

Jurong Island: What it takes To achieve a world-class Petrochemical hub

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The stellar success of Singapore’s Jurong Island Chemical Hub can be attributed to clever land utilization, adaptability to volatile markets and adequate attention to safety and security

Singapore has no oil or gas resources and limited land space. But against all odds, it has achieved tremendous success in the petrochemical industry. Today, Singapore is the third-largest oil refining centre in the world, the largest bunkering port and, one of the top 3 oil trading hubs in the world and the price discovery centre of Asia’s oil trading industry.

And Jurong Island Chemical Hub, the pillar of Singapore’s petrochemicals industry, is an embodiment of Singapore’s success. The island is an amalgamation of seven small islands in the western part of Singapore, formed through land reclamation. The process started in 1983 through the combined effort of various government agencies in Singapore, in particular the Economic Development Board and JTC Corporation.

Despite having no feedstock advantage or a substantial domestic market to support the petrochemical production, Jurong Island has persevered through stiff competition and maintained its position as one of the top global petrochemical hubs. Today, Jurong Island Chemical Hub is home to almost 90 international petroleum and chemical companies, and has

contributed to investments of over S\$47 billion. The Hub manufactures refined & chemical products from integrated petrochemical complexes of oil majors Exxon Mobil and Shell, intermediate products from chemical producers such as Sumitomo & BASF, to

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automotive chemicals and agro-chemicals, from firms such as Evonik and Solvay.

We look at some of the critical reasons for this success.

Effective utilization of land space_

The effective utilisation of land has allowed all these facilities to be built within a relatively small area. There is a large focus on infrastructural support such as common pipeline corridors to make plant-to-plant transfers easier and more cost efficient. The close proximity of the plants allow one company’s output to be used as feedstock for another, thereby reducing logistics costs. Additionally, the presence of third-party providers that handle non-manufacturing services helps reduce costs. The network also offers companies alternative options for product storage, freeing up space to carry out more processing.

The [Jurong Rock Caverns \(JRC\)](#) are also an important breakthrough in the provision of infrastructure for the Jurong Island Chemical Hub. When the idea was first conceptualised in the early 2000s, storing oil underground was unheard of in Singapore and in many parts of the world. The JRC is constructed at about 130m below the sea and is designed for flexible operations that can link to various customers

on the island. Surbana Jurong, together with [Geostock](#), embarked on the basic engineering design and construction management, including commissioning, of the JRC in 2006. The Jurong Rock Caverns Phase 1 officially opened in 2014. With 1.47 million cubic metres of storage space underground, it freed up about 60 hectares of surface land. Now that this previously unthinkable idea has become a reality, further underground expansion is being considered.

Adaptability and flexibility_

Singapore has been able to adapt to market volatility, allowing the industry to flourish. With the Jurong Island Version 2.0 Initiative announced, the focus expanded from investment attraction to enhancing competitiveness and sustainability through creating robustness, optimization and optionality. Instead of building more refineries, Jurong Island will transform itself to focus on specialty chemicals, which are generally used in the textile, automotive and agriculture sectors. They are higher up the value chain as they serve more unique functions, and in 2015 it was reported that one-third of more than S\$6 billion in fixed asset investments over recent years came from [specialty chemicals](#) alone.

Some countries have seen some difficulty in attracting specialty chemical investments due to lax intellectual property laws. Singapore has managed to gain investor confidence in this sector due to its intellectual property protection laws, access to skilled labour and research and development capabilities.

Flexibility is important in finding solutions to challenges. Take for example the ongoing development of the Pengerang Integrated Petroleum Complex, a petrochemicals hub in Johor, Malaysia. Although at first glance it might seem to pose a threat, there is also potential for both Singapore and Malaysia to collaborate and mutually benefit, given that land is limited in Singapore.

Safety and security_

Safety is arguably the most important factor in ensuring Jurong Island operates smoothly. A key

lesson is that in the implementation of a project, from the initial planning and design stages to construction and operation of facilities, meticulous supervision is required and must be enforced.

Additionally, in-depth knowledge of the industry is essential, as facilities see thousands of chemicals and products that possess unique properties. Knowledge of and experience with handling these products are paramount in ensuring safe, synergistic clustering.

Singapore has extremely high standards and rigorous guidelines on individual plant safety – vital for plants so close to one another. Should an unfortunate accident occur, Singapore has shown it can respond efficiently, like it did during the [2016 Jurong Aromatics fire](#).

Started in a condensate storage tank within the plant, the fire was isolated and put out by the Company Emergency Response Team (CERT) and the Singapore Civil Defence Force (SCDF) in a 5 hour operation. The neighbouring companies were evacuated immediately despite there being no immediate threat, and companies with connecting pipelines to the affected plant executed mitigation measures to isolate any potential escalation of the fire to their own facilities. All stakeholders were in constant communication while they monitored the situation, and the SCDF also updated the fire situation through Facebook. Such a transparent and proven effective response system is necessary to maintain the confidence and trust of both investors and the public.

What is in store for the future of Singapore's petrochemicals industry_

A foreseeable challenge to the industry is the world's move towards protectionism. This means that Asian refiners, especially those in Singapore, need to constantly innovate to stay competitive.

Moving ahead, some things that could be considered for the future of Jurong Island are the development of sustainable feedstock and technologies, moving towards lower carbon emissions and improving overall energy efficiency. Additionally, floating platforms could be considered to increase space, or perhaps even [Hyperloop technology](#), such as that

proposed in Dubai, to increase product transport efficiency.

A comprehensive development plan is merely the first step in achieving success. Singapore has the added advantage of a whole-of-government ecosystem, whereby various government agencies form a cohesive committee to support the development plan. The collective experience of the team that implements the plan and a focus on prudence and adaptability to global economic and oil cycles are vital to turn the dream into reality. Jurong Island already stands as testimony to this.

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