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Nuclear energy development in Southeast Asia: Implications for Singapore

Southeast Asia is witnessing a revival of interest in civil nuclear energy development in the region. Behind this shift are factors such as political transition in Japan, the lure of economic benefits and incentives, and continuing efforts to promulgate the view that the nuclear option is safe. Given the potential transboundary consequences of nuclear accidents, these developments have implications for the security and safety of Singapore's population. Enhancing nuclear safety must thus remain a priority, and the role of regional platforms must be strengthened towards this end.

By Sofiah Jamil and Lina Gong



The Bataan nuclear power plant in the Philippines was completed in 1984 but was mothballed due to safety concerns. There have been discussions on reactivating the plant, but progress towards that has been limited. It is now a tourist site.

Credit: Annabs Sanchez / flickr.

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Introduction

Civil nuclear energy policy in Southeast Asia has seen sharp swings recently. Prior to the Fukushima tsunami and nuclear crisis in March 2011, several ASEAN member states had been actively pursuing nuclear energy. Fukushima compelled some to re-evaluate their plans. Thailand delayed the construction of its first nuclear power plant. In the Philippines, it became more difficult to gain public support to reactivate the Bataan nuclear reactor.¹ Meanwhile, Japan pledged to phase out nuclear energy. Two years on, however, the momentum has reversed. Japan is now taking a more pro-nuclear stance, and some countries in Southeast Asia have revived their nuclear plans.

What is behind the rapid policy about-turn? This NTS Insight argues that while the discourse post-Fukushima has emphasised safety and energy governance, economic and strategic interests remain primary drivers of civil nuclear energy use in Southeast Asia. The first section

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thus looks at a core factor underpinning interest in nuclear energy use in Southeast Asia, namely, the region's high dependence on energy imports. The next section looks at the ways in which countries in Southeast Asia have responded to Fukushima. This is followed by a discussion of why nuclear energy remains an attractive option despite the risks highlighted by Fukushima. This NTS Insight concludes by examining the implications of nuclear energy development in the region for Singapore, which has itself rejected nuclear energy development for now.²

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Civil nuclear energy: A response to energy insecurity

In Southeast Asia, energy demand is rising in tandem with economic development, posing a challenge to the energy security of states in the region. Indonesia, Malaysia, Singapore, the Philippines, Thailand and Vietnam account for 95 per cent of the region's energy consumption and they are projected to account for 80 per cent of regional energy growth by 2030.³ However, in these countries, available national supply is not sufficient to meet demand. Indonesia is a major exporter of coal and liquid natural gas but a net importer of oil; Malaysia exports natural gas but imports coal; Singapore and the Philippines are dependent on fossil fuel imports.⁴

A major source of energy insecurity in the region is its dependence on fossil fuels, which make up 73 per cent of the region's energy consumption (Table 1). A high proportion of these fuels have to be imported from outside of Southeast Asia, which means that the region is susceptible to risks related to geopolitical and domestic shocks in oil-exporting countries and regions. For instance, political volatility in the Middle East would have significant implications for countries in Southeast Asia.

Given rising energy demand and the need to address vulnerabilities arising from dependence on fossil fuels, diversification of energy resources becomes an attractive strategy. It is no surprise then that those countries that consume the most energy in Southeast Asia have explored the nuclear energy option. The next section discusses the impact of Fukushima on nuclear energy policy in Southeast Asia.

Table 1: Fossil fuel consumption in Southeast Asia, 2010.

Country	Fossil fuel consumption (kilotonnes of oil equivalent)	Share of total energy consumption (%)
Brunei	3,314.00	100.0
Cambodia	1,286.22	25.6
Lao PDR	959.00	31.2
Indonesia	136,140.80	65.5
Malaysia	68,722.55	94.6
Myanmar	3,023.42	21.6
Philippines	24,366.97	60.2
Singapore	32,380.51	98.8
Thailand	93,825.53	79.9
Vietnam	41,757.36	70.5
Regional total	404,818.00	73.2

Source: World Bank, 'Fossil fuel energy consumption (% of total)', accessed 21 February 2013, <http://data.worldbank.org/indicator/EG.USE.COMM.FO.ZS>; Bouathep Malaykham, 'Overview of energy efficiency and conservation in the Lao PDR' (presentation at the 2nd East Asia Summit (EAS) Energy Efficiency Conference, Phnom Penh, Cambodia, 31 July – 1 August 2012), <http://www.eria.org/events/3.%20Mr.Bouathep%20Malaykham%20-%20Overview%20of%20Energy%20Efficiency%20and%20Conservation%20in%20the%20Lao%20PDR.pdf>

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Shifts in nuclear energy policy in Southeast Asia

Until the 2011 Fukushima crisis, interest in nuclear energy was on the rise in Southeast Asia. Vietnam, Indonesia and Thailand were actively pursuing plans for nuclear power generation; Malaysia and the Philippines were in the process of studying the option; and the Singapore government had just commissioned a pre-feasibility study. Fukushima put a halt to that momentum.

The impact of Fukushima

In Southeast Asia, only Vietnam remained unaffected by Fukushima. In September 2011, just a few months after the crisis, the Vietnamese government reaffirmed its bilateral cooperation with Japan on nuclear energy by signing an agreement on the Ninh Thuan 2 power plant with a group of Japanese companies.⁵ Surveys in several cities and provinces in Vietnam also indicated strong public support for nuclear energy.⁶

In other Southeast Asian countries, however, Fukushima resulted in strong opposition to nuclear power plants and concern over safety issues. There was a sense that if Japan – with its advanced nuclear technology and (perceived) excellent safety record – could experience a nuclear crisis, what chance would there be for Southeast Asian countries? After all, countries in Southeast Asia are still in the fledgling stage of developing nuclear expertise and some are prone to environmental hazards such as earthquakes. Fukushima also highlighted the critical need to assess the implementation of safety standards.

Such considerations made countries take a more cautious approach to nuclear energy development. Prior to Fukushima, Thailand had intended to build five nuclear power plants, with nuclear power to account for 8 per cent of Thailand's electricity supply by 2030.⁷ Its first plant was supposed to start construction in 2014.⁸ As a result of Fukushima, the government delayed the project, citing safety concerns, public opposition, and recommendations by the International Atomic Energy Agency (IAEA) as reasons for its decision.⁹ The delay, initially set at three years, was extended by another three years in 2012.¹⁰

The swing back to nuclear

Today, the momentum appears to have swung back in favour of nuclear energy, at least among policymakers. Indonesia, Malaysia and the Philippines have started to again pursue nuclear power plants. In Indonesia, the search for an appropriate location continues. While there is public opposition against several proposed sites, local politicians in West Kalimantan were recently reported as suggesting that their province may be ideal given that it does not sit on the Pacific Ring of Fire and is relatively less prone to weather-related disasters.¹¹ In Malaysia, the government delayed the feasibility study on nuclear development by six months in an attempt to mitigate public opposition, but will continue to pursue plans to build two nuclear reactors in the 2020s.¹² Among the locations being considered are two coastal sites in the southern state of Johor.¹³ (Given the proximity of that state to Singapore, and the substantial investments by Singaporeans in Johor's Iskandar Development Region, such plans would be of immediate concern to Singapore.) In December 2012, the Philippines announced that it would again consider nuclear energy as an option.¹⁴

Singapore is the only exception. The government announced in parliament in October 2012 that, based on the findings of the pre-feasibility study mentioned earlier, it will not pursue the nuclear option. Nevertheless, it has not completely closed the door on nuclear energy. The assessment was that current nuclear technologies are not advanced enough,¹⁵ and that the safety risks are too high; but that further technological advances may justify reopening the issue.

Multilateral support for nuclear development

In East Asia, interest in nuclear power can be seen at the multilateral level, both prior to and after Fukushima. In August 2007, ASEAN Plus Three members had agreed to promote information exchange on nuclear energy development at the ASEAN Plus Three Ministers on Energy Meeting. After the Fukushima crisis, nuclear safety was taken up at various regional events. The 2012 Asia-Pacific Economic Cooperation (APEC) meeting concluded with the St Petersburg Declaration on energy, a statement emphasising the importance of safety in diversifying energy sources in the region. Following on from that, at the 30th ASEAN Ministers on Energy Meeting in Phnom Penh, ASEAN ministers adopted a joint statement on an agreement to develop a coordinated ASEAN approach that would improve nuclear safety in cooperation with the IAEA and other relevant partners.

The persistence shown by Southeast Asian countries in pursuing civil nuclear energy before Fukushima, and after, could be explained by the prioritisation of economic development in Southeast Asia. The significance of economic motivations need therefore be examined more closely. The following section examines the interests of various stakeholders, and also discusses efforts to increase the attractiveness of nuclear energy to the populace.

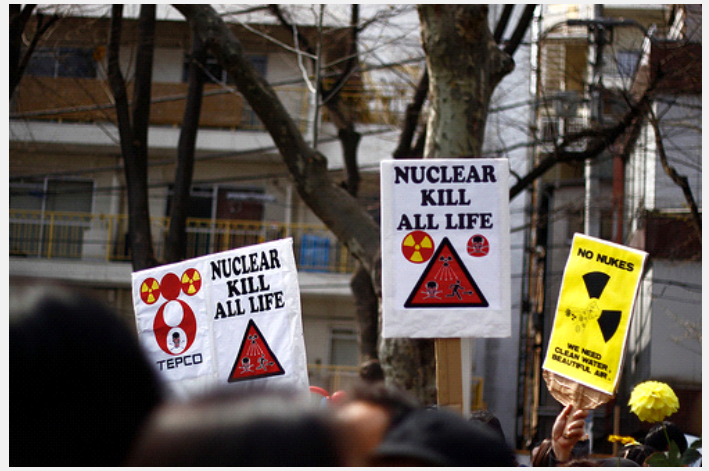
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What sustains interest in nuclear energy development?

Several factors have sustained interest in civil use of nuclear energy despite the concerns brought to the fore by the Fukushima nuclear crisis: (1) the Japanese example; (2) investment gains from nuclear energy development; (3) the interests of the private sector; (4) the strong direct and indirect economic and financial benefits for communities; and (5) top-down efforts that encourage the perception that nuclear energy is safe, or highly safe.

The Japanese example

In the months immediately after the disaster, strong public opposition in Japan caused the Noda administration to improve nuclear energy governance. An inter-ministerial level Council on Energy and Environment was created, and the Nuclear Regulation Agency (NRA) was established under the auspices of the Ministry of the Environment and the Nuclear Safety Commission.¹⁶ Consultation with civil society was also enhanced with the formation of the Fundamental Policies Committee to provide input on Japan's energy blueprints. The committee included technical experts, private sector executives and representatives of consumer and labour organisations, that is, those who are largely cautious about the use of nuclear energy.¹⁷ These developments culminated with a decision to phase out nuclear energy by the year 2040.



Despite strong public opposition to nuclear energy in the immediate aftermath of the Fukushima nuclear crisis, it is likely that nuclear power will continue to have an important place in Japan's energy mix.

Credit: SandoCap / flickr.

However, in a U-turn in September 2012, the Japanese government retracted its ambitious nuclear-free goal, apparently conceding to the difficulties of managing energy demand without nuclear energy. Prior to Fukushima, 30 per cent of the country's electricity had been generated from nuclear energy. The incident led to all of Japan's nuclear reactors being shut down for safety scrutiny,¹⁸ and Japan had to turn to alternative sources of energy. In 2011, demand for heavy fuel oil and gas oil for electricity generation increased by 113 per cent compared to 2010.¹⁹ Since Japan is wholly dependent on imports for its oil and gas, that sharp rise in demand was partly responsible for the country's record-high trade deficit in 2011.²⁰

Changes in the ruling government also played a part. Prime Minister Yoshihiko Noda's party, unable to deal with Japan's stagnating economy, lost in the December 2012 general election. The new government under Shinzo Abe has taken a more pro-nuclear stance. It is reconsidering the use of nuclear energy – it will not allow its economic plans to be hampered by higher energy costs.²¹ In other words, Japan has made its economy a priority. The change in Japan's position on nuclear energy could serve to validate the continued development of nuclear energy in Southeast Asia. It is likely that some policymakers in the region would reason thus: if Japan – a country highly vulnerable to earthquakes and with the traumatic experience of a tsunami and nuclear crisis behind it – is still able to consider the use of nuclear energy, there is little reason why Southeast Asia should not pursue nuclear energy either.

Investment gains

Potential financial gains from nuclear energy development are a motivation for countries with nuclear expertise as well as those interested in developing nuclear power plants. The Abe administration in Japan has prioritised diplomatic efforts to enhance economic (as well as strategic) ties with Southeast Asia and build on efforts in recent years to accelerate the export of Japan's nuclear power technology,²² likely motivated at least in part by the need to resuscitate its ailing economy.²³ Russia, South Korea and China have also, to varying degrees, increasingly engaged in providing technical expertise and training at the request of the developing nations of Southeast Asia.

In addition, Russia and Northeast Asian states such as South Korea have been active in providing overseas development assistance (ODA) to support sustainable development in several Southeast Asian countries. They have been investing in civil nuclear development in Thailand, Myanmar, Indonesia, the Philippines and Vietnam since the 1990s.²⁴ The capital for Vietnam's first proposed nuclear power plant in Ninh Thuan, for instance, is entirely dependent on ODA from Russia and Japan.²⁵ Such foreign financial and technological assistance reinforces the determination of Southeast Asian governments to pursue nuclear energy.

The continued pursuit of the nuclear option could also be attributed to some extent to sunk costs. Some countries may find it more difficult to abandon nuclear plans given the amounts already invested in initial phases. For instance, the government of Vietnam has been strengthening nuclear engineering programmes offered by its universities, and has been sending officers and students to Russia and Japan to attend various training courses on operating nuclear power plants.²⁶

Private sector interests

Private sector interests are another factor driving sustained pursuit and use of nuclear energy. In Japan, for example, the private sector is strongly in favour of restarting the country's nuclear reactors. The chairman of the Japanese Business Federation has argued that stable

energy supply is critical for Japan's economic recovery and growth.²⁷ Pressure from the private sector was a major reason behind the government's retreat from the nuclear-free goal.²⁸

Companies in Southeast Asia have also been supportive of nuclear energy development, motivated by concern over potential business disruption should electricity shortages occur. The Thai National Shippers' Council, for instance, sees nuclear energy as an option to address the rising demand for electricity in Thailand and criticises the government for delaying the nuclear project.²⁹

Economic incentives for communities

At the local community level, the experience of Japan shows that support for civil nuclear power projects could be enhanced through a web of complex incentives.³⁰ Since the 1960s, compensation programmes have been used to counterbalance expected risks to local communities and ensure consent from the community.³¹ Those residing near potential power plants would also be promised benefits such as discounts on their electricity bill.³² While the 'relationship between compensation and income is key in the history of the marketplace for nuclear facilities in Japan',³³ the results are likely to be mixed in Southeast Asia. The region has seen even poor communities object strongly to nuclear energy projects due to worries over their potential risks – despite the carrot of economic development. On the other hand, some communities may find the prospect of poverty alleviation sufficient inducement. In such cases, compensation systems would have to be transparent and not subject to corruption.

Support for nuclear energy facilities has also been seen in communities that have come to depend on them for the health of the local economy and for their livelihoods. A recent survey by Japan's *Yomiuri Shimbun* found that of the 135 mayors of communities living near nuclear plants, only 18 per cent said that they would not support restarting nuclear reactors. Fifty-four per cent said that they would accept it.³⁴ Those in favour see such facilities as a means of ensuring a stable source of electricity as well as employment.

In Vietnam, public acceptance of nuclear energy is as high as 90 per cent, with 47.7 per cent considering nuclear energy useful and safe.³⁵ The high support rate may be partly explained by the benefits stemming from nuclear power projects, such as improvements in infrastructure and increase in business opportunities.³⁶ (It should be noted, however, that there is tight control over information in the country. Thus, the positive response to nuclear energy may be due to lack of awareness on the part of communities about the risks associated with nuclear energy.)

The perception of safety

Another dominant factor influencing continued interest in nuclear energy is the promulgation of the notion that the safety systems of some countries, or nuclear power plants themselves, are safe, or highly safe. This belief has been called by some the 'safety myth'.³⁷

The 'safety myth' is particularly salient in relation to Japan. As mentioned earlier, there is a perception in East Asia that Japan is strong on safety. Some have even gone so far as to say that Fukushima was simply an unfortunate turn of events. They discount the significance of the crisis, arguing that it was a low-probability occurrence. Such an interpretation does not however align with the findings of Japan's Nuclear Accident Independent Investigation Commission (NAIIC). Its report notes that certain 'conventions of Japanese culture', such as 'reflexive obedience', 'stick with the program' insular perspectives, cliquish behaviour and the tendency not to question authority, could have an impact on safety management and governance.³⁸

The notion that Japan is especially strong in the area of safety is also challenged by the observation that Japan's nuclear safety regime had 'no ability to develop its own regulations', and in fact, 'the basic framework for safety standards is literally a carbon copy of those developed overseas'.³⁹ Moreover, Japan has neither reviewed nor adapted its safety standards over the years, thus suggesting a 'total absence of ability and sense of responsibility' on the part of the Japanese government.⁴⁰

Another argument often put forward, and used by Southeast Asian governments such as Indonesia and Vietnam, is that the technology to be adopted would be much more advanced than that used in the Fukushima reactors.⁴¹ The Japanese contractors of Vietnam's second nuclear power plant said that they would incorporate lessons from the Fukushima crisis in constructing the new facility.⁴²

The nuclear-is-safe message is often advanced by pro-nuclear interests through their outreach to various stakeholders. Japan has mastered the art of doing so. It has grassroots initiatives such as awareness programmes targeted at specific communities. The merging of its education ministry and its science and technology ministry as part of government restructuring also influenced the content of school syllabi to be more pro-nuclear.⁴³

Taking a leaf out of Japan's book, Vietnam and Indonesia have also tried to persuade communities through socialisation initiatives. Vietnam arranged for heads of villages close to potential sites of nuclear power plants to visit plants in Japan, including Fukushima in 2010.⁴⁴ Such initiatives appear to have paid off. As mentioned earlier, there is high support for nuclear energy projects in the country.

Such socialisation programmes have been less successful in Indonesia. Even though the government had allocated USD15.9 million to increase public awareness in the Bangka-Belitung (Babel) province,⁴⁵ local communities were unmoved. They were in fact 'unhappy with socialisation programmes taking place in their villages, and also remained unconvinced that Bangka was geologically safe for a nuclear

power plant'.⁴⁶ Nevertheless, the government continues to try to assure the public of Indonesia's nuclear safety preparedness, as seen in the recent assertion by Indonesian government officials that 'eight Indonesians ... work as inspectors for the IAEA'.⁴⁷ The picture in Indonesia as far as acceptance of nuclear plans goes is also not wholly negative: local governments in some provinces, such as West Kalimantan as mentioned earlier, have been welcoming of nuclear power plant projects.

Overall, then, the high level of economic benefits for countries, businesses and communities has led countries to try to overcome any resistance towards nuclear energy projects. This determination to pursue the nuclear option makes the issue of nuclear energy development one that the region should pay attention to.

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Conclusion and implications for Singapore

The Fukushima crisis and the subsequent social, economic and political consequences demonstrate that the implications of nuclear energy development go beyond the energy sector and domestic boundaries. With nuclear energy plans progressing steadily in Vietnam and Indonesia, and with China increasing its use of nuclear energy and Japan likely to restart its nuclear reactors, Singapore will be in a nuclear neighbourhood despite being itself nuclear-free. Given the potentially transboundary consequences of nuclear accidents, it is crucial for Singapore to be part of the discussion on nuclear energy development in the region, and for it to take measures to address nuclear issues.

As an initial step, Singapore could integrate aspects of nuclear hazards into its current disaster preparedness plans. Public education would be key given the newness of nuclear energy to the Singapore public. Training on survival skills amid nuclear contamination could be provided to citizens to prepare them for such emergencies. Much in fact still needs to be done to strengthen disaster preparedness within Singapore society. A

recent *National Geographic* survey suggests that there is a lack of resilience among Singaporeans. The survey found that 79 per cent of Singaporeans did not consider themselves prepared for a major disaster.⁴⁸ Many Singaporeans also take safety for granted. The same survey noted that half of the respondents felt that readiness for a disaster is the responsibility of the government, while 38 per cent indicated that they did not know what they should be doing to prepare for a disaster, and 23 per cent did not think any disaster would happen.⁴⁹

While it is commendable that Singapore has benefited from its investments in infrastructure and technology (for disaster preparedness) as well as its pragmatic decision-making approach, there is a need to guard against going down the slippery slope of pure economics and over-confidence on safety. Indeed, the Japanese experience of nuclear energy development demonstrates that while the public can be socialised to believe narratives perpetuated by the state in order to facilitate sectoral economic interests, that does not necessarily translate into better safety systems.

Singapore could also use its technological advantage to support nuclear energy development in the region. Despite determined efforts by Southeast Asian countries to acquire nuclear technology and expertise, it would still take them a while to build capacity in managing nuclear technologies. Japan, considered a country with a high level of nuclear expertise, has been involved in nuclear power development for five decades. Moreover, there is a sense among observers that widespread corruption, poor safety standards and a lack of transparency – issues commonly associated with the developing world – will persist, and will need to be tackled. According to Hien Pham Duy, one of Vietnam's top nuclear scientists, his government's nuclear power plans were based on a 'lack of vigorous assessment of the inherent problems of nuclear power, especially those arising in less developed countries'.⁵⁰ Although Singapore has no plans to develop nuclear energy at this stage, it is in a better position than its neighbours to develop expertise in the management of nuclear power technologies. Doing so would allow Singapore to meaningfully engage with its neighbours on nuclear development issues, and at the same time help it beef up its own preparedness for nuclear accidents.

The various ways in which Singapore can support nuclear energy development must then be channelled into international and regional forums, as means of strengthening coordination on regional nuclear safety governance. Given its vulnerability to transboundary risks from nuclear energy plans in Indonesia and Malaysia, Singapore could play a significant role in calling for transparency of information and strict implementation of safety standards. A good example of this is its hosting of an Asia-Europe Meeting (ASEM) seminar on nuclear safety in June 2012. Such meetings enhance awareness of nuclear safety, and emphasise the importance of streamlining regional efforts on nuclear governance with other aspects of regional environmental protection.



Nuclear accidents could have an impact beyond national boundaries, highlighting the importance of regional and international platforms to address issues of nuclear energy governance, such as this bilateral meeting between ASEAN and the International Atomic Energy Agency (IAEA) during the IAEA Ministerial Conference on Nuclear Safety in 2011.

Credit: Dean Calma / IAEA.

The U-turn in Japan as well as in Southeast Asia demonstrates that economic factors play a significant role in shaping countries' position on civil nuclear energy. In this regard, efforts that include economic incentives – for example, foreign financial assistance and technological advancements that reduce the cost of ensuring nuclear safety – can be effective in persuading countries to formulate and implement strict safety standards. Singapore has the capabilities to potentially provide the necessary financial and technical support to neighbouring countries, and regional forums that promote coordination and cooperation among Southeast Asian nations would be vital platforms for facilitating such transfer.

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