



Key Messages

- 1 Singapore's success story derives from a combination of conducive market forces and government activism around creating an investor-friendly state geared towards aggressive export-oriented industrialization (EOI).
- 2 Over time, Singapore's petroleum industry has shown a competitive edge in the process of refining, storing, trading, and exporting fuels.
- 3 Singapore downstream success derives from interlinkages achieved between its major assets—the Jurong cluster model, a strong shipping port, a conducive investment climate, and its position as Asia's most important trading hub.

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CCSI Downstream Beneficiation, Refined Petroleum Case Study: Singapore

1. Introduction

The island nation of Singapore in Southeast Asia has emerged as the third-largest export-oriented refining center in the world. With little ownership or availability of oil reserves within its territory, Singapore has grown a robust value-adding industry around refining, storage, and export activities. Helmed by a government resolute on private sector-led economic growth, Singapore has leveraged its natural advantages - a deep-water port and strategic location in the Asia Pacific - to funnel investments into developing superior processing, storage, and shipping capabilities. This helped Singapore be renowned as the “Houston of Asia” in the global oil and gas industry.

This paper aims to signpost critical moments in the historical development of Singapore's oil downstream sector. Through the 70s and early 80s, Singapore dominated the market with its “swing” refiners that could adapt to structural shifts in regional and global demand and set trade prices. The 90s marked the beginning of a difficult period for Singapore's refining industry, which has been struggling to compete with Asian neighbors building up large refining capacities. Singapore's trajectory furnishes lessons for other industrializing nations aspiring to create indigenous industry and participate in the global oil downstream business.

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Background:

Singapore is an island nation with a population of 5.78 million and a nominal GDP of \$410.3 billion. The country currently has a refining capacity of 1,514 thousand barrels per day (b/d)¹ and represents 1.5% of the total refining capacity. It has some of the largest refineries in the world, include the Shell (Pulau-Bukom) refinery with a capacity of 462,000 b/d, the ExxonMobil (Jurong Island) refinery with a capacity of 592,500 b/d, and the Singapore Refining Company (Jurong Island).²³

Singapore's oil refining industry is export oriented with domestic demand amounting to 200,000 b/d. Singapore's refineries made up 7.2% of the world's total refined oil exports in 2016 worth \$37.7 billion.⁴ Key importing countries for Singapore's 1 million b/d refined petroleum output include Indonesia, Malaysia, China, Hong Kong, Australia, and Vietnam.⁵

This prolific industry established itself in the early 1800s. Sir Stamford Raffles had just inaugurated the island nation of Singapore with the intention of promoting colonial Britain's adventurism in the Asia Pacific. He saw an opportunity in Singapore's strategic location, a convenient and efficient pathway between East, South, and Southeast Asia. In 1892, the British built three bulk storage tanks for kerosene on Bukom island for storing oil and supplying British operations in East Asia. The British saw value in investing in Singapore's port infrastructure, regional connectivity, and storage capacity early on.

The 1960s: A nation of enterprise and exports

In 1957, a few years shy of independence, the Singapore-Malaya government set up a body called the Industrial Promotion Board (IPB) with the task to strategize about growth opportunities for the Singaporean economy. It got replaced later in 1961 with the Economic Development Board (EDB), endowed with a budget of \$100 million and with the mandate to design and implement policies to promote industrial investments in Singapore, foster enterprise opportunities in international markets, and offer development financing options.

¹ Energy Market Authority, Ministry of Trade and Industry, "Economic Survey of Singapore 2016," available at <https://www.mti.gov.sg/Resources/Economic-Survey-of-Singapore/2016/Economic-Survey-of-Singapore-2016>, last accessed (November, 2018)

² For comparison, the United States has a capacity of 18.6 million b/d, China of 14.1 million b/d, India of 4.6 million b/d, Indonesia of 1.1 million b/d, and South Korea of 3.2 million b/d.

³ BP, "BP Statistical Review of World Energy 2017," available at (<https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy/downloads.html>," last accessed (November 2018)

⁴ Energy Market Authority, Ministry of Trade and Industry, "Economic Survey of Singapore 2016, (2016), op cit.

⁵ The Observatory of Economic Complexity, MIT Atlas – Singapore, , available at (<https://atlas.media.mit.edu/en/profile/country/sgp/>) (last accessed November 2018).

In 1965, Singapore broke away from the Malaya state and moved from an import-substitution industrial strategy to an export-oriented industrialization (EOI) strategy. British-Dutch oil major Shell had already set up its first refinery with capacity at 20,000 b/d with the intention of tapping into Southeast Asian markets. While Singapore had no shortage of labor, it found itself deficient in capital needed to establish and sustain industrial operations⁶. This prompted the government to attract capital-intensive multi-national corporations (MNC) into targeted industries (including refineries) by offering incentives in export processing zones (EPZ).⁷

In 1968, the EDB created the Development Bank of Singapore (DBS) with the function of overseeing capital financing for EOI industries. This led to the creation of a public limited company, International Trading Company (Intraco), with the mission statement “to develop overseas markets for Singapore-made products and to source cheaper raw materials for local industries through bulk buying.”⁸ Organizations like the EDB and Intraco were responsible for increasing foreign direct investment into Singapore and exploring foreign markets for Singapore’s exports. This was particularly important as an economic stimulant for Singaporean manufacturing (whose share of the GDP jumped from 13.2% to 15.6% between 1960 and 1965).⁹ In effect, their deployment of export promotion strategies nurtured the growth of a strong petroleum refining industry facilitated by hefty investments from international oil companies (IOC). Oil refining was cited as Singapore’s “dominant growth industry between 1965 and 1969” as the island nation steadily rose as the Asia-Pacific’s leading entrepot economy.¹⁰

From 1968 to 1972, foreign direct investment into manufacturing leaped from \$110 million in 1968 to \$518 million.¹¹

⁶ Wei-Lan., “Singapore’s Export Promotion Strategy and Economic Growth (1965-84).” Working Paper No. 116. World Bank, (2001)

⁷ According to Wei-Lan, EPZs had a specific function: “First, they are industrial sites with excellent physical infrastructure at highly subsidised rates. Second, the EPZs allow the duty-free entry of goods destined for re-export. The zones thus seek to attract 100% of foreign-owned subsidiaries that are vertically integrated into the investing firm’s marketing and production structure.” (5)

⁸ Rodan. Gary, *The Political Economy of Singapore’s Industrialization: National State and International Capital*, (1989)

⁹ Soon, T.W., & Stoeber, W. A., “Foreign investment and economic development in Singapore: a policy-oriented approach,” *The Journal of Developing Areas*, 30(3), 317-340, (1996)

¹⁰ Rodan. *The Political Economy of Singapore’s Industrialization: National State and International Capital*, (1989), op cit

¹¹ Wei-Lan. *Singapore’s Export Promotion Strategy and Economic Growth (1965-84)*,” (2001), op cit.

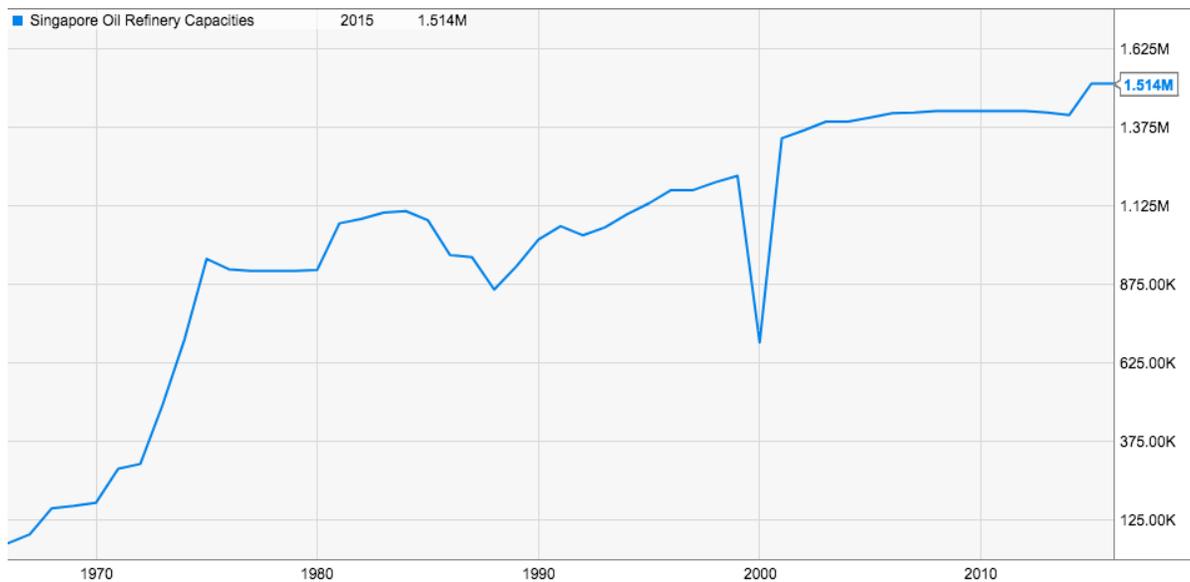


Figure 1. A trajectory of Singapore’s refining capacity since inception. Courtesy: YCharts.

Investment incentives included allowing companies to operate tax-free for the first five years and removing duties from imports of raw materials and equipment needed as inputs. In 1967, the government passed the Economic Expansion Incentives Act, which reduced taxes on profits from exporting manufactured products to 4%. Other crucial EDB policies to attract and retain investors included implementing anti-monopoly laws, quick approval/licensing processes for private investment, and investing in advanced logistics infrastructure.

Apart from the investment incentives, the refinery sector was attracted by fuel demand increases in Asia, few competing refineries in the region, and a strong value proposition in Singapore’s ability to produce and store refined petroleum products as well as leverage its strategic positioning between the Indian Ocean and Pacific Ocean trading routes. Under such auspicious circumstances, the Government, in the form of the EDB planned and rolled out a set of initiatives (which will be discussed below) that would attract capital and market opportunities to Singapore’s oil refining sector. Before other players like Japan or South Korea grew their oil downstream sectors, Singapore catered to the Asia-Pacific’s fuel and specialty chemical needs. As analyst Weng Hoong Ng summarizes, “Singapore enjoyed first-mover advantage in the oil refining business.”¹²

The 1970s: The wonder years

While many companies like Mobil came to Singapore with the intention of utilizing and developing its storage facilities, the EDB made a compelling case for Mobil to invest in refining on grounds of Southeast Asian demand

¹² Ng, Singapore, the Energy Economy: From the First Refinery to the End of Cheap Oil, 1960-2010. Routledge, (2013).
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and “good economic incentives.”¹³ The case became even stronger once conflict broke out in the region. The fuel needs of the American military’s involvement in Vietnam coupled with the strong anti-communist and pro-business stance of Singapore’s PAP-led government regime attracted investment in the refining industry.¹⁴

The EDB burnished its case by extending policies such as tax relief for industries it granted “pioneer” status. Under this policy, pioneer companies and industries (and oil refining was considered to be one) could enjoy exemption from paying taxes on profits for 5 years, 10 years, or even longer time periods. In addition to offering a tax incentives, Singapore demonstrated political stability in the 1970s.¹⁵ This made foreign companies feel comfortable to invest and diversify their portfolios in the country. Shell, for example, prioritized upgrading its Singapore refineries over its corresponding assets in Malaysia and the Philippines.¹⁶

By 1970, the government was spending \$332.8 million on developing infrastructure to primarily support the export-oriented industry sector. In addition to government support, Singapore’s industries also saw \$649.9 million in foreign direct investment, which translated to refining capacity scaling up to 400,000 b/d.¹⁷ Singapore had become the world’s third largest refining center following Houston and Amsterdam. In 1969, the government gave a big push to develop the downstream industry. It formed the Singapore Petroleum & Chemical Company (SPCC), which started operations with a refinery in Pulau Merlimau in 1973. In 1979, the SPCC became the SPC, Singapore Petroleum Company, a joint venture of the Singaporean government, BP, and Caltex.

In addition to the Vietnam War, other conflicts and instabilities underwrote the growth of Singaporean refining. The Iranian Revolution and Arab-Israeli wars of the 1970s caused significant oil price fluctuations, generated high demand, and helped Singapore reach 1 million barrels per day refining capacity.¹⁸ While refiners in Europe were struggling to cope with high oil prices and low profits following the first oil price shock, Singapore’s refineries benefited from stable demand in Asia.¹⁹

In 1974, Singapore made its foray into petrochemicals in a joint venture agreement with the Japanese corporation Sumitomo Chemical. A resilient refining base and the prospect of connecting Sumitomo’s refining ambitions in the Middle East to markets in Japan and Southeast Asia drove this investment.²⁰ After rounds of negotiations and delays,

¹³ Ng, Singapore, the Energy Economy: From the First Refinery to the End of Cheap Oil, op cit.

¹⁴ Ng, Singapore, the Energy Economy: From the First Refinery to the End of Cheap Oil, op cit.

¹⁵ Meanwhile, neighboring countries were experiencing mass conflict and political instability: Vietnam slipped into war in the late 1960s, Thailand’s farming class led a revolution in 1970, and Indonesia was beset by a Communist purge in 1965.

¹⁶ Ng, Singapore, the Energy Economy: From the First Refinery to the End of Cheap Oil, op cit.

¹⁷ Doshi. Singapore in a Post-Kyoto World: Energy, Environment and the Economy. Institute of Southeast Asian Studies, (2005)

¹⁸ Ng, Singapore, the Energy Economy: From the First Refinery to the End of Cheap Oil, op cit.

¹⁹ Ng, Singapore, the Energy Economy: From the First Refinery to the End of Cheap Oil, op cit.

²⁰ Ng, Singapore, the Energy Economy: From the First Refinery to the End of Cheap Oil, op cit.

the Governments of the two countries formed the Petrochemical Corporation of Singapore Private Limited (PCS) in 1977.

The 1980s: Stumbling through, but getting by

The 80s spelled a tumultuous period for Singapore. The oil industry experienced volatile years only stabilizing by the 90s. To counter the volatility, in the 1980s, the Singaporean Government focused its efforts on increasing Singapore's comparative advantage in fostering industries that had high value addition margins and employed high skilled workers.²¹

High investment inflows and growth numbers prompted the Government to create the Singapore National Oil Corporation (SNOC) in 1980. The SNOC was tasked with supervising the country's energy sector and managing energy resources and infrastructure.²² It played an administrative role, monitoring private companies running refineries in the country while also attempting to stimulate economic growth in the downstream sector.²³ The results became visible in 1981, when petroleum exports increased from \$8.59 million to \$10.1 million.²⁴ Between 1980 and 1986, Singaporean refineries received investments amounting to \$1.22 billion primarily earmarked for technology upgrades.²⁵ The government's low tax policies, part of the 1967's Economic Expansion Incentives Act, continued to play an important role in catalyzing investment.²⁶

As part of its bid to expand enterprise and activity centered on high technological sophistication and skill levels, the Government focused more on developing a nascent petrochemicals industry. The Government divested from the loss-making PCS, which had underperformed, and developed the Jurong Economic Zone in 1983. The initiative to industrialize Jurong was partly motivated by the recognition of industrial land scarcity on the mainland. The Jurong Town Corporation (JTC) and EDB funneled infrastructure investments into Jurong to develop it as a special industrial zone that would support a robust refining and petrochemicals industry.

At the end of the 1980s, Singapore's refining capacity stood at 1.1 million b/d. This was fulfilled by five major refinery establishments (Shell, Esso, Mobil, SRC, and BP), which were trading about 1.9 million b/d internationally.²⁷ While competition had mounted from Singapore's biggest clients, Malaysia and Indonesia,

²¹ Wei-Lan, C. (2001). "Singapore's Export Promotion Strategy and Economic Growth (1965-84)." Working Paper No. 116. World Bank.

²² As Sharma, et al note, the SNOC's original tasks were to advise on energy policy, monitor supplies of energy to ensure national security

²³ Sharma, et al. Energy market and policies in ASEAN. Institute of Southeast Asian Studies. (1991)

²⁴ Doshi (,Singapore in a Post-Kyoto World: Energy, Environment and the Economy. Institute of Southeast Asian Studies, (2005), op cit

²⁵ Energy Market Authority, Ministry of Trade and Industry, "Economic Survey of Singapore 2016," op cit.

²⁶ Energy Market Authority, Ministry of Trade and Industry, "Economic Survey of Singapore 2016," op cit.

²⁷ Ng, Singapore, The Energy Economy: From the First Refinery to the End of Cheap Oil, op cit..

developing their own refinery industries, Iraq's invasion of Kuwait in 1990 saw refinery margins skyrocket.²⁸ Refineries in Singapore were able to benefit during the early stages of the conflict due to a sharp increase in fuel demand, which drove high fuel prices.²⁹

The 1990s and 2000s: Developing a trading center and Jurong

As the country's oil refining sector prospered, Singapore began to be seen as central to the oil trading network of the Asia Pacific, which included Japan, South Korea, Taiwan, and India.

Oil trading proved to be a highly complementary business to the refining sector. Refining and selling oil from Asia-Pacific's most active trading enclave offered a lucrative prospect. In fact, oil traders benefited from the high profit margins owing to a flourishing business of third-party refining in the island-nation.³⁰ The first oil traders were the IOCs, but today's circuit is filled with firms specializing in commodities spot trading, such as Vitol, Glencore, and Trafigura. A testament to Singapore's success as Asia's premier oil trading hub is the fact that Platts sets the FOB benchmark for refined oil products in Singapore.³¹

In 1989, the government launched the Singapore International Monetary Exchange (SIMEX) for trading futures contracts under a strong regulatory and fiscal umbrella. Trading floors saw even greater activity owing to generous tax incentives under the Approved Oil Trader and Approved International Trader policies. In 2001, the government consolidated the AIT and AOT policies into a leaner version, the Global Trader Programme (GTP), that went on to enlist over 270 trading firms from around the world. The GTP also offered a reduced corporate tax rate of 5% or 1% on qualifying trading income³² for 3-5 years. In fact, the success of Singapore's competitive tax regime for commodities financing can be seen in trading major Trafigura's move to relocate its trading headquarters from Switzerland to the island nation.³³ In the Asia Pacific, Singapore provided robust banking and finance infrastructure,

²⁸ Refinery margin is the measure of the value that the refinery earns per unit of input. Typically, this is per barrel of crude oil processed. Margin refers to the difference between the value or price of the products made (gasoline, diesel, jet fuel) and the feedstock (crude and other feedstock) used to make them. The price of both refinery inputs and outputs can fluctuate independently of each other for short periods due to supply, demand, transportation and other factors.

²⁹ Ng, Singapore, the Energy Economy: From the First Refinery to the End of Cheap Oil, op cit..

³⁰ Third party refining is when refineries charged third parties for using their refinery capacity. Ownership of the feedback and finished product remains with the third part. NOCs, traders and major oil companies, who would use Singapore refineries to dispose of extra crude stocks and then take back the finished product for domestic supply or as feedstock for other products.

³¹ Ramaswamy, Singapore's Role as a Key Oil Trading Centre in Asia. In *Energy Perspectives on Singapore and the Region* (pp. 31-41). Singapore: Institute of Southeast Asian Studies (2006)

³² Qualifying trading income includes income from physical trading, brokering of physical trades and derivative trading income.

³³ "Trafigura shifts trading centre to Singapore," in Reuters, (May 2012), available at, <http://www.reuters.com/article/trafigura-trading-move-idUSL5E8GN3U820120523>

connectivity to key regional markets (especially China) showing high growth potentials, strong rule of law, and a well-developed oil downstream sector for firms looking to trade and set prices for oil commodities.

As discussed above, recognizing larger profit margin potential in petrochemicals and greater labor market returns to high-skilled labor, the EDB attempted to attract investment in petrochemicals on Jurong in the 1990s. It established roadways to link the seven disconnected islands of Jurong. Connecting the islands helped create a centralized hub for Singapore's export-oriented industries and facilitate economies of scale achieved from proximity and inter-linkages. By 1995, Singapore's petrochemicals trade was valued at \$11.7 billion and its export earnings reached \$5 billion. This grew further with the Singapore Refinery Company investing \$1 billion in more advanced refining infrastructure (residue catalytic cracker complex) in 1996; ExxonMobil investing \$2 billion in a petrochemicals plant in 2001; and Shell building a large petrochemicals complex boasting a 800,000 t/y ethylene cracker on Bukom Island and a 750,000 t/y mono-ethylene glycol plant on Jurong in 2006.

Jurong's "integrated production" model

Industries on Jurong enjoyed multiplier growth effects due to agglomeration, industrial interlinkages and access to a robust trading and shipping port. All businesses on Jurong have access to shared services, downstream activities, and supply chain inputs—workers, infrastructure, contractors and consultancies, and raw materials. As the seven islands were connected to each other and to the mainland, the companies (from goods manufacturing, oil, petrochemical, and chemical sectors) were able to cultivate partnerships and take advantage of common resources. Proximity to feedstock from refineries, and storage, shipping and distribution infrastructure has energized refining and petrochemicals companies. The cluster model has enabled the reduction of operational costs, increased operational efficiency, provided scale-up opportunities, and access to a collaborative environment.

While Singapore's petrochemicals sector was doing well, the refining industry suffered in the late 90s. The Asian financial crisis of 1997 adversely affected Singapore's refineries, prompting asset rationalization from many refiners and a consequent fall in output (see Figure 2 below). To add to these woes, competition increased from Thailand, Malaysia, China, and India, where large and advanced refinery investments were unveiled.

Hope came from Exxon and Mobil's merger in 1998, which invested in a large 580,000 b/d refinery.³⁴ A rejuvenation of investor confidence thus buoyed Singapore's refineries through the early 2000s, recouping the refined product output it had lost in the prior period (see Figure 1). Third party processing deals streamed in from Japan, Indonesia, and Malaysia. But most of all, it was Chinese oil companies, who possessed surplus reserves of crude but lacked adequate refining capacity, that supported Singapore's refining industry. As business began to recover, refiners saw their margins grow again in 2003 as the US rallied a major military intervention in Iraq (see Figure 2).

³⁴ Ng, Singapore, the Energy Economy: From the First Refinery to the End of Cheap Oil, op cit.
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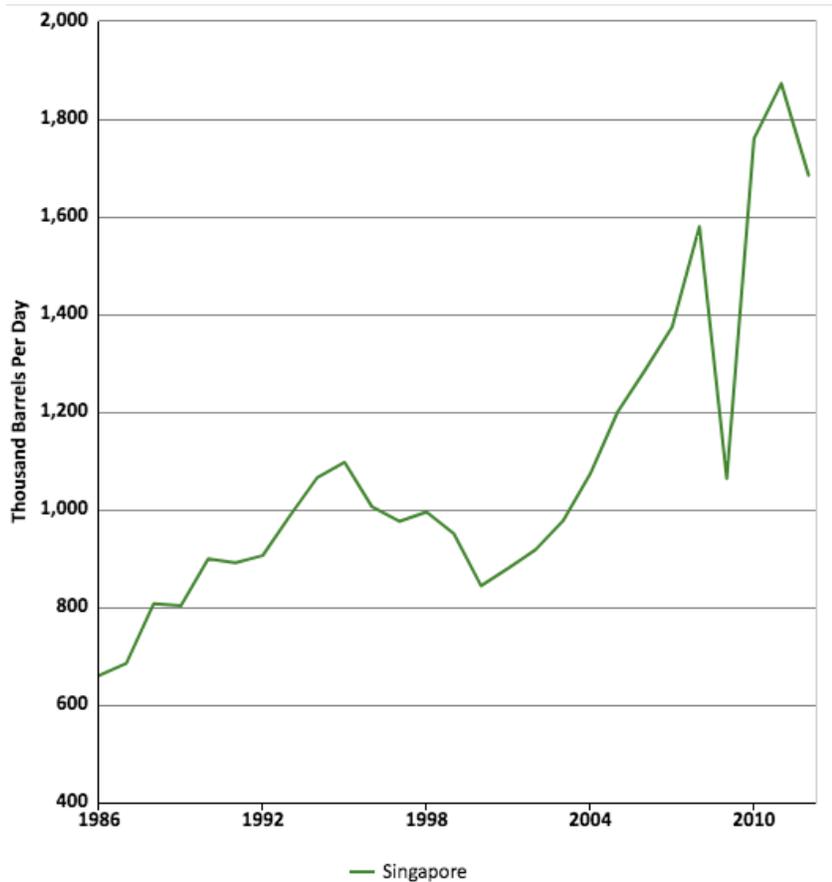


Figure 2. Singapore's Refined Petroleum Exports since 1986. Source: *Knoema International Energy Statistics*.

The late 2000s and Now: Competition and Consumption in Asia

The late 2000s brought in even newer and more pressing challenges for Singapore. While oil is increasingly being substituted by natural gas particularly as an input for electricity generation, crude oil remains a key commodity in high demand in transportation throughout the world. Asian industrialization has been a fuel-intensive process, generating high demand for petroleum and diesel, which can sustain Singapore's refineries. Confronting increased urbanization, globalized supply chains, infrastructure development, and population growth, the Asia Pacific region has also witnessed the construction of mega airports, including Singapore's busy Changi International Airport, catering to large amounts of air traffic and operating on high volumes of petroleum and jet fuel.³⁵ To serve this demand, Singapore has specialized in importing large volumes of crude from the Middle East, storing, blending, and exporting LPG, gasoline, jet fuel, diesel and a variety of other petro-products to the entire world. Between 2014 and 2015, the country's crude oil imports grew by 4.2% and petroleum exports grew by 6.3%.³⁶

³⁵ Doshi, T. (1989). *Houston of Asia: The Singapore petroleum industry*. Institute of Southeast Asian Studies

³⁶ Yearbook of Statistics Singapore, 2016.

A driving force behind Singapore's competitive advantage in the O&G industry has been its superior storage capabilities. The island nation is one of the busiest bunkering port in the world, selling 48 million tonnes of bunker fuel.³⁷ In fact, shipping has been a prolific industry of late: Oil-in-bulk cargo shipments rose by 13% in 2016 with throughput surging past 20.1 million tonnes.³⁸ These characteristics have attracted companies like Shell and ExxonMobil to use Singapore port as a stockpiling center and logistics hub.

Moving storage to Singapore has helped companies reduce costs (by refining and storing oil in the same location) and easily ship products to consumer markets in Asia Pacific. Singapore's port is situated along one of the world's busiest shipping routes, and extensive industry around trading have brought in many independent storage firms, including Vopak, Hin Leong, and Oiltanking. These companies specialized in leasing out space—surpassing 89.5 million barrels in 1991—to enterprising oil majors.³⁹

However, Singapore's 20.5 million cubic meters of storage space (2014) face two significant hurdles: space and cost. The island is facing constraints of land availability (particularly waterfront land) with pressure from existing gargantuan storage terminals and limited room for expansion. The scarcity of storage space and rising storage costs have created long queues of traders looking at other countries, including China, South Korea, Malaysia, and Indonesia, to fulfill storage needs.

Petrochemicals and specialty chemicals are also experiencing high demand in the region. In 2010, the Government initiated “Jurong Island Version 2.0” to further improve the SEZ. In 2014, Singapore also expanded its storage capacity by constructing an underground facility called the Jurong Rock Caverns. Business responded affirmatively as Exxon, Sumitomo Chemical, Infineum, Chevron, Sembcorp, and Evonik opened plants throughout the year. In 2015, the Jurong Island SEZ became home to over 100 petrochemical companies with an estimated \$34 billion worth of investment. Its chemicals industry was valued at \$57.8 billion and accounted for 28.6% of Singapore's manufacturing output in 2015.⁴⁰ The latest estimates from January 2017 indicate a 37% growth in petrochemical exports.⁴¹ However, challenges to the industry also persist: there is limited space for expansion and growing concerns about petrochemicals' carbon emissions.

³⁷ “Singapore box volume steady at 30.9 M in 2016, remains top bunkering port,” in Seatrade Maritime News, (January 2017)m available at: <http://www.seatrade-maritime.com/news/asia/singapore-box-volumes-steady-at-30-9m-in-2016-remains-top-bunkering-port.html>

³⁸ Economic Survey of Singapore 2016.

³⁹ ISEAS.

⁴⁰ Global Business Reports, “Singapore 2016,” (2016) available at: <http://gbreports.com/wp-content/uploads/2016/10/Singapore-Chemicals-2016-Web-Preview.pdf>

⁴¹ “Singapore January petrochemical exports grow 37.1% on year,” *ICIS*, (February 2017), available at: <https://www.icis.com/resources/news/2017/02/17/10079939/singapore-january-petrochemical-exports-grow-37-1-on-year/>

Moreover, the refinery sector continues to face increasing competition from new refineries coming on stream in Asia. Investment in refining capacity in the region is driven by strong growth forecast in oil demand in the South East Asian region. Oil demand is forecast to rise by approximately 1.2 million b/d by 2025, from 2015 levels, with growth centered on the Philippines and Vietnam.⁴² This has prompted significant investment in the region, with both brownfield expansion and greenfield refineries being planned in Indonesia, Vietnam and Malaysia.

The new mega refineries opening in the Middle East and Southeast Asia are threatening the profitability of the Singaporean refiners. For example, India's Jamnagar plant (the largest refinery in the world by capacity) has outperformed Singaporean refiners in terms of profitability (see Figure 3).

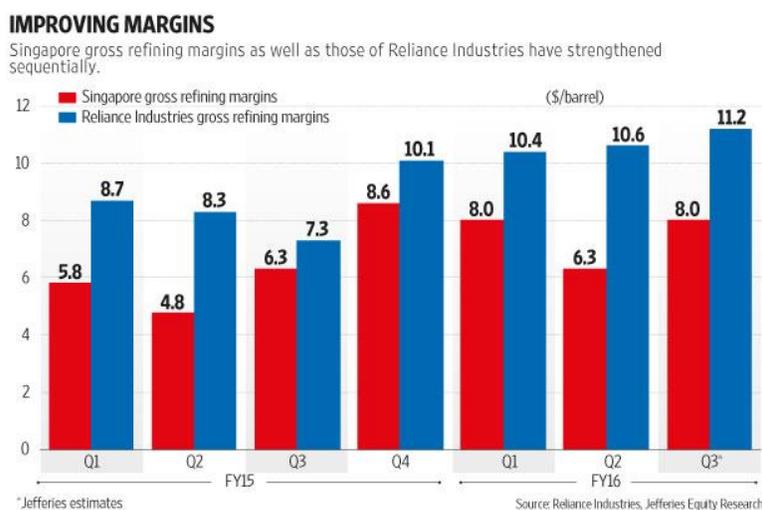


Figure 3. Comparing refining margins between Singapore and India. Source: Reliance Industries, Equity Research, Livemint.

Countries such as Indonesia, Malaysia and the Philippines have attracted IOC investment threatening Singapore's market share.

Planned Refinery Projects

Country	Refinery	Capacity (b/d)	Start-up date	Partners	Type	Feedstock Supplier
Vietnam	Nghi Son Refinery and Petrochemical	200,000	Q1 2018	PetroVietnam (25.1%); Kuwait Petroleum International (35.1%); Idemitsu Kosan (35.1) Mitsui Chemicals (4.7%)	Greenfield	Refinery designed to run on Kuwaiti crudes
Malaysia	RAPID	300,000	2019	Petronas (50%) Saudi Aramco (50%)	Greenfield	Saudi Aramco 70% supplier
Indonesia	Turban, East Java	300,000	2021	Pertamina, Rosfelt	Greenfield	Rosneft 45% supplier
Indonesia	Bontang	300,000	n/a	Pertamina	Greenfield	

⁴² S&P Platts Global, Emerging among giants, September 2017, <https://secure.viewer.zmags.com/publication/3f6a8a68#/3f6a8a68/2CCSI Downstream Beneficiation, Refined Petroleum Case Study: Singapore>

Indonesia	Cilacap	52,000	2021	Pertamina (55%) Saudi Aramco (45%)	Expansion and upgrade
Indonesia	Balikpapan	100,000	2019	Pertamina	Expansion and upgrade
Vietnam	Dung quat Source: Platts	40,000	2022	PetroVietnam	Expansion

Source: S &P Platts: ⁴³

The new refineries set up in these countries benefit from updated technology and planning. These new refineries are not only large, complex, and export-oriented, but have also mastered the production of high-quality fuel with low sulphur content.

While Singapore has offered a premier trading post in Asia in addition to macroeconomic stability, technologic innovations, minimal requirements or constraints to foreign investments, and favorable bureaucratic reforms in the form of licensing and import regimes, this has not sufficed to curb competition from large and complex refineries in neighboring countries and concerns about the oil downstream sector’s negative environmental externalities have applied pressure on refineries to scuttle expansionary plans and direct efforts towards achieving higher sustainability standards. In accordance with Singapore’s 2020 plan, the government is planning to introduce a carbon tax that could make refining a costlier activity. ⁴⁴ The refined petroleum industry has suffered production losses in recent years, its output slumping from \$57.2 billion in 2012 to \$32.9 billion in 2015. ⁴⁵

Lessons Learned:

Singapore’s refining sector has grown due to strong fuel consumption trends in rapidly-industrializing Asian economies. Building on Shell’s initiative to set up a refinery to exploit the Asian market and on the strategic location of its port in the Asia-Pacific region that made it a strong candidate for firms looking to tap promising East and Southeast Asian markets, the Government envisioned an export-driven industry around refined oil products. The National Government executing its vision by adopting a twin-track strategy of keeping bureaucratic regulations minimal while building supportive dedicated institutions with stewardship to strategically attract investments and providing fiscal incentives as well as supportive infrastructure. This, in turn, allowed the oil and gas downstream sector a prominent role in the early years of the nation’s economy. Unlike most Asian countries, Singapore decided to avoid market monopolization through a state-owned oil company: It found success in keeping restrictive

⁴³ S &P Platts Global, Emerging among giants, September 2017, <https://secure.viewer.zmags.com/publication/3f6a8a68#/3f6a8a68/2>

⁴⁴ “Analysis: Singapore can’t afford to let oil exports lose edge despite carbon tax,” (February 2017), available at: <https://www.platts.com/latest-news/oil/singapore/analysis-singapore-cant-afford-to-let-oil-exports-27775455>

⁴⁵ Yearbook of Statistics Singapore, 2016.

regulatory impulses away from the petroleum sector and leaving the door open to foreign enterprises and market forces to mold industry.

Moreover, the government decided to capitalize on its comparative advantage, and invested in industrial agglomeration. In Singapore's case, this model of industrial organization took the form of the Jurong Island EPZ, proceeding from the co-location and integration of value chain activities (refining, storage, shipping). This model has allowed the industry in Singapore to differentiate itself from other emerging players in Asia by helping firms achieve significant reduction in operational costs and significant gains in operational efficiency. The country has been able to exploit the agglomeration model in a way that yields organizational integration and synergies that drives industrial growth.

Furthermore, while demand for Singapore's refinery capacity has fluctuated over the last decade, oil trading in the country has been very profitable. The government was timely in recognizing trading as a growing industry, and supported it with policy interventions such as the Global Trader Programme that offered tax incentives. Singapore has since maintained its primacy as Asia's oil trading hub due to linkages established between a well-developed financial services and an agglomerated downstream petroleum industry. This has allowed Singapore to fulfill spot demands in the region and play an influential role (as a price-setter) in the global oil and gas business.

Ultimately, the Singapore's success story has been scripted by the Government's two-phased strategy of catalyzing key IOC investments into the oil refining in the country's early years, and then, recognizing a shift in the region's product demand trends, developing a competitive petrochemicals sector from a robust refining base by implementing a policy of industrial clustering.

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