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Nuclear Renaissance in Southeast Asia

In the face of rising oil prices and calls to combat climate change, nuclear power has emerged as an attractive long-term alternative energy source to sustain socioeconomic development in Southeast Asia. However, this move is potentially fraught with numerous difficulties, hence presenting a dilemma in balancing energy security and public concerns. This edition provides an update on the nuclear renaissance currently unfolding in Southeast Asia.

Southeast Asia's Nuclear Dilemma

Decades ago, the governments of Indonesia, Malaysia, the Philippines, Thailand and Vietnam had instituted plans for nuclear power plants (NPPs) but interest subsequently plummeted after the 1986 Chernobyl disaster, followed by the impact of Asian financial crisis in 1997 on both capital and electricity demand. While more readily attainable alternative energy has been developed, long-term energy requirements and national pride could finally result in the reintroduction of NPPs, with climate change cited as a reason since nuclear power is viewed as a clean energy that could reduce dependence on traditional fuels.

Nonetheless, nuclear energy emerged as a debate between advocates and environmentalists during the September 2007 climate change conference in Bali. There was a sense that shifting public scepticism towards favouring civil nuclear energy use might well remain a mammoth task for nuclear energy advocates.

Nevertheless, high oil prices and the forecast that regional electricity consumption would increase by an average of 16 percent per year in the next two decades imply an urgency to secure energy resources to sustain economic development. However, the balancing of public concerns and energy security initiatives presents a policy dilemma.

Tales of the Five Nations

According to the Nuclear Issues Briefing Paper, in Southeast and East Asia there are 109 operational nuclear power plants, with 18 more under construction and around 110 in the planning stage. In addition, there are 56 research rectors in 14 countries. In Southeast Asia alone, it would appear that five countries in Southeast Asia have begun planning for civil nuclear energy use:

Indonesia: Nuclear power presents an attractive alternative for Indonesia, which had been experiencing regular electricity blackouts. Tenders in 2008 have planned for two 1,000-megawatt (MW) NPPs - Muria 1 and 2 – to be constructed in 2010 and operational in 2017. Tenders for Muria 3 and 4 are also planned in

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2016, to be operational in 2023. The total planned 4,000 MW nuclear facilities cost $8 billion and would serve the main Java-Bali grid. While the government might acquire fuel from abroad, Indonesia does possess uranium deposits in Kalimantan. However, in earthquake- and volcano-plagued Indonesia, safety concerns, potential radioactive leakages in densely populated sites as well as pricing concerns endanger the plan even though it has the support of the Indonesian parliament and the International Atomic Energy Agency (IAEA). There are also concerns over the risk of nuclear weaponisation in view of the visit to Tehran by Indonesian President Susilo Bambang Yudhoyono in March 2008. The Indonesian President was quoted saying "Tehran is ready to make available to Jakarta its achievements and its valuable experience in a variety of fields, including in nuclear engineering, nanotechnology and economics." It is also worth noting that Indonesia, a non-permanent member of the UN Security Council, was the only country that voted against a recent UN resolution imposing new sanctions on Iran. Nonetheless, with planning, technology, manpower and financing claimed to be ready, the national nuclear energy agency BATAN remains adamant about operating the first $1.6 billion NPP by 2017 near Mount Muria, a dormant volcano on Java Island. However, domestic politics and bureaucratic red tape might potentially cause delays.

Malaysia: In June 2008, Malaysian Deputy Prime Minister Najib Razak commented that Malaysia may consider nuclear power to meet long-term energy needs amid surging oil prices and this is supported by the IAEA. In fact, in 2007, Malaysia announced its plans to build a 26-million dollar nuclear monitoring laboratory – the first in Southeast Asia – which is slated to be operational in 2009 to facilitate nuclear safety checks in Southeast Asia. The state power company Tenaga Nasional (TNB) may be slated to construct Malaysia's first 1,000MW NPP at a cost of $3.1 billion. In early August 2008 South Korea offered to provide Malaysia with the necessary nuclear management training. Nonetheless, the main issue would rest on the economies of nuclear power since existing energy sources do not differ much in pricing. There may also be concerns over possible nuclear proliferation, bearing in mind the nuclear trafficking scandal in 2004 involving Scomi Precision Engineering (SCOPE) – a Malaysian company allegedly part of the A.Q. Khan nuclear proliferation network which supplied sensitive nuclear technology and know-how to Libya, Iran and North Korea. Nevertheless, Malaysia may try to allay such concerns through a prime ministerial message during the 2008 World Conference against Atomic and Hydrogen Bombs in Hiroshima, stating their support for international efforts towards the total elimination of weapons of mass destruction.

The Philippines: During the administration of then President Ferdinand E. Marcos, the Philippines had embarked on its own nuclear energy plans; but the 621MW Bataan NPP (BNPP) was mothballed in 1986 by the Corazon Aquino administration due to financial and safety concerns. However, the early 1990s power crisis led to a renewed interest in the nuclear option. In April 2007, the Philippine Department of Energy

Recalling the Southeast Asian Nuclear Past

Nuclear power in Southeast Asia has its roots since the mid- to late-1950s and during the early 1960s. Back then, nuclear power was especially appealing since it symbolizes modernity and the ability to master such a technologically sophisticated endeavour. These earlier aspirations were then supported by the US Atoms for Peace Program. Under the program, the first small nuclear research reactors were established in Indonesia, the Philippines (1963), Thailand (Office of Atoms for Peace, 1961) and South Vietnam. Indonesia's interest in the civilian nuclear energy use dated back to the mid-1950s. In the early 1960s, Indonesia was supported by the US, resulting in a research reactor constructed in Bandung, West Java, as well as the Soviet Union. Under then Sukarno's nationalist rule, indigenous nuclear weapons capability was also proposed – sparking fears that Jakarta might seek assistance from Beijing which has detonated its first nuclear bomb in 1964 – and approved in July 1965. Such aspirations ended with the fall of Sukarno and the emergence of General Suharto in October 1965.

Source
"Southeast Asia – a new nuclear territory", *Energy Economist*, Issue 318, 1 April 2008.

began to study the development of nuclear energy in the context of an overall national energy plan. Financial and manpower woes remain the key stumbling blocks to this plan; the IAEA, which was invited to advise on the safe and economical operation of BNPP as well as to recommend a policy framework for nuclear power development, puts the BNPP rehabilitation at a cost of $800 million. There have also been intense national debates over nuclear waste disposal issues. In addition to this, Filipino lawyer Rolio Golez notes that the Philippines perceived to be lacking in a 'culture of safety'.

Thailand: With natural gas reserves running low; nuclear power seems appealing for Thailand to ease import dependence. Under its Power Development Plan, the Thai government has planned for four 1,000MW reactors – estimated at a total cost of $6 billion and to be built by the Energy Generating Authority of Thailand (EGAT) – operational by 2021. In fact, a small research reactor has been operated since 1977 and a second facility is now under development. After an IAEA advisory visit in September 2007 the Nuclear Power Program Development Office was established to carry out site surveys and to undertake a public education campaign. The Thai business community seems to favour the nuclear option. Speaking at a business conference in January 2008, the chairman of the Saha Group – one of Thailand's largest consumer product conglomerates – remarked that his company supported the use of nuclear energy as the company relies on exports. "With higher energy costs, our competitiveness will be hit. Thailand must adapt, and nuclear power would be a way towards sustainable growth now that Vietnam and Indonesia have already embarked on this plan." Despite the ardent support, however, there were still looming concerns over waste disposal and terrorist threats.

Vietnam: In June 2008, Vietnam's National Assembly decided to build the country's first nuclear power plant in 2017, at an estimated cost of $3.4 billion with a 1,400-4,000MW capacity. Russia is said to be a likely source for technical expertise. Moreover, despite the costs, nuclear power, has strategic aspects for Vietnam, such as "diversification of energy sources, energy security, the environment and development of national potential of science and technology". However, Hanoi's decision has generated fears over the future militarization of its nuclear program ostensibly to deter Chinese aggression. Nonetheless, given Vietnam's scientific and technological backwardness, fears and concerns would remain over safety and management of radioactive waste, not to mention also the country's percieved lack of transparency.

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More Security or Insecurity?

It would appear that in the quest for nuclear energy, certain other aspects of human security have been neglected. In January 2007 the Cebu Declaration on East Asian Energy Security signed during the East Asia Summit was opposed by international environmentalist group Greenpeace, which stated that the nuclear energy pursuit "only contributes to the growing insecurity in the region." The concerns over the use of nuclear power, defined broadly, could be categorized as: physical security, environmental impact, institutional and industrial malaises, nuclear proliferation and economic costs.

Physical security

Since 9/11 the protection of NPPs against sabotage has become crucial. In 2005, Greenpeace postulated that floating NPPs might become attractive terrorist targets, underlining the increasing sophistication of terror groups in the Southeast Asian region. On the other hand, the Russian Atomic Energy Agency allegedly projected for floating NPPs to be operational in areas including Southeast Asia. A radioactive leak from a Japanese NPP caused by an earthquake in 2007 also illuminated the susceptibility of modern NPPs to natural disasters, especially in Southeast Asia that is prone to earthquakes and volcanic eruptions.

Environmental impact

Management of radioactive waste and its environmental ramifications are also pertinent concerns, notwithstanding ruminations by nuclear proponents that new-generation NPPs in the pipeline would have better fail-safe mechanisms. Southeast Asia would be especially hard hit by the trans-boundary environmental impact from improper radioactive waste disposal. A grim reminder of trans-boundary damage being Indonesia's haze. According to Greenpeace, Southeast Asian states also lacked experience in managing radioactive wastes and leakage.

Institutional and industrial malaises

Institutional malpractices in Southeast Asia could have potential ramifications on the proper regulation of nuclear energy use. Carl Thayer, a Southeast Asia expert with the Australian Defence Force Academy, pointed out that corruption within regional licensing and

Competing Nuclear Investors

Reconsidering the option to build nuclear power plant, Southeast Asia has become a potential new market for the business sector. According to Citizen's Nuclear Information Center (CNIC) in Tokyo, Japan and South Korea are two countries that are most eager to secure contracts for the construction of nuclear power plants in Southeast Asia. France, Russia, Canada, China and the US among those who are also interested in investing to help countries in the region to develop the capacity and capability to set up and run nuclear power facilities.

Toshiba, Hitachi and Mitsubishi are among Japanese companies seeking nuclear contracts in Southeast Asia and seem well placed to benefit from Japan's long history of economic cooperation with countries in the region. Moreover, the Japanese government is pushing for new incentives to invest in nuclear power development in Southeast Asia and elsewhere. Japanese government has signed a bilateral assistance agreement with Vietnam which part of it stated that Japan is scheduled to help Vietnam prepare and plan for the introduction of nuclear energy, educate experts in nuclear power and help the country formulate nuclear safety regulations. Vietnam has also signed nuclear cooperation agreements with the governments of Russia, France, South Korea and the US.

South Korea's stated-owned electric company has formed a technological alliance with Indonesia's state-owned electric company- PLN. The Korean government also assisted Vietnam navigate the legal waters of nuclear reactor. French nuclear power industry representatives pointed to a new government agency, the French International Nuclear Energy Agency, which had been established to provide experts to collaborate with foreign governments on feasibility studies, safety concerns and other issues. China has a goal of entering the global nuclear business as an investor and supplier rather than as a recipient of foreign expertise, equipment and investment. Established nuclear power players have considered China's nuclear business sector as a fast-rising and low-cost competitive threat.

Source

Geoffrey Gunn, Asia's tigers eye nuclear future, *Asia Times Online*, 15 February 2008.
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supervisory agencies could undermine the best of IAEA guidelines and oversight. In the 2006 Corruption Perceptions Index that ranked 163 nations (the least corrupt first and the most last), Vietnam was ranked 111th and Indonesia, 130th; both aspire to introduce nuclear energy. Some countries hopping on the nuclear bandwagon have abysmal industrial safety records; Greenpeace had fingered Southeast Asia for lack of requisite expertise and trained manpower.

Nuclear Proliferation

The problem of fuel supply security raises the question about nuclear fuel enrichment. The Southeast Asian rush towards nuclear power thus raises the spectre of weapons proliferation especially in view of Iran's alleged nuclear weapons programme and its insistence on indigenous enrichment. There are also serious concerns over possible proliferation to terrorists. In 2005, there were allegations of radioactive material in Southeast Asia that could be used by terrorists to manufacture "dirty bombs".

Economic costs

Resorting to the use of NPPs involves huge life cycle costs, not to mention also the costs of decommissioning and disposing contaminated components of NPP. Moreover, with the lack of technology, expertise and raw materials, ASEAN countries will have to import all of these aspects in high cost. Notwithstanding the region's speedy recovery from the Asian Financial Crisis in 1997, Southeast Asia's use of NPPs would certainly entail economic costs at the expense of other social benefits programs.

Regulatory framework

Indonesia and Vietnam are the two countries most determined to establish nuclear energy in Southeast Asia. In Vietnam, a law providing the framework for development of nuclear power plants and foreign investment in the industry, wider civilian applications for nuclear science, and safety and non-proliferation standards and controls has been approved by the parliament. This will be the basis for the government to proceed with project planning and establish a tendering process for power plant construction, fueling and operation.

In Indonesia, the government has issued Act No. 10 of 1997 to replace Act No. 31 of 1964. In this Act, the authority in executing and regulating nuclear energy is separated into two different institutions to guarantee the control of nuclear energy in order to improve the nuclear safety. The responsibility to promote the application of nuclear energy is vested in the National Nuclear Energy Agency or BATAN as the. The legal framework for the establishment of BATAN lies under Presidential Decree No.197/1998. According to this Decree, BATAN has responsibility to execute, and to promote the research and the use of nuclear energy in Indonesia.

Responsibility to regulate and control nuclear energy is vested in the Nuclear Energy Control Board or BAPETEN, which was established via Presidential Decree No.76/1998. According to this Decree, BAPETEN has the responsibility to regulate and control the use of radioactive

Nuclear safety fears - the modern Japanese antecedent

In July 2007, a 6.8-richter earthquake ignited a fire at the Kashiwazaki-Kariwa NPP – located northwest of Tokyo and the largest in the world – causing a 'minor' radioactive leakage. IAEA investigations suggested a longer shutdown despite hopes that it might be reopened soon. This incident calls into question the vulnerability of nuclear plants in earthquake-prone Japan, a nation that receives nearly one-third of its electricity from 55 nuclear reactors. In addition, the manner in which the operator handled the incident also did little to put citizens at ease; initial reports claimed no reactor damage but it was not until hours later when a statement revealing radioactive leakage was released. Projections of another major Japanese earthquake in the next 50 years standing at 90% would have to be taken into serious consideration as nuclear expansion becomes a key component for Japan's long-term energy plan. With up to eight more NPPs projected for 2015, this incident has created more worries.

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"Nuclear Power; Japanese plant may be shut down for a year – IAEA", Greenwire, 21August 2007.

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materials, radiation sources, nuclear reactors and nuclear materials in Indonesia. The Law on Nuclear Reactors issued in 2006 gave the authority to an independent power producer to build and operate on one of three sites on the central north coast of Java.

Apart from regulations at the national level, Southeast Asian countries in various degrees are signatories to international treaties related to nuclear energy and its safety.

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The Role of ASEAN

In the Declaration of Climate Change, Energy and the Environment issued at the East Asia Summit in November 2007, governments stated that they will ensure "safety and safeguards that are of current international standards and environmental sustainability". This was following the statement of support from ASEAN leaders for building "civilian nuclear power" and establishing a "regional nuclear safety regime". Earlier in August 2007, the ASEAN energy ministerial meeting in Singapore adopted in principle the latter's proposal for an ASEAN Nuclear Energy Safety Sub-Sector Network to explore nuclear safety issues. In April 2008, former Secretary General of ASEAN, Rodolfo Severino suggested that nuclear power in Southeast Asia might be managed and regulated through a central ASEAN nuclear power authority, based on the European experience in the form of EURATOM.

Indeed, as pointed out by ASEAN officials and those working on nuclear power issues in the individual governments, nuclear energy management and regulation in Southeast Asia do not begin in an institutional vacuum since there

Southeast Asia and other Asia Nuclear Power Outlook

Countries	Operation		Construction[1]		Planned[2]		Proposed[3]		Uranium demand 2008 (tons)[4]
	No	MW	No	MW	No	MW	No	MW	
Bangladesh							2	2,000	
China	11	8,957	5	4,540	30	32,000	86	68,000	1,396
India	17	3,779	6	2,976	10	8,560	9	4,800	978
Indonesia					4	4,000			
Japan	55	47,577	2	2,285	11	14,945	1	1,100	7,569
N. Korea					1	950			
S. Korea	20	17,533	3	3,000	5	6,600			3,109
Pakistan	2	400	1	300	2	600	2	2,000	65
Taiwan	6	4,884	2	2,600					n.a.
Thailand							4	4,000	
Vietnam							8	8,000	

[1] Construction = first concrete for reaction poured, or major refurbishment under way
[2] Planned = Approvals, funding or major commitment in place, mostly expected in operation within 8 years
[3] Proposed = Clear intention or proposal but still without firm commitment
[4] refers to mined uranium, that is before conversion, enrichment and fabrication

Source: Analysis: Asia Power, *Energy Economist 12, Issue 318*, 1 April 2008.

already exists a regional legal framework which can be developed, strengthened and focused. An important regional framework which could facilitate safe nuclear energy usage is the Southeast Asian Nuclear Weapons Free Zone (SEANWFZ) Treaty, which bans signatories from developing, stationing, transporting, using or testing nuclear weapons in the region and also advocates the peaceful and safe use of nuclear energy and the proper disposal of radioactive material or waste. It is worth noting that ASEAN has detected no violation of the treaty since it came into force in 1997. In July 2007, the commission set up by the treaty reviewed compliance with its provisions and adopted a plan to ensure continued compliance; among other things includes the encouragement of ASEAN members to sign and implement the complete array of UN treaties and conventions pertaining to nuclear energy and nuclear power.

SEANWFZ would remain strategically relevant because it (a) conveys a message of peace and security; (b) contributes to the global campaign against the proliferation of nuclear weapons and the use and threat of use of weapons of mass destruction; (c) adds pressure to the nuclear weapons states to pursue nuclear disarmament; and (d) contributes to building the confidence of Southeast Asian countries in managing their common security and exercising a good measure of control over their destiny. However, whether or not such renewed interest could be translated into enthusiastic support for SEANWFZ remains to be seen.

While most Southeast Asian nations are, to various degrees, signatories to other international treaties pertaining to nuclear energy and safety, as well as having relevant national laws and regulations in place, the picture remains uneven. For instance, not all ASEAN members have signed or ratified the CTBT, which could further strengthen the efforts to protect the region and the world from nuclear weapons through the international monitoring and verification system.

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