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Singapore



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Overview

Singapore's strategic location between the Indian and Pacific Oceans has allowed it to become one of Asia's major petrochemical and refining hubs.

Easy access to the sea and a strategic location near the Strait of [Malacca](#) has enabled Singapore to become one of Asia's main energy and petrochemicals hubs and one of the world's top-three oil trading and refining centers. The Port of Singapore is one of the busiest in the world in terms of container throughput and handles around 130,000 vessels a year at its various terminals. Many global energy companies have regional headquarters in Singapore.

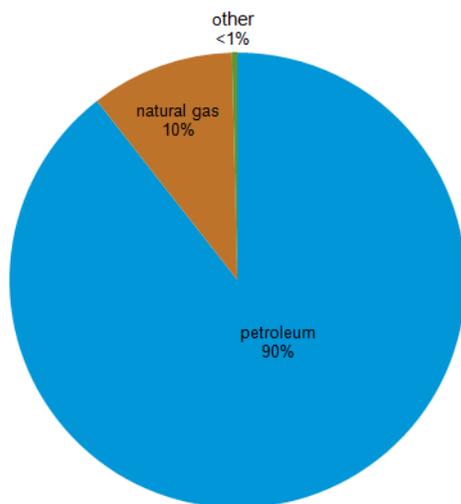
The refining and petrochemicals industry is critical to Singapore's economy, which continues to benefit from strong growth in regional demand for petroleum products. Almost 90 percent of Singapore's primary energy consumption comes from petroleum use, mostly for refining. At the same time, Singapore increasingly competes with countries like [China](#) and [Vietnam](#) that have expanded into the regional petroleum products market. Singapore's government stated it will promote long-term growth in refining capacity in order to maintain its market position as a refining and oil trading leader.

Singapore has almost no indigenous hydrocarbon resources. Imported crude goes mostly to the petrochemicals and refining sector. Imported natural gas fuels most of Singapore's power generation, with small amounts of coal and renewable resources fueling the rest. Natural gas use made up nearly 10 percent of the country's total primary energy consumption in 2011. As natural gas demand continues to grow, the country seeks to augment gas imported via pipeline with liquefied natural gas (LNG) imports. The government expects Singapore's first LNG import terminal to begin operating in second-quarter 2013. This new capacity would enable Singapore to diversify its suppliers and not rely solely on [Indonesia](#) and [Malaysia](#) for all its natural gas imports.



Source: U.S. Energy Information Administration

Singapore total primary energy consumption, 2011



Source: U.S. Energy Information Administration, International Energy Statistics

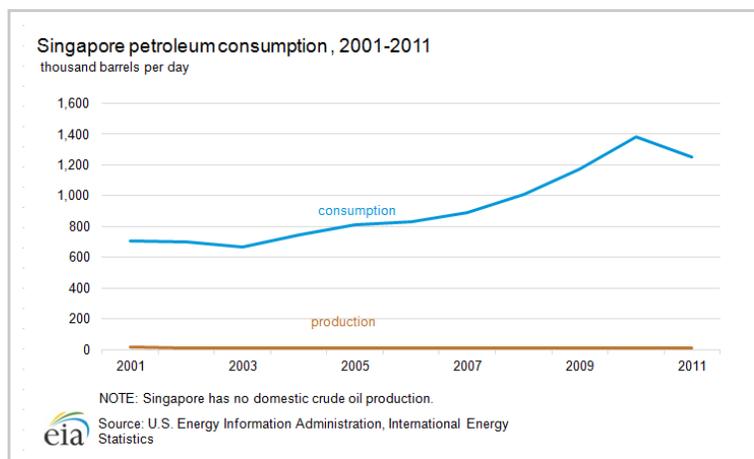
Oil & other liquids

Singapore has world-class refining, storage, and distribution infrastructure. However, the country has no domestic oil reserves and must import all its crude oil.

The petrochemical industry is the backbone of Singapore's economy and features world-class refining, storage, and distribution infrastructure. Several elements have made the city-state an important oil trading and refining hub. Singapore is strategically located between the Indian and Pacific Oceans, allowing companies to have easy access to large regional markets. It has deep-water berths that can accommodate large Suezmax and Panamax oil tankers. Jurong Island, on the southern edge of Singapore, contains very large crude carrier (VLCC) anchors and transmission networks for LNG, liquefied petroleum gas (LPG), and petrochemicals.

The country has no domestic oil reserves and must import all its crude oil. The government has encouraged the use of natural gas in power generation, and domestic liquids consumption has fallen in recent years. In 2011, Singapore averaged 1.3 million barrels of

oil per day (bbl/d), compared to 1.4 million bbl/d in 2010.



Sector organization

Singapore's government actively promotes competitive markets and energy diversification. The country has liberal foreign investment laws, and companies receive tax breaks for investing in the petrochemical sector. The Singapore National Oil Company (SNOC) officially represents the state in the oil sector, although it has ceased for the most part to engage in active oil trading or production.

The biggest national energy firm is the Singapore Petroleum Company (SPC). SPC is involved in downstream activities, such as distribution and marketing, and it co-owns one of the largest refineries in the country. PetroChina, an arm of the state-owned China National Petroleum Corporation (CNPC), purchased SPC in January 2010 for \$2.2 billion.

Almost all major international oil companies have refining and distribution interests in Singapore, although BP recently divested from Singapore's downstream sector. Chevron's Caltex has a major operations center in Singapore and holds a 50-percent stake in one of Singapore's refineries. ExxonMobil and Royal Dutch Shell also have high levels of investment in Singapore's energy sector and have acquired many petrochemical and refining assets.

Exploration and production

Singapore has no commercial oil reserves or prospective production areas and must rely entirely on imported crude oil for refining.

Lacking domestic sources of energy, Singaporean companies are active in overseas exploration and production. SPC owns assets in the [South China Sea's](#) Song Hong Basin and the Gulf of Tonkin. SPC also has working interests in various production-sharing contracts (PSCs) in East Java and the West Natuna Sea. In 2005, SPC entered into an agreement with Cambodia's government over oil and gas fields in the Gulf of Thailand.

Downstream and refining

Singapore has a crude refining capacity of just under 1.4 million bbl/d. Jurong Island is the center of Singapore's petrochemical industry. Many major international energy companies

operate retail networks in the area.

Singapore has sophisticated oil refineries and storage terminals. The country has a crude refining capacity of just under 1.4 million bbl/d, according to *Oil & Gas Journal*. This capacity is spread across three refineries and is significantly greater than the country's domestic petroleum products consumption. Refiners focus on export markets rather than domestic consumption.

Jurong Island is the center of Singapore's petrochemical industry. Companies operating on the island share facilities and utilities to reduce their operating costs and benefit from government tax incentives. Many international brands operate retail networks in the area, including Chevron, ExxonMobil (especially through its international trade name Esso), Royal Dutch Shell, and the Singapore Petroleum Company.

In late 2010, oil trader Hin Leong submitted a proposal to build a fourth refinery in Singapore on Jurong Island. It would be a highly complex oil refinery meant to produce ultra-low sulphur gasoline, diesel, and naphtha that would increase processing capacity by 300-500 thousand bbl/d and feed into the island's petrochemical sector.

Companies operating in Singapore have also continued to invest in storage facilities to meet the country's refining demands. Storage capacity was around 55 million barrels as of year-end 2012. The country's largest oil storage facility is located on Jurong Island and can store about 17 million barrels. The government also maintains strategic petroleum reserves of about 32 million barrels of crude oil and 65 million barrels of refined petroleum products.

Top Asian oil refiners, 2012

Country	approx. crude capacity (1,000 barrels/day)	No. of refineries
China	11,600	54
Japan	4,800	30
India	4,300	22
South Korea	2,800	6
Singapore	1,400	3
Taiwan	1,300	4
Indonesia	1,000	8
Thailand	580	4
Malaysia	540	7
Vietnam	140	1

Source: U.S. Energy Information Administration, *Oil & Gas Journal*, IHS

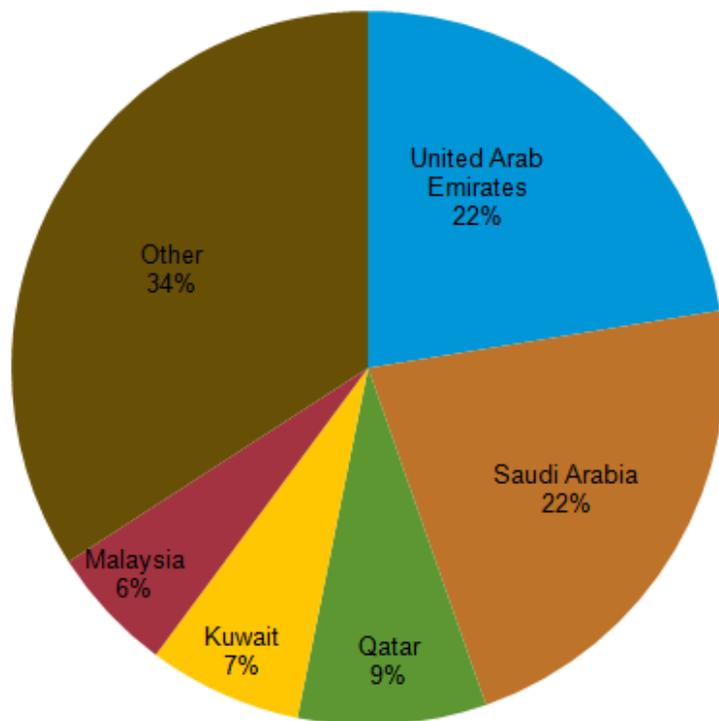
Trade

Neighboring countries increasingly are challenging Singapore's position as a leader in the regional refining market. India's world-class refineries, particularly Jamnagar in the northwest part of the country, have reduced Indian imports of refined petroleum products.

Malaysia's Melaka refining complex and Thailand's Sri Racha oil facility have begun to compete with products from Singapore. In 2009, Vietnam brought its first refinery onstream and slowly began to cut into Singapore's business of importing crude from Vietnam and selling it back as refined products. Despite this competition, Singapore continues to be a major regional refining and trading hub.

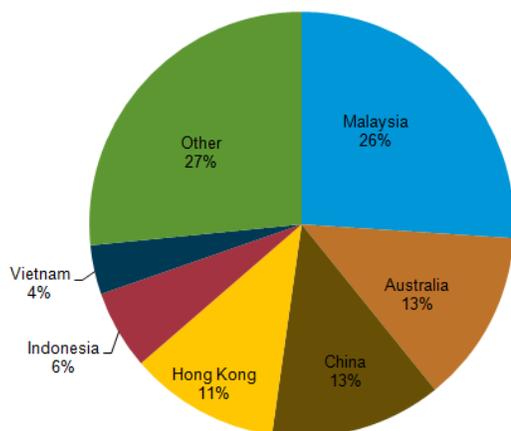
Oil from the United Arab Emirates, Saudi Arabia, and Qatar accounts for over 50 percent of Singapore's crude imports. Singapore's refined petroleum exports, especially gasoline and distillate fuel oil, largely feed Asian markets, with over a quarter of total exports sent to Malaysia, and major quantities sent to Australia and China in 2012.

Singapore crude oil imports by source, 2012



Source: U.S. Energy Information Administration, Lloyd's List Intelligence

Singapore refined petroleum product exports by destination, 2012



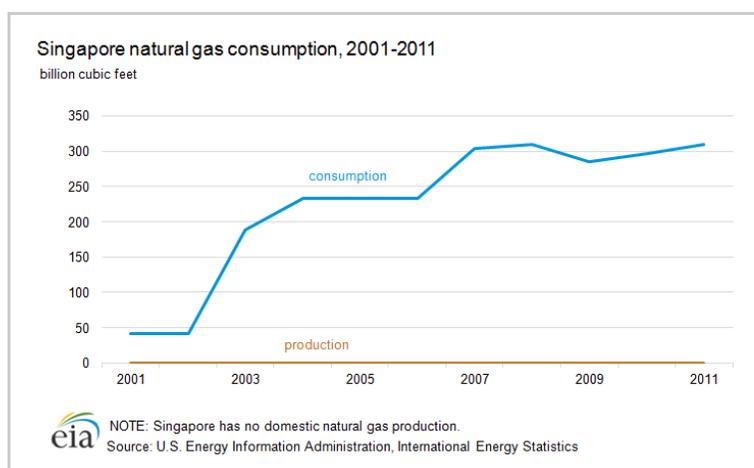
Source: U.S. Energy Information Administration, GTI Global Trade Atlas

Natural gas

Singapore's government promotes the use of natural gas. Malaysia and Indonesia currently supply all of the country's natural gas. The government is building a terminal to import liquefied natural gas and diversify its supply.

Singapore's government actively promotes the use of natural gas. Since 2001, it has provided rebates to commercial and residential vehicle owners who shift to natural gas-powered vehicles. That year, the government set a target that 60 percent of the country's electricity would come from natural gas by 2012; Singapore actually met this target in 2003. In 2011, natural gas accounted for 78 percent of Singapore's power generation.

Ninety-eight percent of Singapore's natural gas goes to the power sector, according to PFC Energy, with trace amounts going to the industrial and household sectors.



Sector organization

As with the oil sector, Singapore's natural gas sector is open to competition. The country has two discrete natural gas systems—a town gas pipeline network and the natural gas pipeline network. City Gas Pte operates the town gas network, which services a large portion of Singapore's households that use gas for cooking and water heating. PowerGas Ltd is the country's primary gas transporter and owns the natural gas pipeline network, but the company may not participate in gas imports and retail business. Other Singapore energy companies manage import contracts independently to supply natural gas.

Exploration and production

As with oil, Singapore has no commercial gas reserves or prospective production areas and must rely entirely on imported natural gas.

Pipelines and infrastructure

Singapore imports natural gas via three regional pipelines, governed by different contracts. Two of these pipelines link Singapore and Indonesia. Singaporean power company Gas Supply has imported 128 billion cubic feet (Bcf) of gas per year from Sumatra in Indonesia since 2006 through one contract, which is set to expire in 2023. Sembcorp has had a

contract since since 2001 with Pertamina, Indonesia's national oil company, to import around 119 Bcf of gas per year from West Natuna as part of a 22-year deal. An Indonesian field operated by ConocoPhillips is set to fuel Singapore's planned Island Power station, although the project has been delayed.

Malaysia and Singapore share a single gas pipeline. Singapore's Senoko Energy has a contract with Malaysia's Petronas to import 42 Bcf of gas via pipeline annually for up to 10 years, starting in 2007. Finally, Keppel Gas Pte, a subsidiary of Singapore conglomerate Keppel Energy, has a 17-year contract to import another 42 bcf annually from PETRONAS, starting in 2005.

Singapore Natural Gas Import Contracts

Source Country / Location	Exporter	Importer / Retailer	Purpose	Amount (bcf)	Amount (Mmcf/d)	Amount (bcm)2
Malaysia	Petronas	Senoko Energy Ltd (Importer)	Power generation	42	115	
Malaysia	Petronas	Keppel Gas Pte Ltd (Importer)	Mainly for power generation	42	115	1.2
Indonesia, West Natuna	Pertamina	Sembcorp Gas Pte Ltd (Importer and Retailer)	Power generation and industrial use	119	325	3.5
Indonesia, South Sumatra	Pertamina	Gas Supply Pte Ltd (Importer) & City Gas Pte Ltd (Retailers)	Power generation and industrial use	128	350	3.6

Source: U.S. Energy Information Administration, Singapore Electric Market Authority

Liquefied natural gas

Singapore began building an LNG import terminal in 2010 to supplement its pipeline imports. The initial capacity of the terminal will be 170 Bcf. In 2009, the government announced that Singapore LNG (SLNG), a subsidiary of the government's Energy Market Authority (EMA), would develop and operate the terminal. The government expects the plant to be operational in the second quarter of 2013, ramping up to almost 300 Bcf by end of 2013. A possible fourth construction phase could raise the terminal's throughput capacity to almost 440 Bcf.

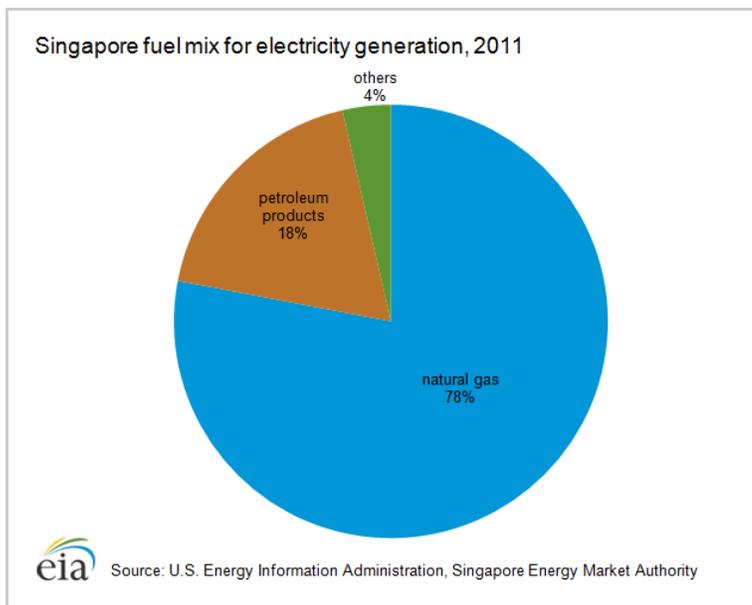
EMA appointed BG Singapore Gas Marketing Pte Ltd (BG) to procure LNG for Singapore, granting the company an exclusive license to import LNG, regasify it, and sell it. BG may sell up to 150 Bcf annually. As of mid-2012, BG had sold about 130 Bcf of regasified LNG as an initial tranche of long-term gas purchase contracts.

Electricity

Natural gas fuels almost 80 percent of Singapore's electricity generation.

Natural gas generates most of Singapore's electricity. The country had an installed power capacity of 10.5 Gigawatts (GW) as of November 2012, according to the EMA, and the government has set out to add 3 GW by 2017. Singapore plans to fuel the additional capacity with LNG. The government has also considered whether it could import electricity from a proposed ASEAN Power Grid, particularly from Malaysia and Indonesia, to supplement its internal electricity generation.

According to PFC Energy, the manufacturing sector and household power use accounted for the 39 percent and 17 percent, respectively, in 2011. Other groups accounted for 44 percent of electricity demand.



Sector organization

Singapore began to open the electricity industry to competition in the late 1990s. In 2001, the government separated electricity transmission from retail business. The National Electricity Market of Singapore (NEMS), a real-time electricity trading pool where companies compete to sell electricity, began operating in 2003. The government is reviewing the final phase of liberalization, Full Retail Contestability, which deals with "non-contestable consumers", or around 25 percent of total electricity sales in Singapore. Non-contestable consumers, usually smaller consumers and households, must purchase electricity through a specialized retailer (SP Services) at a regulated price and may not purchase electricity from other retailers.

The Energy Market Authority (EMA) serves as the regulator for the electricity sector and oversees both the contestable and non-contestable sectors. The Energy Market Company (EMC) operates the wholesale electricity market and allows power generators to sell electricity to retailers and end users through NEMS.

The three largest power-generating companies in Singapore are Power Seraya (3.1 GW), Senoko Power (2.6 GW), and Tuas Power (2.7 GW). Together, these companies account for approximately 80 percent of the country's generation capacity.

Conventional thermal

Singapore's power companies use natural gas as their major fuel source. Singapore's LNG plant may provide power companies an opportunity to increase fuel supplies and invest in new capacity. For example, electricity company Island Power plans to add 800 MW of LNG-powered capacity by the end of 2013.

Indonesia's government has also proposed meeting Singapore electricity needs by having Indonesian utility PTT begin construction of coal-fueled plants before 2014 on Batam Island to feed into Singapore's power grid. Under the plan, these power plants could have capacity of 4 GW, with up to 75 percent of the plant's capacity allocated for Singapore's use. The two countries had not reached a sales agreement as of February 2013.

Renewables

Singapore faces feedstock constraints on renewable resources, which limit the amount of biofuels it can consume. However, the government has invested in developing the solar industry. There were 120 grid-connected commercial solar PV installations with a capacity of 5.26 megawatts in 2012, according to EMA. Norway's Renewable Energy Corporation established the world's largest solar panel manufacturing complex in Singapore, and companies Solar Energy Power and Eco-Solar set up their Asia-Pacific headquarters in Singapore.

Notes

- Data presented in the text are the most recent available as of March 12, 2013.
 - Data are EIA estimates unless otherwise noted.
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Sources

- Asia Pacific Petroleum Monthly
- Bloomberg
- The Economist Intelligence Unit
- FACTS Global Energy
- IHS Global Insight
- IHS Edin
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