Stronger government push for nuclear

# Asia's slow push for nuclear energy use

Nuclear power programmes across Asia are once again slowly gaining steam, driven by a mix of waning public outrage and urgent necessity, but safety concerns remain a potent dampener.

Just after the Fukushima Daiichi nuclear disaster, Indonesians were asked whether nuclear power plants (NPPs) should be in the country. The votes back then were roughly split between supporters and oppositionists, but time seemed to have allayed some of the fears from the accident. In a 2016 survey, more than 75% of Indonesian respondents believed NPPs should be in the country. Other glimpses of this confidence rebound can be observed across the region, especially as nuclear power promises an economically sound solution for the growing energy needs of emerging Asian nations even as resistance remains strong, led by the likes of Taiwan and Vietnam.

Indonesia has shown a resurgence of public support for nuclear power, says **Dr Taswanda Taryo**, principal researcher of PTKRN-BATAN, Serpong, citing a recent survey where 4,000 people were directly interviewed and 77.5% agreed that NPPs should be available in the country, up from 75.3% in 2015 and from around 49% after the Fukushima accident occurred. The results of the survey, which has been done since 2009, suggests that majority of Indonesians want NPPs and have shaken off their reservations as the years have passed.

The spike in public confidence can be attributed to a stronger government push for nuclear power in recent years. In 2014, the government created a nuclear energy outlook and established the Government Decree No.79 that clearly states that Indonesia needs 115GW of power by 2025, more than double the existing electricity generation of 52GW. To fill in the gap, the government is supporting the development of new energy and renewable energy, including solar, geothermal, micro-hydro, biomass, and nuclear. "The advantages of nuclear is that it is green, very competitive, and able to provide a bigger power of electricity," says Taryo.

Despite swelling public support for NPPs, there are several major challenges related to infrastructure and policy. NPP construction, for one, takes seven to nine years, a lengthy period that exceeds the serving term of Indonesian politicians and deters leaders from taking on these big-scale projects.

**The spike in public confidence can be attributed to a stronger government push for nuclear power in recent years.**

"The construction of NPPs depends on political decision. Politicians are not interested in constructing NPPs since the construction time is more than 5 years," says Taryo. "They have only 5 years to lead the country. It is better for them not to take the decision once they lead the country."

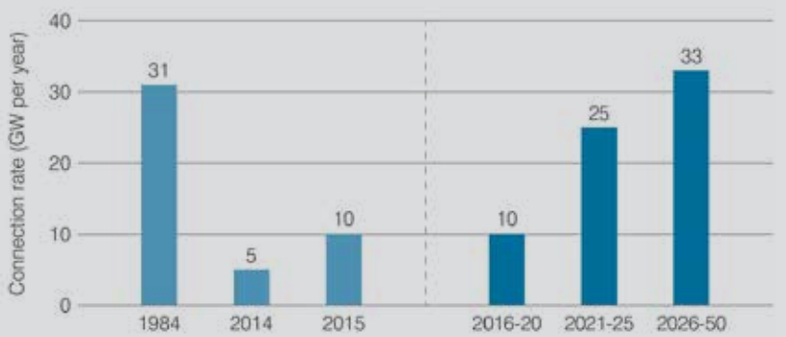
He reckons more can be done in terms of financing, especially as the government looks to spend on other key infrastructure such as roads, ports, tolls, and railways. Building new NPPs also require improved expertise in selecting nuclear technologies based on factors, including safety, security, environmental impact, and capability to construct the project on time.

Finally, the country needs to improve its power grid and make sure that electricity generated from NPPs are kept relatively cheap, which is made more complicated by the country's archipelagic geography consisting of more than 3,000 islands. Taryo says it can be an uphill battle for nuclear power if electricity prices are high, or more than 10 cents/Kwh.

**Nuclear opposition**

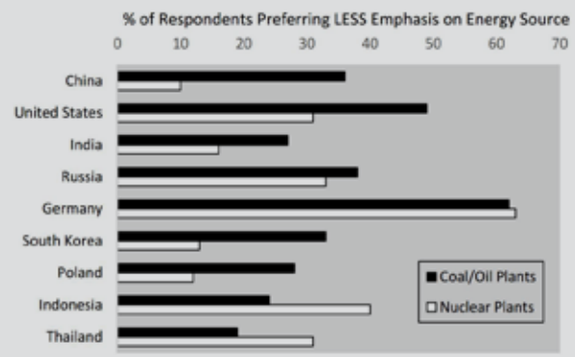
As countries like Indonesia look to ramp up their nuclear power programmes on the back of stronger public support, the governments of Taiwan and Vietnam have ditched nuclear due to vocal opposition from their constituents. Taiwan yielded to public demand to stop nuclear power generation, which forced the country to crank up the combined share of wind and solar power to 20% in the coming decade to offset the loss of nuclear power. Thermal energy is also being eyed as an attractive energy source following Taiwan's planned nuclear phase-out.

**Nuclear grid connections rates required to meet the Harmony target of 1000 GW of new build by 2050**




*Source: World Nuclear Organization*

**Relative unpopularity of coal/oil and nuclear plants in 2008**




*Source: WorldPublicOpinion.org*

Strong anti-nuclear power sentiment continues to persist in Taiwan despite doubts on whether the ambitious targets for non-hydro renewables like wind and solar power can be achieved. Then, last year, Vietnam had to forego plans to build a couple of NPPs in Ninh Thuan province because of safety and project feasibility concerns. Vietnam's National Assembly voted to abandon what would have been landmark NPP projects in cooperation with Russia and Japan, a decision that was spurred on by growing public debt and ballooning project costs.

In Malaysia, rallying public support has been harder following the Fukushima disaster and is one of the biggest challenges to the country's nuclear aspirations, says **Dr Mohd Zamzam Jaafar**, chief executive officer of the Malaysia Nuclear Power Corporation. "Winning public buy-in after the Fukushima accident with respect to nuclear safety and what to do with radioactive materials and used nuclear fuels" is a key hurdle to nuclear power development, he says. Because of shaky public support, the government cannot step hard on the nuclear development pedal. Critics have also called into question the competitiveness of nuclear electricity given its high upfront investment costs, especially when compared to popular renewable energy.

**Akira Tokuhiro**

**Nguyen Hao Quang**

**Mohd Zamzam Jaafar**

**Professor R. Rajaraman**

### Abort mission

Despite the hurdles that Malaysia's nuclear programmes face and the potential chilling effect after Vietnam pulled the plug on its NPPs, Zamzam reckons there is still merit for the country to leverage nuclear power to drive economic growth and lower electricity cost. "It is too early to assess the impact of Vietnam's decision to stop its nuclear power programme in the Association of Southeast Asian Nations (ASEAN). The Nuclear Energy Cooperation-Sub-Sector Network (NEC-SSN), a programme under the ASEAN Ministers of Energy Meeting, continues with Malaysia as the current Chairman. Nuclear Power Asia 2017 is listed as an activity under ASEAN NEC-SSN and Malaysia is still pursuing the nuclear option," he says.

"Nuclear is an important base load power generation source as demonstrated in many countries with NPPs in operation. This is an important feature valued by customers and investors who rely on affordable 24/7 power supply. With expansion of sustained commercial activities, national economic development can be assured through job creation and better standard of living for people." Zamzam notes that Japan, in restarting its nuclear programme amidst public opposition, has explicitly recognised the role of nuclear to provide reliable electricity supply and enabling a more diversified energy mix for electricity generation. Nuclear has also been shown to be a proven low carbon power source. This will likely play a major role for countries that want to meet the Paris Agreement requirements with respect to greenhouse gas emission and climate change concerns.

In India, there is a similar need to push through with the nuclear programme even in the face of fierce criticism and public protests. The fast-developing and populated country is ploughing forward to meet its economic development goals and mitigating its recurring energy shortages.

As India's middle class continues to swell, government leaders feel increased pressure to provide electricity across the nation. The state government of Tamil Nadu, facing critical electricity shortages, proceeded with the full rollout of the Kukankulam nuclear facility to provide electricity to the surrounding poor and underpowered southern states, even as protests among concerned villagers erupted. The government's nuclear adviser to Rajagopala Chidambaram has tried to assuage the public that the Fukushima nuclear accident has taught lessons that will help prevent a similar incident from occurring in India, and insisted that nuclear accidents must not derail the nation from pursuing a safe civil nuclear programme.

### India's nuclear predicament

Supporters of India's nuclear program believe it can substantially mitigate the country's ravenous energy needs, but the commitment to nuclear comes with caution from critics: There is a dearth of nuclear experts, which may impair the sustainability and safety of the program. "In India, [our nuclear] expertise is contained almost totally within the Department of Atomic Energy (DAE)," says **Professor R. Rajaraman**, emeritus professor of Theoretical Physics School of Physical Sciences. "There are no nuclear engineering schools in our universities or institutes of technology. This has been by design."

Apart from a few private companies that supply some parts for reactors, the "nuclear industry" in India consists only of that one government department, the DAE. Consequently, argues Rajaraman, when the need arose for some public debate on nuclear activities, there was little independent outside expertise available to foster a balanced debate. Nurturing more local nuclear experts will be critical to the Indian government's plan to expand its nuclear energy capacity in the coming decades to address electricity shortfalls and lower carbon emissions. He warns that if the nuclear industry cannot develop in a unified and committed manner, there is a chance that momentum can shift to solar power, especially as the latter's implementation costs fall and generation becomes more efficient.

India's lack of nuclear expertise is also limiting its nuclear options. The country boasts vast quantities of thorium, an alternative to uranium. However, the country lacks hands-on experience and technology to harness thorium, preventing it from considering the element as a viable alternative.

"Thorium is simply not an alternative in the short-term," says **SP Singh**, former head of the Nuclear Safety Division of the Atomic Energy Regulatory Board of India. "No power reactors are using thorium on a large scale today. Developing a system for a thorium reactor will take decades. It would take a long time for

a thorium demonstration reactor to be established and only then can we take steps toward assessing if thorium is advantageous or not. We have plenty of thorium, but have no technology available right now to utilise it," he adds.

**Playing technological catch-up**

Recognising the need of Asian countries, China has been stepping up to supply nuclear technology to the likes of Malaysia, Cambodia, and Thailand, although there are concerns over the safety standards from Chinese suppliers. This might prove tricky for governments that are still trying to woo critics, many of whom worry about the safety of nuclear facilities.

The Chinese are making bold moves to expand their nuclear technology exports in Southeast Asia, with both Thai and Malaysian authorities revealing they are in various stages of talks with Chinese technology suppliers. The China General Nuclear Power Corporation has outlined plans for commercial expansion into Southeast Asia, singling out its relationship with Malaysia and even establishing a regional headquarters in the country.

China has also been helping Cambodia ramp up its nuclear capabilities, from preparing a legal framework for the development of a peaceful use industry to offering scholarships to high-achieving Cambodian engineering students. Apart from Malaysia and Cambodia, Indonesia remains keen to drive toward nuclear power. Thailand, which had shelved plans after the Fukushima disaster, is also talking to the Chinese. Not everyone is falling in line to do nuclear business with China, however. The Vietnamese Atomic Energy Institute has expressed concern about the downstream safety-related consequences of three new plants close to, or relatively close to, the SRV's frontier with China. The Institute is desperately trying to mitigate risk by encouraging a dialogue with Chinese operators.

"With the very strong nuclear activity in China across the border, checkpoints [need to] be set up in the area to promptly detect any impacts," says **Nguyen Hao Quang**, Vice Director of the Institute. The Vietnamese have traditionally sought the established experience of the Japanese and Russians in building their nuclear industry. Singh, which has spent 12 years overseeing nuclear safety, shares Vietnam's concerns. "The major challenge now is that the Chinese eat into their cost margin by compromising safety," he says. "Safety is reduced to export technology and this will affect not only the Chinese people but also mainly the people of importing nation."

Nations interested in importing Chinese technology and eventually plants, such as the Cambodians, Malaysians, and perhaps the Thais, are keen to take advantage of the fact that contracts may be half the cost of the French and two thirds the cost of the Russians. However, there may be risks involved in these relationships. Singh admits that all nuclear vendor or export countries have taken the failings of Fukushima into account, including the Chinese. But not everything is yet understood, and countries might not have the safety precautions in place to justify increased nuclear risk.

"Importing nations need to be careful that these [Chinese] designs still meet international standards. The Chinese have been known to overload the reactors. Any nation that considers importing Chinese units needs to make sure that such units meet Generation-3 safety standards," says Singh. "Importing nations are very heavily populated with only small 'safety zones'. Certain Chinese technology — particularly what they export — is obsolete. An accident will devastate the immediate area, which will naturally involve relatively densely populated neighbouring regions."

**China is leading**

China-based American nuclear specialist Robert Barrett, a partner with PwC in Beijing, is more upbeat about Chinese technology. He says that the Chinese are generally very good at what they do and they offer export solutions in nuclear that other nations cannot. "The Chinese offer good technology and good financial solutions — the finance side plays a very important role and Chinese nuclear vendors don't have to look toward bank financing," he says. However, he does warn that "in terms of their internal construction, the Chinese government is somewhat challenged by the fact that safety and standard operating procedures become less pure as nuclear technology reaches the provinces and the central government has some difficulty in making provincial authorities stick to the line."

Japanese nuclear expert **Professor Akira Tokuhiro,** suggests that more transparency is needed before the question of safety can be answered. "Detailed information is rarely revealed to the general and the educated public. It would be unprecedented and 'fearless' if the Chinese designs were, on invitation, subject to safety-in-design review." Tokuhiro reckons safety risks can be mitigated if design details can be made available to a review beyond that already exercised by the IAEA. An example is how the Koreans are undergoing the American NRC review process with their APR-1400 reactor design, and the Chinese might also follow suit — a process that provides the public and experts an opportunity to scrutinise and ask questions.

"Since detailed information is hard to find on Chinese nuclear technologies and also on state of operations, there are expectations that many in the nuclear communities share," says Tokuhiro. As a best practice moving forward to increase the confidence of the public and other stakeholders to nuclear programs, he suggests nuclear industries subject themselves to several stringent standards. These include, among others, demonstrating a world-class safety culture with international peer review, making operational data available to IAEA/INPO/WANO, and demonstrating risk and crisis management and communications.

Asian nations will need strong regulatory control to ensure safety standards are met, says **Gerald Ouzounian,** international director at ANDRA. Greater transparency is likewise needed to allay prevailing safety doubts and boost public support, but doing so might be difficult. "There is an important need for institutional control and infrastructures when committing in nuclear with new reactors. Among the challenges, the most important is definitely the regulation system for making sure that safety is achieved, for the public and the environment," says Ouzounian. "The unique challenges will be to operate safely the new facilities, protecting them against any security risk, and providing all relevant information to the authorities, in charge of making it available for the public. Transparency is challenging."

Countries follow in the footsteps of France, where 58 reactors are operated by EdF, the national electric power company, under the supervision of the Nuclear Safety Authority (ASN). All information is reported on the ASN website, allowing everyone easy access to the information.

> **There is an important need for institutional control and infrastructures when committing in nuclear with new reactors.**

**Nuclear power plants in commercial operation or operable**

| | Power Reactors operable or in Operation | Power Reactors Under Construction | Power Reactors Planned | Research Reactors | Other Stages of the Fuel Cycle |
|---|---|---|---|---|---|
| Australia | | | | 1 | UM |
| Bangladesh | | | 2 | 1 | |
| China | 30 | 24 | 40 | 16 | UM, C, E, FF |
| India | 21 | 6 | 22 | 4 | UM, FF, R, WM |
| Indonesia | | | 1 | 3 | FF |
| Japan | 43 | 3 | 9 | 14 | C, E, FF, R, WM |
| S. Korea | 25 | 3 | 8 | 2 | C, FF |
| N.Korea | | | 0 | 1 | C?,FF?,R |
| Malaysia | | | 0 | 1 | |
| Pakistan | 3 | 2 | 2 | 1 | UM, E, FF |
| Philippines | | | 0 | 1 | |
| Thailand | | | 0 | 1+1 | |
| Vietnam | | | 4 | 1 | |
| ** Total | 128 | 40 | 89 | 49* | |

*Source: World Nuclear Association*