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Yemen



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[full report](#)

Overview

Although Yemen is not a major hydrocarbon producer relative to some of the other countries in the Middle East, oil and natural gas resources are sufficient to enable exports. However, Yemen's difficult security environment hinders the production and transport of those resources.

Yemen's energy sector is in a state of flux. Declining oil production and frequent attacks on Yemen's energy infrastructure have offset positive developments in the country's natural gas sector since 2009. Yemen's difficult security environment complicates the exploration, production, and transport of energy resources in the country, and could undermine the country's emerging liquefied natural gas (LNG) export sector.

Yemen is not a major energy producer compared with other countries in the Middle East. Yemen's crude oil production has never ranked in the top-30 globally, and the country used all of its natural gas production to aid in oil recovery until 2009. Nevertheless, the country's location at the Bab el-Mandab, [a key chokepoint in international shipping](#), makes it important in terms of international energy trade. More than 3.4 million barrels of oil per day (bbl/d) pass through Bab el-Mandab, and closure of the two-mile strait would force tankers to sail around the southern tip of Africa to reach European and North and South American markets.

Yemen is highly dependent on its hydrocarbons sector. Even with the earnings from natural gas exports, the International Monetary Fund (IMF) estimates that Yemen needs an oil export price of approximately \$215 per barrel to balance its budget. IMF figures also show that nearly 60% of government revenues came from the hydrocarbons sector between 2010 and 2012. Yemen, as a member of the Extractive Industries Transparency Initiative (EITI), reported in July 2013 that government revenues from the oil and gas sector in 2010 were more than \$5 billion. IMF estimates indicate that in 2012 oil exports accounted for approximately 70 percent of hydrocarbon revenue, while natural gas exports accounted for just 3 percent.

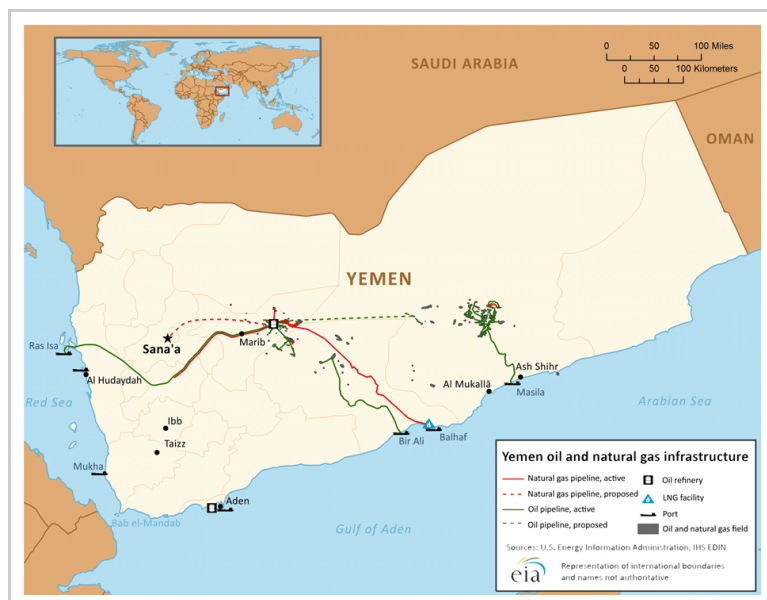
Oil production in Yemen declined steadily after peaking in 2001, but beginning in 2009 the country began producing commercial quantities of natural gas for domestic use and for exports as LNG. This latter point could help the country stabilize its economy even without

an extremely high oil export price. However, replacing oil export revenues with LNG export revenues does little to help the country reduce its dependence on its hydrocarbons sector.

Yemen summary energy statistics

Oil (million barrels)			
Proved reserves, 2013	Total oil supply, 2012	Total petroleum consumption, 2012	Reserves-to-production ratio
3,000.0	57.3	50.1	52.4
Natural Gas (billion cubic feet)			
Proved reserves, 2013	Dry natural gas production, 2011	Dry natural gas consumption, 2011	Reserves-to-production ratio
16,900.0	339.7	30.7	49.7
Electricity			
Generating capacity, 2010 (million kilowatts)	Electricity generation, 2011 (billion kilowatthours)	Electricity consumption, 2010 (billion kilowatthours)	Distribution losses, 2010 (billion kilowatthours)
1.3	7.3	5.5	1.8

Source: U.S. Energy Information Administration



Sector organization

Yemen's Ministry of Oil and Minerals oversees the country's oil and natural gas sectors. The Ministry sets oil and gas policies and manages relations with foreign operators, but any contracts with foreign companies also require parliamentary approval. The national oil company, Yemen General Corporation for Oil, Gas, and Mineral Resources, guides a number of state-owned subsidiaries that handle most day-to-day operations and deals with energy sector revenues.

Selected subsidiaries of the Yemen General Corporation for Oil, Gas, and Minerals

Group	Function
Aden Refinery Company	Oversees operations at the Aden refinery, including transport to international destinations
Petroleum Exploration and Production Authority	Manages petroleum exploration and production; oversees licensing rounds and contracts with foreign investors
Safer E&P Operations company	Upstream operator; second largest producer in Yemen
Yemen Gas Company	Responsible for sales, marketing, and supply of liquefied petroleum gases domestically
Yemen Investments Company for Oil and Minerals	Upstream operator; focused on Jannah and West Ayad areas
Yemen Petroleum Products Distribution company	Markets and distributes petroleum products in the local market
Yemen Refining Company	Oversees domestic refining operations

Source: Yemen Ministry of Oil and Minerals, Yemen General Corporation for Oil, Gas, and Minerals, company websites

Foreign operators account for most of oil production in Yemen. Major international oil companies in Yemen include Total (which operates the Yemen LNG facility in addition to being active in several exploration blocks), Occidental Petroleum Corporation, and Nexen, a subsidiary of the China National Offshore Oil Corporation.

Yemen relies heavily on production-sharing agreements (PSAs) with foreign companies, which usually include 20-year concessions for production activities. In 2013, Yemen's government announced plans to transfer any expiring exploration licenses to state-owned companies. Production royalties paid to Yemen's government range between 3 and 10 percent.

Oil

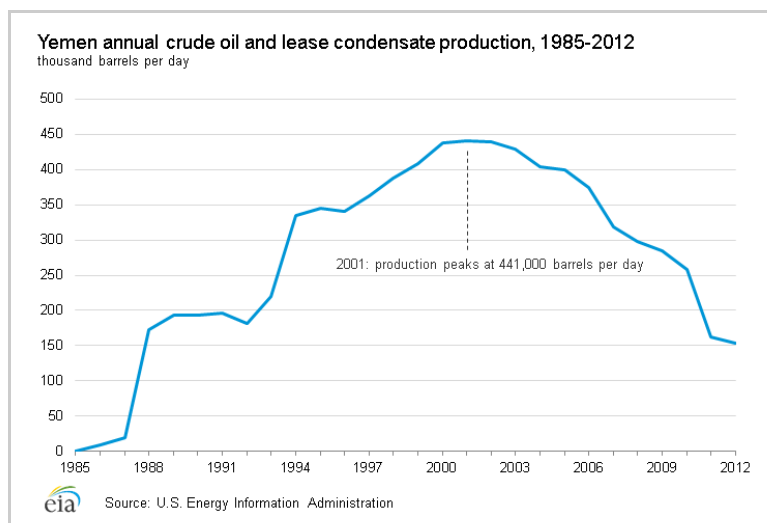
Yemen's oil production has decreased significantly since peaking in 2001 because of natural decline in the country's aging fields and frequent attacks on its oil infrastructure.

According to the *Oil & Gas Journal*, Yemen had proved reserves of oil totaling 3 billion barrels as of January 2013. Yemen has two primary crude streams, the light and sweet Marib stream and the medium-gravity and more sulfur-rich Masila stream.

The combination of declining production in its mature fields and frequent attacks on its energy infrastructure has left Yemen's oil sector in poor shape. Nevertheless, the country continues to hold bidding rounds for exploration blocks that may hold additional oil resources. Yemen's Minister of Oil and Minerals said in January 2013 that Yemen's

reserves of oil are higher than previously thought, which, if true, could help reverse (or at least slow) the country's declining production. However, even if additional resources exist in the country, the current security environment restricts the ability of companies to produce and transport oil.

In the first eight months of 2013 there were at least nine attacks on Yemen's oil and natural gas pipeline system. In 2012, there were more than 15 attacks, and oil exports were completely offline for most of the first half of the year. Securing the country's pipelines and other critical energy infrastructure is a stated goal of Yemen's current President, but to date the efforts have not been entirely successful. The security situation has led several smaller international oil companies to suspend operations. Despite this instability, the government aims to attract investors with this latest bidding round and promises less government involvement in exploration and production operations moving forward.



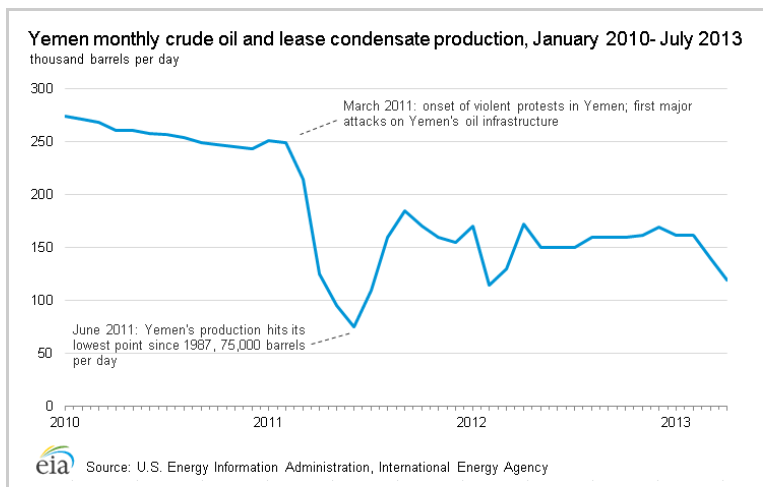
Exploration and production

Yemen's oil production declined after 2001 as a result of declining production in the country's maturing fields, and attacks on the country's oil infrastructure since 2011 have led to significant short-term disruptions.

Yemen offered five exploration blocks for bidding in late 2012—the country's fifth bidding round—and an additional 20 blocks in early 2013. The blocks on offer in the fifth round were all onshore, while the blocks in the sixth round were in both onshore (11 blocks) and offshore (9 blocks) areas. In August 2013, Yemen selected 18 international oil companies to bid for the 20 blocks on offer.

Yemen began producing crude oil in 1986 at very low levels and gradually increased production throughout 1987. The country's first significant production came in 1988, when it produced 173,000 bbl/d according to EIA data. Yemen's average monthly crude oil production declined after 2001, when production peaked at over 440,000 bbl/d. Yemen had plans to boost production to 500,000 bbl/d, but declining production at its maturing fields, limited exploration, and frequent attacks on the country's energy infrastructure make that goal infeasible. EIA estimates that Yemen's crude oil production was approximately 120,000 bbl/d in August 2013.

Most of Yemen's production is from the Marib-Jawf area in central Yemen and near the Masila area in the east, with production coming from just 13 of the country's 105 exploration blocks. Since 2001, the country's most productive field has been the Tawila field, which averaged nearly 90,000 bbl/d in 2003 but has since declined along with many of the country's other large fields. Natural decline rates at many of Yemen's major fields—including Tawila—are a primary driver of the country's drop off in production, but the frequent attacks on the country's energy infrastructure since 2011 have caused much sharper declines in recent years.



Exports, imports, and consumption

Attacks on Yemen's key oil infrastructure kept the country's major Marib-Ras Isa pipeline offline for more than half of 2012 which severely curtailed domestic petroleum consumption.

With the continued decline in oil production since the early 2000s, Yemen has struggled to keep its export sector at normal operating levels. When the 225,000 bbl/d Marib-Ras Isa pipeline was offline for more than half of 2012 because of persistent attacks, it was domestic consumers, not export destinations, who lost access to oil, according to news reports. The pipeline, which runs from the Marib region in the center of the country to the export terminal at Ras Isa, is critical to Yemen's export operations. As such, it is one of the most frequent targets of sabotage.

Yemen does not have any overland pipeline connections to its neighbors, so all of the country's petroleum exports depart via tanker vessels. In recent years, more than three-quarters of their petroleum exports went to destinations in Asia. In 2010, Yemen exported just 175,000 bbl/d of crude oil, down from more than 350,000 bbl/d seven years earlier. In addition to crude oil exports, Yemen exports limited amounts of refined petroleum products, averaging just 25,000 bbl/d of refined product exports between 2000 and 2010.

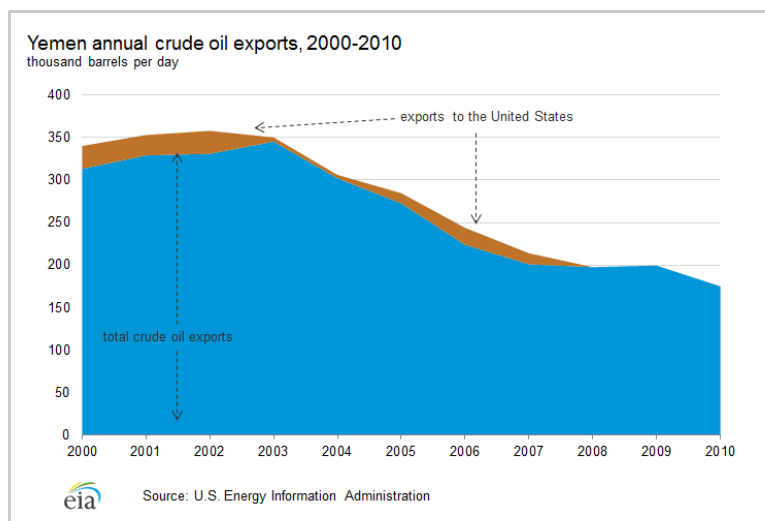
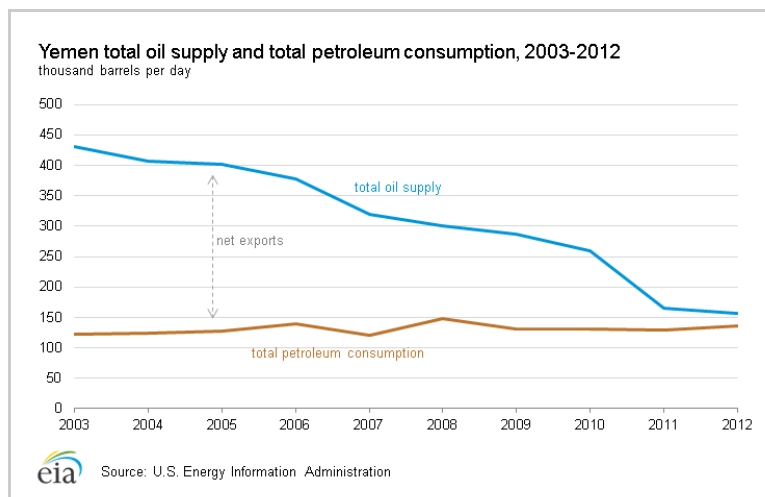
Yemen regularly imports petroleum products, particularly distillate fuel oil and residual fuel oil. Between 2000 and 2010, Yemen's imports of all petroleum products grew from just 2,000 bbl/d to nearly 60,000 bbl/d. With declining domestic production and the possibility of continuing attacks on its energy infrastructure, Yemen's reliance on imported petroleum products is likely to increase.

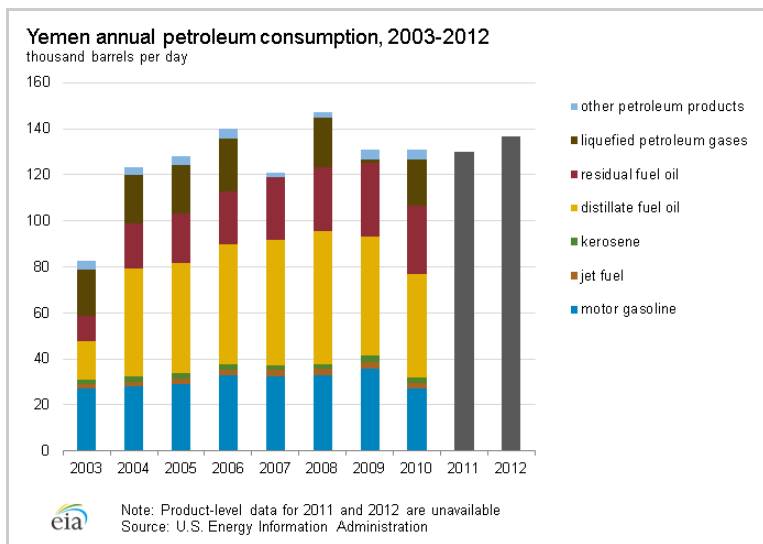
Yemen's oil consumption has been trending steadily upwards, reaching 137,000 bbl/d in 2012. With two operating refineries, Yemen produces some of the petroleum products it needs to meet domestic demand, but the country imports additional petroleum products to help meet internal demand. The Aden refinery is the largest in the country, accounting for the majority of Yemen's total refining capacity of 140,000 bbl/d.

Yemen refinery capacities

Operator	Refinery name	Capacity (bbl/d)
Aden Refining Company	Aden Refinery	130,000
Yemen Oil Company	Ma'arib Refinery	10,000
Total		140,000

Source: *Oil & Gas Journal*



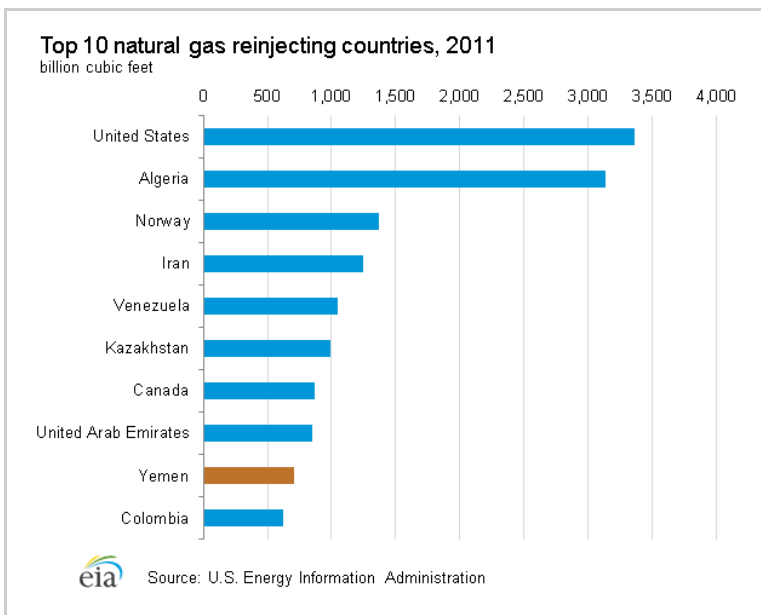


Natural gas

Until recently, Yemen reinjected most of its natural gas production to aid in oil recovery. However, since 2009 the country has been an LNG exporter, and the government aims to increase the use of natural gas in many sectors, including electricity generation.

As of January 2013, Yemen held 16.9 trillion cubic feet (Tcf) of proved natural gas reserves according to the *Oil & Gas Journal*. One of the larger natural gas deposits in Yemen is in the oil-rich Marib-Jawf area, where there may be 18 Tcf in recoverable volumes of natural gas, according to Yemen's government.

Until 2009, Yemen reinjected nearly all of the natural gas it produced to aid in oil extraction. In 2009, the Yemen LNG facility opened, and the country began to divert dry natural gas away from the oil fields and towards domestic and international consumers. Yemen's domestic market began consuming small amounts of natural gas in 2009, and there are plans to increase the use of natural gas in many sectors—particularly in power generation—to make up for diminishing petroleum supplies. Despite this effort, in 2011 Yemen still reinjected the ninth-largest volume of natural gas to aid in oil recovery in the world.



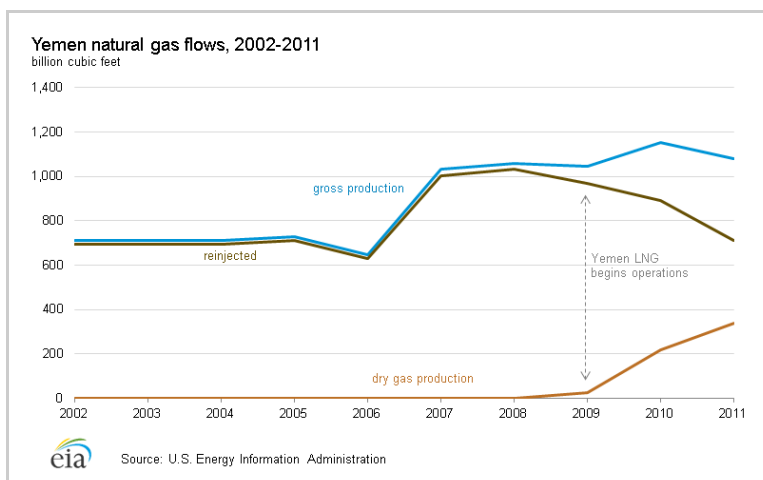
Exploration and production

In 2011, Yemen reinjected the 9th-largest volume of natural gas in the world.

Because Yemen's natural gas was historically a tool used to aid oil recovery efforts, there was rarely any exploration specifically targeting natural gas. With the opening of the Yemen LNG facility in 2009, the economic incentives for discovering and producing natural gas have changed.

Yemen began producing natural gas in the early 1990's, however, from 1993 until 2009—when the Yemen LNG facility came online—Yemen reinjected virtually all (98 percent) of the natural gas produced inside the country. With the opening of the country's only LNG facility in November of 2009, Yemen began producing commercial quantities of dry natural gas for the first time in its history. In 2011, Yemen produced 340 billion cubic feet (Bcf) of dry natural gas, up from just 28 Bcf in 2009 when the production of dry natural gas began.

With the continued build-out of infrastructure to feed Yemen LNG, the possibility of diverting natural gas used in oil recovery to domestic consumers—such as the power sector—becomes more feasible. Further, exploration in Yemen's onshore and offshore blocks may yield additional recoverable quantities of natural gas, although, like oil exploration, the security environment in the country will play a big role in determining the interest of international investors.



Exports, imports, and consumption

The startup of the Yemen LNG facility in 2009 gave Yemen the ability to export natural gas for the first time.

Yemen has never been a natural gas importer, and, until 2009, never consumed natural gas domestically. Since 2009, Yemen's natural gas consumption has grown, but not nearly as fast as its natural gas exports. Yemen's consumption of natural gas remains limited, peaking at just 34 Bcf in 2010. In contrast, Yemen exported 309 Bcf of LNG in 2011, representing over 90 percent of its total dry natural gas production that year. According to IHS Global Insight, Yemen LNG provided approximately 3 percent of global LNG volumes as of early 2013.

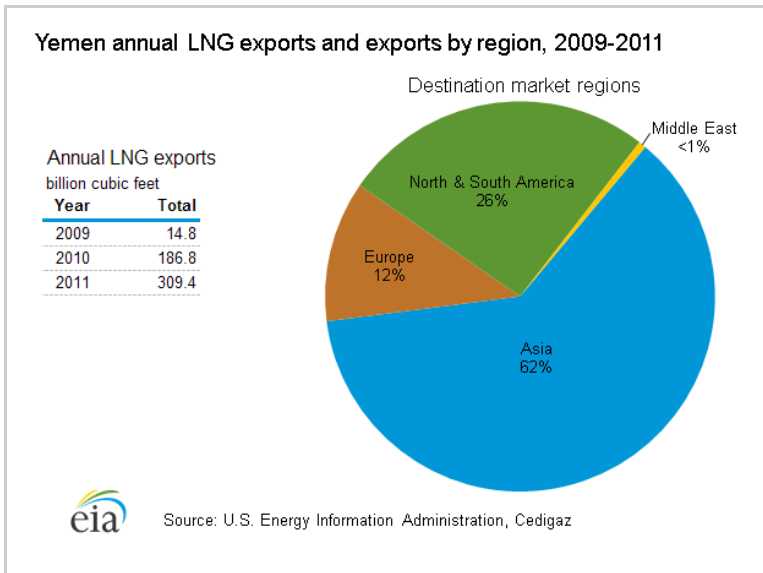
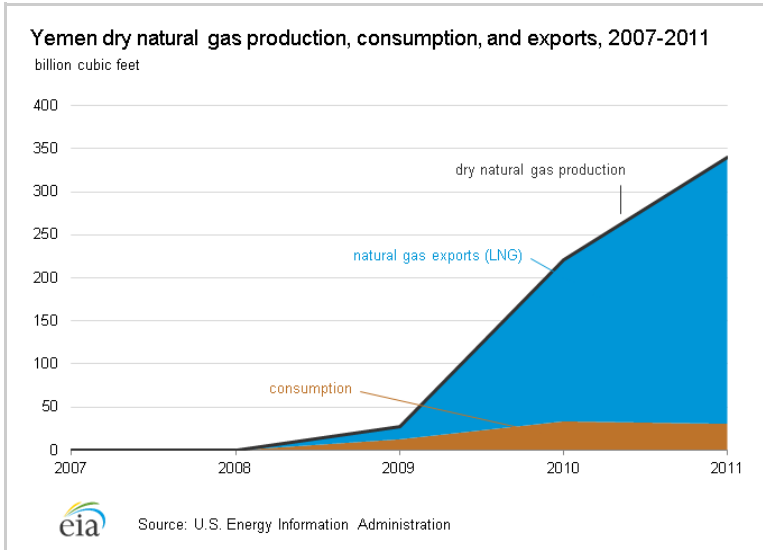
French company Total operates the 6.7 million ton per year (322 Bcf) Yemen LNG facility, and most of the exported LNG is under contract to GDF Suez, Total, or Korean Gas (KOGAS). The volumes purchased by GDF Suez and Total are non-dedicated—meaning that they can go to any willing destination market—while the volumes contracted to KOGAS all go to South Korea. In late 2012, Yemen LNG renegotiated its contracts with GDF Suez and Total, claiming that the prices it received for LNG were too far below prices elsewhere in the international market. In August 2013, Yemen's government began discussions with the government of South Korea over changing the KOGAS contract price. Yemen LNG is also in discussions with Turkey's Petroleum Pipeline Corporation (BOTAS) on a deal that could send up to 35 Bcf of LNG per year to Turkey.

Yemen LNG shareholders

Group	Share (percent)
Total	39.62
Hunt Oil Company	17.22
Yemen Gas Company	16.73
SK Corporation	9.55
KOGAS	6.00
Hyundai Company	5.88
General Social Security and Pension Corporation	5.00

Source: Yemen Ministry of Oil and Minerals

Like its oil infrastructure, Yemen's natural gas infrastructure—particularly pipelines—is the target of persistent attacks. In 2012, Yemen LNG was offline for more than six months as the result of numerous attacks on the country's natural gas system, leading to several lost cargos. In 2013, there have been several more attacks, but there have not been any associated production or export declines.



Electricity

The majority of Yemen's population does not have access to electricity, although the country plans to build several new generating facilities over the coming years.

Yemen's electricity infrastructure is outdated and insufficient to meet the country's needs. Data from the World Bank indicated that, as recently as 2010, only 40 percent of Yemen's population had access to electricity. Even for grid-connected consumers, blackouts are frequent as a result of persistent attacks on the country's energy infrastructure. Petroleum,

including distillate and residual fuel oil, is the fuel for much of Yemen's electricity generation, although natural gas is capturing a growing market share following the development of the country's natural gas resources.

Yemen's generating capacity as of 2010 was just 1.3 million kilowatts (gigawatts), which was the lowest capacity in the Middle East, excluding the Palestinian Territories. Likewise, in 2011 Yemen's total net generation (7.3 billion kilowatthours) and consumption (5.8 billion kilowatthours) are the lowest in the Middle East, except for the Palestinian Territories, despite having the fourth-largest population in the region. Many of Yemen's electric plants are now able to use natural gas as fuel, which has helped the country move away from burning petroleum to generate electricity. According to estimates by Yemen's Ministry of Electricity, the country's generating capacity in 2012 was just over 1.5 gigawatts.

Over the past several years, Yemen worked to integrate its electric grid with neighboring Saudi Arabia's. In 2007, the two countries established a grid interconnection, and there is a \$400 million interconnection expansion program that should allow for transfers of between 500 and 1,000 megawatts between the two countries.

In August of 2013, Yemen began construction on a new 400 megawatt gas-fired generating facility, and the facility should be operational some time in 2014. Additionally, in September 2012, Yemen reached an agreement with the China National Corporation of Overseas Economic Cooperation on the construction of three natural gas-fueled generation facilities. Each will have more than 400 megawatts of generating capacity. Further, Turkey agreed to help Yemen construct a 163 megawatt electric plant capable of burning either petroleum or natural gas in late 2012, although details on this project are unavailable as of September 2013.

Yemen's government also aims to develop a renewable energy sector. Yemen began pilot projects for solar and geothermal generation projects in 2003 and 2006, respectively. Progress has been slow, however, due to a lack of financial backing and the security environment in the country. In the past, Yemen discussed establishing a civilian nuclear program, but the possibility of such a venture is unlikely.

Yemen electric power generation capacity by fuel type, 2012

Fuel type	Share
Petroleum	59%
Natural gas	41%

Source: IHS EDIN

Notes

- Data presented in the text are the most recent available as of September 19, 2013.
 - Data are EIA estimates unless otherwise noted.
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Sources

- Aden Refinery Company
- APEX Tanker Data
- The Arab Fund
- Arab Oil & Gas Journal
- BBC World Wide Monitoring
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