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The Mineral Industry of the United Arab Emirates

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In 2013, the United Arab Emirates (UAE)[1] continued to be a regional industrial center and a global trade and financial hub. Revenue from the country's large hydrocarbon sector was supplemented with revenue from downstream mineral industries. The UAE was the world's fifth-ranked producer of primary aluminum after China, Russia, Canada, and the United States, and it accounted for about 4% of the total global output. It was a major regional producer of industrial minerals and metals, including cement, iron and steel, nitrogen fertilizers, and sulfur. It was also one of the world's top crude oil producers in 2013, with an average daily production of 2.8 million barrels. The UAE ranked sixth in the world in terms of its crude oil reserves, which totaled about 98 billion barrels, or about 6% of the world's reserves. It ranked seventh in the world in terms of its natural gas reserves, which totaled about 6 trillion cubic meters; however, the country continued to be a net natural gas importer to meet its increasing domestic energy consumption. The UAE registered notable increases in the production of some mineral commodities and fuel minerals, including cement, iron and steel, liquefied petroleum gas (LPG), and nitrogen owing to the commissioning of new production lines, reaching full capacities at existing plants, and new merger agreements. Considerable progress was made in natural gas, nuclear energy, petroleum, renewable energy, and sulfur development projects (table 1; U.S. Energy Information Administration, 2013; Abu Dhabi National Oil Co., 2014, p. 13; BP p.l.c., 2014, p. 6, 8, 20, 22; Bray, 2014, p. 16–17; HSBC Global Connections, 2014; Organization of the Petroleum Exporting Countries, 2014, p. 31).

Government Policies and Programs

As of yearend 2013, the UAE did not have a specific, comprehensive Federal law covering the mining industry (DLA Piper, 2012, p. 85–86). The Abu Dhabi Emirate, which is the largest of the UAE's seven Emirates in terms of land area, controlled 94% of the UAE's national oil and gas reserves; the Dubai Emirate controlled 4% of the national oil and gas reserves, and the other five Emirates combined controlled the remaining 2%. Article 23 of the UAE Federal Constitution considers each Emirate to be responsible for managing its own natural resources, including oil and natural gas. The Supreme Petroleum Council (SPC) of the UAE regulates the extraction of oil and natural gas and sets the governing policies for oil and natural gas extraction in each Emirate. The Federal Ministry of Energy is responsible for determining the planning priorities; however, it has minimal governing authority (Phakey and Renouf, 2014).

The UAE continued to develop regulations for foreign investment by introducing a modified investment law. The new draft of the proposed Commercial Companies Law, which reached an advanced stage in 2013, includes provisions that postpone consideration of increased foreign ownership of UAE companies, confirms regulations currently in place for limited liability companies, and allows the Government to handle corporate violations at an earlier stage. The law is expected to provide a conducive environment for corporate regulation in the UAE when enacted in 2015 (Latham and Watkins, 2013, p. 1, 2; U.S. Department of State, 2014).

The government of Abu Dhabi continued implementing its "Economic Vision 2030" plan in 2013 by increasing its investments in infrastructure and energy. The Abu Dhabi government also encouraged the diversification of energy sources by incorporating renewable and nuclear energy projects in its short-term plans. Those plans were aimed at decreasing the Emirate's dependence on the petroleum sector (Government of Abu Dhabi, 2008, p. 1, 5, 23, 45, 78; Norman, 2013; HSBC Global Connections, 2014; MEED, 2014a).

Minerals in the National Economy

The UAE's gross domestic product (GDP) increased by 5.2% in real terms in 2013 compared with 4.7% in 2012. Despite the UAE Federal Government's diversification strategy, the hydrocarbon sector accounted for about 40% of the country's GDP in 2013, which was a 3% increase from that of 2012, and the nonhydrocarbon sector accounted for about 60% of the GDP. The mining and quarrying sector accounted for about 6% of the GDP; of this amount, the quarrying sector accounted for 11%, and the crude oil and natural gas sector, for 6%. In 2013, the mining sector (including hydrocarbons) employed about 69,000 people directly, and was indirectly responsible for the employment of about 178,000 people (World Travel and Tourism Council, 2013, p. 16; Bank Audi S.A.L., 2014, p. 3; NBD PJSC, 2014, p. 1–2; United Arab Emirates National Bureau of Statistics, 2014b).

Production

The most notable increases in production of industrial mineral commodities in 2013 compared with those of 2012 were for ammonia and urea, which doubled in output owing to Ruwais Fertilizer Industries' (FERTIL's) commissioning of a new production facility. The majority of the ammonia produced was used to produce urea. Despite the unchanged domestic demand for cement in 2013, the country's overall output of cement increased by 23% in response to declared infrastructure development projects by the Federal Government, expanded

[1]The United Arab Emirates is a federation of seven Emirates: Abu Dhabi, Ajman, Dubai (Dubayy), Fujairah (Al Fujayrah), Ras Al Khaimah, Sharjah (Ash Shariqah), and Umm al-Quwain (Umm Al Qaywayn).

capacities, and increased exports to other member countries of the Gulf Cooperation Council (GCC). Output of mineral fuels and natural gas changed notably in 2013. LPG output increased substantially (by 78%) compared with that of 2012 owing to the completion of the Integrated Gas Development (IGD) project in Abu Dhabi, which was expected to position the UAE as one of the major LPG producers in the world by 2017. Production of residual fuels increased by 24%, and that of crude oil and condensate, by 8%, whereas production of distillate fuels decreased by 3.6% owing to a production halt during a refinery expansion project; production of natural gas also decreased slightly. Increases in production of metals included that of crude steel, by 19%; hot-rolled steel, by 18%; and direct-reduced iron (DRI), by 13%; production of aluminum also increased slightly (table 1; Platts, 2013).

Structure of the Mineral Industry

The Abu Dhabi Emirate makes up about 86% of the land area of the UAE; the Emirate controlled and managed the majority of the Nation's petroleum and natural gas resources through the wholly state-owned Abu Dhabi National Oil Co. (ADNOC) (United Arab Emirates Government, 2014). ADNOC operations were run through 16 subsidiaries that carried out most of the exploration, production, transportation, and marketing operations for crude oil, liquefied natural gas (LNG), LPG, petrochemicals, and other petroleum industries in the UAE. The Abu Dhabi Company for Onshore Oil Operations (ADCO) operated seven major onshore fields (Abu Al Bukhoosh, Arzanah, Asab, Bab, Bu Hasa, Jarn Yaphour, Sahil, and Shah fields). The Abu Dhabi Marine Operating Co. (ADMA-OPCO) operated two offshore fields (Umm Shaif and Zakum). The Zakum Development Co. (ZADCO) operated three offshore fields (Satah, Umm Al-Dalkh, and Upper Zakum).

Abu Dhabi Gas Industries Ltd. (GASCO) operated three plants for natural gas processing and natural gas liquids (NGL) extraction (Asab, Bu Hasa, and Habshan/Bab) as well as the NGL fractionation plant in Ruwais. The company also operated a pipeline distribution network to route natural gas to domestic industrial companies, including Emirates Aluminium Co. Ltd., and the local power stations. Abu Dhabi Oil Refining Co. (TAKREER), which operated the Ruwais and Umm Al Nar refineries, and National Gas Shipping Co. (NGSCO) also conducted oil processing. Abu Dhabi Gas Liquefaction Company Ltd. (ADGAS) operated an LNG plant on Das Island and carried out natural gas processing. ADNOC Linde Industrial Gases Co. (ELIXIER), which operated the Ruwais air separation plant and the Mirfa nitrogen plant, also carried out natural gas processing. The chemical and petrochemical manufacturing companies included Abu Dhabi Polymers Co. Ltd. (BOROUGE) and FERTIL. Supportive services were provided for exploration and production through National Drilling Co. (NDC), which conducted onshore and offshore drilling; Abu Dhabi Petroleum Ports Operating Co. (IRSHAD), which undertook marine operations of the Abu Dhabi petroleum ports; and the Mussafah Offshore Supply Base (ESNAAD), which provided facilities, services, and supplies (Abu Dhabi National Oil Co., 2014, p. 6–8).

Fujairah Natural Resources Corp. (FNRC) was the Government agency in charge of the development of mineral production in the Emirate of Fujairah, which is located in the northeastern part of the UAE. In 2012 (the latest year for which comprehensive data were available), the FNRC produced more than 77 million metric tons (Mt) of industrial mineral commodities and other building materials. The FNRC operated the Al Kaser Bay export terminal, which was inaugurated in October 2012. The terminal included two ports, each of which had a per-ship loading capacity 15,000 t and through which large-size stones were exported to other GCC countries for use in maritime pavement, backfill, and leveling projects (Fujairah Natural Resources Corp., 2013, 2015).

Emirates Global Aluminium (EGA) was a wholly state-owned company and the major aluminum producer in the UAE. It conducted its operations through its subsidiaries Dubai Aluminium Co. (DUBAL), which operated a smelter at Jebel Ali, and Emirates Aluminium Co. (EMAL), which operated a smelter at Taweelah (Emirates Global Aluminium, 2014).

Emirates Steel Industries, which was a subsidiary of SENAAT General Holding Corp., was the leading steel producer in the UAE. It conducted its operations at the integrated steel plant in the industrial city of Abu Dhabi (Emirates Global Aluminium, 2014; HSBC Global Connections, 2014; SENAAT General Holding Corp., 2014).

Mineral Trade

The total value of the UAE's foreign trade showed a minor increase in 2013 compared with that of 2012 (United Arab Emirates National Bureau of Statistics, 2014a, p. 6–10, 12). Asian countries accounted for about 43% of the total value of net foreign trade with the UAE, followed by the European Union, 23%, the Americas, 10%, and GCC countries, 9%. The UAE's trade value with the GCC countries increased notably (by 19%) in 2013 compared with that of 2012. The value of the UAE's imports increased by about 3% in 2013 compared with those of 2012 owing to the increase in trade of pearls and precious stones. In 2013, the UAE's non-oil exports decreased by about 13%, whereas exports of minerals and manufactured metals increased substantially (by 26%). The value of the country's reexports of manufactured goods increased by about 6% in 2013 compared with that of 2012 (United Arab Emirates National Bureau of Statistics, 2014a, p. 6–10, 12).

The UAE's leading exports market was Japan, which accounted for 14% of the country's total exports, followed by India, 11%, and Iran, 10%. The UAE's leading goods supplier was China, which accounted for 14% of the country's total imports, followed by India, 13%, and the United States, 10% (World Bank, The, 2014, p. 42, 51). The bilateral trade balance between the UAE and the United States was about $22.3 billion in 2013, which was an 8% increase compared with that of 2012. U.S. exports of goods to the UAE were valued at $24.6 billion in 2013, which was a 9% increase from that of 2012 (with machinery, gold, and metals topping the list) and made the UAE the 17th-ranked market for U.S. goods exports. U.S. imports from the UAE were valued at $2.3 billion in 2013, making the UAE the 65th-ranked goods exporter to the United States; aluminum, diamond, and fertilizers topped

the list of U.S. imports from the UAE (Office of the U.S. Trade Representative, 2014; U.S. Census Bureau, 2014, 2015).

In 2013, the UAE imported 5.6 Mt of semifinished and finished steel products (down from 6.2 Mt in 2012 and 13.6 Mt in 2008), making it the world's sixth-ranked importer of these types of products. The country imported about 3.0 Mt of iron ore (which was a slight decrease from that of 2012), about 2.9 Mt of flat products (a 9% decrease from that of 2012), and about 1.9 Mt of long products (a 15% decrease from that of 2012). The UAE exported about 97,000 t of long products, which was a 149% increase compared with exports of that type in 2012, and 48,000 t of flat products, which was a 36% decrease compared with exports of that type in 2012 (World Steel Association, 2014a, p. 65, 67, 70, 72, 105; 2014b, p. 25).

The UAE did not produce any mined gold in 2013, although the country was a major global gold trade center. About 40% of the world's physical trade in gold came through Dubai. In 2013, Dubai's annual traded volume of gold was about 2,250 t valued at $75 billion, which as a 7% increase compared with that of 2012. India ranked first among Dubai's foreign gold-trading partners; the value of total bilateral trade between the two countries in 2013 was $30 billion (Consulate General of India-Dubai, 2014; UAEinteract, 2014; World Trade Organization, 2014, p. 26, 76).

The UAE did not produce any diamond in 2013; however, it was a major global diamond trading hub of both rough and polished diamond. Dubai increased its imports of rough diamond by about 11% in 2013 to 66,685 million carats from 59,744 million carats in 2012; it increased its exports of rough diamond by about 12% in terms of weight (6% in value) to 67,935 million carats from 60,446 million carats in 2012. The diamond trading partners of the UAE included Angola, Belgium, China, Hong Kong, India, South Africa, Switzerland, and the United Kingdom (Dubai Diamond Exchange, 2013; Israeli Diamond Industry, 2014; Kimberley Process, 2015).

Commodity Review

Metals

Aluminum.—In 2013, the UAE produced about 1.9 Mt of aluminum, which was slightly more than in 2012. EGA was a 50–50 joint-venture company held by Mubadala Development Co. of Abu Dhabi and Investment Corp. of Dubai. EGA was formed through a $15 billion merger agreement between DUBAL and EMAL. EGA owned DUBAL's and EMAL's existing smelters in Jebel Ali and Taweelah, respectively. Following the completion of the second phase of EMAL's $8 billion smelter expansion in mid-2014, EGA's combined production capacity was expected to reach 2.4 million metric tons per year (Mt/yr) by yearend 2014, which would make the UAE the world's fourth-ranked producer of aluminum. The upgraded capacity was projected to enable the EGA to have a combined portfolio that would consist of remelt ingot, high-purity aluminum, and billet. The EGA planned to export 90% of its production mainly to consumers in Asia and in the Middle East and North Africa regions. The EGA continued to secure raw materials for its production plants in the UAE in 2013. The company owned Guinea Alumina Corp. (GAC), which had been established to develop an alumina refinery and associated bauxite mine in Guinea. GAC had allocated $5 billion to the project, including $1 billion to extract and export bauxite to the UAE and $4 billion to construct an aluminum refinery and a port. The bauxite facility was expected to start exporting by 2017, and the 2.0-Mt/yr-capacity aluminum refinery was expected to be in operation by 2022 (Carvalho and Doherty, 2013; Emirates Global Aluminium, 2014; HSBC Global Connections, 2014).

Antimony.—In 2013, Tri-Star Union FZ LLC, which was a joint venture of Tristar Resources p.l.c. of the United Kingdom and the Union International Holdings Group of the UAE, stopped its previous plans to construct an antimony plant at the Al Ghail Industrial Zone in Ras Al Khaimah Emirate. Instead, the company signed a memorandum of understanding with the Oman Investment Fund and Castell Investments of Oman in October to create a new joint venture and prepare an estimated timeline to construct the facility and plant in the Sultanate of Oman (Tristar Resources p.l.c., 2014).

Gold.—In 2013, the Kaloti Jewellery Group, which was considered one of the world's leading producers of refined gold, operated one of the largest gold refineries in the UAE; the refinery was located in Sharjah Emirate and had the capacity to produce 300 metric tons per year (t/yr) of refined gold. The construction of a new $60 million gold and silver refinery project by the Kaloti Jewellery Group continued in the outskirts of Dubai. The project, which was expected to increase the UAE's silver refining capacity to 600 t/yr from 100 t/yr, was also projected to increase the country's gold-refining capacity to 1,440 t/yr from 800 t/yr when commissioned in 2015 (Gulf News, 2014; Kaloti Jewellery Group, 2015).

Iron and Steel.—Emirates Steel Industries P.J.S.C. (a subsidiary of SENAAT General Holdings Corp.) had the only integrated steel plant in the UAE. The company was expected to continue leading upstream steel development in the UAE during the next few years. The company's production capacity was 3.5 Mt/yr of steel billet in 2013 and was expected to reach about 5.5 Mt/yr within the next 3 years. The third phase of the Emirates Steel Industries expansion project at the new Khalifa Industrial Zone (Kizad) was projected to add about 1.6 Mt/yr to the company's capacity when commissioned in mid-2014. This phase of the project was expected to include a new DRI plant, a melt shop, and a continuous rolling mill (SENAAT General Holding Corp., 2014; Steel Times International, 2014).

United Iron and Steel Co. was projected to start construction work on a new $138 million steel rolling mill at the Mussafah Industrial Area in Abu Dhabi in 2014. The mill, which was projected to start commercial production by 2016, would produce galvanized steel coil used in building applications. The mill would have an initial capacity of 0.3 Mt/yr; the capacity was planned to be increased to 0.5 Mt/yr at a later time (HSBC Global Connections, 2014; Watts, 2014).

Industrial Minerals

Cement.—In 2013, the UAE consumed 8 Mt of cement domestically. The sector continued to increase its capacity to

reach production of 60% more than domestic consumption, with the aim of exporting the remainder of its production to the other GCC countries, which had collectively the highest cement consumption rate in the world at about 1,950 kilograms per capita. The UAE's cement production capacity was 24 Mt/yr, which was about 33% of the GCC total in 2013, and the UAE's estimated production in 2013 was about 21 Mt. More than 22 companies in the UAE traded in cement in 2013; about 9 of those companies produced cement (Karmani, 2014, p. 4, 9, 13, 32–33).

Gulf Cement Co. in Ras Al Khaimah had the capacity to produce 2.7 Mt/yr of cement, and the company supplied a number of the development and infrastructure projects in the country, including the Dubai Airport expansion and the Burg Khalifa project. Union Cement Co. P.S.C. at the Khor Khuwair Industrial Area in Ras Al Khaimah Emirate had the capacity to produce 4.8 Mt/yr of cement; it used local limestone, shale, and silica to produce different grades of sulfate-resistant cement, in addition to portland cement. Arkan Building Materials Co. (ARKAN) P.J.S.C., which was 51% owned by SENAAT General Holding Corp., operated the Emirates cement factory at the Al Ain Industrial Area in Abu Dhabi Emirate; the cement factory had the capacity to produce about 1.1 Mt/yr of cement. The company was constructing a new $354 million cement plant that was planned to have the capacity to produce 4.5 Mt/yr of cement, which would increase the company's cement production capacity to 5.6 Mt/yr. The plant was expected to begin production by yearend 2014 (Global Cement Co., 2014; Gulf Cement Co., 2014; Union Cement Co. P.S.C., 2014; World Cement, 2014).

Lime.—The Ras Al Khaimah Co. for White Cement and Construction Materials PSC, which was a major UAE lime-producing company in the Ras Al Khaimah Emirate, increased its production slightly to 346,000 t of lime in 2013 from 340,000 t in 2012. The company used raw limestone that was supplied from deposits near the Hajar Mountains of Ras Al Khaimah. The Emirate lime factory, which was owned by the Al Jazeera Emirates Group, was based in Abu Dhabi Emirate and had a capacity of 1,000 metric tons per day (t/d) of lime. The factory produced calcium carbonate, hydrated lime powder, dolomite powder, quick lime powder, and quick lime lumps (Global Manufacturers, 2014; Ras Al Khaimah Co. for White Cement and Construction Materials PSC, 2014; Emirates Lime Factory, 2015).

Nitrogen.—FERTIL, which was the major nitrogen fertilizer producer in the UAE, was a joint venture between ADNOC (66%) and Total S.A. of France (33%). FERTIL operated two ammonia plants and two urea plants in the Ruwais Industrial Complex. In July 2013, the company commissioned the expansion of the FERTIL 2 project, which was carried out by Samsung Engineering and Construction Co. Ltd. of the Republic of Korea, and increased the production of ammonia by about 0.6 Mt/yr and urea by about 1.3 Mt/yr. FERTIL had a capacity of 1.2 Mt/yr of ammonia and 2.1 Mt/yr of urea by late 2013 (Abu Dhabi National Oil Co., 2014, p. 8, 13; Chemicals Technology; 2014; MEED, 2014b).

FERTIL sold about 96% of its ammonia production domestically and exported the remainder to consumers in Saudi Arabia and South Africa. FERTIL exported the majority of its urea production to foreign consumers, including Brazil (20%), Pakistan (16%), and the United States (28%), and the remainder went to domestic industries (Arab Fertilizers Association, 2014, p. 15–16, 27, 30, 32, 35).

Sulfur.—The UAE produced 1.9 Mt of sulfur in 2013 and accounted for 27% of total sulfur production in GCC countries. The commissioning of GASCO's Habshan 5 project by yearend 2013 and the Al Hosn Gas's new Shah sour gas project, which is located 210 km southwest Abu Dhabi, by yearend 2014 was expected to triple the UAE's sulfur supply in 2015. Al Hosn Gas was a joint venture between ADNOC (60%) and Occidental Petroleum Corp. of the United States (40%). The construction of the 120-kilometer (km) sulfur transportation railway between the Shah field and the Ruwais terminal continued; the section between the Habshan field and the Ruwais terminal was undergoing testing in late 2013 (Messick, 2013; Abu Dhabi National Oil Co., 2014, p. 13; Arab Fertilizers Association, 2014, p. 11, 21, 24, 63).

Mineral Fuels and Other Sources of Energy

Natural Gas.—ADNOC completed the IGD project in the third quarter of 2013. The project included the construction of new onshore and offshore gas processing plants at the Habshan field and at Ruwais in Abu Dhabi. The $7 billion natural gas project was implemented by ADGAS, ADMA–OPCO, and GASCO and was planned to process the natural gas received from the Umm Shaif field at the Habshan and the Ruwais facilities to produce a combined 22.6 million cubic meters per day of natural gas for domestic consumption (Abu Dhabi National Oil Co., 2014, p. 10).

Al Hosn Gas's Shah gas development project was planned to extract and process 28.3 million cubic meters per day of wet natural gas, which contained about 23% hydrogen sulfide, from the Shah sour gas reservoir, and to produce 14.2 million cubic meters per day of natural gas. The $10 billion project was expected to be completed by the beginning of 2015 and was considered to be a vital energy infrastructure project for the UAE (Abu Dhabi National Oil Co., 2014, p. 10; Saadi, 2014).

Nuclear Energy.—Electricity use in the UAE increased by 9% in 2013 compared with that of 2012 owing to the increase in domestic power consumption led by new projects in the petroleum and natural gas sector and downstream industries. In 2012 (the latest year for which data were available), the country met about 98% of its electricity needs through local natural gas powerplants. Those plants continued to consume the majority of the domestic natural gas production and led the country to continue to import natural gas as LNG by pipelines from neighboring Qatar, as it had done since 2007 (HSBC Global Connections, 2014; World Nuclear Association, 2014).

In 2013, the UAE continued with construction of the four-unit (Barakah 1, Barakah 2, Barakah 3, and Barakah 4) nuclear powerplant. Each unit would have 1,400 megawatts (MW) of electricity generating capacity by 2020. Emirates Nuclear Energy Corp. (ENEC) completed the installation of the contaminant liner plate at the Barakah 1 reactor building in late 2013. The first phase of the Barakah 1 project, which was being carried out by Hyundai Engineering and Construction Company Ltd. of the Republic of Korea, was scheduled to be

more than 50% completed by the third quarter of 2014 and to begin commercial production by 2017. ENEC was on schedule with the second phase of the project, Barakah 2, which was being carried out by Samsung C&T Corp. of the Republic of Korea. Samsung started the construction work on this phase of the project around May 2013; the plant was expected to start operations by 2018 (Emirates Nuclear Energy Corp., 2013; World Nuclear Association, 2014).

Petroleum.—In 2013, ADNOC produced crude oil from onshore fields, including the Murban field, and from offshore fields, including the Lower Zakum, the Umm Shaif, and the Upper Zakum fields. ADNOC planned to produce a new crude stream called Das, which was expected to be a blend of light and sweet crude, from the two existing streams of the Lower Zakum and the Umm Shaif fields by the third quarter of 2014 (Abu Dhabi National Oil Co., 2014, p. 12).

The UAE continued to develop existing petroleum fields by incorporating new technologies, including enhanced oil recovery technologies. The Upper Zakum offshore field development project was set up on four artificial islands using enhanced oil recovery methods and was projected to be sustainable for 25 years. In 2013, the project, which was managed by ZADCO [a consortium of ADNOC (60%), ExxonMobil Oil Co. of the United States (28%) and Japan Oil Development Co. (JODCO) of Japan (12%)], was expected to increase the field's output to 750,000 barrels per day (bbl/d) by 2017 from the current 550,000 bbl/d. The Lower Zakum field, which was operated by ADMA–OPCO, was also expected to increase its output to 425,000 bbl/d by 2020 from the current 300,000 bbl/d (U.S. Energy Information Administration, 2013; Abu Dhabi National Oil Co., 2014, p. 11).

In 2013, ADCO continued to implement its onshore Sahil-Asab-Shah full-field development project, which was expected to increase its crude oil production to 1.8 million barrels per day by 2017. The expansion was conducted by constructing new facilities and adding a crude oil field in Qusahwira. The field, which was commissioned in late 2013, had an initial capacity of 30,000 bbl/d; the capacity was projected to be increased to 53,000 bbl/d by 2017 (Abu Dhabi National Oil Co., 2014, p. 11).

The UAE had five refining facilities in 2013. The largest was at Ruwais and was operated by TAKREER, which was a wholly owned subsidiary of ADNOC; the Ruwais facility had the capacity to produce 400,000 bbl/d of crude oil. The Ruwais refinery was about to go through a $10 billion expansion that would add 417,000 bbl/d of crude oil refining capacity, bringing the overall capacity to 800,000 bbl/d by mid-2014. Plans were in place to expand the storage capability of the Al Fujairah export terminal substantially in the next 3 years by adding three subsea loading lines, an intermediate pumping station, and three offshore buoys designed for deepwater tanker loading (U.S. Energy Information Administration, 2013; Abu Dhabi National Oil Co., 2014, p. 8, 12; Oil and Gas Journal, 2014).

In 2013, a joint venture of ADNOC (51%) and Abu Dhabi Future Energy Co. (MASDAR) (49%) initiated the development of a three-component carbon capture, use, and storage facility that would have the capacity to sequester 800,000 t/d of carbon dioxide (CO_2). The contract to build the $122.5 million project was awarded to the Dodsal Engineering and Construction Group of India. The project was designed to capture CO_2 at the source at the Emirates Steel Industries (ESI) mill at Mussafah and then compress and transport the CO_2 through a 50-km pipeline to ADNOC's onshore oilfields where it would be reinjected into the oilfields to enhance oil recovery rates. The facility was expected to be inaugurated by 2016 (Abu Dhabi National Oil Co., 2014, p. 11; Global CCS Institute, 2014).

Renewable Energy.—The Abu Dhabi government created additional investment opportunities in multiple industrial sectors to help reach its goal of generating 7% of Abu Dhabi's electricity from renewable resources by 2020. The Dubai government announced plans to generate 5% of its electricity from renewable sources, including solar and nuclear, by 2030. MASDAR, which was wholly owned by Mubadala Development Co., acquired the 100-MW photovoltaic (PV) project in late 2013. The Noor-1 project would use the PV panels located at the Al-Aflaj area east of Al Ain city to convert sunlight into electricity directly. This approach would be different from that used at the Shams-1 solar powerplant (a 100-MW solar thermal project that was commissioned in 2012), which used concentrated solar power to generate electricity from the heat of the sun. The Noor-1 project was expected to include two PV subfields. The first subfield would be made up of about 50 MW of crystalline PV modules, and the second subfield would be made up of about 50 MW of thin-film modules and cover an area of about 3 square kilometers (Norman, 2013; Government of Abu Dhabi, Regulation and Supervision Bureau, 2014; Wilkinson, 2014).

Outlook

The UAE's economy is expected to grow at a rate of 5% in 2014; the growth is expected to be driven by increased production by the nonhydrocarbon sector. The UAE Government's large investments in the infrastructure and energy sectors are projected to stimulate further economic growth within the next few years, and the industrial and trade sectors are expected to play a significant role in stabilizing the country's economy during this period. The government of Abu Dhabi is expected to fund $337 billion worth of development projects in various sectors between 2013 and 2030. Those projects are expected to diversify Abu Dhabi's economy and reduce its dependence on petroleum resources in the long run (Government of Abu Dhabi, 2008, p. 1, 5, 23, 45, 78; Blake, Cassels & Graydon LLP, 2014, p. 12; International Monetary Fund, 2014, p. 6; MEED, 2014a).

The projected increase in the UAE's sulfur production resulting from the inauguration of the Shah sour gas project within the next 3 years could make the country one of the major sulfur producers in the world. The upstream development projects by ADNOC and its subsidiaries, such as the Upper Zakum full-field development, and by Al Hosn Gas are expected to sustain the UAE's role in the global hydrocarbon sector. The Barakah nuclear power project and the Noor-1 solar power project are expected to play critical roles in the diversification of the country's energy sources and support the Federal Government's objective to decrease the country's dependence on petroleum and natural gas within the next 5 years (CNBC Arabia, 2014; LPG World Forum, 2014).

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TABLE 1
UNITED ARAB EMIRATES: PRODUCTION OF MINERAL COMMODITIES[1]

(Thousand metric tons unless otherwise specified)

Commodity[2]		2009	2010	2011	2012	2013
METALS						
Aluminum, primary		955	1,400	1,800	1,820	1,864
Chromite ore		24	25 r	--	--	--
Iron and steel:						
Direct-reduced iron		--	1,180	2,250	2,720	3,075
Steel, crude		100	500	2,000	2,408	2,878
Hot-rolled long products		1,170	1,580	1,950	2,156	2,549
Concrete-reinforcing bars		--	--	--	1,586	1,662
INDUSTRIAL MINERALS						
Cement, hydraulic		18,997	18,000	18,000	17,000	21,000 e
Gypsum[e]		760	720	720	680	700 e
Lime		147	174	340	400	450 e
Nitrogen:						
N content of ammonia		380	392	386	330	658
N content of urea		284	310	324	289	618
Sulfur[3]		2,175	1,829	1,885	1,900	1,900
MINERAL FUELS AND RELATED MATERIALS						
Gas, natural:						
Gross	million cubic meters	75,840	79,778	82,433	85,613	83,796
Dry	do.	48,800	51,300	52,300	54,308	56,000
Natural gas plant liquids	thousand 42-gallon barrels	91,250	98,550	146,000	146,000	145,000 e
Petroleum:						
Crude and condensate	do.	1,003,750	1,046,455	1,212,530	1,233,700	1,330,790
Refinery products:						
Liquefied petroleum gas	do.	5,840	6,570	8,103	6,606	11,791
Gasoline	do.	12,994 r	15,731 r	20,914 r	23,834 r	26,024
Kerosene and jet fuel	do.	35,405 r	37,120 r	49,202 r	53,947 r	55,042
Distillate fuels	do.	26,681 r	29,017 r	36,427 r	31,317 r	30,185
Residual fuels	do.	5,584 r	5,803 r	6,679 r	5,767 r	7,154
Other	do.	34,273 r	42,048 r	49,640 r	50,990 r	42,997
Total	do.	120,777 r	136,289 r	170,965 r	172,461 r	173,193

[e]Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r]Revised. do. Ditto. -- Zero.

[1]Table includes data available through December 9, 2014.

[2]In addition to the commodities listed, industrial minerals, such as common clays, crushed stone, diabase, gravel, limestone, marble, sand, salt, and shale presumably are produced, but output is not reported, and available information is inadequate to make reliable estimates of output.

[3]Byproduct of petroleum refining and natural gas processing.

TABLE 2
UNITED ARAB EMIRATES: STRUCTURE OF THE MINERAL INDUSTRY IN 2013

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Aluminum		Emirates Global Aluminium (EGA) [Mubadala Development Co. of Abu Dhabi, 50%, and Investment Corp. of Dubai (Government of Dubai, 100%), 50%]	Jebel Ali and Taweelah	950
Do.		do.	Khalifa Port and Industrial Zone, Abu Dhabi	800
Cement:				
Portland		Aditya Birla Star Cement (Aditya Birla, 80%, and private, 20%)	Grinding plant at Abu Dhabi	1,100
Do.		do.	Grinding plant at Ajman	1,000
Do.		do.	Clinker plant at Ras Al Khaimah	2,200
Do.		Al Ain Cement Factory (SENAAT General Holding Corp.)	Al-Ain	3,400
Do.		Arabian Gulf Cement Company LLC	Ajman	1,100
Do.		Arkan Building Materials Co. (ARKAN) P.J.S.C. (SENAAT General Holding Corp., 51%)	Al-Ain	1,300
Do.		Binani Cement Factory LLC	Grinding plant at Jabal Ali	2,000
Do.		Bin Hamel Nael Cement Co.	Grinding plant at Al-Ain	500
Do.		Cemex Falcon LLC	Grinding plant at Dubai	1,600
Do.		Emirates Cement Factory (SENAAT General Holding Corp.)	Abu Dhabi	2,300
Do.		Fujairah Cement Industries P.S.C.	Dibba, Fujairah	2,800
Do.		Gulf Cement Co. (National Investment Co., 35.75%; Ras Al Khaimah government, 7.67%; individual investors, 56.58%)	Khor Khuwair, Ras Al Khaimah	2,700
Do.		Hamriyah Cement Co. FZC (Bin Kamil Investment Group)	Grinding plant at Sharjah	1,000
Do.		Jebel Ali Cement Co. (Sharaf Industries, 100%)	Jebel Ali, Dubai	840
Do.		KCC Co. LLC	Grinding plant at Sharjah	500
Do.		Lafarge Emirates Cement L.L.C. (Lafarge S.A., 50%, and private, 50%)	Fujairah	3,000
Do.		National Cement Company P.S.C. (Holcim Ltd.)	Sharjah	2,200
Do.		Pioneer Cement Industries LLC (Raysut)	Ras Al Khaimah	1,200
Do.		Ras Al Khaimah Cement Co. P.S.C.	Khor Khuwair, Ras Al Khaimah	1,000
Do.		Sharjah Cement and Industrial Development Co. (private, 70%, and government of Sharjah, 30%)	Sharjah	3,500
Do.		Teba Cement Co.	Grinding plant at Abu Dhabi	1,100
Do.		Umm al-Qaywayn Cement Industries Co. P.S.C.	Umm al-Quwain	1,600
Do.		Union Cement Co. P.S.C. (Ras Al Khaimah government, 41%, and Abu Dhabi Investment Authority, 20%)	Khor Khuwair, Ras Al Khaimah	4,800
White		Ras Al Khaimah Company for White Cement and Construction Materials	Ras Al Khaimah	450
Clay		Fujairah Natural Resources Corp. (FNRC)	Fujairah	2,000
Gold, refined	metric tons	Al Etihad Gold L.L.C.	Al Quoz, Dubai	200
Do.	do.	Al Etihad Gold Refinery DMCC	Jumeirah Lake Towers, Dubai	200
Do.	do.	Al Ghaith Gold (private, 100%)	Dubai	100
Do.	do.	Al Ghurair Giga Gold (private, 100%)	do.	100
Do.	do.	ARY Aurum Plus (private, 100%)	Sharjah	25
Do.	do.	Emirates Gold (private, 100%)	Dubai	200
Do.	do.	Kaloti Jewellery Group	Sharjah	300
Iron and steel:				
Iron, direct-reduced		Emirates Steel Industries P.J.S.C. (SENAAT General Holding Corp., 100%)	Abu Dhabi	3,000
Do.		Al Nasser Industrial Enterprises LLC	do.	250
Steel:				
Billet		Emirates Steel Industries P.J.S.C. (SENAAT General Holding Corp., 100%)	do.	3,500
Do.		Al Nasser Industrial Enterprises LLC	do.	220
Wire rod		Emirates Steel Industries P.J.S.C. (SENAAT General Holding Corp., 100%)	do.	480
Rebar		do.	do.	620
Do.		Alam Steel	Dubai	500
Do.		Al Nasser Industrial Enterprises LLC	Abu Dhabi	90

See footnotes at end of table.

TABLE 2—Continued
UNITED ARAB EMIRATES: STRUCTURE OF THE MINERAL INDUSTRY IN 2013

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Iron and steel—Continued:				
Steel—Continued:				
Rebar—Continued		Essar Steel Middle East PZE	Dubai	1,000
Do.		Hamriyah Steel FZC (Metalloinvest, 80%, and Sheikh Sultan Bin Khalifa Al Nahyan, 20%)	do.	1,000
Do.		Union Iron & Steel Company LLC	Abu Dhabi	500
Do.		Conares Metal Supply Ltd.	Dubai	400
Do.		Star Steel International LLC	Jebel Ali, Dubai; Hamriyah Free Zone, Sharjah	360
Do.		Al Ghurair Iron and Steel Co.	Abu Dhabi	350
Lime		Emirates Lime factory (Al Jazeera Industrial Group)	do.	350
Do.		Ras Al Khaimah Lime Co. (Ras Al Khaimah Co. for White Cement and Construction Materials PSC)	Ras Al Khaimah	350
Natural gas, liquefied		Abu Dhabi Gas Liquefaction Co. Ltd. (ADGAS) [Abu Dhabi National Oil Co. (ADNOC), 70%; BP p.l.c., 10%; Mitsu $ Co. Ltd.,15%; Total S.A., 5%]	Das Island	8,000
Nitrogen:				
Ammonia		Ruwais Fertilizer Industries (FERTIL) (Abu Dhabi National Oil Co. (ADNOC), 66.66%, and Total S.A., 33.33%)	Ruwais, Abu Dhabi	1,200
Urea		do.	do.	2,100
Petroleum:				
Crude	thousand 42-gallon barrels per day	Abu Dhabi Company for Onshore Oil Operations (ADCO) [Abu Dhabi National Oil Co. (ADNOC), 60%; BP p.l.c., 9.5%; Exxon Mobil Corp., 9.5%; Royal Dutch Shell Group, 9.5%; Total S.A., 9.5%; Participations and Explorations Corp., 2%]	Onshore Abu Dhabi oilfields, including the Asab, the Abu Al Bukhoosh, the Arzanah, the Bab, the Bu Hasa, the Jarn Yaphour, the Sahil, and the Shah fields	1,300
Do.	do.	Abu Dhabi Marine Operating Co. (ADMA-OPCO) [Abu Dhabi National Oil Co. (ADNOC), 60%; BP p.l.c., 14.67%; Total S.A., 13.33%; Japan Oil Development Corp., 12%]	Offshore Abu Dhabi oilfields, including the Umm Sharif and the Zakum fields	600
Do.	do.	Zakum Development Co. (ZADCO) [Abu Dhabi National Oil Co. (ADNOC), 63.36%; ExxonMobil Abu Dhabi Offshore Petroleum Company Ltd., 24.64%; Japan Oil Development Corp., 12%]	Offshore Abu Dhabi oilfields, including the Satah, the Umm Al-Dalkh, and the Upper Zakum fields	518
Do.	do.	Dubai Petroleum Establishment (Government of Dubai, 100%)	Dubai oilfields, including the Margham, the Falah, the Fateh, the Rashid, and the S.W. Fateh fields	100
Do.	do.	BP p.l.c. and Crescent Petroleum Company Inc.	Sharjah oilfields, including the Kahaif, the Saja, the Moveyid, and the Mubarek fields	50
Refinery products	do.	Abu Dhabi Oil Refining Co. (TAKREER) [Abu Dhabi National Oil Co. (ADNOC), 100%]	Ruwais refinery, Ruwais, Abu Dhabi	120
Do.	do.	do.	Umm Al Nar refinery, Abu Dhabi	85
Do.	do.	ENOC Processing Company LCC (EPCL) [Investment Corp. of Dubai (Government of Dubai, 100%) 100%]	Jebel Ali refinery, Jebel Ali, Dubai	120
Do.	do.	Sharjah Oil Refining Co. F.Z.C. (FAL Group, 100%)	Hamriyah Free Trade Zone, Sharjah	71
Do.	do.	Metro Oil Corp.	Fujairah	90
Salt		Alghaith Industries (Al Ghaith Holding PJSC)	Mussafah, Abu Dhabi	110
Sand		Fujairah Natural Resources Corp. (FNRC)	Fujairah	20,000
Silica, glass		Emirates Float Glass LLC (Dubai Investment PJSC, 100%)	Industrial City 1 and 2, Abu Dhabi	440
Do.		Guardian Zoujaj International Float Glass Co. LLC (Guardian RAK)	Ras Al Khaimah	255
Silver, refined	metric tons	Emirates Gold (private, 100%)	Dubai	100
Sulfur		Abu Dhabi National Oil Co. (ADNOC)	Abu Dhabi	2,000

Do., do. Ditto.