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## Is Singapore Betting on Nuclear Energy?

*By Alvin Chew*

### SYNOPSIS

*As Singapore deals with the twin challenges of climate change and energy security, nuclear power is an increasingly viable option alongside other low carbon energy sources.*

### COMMENTARY

In his Budget 2025 speech, Singapore Prime Minister Lawrence Wong announced that his government will study the [potential deployment of nuclear energy](#) in the city-state.

In the years leading up to this announcement, Singapore officials had said that efforts to [understand the technology](#) were underway, but no decision had been made about deploying nuclear energy.

Singapore aims to achieve [net-zero carbon emissions](#) by 2050. Its strategy to decarbonise its energy supply includes deploying solar power, importing cleaner electricity, and adopting low-carbon alternatives such as hydrogen production.

Wong said that domestic sources of clean power are needed for greater energy resilience and that there are “inherent challenges” in hydrogen production, storage, and transportation.

This leads to a renewed focus on nuclear power, which has been helped by technological advancements over the last decade.

### **Twin Challenges: Climate Change and Energy Security**

It is certain that future energy sources will need to be clean and not include natural

gas, which Singapore currently relies on for about 95 per cent of its electricity generation.

Not only is the burning of natural gas polluting, but Singapore's natural gas supplies are also imported. As we move into the age of digitalisation and embrace artificial intelligence in our daily activities, our energy consumption will be more intensive.

Thus, Singapore has twin challenges in dealing with climate change as well as energy security. Its energy transition pathway will tackle these problems concurrently.

Generating solar power domestically will enhance the nation's energy security profile. However, electricity generated from solar energy is intermittent in nature as the weather is variable. A steady energy supply is required to run the nation's critical infrastructure, from desalination plants to data centres.

Moreover, because of limited geographical space, solar power can only make up a small fraction of Singapore's energy mix.

### **Nuclear Safety the Highest Priority**

Nuclear energy has been powering some developed countries and helping them advance their economies for decades. It provides 70 per cent of France's electricity and 30 per cent of Japan's before the Fukushima nuclear accident.

In 2012, just a year after the Fukushima nuclear accident, Singapore assessed that large conventional nuclear power plants were unsuitable for the country due to safety risks.

However, it has continued to explore nuclear energy and ways to mitigate the risks. The Singapore Nuclear Research and Safety Initiative, which was established in 2014, deepened our understanding of nuclear safety and new reactor technologies.

The advent of small modular reactors (SMRs) has made the deployment of nuclear energy an option for Singapore. SMRs with advanced Gen IV technologies have inherent safety features that will not lead to nuclear accidents like the ones in Chernobyl and Fukushima. However, very few SMRs have been deployed so far, so they lack a track record of operational safety.

Singapore has partnered with experienced countries to continue studying the safety of new reactor technologies. It is learning from the International Atomic Energy Agency on how to respond to a nuclear emergency and protect its population from radiation fallout.

Singapore is also contributing to building a nuclear safety culture in Southeast Asia.

### **The Future of Low-Carbon Alternatives**

The advancement of nuclear energy does not mean that other low-carbon forms of energy are no longer viable in Singapore.

Some sectors, such as aviation transport, are hard to electrify. Hydrogen can serve as an alternative to the pollutive jet fuel currently used by airlines. However, hydrogen is presently produced using natural gas, which is counter-effective in reducing carbon emissions. It is inefficient and costly to produce clean hydrogen through electrolysis from concentrated solar power.

With SMRs, hydrogen can be more efficiently produced via the thermochemical process. Advanced reactors, such as the high-temperature gas-cooled reactor, produce great amounts of heat to split water molecules and produce hydrogen.

Through nuclear energy, Singapore can sustain an environmentally friendly hydrogen economy.

Nuclear energy will be prominently featured alongside renewables as a clean energy source in countries' decarbonisation efforts. The technology has been developing since the 1950s, but it is still nascent in Singapore and the region.

Therefore, policymakers should not rush into decisions about deploying nuclear energy. The rational approach is to build up capabilities to its safe and secure deployment.

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*Alvin Chew is a Senior Fellow at the S. Rajaratnam School of International Studies (RSIS), Nanyang Technological University (NTU), Singapore. This commentary was adapted from an op-ed originally published by [CNA](#) on 24 February 2025. It is republished with permission.*

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