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The Mineral Industry of the United Arab Emirates

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Note: In this chapter, information for 2020 is followed by information for 2021.

In 2020, the United Arab Emirates (UAE)[1] was the world's fifth-ranked producer of aluminum and sulfur, accounting for 3.9% of all aluminum smelter output and 7.5% of all sulfur production. In addition, the UAE was the world's seventh-ranked producer of crude petroleum and condensate, accounting for 4.2% of the world's production. According to the 70th edition of the Statistical Review of World Energy (BP p.l.c., 2021), the proven crude petroleum reserves in the UAE were estimated to be 97.8 billion barrels (Gbbl; or 5.6% of the world's total crude petroleum reserves) and the country's proven natural gas reserves were estimated to be 5.9 trillion cubic meters (3.2% of the world's proven natural gas reserves). The UAE was a major regional producer of industrial minerals, metals, and downstream metal products, including cement, iron and steel, nitrogen fertilizers, and sulfur. Other fuel products and industrial minerals produced included gypsum, lime, and refined petroleum. The UAE was a member of the Organization of the Petroleum Exporting Countries (OPEC) and the Cooperation Council for the Arab States of the Gulf, which is also known as the Gulf Cooperation Council (GCC) (table 1; BP p.l.c., 2021, p. 16, 34; 2022, p. 15; Apodaca, 2022; Bray, 2022; Cooperation Council for the Arab States of the Gulf, 2022; Organization of the Petroleum Exporting Countries, 2022b).

Minerals in the National Economy

In 2020, the real gross domestic product (GDP) of the UAE was reported by the UAE's Federal Competitiveness and Statistics Centre to have decreased by 5.0% compared with an increase of 1.1% (revised) in 2019; the nominal GDP of the UAE was estimated to be $349 billion.[2] The GDP value of the mining and energy sector in 2020 decreased to $61 billion from $94 billion in 2019, which was a decrease of 35.7%. The mining and energy sector remained the leading contributor to the country's GDP, accounting for 17.3% of the total, but that was lower than the 22.5% share in 2019. Other leading sectors in the economy were wholesale and retail trade, which accounted for 13.7% of the GDP; manufacturing, 10.3%; construction, 9.8%; and financial and insurance activities, 8.4% (United Arab Emirates Ministry of Cabinet Affairs, 2022b, tables 2, 6).

In 2020, Government revenue (preliminary) from hydrocarbon activity was estimated to have decreased by 22.4% to $41.6 billion from $53.7 billion in 2019; the Government's total revenues were estimated to be about $101 billion. In 2020, revenue from hydrocarbon production accounted for about 41.4% of total Government revenue, which was slightly higher than its share in 2019 but down from a high of 69.1% in 2011 (United Arab Emirates Ministry of Cabinet Affairs, 2021, table 47).

In 2020, the value of goods exported by the UAE decreased by 13% to $350 billion from $404 billion (revised) in 2019. This change was attributed to a 40% decline in the total value of crude petroleum exports, which decreased to $31 billion from $52 billion (revised) in 2019. The average price of exported Murban crude (the country's export blend) decreased to $42.98 per barrel in 2020 from $64.72 per barrel in 2019. The value of the country's exports of pearls, stones, precious metals, and articles thereof increased by 47% to about $30.4 billion; of exports of base metals and articles thereof, by 13% to $11.5 billion; and of exports of mineral products, decreased by 39% to $3.6 billion. In terms of tonnage, the leading metal exports were raw steel [3.50 million metric tons (Mt)], aluminum and articles thereof (2.39 Mt), articles of iron and steel (1.53 Mt), copper and articles of copper [331,000 metric tons (t)], and nickel and articles of nickel (120,000 t) (Organization of the Petroleum Exporting Countries, 2022a, p. 17–18, 66; United Arab Emirates Ministry of Cabinet Affairs, 2022a, tables 13, 17).

The value of goods imported by the UAE in 2020 decreased by 14% to $214 billion from that in 2019. Imports of pearls, stones, and precious metals and products thereof decreased in value by 10% to about $52 billion. The leading sources of imported gemstones, pearls, precious metals, and products thereof in 2020 were Guinea, which supplied $6.6 billion worth; India, $4.7 billion; Mali, $2.9 billion; South Africa, $2.9 billion; Egypt, $2.3 billion; Sudan, $1.8 billion; and Niger, $1.7 billion. The value of imports of base metals and articles thereof in 2020 decreased by 14% to $13.0 billion. The value of imports of mineral fuels, mineral oils and products of their distillation, and bituminous substances decreased by 35% to $10.8 billion (International Trade Centre, 2022; United Arab Emirates Ministry of Cabinet Affairs, 2022a, tables 12, 16).

Goods exported to the United States from the UAE were valued at $3.1 billion in 2020. Bauxite and aluminum exports, which were valued at $787 million, accounted for about 26% of the total exports. Other notable mineral-related exports to the United States included petroleum products (other) valued at $262 million; iron and steel products (not otherwise classified), $103 million; crude petroleum, $97 million; fuel oil, $70 million; gem diamond and other gemstones, $41 million;

[1]The United Arab Emirates is a federation of seven Emirates: Abu Zaby (Abu Dhabi), ʻAjman, Al Fujayrah, Ash Shariqah (Sharjah), Dubayy (Dubai), Ra's al Khaymah, Umm al Qaywayn.

[2]Where necessary, values have been converted from United Arab Emirates dirham (AED) to U.S. dollars (US$) at the annual average exchange rate of AED3.673=US$1.00 for 2021, 2020, and 2019.

other precious metals, $40 million; sulfur and other nonmetallic minerals, $13 million; and liquid petroleum gases, $6 million. Imports to the UAE from the United States were valued at $14.7 billion in 2020. Gem diamond exports, which were valued at $421 million, accounted for about 3% of total imports. Other notable mineral-related imports from the United States included crude petroleum valued at $364 million; petroleum products (other), $139 million; nonmonetary gold, $94 million; natural gas, $65 million; iron and steel products (other), $43 million; nonferrous metals (other), $22 million; copper, $20 million; and aluminum and alumina, $13 million (U.S. Census Bureau, 2022a, b).

The Dubai Multi Commodities Centre (DMCC) was the home of the Dubai Diamond Exchange (DDE) auction facility. The DMCC reported that $21 billion in diamond was traded in Dubai in 2019 but that the trade value decreased to an estimated $13 billion in 2020. The UAE was the third-ranked trading hub for rough diamond after Belgium and India; Israel and China were ranked fourth and fifth. In August 2020, the Government of Dubai normalized trade with Israel. The DMCC hoped that increased trade with Israel would help it achieve its aim to become the world's leading international diamond trading hub; diamond transactions by the DDE had seen a notable increase from nearly zero in the late 1990s. Rough diamond imports decreased by 9.1% to 69.6 million carats in 2020 from 76.5 million carats in 2019; rough diamond exports decreased by 19.8% to 63.5 million carats in 2020 from 79.2 million carats in 2019. The UAE's diamond-trading partners included diamond-producing countries in Africa, diamond-processing centers in Asia, and diamond-consuming markets in China, Europe, and the United States (Dubai Multi Commodities Centre, 2019, 2020, 2022; Cornwell, 2020; Kimberley Process Certification Scheme, 2020, 2021).

The UAE did not have a specific, comprehensive Federal law governing the mineral industry. Article 23 of the UAE Federal Constitution grants each Emirate ownership of and the ability to manage and mine its mineral resources. The Abu Dhabi Emirate, which is the largest of the UAE's seven Emirates in terms of land area, controlled 96% of the UAE's national petroleum reserves; the Dubai Emirate, 4%; and the other five Emirates combined, 2%. The Abu Dhabi Emirate also controlled 94% of the UAE's natural gas reserves; the Dubai Emirate, 1.5%; and the other five Emirates combined, 4.5%. Each Emirate regulated the extraction of petroleum and natural gas by itself. In Abu Dhabi, the Supreme Petroleum Council regulated and set related policies for petroleum and gas extraction. In the Dubai Emirate and the Sharjah Emirate, the Dubai Supreme Council of Energy and the Sharjah Petroleum Council, respectively, were responsible for regulating and developing the petroleum and natural gas industries (PricewaterhouseCoopers, 2015, p. 55; Sherman and Sterling LLP, 2019; Legal Advice Middle East, 2020).

Production

In 2020, production of alumina increased by 75% to 1.9 Mt. The increase was due to the continued rampup of the Al Taweelah alumina refinery located in the Khalifa Industrial Zone (KIZAD), Abu Dhabi, which began operations in 2019. Notable decreases in production included that of chromite ore, which decreased by 54% to 62,413 t; concrete-reinforcing bars, by 20% to 1.6 Mt (estimated); direct-reduced iron (DRI), by 19% to 3.0 Mt; raw steel, by 18% to 2.7 Mt; hot-rolled steel products, by 17% to 2.5 Mt (estimated); kerosene, including jet fuel, by 14% to 89.3 million barrels (Mbbl); and sulfur (byproduct of natural gas and petroleum), by 13% to 5.2 Mt (estimated). Data on mineral production are in table 1 (Emirates Global Aluminium, 2019; Aluminium Insider, 2021).

Structure of the Mineral Industry

The Abu Dhabi Emirate controlled and managed its petroleum and natural gas resources through Abu Dhabi National Oil Co. (ADNOC). ADNOC operated eight major onshore fields (the Abu Al Bukhoosh, Arzanah, Asab, Bab, Bu Hasa, Jarn Yaphour, Sahil, and Shah Fields) as ADNOC Onshore. ADNOC also operated three offshore fields (the Lower Zakum, the Nasr, and the Umm Sharif Fields) as ADNOC Offshore. The Zakum Development Co. (ZADCO), which was a consortium of ADNOC (60%), Exxon Mobil Oil Corp. of the United States (28%), and Japan Oil Development (12%), operated three offshore fields (the Satah, the Umm Al-Dalkh, and the Upper Zakum Fields) (table 2; Gulf News, 2017; U.S. Energy Information Administration, 2017, p. 2–3).

Abu Dhabi Gas Industries Ltd. Co. (GASCO) operated three plants (Asab, Bu Hasa, and Habshan/Bab) for natural gas processing and natural gas liquids (NGL) extraction. The company also operated a pipeline distribution network to route natural gas to domestic industrial companies and local power stations. Abu Dhabi Oil Refining Co. (TAKREER) operated the Ruwais and Umm Al Nar refineries. Abu Dhabi Gas Liquefaction Co. Ltd. (ADGAS) operated a liquefied natural gas plant and carried out natural gas processing on Das Island. Chemical and petrochemical manufacturing companies included Abu Dhabi Polymers Co. Ltd. (BOROUGE) and Ruwais Fertilizer Industries (FERTIL) (table 2; U.S. Energy Information Administration, 2017, p. 2).

Emirates Global Aluminium (EGA) was a 50–50 joint venture between the Investment Corp. of Dubai and Mubadala Investment Co. of Abu Dhabi, which were both wholly owned by the Government of Abu Dhabi. An alumina refinery and two aluminum smelters were operated by EGA. Its bauxite mine in the Republic of Guinea and the alumina refinery in the KIZAD vertically integrated the company's supply chain. Emirates Steel Industries P.J.S.C. (ESI), which was a subsidiary of Government-owned SENAAT General Holding Corp. (SENAAT), was the leading steel producer in the UAE. Operations at the integrated steel plant in Abu Dhabi Industrial City were conducted by ESI. Table 2 is a list of major mineral industry facilities (Emirates Global Aluminium, 2020, p. 14–15; 2021a).

Commodity Review

Metals

Aluminum.—In 2020, EGA produced 2.5 Mt of aluminum, which was a decrease of 2% from the 2.6 Mt produced in 2019. The aluminum produced by EGA was exported to more than 400 customers in 50 countries. In March 2020, EGA announced that it was increasing its production capacity by

78,000 metric tons per year (t/yr) to reach a total of about 1.5 million metric tons per year (Mt/yr) of aluminum at its Al Taweelah smelter; construction of the additional capacity was expected to be completed by 2021 (tables 1, 2; Emirates Global Aluminium, 2021b, d).

Iron and Steel.—In 2020, ESI was the leading steel producer in the UAE; it produced 2.7 Mt of raw steel and had a production capacity of 3.5 Mt/yr. About 160,000 t, or 60%, of the rebar required in the construction of the Barakah nuclear energy powerplant, which began in August 2020, was supplied by ESI. Since the beginning of the Barakah project in 2010, ESI had been a partner of the Emirates Nuclear Energy Corp. (ENEC) (table 1; Phys.org, 2018; Arab Iron and Steel Union, 2020; British Broadcasting Corp., 2020; Katona, 2020).

In addition to ESI, there were several other producers of steel products in the UAE in 2020. In Abu Dhabi Industrial City, Al Ghurair Iron and Steel Co. (AGIS) had a production capacity of 500,000 t/yr; Al Nasser Industrial Enterprises LLC, 90,000 t/yr; and Union Iron & Steel Co. LLC, 500,000 t/yr. In Dubai, Alam Steel Ltd. operated a facility with a production capacity of 500,000 t/yr and Conares Metal Supply Ltd. (Conares) operated a steel facility with a production capacity of 1 Mt/yr. In August 2020, Conares announced plans to build a new steel facility in Dubai with a production capacity of 100,000 t/yr. In Sharjah, Essar Steel Middle East PZE and Hamriyah Steel FZC each operated facilities with the capacity to produce 1 Mt/yr of steel, whereas Star Steel International LLC had a production capacity of 360,000 t/yr (table 2; Trade Arabia News Service, 2020).

Industrial Minerals

Cement.—The UAE had more than 20 cement operations and a total installed production capacity of nearly 50 Mt/yr (estimated) of cement. In 2020, capacity utilization was less than 30% because only about 14.9 Mt (estimated) of cement was produced compared with 16.1 Mt in 2019. The leading cement-producing companies were Arkan Building Materials Co. PJSC, Lafarge Emirates Cement LLC, National Cement Co., Sharjah Cement and Industrial Development Co., and Union Cement Co.; most of the cement plants were located in areas north of Abu Dhabi (table 2).

Mineral Fuels

Natural Gas.—Both production and exports of natural gas decreased in 2020; production decreased slightly to 55.1 billion cubic meters, and exports decreased by 5.3% to 8.8 billion cubic meters. The country's imports of natural gas increased by 0.7% in 2020 to 22.7 billion cubic meters. The UAE ranked fourth in natural gas production in the Middle East, behind Iran, Qatar, and Saudi Arabia. The domestic primary energy consumption in the UAE decreased by 8.2% to 4.19 exajoules in 2020. Natural gas accounted for 60% of the country's primary energy consumption; crude petroleum, 36%; coal, 3%; and nuclear and renewable sources, 1% (table 1; BP p.l.c., 2021, p. 10–11; Organization of the Petroleum Exporting Countries, 2022a, p. 79–81).

In February 2020, ADNOC announced the discovery of the Jebel Ali natural gas reservoir, which is located onshore between the Abu Dhabi and Dubai Emirates. According to Government officials, the Jebel Ali reservoir was estimated to contain about 2.3 trillion cubic meters of natural gas resources, which would make it the fourth-largest natural gas field in the Middle East behind the North Field in Qatar, the South Pars Field in Iran, and the Bab Field in Abu Dhabi. ADNOC planned to develop the reservoir jointly with the Dubai Supply Authority (DUSUP), a distributor of natural gas in Dubai. ADNOC characterized the discovery as "shallow gas" and noted that development costs would be much lower than for its other natural gas resources (Di Paola and others, 2020; Gamal and Abdullah, 2020; Vohra, 2020).

The National Marine Dredging Co. (NMDC) began dredging, land reclamation, and marine construction in 2020 to build multiple artificial islands in the first phase of the development of the Ghasha concession. ADNOC awarded a $1.4 billion contract to NMDC in February 2019 to develop the concession, which would consist of the Dalma, Ghasha, Hail, Mubarraz, and Nasr offshore sour gas fields. NMDC planned to construct 10 new artificial islands and two causeways, as well as expand an existing island, Al Ghaf. The project was expected to take 38 months to complete and would provide the infrastructure required to further develop, drill, and produce gas from the sour gas fields in the Ghasha concession. ADNOC had awarded stakes in the Ghasha concession to Eni S.p.A. of Italy (25%), Wintershall Dea AG of Germany (10%), OMV Group of Austria (5%), and PAO Lukoil of Russia (5%). The project was expected to produce more than 40 million cubic meters per day of natural gas and more than 120,000 barrels per day of crude petroleum and condensates when its development is completed (expected by 2023) (Arab News.com, 2019; Lukoil Oil Co. PJSC, 2019; Royal IHC, 2020).

In June 2020, ADNOC sold 49% of its natural gas pipelines for $10 billion to a group of six investors, including Brookfield Asset Management of Canada, Global Infrastructure Partners of the United States, and Singapore's sovereign wealth fund. There were 38 pipelines involved in the deal, which spanned almost 1,000 kilometers; the pipeline network linked ADNOC gasfields with export terminals and local buyers (Di Paola and others, 2020; United Nations Conference on Trade and Development, 2021, p. 50, 250).

Petroleum.—Production of crude petroleum and condensates in the UAE decreased by 7.4% to about 1.4 Gbbl, or by about 3.7 million barrels per day (Mbbl/d), in 2020; the UAE ranked third in crude petroleum production in the Middle East, behind Iraq and Saudi Arabia. ADNOC planned to increase crude petroleum production to 5 Mbbl/d by 2030. About 885 Mbbl of crude petroleum was exported in 2020, which was a slight increase compared with the 881 Mbbl exported in 2019. The UAE also produced 339 Mbbl of petroleum products, of which 307 Mbbl was exported (table 1; Gamal and Chmaytelli, 2018; BP p.l.c., 2021, p. 18; Organization of the Petroleum Exporting Countries, 2022a, p. 38, 48–49).

MINERAL INDUSTRY HIGHLIGHTS IN 2021

In 2021, the UAE was the world's fifth-ranked producer of aluminum and sulfur, accounting for an estimated 3.8% of all aluminum smelter output and an estimated 6.4% of all

production of sulfur. In addition, the UAE was the world's seventh-ranked producer of crude petroleum and condensate, accounting for 4.1% of the world's production. The real GDP of the UAE in 2021 increased by 3.9%; the nominal GDP of the UAE was estimated to be $414 billion.[3] The mining and energy sector's portion of the GDP in 2021 increased by 67.6% to $102 billion. The mining and energy sector remained the leading contributor to the country's GDP, accounting for 24.5% of the total. Other leading sectors in the economy were wholesale and retail trade, which accounted for 13.1% of the GDP; manufacturing, 10.4%; construction, 8.2%; public administration and defense, 7.4%; and financial and insurance activities, 7.3%. Government revenue from hydrocarbon activity was estimated by the International Monetary Fund to be about $68 billion, which accounted for about 54.8% of total Government revenue of $125 billion (table 1; BP p.l.c., 2022, p. 15; International Monetary Fund, 2022, p. 29; United Arab Emirates Ministry of Cabinet Affairs, 2022b, tables 2, 6; Apodaca, 2023; Merrill, 2023).

The value of exports from the UAE increased by 21% to $425 billion. This was attributed to a 74% increase in the total value of crude petroleum exports to $55 billion. The average price of the of Murban crude exports increased to $70.09 per barrel in 2021 from $42.98 per barrel in 2020. The value of the country's exports of pearls, stones, and precious metals and articles thereof increased by 19% to about $36 billion. The export value of base metals and articles thereof increased by 66% to $19 billion; and that of mineral products increased by 51% to $5 billion. In terms of tonnage, the leading metal exports were aluminum and articles thereof (3.5 Mt), articles of iron and steel (1.7 Mt), copper and articles thereof (390,000 t), and nickel and articles thereof (214,000 t) (Organization of the Petroleum Exporting Countries, 2022a, p. 17–18, 66; United Arab Emirates Ministry of Cabinet Affairs, 2022a, tables 13, 17).

The value of goods imported by the UAE in 2021 increased by 26% to $270 billion. Imports of pearls, stones, and precious metals and articles thereof, which accounted for about 27% of the country's imports, increased in value by 41% to about $74 billion. The value of imports of base metals and articles thereof increased by 26% to $16 billion. The value of imports of mineral fuels, mineral oils and products of their distillation, and bituminous substances increased by 16% to $12 billion (United Arab Emirates Ministry of Cabinet Affairs, 2022a, tables 12, 16).

Exports of goods to the United States from the UAE were valued at about $6.0 billion in 2021. Bauxite and aluminum exports, which were valued at $1.3 billion, accounted for 21% of the total exports. Other notable mineral-related exports to the United States included petroleum products (other) valued at $687 million; crude petroleum, $449 million; fuel oil, $229 million; gem diamond and other gemstones, $193 million; iron and steel products (not otherwise classified), $150 million; other precious metals, $141 million; chemicals (fertilizers), $44 million; stone, sand, and cement, $10 million; and nonmonetary gold and sulfur and other nonmetallic minerals, $2 million each. Imports to the UAE from the United States were valued at $17.2 billion in 2021. Gem diamond imports, which were valued at about $788 million, accounted for about 5% of the total imports. Other notable mineral-related imports from the United States included nonmonetary gold valued at $634 million; petroleum products (other), $121 million; iron and steel products (other), $33 million; aluminum and alumina, $27 million; precious metals (other), $22 million; nonferrous metals (other), $19 million; chemicals (fertilizers), $17 million; and copper, $15 million (U.S. Census Bureau, 2022a, b).

The DMCC reported that nearly $23 billion in diamond was traded in Dubai in 2021. The UAE became the leading hub for rough diamond trade in the world, overtaking Belgium. The country's imports of rough diamond increased by 43.8% to 100.1 million carats; exports of rough diamond decreased by 64.5% to 104.4 million carats (Kimberley Process Certification Scheme, 2021, 2022; Dubai Multi Commodities Centre, 2022).

In 2021, notable increases in production included that of DRI, which increased by 23% to 3.7 Mt; alumina and kerosene (including jet fuel), by 20% each; residual fuel oil, by 12%; and raw steel, by 10%. Chromite ore production decreased by 65% to 21,800 t. Data on mineral production are provided in table 1.

Alumina and aluminum production in the UAE increased to 2.3 Mt and 2.5 Mt, respectively, in 2021. During the year, EGA completed the expansion of the Al Taweelah aluminum smelter, which increased its production capacity to 1.5 Mt/yr of aluminum. In July 2021, EGA noted that the aluminum sector was one of the leading industries in the UAE, accounting for 1.4% of the GDP and supporting 60,000 jobs (Emirates Global Aluminium, 2021c, 2022).

In July 2021, Conares announced plans to increase its steel products production capacity by 300,000 t/yr, in addition to the 100,000 t/yr of planned capacity that the company announced in 2020. The company, which had a workforce of nearly 700 employees, planned to sell the additional steel primarily into the export market. In June 2021, the company celebrated a milestone of having operated for 10 years in the UAE (Khaleej Times, 2021; Menon, 2021).

Lepidico Ltd. of Australia signed a 25-year agreement with Abu Dhabi Ports Co. in October 2021 to establish a lithium production facility in the KIZAD. The company noted that the facility would become the first lithium facility in the Middle East, would cost $95 million to construct, and would cover an area of 57,000 square meters. Lithium would be produced from lepidolite concentrate that was to be sourced from Namibia. Lepidico planned for the construction of the facility to start in September 2022 and that the startup of operations would take place in 2024 (Lepidico Ltd., 2021; 2022, p. 14; Skidmore, 2021).

In May 2021, Helios Industry Co. announced plans to invest $1 billion to construct an ammonia plant in the KIZAD. The plant, which was to be built in multiple phases, would have a target production capacity of 200,000 t/yr of ammonia. Because the plant would be entirely powered by an 800-megawatt (MW) solar powerplant, the produced ammonia would be classified as green ammonia. In August 2021, Helios awarded Thyssenkrupp AG of Germany a contract to perform a technical study for the project, which would involve water electrolysis technology in the production of hydrogen to produce the ammonia. Also in May, ADNOC announced plans for the construction of an

[3]Where necessary, values have been converted from United Arab Emirates dirham (AED) to U.S. dollars (US$) at the annual average exchange rate of AED3.673=US$1.00 for 2021.

ammonia plant in the TA'ZIZ industrial park in Ruwais. The plant would have a target production capacity of 1 Mt/yr of blue ammonia; blue ammonia is made from nitrogen and hydrogen that is produced from natural gas, with the carbon dioxide byproduct captured and stored. ADNOC planned to start production of the blue ammonia plant in 2025 (Saadi, 2021; Thyssenkrupp AG, 2021).

ADNOC continued to develop the Ghasha concession during 2021. In November, ADNOC awarded construction and engineering contracts to the National Petroleum Construction Co. (NPCC) for about $500 million and another $950 million to a joint venture between Tecnicas Reunidas of Spain and Target Engineering of Egypt. The contracts included construction of natural gas conditioning facilities, pipelines, umbilical cables, and wellhead topsides. Both contracts were expected to be completed by 2025 (Gulf News, 2021).

In September 2021, ENEC announced that its subsidiary, Nawah Energy Co., had started operation of unit 2 of the Barakah nuclear energy powerplant; unit 1 had achieved startup in 2020 but didn't start commercial operations until early 2021. Taken together, the two units had a combined capacity of 2,800 MW. Testing of the units had been undertaken by an independent nuclear regulator, the Federal Authority for Nuclear Regulation. In addition, a prestartup review of the units was completed in compliance with the World Association of Nuclear Operators' guidance. The two remaining units under construction, unit 3 and unit 4, of the Barakah nuclear powerplant also had a combined capacity of 2,800 MW, and were 94% and 87% completed, respectively, according to ENEC. Located in the Al Dhafra region of Abu Dhabi Emirate, the Barakah nuclear energy powerplant was the first nuclear energy site in the UAE, the first nuclear energy plant on the Arabian Peninsula, and the first commercial nuclear energy plant in the Arab world (Nuclear Engineering International, 2021).

Outlook

The GDP of the UAE is expected to increase by 3.5% in 2022 and 3.6% in 2023 owing to a global recovery in energy prices following the coronavirus disease 2019 (COVID-19) pandemic, as well as an expected increase in hydrocarbon production in the country, according to the International Monetary Fund. The Ghasha concession is expected to increase the country's production of crude petroleum and natural gas by 2023. The country's production of aluminum, cement, and iron and steel is expected to increase during the next few years owing to increased demand resulting from Government construction projects, especially construction related to completing the remaining units (units 3 and 4) of the Barakah nuclear energy powerplant. Infrastructure spending related to the multiyear development of the Ghasha concession is also expected to stimulate the economy and result in increased demand for mineral commodities produced within the UAE. Ammonia and lithium production are also expected to increase as projects are completed during the next several years. ADNOC and Helios have ammonia plants expected to be completed by 2025. Lepidico is expected to start the first lithium facility in the Middle East by 2024 (Nuclear Engineering International, 2021; International Monetary Fund, 2022, p. 26).

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TABLE 1

UNITED ARAB EMIRATES: PRODUCTION OF MINERAL COMMODITIES[1]

(thousand metric tons, gross weight, unless otherwise specified)

Commodity[2]		2017	2018	2019	2020	2021
METALS						
Aluminum:						
Alumina		--	--	1,100	1,920	2,300
Metal, primary		2,611	2,640	2,570	2,520	2,540
Chromium, mine, chromite ore	metric tons	57,797 r	190,146	136,100 r	62,413	21,800
Iron and steel:						
Direct-reduced iron		3,608	3,784	3,667	2,961	3,653
Steel:						
Raw steel		3,309	3,247	3,327	2,722	2,997
Products:						
Concrete-reinforcing bars		2,179	2,070	2,000 e, r	1,600 e	1,700 e
Hot-rolled, long		3,246	3,167	3,029 r	2,500 e	2,600 e
Lead, refinery, secondary	metric tons	25,000	25,000	25,000	25,000	25,000
INDUSTRIAL MINERALS						
Cement, hydraulic[e]		17,400	17,200 r	16,100 r	14,900	15,000
Lime[e]		480	470	470	470	480
Nitrogen, N content:[e]						
Ammonia		900	1,000	920 r	930	930
Urea		900	1,000	900 r	900	900
Sulfur, byproduct, natural gas and petroleum, S content[e]		4,600 r	5,300 r	6,000 r	5,200	5,200
MINERAL FUELS AND RELATED MATERIALS						
Natural gas, marketable	million cubic meters	54,086	47,624	55,097	55,064	54,485
Petroleum:						
Crude, including condensate	thousand 42-gallon barrels	1,427,000	1,427,880	1,459,635 r	1,351,638	1,338,820
Refinery:						
Distillate fuel oil	do.	83,585	83,585	82,855	76,128	83,220
Gasoline	do.	35,770	35,770	35,040	32,940	35,770
Kerosene, including jet fuel	do.	104,775	105,485	103,295	89,304	106,945
Residual fuel oil	do.	17,885	17,155	16,425	15,006	16,790
Other	do.	138,335	132,860	129,210	124,806	136,875
Total	do.	380,000	375,000	367,000	338,000	380,000

[e]Estimated. [r]Revised. do. Ditto. -- Zero.

[1]Table includes data available through October 5, 2022. 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.

[2]In addition to the commodities listed, aluminum products, common clays, crushed stone, diabase, gravel, gypsum, limestone, liquefied natural gas, marble, refined copper, refined gold, refined lead (primary), refined silver, sand, salt, shale, and silica may have been produced, but available information was inadequate to make reliable estimates of output.

TABLE 2
UNITED ARAB EMIRATES: STRUCTURE OF THE MINERAL INDUSTRY IN 2021

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities[1]	Annual capacity
Alumina	Emirates Global Aluminium (EGA) [Investment Corp. of Dubai (Government of Dubai, 100%), 50%, and Mubadala Investment Co. of Abu Dhabi (Government of Abu Dhabi, 100%), 50%]	Refinery at Al Taweelah, Khalifa Industrial Zone (KIZAD), Abu Dhabi Emirate	2,300
Aluminum	do.	Smelter at Jebel Ali, Dubai Emirate	1,000
Do.	do.	Smelter at Al Taweelah, Khalifa Industrial Zone (KIZAD), Abu Dhabi Emirate	1,500
Aluminum products	Ducab Aluminum Co. (Dubai Cable Co. Ltd. of Dubai, 60%, and SENAAT General Holding Corp., 40%)	Plant at Al Taweelah, Khalifa Industrial Zone (KIZAD), Abu Dhabi Emirate	50
Do.	Taweelah Aluminum Extrusion Co. LLC (TALEX) [Gulf Extrusions Co. LLC (Al Ghurair Group), 100%]	do.	100
Cement:			
Portland	Aditya Birla Star Cement (Aditya Birla, 80%, and private investors, 20%)	Grinding plant at Abu Dhabi	1,200
Do.	do.	Grinding plant at Ajman	900
Do.	do.	Cement plant at Ras Al Khaimah	2,400
Do.	Arabian Gulf Cement Co. LLC	Cement plant at 'Ajman	1,100
Do.	Arkan Building Materials Co. PJSC (Arkan) (SENAAT General Holding Corp., 51%, and private investors, 49%)	Cement plant at Al-Ain	5,700
Do.	Bin Hamel Nael Cement Co.	Grinding plant at Al-Ain	1,000
Do.	Cemex Falcon LLC	Grinding plant at Dubai	1,600
Do.	Emirates Cement Factory (SENAAT General Holding Corp.)	Plant at Abu Dhabi	2,300
Do.	Fujairah Cement Industries P.S.C.	Plant at Dibba, Al Fujayrah Emirate	2,400
Do.	Gulf Cement Co. (National Investment Co., 35.75%; Ras Al Khaimah Government, 7.67%; individual investors, 56.58%)	Plant at Khor Khuwair near Ras Al Khaimah	2,700
Do.	Hamriyah Cement Co. FZC (Bin Kamil Investment Group)	Grinding plant at Sharjah	920
Do.	Jebel Ali Cement Co. (Sharaf Industries, 100%)	Cement plant at Jebel Ali, Dubai Emirate	840
Do.	KCC Co. LLC (K Cement International, 100%)	Grinding plant at Sharjah	570
Do.	Lafarge Emirates Cement Co. LLC (Government of Al Fujayrah, 50%, and LafargeHolcim S.A., 50%)	Plant at Fujairah	3,200
Do.	Nael Cement Co.	Grinding plant at Al-Ain	700
Do.	National Cement Co. P.S.C.	Plant at Dubai	2,100
Do.	National Cement Factory Co. [Ittihad International Investment Co. (III), 100%]	Grinding plant in Abu Dhabi	3,000
Do.	Pioneer Cement Industries LLC (Raysut)	Plant at Ras Al Khaimah	1,500
Do.	Ras Al Khaimah Cement Co. P.S.C.	Plant at Khor Khuwair near Ras Al Khaimah	1,000
Do.	Sharjah Cement and Industrial Development Co. (private investors, 70%, and Government of Sharjah, 30%)	Plant at Sharjah	4,300
Do.	Star Super Cement Industries LLC (UltraTech Cement Ltd., 100%)	Grinding plant at Jebel Ali, Dubai Emirate	2,400
Do.	Teba Cement Co.	Grinding plant at Abu Dhabi	1,200
Do.	Umm al-Qaywayn Cement Industries Co. P.S.C.	Plant at Umm al-Quwain	640
Do.	Union Cement Co. P.S.C. (Shree Cement Ltd., 97.61%)	Plant at Khor Khuwair near Ras Al Khaimah	4,800
White	JK Cement Ltd.	Plant at Fujairah	600
Do.	Ras Al Khaimah Co. for White Cement and Construction Materials (RAKWCCM)	Plant at Ras Al Khaimah	900

See footnotes at end of table.

TABLE 2—Continued
UNITED ARAB EMIRATES: STRUCTURE OF THE MINERAL INDUSTRY IN 2021

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities[1]	Annual capacity
Copper, metal		Ducab Metals Business	Copper rod plant at Jebel Ali, Dubai Emirate	NA
Do.		Fujairah Gold FZC (Vedanta Ltd., 100%)	Copper rod plant at Furairah Free Zone	100
Gold, refined	metric tons	Al Etihad Gold Refinery DMCC	Refinery at Dubai	200
Do.	do.	Dijillah Gold Refinery FZC	Refinery at Sharjah	NA
Do.	do.	Emirates Gold DMCC (private investors, 100%)	Refinery at Dubai	200
Do.	do.	Fujairah Gold FZC (Vedanta Ltd., 100%)	Refinery at Fujairah Free Zone 2	20
Do.	do.	Gulf Gold Refinery Services (TLI Global FZE, 100%)	Refinery at Dubai	NA
Do.	do.	International Precious Metal Refiners LLC (IPMR)	Refinery at Sharjah	100
Do.	do.	Kaloti Precious Metals	do.	450
Iron and steel:				
Iron, direct-reduced iron		Emirates Steel Industries P.J.S.C. (ESI) (SENAAT General Holding Corp., 100%)	Direct-reduced iron plant at Abu Dhabi Industrial City	4,000
Do.		Gulf Sponge Iron (Al Nasser Industrial Enterprises LLC)	do.	250
Steel:				
Billet		Emirates Steel Industries P.J.S.C. (ESI) (SENAAT General Holding Corp., 100%)	Plant at Abu Dhabi Industrial City	3,500
Do.		Emirates Steel LLC (Al Nasser Industrial Enterprises LLC)	do.	450
Rebar		Alam Steel Ltd.	Rolling mill at Jebel Ali Free Zone, Dubai Emirate	500
Do.		Al Ghurair Iron and Steel Co. (AGIS) (Al Ghurair Group)	Rolling mill at Abu Dhabi Industrial City	500
Do.		Al Nasser Industrial Enterprises LLC	do.	90
Do.		Conares Metal Supply Ltd.	Rolling mill at Dubai	1,000
Do.		Emirates Steel Industries P.J.S.C. (ESI) (SENAAT General Holding Corp., 100%)	Rolling mill at Abu Dhabi Industrial City	2,000
Do.		Essar Steel Middle East PZE	Rolling mill at Hamriyah Free Zone, Sharjah Emirate	1,000
Do.		Hamriyah Steel FZC (Metalloinvest, 80%, and Sheikh Sultan Bin Khalifa Al Nahyan, 20%)	do.	1,000
Do.		Star Steel International LLC	do.	360
Do.		Union Iron & Steel Co. LLC	Rolling mill at Abu Dhabi Industrial City	500
Wire rod		Emirates Steel Industries P.J.S.C. (ESI) (SENAAT General Holding Corp., 100%)	Plant at Abu Dhabi Industrial City	550
Unspecified steel products		Star Steel International LLC	Section mill at Hamriyah Free Zone, Sharjah Emirate	240
Lime		Emirates Lime factory (Al Jazeera Industrial Group)	Plant at Abu Dhabi Industrial City	350
Do.		Ras Al Khaimah Lime Co. (Ras Al Khaimah Co. for White Cement and Construction Materials PSC)	Plant at Ras Al Khaimah	365
Natural gas:				
Liquefied natural gas		Abu Dhabi Gas Liquefaction Co. Ltd. (ADGAS) [Abu Dhabi National Oil Co. (ADNOC), 70%; Mitsui and Co. Ltd.,15%; BP p.l.c., 10%; TotalEnergies SE, 5%]	Plant at Das Island, 160 km west of the city of Abu Dhabi	8,000
Natural gas, marketable	million cubic meters	Abu Dhabi Gas Development Co. Ltd. (Al Hosn Gas) [Abu Dhabi National Oil Co. (ADNOC), 60%, and Occidental Petroleum Corp., 40%]	Shah sour gas field, 180 km southwest of the city of Abu Dhabi	5,100
Nitrogen:				
Ammonia		Ruwais Fertilizer Industries (FERTIL) [Abu Dhabi National Oil Co. (ADNOC), 66.67%, and Total S.A., 33.33%]	Plants at Ruwais, Abu Dhabi Emirate	1,200
Urea		do.	do.	2,100

See footnotes at end of table.

TABLE 2—Continued
UNITED ARAB EMIRATES: STRUCTURE OF THE MINERAL INDUSTRY IN 2021

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities[1]	Annual capacity
Petroleum:				
Crude	thousand 42-gallon barrels per day	Abu Dhabi National Oil Co. (ADNOC) Onshore [Abu Dhabi National Oil Co. (ADNOC), 60%; BP p.l.c., 10%; TotalEnergies SE, 10%; China National Petroleum Corp. (CNPC), 8%; Inpex Corp, 5%; CEFC China Energy, 4%; GS Energy, 3%]	Onshore Abu Dhabi Emirate oilfields, including the Abu Al Bukhoosh, the Arzanah, the Asab, the Bab, the Bu Hasa, the Jarn Yaphour, the Sahil, and the Shah fields	1,800
Do.	do.	Abu Dhabi National Oil Co. (ADNOC) Offshore [Abu Dhabi National Oil Co. (ADNOC), 60%; BP p.l.c., 14.67%; TotalEnergies SE, 13.33%; Japan Oil Development Corp. (JODCO), 12%]	Offshore Abu Dhabi Emirate oilfields, including the Lower Zakum, the Nasr, and the Umm Sharif fields	650
Do.	do.	BP p.l.c. and Crescent Petroleum Co. Inc.	Sharjah Emirate oilfields, including the Kahaif, the Saja, the Moveyid, and the Mubarek fields	50
Do.	do.	Dubai Petroleum Establishment (Government of Dubai, 100%)	Dubai Emirate oilfields, including the Margham, the Falah, the Fateh, the Rashid, and the S.W. Fateh fields	100
Do.	do.	Zakum Development Co. (ZADCO) [Abu Dhabi National Oil Co. (ADNOC), 60%; ExxonMobil Abu Dhabi Offshore Petroleum Co. Ltd., 28%; Japan Oil Development Co. Ltd. (JODCO), 12%]	Offshore Abu Dhabi Emirate oilfields, including the Satah, the Umm Al-Dalkh, and the Upper Zakum fields	750
Natural gas liquids	do.	Abu Dhabi Gas Industries Ltd. Co. (GASCO) [Abu Dhabi National Oil Co. (ADNOC), 68%; Royal Dutch Shell Group, 15%; TotalEnergies SE, 15%; and Partex Oil and Gas Group, 2%]	Plants at Asab, Bu Hasa, and Habshan/Bab	280
Do.	do.	Abu Dhabi Gas Development Co. Ltd. (Al Hosn Gas) [Abu Dhabi National Oil Co. (ADNOC), 60%, and Occidental Petroleum Corp., 40%]	Al Hosn sour gas plant, 180 km southwest of the city of Abu Dhabi	44
Refinery products	do.	Abu Dhabi Oil Refining Co. (TAKREER) [Abu Dhabi National Oil Co. (ADNOC), 65%; Eni SpA, 20%; OMV, 15%]	Refinery at Ruwais, Abu Dhabi Emirate	817
Do.	do.	do.	Refinery at Umm Al Nar, Abu Dhabi Emirate	85
Do.	do.	Ecomar Energy Solutions	Refinery at Fujairah	20
Do.	do.	ENOC Processing Co. LLC (EPCL) [Investment Corp. of Dubai (Government of Dubai, 100%), 100%]	Refinery at Jebel Ali, Dubai Emirate	140
Do.	do.	Uniper SE	Refinery at Fujairah	67
Do.	do.	Vitol SA	do.	82
Salt		Alghaith Industries (Al Ghaith Holding PJSC)	Plant at Abu Dhabi Industrial City	110
Do.		Wasit Group	NA	NA
Sand		Fujairah Natural Resources Corp. (FNRC)	Quarry at Fujairah	20,000
Do.		Fujairah Building Industries	do.	NA
Silica, glass		Emirates Float Glass LLC (Dubai Investment PJSC, 100%)	Quarry at Abu Dhabi Industrial City	440
Do.		Guardian Zoujaj International Float Glass Co. LLC (Guardian RAK)	Quarry at Ras Al Khaimah	255
Silver, refined	metric tons	Emirates Gold (private investors, 100%)	Refinery at Dubai	100
Do.	do.	Fujairah Gold FZC (Vedanta Ltd., 100%)	Refinery at Fujairah Free Zone 2	105
Do.	do.	International Precious Metal Refiners LLC (IPMR)	Refinery at Sharjah	1,000
Do.	do.	Kaloti Precious Metals	do.	450
Stone, limestone		Stevin Rock LLC (Government of Ras Al Khaimah, 100%)	Khor Khuwair Quarry, Saqr Port	80,000
Do.		Ras Al Khaimah Rock Co. LLC (RAK) (Government of Ra's al Khaymah, 100%)	Quarry at Ghalilah, Ra's al Khaymah Emirate	22,000
Do.		Al A'ali Crushers	Quarries in Fujairah	10,000
Do.		National Quarries LLC [Al-Jazeera Investment Group (Dubai)]	do.	9,000

See footnotes at end of table.

TABLE 2—Continued
UNITED ARAB EMIRATES: STRUCTURE OF THE MINERAL INDUSTRY IN 2021

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities[1]	Annual capacity
Stone, limestone—Continued	Oryx Crushers	Quarries in Fujairah	4,000
Do.	Riddhi Siddhi Crusher and Land Transport	do.	NA
Do.	Saif Bin Darwish Crushers	do.	NA
Sulfur	Abu Dhabi Gas Development Co. Ltd. (Al Hosn Gas) [Abu Dhabi National Oil Co. (ADNOC), 60%, and Occidental Petroleum Corp., 40%]	Al Hosn sour gas plant, 180 km southwest of the city of Abu Dhabi	3,275
Do.	Abu Dhabi Gas Industries Ltd. Co. (GASCO) [Abu Dhabi National Oil Co. (ADNOC), 68%; Royal Dutch Shell Group, 15%; TotalEnergies SE, 15%; Partex Oil and Gas Group, 2%]	Plants at Asab, Bu Hasa, and Habshan/Bab	2,370
Do.	Abu Dhabi National Oil Co. (ADNOC)	Plant at Abu Dhabi	2,000

Do., do. Ditto. NA Not available.
[1]Abbreviation(s) used for unit(s) of measure in this table include the following: km—kilometer.