

# 2014 Minerals Yearbook

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## IRAN [ADVANCE RELEASE]

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# THE MINERAL INDUSTRY OF IRAN

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Iran was a leading mineral commodity producer in the Middle East and North Africa (MENA) region whose territory lies along the Tethyan Eurasian Metallogenic Belt that runs from Western Asia to the Balkans. The geology of Iran consists of a complex tectonic framework within the broader Alpine-Himalayan Orogenic Belt. Metallic mineral resources occur predominantly within igneous and metamorphic rocks along the Urumieh-Dokhtar Magmatic Belt that trends northwest-southeast between the Central Iranian and Sanandaj-Sirjan Terranes in the Provinces of Esfahan, Hamadan, Kerman, Markazi, Yazd, and Zanzan. Off the southeastern coast of Iran is the Strait of Hormuz, a key global shipping route of mineral fuels that accounted for about 30% of all seaborne traded petroleum and about 20% of total petroleum output in the world in 2014 (Ghorbani, 2013, p. 243–249; U.S. Central Intelligence Agency, 2015; U.S. Energy Information Administration, 2015, p. 1; Zürcher and others, 2015, p. 4–5).

The mineral industry held a prominent role in the economy of Iran, although its contribution to the country's gross domestic product (GDP) had decreased since 2012. This declining trend applied especially to Iran's hydrocarbon sector, which included the production of natural gas and petroleum, the refining of crude petroleum, and the distribution of mineral fuels. In 2014, Iran was the world's third-ranked producer of natural gas after the United States and Russia and accounted for about 5.2% of the world's output. Iran also was the world's sixth-ranked producer of crude petroleum and condensate (natural gas liquids) after the United States, Saudi Arabia, Russia, Canada, and China, and accounted for about 4.2% of the world's output. Iran also accounted for about 2.5% of total refinery throughput in the world in 2014 (Central Bank of the Islamic Republic of Iran, 2015, p. 3; BP p.l.c., 2016, p. 8, 16, 22).

More than 40 nonfuel mineral commodities were mined and about 20 metals and industrial minerals, including aluminum, cement, and steel, were refined or manufactured in Iran. The country was the world's 2d-ranked producer of gypsum after China and accounted for 6.1% of the world's output of gypsum in 2014; the world's 7th-ranked producer of kaolin, with 4.5% of the world's output; 6th-ranked producer of barite, with 3.6% of the world's output; 7th-ranked producer of feldspar, with 2.8% of the world's output; 8th-ranked producer of bentonite, with 2.7% of the world's output; and 10th-ranked producer of sulfur, with 3% of the world's output. Although its share of world output was below 2%, Iran was also the 7th-ranked producer of cement and fluorspar, 9th-ranked producer of molybdenum, 11th-ranked producer of iron ore, 13th-ranked producer of lime, and 16th-ranked producer of nitrogen (table 1; Apodaca, 2016a, b; Corathers, 2016; Crangle, 2016; Flanagan, 2016; McRae, 2016a, b; Polyak, 2016; Tanner, 2016; Tuck, 2016; van Oss, 2016).

Mineral-related issues, specifically uranium enrichment for noncivilian use and the potential to produce fissile material

for the development of nuclear weapons, continued to negatively affect Iran's economic and political relations with the Governments of the United States and the European Union (EU). Although international sanctions previously imposed on Iran were partially suspended in January 2014 for an interim period, they continued to limit investment into and exports of Iran's mineral commodity products, including aluminum, coal, gold and other precious metals, graphite, petroleum and refined petroleum products, and steel (table 1; U.S. Government Accountability Office, 2013, p. 3–4; European Union, 2014; U.S. Department of the Treasury and U.S. Department of State, 2016, p. 2).

## Minerals in the National Economy

Iran's real GDP increased by 3.0% in 2014 compared with a decrease of 1.9% in 2013. The nominal GDP was \$425.3 billion in 2014, which made Iran's economy the second largest in the MENA region after Saudi Arabia. The increase in economic activity in 2014 after two annual economic contractions of 6.8% and 1.9% in 2012 and 2013, respectively, was mainly owing to the economic stimulus provided by the partial lifting of international sanctions on Iran implemented under the interim Joint Plan of Action (JPA) in November 2013. Petroleum exports as well as industrial output of key sectors of the economy, such as the automobile sector that consumed a significant amount of such minerals as aluminum and steel, modestly recovered in 2014 owing to the removal of various constraints that had been imposed on Iran's industrial supply chains, trade relations, and international financial transactions in previous years. The contribution of hydrocarbons to real GDP increased by 4.8% in 2014 compared with a decrease of 8.9% in 2013. The contribution of nonhydrocarbons to real GDP increased by 2.8% compared with a decrease of 1.1% in the previous year (World Nuclear News, 2014; Central Bank of the Islamic Republic of Iran, 2015, p. 3; International Monetary Fund, 2015, p. 4, 10, 38; World Bank, The, 2015a, b).

Iran had an extensive mineral-production and mineral-processing industry. The hydrocarbon sector's share of the GDP was 15.3% in 2014 compared with 17.0% in 2013. Mining and manufacturing combined accounted for an additional 12.8% of the GDP compared with 12.7% in 2013. The mineral-processing sector, which included the processing and refining of copper and zinc and the production of cement and steel, reportedly accounted for about 5% of the GDP. The mining sector's share was reportedly about 1%. The construction sector accounted for 8.7% of the GDP in 2014 compared with 9.2% in 2013. The mineral fuels, mining and manufacturing, and construction sectors all made a positive contribution to the GDP in 2014 compared with 2013 when their contribution was less than the previous year (tables 1, 2; Bizaer, 2015; Central Bank of the Islamic Republic of Iran, 2015, p. 2; International Monetary Fund, 2015, p. 31; Iran International Magazine, 2015, p. 25).

In 2013 (the latest year for which comprehensive data were available), the gross value added of the mining sector was about \$5.2 billion (IRR110,036 billion<sup>1</sup>). The gross value added of iron ore accounted for 48% of total value added; nonferrous metallic ores, 28%; stones and sand and gravel, 15%; coal, 2.4%; chemical materials, 0.7%; and salt, 0.2%. The mineral commodities whose mining generated the highest value added were, in order of value added, iron ore, copper, and dimension stone, which collectively accounted for 78% of the total gross value added of the mining sector. These were followed by, in descending order of value added, coal, limestone, sand and gravel, lead and zinc, chromite ore, rubble stone, kaolin, and gypsum (Statistical Centre of Iran, 2015, p. 56–58).

International sanctions related to uranium enrichment and reprocessing activities had been imposed on Iran beginning in 2006. Measures by the United States and the EU were primarily directed at the country's mineral sector activities (such as the production, refining, and transport of crude petroleum and metal ores) and included prohibiting large-scale investment in Iran's mineral sector, proscribing insurance for exports to or imports from Iran, placing an embargo on petroleum imports, and eliminating access to international transaction systems by Iranian entities. In recent years, sanctions have reduced Iran's national output, trade surplus, and Government revenue, primarily through lower mineral fuel production and exports (U.S. Government Accountability Office, 2013, p. 3–57; 2014, p. 1; U.S. Energy Information Administration, 2015, p. 5).

Multiple sanctions had been imposed by the United States on Iran since 1995. The United States sanctions included the Iran Sanctions Act of 1996, as amended; the Comprehensive Iran Sanctions, Accountability, and Divestment Act of 2010, as amended; Executive Order 13599 of February 5, 2012; Executive Order 13606 of April 22, 2012; Executive Order 13608 of May 1, 2012; Executive Order 13622 of July 30, 2012; Executive Order 13628 of October 9, 2012; and Executive Order 13645 of June 3, 2013. Under the Iranian Transactions Regulations—31 C.F.R. Part 560, exports to and imports from Iran, dealing in Iranian-origin goods or services, financial dealings with Iran, and banking services to the Government of Iran are prohibited. Public Law 112–239 of January 2, 2013 [National Defense Authorization Act for Fiscal Year 2013 (NDAA–2013)], included additional sanctions. Mineral sector activities affected by the subsection of NDAA–2013 that was entitled the “Iran Freedom and Counter-Proliferation Act of 2012” included the sale, supply, or transfer (directly or indirectly to or from Iran) of coal, graphite, precious metals, raw (which may include ore) or semifinished metals and software for integrating industrial processes (U.S. Department of the Treasury, 2012, p. 1–4; 2015; U.S. Government Printing Office, 2013, §1245–§1254).

The European Union Council Regulation No. 267/2012 restricted the EU's imports of crude petroleum and petroleum products from Iran; prohibited investment in Iran's petrochemical industry; and prohibited trade with the country in diamond, gold, and precious metals. The United Nations (UN) had

adopted Resolution 1929 in 2010 imposing additional sanctions in response to Iran's apparent lack of appropriate response to previous UN resolutions that obliged Iran to suspend uranium reprocessing and enrichment activities (United Nations Security Council, 2010, 2015; European Union, 2012; European Commission, 2015a, p. 32–48).

The JPA was agreed to in November 2013 between the Governments of Iran and the P5+1 group (which was also known as the E3+3 group) of the United Nations, which consisted of the five permanent members of the UN Security Council (China, France, Russia, the United Kingdom, and the United States) plus Germany. Under the terms of this interim agreement, no new nuclear-related sanctions against Iran would be imposed by either the UN Security Council or the EU until July 2014. The Governments of the United States and the EU also agreed to partially suspend certain nuclear-related sanctions on trade and transportation involving various sectors of Iran's economy, including petrochemical products and gold and precious metals. In return, the Government of Iran pledged to suspend nuclear enrichment above 5% in all facilities, to freeze its enrichment capacity by not installing new centrifuges or feeding them with natural uranium, to reduce its stockpile of enriched uranium, and to allow enhanced monitoring and verification by the International Atomic Energy Agency (IAEA). The JPA was implemented in January 2014 and subsequently extended to November 2014 upon the IAEA's positive report on Iran's compliance with the terms of the agreement in May 2014 (European Union, 2014; World Nuclear News, 2014; U.S. Energy Information Administration, 2015, p. 2; World Nuclear Association, 2015).

### Government Policies and Programs

The Mining Act of 1998 based on Articles 44 and 45 of Chapter 4 of the 1978 Constitution of the Islamic Republic of Iran and amendments to the Mining Act of 2013 govern the activities of the mineral sector in Iran. The Petroleum Act of 1987 defines the Government's authority in the petroleum sector. Foreign investment in all sectors of Iran's economy is regulated by the Foreign Investment Promotion and Protection Act (FIPPA) of 2002. According to FIPPA, the mining sector includes both nonfuel minerals and mineral fuels. Foreign investment applications are submitted to the Organization for Investment, Economic and Technical Assistance of Iran and evaluated by the Foreign Investment Board. Investment licenses are issued upon the approval of the Board and the final signature of the Minister of Economic Affairs and Finance. There are no restrictions on foreign ownership of nonfuel mineral rights, which could be as high as 100%; however, foreign ownership of resources is strictly regulated in the petroleum and natural gas sectors. The FIPPA provides a number of tax exemptions to eligible mining projects, the right to transfer profits out of the country in foreign currency, and guaranteed compensation for any investment in projects that are subsequently nationalized (Rashidinejad and Karim, 2011, p. 237; Ministry of Industry, Mine and Trade, 2013; Iranian Mines and Mining Industries Development and Renovation Organization, 2014a, p. 3, 4, 33; Bizaer, 2015; Farzin, 2015, p. 30; Tivey and others, 2015, p. 2).

<sup>1</sup>Where necessary, values have been converted from Iranian rials (IRR) to U.S. dollars (US\$) at an average annual exchange rate of IRR26,509=US\$1.00 for 2014 and IRR21,253=US\$1.00 for 2013.

The Government-owned holding company Iranian Mines and Mining Industries Development and Renovation Organization (IMIDRO), which was established in May 2001 in accordance with Article 6 of the Law on Centralization of Industrial and Mining Activities of 2000/2001, is responsible for the formulation and implementation of the country's mining policy. These policy areas include mineral exploration and extraction activities, mine and plant construction and development, and royalty rates on mineral production. The Ministry of Industry, Mine and Trade (MIMT), which was formed in 2011 with the merging of the Ministry of Mines and Metals, the Ministry of Industries and Mines, and the Ministry of Trade, issues mineral exploration licenses, discovery certificates, and extraction licenses to private companies. A discovery certificate is issued for the discovery of a mineral deposit; a certificate is required to apply to the MIMT for an extraction license. Extraction licenses state the quantity of the minerals that may be mined at a site and the royalty rate to be paid, which are determined on a case-by-case basis. The Geological Survey of Iran conducts basic geologic research and mineral exploration and evaluation of the Nation's mineral resources except for mineral fuels (Rashidinejad and Karim, 2011, p. 237; Ministry of Industry, Mine and Trade, 2013, p. 3; Geological Survey of Iran, 2014; Iranian Mines and Mining Industries Development and Renovation Organization, 2015c; Tivey and others, 2015, p. 2).

The 20-year Perspective 2025, which was formulated in 2005 as a comprehensive guiding framework for sustainable economy growth in the country along with the fourth 5-year development program of the Islamic Republic of Iran (2006–10), set substantially higher annual output targets for the mineral industry. By 2025, Iran planned to quadruple the output of aluminum to 1.5 million metric tons per year (Mt/yr), copper cathode to 0.8 Mt/yr, direct-reduced iron to 54.6 Mt/yr, and iron pellets to 82.8 Mt/yr; triple that of crude steel to 52 Mt/yr and gold to 10,000 kilograms per year; and double that of cement to 120 Mt/yr, pig iron to 5.9 Mt/yr, and zinc to 0.3 Mt/yr. The fifth 5-year development program, which covered the years 2011 through 2015, did not set numerical targets for the annual production of mineral commodities. Instead, it focused on the diversification of products to be exported, the clustering of small-, medium-, and large-scale enterprises to form competitive corporations, and the development of downstream industries with private sector financing. Mineral production targets set by Iran's previous four development programs had not been met by their respective end dates (Rashidinejad and Karim, 2011, p. 237; Karbasian, 2014, p. 4; Financial Tribune, 2015b; Iranian Mines and Mining Industries Development and Renovation Organization, 2015e, p. 13).

## Production

Data on mineral production in Iran are shown in table 1. The output of the nonfuel minerals sector of Iran recovered in part in 2014 after decreasing in the previous 2 years. The output of the mineral fuels sector continued to decrease, except for natural gas and uranium. The production of salt increased by 90%; barite, by 49%; pig iron, by 39%; gold, by 32%; aluminum metal and mercury, by 20% each; zinc metal, by 18%; zinc content of ore, by 15%; and fluorspar and uranium, by 13% each.

The production of boron decreased by 80%; phosphate rock, by 68%; talc, by 44%; bauxite, by 32%; motor gasoline, by 24%; perlite, by 23%; lead and kerosene, by 22% each; manganese, by 19%; chromite, by 17%; feldspar, by 14%; kaolin, by 13%; and crude petroleum, by 13% (table 1).

## Reserves and Resources

A total of 68 types of mineral commodities, including mineral fuels, were identified across Iran as of yearend 2014. The country ranked particularly high in the world in terms of the size of its reserves of petroleum and natural gas. According to BP p.l.c., Iran held the world's largest natural gas reserves, accounting for 18.2% of proved worldwide natural gas reserves, and the world's fourth-largest crude petroleum reserves, accounting for 9.3% of proved worldwide crude petroleum reserves in 2014 (Karbasian, 2015, p. 2; BP p.l.c., 2016, p. 6, 20).

Among nonfuel mineral commodities, Iran's reserves of barite, feldspar, fluorspar, gypsum, and iron ore were most significant on a global scale and those of chromium, coal, copper, gold, manganese, molybdenum, phosphate rock, and zinc were significant on a regional scale. The U.S. Geological Survey estimated that Iran held globally significant reserves of feldspar (2d largest in the world), barite and gypsum (5th largest), fluorspar (8th largest), and iron ore (10th largest). According to the Government of Iran, Iran's copper ore reserves were 4.2 billion metric tons (Gt); iron ore, 2.7 Gt; bauxite and alumina sources, 1.2 Gt; kaolin, 100 million metric tons (Mt); phosphate rock, 16.5 Mt; zinc, 11 Mt; barite, 10 Mt; manganese, 9.7 Mt; chromium, 8.5 Mt; and gold, 340 metric tons (t). The country was reported to have the potential to extract up to 80 mineral commodities, as mineral exploration had been undertaken in only a small portion of the country's territory. Iran ranked among the top 15 countries in the world in terms of mineral deposit variety and among the top 2 countries in the MENA region (Rashidinejad and Karim, 2011, p. 238; Samaneh Kansar Zamnin Co., 2013a; Iranian Mines and Mining Industries Development and Renovation Organization, 2014b, p. 9; 2015e, p. 11; Karimov, 2014b; Crangle, 2015; Farzin, 2015, p. 26–27; Iran Daily, 2015; Karbasian, 2015, p. 2; McRae, 2015a, b; Press TV, 2015a; Sharma, 2015; Tanner, 2015; Tivey and others, 2015; Tuck, 2015).

## Structure of the Mineral Industry

The MIMT administered all mining, smelting, and refining industries of Iran, except for the petroleum and natural gas sectors, which were administered by the Ministry of Petroleum. Four state-owned companies overseen by the Ministry of Petroleum covered all functions in the petroleum and natural gas upstream and downstream sectors. The National Iranian Oil Co. (NIOC) was responsible for exploration and production of petroleum and natural gas. The National Iranian Gas Co. processed, delivered, and distributed gas for domestic use. The National Petrochemical Co. produced petrochemical products. The National Iranian Oil Refining and Distribution Co. (NIORDC) managed the country's refineries, delivered crude petroleum to refineries and exports berths, and produced,



processed, and distributed petroleum products. The Atomic Energy Organization of Iran (AEOI), which was also a Government organization, was engaged in the exploration, mining, and treatment of uranium in Iran (Rashidinejad and Karim, 2011, p. 237; National Iranian Oil Refining and Distribution Co., 2014; Farzin, 2015, p. 30–31; U.S. Energy Information Administration, 2015, p. 2–3; World Nuclear Association, 2015).

Through IMIDRO, the Government controlled many of the large-capacity mining and mineral-processing companies, although most of Iran's mines were privately owned. Government ownership was especially the case for producers of aluminum, ammonia, cement, coal, copper, iron and steel, and salt. The leading IMIDRO subsidiaries were Almahdi Aluminium Co. (aluminum and lime), Ehdas Sanat Co. (cement), Esfahan Steel Co. (steel), Iranian Aluminium Co. (IRALCO) (aluminum), Iranian Mineral Processing Research Center (multiple minerals), Iran Minerals Production and Supply Co. (multiple minerals), Iran Zinc Mines Development Co. (lead and zinc), Khuzestan Steel Co. (steel), Mobarakeh Steel Co. (steel), National Iranian Copper Industries Co. (NICICO) (copper and molybdenum), and National Iranian Steel Co. (NISCO) (steel) (table 2; Iran International Magazine, 2014; Iranian Mines and Mining Industries Development and Renovation Organization, 2015a, p. 12; 2015d).

As of March 2013 (the latest month for which comprehensive data were available), there were 5,499 active mines in Iran, excluding mineral fuels, radioactive, and pottery soil mines. Of those that were active, 4,515 mines, or 82% of the total, were engaged in the mining of stone and sand and gravel. There were 160 mines that produced iron ore; 148, nonferrous metal ores; 119, chemical materials; 101, coal; and 88, salt. The mines employed a total of 95,540 workers. Of these, 44,813 workers, or about 47%, were employed in the mining of stone and sand and gravel. There were 18,519 workers employed in the mining of iron ore; 14,755, nonferrous metallic ores; 12,291, coal; 1,837, chemical materials; and 726, salt. The manufacturing of nonmetallic mineral products employed the second-highest number of workers within the manufacturing sector, accounting for 14.5% of total manufacturing employment. The mineral sector as a whole employed about 620,000 workers (Iranian Mines and Mining Industries Development and Renovation Organization, 2015e, p. 10; Statistical Centre of Iran, 2015, p. 58, 70).

## Mineral Trade

Iran's total goods exports were valued at \$86.5 billion in 2014 compared with \$93.1 billion in 2013. The country's total goods imports were valued at \$65.1 billion compared with \$61.1 billion in 2013. As a result, the country's trade surplus in goods decreased to \$21.4 billion in 2014 from \$32.0 billion in 2013. Iran's current account surplus decreased to about 4% in 2014 from about 12% in 2011. This was largely owing to a 60% decrease in petroleum exports since mid-2012, which reflected both the large decrease in the volume exported and the substantial decrease in international crude petroleum prices in 2014. Nonpetroleum exports increased to 8% of the GDP from 5% of the GDP during the same period (Central Bank of the

Islamic Republic of Iran, 2015, p. 13; International Monetary Fund, 2015, p. 44).

Mineral fuels accounted for about 64% of the total value of exports in 2014, which was a decrease from about 70% in 2013. Crude petroleum exports accounted for most of the total hydrocarbon exports, which included condensate, natural gas, and refined petroleum products. In 2014, total hydrocarbon exports were valued at \$55.4 billion compared with \$64.9 billion in 2013, \$68.1 billion in 2012, and \$119.1 billion in 2011. The substantial, multiyear decline in hydrocarbon export revenue was attributed to the continued effect of international sanctions imposed on the country's exports of mineral fuels. Iran also imported petroleum condensate, natural gas, natural gas liquids, and refined petroleum products, which were valued at \$3.9 billion, or about 6.1% of total imports in 2014 compared with \$3.1 billion, or about 5.1% of total imports in 2013. In 2012, hydrocarbon imports had been valued at \$2.7 billion, or about 3.9% of total imports; and in 2011 at \$5.7 billion, or about 7.3% of total imports. The increase in hydrocarbon imports in 2014 was attributed to the country's increasing reliance on imports of refined petroleum products such as gasoline, jet fuel, and diesel in order to accommodate higher domestic consumption of and lower domestic production of subsidized fuels, especially motor gasoline (table 1; Central Bank of the Islamic Republic of Iran, 2015, p. 13; Mohamedi, 2015, p. 5; U.S. Energy Information Agency, 2015, p. 1).

Crude petroleum and condensate exports were 1.4 million barrels per day (Mbbbl/d) in 2014 compared with 1.3 Mbbbl/d in 2013 and 2.6 Mbbbl/d in 2011. The main importers of petroleum from Iran were China, India, Japan, the Republic of Korea, and Turkey. China and India accounted for nearly all the 150,000-barrel-per-day (bbl/d) increase in export levels. Iran's entire trade in natural gas was done by pipeline and none by transportation as liquefied natural gas (LNG). In 2014, Iran exported 9.6 billion cubic meters of natural gas and imported 6.9 billion cubic meters. About 93% of natural gas exports (8.9 billion cubic meters) went to Turkey, and the remainder (0.7 billion cubic meters), to Armenia and Azerbaijan. About 94% of natural gas imports (6.5 billion cubic meters) was supplied by Turkmenistan, and the remainder (0.3 billion cubic meters), by Azerbaijan. In 2014, Iran also imported about 61,000 bbl/d of refined petroleum products, of which 94% was motor gasoline (BP p.l.c., 2015, p. 28; U.S. Energy Information Administration, 2015, p. 7, 9, 12, 13).

Iran exported 47,300 t of alumina valued at \$68.1 million in 2014 compared with 15,900 t valued at \$6.4 million in 2013. Exports of aluminum ingots were 135,500 t valued at \$231.6 million compared with 202,000 t valued at \$342.2 million in 2013; cement, 1.5 Mt (\$850.2 million) compared with 1.7 Mt (\$2.3 billion) in 2013; copper cathodes, 46,600 t (\$328.6 million) compared with 18,700 t (\$132.1 million) in 2013; crude steel, 268,300 t (\$400.2 million) compared with 983,400 t (\$787 million) in 2013; lead ingots, 60,400 t (\$120.6 million) compared with 53,400 t (\$98.6 million) in 2013; and zinc ingots, 80,900 t (\$145.7 million) compared with 84,800 t (\$149.1 million) in 2013 (Ministry of Industry, Mine and Trade, 2014, p. 30–31, 34–35).

Iran imported 135,100 t of alumina valued at \$58.3 million in 2014 compared with 118,100 t valued at \$61.6 million in 2013. Imports of aluminum ingots were 69,400 t valued at \$75.8 million compared with 80,200 t valued at \$40.4 million in 2013; copper cathode, 400 t (\$3.2 million) compared with 1,000 t (\$9.3 million) in 2013; crude steel, 258,800 t (\$140.9 million) compared with 773,700 t (\$487 million) in 2013; iron ore, 2.0 Mt (\$338.9 million) compared with 232,100 t (\$43.9 million) in 2013; lead ingots, 500 t (\$1.6 million) compared with 870 t (\$2.3 million) in 2013; and zinc ingots, 630 t (\$1.5 million) compared with 570 t (\$1.3 million) in 2013 (Ministry of Industry, Mine, and Trade, 2014, p. 28–29, 32–33).

Iran remained a net steel importer in 2014. The country exported 772,000 t of semifinished and finished steel products in 2014 compared with 368,000 t in 2013; 56,000 t of ingots and semis (semi-finished products—billets, blooms, slabs), (90,000 t in 2013); 17,000 t of long products (27,000 t in 2013); and 695,000 t of flat products (248,000 t in 2013). The country exported no pig iron in 2014 (compared with 0 t in 2013) or direct-reduced iron (32,000 t in 2013). Iran imported 4.4 Mt of semifinished and finished steel products in 2014 compared with 3.1 Mt in 2013; 192,000 t of ingots and semis (304,000 t in 2013); 829,000 t of long products (679,000 t in 2013); and 3.0 Mt of flat products (1.7 Mt in 2013). The country imported no pig iron in 2014 (compared with 0 t in 2013) or direct-reduced iron (0 t in 2013) (World Steel Association, 2015, p. 54, 57, 60, 62, 65, 67, 70, 72, 93, 95, 98, 99).

Iran's exports to the United States were zero in 2014 compared with about \$2.2 million in 2013. The country's imports from the United States were valued at about \$186.6 million compared with about \$308.1 million in 2013. Mineral imports from the United States included, in order of value, \$3.4 million in chemicals; \$101,000 in nonferrous metals; and \$40,000 in copper (U.S. Census Bureau, 2015a, b).

Iran's exports to the EU member states increased by 47.7% to \$1.5 billion (EUR1.2 billion<sup>2</sup>) in 2014. Mineral exports to the EU included about \$390 million in base metals and articles (chiefly exports of iron and steel, which were valued at \$352 million and accounted for about 23.0% of total exports), and \$221 million in mineral fuels, lubricants, and related materials, which accounted for about 14.4% of total exports. Iran's imports from the EU increased by 18.0% to reach \$8.2 billion in 2014. Mineral imports from the EU included \$1.8 billion in chemicals and related products, which accounted for about 21.9% of total imports (European Commission, 2015b, p. 2–4).

## Commodity Review

### *Metals*

**Bauxite and Alumina and Aluminum.**—Iran's production of bauxite decreased by 32% to 540,000 t, whereas alumina production increased by 3% to 252,000 t in 2014. The country's bauxite output continued to lag behind domestic demand from its alumina and aluminum producers. Iran Alumina Co.

remained the only producer of bauxite and alumina in the country. The company operated the Jajarm Mine, North Khorasan Province. Jajarm was the country's only active bauxite mine, with estimated reserves of 10.6 Mt averaging 47% total available alumina. The mine supplied about 36% of Iran's annual domestic bauxite consumption, whereas imports, mostly from Guinea, accounted for the remaining 64%. Iran Alumina also operated a 280,000-metric-ton-per-year (t/yr) alumina refinery in Jajarm, which met about one-quarter of annual domestic demand. Iran imported alumina from China and India to meet about three-quarters of domestic demand from aluminum smelters. In order to increase bauxite production, Iran Alumina explored deposits in Kerman, Kohgiluyeh va Bowyer Ahmad, Semnan, and Yazd Provinces. The company planned to commission the Taash and the Ganou Mines in Semnan Province; the relatively higher grade alloy of these mines would be mixed with low-grade bauxite from the Jajarm Mine. Iran Alumina was also in the process of evaluating the 4-Mt/yr Societe des Bauxites de Dabola-Tougue project in Guinea in West Africa; the project was 51% owned by IMIDRO and 49% by the Government of Guinea. IMIDRO planned to build a 2-Mt/yr-capacity alumina (from bauxite) refinery in Arak, Markazi Province, and a 200,000-t/yr alumina (from nepheline syenite) refinery in Sarab, East Azerbaijan Province (table 1; Iran Daily, 2014b; Iran International Magazine, 2015, p. 116, 118, 121; Islamic Republic News Agency, 2015; Mehr News Agency, 2015a; Minews, 2015c; Sharma, 2015).

Iran's aluminum production increased by 20% to 354,000 t in 2014; however, the aluminum output of 295,000 t in 2013 had been below the country's recent average annual output of about 320,000 t. Despite Iran's abundant reserves of natural gas available for energy use, insufficient electricity generation as well as a shortage of bauxite input continued to hinder the development of the country's aluminum industry. Total aluminum capacity of about 470,000 t/yr was not fully utilized. IMIDRO planned to achieve its 2025 target output of 1.5 Mt/yr through foreign investment of about \$10 billion and provision of electricity to new aluminum plants at fixed rates under long-term agreements. The short-term goal was to increase domestic aluminum output to 770,000 t/yr by 2016 through expansion of the sector's total capacity; 60% of this output would be exported (table 1; Mottahedi and Mottahedi, 2012; Farge, 2013; Minews, 2014a; Sharma, 2015; Nasser and Kalantari, 2016).

Two companies produced primary aluminum in Iran: IRALCO and AHAC. IMIDRO's plans to expand the aluminum sector's total capacity included the expansion of the Hormozgan smelter capacity to 250,000 t/yr from 110,000 t/yr and the construction of a 110,000-t/yr smelter in Jajarm by Iran Alumina Co. and a 276,000-t/yr smelter in Lamerd, Fars Province, by South Aluminum Co. (SALCO). AHAC and SALCO planned to further increase the capacities of each smelter to 500,000 t/yr by 2025. Kaveh Khozestan Aluminium Co. was in the process of building an aluminum smelter with a 350,000-t/yr capacity in Masjed Soleyman, Khuzestan Province, through two 175,000-t/yr phases (table 1; Hosseini and Moghadam, 2014; Iran International Magazine, 2015, p. 115; Karbasian, 2015, p. 5).

<sup>2</sup>Where necessary, values have been converted from euro area euros (€) to U.S. dollars (US\$) at an average annual rate of EUR0.784=US\$1.00 for 2014 and EUR0.783=US\$1.00 for 2013.

**Copper and Molybdenum.**—Iran's production of copper concentrate increased by 7% to 800,000 t; copper anode, by 4% to 232,500 t; and copper cathode, by 3% to 194,000 t in 2014.

There were 34 operating copper mines in Iran in 2014. The three largest mines were operated by NICICO—the Miduk Mine in the Miduk copper complex, the Sarcheshmeh Mine in the Sarcheshmeh copper complex, and the Sungun Mine in the Sungun copper complex. The Sungun copper deposit is located 100 kilometers (km) northeast of Tabriz close to Iran's northern border with Armenia and Azerbaijan. The reserves (proven plus probable) of the mine were estimated to be 850 Mt grading 0.6% copper. The Sarcheshmeh deposit is located in Kerman Province in the central area of the Zagros Mountains. The reserves (proven plus probable) were estimated to be 1.2 Gt grading 0.7% copper. About 25 Mt of copper ore was extracted annually from the Sarcheshmeh Mine. The extracted copper ore from all three mines was transported to the Sarcheshmeh copper complex as of 2014, but plans were underway for their delivery to Sungun and for export to Armenia and Azerbaijan thereafter. In 2014, the Sungun plant was capable of recovering up to 92% of copper from ore. The plant had the capacity to recover 173,000 t of copper concentrate at 26% copper content from 7 Mt grading 0.7% copper from the Sungun deposit (Samaneh Kansar Zamnin Co., 2013a, b; Karimov, 2014a; Minews, 2014b; Financial Tribune, 2015d; Iran International Magazine, 2015, p. 32, 35, 39).

NICICO had 18 copper production development projects in progress. In 2014, the company completed the second phase of development at the Sarcheshmeh copper complex in Kerman Province and Sungun copper recovery plant in East Azerbaijan Province, which increased the capacity to 150,000 t/yr and 160,000 t/yr, respectively. NICICO planned to increase the Sungun plant's capacity to 400,000 t/yr by 2018 and its copper concentrate output to 280,000 t in 2015, 300,000 t in 2016, 350,000 t in 2017, and 380,000 to 400,000 t in 2018. In 2014, the company also began the construction of the 70,000-t/yr-capacity Sungun hydrometallurgical plant, which would produce cathodes via a hydrometallurgical method (International Mining, 2014; National Iranian Copper Industries Co., 2014).

Mobina Mining Industrial Technology and Engineering Co., through its contract with NICICO, was in the process of constructing the Darehzar copper concentrator and the Nuchoon copper and molybdenum concentrator, each with production capacity of 200,000 t/yr of copper concentrate grading 26% copper, and 4,500 t/yr of molybdenum concentrate at Nuchoon. The project was expected to be completed in 2016. In 2015, NICICO planned to attract investments into development of the Taft Copper Mines (Aliabad and Dareh Zereshk) and the Chehel Kooreh Copper Mine (Mobina Mining Industrial Technology and Engineering Co. 2010; Minews, 2015b, p. 57).

The Geological Exploration Centre, which was a private company based in Georgia, conducted exploration of porphyry copper-gold deposits and identified various first-, second-, and third-order targets in Iran from 2006 to 2013. First-order targets included Prospects 1, 2, and 3 with deposits that could be explored relatively quickly and inexpensively. The total reserves for the first-order targets were estimated to be 20.1 Mt of copper. The second-order targets included porphyry

copper-gold deposits that required a longer exploration period and more investment. These were Mianeh, near Tabriz, with an estimated resource of 60 Mt grading 0.8% copper with traces of gold; Ahar, which was located 75 km from Tabriz; Aras River, which was a porphyry gold system with molybdenum, gold, lead, and zinc; and south Khorasan near the eastern border with Afghanistan. The third-order targets included 15 new prospects for gold and copper, many of which were deemed economical (Geological Exploration Centre, 2015).

**Gold.**—There were 24 small-scale gold mines in Iran, of which 15 were operational, 1 was being equipped, and 8 were inactive. Gold deposits were located in East Azerbaijan, Esfahan, Hamadan, Kordestan, Kerman, Markazi, Qom, Razavi Khorasan, South Khorasan, West Azerbaijan and Yazd Provinces. The largest gold mines in the country were, in descending order of reserves, the Zarshouran Mine, which was being developed and had 100 t of gold in probable reserves; the Sari Gunay Mine in Kordestan Province with probable reserves of 63 t; the Agh Darreh Mine in West Azerbaijan Province with probable reserves of 30 t; the Muteh Mine, which was located near Delijan in Esfahan Province and had 14 t of probable reserves; the Argash Mine in Neyshabur in Esfahan Province; and the Torghabeh Mine in Mashhad County in Razavi Khorasan Province (Tadbirkhabar, 2014; Iran Daily, 2015; Mukhopadhyay, 2015; Press TV, 2015b).

Iran planned to increase annual gold production to 7 t from 3 t with the commissioning of two new mines, Zarshouran and Sari Gunay, in the near future. The Government expected further exploration to enable gold output to increase to 10 t/yr. In September 2014, pilot production began in Zarshouran near the city of Takab in West Azerbaijan Province with the production of the first piece of 24-karat gold from the processing facility. The Zarshouran gold project had been initiated by IMIDRO in 2010 following exploration work conducted by Minorco and Lunar Consulting Co. of South Africa in 1995. Ore reserves at Zarshouran were estimated to be 11.5 Mt of ore with an average grade of 7.9 grams per metric ton (g/t) gold and, thus, were expected to contain 91 t of gold. The gold processing plant, which began operation in November 2014, was designed with a production capacity of 3 t/yr of gold, 1 t/yr of mercury, and 2.5 t/yr of silver. IMIDRO planned to begin full operations in 2015 and to increase production of gold from 3 t/yr of gold to 6 t/yr of gold in the second phase of the project by 2017. The company also planned to begin gold production from the Sari Gunay Mine in 2015. Deposits at the mine were estimated to have an ore grade of 1.6 g/t gold and gold production of 2 t/yr (RT, 2014; Iran Daily, 2015; Minews, 2015b, p. 35–36; Mines & Mining Industries English Magazine, 2015, p. 36; Mukhopadhyay, 2015).

**Iron and Steel.**—Iran's steel production continued its rising trend in 2014. The country produced about 16.3 Mt of crude steel, 14.6 Mt of direct-reduced iron, and 2.8 Mt of pig iron, which made it the leading steelmaker in the MENA region and the 14th-ranked steelmaker in the world in 2014. More than 85% of Iran's steel production was based on electric arc furnace (EAF) technology owing to the country's abundant natural gas supplies. Iran's 2025 target output levels were 46.1 Mt of crude steel, 54.6 Mt of direct-reduced iron, and 5.9 Mt of pig iron



(Karbasian, 2014, p. 4; Bloomberg, 2015; Middle East Steel, 2015; World Steel Association, 2015, p. 54, 60, 65, 70, 93, 98; Frost & Sullivan, 2016).

The leading steel-producing companies in Iran were MSC, which had a market share of 47%; KSC, 23%; Esfahan Steel Co., 20%; and Iran National Steel Industries Group, 10%. Esfahan Steel was the sole user of blast furnace method in Iran and had a total production capacity of 3.6 Mt/yr. In 2014, the MIMT facilitated total investment of \$5 billion into three steel projects in the country in order to increase the steel sector's capacity. These were the Arvand Free Trade Zone (FTZ) project with a planned capacity of 5 Mt/yr; the Bandar Abbas project, 6 Mt/yr; and the Chabahar project, 3 Mt/yr. As of yearend 2014, all three projects were ongoing and required further investment (Financial Tribune, 2015a; Karbasian, 2015, p. 5; Mehr News Agency, 2015b; Tasnim News Agency, 2015; Yazdizadeh, 2016).

In June 2014, the MIMT signed an agreement with Kuwait Steel Co. to build a steel complex in Persian Gulf Mining & Metal Industries Special Zone (PGSEZ) in three stages. The project involved the construction of a direct-reduced iron facility with a production capacity of 1.6 Mt/yr and a steel mill with a capacity of 1 Mt/yr in the first stage. Kuwait Steel would build a rolling mill unit with a capacity of 1 Mt/yr in the second stage and a pelletizing plant with a capacity of 5 Mt/yr in the third stage (Angel and Burmistrova, 2014; Financial Tribune, 2014).

**Iron Ore.**—Iran's iron ore production was 48.5 Mt in 2014, which was essentially unchanged from production of 48.2 Mt in 2013. Output in 2014 consisted of 27 Mt of lump and fine iron ore and about 21 Mt of pelletized iron ore. Iran exported 21.8 Mt of iron ore in 2014, ranking it ninth in world exports of iron ore, compared with 22.5 Mt in 2013. Exports were projected to decrease to between 15 and 16 Mt in 2015 and to less than 10 Mt in 2017 owing in part to an anticipated increase in demand from domestic steel producers, who planned to triple steel output in the next decade in line with the Government's 2015 mineral output targets (Karbasian, 2014, p. 4; Serapio, 2015; Shad, 2015, p. 3; World Steel Association, 2015, p. 103).

There were 156 iron ore mines in operation in Iran, but about 5% of them, which were all controlled by IMIDRO, contained 86% of the reserves. Iran's Sangan, Gole Gohar, and Chadormalu Mines were considered to be the largest iron ore mines in terms of reserves in the MENA region, with reserves of 1,200 Mt, 1,000 Mt, and 200 Mt, respectively. The Gol-e-Gohar Mine in Kerman Province in southeastern Iran and the Chadormalu Mine in central Iran accounted for about 80% of the country's iron ore production, or about 38 Mt in 2014. The Sangan industrial project, which was located in Razavi Khorasan Province in eastern Iran near the border with Afghanistan and included steelmaking, was expected to produce 17.5 Mt/yr of iron ore and 15 Mt/yr of pellets. The major iron-ore-producing companies were Chadormalu Mining and Industrial Co., Gol-e-Gohar Iron Ore Co., and Iran Central Iron Ore Co. (Karbasian, 2014, p. 9; Hannam & Partners, 2015, p. 13; Shad, 2015, p. 3).

Privately owned iron ore mines had a reported total capacity of between 11 and 12 Mt. They accounted for about 20% of domestic production, but nearly 50% of Iran's iron ore exports, as they exported most of their output. Almost 6 Mt of private

iron ore production capacity was not utilized in 2014, however, and a further 4 Mt of capacity was likely to shut down in 2015 owing to low prevailing global iron ore prices and the sector's lack of export competitiveness (Angel, 2015).

**Lead and Zinc.**—Through 2014, less than 1% of Iran's current lead and zinc reserves were estimated to have been extracted. There were about 60 active processing units in the country's zinc sector. Iran's total production capacity of zinc ingots was about 450,000 t/yr and that of lead ingots was about 420,000 t/yr. Total concentrate capacity of zinc and lead exceeded 2 Mt/yr, but capacity utilization was only 35% to 40% owing to the shortage of mined ore. Domestic consumption was between 80,000 t/yr and 100,000 t/yr of zinc ingots and 100,000 t/yr and 110,000 t/yr of lead ingots. About 60% of lead and zinc ingot output was exported (Iranian Mines and Mining Industries Development and Renovation Organization, 2015b, p. 2; Mines & Mining Industries News, 2015a; Tivey and others, 2015, p. 2).

Iran's two largest zinc mines in terms of reserves were the Mehdi Abad Mine in Yazd Province and the Angouran Mine in Zanzan Province, with remaining reserves of 342 Mt grading 5.5% zinc and 2.2% lead and 9 Mt grading 26% zinc and 6% lead, respectively. In 2014, the production capacity of the Angouran Mine was increased by Calcimin Co. to 1 Mt/yr from 0.7 Mt/yr. Ore extracted from the mine was processed by 78 small-scale zinc and lead plants located in Zanzan Province. The three largest processors were Calcimin Co., which had the capacity to produce 500,000 t/yr of zinc and 30,000 t/yr of lead; Zangan Zinc Industry LLP, which had the capacity to produce 250,000 t/yr of zinc; and Zanzan Zinc Kholes Sazan Industries Co., which had the capacity to produce 200,000 t/yr of zinc and 20,000 t/yr of lead. In 2014, overburdening (waste stripping) operations by Mehdi Abad Zinc Co. (a subsidiary of K.D.D. Group) continued at the eastern part of the IMIDRO-owned Mehdi Abad zinc mine. Under the terms of Mehdi Abad Zinc's extraction license, the proposed mining project would operate for 25 years, and the company would build a processing plant within 3 years with a production capacity of 100,000 t/yr of zinc and lead ingots. The zinc smelting plant at the site had had a 35,000-t/yr capacity in the past. The Mehdi Abad Mine was expected to become the main supplier of zinc and lead to domestic industry through the extraction of 30 Mt/yr of ore after zinc deposits in the Angouran Mine were fully extracted (table 2; Financial Tribune, 2015c; Iranian Mines and Mining Industries Development and Renovation Organization, 2015c, p. 2; K.D.D. Group, 2015; Minews, 2015a, d; Mobin Mining and Construction Co., 2016).

### **Industrial Minerals**

**Barite.**—In 2014, Mehdi Abad Zinc operated a barite mine at the Mehdi Abad lead, zinc, and barite complex in Yazd Province. The reserves of the mine were estimated to be 113 Mt of barite with an average density of 3.8 grams per cubic centimeter. K.D.D. Group planned to install a barite processing plant with capacity of 1 Mt/yr of barite within 18 months (Financial Tribune, 2015c; K.D.D. Group, 2015; Iran International Magazine, 2015, p. 125; Minews, 2015b, p. 41).



**Cement and Gypsum.**—Iran produced a variety of gray cement, including ordinary portland cement (OPC), sulfate-resistant, low-heat portland and pozzolanic cement, as well as white cement. The country's cement output had increased at an average annual growth rate of 12.3% from 22 Mt in 2002 to 70.25 Mt in 2012; however, output decreased by 3% to 66.4 Mt in 2014 after decreasing slightly in 2013. The decline in production was largely owing to continuing contraction of the construction sector since 2012 as well as an inadequate provision of natural gas to industrial users, which prompted the idling of a portion of cement capacity. There was a surplus clinker stock of 17 Mt as of yearend 2014. Iran's cement exports have increased in recent years in response to lower domestic consumption, which decreased from 57.6 Mt in 2012 to 54 Mt in 2014. Iran became the leading global exporter of cement in 2014, shipping 19.4 Mt (including clinker) primarily to countries in the MENA region and central Asia—51% of exports were shipped to Iraq, followed by Afghanistan, Kuwait, and Qatar (9% each); Turkmenistan (6%); and Pakistan (5%) (table 1; Global Cement, 2015b, c; International Cement Review, 2015, p. 175–176).

Iran has substantially increased its cement production capacity in recent years. As of September 2014, capacity was 89 Mt/yr compared with 78 Mt/yr in 2010 and 30 Mt/yr in 2000. The country had 70 cement plants, including 8 grinding facilities with 85 kilns in 2014. The construction of 54 new plants with an additional capacity of 48.3 Mt/yr was planned. Some of the new projects that began operations in recent years include Lamerd Cement Co.'s 1.0-Mt/yr-capacity plant in Fars Province; Urmia Cement Co.'s second development phase of its plant in Orumiye in West Azerbaijan Province, which increased capacity by 1 Mt/yr; Azar-Abadegan Khoy Cement Co.'s 1.1-Mt/yr-capacity plant in West Azerbaijan Province, which was one of the country's first private sector cement factories; and Tis Chabahar Cement Co.'s 1-Mt/yr-capacity Chabahar plant in Sistan va Baluchestan Province, which was built close to Chabahar Quays on the Gulf of Oman to facilitate seaborne exports (Global Cement, 2015a; International Cement Review, 2015, p. 176).

The Government-controlled holding companies commanded a 48% share of the cement market. These included Fars & Khuzestan Cement Holding Co., which was the country's largest cement holding company, with 18 operating subsidiaries and a total capacity of 31.0 Mt/yr. Among its subsidiaries was Abyek Cement Co., which was the largest cement producer in Iran with 7.3 Mt/yr of capacity and a market share of 21%. Tehran Cement Co. operated four plants with a total capacity of 10.4 Mt/yr. Bank Melli Investment Co. had partial ownership in eight companies through the Cement Investment and Development Co.; the total capacity of the plant was 8.0 Mt/yr, and it had a market share of 6.5%. Ghadir Investment Co. had four subsidiaries (including Sepahan Cement) with a total (combined) capacity of 7.4 Mt/yr. Private companies accounted for the remaining 52% of the cement market. Espandar Investment Co., which was co-owned by Holcim Ltd. of Switzerland, was the only cement company with partial foreign ownership. Espandar operated four plants with a total

(combined) capacity of 5 Mt/yr and a market share of 7.8% (International Cement Review, 2015, p. 176).

Several construction contracts, including the Bagheran, Bojnourd, Karoon, and Zabol cement plants, were awarded by the Government to Boland Payeh CG Co. The Zabol project consisted of the construction of a cement factory with a capacity of 1.2 Mt/yr of cement, a limestone crusher, and a kiln feeder. The Bagheran cement plant consisted of a cement grinder, a cement-conveying system, and a feeding system to produce 1.2 Mt/yr of cement; the cement would be supplied to southeastern Iran and Afghanistan. The Bojnourd Project consisted of a gypsum grinder, a clinker conveyor, and a cement grinder. The Karoon cement plant would have a production capacity of 1.1 Mt/yr (Boland Payeh GC Co., 2015).

Iran's gypsum output decreased by 8% to 14.6 Mt in 2014 from 15.8 Mt in 2013. Gypsum was mainly used by cement plants for making plaster. Iran's gypsum mines were mainly located in Hormozgan, Semnan, and South Khorasan Provinces. Semnan Province was the leading gypsum-producing Province in Iran with 50 active gypsum mines, accounting for 80% of domestic production and 6% of global production. Thirty-eight gypsum mines operated in Hormozgan Province, and produced more than 1.88 Mt of gypsum in 2014 (table 1; Mehr News Agency, 2013; Minews, 2015e; Smt News, 2015).

**Graphite.**—IMIDRO planned to restart Iran's graphite production in order to enable increased domestic production of steel and to reduce graphite imports. In Iran, production of 1 t of steel required the use of between 2 and 2.5 kilograms (kg) of graphite electrode, a key semimetallic ingredient. The country's annual steel production of about 14 Mt resulted in an annual consumption of about 32,000 t of graphite electrode, which was entirely imported. Reaching the Government's 2025 production target of 52 Mt/yr of steel would increase demand for graphite electrode to 100,000 t/yr. In November 2014, IMIDRO announced that it would resume the construction of a graphite electrode unit in Ardekan, Yazd Province, after 13 years. The plant was expected to create 577 jobs in the first phase. It was also expected to increase annual production from 30,000 t to 45,000 t of graphite electrode in the second phase. The first phase of the project was planned to be completed by an unnamed European contractor in 2015 (Iran Chamber of Commerce, Industries, Mines and Agriculture, 2014; Iran Daily, 2014a; Iran International Magazine, 2014, p. 75; Karbasian, 2014, p. 17; Middle East Steel, 2016).

### ***Mineral Fuels and Related Materials***

Iran's primary energy supply sources continued to be natural gas (60.8%) and crude petroleum and petroleum products (37.0%) in 2014. Hydropower accounted for about 1.3% of primary energy supply, whereas coal, nuclear, and nonhydropower renewable energy sources accounted for less than 0.5% each. Domestic energy consumption has increased by almost 50% since 2004. The Government implemented the second phase of the energy subsidy reform in 2014, which raised the prices of domestic petroleum, natural gas, and electricity charged to local consumers (BP p.l.c., 2015, p. 41; U.S. Energy Information Administration, 2015, p. 2).

**Coal and Coke.**—Iran's total coal reserves were reported by the Government to be 11 Gt, of which 756 Mt was proven, 3 Gt was probable, and 7 Gt was possible. Reserves were located in Alborz, Kerman, Mazandaran, Semnan, and South Khorasan Provinces. Among the deposits with the largest reserves were Parvadeh 4 in Tabas, South Khorasan Province (250 Mt); Khomroud in Kerman Province (100 Mt), and Savadkouh in Mazandaran Province (50.5 Mt). Iran's total coal production capacity was 1.5 Mt/yr of concentrated coal (3.0 Mt/yr of raw coal) (Karbasian, 2014, p. 15; Iranian Mines and Mining Industries Development and Renovation Organization, 2015b, p. 1–2).

Iran's annual coal output has been below 1 Mt of concentrated coal in recent years owing to market conditions and lack of investment into mines. The Government's Comprehensive Coal Plan envisioned coal production of 5.8 Mt/yr in the medium term, of which 4.6 Mt/yr of coal would be extracted by local mines. In order to achieve this substantial increase in coal output, the Government planned to upgrade 11 coal mines, of which 4 were located in Mazandaran, 3 in Kerman, 3 in east Alborz, and 1 in central Alborz. Among these, the Khomroud Mine in Kerman (with a new planned capacity of 450,000 t/yr) and Parvadeh 4 (450,000 t/yr); Eastern Parvadeh (600,000 t/yr); and Parvadeh 2 and Parvadeh 3 (500,000 t/yr combined) in South Khorasan were regarded as priority projects to increase concentrated coal production capacity by about 72% to 2 Mt/yr. The second priority projects included the development of the Hashouni and the Pabdana Mines in Kerman (150,000 t/yr capacity combined), Takht and Vatan Mines in eastern Alborz (150,000 t/yr capacity combined), and Kordobad Mine in Mazandaran (230,000 t/yr capacity). With these new projects, IMIDRO sought to maintain coal production at current levels (Iranian Mines and Mining Industries Development and Renovation Organization, 2015b, p. 1, 3).

Iran's annual coke production has been about 1 Mt in recent years. The Government's Comprehensive Coal Plan targeted 4.2 Mt/yr of coking coal production by 2019 in order to supply the production of 6 Mt/yr of blast furnace steel. Multiple projects were either in progress or recently completed in order to further develop coke production. In 2014, Phase 2 of the Isfahan Steel Mill (which had a capacity of 900,000 t/yr), the Middle East Coke Production Co. (800,000 t/yr), and Tabas Coke Production Co. (450,000 t/yr) were put into operation. The Savadkouh coke production project (300,000-t/yr capacity), which also involved the development of the Kordobad coal mine, and Phase 2 of the Zarand coke production project (400,000-t/yr capacity) were in progress. Including the previously completed Phase 1 of the Zarand coke production project, Iran's total coke capacity increased to 3.5 Mt/yr in 2014 and was expected to meet its target of 4.2 Mt/yr in 2019 (Karbasian, 2014, p. 15; Iranian Mines and Mining Industries Development and Renovation Organization, 2015b, p. 1–2).

**Natural Gas.**—Iran's production of dry natural gas increased by 14% since 2010. Most of the output was consumed domestically. Production was expected to increase significantly as new phases of the South Pars field entered production. Iran sought to boost daily natural gas output to 1.2 billion cubic meters by 2020. Natural gas was produced mainly in the south

of the country and consumed mostly in the north. Iran relied on an extensive pipeline network to transport its gas domestically, but did not have the infrastructure in place to export or import LNG. Of the gross natural gas output, about 80% of it was marketed. The remaining 20% of output was either reinjected into petroleum wells to enhance petroleum recovery (12%) or vented and flared (7%). The NIOC was projected to require three or four times as much natural gas per year for petroleum fields in the next decade (Almeida, 2015; Mohamedi, 2015, p. 5–6; U.S. Energy Information Administration, 2015, p. 10–12).

The South Pars field, which is located 100 km offshore in the Persian Gulf and operated jointly with Qatar, was estimated to be the world's largest gasfield and to contain 10% of global conventional natural gas reserves. South Pars accounted for about 40% of Iran's gross natural gas production, held about 40% of its total proven natural gas reserves, and met about 55% of its domestic daily gas consumption. Other major gasfields included Forouz, Kangan, Kish, North Pars, and Tabnak. The South Pars project, which was being managed by the Pars Oil and Gas Co., a subsidiary of the NIOC, was the country's most significant current mineral fuel development project. Of the planned 24 phases of development, phases 1 to 10 and 12 were complete and phases 15 to 18 were partially complete. Phases 15 and 16 were expected to have a capacity of 57 million cubic meters per day of natural gas and 80,000 bbl/d of condensate. Production from phases 1 to 10 was allocated to the domestic market, whereas the remaining phases were planned for exports. All phases were expected to be completed by 2018 and to increase Iran's production by 40 billion cubic meters per year (Natural Gas World, 2014; Khatinoglu, 2015; U.S. Energy Information Administration, 2015, p. 11–12; Rigzone, 2016).

**Petroleum and Petroleum Products.**—Iran produced about 3.4 Mbbl/d of petroleum and other liquids in 2014, which was higher than the output level of 3.2 Mbbl/d in 2013, but substantially lower than that of 4.2 Mbbl/d in 2011. Of the total in 2014, 2.8 Mbbl/d was crude petroleum and 0.6 Mbbl/d was condensate and natural gas liquids. Iran's crude petroleum output was higher than the 2.7 Mbbl/d produced in 2013, but substantially lower than the 3.7 Mbbl/d produced in 2011 (U.S. Energy Information Administration, 2015, p. 5).

One-half of Iran's crude petroleum production was provided by onshore fields that have operated for longer than 70 years. Chief among these were the Ahwaz-Asmari, the Gachsaran, and the Marun fields. The NIOC sought to offset the output decline in aging fields by reinjecting natural gas into petroleum wells in order to improve recovery rates. Iran did not produce any petroleum in the Caspian Sea, where it held estimated reserves of 0.5 billion barrels of crude petroleum and lease condensate and 28.3 billion cubic meters of natural gas. According to the Government, the Sardar Jangal field in the Caspian Sea contained 100 million barrels of petroleum reserves (U.S. Energy Information Administration, 2013, p. 9, 12; 2015, p. 5–6; International Energy Agency, 2015, p. 53).

Twelve new petroleum exploration and development blocks were announced in recent years, including Azar, Forouzan, North Azadegan, North Yaran, South Azadegan, South Pars, South Yaran, and Yadaravan. These upstream projects were either delayed or canceled altogether, however, owing to the

impact of international sanctions and the lack of requisite investment and technology. The development of a few projects continued, but they were not expected to begin production soon (U.S. Energy Information Administration, 2015, p. 6).

Iran accounted for 2.1% of the world's crude petroleum refining capacity in 2014. The NIORDC operated 15 refineries with a total production capacity of about 1.99 Mbbl/d. The company sought to increase refining capacity in recent years in an effort to achieve self-sufficiency in refined products in response to international sanctions, but this target was not met. As of yearend 2014, the production of refined products—in particular, that of motor gasoline—remained below the level of domestic consumption. The NIORDC planned to build five more refineries and three condensate splitters. The Abadan, the Arak, and the Bandar Abbas refineries were reportedly in need of major repairs and upgrades in order to switch more of their capacity to higher value added refinery products (Natural Gas Europe, 2014; George and Bouso, 2015; Mohamedi, 2015, p. 5; U.S. Energy Information Administration, 2015, p. 7; BP p.l.c., 2016, p. 17).

**Uranium.**—Iran had a small amount of identified uranium resources, about one-third of which were measured and indicated and the remaining two-thirds of which were inferred. The mineralization trends of Birjand-Kashmar, Kerman-Sistan, Naiin-Jandagh, and salt plugs in southern Iran were favorable areas for the occurrence of undiscovered uranium resources. Most uranium exploration was undertaken in central Iran. A total of 2,880 t of uranium content was added to the identified resource estimate based on exploration in the Saghan Mine, the Gachin and Narigan deposits, and the Champeh and Moghuyeh salt plugs in 2012 and 2013. In February 2013, AEOI reported the increase of Iran's uranium resources to 4,000 t from 1,527 t (Organisation for Economic Co-operation and Development Nuclear Energy Agency and International Atomic Energy Agency, 2014, p. 268; World Nuclear Association, 2015).

Uranium mining and milling took place in Gachin in Hormozgan Province near the Port of Bandar Abbas on the Persian Gulf and in Saghand in the central desert region of Yazd Province. Ore was extracted in Gachin in surface salt plugs grading at 0.20% uranium (U) through open pit mining. The Bandar Abbas uranium plant, which began production from Gachin ore in 2006, produced about 12 t/yr of uranium with acid leaching, which was then delivered to the Isfahan conversion plant. The daily feed of the plant was subsequently increased to 70 t owing in part to a depletion of ore grade. Saghand, the second uranium mine in Iran, was an underground mine which began operations in April 2013. Its resources were reportedly 900 t of uranium contained in a deposit with a grade of 0.055% U. The associated Ardakan plant, which was located 75 km west of Saghand, was expected to produce 58 t/yr of uranium from the Saghan ore. Higher grade ore would be processed through acid leaching, whereas lower grade ore would be heap-leached on site. The Ardakan plant was at a precommissioning stage and was expected to begin operations in 2013, but no further details were available (Organisation for Economic Co-operation and Development Nuclear Energy Agency and International Atomic Energy Agency, 2014, p. 269; World Nuclear Association, 2015).

In July 2014, the IAEA reported that Iran had either diluted or converted its entire inventory of 209.1 kg of 20% enriched

uranium hexafluoride into uranium oxide, as agreed under the JPA of November 2013. The IAEA stated that Iran had also not enriched uranium above 5% at any of its declared facilities or further developed the Natanz Fuel Enrichment Plant (FEP), the Fordow Fuel Enrichment Plant (FFEP), and the Arak I-40 heavy water reactor. The IAEA inspectors were given managed access to the uranium mines and mills at Ardakan, Gachin, and Saghand, and to the enrichment facilities in Fordow and Natanz (World Nuclear News, 2014; World Nuclear Association, 2015).

## Outlook

Iran's mineral commodity production may increase significantly in coming years if international sanctions targeted at its mineral industry are lifted and global commodity prices stabilize. Numerous production-capacity expansion projects, especially for metals and industrial minerals, are currently in progress and new mineral extraction mines and facilities are being constructed across Iran. Many more minerals-related projects are being planned or will begin production in the near future, provided the required foreign investment materializes. The production of alumina, aluminum, chromium, coal, copper, gold, iron ore, lead, molybdenum, steel, uranium, and zinc are expected to increase substantially as new mineral extraction and processing complexes become active and existing mines and facilities are technologically upgraded in order to meet the Government's 2025 production targets for the mineral industry. The rate of growth of cement output is contingent on the recovery of demand by the domestic construction industry. The future trajectory of hydrocarbons and refined petroleum products output in the country depends on the stabilization of global mineral commodity prices and whether international sanctions targeted at Iran's mineral production and trade are fully lifted in coming years, which could reverse the recent decline in investment into the sector. The lack of sufficient investment funds and electricity generation as well as required technological upgrades may continue to hamper Iran's mineral production.

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TABLE 1  
IRAN: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

(Metric tons unless otherwise specified)

Commodity <sup>2</sup>	2010	2011	2012	2013	2014
<b>METALS</b>					
Aluminum:					
Bauxite, gross weight	687,000	847,000	892,000	788,600	540,000
Alumina <sup>c</sup>	236,000	233,000	227,000	245,000	252,000
Metal, primary ingot	303,000	321,900	336,500	295,000	354,000
Antimony	600	600	--	400	432
Chromite, mine output, concentrate:					
Gross weight	394,000	440,000	412,000	410,000	338,700
Cr <sub>2</sub> O <sub>3</sub> content	169,400	189,200	192,200	191,100	158,000
Copper:					
Mine output:					
Ore mined (0.6% to 1.2% Cu):					
Gross weight thousand metric tons	27,470	37,290	34,780	32,420	31,500
Cu content	256,700	258,900	238,000	222,900	216,800
Concentrate (27% to 35% Cu):					
Gross weight	760,000	940,000	950,000	750,000	800,000
Cu content	255,000	255,000	260,000	210,000	220,000
Metal:					
Smelter output, blister or anode	279,000	270,000	271,000	224,000	232,500
Refined output, cathode	221,000	235,000	213,000	189,000	194,000
Gold, mine output, Au content <sup>3</sup> kilograms	2,000	2,200	2,800	2,500	3,300
Iron and steel:					
Ore and concentrate:					
Gross weight thousand metric tons	31,029	35,843	39,783	48,175	48,451
Fe content do.	15,200	17,600	19,500	23,600	23,700
Metal:					
Pig iron do.	2,540	2,242	2,143	2,007	2,782
Direct-reduced iron do.	9,350	10,368	11,582	14,458	14,551
Steel, crude, ingots and castings do.	11,995	13,197	14,463	15,422	16,331
Lead:					
Mine output, concentrate:					
Gross weight	67,000	62,000	75,000	85,000	66,000
Pb content	32,000	29,600	35,600	40,300	31,500
Manganese, mine output (30% to 35% Mn):					
Gross weight	126,000	228,000	195,000	207,000	167,000
Mn content	42,500	77,200	66,100	70,200	56,600
Mercury	2	2	--	10	12
Molybdenum, mine output, concentrate:					
Gross weight	6,600	6,000	6,300	6,200	6,200
Mo content	3,676	3,365	3,516	3,471	3,494
Silver	106	101	96	85	80
Zinc:					
Mine output, concentrate:					
Gross weight	260,000	280,000	280,000	264,000	304,000
Zn content	128,000	138,000	138,000	130,000	150,000
Metal	120,000	132,000	132,000	120,000	142,000
<b>INDUSTRIAL MINERALS</b>					
Arsenic	13	98	101	110	110
Barite	322,000	300,000	315,000	360,000	537,000
Boron, borax	1,060	1,044	3,000	914	180
Cement, hydraulic thousand metric tons	55,000	66,000	70,250	68,700	66,400
Clays:					
Bentonite	542,900	422,000	427,000	397,100	419,700
Industrial clays	550,000	550,000	550,000	550,000	600,000
Kaolin	761,500	762,000	800,000	946,400	820,100
Diatomite	3,000	--	--	9,500	9,900

See footnotes at end of table.

TABLE 1—Continued  
IRAN: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

(Metric tons unless otherwise specified)

Commodity <sup>2</sup>	2010	2011	2012	2013	2014
INDUSTRIAL MINERALS—Continued					
Feldspar	533,100	576,600	1,100,000	1,313,200	1,128,600
Fluorspar	59,831	55,976	80,000	69,828	78,736
Gemstones, turquoise <sup>c</sup> kilograms	20,000	20,000	21,000	21,000	21,000
Graphite	360	360	--	--	--
Gypsum thousand metric tons	13,672	15,353	14,179	15,800	14,600
Industrial or glass sand (quartzite and silica) <sup>c</sup> do.	1,500	1,500	1,500	1,500	1,500
Lime <sup>c</sup> do.	2,700	2,800	2,800	2,800	2,800
Magnesite	173,500	172,700	143,000	170,700	165,900
Mica	2,860	7,130	7,000	7,000	7,000
Nitrogen:					
N content of ammonia	2,500,000	2,500,000	2,500,000	2,500,000	2,500,000
N content of urea	1,600,000	1,600,000	1,600,000	1,600,000	1,600,000
Perlite	19,200	20,000	30,000	55,100	42,600
Phosphate rock:					
Ore	362,000	370,000	370,000	380,000	122,000
P <sub>2</sub> O <sub>5</sub> content	108,700	110,000	110,000	113,600	36,500
Salt	2,997,400	2,714,700	2,962,000	2,078,682	3,940,100
Stone, construction and building, crushed <sup>c, 4</sup> thousand metric tons	26,000	26,000	27,000	27,000	27,000
Strontium, celestite	--	40,000	20,000	--	20,000
Sulfur:					
Byproduct of petroleum and natural gas	1,780,000	1,575,000	2,000,000	2,100,000	2,100,000
Byproduct of metallurgical processing, S content of acid	80,000	75,000	90,000	95,000	95,000
Total	1,860,000	1,650,000	2,090,000	2,195,000	2,195,000
Talc	62,672	58,987	116,000	92,958	52,492
Vermiculite	1,200	1,200	1,200	1,200	1,200
MINERAL FUELS AND RELATED MATERIALS					
Coal:					
Hard thousand metric tons	1,045	1,066	1,044	858	810
Lignite do.	2,324	2,327	2,820	2,800	2,700
Coke do.	984	1,052	940	1,059	1,000
Gas, natural:					
Gross million cubic meters	220,123	224,122	231,332	228,887	244,551
Dry do.	187,357	188,753	202,431	199,293	212,796
Gas plant liquids thousand 42-gallon barrels	145,000	145,000	150,000	156,000	160,000
Petroleum:					
Crude do.	1,293,560	1,305,240	1,365,027	1,304,985	1,137,742
Refinery products:					
Motor gasoline do.	126,400	112,603	152,789	166,331	125,706
Kerosene do.	47,523	42,669	45,443	45,443	35,551
Distillate fuel oil do.	206,408	218,307	202,794	214,839	213,744
Residual fuel oil do.	172,280	177,828	173,850	187,172	176,368
Other do.	83,695	86,870	86,505	86,505	96,360
Total do.	636,306	638,277	661,381	700,290	647,729
Uranium	7	12	15	40	45

<sup>c</sup>Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. do. Ditto. -- Zero.

<sup>1</sup>Table includes data available through June 20, 2016.

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

<sup>3</sup>Includes gold recovered from the Mouteh gold mine and from the Sarcheshmeh copper complex.

<sup>4</sup>Includes marble and travertine.



TABLE 2  
IRAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2014<sup>1</sup>

(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)] <sup>2</sup>	Northeast of Jajarm, North Khorasan Province	280
Aluminum	Iranian Aluminium Co. [Iranian Mines and Mining Industries Development and Renovation Organization (IMIDRO), <sup>2</sup> 60%, and a joint venture of Industrial Development Investment Co. and a subsidiary of Mehr Finance & Credit Institution, 40%]	Arak, Markazi Province	230
Do.	Almahdi Aluminium Co. [(Iranian Mines and Mining Industries Development and Renovation Organization (IMIDRO)] <sup>2</sup>	Bandar Abbas, Hormozgan Province	257
Bauxite	Iran Alumina Co. [Iranian Mines and Mining Industries Development and Renovation Organization (IMIDRO)] <sup>2</sup>	Jajarm Mine, about 15 kilometers northeast of Jajarm	800
Cement	Abadeh Cement Co.	Abadeh, Fars Province	393
Do.	Abyek Cement Co. (Fars & Khouzestan Cement Co.)	Abyek, Qazvin Province, 80 kilometers northwest of Tehran	7,300
Do.	Anarak Special Cement Co.	Anarak, Markazi Province	500
Do.	Ardebil Cement Co. (Espendar 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 & Khouzestan 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 & Khouzestan Cement Co.)	About 37 kilometers from Bojnourd, North Khorasan 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 & Khouzestan Cement Co.)	Doroud, Lorestan Province	1,245
Do.	East Wite Cement Co.	NA	330
Do.	Ekbatan Cement Co. (Espandar Cement Investment Co.)	Ekbatan, Tehran Province	114
Do.	Eshabban Cement Co.	20 kilometers west of Eshabban, Fars Province	350
Do.	Firozkouh Cement Co. (Espandar Cement Investment Co.)	About 180 kilometers northeast of Tehran	1,030
Do.	Fars Cement Co. (Fars & Khouzestan Cement Co.)	Shiraz, Fars Province	819
Do.	Fars Now Cement Co. (Fars & Khouzestan 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), South Khorasan Province	811
Do.	Gharb Cement Co. (Fars & Khouzestan 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.	Karoon Cement Co.	Near Masjed Soleyman, Khuzestan Province	936
Do.	Kavan Boukan Cement Co.	Near Kashan, Esfahan Province	1,030
Do.	Kavir Kashan Cement Co. (Espendar Investment Co.)	Near Kashan, Esfahan Province	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 & Khouzestan Cement Co.)	Khash, Sistan va Baluchestan Province	811
Do.	Khazar Cement Co. (Fars & Khouzestan Cement Co.)	About 80 kilometers northwest of Qazvin, Qazvin Province	1,248
Do.	Khouzestan Cement Co. (Fars & Khouzestan Cement Co.)	Ramhormoz, Khuzestan Province	2,496
Do.	Kohkiloye Yasuj Cement (State Retirement Organization <sup>2</sup> and Fars & Khouzestan Cement Co.)	Behbahan, near Deh Dasht, Kohkiloye, Kohgiluyeh va Bowyer Ahmad Province	1,200
Do.	Kordestan Cement Co. (Ghadir Holding Co.)	North of Bijar, Kordestan Province	998
Do.	Lamerd Cement Co.	Lamerd, Fars Province	1,030
Do.	Lar-e Sabzevar Cement Co.	Sabzevar, Razavi Khorasan 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

See footnotes at end of table.

TABLE 2—Continued  
IRAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2014<sup>1</sup>

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Cement—Continued	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 & Khouzestan 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	240
Do.	Peyvand Golestan Cement Co.	NA	1,030
Do.	Safaieh Cement Co.	NA	624
Do.	Saman Gharb Cement Co.	NA	2,184
Do.	Sarooj Boushehr International Co.	Kangan, Bushehr Province	624
Do.	Saveh Grey Cement Co. (Fars & Khouzestan Cement Co.)	Saveh, Markazi Province	2,246
Do.	Saveh White Cement Co. (Fars & Khouzestan Cement Co.)	do.	230
Do.	Sepahan Cement Co. (Ghadir Investment Holding)	Mobarekeh, Esfahan Province	3,089
Do.	Shahrekord Cement Co.	NA	1,030
Do.	Shahrud Cement Co. (Fars & Khouzestan Cement Co.)	Shahrud, Semnan Province	1,872
Do.	Sharg Cement Co. (Ghadir Investment Holding)	Mashhad, Razavi Khorasan Province	1,997
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 & Khouzestan Cement Co. and Social Security Organization Investment Co.)	About 33 kilometers northwest of Tabriz, East Azerbaijan Province	2,184
Do.	Tehran Cement Co. (Ghadir Investment Holding)	Tehran, Tehran Province	3,170
Do.	Tejarat Mehriz Cement Co.	NA	1,123
Do.	Tis Chabahar Cement Co.	Chabahar, Sistan va Baluchestan Province	1,000
Do.	Urmia Cement Co. (Fars & Khouzestan Cement Co.)	Orumiyyeh, West Azerbaijan Province	1,966
Do.	Urumieh 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 & Khouzestan Cement Co.)	Zanjan, Zanjan Province	606
Do.	Zarin Rafsanjan Cement Co.	NA	218
Do.	Zarveh Torbat Cement Co.	Torbat-Heydareh, Razavi Khorasan Province	1,092
Chromite	Faryab Mining Co.	Faryab Mine and processing plant, Minab, Hormozgan Province	180 <sup>c</sup>
Do.	Esfandaghe Mines Co.	Abdasht Mine, Kerman Province; Suqan (Saboughan) Mine, Kerman Province; Processing plant at Esfandaghe, Kerman Province	30
Do.	NA	Furumad Mine, Shahrud, Semnan Province; Gaft processing plant, Semnan Province	6
Do.	NA	Mir Mahmud Mine, Mayami, Semnam Province	6
Do.	NA	Dumak Mine, Zahedan, Sistan va Baluchestan Province	2
Coal	National Iranian Copper Industries Co. (NICICO) [Iranian Mines and Mining Industries Development and Renovation Organization (IMIDRO)] <sup>2</sup>	Eastern Parvadeh Mine, South Khorasan Province	600
Do.	do.	Khomroud Mine, Kerman Province	450
Do.	do.	Parvadeh 4 Mine, South Khorasan Province	450
Do.	do.	Parvadeh 2 and 3 Mines, South Khorasan Province	500
Do.	do.	Kordabad Mine, Mazandaran Province	230
Do.	do.	Hashouni and Pabdana Mines, Kerman Province	150
Do.	do.	Takht and Vatan Mines, Alborz Province	150
Coke	Isfahan Steel Co. [Iranian Mines and Mining Industries Development and Renovation Organization (IMIDRO)] <sup>2</sup>	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)] <sup>2</sup>	NA	800
Do.	Tabas Coke Production Co. [Iranian Mines and Mining Industries Development and Renovation Organization (IMIDRO)] <sup>2</sup>	NA	450
Do.	Zarand Iranian Steel Co.	Zarand, Kerman Province	400

See footnotes at end of table.

TABLE 2—Continued  
IRAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2014<sup>1</sup>

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
<b>Copper:</b>				
Concentrate		National Iranian Copper Industries Co. (NICICO) [Iranian Mines and Mining Industries Development and Renovation Organization (IMIDRO)] <sup>2</sup>	Sarcheshmeh Mine, south of Rafsanjan, Kerman Province	640
Do.		do.	Sungun copper mine, East Azerbaijan Province	300
Do.		do.	Miduk copper mine, Kerman Province	150
Do.		do.	Qal'eh Zari Mine, about 120 kilometers southwest of Birjand, South Khorasan 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)] <sup>2</sup>	Smelter, Sarcheshmeh copper complex, south of Rafsanjan, Kerman Province	145
Do.		do.	Smelter near Khatoonabad, Kerman Province	80
Refined metal		do.	Refinery, Sarcheshmeh copper complex, south of Rafsanjan, Kerman Province	240
Do.		do.	Electrowon plant, Sarcheshmeh copper complex, south of Rafsanjan, Kerman Province	12
Do.		do.	Electrowon plant, Miduk copper complex, Kerman Province	5
Gemstones, turquoise		NA	Neyshabur Mine, Razavi Khorasan Province	6 <sup>e</sup>
<b>Gold:</b>				
Ore	kilograms	Iran Minerals Production and Supply Co. (IMPSACO) [Iranian Mines and Mining Industries Development and Renovation Organization (IMIDRO)] <sup>2</sup>	Muteh Mine (Chah Khaton and Senjedeh pits), Esfahan Province, and Kuh-e-Zar Mine, Semnan Province	300
Do.	do.	Iranian Mines and Mining Industries Development and Renovation Organization (IMIDRO)] <sup>2</sup>	Zarshouran Mine, 31 km north of Takab, West Azerbaijan Province	3,000
Do.	do.	National Iranian Copper Industries Co. (NICICO) [Iranian Mines and Mining Industries Development and Renovation Organization (IMIDRO)] <sup>2</sup>	Coproduct of production from various copper mines	600
Do.	do.	Pooya Zarcan Agh Darreh	Agh Darreh	2200 <sup>3</sup>
Do.	do.	Zar Kuh Mining Co.	Sari Gunay Mine, Kordestan Province	2,000
Do.	do.	Artisanal placer operations	Neyshabur area, Razavi Khorasan Province	NA
Metal <sup>4</sup>	do.	National Iranian Copper Industries Co. (NICICO) [Iranian Mines and Mining Industries Development and Renovation Organization (IMIDRO)] <sup>2</sup>	Sarcheshmeh copper complex, south of Rafsanjan, Kerman Province	210
<b>Iron and steel:</b>				
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), <sup>2</sup> 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), <sup>2</sup> 18%]	Gol-e-Gohar Mine, about 50 kilometers southwest of Sirjan, Kerman Province	7,000
Do.		Iran Central Iron Ore Co. [National Iranian Steel Co. (NISCO), 100%] <sup>5</sup>	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)] <sup>2</sup>	Jalal Abad Mine, about 40 kilometers northwest of Zarand	2,000
Do.		NA	Chah Gaz Mine, Yazd Province	NA
Do.		NA	Mishdovan Mine, Yazd Province	NA
Do.		Sangan Iron Ore Co. [National Iranian Steel Co. (NISCO)] <sup>5</sup>	Sangan (Songun) Mine, about 140 kilometers southeast of Torbat e-Heydariyeh, Razavi Khorasan Province	2,600
Do.		About 20 small privately owned mines	NA	1,000 <sup>e</sup>
Cast iron		Zagros Steel Co. (Government, majority interest)	Foundry in Kordestan Province	70

See footnotes at end of table.

TABLE 2—Continued  
IRAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2014<sup>1</sup>

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
<b>Iron and steel—Continued:</b>				
Direct-reduced iron		Mobarekeh Steel Co. [National Iranian Steel Co. (NISCO)] <sup>5</sup>	Direct-reduction iron plant (Midrex <sup>®</sup> process) about 50 kilometers southwest of Esfahan, Esfahan Province	5,000
Do.		Khuzestan Steel Co. [National Iranian Steel Co. (NISCO)] <sup>5</sup>	Direct-reduction iron plant (HYL I, Midrex <sup>®</sup> , and Purofer processes), Ahwaz, Khuzestan Province	4,000
Do.		Hormozgan Steel Co. [National Iranian Steel Co. (NISCO) <sup>5</sup> and partners]	Direct-reduction iron plant (Midrex <sup>®</sup> process), Bandar Abbas, Hormozgan Province	1,500
Do.		Esfahan Steel Co. [National Iranian Steel Co. (NISCO)] <sup>5</sup>	Direct-reduction iron plant (Ghaem process) about 40 kilometers southwest of Esfahan, Esfahan Province	600
Steel, crude		Mobarekeh Steel Co. [National Iranian Steel Co. (NISCO)] <sup>5</sup>	Plant about 50 kilometers southwest of Esfahan, Esfahan Province	5,400
Do.		Khuzestan Steel Co. [National Iranian Steel Co. (NISCO)] <sup>5</sup>	Plant at Ahwaz, Khuzestan Province	3,600
Do.		Esfahan Steel Co. [National Iranian Steel Co. (NISCO)] <sup>5</sup>	Plant about 40 kilometers southwest of Esfahan, Esfahan Province	3,600
Do.		Kish South Kaveh Steel Co. (SKS)	Hormozgan Province	1,200
Do.		Khorasan Steel Co. [Iranian Mines and Mining Industries Development and Renovation Organization (IMIDRO) <sup>2</sup> 60%, and a Government pension fund, 40%]	Plant at Neyshabur, Razavi Khorasan Province	650
Do.		Vian Steel Melting and Casting Co.	Plant, about 42 kilometers of Hamadan, Hamadan Province	600
Do.		Meybod Steel Co. (Iranian Mines and Mining Industries Development and Renovation Organization (IMIDRO)], <sup>3</sup> 50%)	About 15 kilometers southwest of Meybod, Yazd Province	300
Magnesite		Birjand Refractory Mining Co. (Iranian Refractories Procurement & Production Co.)	Hoz Sefid, Shirkuhak, and Torshak Mohammadi Mine about 50 kilometers southeast of Birjand, South Khorasan Province	NA
Molybdenum, concentrate		National Iranian Copper Industries Co. (NICICO) [Iranian Mines and Mining Industries Development and Renovation Organization (IMIDRO)] <sup>2</sup>	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	National Iranian Oil Co. (Government, 100%)	Associated gas from company oilfields	96
Do.	do.	do.	Aghar, Dalan, Kangan, and Nar gasfields	57
Do.	do.	Pars Oil and Gas Co. (National Iranian Oil Co., 100%) <sup>2</sup>	South Pars gasfields, offshore	32 <sup>6</sup>
<b>Petroleum:</b>				
Crude	million 42-gallon barrels	National Iranian Oil Co. (Government, 100%)	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
Do.	do.	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. and buyback contract joint venture of Total S.A. (55%) and Eni SpA (45%)	Doroud field, offshore	65
Do.	do.	National Iranian Oil Co. 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. 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	399
Do.	do.	do.	Refinery at Esfahan	375

See footnotes at end of table.



TABLE 2—Continued  
IRAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2014<sup>1</sup>

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Petroleum—Continued:				
Refined products—Continued	thousand 42-gallon barrels per day	National Iranian Oil Refining and Distribution Co. (NIORDC) (Government, 100%)	Refinery at Bandar Abbas	284
Do.	do.	do.	Refinery at Tehran	245
Do.	do.	do.	Refinery at Arak	242
Do.	do.	do.	Refinery at Borzuyeh	120
Do.	do.	do.	Refinery at Tabriz	110
Do.	do.	do.	Refinery at Shiraz	56 <sup>7</sup>
Do.	do.	do.	Refinery at Lavan Island	48 <sup>7</sup>
Do.	do.	do.	Refinery at BooAli Sina	34
Do.	do.	do.	Refinery at Kermanshah	22
Do.	do.	do.	Refinery at Aras 2	10
Do.	do.	do.	Refinery at Booshehr	10
Do.	do.	do.	Refinery at Aras 1	5
Do.	do.	do.	Refinery at Yazd	3
Phosphate rock		Esfordi Phosphate Complex (Iran Minerals Production & Supply Co.) <sup>2</sup>	About 35 kilometers northeast of Bafgh, Yazd Province	500
Titanium, ilmenite		Kahnuj pilot plant [Iranian Mines and Mining Industries Development and Renovation Organization (IMIDRO)] <sup>2</sup>	Daregaz placer and Kahnuj titanium dioxide processing plant	NA
Uranium	metric tons	Atomic Energy Organization of Iran (Government)	Saghand Mine, about 125 kilometers northeast of Yazd, Yazd Province	58
Do.	do.	do.	Gachin Mine, near Bandar Abbas, Hormozgan Province	21 <sup>6</sup>
Zinc:				
Ore		Iran Zinc Mine Development Co.	Angouran open pit mine, Dandi, Zanjan Province	1,000 <sup>8</sup>
Do.		Mehdi Abad Zinc Co. (K.D.D. Group)	Mehdi Abad Mine, Yazd Province	700 <sup>8</sup>
Do.		Ber-Oner Tehran Co.	Emarat Mine, about 25 kilometers southwest of Arak, Markazi Province	150 <sup>8</sup>
Do.		Bafgh Mining Co.	Kushk Mine, Yazd Province	120 <sup>8</sup>
Do.		BAMA Co. (Irakouh)	Irakouh complex (Gooshfil underground and Tappeh Sorkh open pit mines, about 20 kilometers southeast of Esfahan, Esfahan Province, and Kolah Darvazeh Mine, south of Esfahan, Esfahan Province)	100 <sup>8</sup>
Concentrate		Calcimin Co. (Iran Zinc Mine Development Co.)	Dandi (Angouran) plant, Zanjan Province	500
Do.		Zangan Zinc Industry LLP (Iran Zinc Mine Development Co.)	Zanjan plant, Zanjan Province	250
Do.		Zanjan Zinc Kholes Sazan Industries Co.	do.	200
Do.		Mehdi Abad Zinc Co. (K.D.D. Group)	Mehdi Abad plant, Yazd Province	100
Refined metal		Calcimin Co. (Iran Zinc Mine Development Co.)	Dandi (Angouran) plant, Zanjan Province	80
Do.		Zanjan Zinc Kholes Sazan Industries Co.	Zanjan, Zanjan Province	35
Do.		Bafgh Zinc Co. (Iran Zinc Mine 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 Mine Development Co.)	Dandi, Zanjan Province	18
Do.		National Iranian Lead and Zinc Co. (Iran Zinc Mine 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

<sup>6</sup>Estimated. Do., do. Ditto. NA Not available.

<sup>1</sup>Data were augmented by input from the Iranian National Committee of the World Mining Congress.

<sup>2</sup>Government owned.

<sup>3</sup>Operations suspended.

<sup>4</sup>Recovered from Sarcheshmeh copper plant slimes.

<sup>5</sup>A subsidiary of state-owned Iranian Mines and Mining Industries Development and Renovation Organization (IMIDRO).

<sup>6</sup>May include basic sediment and condensate.

<sup>7</sup>Held 95% equity interest.

<sup>8</sup>Includes lead and zinc ores.