



◀ Countries

Oman



Last Updated: August 22, 2012

Background

Oman is the leading regional non-OPEC oil exporter.

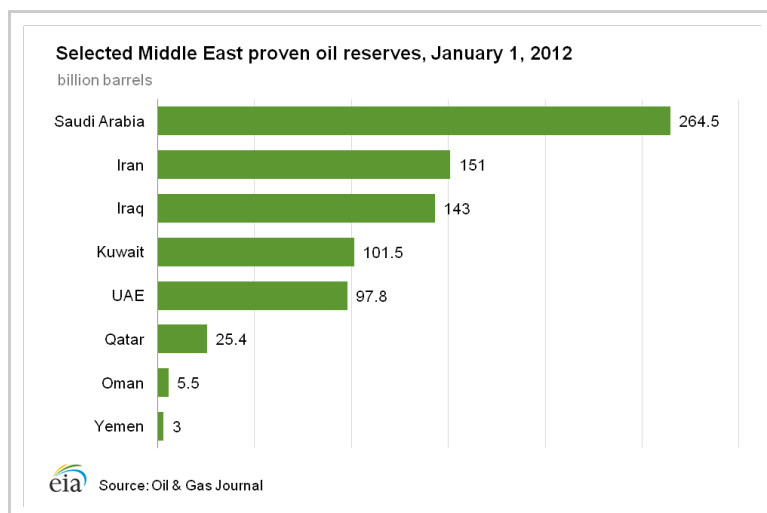
Like most of its neighbors, Oman is dependent upon its oil sector for the majority of its export revenues and government spending. Oman possesses the largest oil reserves of any non-OPEC country in the Middle East and significant reserves of natural gas, of which it is a leading exporter regionally. While crude oil remains a significant yet declining part of its economy, Oman has made a concerted effort to diversify its economic base in face of its declining output. Under Sultan Qaboos bin Said's "Vision 2020" policy, Oman has made considerable investments and progress into developing gas resources, increasing gas production, and developing current and new oil fields.



Oil

Oman has thus far implemented a successful program to reverse the decline in production, deploying some of the most sophisticated methods of oil extraction.

According to *Oil & Gas Journal (OGJ)*, Oman has total proven reserves of 5.5 billion barrels of oil as of January 2012. Oman's reserves are found mainly in the north and central onshore areas, comprised of disparate clusters of smaller fields. This geological composition makes production costs some of the highest in the region. The transition into secondary and tertiary extraction techniques will only increase these costs further. Oman has thus far implemented a successful program to reverse the decline in production experienced for most of the past decade, deploying some of the most sophisticated methods of enhanced oil extraction.



Sector Organization

Oman's Ministry of Oil and Gas coordinates the state's role in the country's hydrocarbon sectors. Final approval on policy and investment, however, rests with the sultan of Oman, Qaboos bin Said, who also holds the office of prime minister. The implementation of oil policy is done through an integrated company in which the Sultanate of Oman owns the majority stake. Petroleum Development Oman (PDO) holds more than 90 percent of Oman's oil reserves and is responsible for 85 percent of its production. Aside from the government's 60 percent ownership, Shell (34 percent), Total (4 percent), and Portugal's Partex 2 percent) all own stakes in PDO.

Given the technical difficulties involved in production, the contract terms for international oil companies (IOCs) have become more favorable than elsewhere in the region, some allowing significant equity stakes in certain projects. Occidental Petroleum has the largest presence of any foreign firm and is the second largest oil-producer in Oman. Other major players with interests in Oman include: Shell, Total, Partex, BP, CNPC, KoGas, and Repsol.

Production

Oman produced 889,000 barrels per day (bbl/d) of total petroleum liquids in 2011, 886,000 bbl/d of which was crude oil. Oman is expected to produce 915,000 bbl/d for 2012 after its Harweel Enhanced Oil Recovery project adds approximately 30,000 bbl/d to that total. Oil production in Oman has increased by more than 24 percent over the past four years, from a low of 714,000 bbl/d in 2007. PDO owns a concession which previously encompassed most of the country (Block-6), which has since been broken up and parceled out in successive bidding rounds. Much of the production growth has come from the success of international firms in developing former portions of Block-6.

In 2002, PDO initiated a review of its mature oil fields to determine the feasibility of enhanced oil recovery (EOR) techniques. On the determination of its review, PDO implemented a comprehensive and large scale EOR program using varied techniques on a field-by-field basis. Oman's oil sector is dependent upon these EOR techniques.

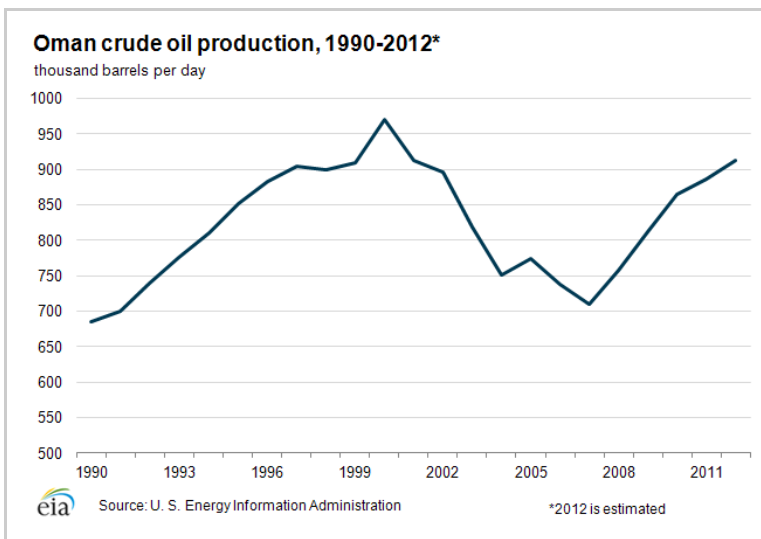
Oman's EOR program consists of three different general methods of extracting oil, some of which have never been used previously on a commercial scale. Miscible gas injection, steam (thermal) injection, and polymer flooding are the cornerstone of Oman's efforts to step up production. Miscible gas injection involves pumping gas, often toxic, that dissolves in the oil, facilitating higher flow rates, which is applied currently at its operations in the Harweel oil field cluster. As a result, Harweel will produce an additional 40,000 bbl/d. Thermal EOR methods are being deployed at Mukhaizna, Marmul, Amal-East, Amal-West and Qarn Alam fields. Thermal EOR entails the injection of steam in various ways and durations so as to facilitate the flow of heavier oil to the well. Mukhaizna has already increased production to 50,000 bbl/d, with Occidental expecting that to rise to 150,000 bbl/d by 2012. Thermal EOR is expected to increase production at both Amal-East and Amal-West to 23,000 bbl/d by 2018. Furthermore, the steam injection at Qarn Alam is projected to further production by 40,000 bbl/d by 2015 through a novel process in which the steam drains oil to lower producer wells. When reservoirs contain heavier grades of crude, the viscosity of the oil restricts its flow to the well. With such a heavy grade of crude, water injection might not prove effective, as the disparity in viscosity causes the water to pass the oil, instead of pushing it to the well. At projects such as Marmul, with its heavy oil, injecting polymer fluid is more effective when injected into a well.

Production growth will range across the entire spectrum of oil development in Oman. PDO wants to increase recovery rates at Yibal, a mainstay of Omani production, to 55 percent through traditional water-flooding. The discovery of al-Ghubar South in 2009 is the most promising discovery for Oman in years. According to the Ministry of Oil and Gas, al-Ghubar South could add as much as 1 billion barrels to reserves. Two significant discoveries were also made at Malaan West and Taliah in the Lekhwair cluster in northwest Oman, which will broaden baseline production in the future.

Other large EOR projects include:

- Karim Cluster - a cluster of 18 small oil fields all flowing to the Nimr production facility, which is operated by Medco (Indonesia). Currently producing 18,000 bbl/d, PDO is aiming to boost production to around 35,000 bbl/d in the short-term.
- Harweel Cluster - PDO estimates a capacity of 100,000 bbl/d from the current 44,000 bbl/d in the next five years.
- Growth of up to 70,000-80,000 bbl/d from five clusters, such as the Rima Cluster, is expected through various efficiency gains and EOR applications.

Oman has also opened tenders for exploration and production in new oil fields in blocks Baqlah, Karawan, Kahil, Qatbeet, and Block 65 to be awarded in 2012. Additionally, Oman is exploring unconventional resources of light tight oil and shale plays.



Consumption and Exports

In 2011, Oman consumed approximately 98,000 bbl/d of petroleum products. Consumption has increased over the last decade, nearly doubling from a level of 52,000 bbl/d in 2000. This has largely been attributable to Oman's industrialization and expanding petrochemical sector, along with improved roadways and an expanding vehicle fleet.

Though Oman is a significant net exporter of petroleum, it is not a member of OPEC. As is the case with other exports from the Gulf, Asia provides the main consumer markets for Omani crude; led by China, Thailand, South Korea, and Japan.

Pipelines and Export Terminals

Oman's pipeline system is mostly focused on delivering crude oil to the country's only oil export terminal at Mina al-Fahal. Located near the capital, Muscat, both the export terminal at Mina al-Fahal and the Main Oil Line feeding the facilities are run by PDO. Pipelines also feed industrial complexes and petrochemical plants, which form an integral part of economic diversification and Oman's expansion into downstream activities. PDO operates over 1,000 miles of oil pipelines which run throughout the country. Additionally, the government has commissioned an export terminal at Sohar along with its plans to expand the Sohar refinery.

Downstream Activities

In 2012, Oman has a refining capacity of 222,000 bbl/d, split between two refineries. The Mina al-Fahal refinery was Oman's first, opened in 1982, and has a capacity of 106,000 bbl/d of crude distillation after an expansion in 2007. The Sohar refinery was brought on-stream in 2006, with a refinery capacity of 116,000 bbl/d. The refineries are operated by the Oman Refineries and Petrochemicals Company (ORPC), the result of a 2007 merger between the Oman Refinery Company and the Sohar Refinery Company. ORPC is owned by the Omani Ministry of Finance (75 percent) and Oman Oil Company (OOC) (25 percent). The Sohar refinery concluded a front-end engineering and design (FEED) study for an expansion project, which will expand crude distillation capacity by 50,000 to 60,000 bbl/d by 2015-16.

Oman continues to pursue the building of a large refinery and petrochemical complex at al-

Duqm in southern Oman, which would be geared toward export markets, ultimately making Oman a net exporter. Under a memorandum of understanding (MoU) signed in July 2009 and Royal Decree in 2011 establishing the Special Economic Zone at Duqm, a joint venture between the Omani government and international investors would build a 230,000 bbl/d refinery, a crude oil export terminal, and several large petrochemical facilities, among other commercial ventures.

Natural Gas

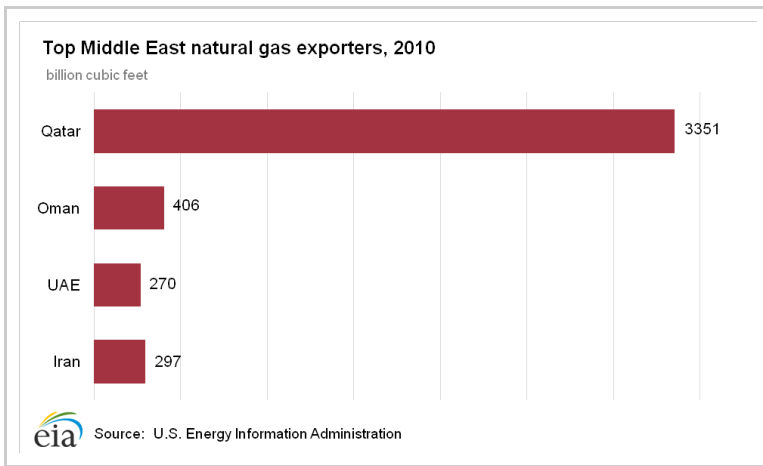
Oman requires increased natural gas supplies to meet the growth in its domestic consumption as well as its enhanced oil recovery projects and LNG export obligations

Oman has proven reserves of natural gas of 30 trillion cubic feet (Tcf) as of January 2012, according to *OGJ*. Due to increasing EOR applications, rising domestic demand, and export obligations, Oman's gas demand has outpaced its production. The Ministry of Oil and Gas are aggressively seeking to increase exploration and production from its reserves. The ministry announced plans to reassess natural gas reserves, planning to increase reserves by a trillion cubic feet per year for the next 20 years and producing more through developing new gas fields, building more plants and through programs akin to the EOR projects implemented in the oil sector.

Given its overwhelming domestic demand and the long-term liquefied natural gas (LNG) export contracts, the country has insufficient feedstock for electricity generation at seasonal peak times. This shortfall has resulted in service interruptions that have slowed industrialization and economic diversification programs, as well as economic growth generally. A regional power grid is being constructed between all Gulf Cooperation Council (GCC) members, of which Oman is one. This will create the possibility to import electricity, especially from neighboring UAE and its planned nuclear plants, and lessen the strain on domestic natural gas supplies used as feedstock. This prospect will only emerge in the medium-term however, largely after 2017 when UAE's nuclear plants begin to come on-line.

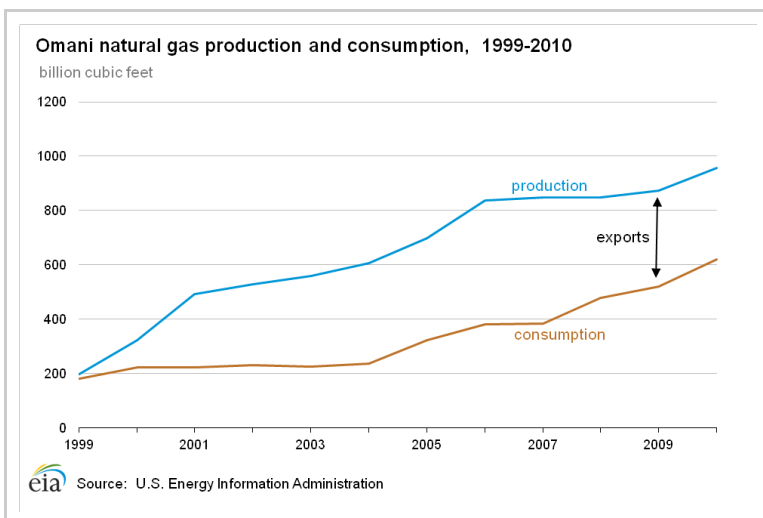
Sector Organization

PDO has an even greater presence in the natural gas sector than in the oil sector, accounting for nearly all of its natural gas supply along with smaller contributions from Occidental Petroleum and Thailand's PTTEP. The government enlists foreign companies in new exploration and production projects, offering generous terms for developing fields that require the sophisticated technology and expertise of the private sector. Developing gas projects with foreign firms such as Occidental, BP, PTTEP, and Petronas will determine Oman's future production. The Oman Gas Company (OGC) directs the country's natural gas transmission and distribution systems. The OGC is a joint venture between the Omani Ministry of Oil and Gas (80 percent) and OOC (20 percent). Oman Liquefied Natural Gas (OLNG)- owned by a consortium including the government, Shell and Total- operates all LNG activities in the Sultanate through its three liquefaction trains in Qalhat near Sur.



Production

Oman produced over one trillion cubic feet (Tcf) of natural gas, equal to about 2.75 billion cubic feet per day (Bcf/d) in 2011. Natural gas production has more than doubled in the past decade and ramped up considerably in the years subsequent to Oman's nadir of oil production. Production will likely continue to grow as companies are in various stages of licensing, exploring, producing, and expanding fields; especially BP's Khazzan-Makarem tight gas project with gas reserves of an astounding 100 Tcf and expected production of one Bcf/d by 2016-17. In addition, the PDO has approved the building of a greenfield gas project, including gas processing plants, and pipelines, in central Oman. The project will produce approximately 42 Mcf/d of gas from Hasirah and Hawqa oil fields. WorleyParsons will conclude the FEED study in 2015. Oman has also launched the Depletion Compression Project, which will boost inlet pressure to bring up production, for its declining gas field at Saih Rawl. Despite Oman's prodigious efforts to diversify its base into gas production, it may face an added internal obstacle. Following protests in 2011, Sultan Qaboos bin Said granted the Majlis al-Shura, Oman's elected legislature, oversight and legislative authorities, allowing the Majlis to question projects and contracts. While the sultan has ultimate authority, the Majlis may have an effect on future energy developments.



Consumption

Natural gas consumption rose rapidly over the past decade, seeing a 180 percent increase from 2000 to a total of 619 Bcf in 2010. This increase is largely attributable to economic

expansion and population growth, while re-injection of natural gas to increase oil production takes up just over 20 percent but continues to rise. A lack of additional natural gas resources has impeded progress in economic diversification, especially in the industrial sector. Although Oman is a net exporter of oil and natural gas, it also imports small volumes of natural gas from Qatar via UAE. The Dolphin Pipeline provides Oman's only natural gas imports, providing approximately 200 million cubic feet per day (Mcf/d).

Pipelines

Oman's natural gas pipeline system is operated by the Oman Gas Company (OGC), a joint venture between the Sultanate of Oman, with an 80 percent equity holding, and Oman Oil Company (OOC) which owns the remaining 20 percent. The pipeline system consists of 1,250 miles of pipeline, transporting natural gas supplies from production facilities primarily to gas-powered electric plants, participants in the petrochemical and industrial sectors, as well as to the Oman and Qalhat LNG projects. In 2015-16, OGC will add a 143-mile, 36-inch gas pipeline from Saih Nihayda field in Central Oman to service the special economic zone in Duqm on the east coast.

Exports

The Oman and Qalhat LNG projects are the sole source of natural gas exports from Oman, with a nameplate capacity of 506 Bcf per year, a daily average of 1.4 Bcf/d. In 2010, Oman exported a total of 406 Bcf, a decline of 2 Bcf from the previous year. Despite facing a gas shortage and increasing domestic demand, Oman exports 55 percent of its gas because of term contracts, the first of which expires in 2020. Aside from the majority stake held by the government of Oman (51 percent), shareholders of Oman LNG include Shell (30 percent), Total (5.54 percent), Korea LNG (5 percent), with Partex and other Japanese investors comprising the rest. Qalhat LNG, operator of one of the three trains, is primarily owned by the government (47 percent) and Oman LNG (37 percent). The gas is sourced from the Saih Rawl and Saih Nihayda gas fields in central Oman. The LNG exported from these projects is destined for Asian markets, principally South Korea and Japan.

Imports

Dolphin Pipeline

Given shortfalls in natural gas production, in 2007 Oman began to import natural gas. The Dolphin Pipeline system, which transports 2 billion cubic feet per day (Bcf/d) of natural gas from Qatar to neighboring UAE and eventually to Oman by way of the Fujairah - al-Ain pipeline, provides increasing natural gas supplies, around 200 Mcf/d, for use in electricity generation.

Additionally, with a MoU signed in 2007, Iran and Oman plan to build a pipeline to bring 1 Bcf/d from source gas in the shared Hanjam and West Bukha fields in the Strait of Hormuz to Qalhat LNG in Sur. This would free domestic production to be connected to the domestic grid. However, the proposed pipeline's future is in doubt due to U.S.-imposed sanctions on Iran.

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