

THE MINERAL INDUSTRY OF OMAN

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Major developments in the natural gas industry highlighted Oman's mineral industry sector in 1996. Key sales and purchase agreements were signed to implement the liquefied natural gas (LNG) project that will provide for the delivery of 4.1 million metric tons per year (Mt/yr) of LNG to the Korea Gas Corp. for at least 25 years. This represents the largest volume of LNG ever contracted between a seller and a single buyer. Several agreements to facilitate downstream processing also were concluded in 1996. They included a \$2 billion financing package for the liquefaction plant at Al Ghalilah, which was signed in November 1996 between Oman and several banks and export credit agencies. Although petroleum and natural gas underwrite Oman's developing economy, providing nearly 90% of Government revenues, other commercially viable mineral ventures include the mining of chromite, the refining of copper with gold and silver as byproducts, the manufacturing of cement, and the producing of crushed and dimension stone and sand and gravel. The main industrial facilities also included a petroleum refinery and natural gas processing plants. The mineral industry accounted for about one-half of the gross domestic product. The Government introduced the 1996-2000 Development Plan, which provides for greater economic diversification.

The Government had engaged in several international ventures to diversify and broaden its hydrocarbon revenue base. In addition to the LNG project to supply growing Asian markets, Oman has entered into agreements for the construction of two 120,000-barrel-per-day- (bbl/d) petroleum refineries in partnership with India's Hindustan Petroleum Co. and Baharat Oil Co. and the construction of a 130,000-bbl/d refinery in Thailand in partnership with Caltex and the Petroleum Authority of Thailand for which Oman was to provide 60% of crude oil throughput. The Government's participation in the Caspian Pipeline Consortium transporting crude oil from the Tengiz Field in Kazakstan to the Black Sea was scaled down from 25% equity to 7% equity. Plans for the construction of a deep-sea pipeline capable of delivering 50 million cubic meters per day (Mm³/d) of Omani natural gas to India's west coast was abandoned in late 1996 in favor of devoting finances to the LNG project. The Anglo-Dutch Shell Group, however, is planning to invest in a LNG regasification unit in the southern Indian state of Tamil Nadu at Ennore, making possible the import of Omani LNG.

The Nimr Petroleum Co. (Saudi Arabia) signed a \$50.5 million exploration agreement covering a concession of 15,000 square kilometer (km²) in northeast Oman over an 8-year period. Other Omani Government oil concessions awarded in 1996 were Triton Energy (Dallas), Phillips Petroleum Oman,

Japan Petroleum Exploration Co., and a joint venture between Atlantic Richfield Co. of the United States and Partex (Oman) Corp. (Middle East Economic Digest, 1996b).

Crude oil production increased to record levels as development activity and enhanced recovery operations continued. Only 5% of the domestic output was refined in Oman. One-half of the resulting product yield was absorbed by the domestic market. Surplus refined products, mostly fuel oil, were exported. Chromite production, entirely destined for export markets, was hampered by diminished prices. Copper ore output ceased, largely because of declining grade at the older surface mines and difficult conditions at the underground Aarja Mine. The smelter and refinery operated by the Oman Mining Co. imported concentrates for toll and custom smelting. (*See table 1.*)

Oman exported about 95% of its crude oil production in 1996, or about 300 million barrels (bbls). Both the heavier crudes of the south and the lighter crudes of the north are gathered and blended into the Omani Export Blend, which averaged \$19.10 per barrel, an increase of 17% over 1995 prices. The bulk of Oman's petroleum exports were destined for Asia. Japan alone received about one-third of Oman's petroleum exports. Other importers, included China, India, Korea, Singapore, and Thailand.

The Petroleum and Mineral Law of Oman, effective since January 1, 1975, governed mineral activities in the country. All minerals are considered Government property until extracted. The royalty tax rate was fixed by a 1976 decree at 20% of the value of production. The Government maintained a majority interest in most companies; however, foreign partnerships were encouraged. The Oman Chromite Co. has limited Government participation with major equities held by private interests. A reform of the complicated tax system to broaden foreign ownership was introduced in October 1996 allowing local companies to make overseas investments without jeopardizing their tax status.

Construction was underway on the expansion project at the Rusayl cement plant. A new \$110 million production line is planned parallel to the existing plant. By 1998 when the expansion program is completed, the clinker capacity will have increased from 600,000 metric tons per year (t/yr) to 1.2 Mt/yr (Industrial Minerals, 1996).

A \$3 billion, 480,000-t/yr capacity aluminum smelter is to be constructed in the Sohar area. Government approval for the Sohar Aluminium Smelter Co. was obtained in late 1996. Shareholders include Charus Enterprises of the United States, the Hong Kong branch of the China National Nonferrous Metals

Industry Corporation (CNNC), and Oman's WJTowell & Co. The smelter is to be constructed in conjunction with a natural-gas-fueled power station of 1,800 megawatt (MW) capacity and a 30-million-gallons-per-day desalination plant. Brown and Root of the United States is to provide project management services (Middle East Economic Digest, 1996a). Central to the development of the smelter was a guaranteed supply of gas for power and a well-developed supporting infrastructure, including a fully fledged industrial port. These projects were made possible by the 25-year guaranteed LNG purchase agreement.

Copper cathodes, the bulk of which were processed from imported concentrates to more fully utilize the refining capacity, were exported from the Port of Majis, about 17 kilometers (km) northwest of Sohar.

The Government concluded the agreement in 1996 with the Japanese International Cooperation Agency and the Metal Mining Agency of Japan for the exploration for copper, gold, silver, and other minerals on a 2,900-km² area near the Batina Coast between Rustaq and Saham.

About 7 Mm³/d of natural gas was produced from the Yibal Field, while the Fahud and Sayh Nuhaidah Fields each accounted for almost 1 Mm³/d. The collection and processing of natural gas in Oman was networked to three plants: the Fahud gas processing plant, the 2.2-Mm³/d-capacity Sayh Nuhaidah gas treatment plant, and the 16.6-Mm³/d-capacity Yibal gas processing plant. The Government Gas System (GGS) received more than one-third of production, which was primarily used as fuel for electric power generation. It was also piped to the Sultan Qaboos University, and connecting lines extend up the Batinah Coast to Sohar at the site of the copper refinery. The GGS included a pipeline that carries gas from Yibal to the Al-Ghubra desalination and powerplant and to the Rusayl Industrial Estate, near Muscat. A pipeline also extends south from Sayh Nuhaidah to Zufar, transporting gas for use in the southern oilfields. Field operations, including reinjection, absorbed about one-half of the natural gas produced. Only about 5% is flared or lost in transmission. The Rusail, Sohar, and Al-Ghubra power stations consume 90% of the dry gas produced at Yibal. The 90-MW Al-Manah power-plant was completed in September 1996 at a cost of \$215 million, representing Oman's first private sector power scheme. Plans for Oman's largest power and water scheme at Batqa have been postponed. Three industrial power schemes are proceeding: the 60-MW power station for Petroleum Development Oman (PDO) as part of the development of the Saih Rawl Gas Fields, the 60 MW plant for Oman Cement Co. at Rusail, and a 1,800-MW powerplant at Sohar to accommodate the new aluminum smelter.

The Government, reserving a majority equity position of 51% in Oman Liquefied Natural Gas LLC, a joint venture, including Royal Dutch Shell, 34%; Total, 6%; Mitsubishi and Mitsui each 3%; Partex, 2%; and Itochu, 1%, is responsible for natural gas liquefaction, shipping, and marketing. The group's proposed \$9 billion natural gas liquefaction project was expected to yield 6.6 million metric tons (Mt) of LNG annually with a proposed startup date in the year 2000. The LNG plant site is to be at Bimmah, 150 km southeast of Muscat.

PDO accounted for about 95% of the nation's total petroleum

production and most of the nation's exploration activities. The company operated more than 1,600 crude oil production wells from 72 producing fields, which were linked to 40 gathering stations. Occidental Petroleum is the largest of the country's four other equity producers and contributed about 38,000 bbl/d. Other producers in 1996 were Japex, Elf Aquitaine and IPC. Petroleum production averaged 883,000 for the year; however output in the last quarter of 1996 averaged 900,000 bbl/d suggesting that Oman's target of producing 1 million barrels per day (Mbbbl/d) of crude oil by 2000 is within reach.

Oman's single refinery, Mina Al-Fahal, has a capacity of 85,000 bbl/d and is dedicated to meeting local demand. A second refinery is being considered for the southern city of Salalah.

Oman proceeded with plans to develop a \$900 million petrochemical complex. The plant is due to come on stream between 2001 and 2002. It will produce about 450,000 t/yr of both ethylene and polyethylene. British Petroleum will retain up to a 49% equity, and 40% will be floated on the Muscat Securities Market. The Oman Oil Co. (OOC) will account for the remainder. A joint-venture fertilizer plant to export annually 1.45 Mt of urea to India and about 315,000 tons of ammonia to other countries is due to begin production in early 2000. The OOC will hold 50% equity in the plant, and two Indian firms will each hold 25% equity.

Although Omani has scaled down its position in the Caspian Pipeline Consortium, the project remains ongoing. Contracts were awarded to build a pipeline system linking the Caspian and Black Seas. The 750-km-long pipeline was expected to carry oil from Azerbaijan, Kazakstan, and Russia, terminating at the port of Novorossiysk on the west coast of the Black Sea. Initial capacity was expected to be 300,000 bbl/d, increasing eventually to 1.5 Mbbbl/d.

The Omani Government took a 20% equity position in a 120,000-bbl/d refinery to be constructed in Rayong, Thailand. The new refinery was expected to accept Omani crude for processing.

The Ministry of Petroleum and Minerals had reported proven copper ore reserves at 8 Mt and proven chromite ore reserves at 1.6 Mt. Recoverable petroleum reserves were estimated by the Ministry of Petroleum and Minerals at 5.3 billion barrels. At least an additional 1.5 billion barrels could be recovered through steam soak, polymer and steam flooding, hot-water injection, and (or) electromagnetic heating of the reservoirs. Recoverable reserves of natural gas have nearly tripled in the last 5 years to 780 billion cubic meters, most of which is nonassociated natural gas (Arab Petroleum Research Center, 1997).

Petroleum and natural gas pipelines totaled nearly 3,000 km. The bulk of crude oil production was serviced by the central pipeline running from the Dhiab Field in the south to the Mina al-Fahal export terminal near Muscat.

An agreement was signed with the Kuwait Fund for Arab Economic Development for \$20.4 million to help finance an expansion of the Port of Mina Qaboos from 1.6 Mt to 2.6 Mt capacity at an estimated cost of \$65 million. A port at Salalah is being developed by the Salalah Port Services Co. a consortium including the Government, Sealand of the United States, and

local investors.

Projects augmenting the central electric grid generating capacity and extending the power network were in various stages of implementation. Expansion work at Ghubra, Oman's largest power station, was completed in 1995, including the installation of two additional 125-MW-capacity natural gas turbines.

The Sultanate of Oman had enjoyed a stable economy sustained by petroleum revenues for more than a decade. Improving technology augmented reserves that continued to outpace reservoir withdrawals, affording a substantial economic base for at least the next 20 years at the current rate of production. The development of the nation's natural gas reserves and increasing overseas investments will place Oman in a secure position when its own petroleum reserves are depleted. The LNG project will provide greater economic diversification, enhance trade relations, and provide a large technology transfer and more opportunities for employment for Omani nationals. During the year, a series of key agreements were completed permitting the project to proceed. Buyers for the majority of the plant's output are now guaranteed for at least 25 years. An offshoot of the LNG project includes a world-scale petrochemical complex, a new aluminum plant, a nitrogenous fertilizer plant, a new power station, a new container port, and a free trade zone at Salalah. The budget deficit is scheduled to be eliminated by 2000 under the 1996-2000 Development Plan. Oil earnings averaged more than \$19 per barrel in 1996 and \$22 in early 1997, compared with the Government's conservative estimate of \$15 per barrel as budgeted for 1996. This increase should result in \$1.2 billion more in oil revenues than originally budgeted for 1996.

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Major Sources of Information

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TABLE 1
OMAN: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity	1992	1993	1994	1995	1996 e/
Cement, hydraulic thousand tons	970	1,000	1,200	1,177 r/	1,260 2/
Chromite, gross weight	1,760	10,236	6,166	5,300 e/	15,252 2/
Copper:					
Mine output, Cu content	13,600	12,000 e/	6,500	--	--
Metal:					
Smelter	15,000	27,700 3/	31,200 4/	34,200 4/	24,663 2/
Refinery	16,236	20,539 5/	24,194 4/	33,900 4/	24,150 2/
Gas, natural:					
Gross million cubic meters	5,300	5,400	6,000 e/	6,860 r/ e/	9,071 2/
Dry do.	3,110	3,150	3,200 e/	3,015	3,176 2/
Gold kilograms	94	90	137	591 r/	576 2/
Natural gas liquids e/ thousand 42-gallon barrels	2,300	2,300	2,300	2,300	2,500
Petroleum:					
Crude do.	270,800	283,240	293,800	310,600 e/	322,300
Refinery products:					
Gasoline do.	4,440	4,500	4,600 e/	4,632 r/	4,888 2/
Jet fuel do.	2,370	2,500	2,500 e/	2,500	2,500
Kerosene do.	80	90	90 e/	90	90
Distillate fuel oil do.	4,580	4,600	4,800 e/	4,800	4,800
Residual fuel oil do.	12,100	12,500	12,500 e/	12,500	12,500
Other do.	850	900	900 e/	900	900
Total do.	24,420	25,090	25,390 e/	25,422 r/	25,678
Sand and gravel thousand tons	6,540	7,000 r/ e/	8,000 r/ e/	9,395 r/	9,629 2/
Silver kilograms	3,205	3,300	1,500 r/ e/	100 r/ e/	97 2/
Stone:					
Marble thousand tons	54	76	70	145 e/	150
Other do.	1,960	1,930	2,000 e/	2,000 e/	3,000
Sulfur e/	40,000	40,000	40,000	35,000	30,000

e/ Estimated. r/ Revised.

1/ Table includes data available through Nov. 1, 1997.

2/ Reported figure.

3/ Includes 17,800 metric tons of anode as toll/custom output.

4/ Includes toll/custom output.

5/ Includes 12,600 metric tons of cathode as toll/custom output.