in northeastern Iran accounted for nearly 9%, or about 94 Mt of coal reserves. The East Alborz region in north-central Iran accounted for 3%, or about 35 Mt of coal reserves (Iranian Mines and Mining Industries Development and Renovation Organization, 2016, p. 35; Iran International Magazine, 2017, p. 129).

In 2017, there was no coal-fired electricity generation in Iran, but a new coal-fired powerplant was scheduled to begin operation in 2020. The Tabas power station—a billion-dollar plant on which construction was begun in 2012—was expected to have two units with a combined capacity of 650 megawatts. The plant, which was located near Tabas, was expected to source coal from the Tabas coal region. The new plant was a partnership between Iran's MAPNA Group and China's Shanghai Electric Group Company Ltd. (Modern Power Systems, 2018; U.S. Energy Information Administration, 2018b).

On May 3, a total of 42 coal miners died owing to an explosion at the Zemestanyurt Mine in Golestan Province. The explosion was reportedly caused by an electric spark from a locomotive, which ignited excessive accumulated methane gas. The mine had a capacity of 100,000 t/yr of coal (which was used by the steel industry) and employed more than 500 workers. Government officials said the privately owned mine would remain closed while an investigation was carried out. Furthermore, the Government noted that the accident would lead to a renewed focus on improving coal mine safety standards (BBC, 2017; Financial Tribune, 2017c).

Natural Gas.—Iran produced 238.0 billion cubic meters of natural gas in 2017—an increase of 4.9% compared with the 226.9 billion cubic meters produced in 2016. Natural gas was produced mainly in southern Iran. Of the country's total natural gas output, only about 77% was dry natural gas. The remainder was either reinjected into petroleum wells to enhance petroleum recovery (about 17%) or vented and flared (about 6%).

Since 2007, dry natural gas (or marketed) production in Iran had increased by about 60% and Iran's use of natural gas in enhanced petroleum recovery had increased by about 50%. Iran vented or flared natural gas where there was insufficient infrastructure to capture and transport natural gas associated with crude petroleum production; the country's amount of vented or flared gas was high compared with other natural gas producers in the world (Organization of the Petroleum Exporting Countries, 2018, p. 115; U.S. Energy Information Administration, 2019b, p. 5–6).

Iran's largest natural gas field in 2017 was the South Pars field located offshore in the Persian Gulf, which straddled the Iran-Qatar maritime border. The Government was developing the field as part of a 24-phase project; at least 75% of the phases had been completed by the end of the year. In 2017, South Pars accounted for more than 50% of Iran's gross natural gas output and held about 40% of its total proven natural gas reserves. The field was managed by Pars Oil and Gas Co., which was a subsidiary of NIOC. In July, NIOC signed a multibillion-dollar contract with Total S.A. of France and Chinese state oil company China National Petroleum Corp. (CNPC) for the development of phase 11 (SP11) of the field. SP11 was expected to be further divided into two phases; the first phase was expected to begin operating by 2021 and would have a production capacity of about 5 billion cubic meters per year for 20 years. Total noted that the first phase would consist of 30 wells and two wellhead platforms connected to existing onshore treatment facilities by two subsea pipelines. Total also noted that the second phase of SP11 was still in the planning stages and would involve construction of offshore compression facilities. The produced gas from SP11 was expected to meet the increasing demand of Iran's domestic market (Petroff, 2017; Total S.A., 2017; U.S. Energy Information Administration, 2018a, p. 12, 16).

Iran ranked fourth among countries that consumed natural gas in 2017 after China, Russia, and the United States. Most of Iran's production was consumed domestically, as nearly equal shares have historically been consumed by the electric power sector, the residential and commercial sector, and the industrial sector. In 2017, Iran generated 304 billion kilowatt-hours (kWh) of electricity, which was an increase of 6.4% compared with the 286 billion kWh generated in 2016. The generation of electricity from natural gas in Iran in 2017 was 246 billion kWh, which was an increase of 9.8% compared with the 224 billion kWh generated in 2016. Natural gas was the largest source of fuel for electricity generation in Iran, accounting for 80.6% of total generation (BP p.l.c., 2018, p. 9, 48; U.S. Energy Information Administration, 2018a, p. 15).

Petroleum and Petroleum Refinery Products.—Iran produced 1.83 billion barrels (Gbb) of crude petroleum (including condensate) in 2017, which was an increase of about 9% compared with the 1.68 Gbb produced in 2016. The increase was primarily owing to the ability to increase exports that resulted from the implementation of the JCPOA. As a result, the country's crude petroleum production reached a 10-year high; production was about 5 Mbb/d. Crude petroleum production by the NIOC was mainly onshore in southwestern Iran; more specifically, in the Khuzestan basin, which held

80% of Iran's total onshore reserves and accounted for about 85% of Iran's total crude petroleum production capacity. Iran also produced crude petroleum from many onshore and offshore fields that were shared with Iraq, Kuwait, Qatar, and Saudi Arabia (BP p.l.c., 2018, p. 14; U.S. Energy Information Administration, 2018a, p. 4, 6–7).

Nearly one-half of Iran's production of crude petroleum was exported in 2017; key destinations were Asia (China, India, and the Republic of Korea) and Europe (mainly Turkey, but also Croatia, France, Greece, Italy, Malta, the Netherlands, Poland, and Spain). Three terminals located in the Persian Gulf handled almost all Iran's crude petroleum exports; namely, Kharg Island, Lavan Island, and Sirri Island. With a storage capacity of about 28 million barrels (Mbbbl) of crude petroleum, Kharg Island was the main export terminal in Iran; it had a loading capacity of up to 7 Mbbbl/d. Lavan Island and Sirri Island were smaller terminals that had storage capacities of 5.5 Mbbbl and 4.5 Mbbbl of crude petroleum, respectively (Financial Tribune, 2016a; Organization of the Petroleum Exporting Countries, 2018; p. 56; U.S. Energy Information Administration, 2018a, p. 8–10).

Iran's total crude refinery capacity was 1.90 Mbbbl/d in 2017, and its refineries produced 1.68 Mbbbl/d, which was an increase of 3.8% compared with the 1.62 Mbbbl/d (revised) produced in 2016. Iran's refinery production capacity ranked second among the members of the Organization of the Petroleum Exporting Countries (OPEC); Saudi Arabia ranked first with 2.9 Mbbbl/d of refinery capacity. Other leading OPEC countries with refinery production capacity in 2016 were Venezuela (1.89 Mbbbl/d, slightly below Iran), the United Arab Emirates (1.12 Mbbbl/d), Kuwait (0.76 Mbbbl/d), Algeria (0.65 Mbbbl/d), and Iraq (0.64 Mbbbl/d). OPEC's overall total refinery capacity in 2017 was 11.4 Mbbbl/d, which represented about 12% of the world total of about 96.9 Mbbbl/d (Organization of the Petroleum Exporting Countries, 2018, p. 38–42).

Uranium.—The AEIOI's uranium mining operations in Iran in 2017 were at the Gachin Mine and the Saghand Mine. The Bandar Abbas uranium plant, which began operations in 2006, produced about 21 t/yr of uranium from the Gachin Mine through acid leaching, which was then delivered to the Isfahan conversion plant. In 2015, uranium ore extraction began at the Saghand underground mine, which had resources of 900 t of contained uranium in material with a grade of 0.055% uranium; the associated Ardakan uranium plant was expected to produce 50 t/yr of uranium from Saghand ore using acid leaching. The Saghand-Ardakan operation produced an estimated 25 to 30 t of uranium in 2017; and total uranium production in Iran in 2017 was estimated to be 50 t of uranium content. Iran's indicated and inferred resources were reported to be about 1,290 t and 3,130 t of contained uranium, respectively. Iran's uranium-mining operations and processing facilities were part of its broader nuclear program, which also included nuclear powerplants, nuclear research sites, a research reactor, and uranium enrichment plants (World Nuclear Association, 2018).

MINERAL INDUSTRY HIGHLIGHTS IN 2018

In 2018, the GDP of Iran decreased by 3.9% in real terms compared with an increase of 3.7% in 2017. Iran's nominal GDP

was \$452 billion. The reimposition of international sanctions by the United States starting in November 2018 (the United States pulled out of the JCPOA in May 2018), a decrease in exports, and a decrease in crude petroleum prices and production, had a negative effect on economic output. Iran's economy was largely driven by the hydrocarbon sector; other leading sectors included agriculture, financial services, and manufacturing. In early 2018 (the latest period for which data were available), the hydrocarbon sector made up 19.6% of the GDP, whereas the mineral industry's share of the GDP remained at between 5% and 6% (Iran International Magazine, 2018, p. 27; Central Bank of the Islamic Republic of Iran, 2019, p. 2; International Monetary Fund, 2019a; 2019b, p. 161; World Bank, The, 2019).

Production

Notable increases in Iran's mineral production in 2018 compared with production in 2017 included that of antimony, which increased by 100%; smelted primary copper, 79%; refined primary copper, 66%; smelted secondary copper, 41%; uranium, 40%; DRI, 33%; refined secondary copper, 29%; copper (leaching), 19%; raw steel, 18%; manganese (gross) and urea, 17%; manganese (content), 16%; and barite, 14%. Notable decreases in production included that of boron, which decreased by 100% (to zero); smelted primary magnesium, by 67%; refined primary lead, 15%; and refined secondary lead, 15%. Data on mineral production are in table 1.

Commodity Review

Metals

Bauxite and Alumina and Aluminum.—Bauxite production in Iran in 2018 was estimated to be 700,000 t. During the year, the Government remained focused on developing its bauxite interests in Guinea. More specifically, in March, Mines and Metals Engineering GmbH (an Iranian firm registered in Germany) reported that it had started the process of prequalification of bidders for the SBDT bauxite project, which was a joint venture between IMIDRO (51%) and the Government of Guinea (49%). The project required engineering design; machinery supply and construction work, including crushing, storing, and grinding units; and transferring slurry through a 325-kilometer pipeline (Financial Tribune, 2018).

Aluminum production in Iran in 2018 was estimated to be 350,000 t. SALCO continued with plans to develop an aluminum smelter in Bushehr Province; development of the smelter, which would have an aluminum capacity of 300,000 t/yr, was delayed until 2019. SALCO's ownership in the plant was 51% by Iran's Ghadir Investment and 49% by IMIDRO. New smelter capacity could increase Iran's aluminum production by as much as 70% during the next several years (Onstad, 2018).

Iron and Steel.—In 2018, Iran's iron ore production increased by 7% to 36.4 Mt from 34.0 Mt in 2017. The increase in iron ore production was likely owing to a 33% increase in DRI production, which increased to nearly 25.8 Mt from 19.4 Mt in 2017. The increase in iron ore demand by DRI producers was partially offset by a decline in iron ore exports, which fell to 17.2 Mt—a decrease of 21% from the 21.8 Mt exported in 2017. China remained the

leading export destination for Iran's iron ore in 2018, accounting for nearly 95% of Iran's iron ore exports (Argus Metals International, 2019; World Steel Association, 2019, p. 102).

Iran's production of raw steel increased by 3.8 Mt, or 18%, to 25.0 Mt in 2018, which was a record-high level. The increase in steel production was owing primarily to an increase in steel exports, by 1.8 Mt to 9.2 Mt in 2018 from 7.4 Mt in 2017. The U.S. International Trade Administration noted that Iran's steel exports as a share of its total steel production increased to 37%, which was the highest level in more than a decade. Thailand was the leading export destination for Iran's steel exports in 2018, accounting for 17% of the total. Other leading destinations for Iran's steel exports were the United Arab Emirates, 16%; Iraq, 13%; and Indonesia, 12% (U.S. International Trade Administration, 2019, p. 3, 6).

Industrial Minerals

Cement.—Iran's production of cement increased by more than 5% to an estimated 58 Mt in 2018. In August, the head of the Industry, Mining, and Trade Organization of Bushehr Province reported that a new cement plant would soon be opened for operations; Monde Dashti Cement Co. was expected to start up a cement plant with an annual capacity of 2.0 Mt/yr of cement in 2019. Iranian officials planned to expand the country's total cement capacity by 2025 to 120 Mt/yr from 85 Mt/yr in 2018 (Mining News Agency, 2018; Global Cement, 2019).

Barite.—Iran's production of barite increased by about 14% to an estimated 490,000 t in 2018. The increase in production was likely owing to an increase in demand for drilling material by the domestic crude petroleum and natural gas industries, and an increase in demand for exports, especially to Qatar. In 2018, Mehdi Abad Zinc Co. (a subsidiary of K.D.D. Group) was the primary producer of barite in Iran, with a production capacity of 600,000 t/yr; the Mehdi Abad Mine was located in Yazd Province in central Iran (table 2; Fast Markets IM, 2017).

Mineral Fuels and Related Materials

Natural Gas.—Iran remained the third-ranked producer of natural gas in the world in 2018, as its production increased by 4.4% to 248.5 billion cubic meters; the increase was owing primarily to the continued development of phases in the South Pars project. During the year, production ramped up at phases 19, 20, and 21, which started operating in 2017; phases 13, 14, 22, 23, and 24 started operations in 2018 and were expected to fully ramp up in 2019. Overall, more than 90% of the planned 24 phases of the South Pars project were operating by the end of 2018. Phase 11 of the project was expected to start operating in 2022. During 2018, both Total and CNPC suspended their investments and withdrew from Phase 11 in response to the United States reinstating sanctions on Iran as part of the United States' withdrawal from the JCPOA. According to the BP Statistical Review of World Energy, Iran held the world's largest natural gas reserves at the end of 2018, with 1,128 trillion cubic feet; Iran's reserves represented 16.2% of the total world reserves (Thomson Reuters, 2018; BP p.l.c., 2019, p. 30; U.S. Energy Information Administration, 2019a, p. 4).

Petroleum and Petroleum Products.—Iran's production of crude petroleum (including condensate) decreased by 6.2% to 1.72 Gbbl in 2018; Iran's ranking among the world's largest crude petroleum producers declined to fifth behind the United States, which produced 5.59 Gbbl; Saudi Arabia, 4.49 Gbbl; Russia, 4.18 Gbbl; and Canada, 1.90 Gbbl. Iran's decrease in production was owing primarily to a decrease in exports related to the United States' withdrawal from the JCPOA. Iran's crude petroleum reserves at the end of 2018 were 155.6 Gbbl, which accounted for 9.0% of the world total, according to the BP Statistical Review of World Energy. Iran held the fourth-largest crude petroleum reserves in the world behind Venezuela, which had 303.3 Gbbl of reserves; Saudi Arabia, 297.7 Gbbl; and Canada, 167.8 Gbbl (U.S. Energy Information Administration, 2018c; BP p.l.c., 2019, p. 14, 16).

Outlook

Iran's economy is projected to remain weak during the next 2 years. The GDP is projected to decrease by 6.0% in 2019 and to increase slightly by 0.2% in 2020 owing to the reinstatement of United States sanctions and an expected reduction in crude petroleum exports, according to the International Monetary Fund. Still, numerous production-capacity expansion projects, especially for metals and mineral fuels, are either currently in progress or planned. Noteworthy increases in production are expected from the SALCO aluminum smelter, the Zarshouran gold mine, the Mehdi Abad lead-silver-zinc mine, the NICICO copper mines, and the South Pars natural gas field, and production of coal to power the Tabas power station is also expected to increase. Maintenance of current levels of hydrocarbon output in the country will depend on technological upgrades, development of new fields, and the full lifting of international sanctions on Iran to increase exports (International Monetary Fund, 2019b, p. 161).

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TABLE 1
IRAN: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons, gross weight, unless otherwise specified)

Commodity ²	2014	2015	2016	2017	2018
METALS					
Aluminum:					
Bauxite	748,297	861,604	766,000 ^{r,e}	735,000 ^e	700,000 ^e
Alumina	251,000	241,000	250,000 ^e	240,000 ^e	240,000 ^e
Metal, primary	355,000	355,000	360,000	340,000 ^e	350,000 ^e
Antimony, mine, Sb content ^e	220 ^r	330 ^r	500 ^r	300	600
Chromium, mine, chromite, concentrate:					
Gross weight	359,332	276,570	342,332 ^r	324,200	330,000 ^e
Cr ₂ O ₃ content	157,953	142,810	162,100 ^r	155,000 ^e	160,000 ^e
Copper:					
Mine:					
Ore, 0.6% to 1.2% Cu:					
Gross weight		thousand metric tons			
Cu content	35,900	44,500	47,000 ^e	47,000 ^e	48,000 ^e
Concentrates, 29% to 35% Cu, Cu content	216,800	246,400	289,300	295,600	300,000 ^e
Leaching, electrowon, Cu content	203,900	233,400	275,900 ^r	288,900	300,800
Smelter:	12,700	13,000	13,400	13,200	15,700
Refinery:					
Primary	156,500	153,500	153,400	114,200	204,100
Secondary	76,000	82,100	72,200	70,900	100,300
Gold, mine, Au content^{e,3}					
		kilograms			
Gross weight	3,300	3,500	3,700	3,700	3,700
Iron ore, mine:					
Gross weight		thousand metric tons			
Fe content	51,544 ^r	48,427 ^r	45,890 ^r	33,967	36,435
	33,800 ^r	31,800 ^r	30,100 ^r	22,200	23,900
Iron and steel:					
Direct-reduced iron		do.			
Pig iron	14,551	14,546	16,013	19,401	25,750
Raw steel, ingots, and castings	2,782	2,459	2,251	2,293	2,362
	16,331 ^r	16,146	17,895	21,236	25,000
Lead:					
Mine, concentrate:^e					
Gross weight	94,000	87,000	90,000 ^r	92,000	92,000
Pb content	44,000	40,800	47,000 ^r	48,000	48,000
Refinery:^e					
Primary	17,000 ^r	18,000 ^r	14,000 ^r	20,000	17,000
Secondary	55,000 ^r	60,000	72,000 ^r	80,000	68,000
Magnesium, primary, metal ^e	500	1,000	2,000	3,000	1,000
Manganese, mine:^e					
Gross weight	140,000	86,500	79,000 ^r	96,000	112,000
Mn content	56,600	35,000	31,900 ^r	38,800	44,900
Mercury, Hg content	12	14	3 ^r	--	-- ^e
Molybdenum, mine, concentrate:					
Gross weight	6,200 ^e	6,705	6,500 ^e	6,500 ^e	6,500 ^e
Mo content	3,494	3,500 ^e	3,500 ^e	3,500 ^e	3,500 ^e
Silver, mine, Ag content ^e		kilograms			
Gross weight	80,000	90,000	90,000	90,000	90,000
Zinc:					
Mine, concentrate:					
Gross weight	282,000	252,000	270,000 ^{r,e}	280,000 ^e	260,000 ^e
Zn content	139,000	124,000	135,000 ^r	140,000 ^e	140,000 ^e
Smelter	145,000	138,000	135,000 ^r	140,000	130,000
INDUSTRIAL MINERALS					
Arsenic trioxide ^e	110	110	110	110	110
Barite	440,741	340,318 ^r	399,750 ^r	430,000 ^e	490,000 ^e

See footnotes at end of table.

TABLE 1—Continued
 IRAN: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons, gross weight, unless otherwise specified)

Commodity ²	2014	2015	2016	2017	2018
INDUSTRIAL MINERALS—Continued					
Boron, borates	1,383	675	700 ^e	700 ^e	-- ^e
Celestite	41,050	36,760	37,000 ^{r,e}	37,000 ^e	37,000 ^e
Cement, hydraulic	66,700	58,600	55,000 ^{r,e}	55,000 ^e	58,000 ^e
Clay:					
Bentonite ^e	420,000 ^r	436,000	356,000 ^r	356,000	360,000
Kaolin	820,067 ^r	791,193 ^r	790,000 ^r	790,000 ^e	790,000 ^e
Unspecified ^e	600,000	600,000	600,000	600,000	600,000
Diatomite	9,912	9,500 ^e	9,500 ^e	10,000 ^e	10,000 ^e
Feldspar	1,055,368	736,149	784,412 ^r	750,000 ^e	750,000 ^e
Fluorspar	78,736 ^r	39,286 ^r	70,820 ^r	70,000 ^e	70,000 ^e
Gemstones, turquoise ^e	21,000	21,000	21,000	21,000	21,000
Gypsum	19,550 ^r	20,000 ^e	16,377 ^r	16,000 ^e	16,000 ^e
Lime ^e	2,800	2,800	2,900 ^r	3,100	3,300
Magnesite	165,886 ^r	165,073 ^r	151,881 ^r	155,916	150,000 ^e
Mica ^e	5,600 ^r	5,600	1,500 ^r	1,500	1,500
Nitrogen, N content:					
Ammonia	2,446,100 ^r	2,641,900 ^r	3,000,000 ^{r,e}	3,400,000 ^e	3,400,000 ^e
Urea	1,600,000	1,800,000 ^{r,e}	2,200,000 ^{r,e}	2,400,000 ^e	2,800,000 ^e
Perlite	42,646 ^r	63,030 ^r	17,083 ^r	20,000 ^e	20,000 ^e
Phosphate rock, ore:					
Gross weight ^e	120,000	200,000 ^r	250,000 ^r	250,000	250,000
P ₂ O ₅ content	36,500	65,300 ^r	77,900 ^r	78,000 ^e	78,000 ^e
Salt	3,940	4,450 ^r	3,000 ^{r,e}	3,000 ^e	3,000 ^e
Sand and gravel, industrial:					
Glass sand, quartzite and silica ^e	1,500	1,500	1,500	1,500	1,500
Stone, crushed, unspecified ^e	27,000	27,000	27,000	27,000	27,000
Sulfur, byproduct, natural gas and petroleum, S content ^e	2,100,000 ^r	2,200,000	2,200,000	2,200,000	2,200,000
Talc	112,500	137,135	130,000 ^e	130,000 ^e	130,000 ^e
Vermiculite	1,200	1,000	1,000 ^e	1,000 ^e	1,000 ^e
MINERAL FUELS AND RELATED MATERIALS					
Coal:					
Bituminous	1,434	1,470	1,500 ^e	1,500 ^e	1,500 ^e
Lignite	2,700	2,800 ^e	2,800 ^e	2,800 ^e	2,800 ^e
Coke, metallurgical	965	980	1,031	1,000 ^e	1,000 ^e
Natural gas, dry basis	212,796	226,673	226,905	238,003	248,524
Petroleum:					
Crude	1,355,610 ^r	1,406,345 ^r	1,678,476 ^r	1,833,760	1,720,975
Natural gas liquids ^e	160,000	160,000	160,000	160,000	160,000
Refinery:					
Distillate fuel oil	178,047 ^r	182,172 ^r	179,084 ^r	198,852	201,188
Gasoline, motor	137,788 ^r	141,109 ^r	138,714 ^r	143,701	145,124
Kerosene	45,990 ^r	43,034 ^r	41,907 ^r	43,472	44,640
Residual fuel oil	155,089 ^r	152,935 ^r	147,425 ^r	140,051	141,109
Other	88,184 ^r	88,190 ^r	84,985 ^r	87,053	84,972
Total	605,000 ^r	607,000 ^r	592,000 ^r	613,000	617,000
Uranium, mine, U content	45	46	50 ^e	50 ^e	70 ^e

^eEstimated. ^rRevised. do. Ditto. -- Zero.

¹Table includes data available through January 6, 2020. All data are reported unless otherwise noted. Totals and estimated data are rounded to no more than three significant digits; may not add to totals shown.

²In addition to the commodities listed, bromine, caustic soda, crude construction materials (such as sand and shell), dimension stone, dolomite, ferroalloys, hafnium oxide, ilmenite, iron oxide pigments, limestone, nepheline syenite, pumice, selenium, silicomanganese, soda ash, zeolites, and zirconium metal may have been produced, but available information was inadequate to make reliable estimates of output.

³Includes gold recovered from the Sarcheshmeh copper complex.

TABLE 2
IRAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2018

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Alumina	Iran Alumina Co. [Iranian Mines and Mining Industries Development and Renovation Organization (IMIDRO)] ¹	Northeast of Jajarm, Khorasan-e Shomali Province	250
Aluminum	Almahdi Aluminium Co [(Iranian Mines and Mining Development and Renovation Organization (IMIDRO)] ¹	Bandar Abbas, Hormozgan Province	250
Do.	Iranian Aluminium Co. (IRALCO) [Iranian Mines and Mining Industries Development and Renovation Organization (IMIDRO) ² majority interest, and a joint venture of Industrial Development Investment Co. and a subsidiary of Mehr Finance & Credit Institution, 40%]	Arak, Markazi Province	220
Barite	Mehdi Abad Zinc Co. (K.D.D. Group)	Mehdi Abad Mine, Yazd Province	600
Bauxite	Iran Alumina Co. [Iranian Mines and Mining Industries Development and Renovation Organization (IMIDRO)] ¹	Jajarm Mine, about 15 kilometers northeast of Jajarm	900
Celestite	Kani Goharan Kimia Co.	Bandar Abbas, Hormozgan Province	72
Cement	Abadeh Cement Co.	Abadeh, Fars Province	393
Do.	Abyek Cement Co. (Fars & Khuzestan Cement Co.)	Abyek, Qazvin Province, 80 kilometers northwest of Tehran	3,900
Do.	Anarak Special Cement Co.	Anarak, Markazi Province	500
Do.	Ardebil Cement Co. (Espandar Cement Investment Co.)	Namin, Ardabil Province	1,092
Do.	Ardestan Cement Co.	North of Esfahan, Esfahan Province	1,092
Do.	Azar-Abadegan Khoy Cement Co.	West Azerbaijan Province	1,095
Do.	Behbahan Cement Co. (Fars & Khuzestan Cement Co.)	Behbahan, Khuzestan Province	718
Do.	Benvid White Cement Co. (Bank Melli Iran Investment Co.)	Benvid, Esfahan Province	164
Do.	Bojnourd Cement Plant (Fars & Khuzestan Cement Co.)	About 37 kilometers from Bojnourd, Khorasan-e Shomali Province	1,654
Do.	Bushehr Cement Co. (Dashtestan Cement)	Borazjan, Bushehr Province	1,000
Do.	Darab Cement Co. [General public (Justice shares), 50%, and Bank Melli Iran Investment Co., 29%]	About 190 kilometers southeast of Shiraz, Fars Province	1,123
Do.	Dashtestan Cement Co.	NA	936
Do.	Doroud Cement Co. (Fars & Khuzestan Cement Co.)	Doroud, Lorestan Province	1,245
Do.	East White Cement Co.	NA	330
Do.	Ekbatan Cement Co. (Espandar Cement Investment Co.)	Ekbatan, Tehran Province	114
Do.	Estahban Cement Co.	20 kilometers west of Estahban, Fars Province	350
Do.	Faraz Firouzkhu Cement Co. (Espandar Cement Investment Co.)	About 180 kilometers northeast of Tehran	1,030
Do.	Fars Cement Co. (Fars & Khuzestan Cement Co.)	Shiraz, Fars Province	819
Do.	Fars Now Cement Co. (Fars & Khuzestan Cement Co.)	About 65 kilometers southeast of Shiraz, Fars Province	936
Do.	Ghaen Cement Co. (Cement Investment and Development Co., 26%, and Bank Melli Iran Investment Co., 14%)	Qayen (Ghaen), Khorasan-e Jonubi Province	811
Do.	Gharb Cement Co. (Fars & Khuzestan Cement Co.)	Kermanshah, Kermanshah Province	1,248
Do.	Gilan Sabz Cement Co.	Deylaman, Gilan Province	1,200
Do.	Hegmatan Cement Co. (Tehran Cement Co., 79%)	East of Razan, Hamadan Province	2,059
Do.	Hormozgan Cement Co. (OMID Investment Co.)	About 75 kilometers west of Bandar Abbas	1,872
Do.	Ilam Cement Co. (Tehran Cement Co., 47%)	Northeast of Ilam, Ilam Province	1,654
Do.	Isfahan Cement Co.	Esfahan, Esfahan Province	1,036
Do.	Jovein Cement Co.	Jovein, Khuzestan Province	1,400
Do.	Karoun Cement Co.	Near Masjed Soleyman, Khuzestan Province	936
Do.	Kavan Boukan Cement Co.	Near Kashan, Esfahan Province	1,030
Do.	Kavir Kashan Cement Co. (Espandar Cement Investment Co.)	do.	557
Do.	Kerman Cement Co. (Bank Melli Iran Investment Co., 38%)	Kerman, Kerman Province	1,148
Do.	Khamseh Cement Co.	Zanjan Province	1,061
Do.	Khash Cement Co. (Fars & Khuzestan Cement Co.)	Khash, Sistan va Baluchestan Province	811
Do.	Khazar Cement Co. (Fars & Khuzestan Cement Co.)	About 80 kilometers northwest of Qazvin, Qazvin Province	1,248
Do.	Khuzestan Cement Co. (Fars & Khuzestan Cement Co.)	Ramhormoz, Khuzestan Province	2,496

See footnotes at end of table.

TABLE 2—Continued
 IRAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2018

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Cement:—Continued	Kohkiloye Yasuj Cement (State Retirement Organization ¹ and Fars & Khuzestan Cement Co.)	Behbahan, near Deh Dasht, Kohkiloye, Kohgiluyeh va Bowyer Ahmad Province	1,200
Do.	Kordestan Cement Co. (Ghadir Investment Co.)	North of Bijar, Kordestan Province	998
Do.	Lamerd Cement Co.	Lamerd, Fars Province	1,030
Do.	Lar-e Sabzevar Cement Co.	Sabzevar, Khorasan-e Razavi Province	1,030
Do.	Larestan Cement Co.	Fars Province	142
Do.	Loshan Cement Co. (Tehran Cement Co., 66%)	Loshan, Gilan Province	206
Do.	Mazandaran Cement Co. (Bank Melli Iran Investment Co., 60%)	Neka, Mazandaran Province	2,278
Do.	Momtazan Cement Co.	Kerman, Kerman Province	1,030
Do.	Naeen Cement Co.	NA	1,560
Do.	Nahavend Cement Co.	NA	1,030
Do.	Neyriz White Cement Co. (Fars & Khuzestan Cement Co.)	Neyriz, Fars Province	164
Do.	Neyzar Qom Cement Co.	NA	1,030
Do.	Omran Anarak Cement Co.	Delijan, Markazi Province	1,030
Do.	Qeshm Cement Co.	Qeshm Island, Hormozgan Province	510
Do.	Peyvand Golestan Cement Co.	NA	1,030
Do.	Safaieh Cement Co.	NA	624
Do.	Saman Gharb Cement Co.	NA	2,184
Do.	Sarooj Bushehr International Co.	Kangan, Bushehr Province	624
Do.	Saveh Grey Cement Co. (Fars & Khuzestan Cement Co.)	Saveh, Markazi Province	2,246
Do.	Saveh White Cement Co. (Fars & Khuzestan Cement Co.)	do.	230
Do.	Sepahan Cement Co. (Ghadir Investment Co.)	Mobarakeh, Esfahan Province	3,089
Do.	Shahrekind Cement Co.	NA	1,030
Do.	Shahroud Cement Co. (Fars & Khuzestan Cement Co.)	Shahroud, Semnan Province	1,872
Do.	Sharg Cement Co. (Ghadir Investment Co.)	Mashhad, Khorasan-e Razavi Province	2,500
Do.	Shomal Cement Co. (Bank Melli Iran Investment Co., 59%)	Pardis, Tehran Province	1,248
Do.	Shomal White Cement Co. (Bank Melli Iran Investment Co., 59%)	do.	89
Do.	Soufian Cement Co. (Fars & Khuzestan Cement Co., 50%, and Social Security Organization Investment Co., 50%)	About 33 kilometers northwest of Tabriz, East Azerbaijan Province	2,184
Do.	Tehran Cement Co. (Ghadir Investment Co.)	Tehran, Tehran Province	3,170
Do.	Tejarat Mehriz Cement Co.	NA	1,123
Do.	Tis Chabahar Cement Co.	Chabahar, Sistan and Baluchestan Province	6,000
Do.	Urmia Cement Co. (Fars & Khuzestan Cement Co.)	Orumiyyeh, West Azerbaijan Province	1,966
Do.	Urmia White Cement Co.	do.	164
Do.	Yasouj Cement Co.	NA	218
Do.	Yazd Bohrouk Cement Co.	Yazd, Yazd Province	1,100
Do.	Zabol Cement Co.	NA	1,030
Do.	Zanjan Cement Co. (Fars & Khuzestan Cement Co.)	Zanjan, Zanjan Province	606
Do.	Zarin Rafsanjan Cement Co.	NA	218
Do.	Zarveh Torbat Cement Co.	Torbat e-Heydariyeh, Khorasan-e Razavi Province	1,092
Chromite:			
Concentrate, Cr ₂ O ₃ content	Esfandaghe Mines Co.	Abdasht Mine, Kerman Province; Suqan (Saboughan) Mine, Kerman Province; processing plant at Esfandaghe, Kerman Province	30
Do.	Faryab Mining Co.	Faryab Mine and processing plant, Minab, Hormozgan Province	180 °
Do.	Shahab Sang Co.	Sabzan Mine, Faryab, Kerman Province	5
Do.	NA	Furumad Mine, Shahroud, Semnan Province; Gaft processing plant, Semnan Province	6
Do.	NA	Mir Mahmud Mine, Mayami, Semnan Province	6
Do.	NA	Dumak Mine, Zahedan, Sistan va Baluchestan Province	2

See footnotes at end of table.

TABLE 2—Continued
 IRAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2018

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity	
Coal	Kerman Coal Co.	Eshkli Mine and Hamkar Mine, Kerman Province	620	
Do.	National Iranian Copper Industries Co. (NICICO) [Iranian Mines and Mining Industries Development and Renovation Organization (IMIDRO)] ¹	Eastern Parvadeh Mine, Tabas Province	600	
Do.	do.	Khomroud Mine, Kerman Province	450	
Do.	National Iranian Copper Industries Co. (NICICO) [Iranian Mines and Mining Industries Development and Renovation Organization (IMIDRO)] ¹	Parvadeh 4 Mine, Tabas Province	600	
Do.	do.	Parvadeh 2 and 3 Mines, Tabas Province	500	
Do.	do.	Kordobad Mine, Savadkouh Province	325	
Do.	do.	Hashouni and Pabdana Mines, Kerman Province	150	
Do.	do.	Takht and Vatan Mines, Alborz Province	150	
Do.	do.	Zemestanyurt Mine, Golestan Province	100	
Coke	Isfahan Steel Co. [Iranian Mines and Mining Industries Development and Renovation Organization (IMIDRO)] ¹	Plant about 40 kilometers southwest of Esfahan, Esfahan Province	900	
Do.	Middle East Coke Production Co. [[Iranian Mines and Mining Industries Development and Renovation Organization (IMIDRO)] ¹	NA	800	
Do.	Tabas Coke Production Co. [Iranian Mines and Mining Development and Renovation Organization (IMIDRO)] ¹	NA	450	
Do.	Zarand Iranian Steel Co.	Zarand, Kerman Province	800	
Copper:				
Concentrate, Cu content	do.	Sarcheshmeh copper complex, south of Rafsanjan, Kerman Province	720	
Do.	do.	Sungun Mine and Plant, East Azerbaijan Province	325	
Do.	do.	Miduk Mine, Kerman Province	150	
Do.	do.	Qal'eh Zari Mine, about 120 kilometers southwest of Birjand, Khorasan-e Jonubi Province	10	
Do.	do.	Chah Firozeh, Chah Messi, Darehzar, and Eijo copper mines, Kerman Province	NA	
Do.	Private cooperatives	Chah Musa Mine and Qal'eh Sukhteh, Semnan Province	5	
Smelter output	National Iranian Copper Industries Co. (NICICO) [Iranian Mines and Mining Industries Development and Renovation Organization (IMIDRO)] ¹	Smelter, Sarcheshmeh copper complex, south of Rafsanjan, Kerman Province	200	
Do.	do.	Smelter near Khatoonabad, Kerman Province	120	
Refined metal	do.	Refinery, Sarcheshmeh copper complex, south of Rafsanjan, Kerman Province	210	
Do.	do.	Electrowinning plant, Sarcheshmeh copper complex, south of Rafsanjan, Kerman Province	14	
Do.	do.	Electrowinning plant, Miduk copper complex, Kerman Province	5	
Ferrochrome	Iran Minerals Production and Supply Co. (IMPASCO) [Iranian Mines and Mining Industries Development and Renovation Organization (IMIDRO)] ¹	Joghatai ferrochrome complex, Khorasan-e Razavi Province	25	
Gemstones, turquoise	NA	Neyshabur Mine, Khorasan-e Razavi Province	6 °	
Gold:				
Ore, Au content	kilograms	Iran Minerals Production and Supply Co. (IMPASCO) [Iranian Mines and Mining Industries Development and Renovation Organization (IMIDRO)] ¹	Mouteh Mine (Chah Khaton and Senjedeh pits), Esfahan Province, and Kuh-e-Zar Mine, Semnan Province	600
Do.	do.	National Iranian Copper Industries Co. (NICICO) [Iranian Mines and Mining Industries Development and Renovation Organization (IMIDRO)] ¹	Combined production from various copper mines	600
Do.	do.	Pouya Zarcan Agh Darreh Co.	Agh Darreh	2,200

See footnotes at end of table.

TABLE 2—Continued
 IRAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2018

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Gold:—Continued				
Ore, Au content—Continued	kilograms	Zar Kuh Mining Co.	Sari Gunay Mine, 90 kilometers east of Sanandaj, Kordestan Province	2,000
Do.	do.	Zarshouran Gold Mine and Mining Industries Development Company [Iranian Mines and Mining Industries Development and Renovation Organization (IMIDRO)] ¹	Zarshouran Mine, 40 kilometers northeast of Takab, West Azerbaijan Province	3,000
Do.	do.	Artisanal placer operations	Neyshabur area, Khorasan-e Razavi Province	NA
Metal ²	do.	National Iranian Copper Industries Co. (NICICO) [Iranian Mines and Mining Industries Development and Renovation Organization (IMIDRO)] ¹	Sarcheshmeh copper complex, south of Rafsanjan, Kerman Province	210
Gypsum		Various local operators	Fars, Hormozgan, and Semnan Provinces	16,000
Iron and steel:				
Iron ore		Chadormalu Mining and Industrial Co. [Omid Investment Management Corp., 37%; Mines and Metals Development Investment Co., 15%; Iranian Mines and Mining Industries Development and Renovation Organization (IMIDRO), ¹ 8%]	Chadormalu Mine, 80 kilometers north of Bafgh, Yazd Province	16,000
Do.		Gol-e-Gohar Iron Ore Co. [Omid Investment Management Corp., 39%; Mines and Metals Development Investment Co., 28%; Iranian Mines and Mining Industries Development and Renovation Organization (IMIDRO), ¹ 18%]	Gol-e-Gohar Mine, about 50 kilometers southwest of Sirjan, Kerman Province	14,000
Do.		Iran Central Iron Ore Co. [National Iranian Steel Co. (NISCO), 100%]	Choghart Mine, Bafgh, Yazd Province	3,250
Do.		Iranian Minerals Production and Supply Co. (IMPASCO) [Iranian Mines and Mining Industries Development and Renovation Organization (IMIDRO)] ¹	Jalal Abad Mine, about 40 kilometers northwest of Zarand, Kerman Province	2,000
Do.	do.		Chah Gaz Mine, Yazd Province	700
Do.	do.		Mishdovan Mine, Yazd Province	500
Do.		Sangan Iron Ore Co. [National Iranian Steel Co. (NISCO)] ³	Sangan (Songun) Mine, about 140 kilometers southeast of Torbat e-Heydariyeh, Khorasan-e Razavi Province	2,600
Do.		About 20 small privately owned mines	NA	1,000 ^c
Cast iron		Zagros Steel Co. (Government, majority interest)	Foundry in Kordestan Province	70
Direct reduced		Mobarakeh Steel Co. (MSC) [National Iranian Steel Co. (NISCO)] ³	Direct-reduction iron plant about 50 kilometers southwest of Esfahan, Esfahan Province	8,990
Do.		Khuzestan Steel Co. (KSC) [National Iranian Steel Co. (NISCO)] ³	Direct-reduction iron plant, Ahwaz, Khuzestan Province	3,820
Do.		Gol-e-Gohar Mining and Industrial Co.	Direct-reduction iron plant, Kerman Province	3,260
Do.		South Kaveh Steel Co.	Direct-reduction iron plant in Bandar Abbas, Hormozgan Province	1,860
Do.		Sirjan Iranian Co.	Direct-reduction iron plant, Kerman Province	1,700
Do.		Hormozgan Steel Co. [National Iranian Steel Co. (NISCO)] ³ and partners]	Direct-reduction iron plant, Gachin, Hormozgan Province	1,660
Do.		Khorasan Steel Co. [Iranian Mines and Mining Industries Development and Renovation Organization (IMIDRO)] ¹ majority interest, and a Government pension fund, 40%]	Direct-reduction iron plant, Khorasan-e Razavi Province	1,600
Do.		Chadormalu Mining and Industrial Co. [Omid Investment Management Corp., 37%; Mines and Metals Development Investment Co., 15%; Iranian Mines and Mining Industries Development and Renovation Organization (IMIDRO), ¹ 8%]	Direct-reduction iron plant, Ardakan, Yazd Province	1,550
Do.		Persian Gulf Saba Steel Co.	Direct-reduction iron plant, Hormozgan Province	1,500
Do.		Esfahan Steel Co. (ESCO) [National Iranian Steel Co. (NISCO)] ³	Direct-reduction iron plant about 40 kilometers southwest of Esfahan, Esfahan Province	600

See footnotes at end of table.

TABLE 2—Continued
 IRAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2018

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity	
Iron and steel:—Continued				
Steel, crude	Mobarakeh Steel Co. (MSC) [National Iranian Steel Co. (NISCO)] ³	Plant about 50 kilometers southwest of Esfahan, Esfahan Province	7,200	
Do.	Khuzestan Steel Co. (KSC) [National Iranian Steel Co. (NISCO)] ³	Plant at Ahwaz, Khuzestan Province	3,600	
Do.	Esfahan Steel Co. (ESCO) [National Iranian Steel Co. (NISCO)] ³	Plant about 40 kilometers southwest of Esfahan, Esfahan Province	3,600	
Do.	Kish South Kaveh Steel Co. (SKS)	Hormozgan Province	1,200	
Do.	Chadormalu Mining and Industrial Co. [Omid Investment Management Corp., 37%; Mines and Metals Development Investment Co., 15%; Iranian Mines and Mining Industries Development and Renovation Organization (IMIDRO), ¹ 8%]	Plant at Ardakan, Yazd Province	1,000	
Do.	Khorasan Steel Co. [Iranian Mines and Mining Industries Development and Renovation Organization (IMIDRO) ¹ majority interest, and a Government pension fund, 40%]	Plant at Neyshabur, Khorasan-e Razavi Province	1,000	
Do.	Arfa Steel Co.	Plant at Ardakan, Yazd Province	800	
Do.	Vian Steel Melting and Casting Co.	Plant, about 42 kilometers from Hamadan, Hamadan Province	600	
Do.	Meibod (Meybod) Steel Co. [Iranian Mines and Mining Industries Development and Renovation Organization (IMIDRO)], ¹ 50%	About 15 kilometers southwest of Meybod, Yazd Province	300	
Lead:				
Concentrate, Pb content	Calcimin Co. (Iran Zinc Mines Development Co.)	Dandi zinc and lead concentrator plant, Zanjan Province	30	
Do.	Zanjan Zinc Kholes Sazan Industrial Group	Zanjan plant, Zanjan Province	20	
Refined metal	National Iranian Lead and Zinc Co. (Iran Zinc Mines Development Co.)	About 12 kilometers east of Zanjan, Zanjan Province	40	
Lead and zinc, ore				
Do.	Iran Zinc Mines Development Co.	Angouran open pit mine, Dandi, Zanjan Province	1,000	
Do.	Mehdi Abad Zinc Co. (K.D.D. Group)	Mehdi Abad Mine, Yazd Province	700	
Do.	Ber-Oner Tehran Co.	Emarat Mine, about 25 kilometers southwest of Arak, Markazi Province	150	
Do.	Bafgh Mining Co.	Koushk Mine, Yazd Province	120	
Do.	BAMA Co. (Irakouh)	Irakouh complex (Gooshfil underground and Tappeh Sorkh open pit mines, about 20 kilometers southeast of Esfahan, Esfahan Province, and Koleh Darvazeh Mine, south of Esfahan, Esfahan Province)	100	
Magnesite	Birjand Refractory Mining Co. (Iranian Refractories Procurement & Production Co.)	Hoz Sefid, Shirkuhak, and Torshak Mohammadi Mines about 50 kilometers southeast of Birjand, Khorasan-e Jonubi Province	NA	
Magnesium	Royal Metal Ingot Co.	South Khorasan Province	6	
Molybdenum, concentrate	National Iranian Copper Industries Co. (NICICO) [Iranian Mines and Mining Industries Development and Renovation Organization (IMIDRO)] ¹	Molybdenum plant, Sarcheshmeh copper complex, south of Rafsanjan, Kerman Province	8	
Do.	do.	Molybdenum plant, Sungun copper complex, East Azerbaijan Province	3	
Natural gas	billion cubic meters	Pars Oil and Gas Co. [National Iranian Oil Co. (NIOC), 100%] ¹	South Pars gasfields, offshore	227
Do.	do.	National Iranian Oil Co. (NIOC) (Government, 100%)	Associated gas from company oilfields	96
Do.	do.	do.	Aghar, Dalan, Kangan, and Nar gasfields	57
Petroleum:				
Crude	million 42-gallon barrels	do.	Onshore oilfields include the Agha Jari, the Ahwaz-Asmari, the Bangestan, the Hakimeh, the Gachsaran, the Karanj, the Marun, the Pazanan, and the Rag-e-Safid. Offshore oilfields include the Abouzar and the Salman	1,400

See footnotes at end of table.

TABLE 2—Continued
 IRAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2018

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners		Location of main facilities	Annual capacity
Petroleum:—Continued					
Crude— Continued	million 42-gallon barrels	National Iranian Oil Co. and buyback contract joint venture of Shell Iran Nowrooz/Soroosh Development (70%), JJI S&N B.V. (20%), and Iranian Offshore Engineering & Construction Co. (10%)		Nowrooz and Soroosh fields, offshore	75
Do.	do.	National Iranian Oil Co. (NIOC) and buyback contract joint venture of Total S.A. (55%) and Eni SpA (45%)		Doroud field, offshore	65
Do.	do.	National Iranian Oil Co. (NIOC) and buyback contract joint venture of Total S.A. (70%) and PETRONAS Carigali International Sdn Bhd (30%)		Sirri A and E fields, offshore	40
Do.	do.	National Iranian Oil Co. (NIOC) and buyback contract joint venture of Total S.A. (60%) and Naftiran Intertrade Co. (40%)		Darquain field, onshore	17
Refined products	thousand 42-gallon barrels per day	National Iranian Oil Refining and Distribution Co. (NIORDC) (Government, 100%)		Refinery at Abadan	400
Do.	do.	do.	do.	Refinery at Isfahan	375
Do.	do.	do.	do.	Refinery at Bandar Abbas	330
Do.	do.	do.	do.	Refinery at Tehran	250
Do.	do.	do.	do.	Refinery at Arak	250
Do.	do.	do.	do.	Refinery at Borzuyeh	120
Do.	do.	do.	do.	Refinery at Tabriz	110
Do.	do.	do.	do.	Refinery at Shiraz	60
Do.	do.	do.	do.	Refinery at Lavan	60
Do.	do.	do.	do.	Refinery at BooAli Sina	34
Do.	do.	do.	do.	Refinery at Kermanshah	22
Do.	do.	do.	do.	Refinery at Aras 2	10
Do.	do.	do.	do.	Refinery at Bushehr	10
Do.	do.	do.	do.	Refinery at Aras 1	5
Do.	do.	do.	do.	Refinery at Yazd	3
Do.	do.	do.	do.	Refinery at Zarand	1
Phosphate rock		Esfordi Phosphate Complex [Iran Minerals Production and Supply Co. (IMPASCO)] ¹		About 35 kilometers northeast of Bafgh, Yazd Province	360
Potash		Khur and Biabanak Potash Complex [Iran Minerals Production & Supply Co. (IMPASCO)] ¹		Near Khur and Biabanak Mines, Isfahan Province	50
Titanium, ilmenite		Kahnuj pilot plant [Iranian Mines and Mining Industries Development and Renovation Organization (IMIDRO)] ¹		Daregaz placer and Kahnuj titanium dioxide processing plant	NA
Uranium	metric tons	Atomic Energy Organization of Iran (AEOI) (Government)		Saghand Mine, about 125 kilometers northeast of Yazd, Yazd Province	58
Do.	do.	do.	do.	Gachin Mine, near Bandar Abbas, Hormozgan Province	21
Do.	do.	do.	do.	Isfahan nuclear conversion plant, Isfahan, Isfahan Province	200
Do.	do.	do.	do.	Fordow nuclear fuel enrichment plant, 20 kilometers north of Qom, Qom Province	21
Do.	do.	do.	do.	Bandar Abbas uranium plant, Bandar Abbas, Hormozgan Province	12
Do.	do.	do.	do.	Natanz nuclear fuel enrichment plant, 80 kilometers southeast of Qom, Qom Province	3
Do.	do.	do.	do.	Isfahan enriched uranium powder plant, Isfahan, Isfahan Province	2
Do.	do.	do.	do.	Arak heavy water reactor, Arak, Markazi Province	NA

See footnotes at end of table.

TABLE 2—Continued
 IRAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2018

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
<i>Zinc:</i>			
Concentrate, Zn content	Calcimin Co. (Iran Zinc Mines Development Co.)	Dandi (Angouran) plant, Zanjan Province	500
Do.	Zangan Zinc Industry (LLP) (Iran Zinc Mines Development Co.)	Zanjan plant, Zanjan Province	250
Do.	Zanjan Zinc Kholes Sazan Industrial Group	do.	200
Do.	Mehdi Abad Zinc Co. (K.D.D. Group)	Mehdi Abad plant, Yazd Province	200
Refined metal	Calcimin Co. (Iran Zinc Mines Development Co.)	Dandi (Angouran) plant, Zanjan Province	80
Do.	Zanjan Zinc Kholes Sazan Industrial Group	Zanjan, Zanjan Province	35
Do.	Bafgh Zinc Co. (Iran Zinc Mines Development Co.)	West of Bafgh, Yazd Province	30
Do.	Qeshm Zinc Smelter Co. (affiliate of Calcimin Co.)	Kaveh Industrial Zone, Qeshm Island, Hormozgan Province	20
Do.	Faravari Mavad Madani Iran Co. (Iran Zinc Mines Development Co.)	Dandi, Zanjan Province	18
Do.	National Iranian Lead and Zinc Co. (Iran Zinc Mines Development Co.)	About 12 kilometers east of Zanjan, Zanjan Province	15
Do.	Bandar Abbas Zinc Production Co. (affiliate of Calcimin Co.)	Bandar Abbas, Hormozgan Province	13

⁶Estimated. Do., do. Ditto. NA Not available.

¹Government owned.

²Recovered from Sarcheshmeh copper plant slimes.

³A subsidiary of state-owned Iranian Mines and Mining Industries Development and Renovation Organization (IMIDRO).