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THE NUCLEAR GRAVY TRAIN:

AN UPDATE ON SOUTHEAST ASIA

Abstract: Notwithstanding the global financial crisis, energy security remains one of the top priorities for the Association of Southeast Asian Nations (ASEAN). The need to reduce reliance on fossil fuels in the face of depleting energy resources spurred nuclear energy developments in Southeast Asia. However, as this edition of the NTS Alert shall argue, despite the overall regional support for nuclear energy developments, progress has been uneven among individual ASEAN countries in their nuclear quest to date, in large part shaped by political will, in addition to other pragmatic factors such as cost and technical feasibility.

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Challenges to Energy Security in Southeast Asia

Securing ample, affordable energy supplies has always been a central component of energy security worldwide. However, the ongoing global financial crisis and increasing salience of climate change have placed twin challenges squarely at the doorstep of energy security.

Even though the financial crisis has deflated oil and gas prices for now, this situation will last only as long as the current situation persists. According to Mikkal Herberg, research director of the Washington-based National Bureau of Asia Research, oil prices would return to US$ 100 per barrel as soon as the global economy recovers. This would lead to supply constraints and possibly a revival of 'toxic competitive energy diplomacy' among major economies.

Adding to the uncertainty over volatile energy prices is climate change, a global issue which has gained increasing prominence in recent times. There are ardent calls for the reduced usage of fossil fuels, though such prospects could remain elusive at least in the short term. Alternative energy would be the way to go in order to ensure long-term energy security – access to ample energy supplies while at the same time being environmentally responsible. In this aspect, Southeast Asian countries are no exceptions.

ASEAN in an Energy Quandary

Energy security is high on the agenda of the Association of Southeast Asian Nations (ASEAN). Despite the current global financial crisis, energy security was to form one of the key themes of the postponed ASEAN Summit that was to be held in Thailand in March 2009, if not for domestic political unrest.

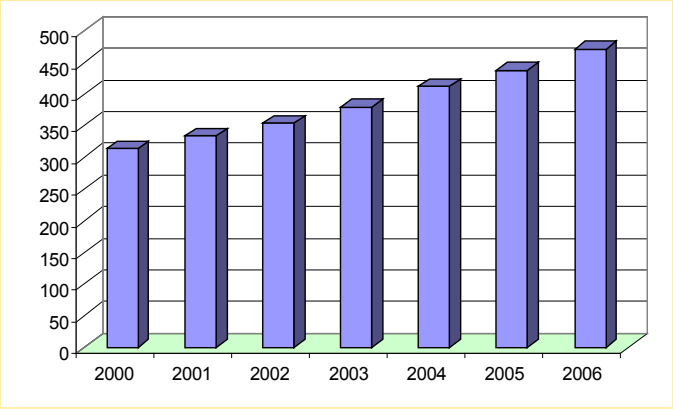
Energy insecurity on the horizon?

As far as ASEAN is concerned, securing ample and affordable energy supplies is crucial for sustained regional socio-

economic development. As Figure 1 shows, electricity consumption in ASEAN had been steadily increasing over the years from 2000 to 2006. In the post-crisis recovery phase, ASEAN could well witness further exponential increments in electricity demand. Thus, there is a corresponding need to secure energy supplies in the midst of an expected return of energy price hikes.

Energy insecurity, as pointed out by Vietnam's Centre of Political and Security Studies deputy director Khong Thi Binh during the 23rd Asia-Pacific Roundtable held in Malaysia in June 2009, could potentially pose a serious threat to regional peace and security. According to her, rising 'energy nationalism' and disputes over energy-rich territories could have potential ramifications for security, especially in the South China Sea.

Figure 1Total Net ASEAN electricity consumption in billion kWh, 2000-2006



Sources: Compiled from US Department of Energy, Energy Information Administration.
Available at http://www.eia.doe.gov/

The need to exercise environmental responsibility

For ASEAN, however, these issues are now complicated by the need to mitigate climate change, through reductions in carbon emissions. To reduce its reliance on petroleum, the consumption of which has been increasing over time as observed in Figure 2, and to exercise environmental accountability, ASEAN would have to seek options in alternative energy sources. However, there has been scepticism among some regional power operators towards, for instance, renewable energy, biofuels and wind power as viable short-term solutions.

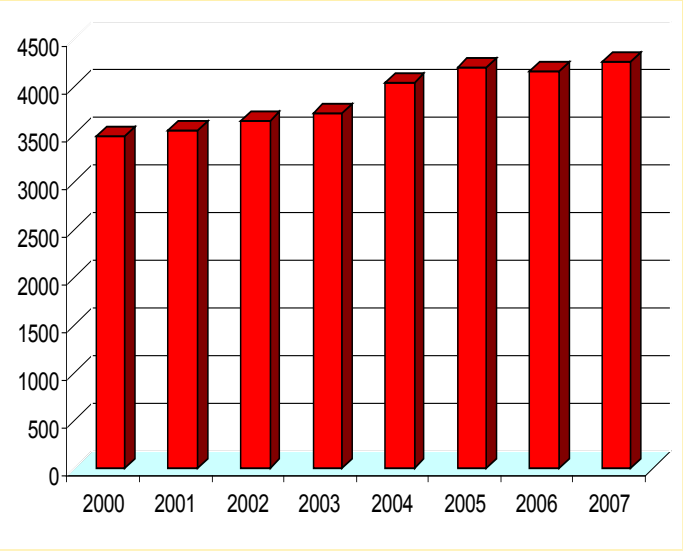
Also, some ASEAN countries are lagging behind in terms of energy efficiency due to funding and staffing woes. Vietnam for example faced obstacles in achieving its energy efficiency targets, given the weak staffing capacity in its energy efficiency and conservation sector, as well as shortfalls in funding required. As such, the huge investments required for the yet-uncertain outcomes of renewable energy development imply that nuclear energy remains highly attractive.

Breaking into the Exclusive Nuclear Club

The nuclear whirlwind has swept over the world, with the ensuing emergence of new nuclear energy aspirants. According to a recent report by the London-based World Nuclear Association, some 43 more countries, including emerging economies, have nuclear energy plans and could potentially add to the existing 31 economies utilising nuclear power. These countries even include those in oil-rich regions such as the Middle East. In Asia alone, there are well over 111 nuclear power plants (NPPs) in operation and another 21 under construction, with plans to build a further 150. Economically less developed countries such as Bangladesh also count themselves amongst the nuclear aspirants.

ASEAN certainly would not desire to be left behind, even though nuclear energy plans in some countries have encountered practical difficulties, in particular funding and technical issues. On the whole, the regional grouping remains supportive. Indeed, nuclear energy featured prominently as part of the agenda for the 26th ASEAN Energy Ministers' Meeting held in August 2008.

Figure 2 Total Net ASEAN petroleum consumption in thousand barrels per day, 2000-2007



Sources: Compiled from US Department of Energy, Energy Information Administration.
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ASEAN supports nuclear power

Most ASEAN countries have expressed their willingness to harness nuclear power as an option even as the regional grouping embarked upon several initiatives to cement cooperation in areas of fossil fuels, particularly with a recent oil stockpiling agreement. Even though not all ASEAN countries possess concrete plans for nuclear energy, intra-regional support has not been lacking for those which do. The Chairman of the ASEAN Technical Working Group on the Establishment of Nuclear Power Plants Ad-Hoc Committee, Professor Carunia Firdausy, revealed in August 2008 that ASEAN member states had expressed no objections to the Indonesian, Thai and Vietnamese nuclear energy programmes. This bodes well for the prospects of nuclear energy development in ASEAN. It would also be interesting to note the developments among ASEAN nuclear aspirants since the global financial crisis began in late 2008.

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Uneven Progress, Unwavering Enthusiasm

Notwithstanding widespread intra-regional support, progress in nuclear energy development varies from country to country, as the following brief country updates for ASEAN nuclear programmes shall show. The nuclear aspirants are grouped into major and minor categories. Major nuclear aspirants are ASEAN countries which already have existing plans for nuclear power; they comprise Indonesia, the Philippines, Thailand and Vietnam. Minor nuclear aspirants are those without such plans even though they have expressed their desire for nuclear energy. They consist of Cambodia, Malaysia and Singapore.

Indonesia

The vast archipelagic state of Indonesia has been witnessing a steady growth in domestic demand for electricity. Hence, Jakarta promoted several strands of – including nuclear – energy development projects in order to satisfy national power requirements.

Originally, the plan was for two 1000-megawatt electric (MWe) NPPs – designated Muria 1 and 2 – to be commissioned by 2017. In the long term, a further two plants, Muria 3 and 4, would be operational by 2024. In all, the four NPPs would cost Jakarta US$8 billion, and would produce a 6-gigawatt electric (GWe) power output in total. The initial plan was also for nuclear power to constitute 2 per cent of the total national power mix by 2017. According to the World Nuclear Association, Indonesia also has a small power and desalination plant, utilising a South Korean-designed SMART reactor, in its pipeline.

The lack of political commitment?

However, the Indonesian nuclear development plan appears beset by woes. Being once viewed as the most likely nuclear power candidate in Southeast Asia, Indonesia has recently seen attention shifted to its neighbours Thailand and Vietnam. A myriad of problems had brought this about, including strong opposition from locals in the highly-populated yet seismically active Java, in which the Muria 1 and 2 NPPs would be developed. There is also the lack of leadership from the central government, quite unlike the case of Thailand and Vietnam, as well as attendant issues of funding.

It is possible that, despite the push by BATAN – the Indonesian National Atomic Energy Agency – for nuclear power operations no later than 2017, a feasibility study on the project cannot get underway until 2010 or 2011, and might not come to fruition until 2016. From the standpoint of political expediency, given the upcoming presidential election in July 2009, the central government might temporarily shelve the issue in order not to alienate Javanese voters who remain largely uncertain about nuclear power. Also, according to Zaki Suud, a nuclear engineer at the Bandung Institute of Technology, Jakarta is at present focused on a 'crash program' to construct coal-fired power plants in Java to meet electricity needs.

Nuclear flip-flopping from Jakarta?

Frustrated by the lack of central leadership from Jakarta, and burdened by power outages in their own constituencies, officials at local government levels had begun to collect information and initiated discussions with foreign vendors on the supply of 'inherently safe modular NPPs'. In Kalimantan alone, four governors enjoyed local political support for NPP projects without direct help from Jakarta, and had already started dialogues with Russian NPP suppliers on the export of KLT-40 small pressurised water reactors. Regulatory and legal frameworks in Indonesia, however, mean that these commercial dealings might be hampered.

Still, the central government has moved back and forth regarding the NPP project. In early April 2009, the programme was apparently halted when Indonesian President Susilo Bambang Yudhoyono remarked in a statement that 'any country can build a nuclear power plant but Indonesia will prioritize the development of electricity from non-nuclear sources.' He added also that 'we have not made any decision to build a nuclear power plant project in the Muria area and I do not agree if a nuclear plant is all of a sudden built there.'

A few days later, Jakarta made an about-turn, with the Energy and Mineral Resources Minister, Purnomo Yusgiantoro, saying that the government is optimistic that the Muria NPP could be operational in 2016 as scheduled, barring any local opposition. Quoted by the *Investor Daily*, Minister Yusgiantoro further revealed that Jakarta has to re-study the plan, establish a new schedule and seek new locations for the NPPs.

Another twist to this development came in late May 2009, when Minister of Research and Technology Kusmayanto Kadiman announced that tenders for NPPs, initially due for completion by the end of 2009, had been postponed indefinitely as a result of a lack of political support since the April legislative election. While a decision on the tenders might not be forthcoming until six more years or so, according to him, the Indonesian government would continue to pursue nuclear power.

The Philippines

At present, the Philippines is one of the most energy-deficient countries in the region. The country faces the twin challenge of increasing energy supply and diversification of energy sources, reducing its dependence on imported oil and coal. Several alternative energy sources, in particular renewables, have been explored. However, nuclear power remains the most ideal, at least for the short term, and yet it is the most controversial for Manila's energy security. The Philippines currently possesses the single and mothballed US$ 2.3 billion, 600-MWe Bataan Nuclear Power Plant (BNPP), whose operations had long since been suspended over litigation concerning bribery and safety deficiencies. Opposition has also been strong from some segments of society, in particular environmental and some religious groups, over safety and governance issues. In late May 2009, a group of 35 seismologists launched a 200-kilometre long 'Energy Revolution Bike Ride' from BNPP to Quezon City to deliver a petition, signed by 5,000 people, against plans to rehabilitate the long-defunct BNPP.

Going ahead despite opposition

Nonetheless, there has been enthusiastic support from some quarters of the domestic political arena for the revival of BNPP operations. According to a Philippine lawmaker, it might take three years to restart BNPP, but even after this is achieved, the country would need to build more NPPs to ensure long-term energy security. Support for restarting BNPP was backed by conclusions reached by an International Atomic Energy Agency mission in 2008 that the plant could be refurbished and operated economically and safely for 30 years. Moreover, according to local studies, reviving BNPP operations could generate electricity at 2.50 pesos per kilowatts per hour (kWh) – 2 pesos less than the average for coal-fired power plants.

Despite strong opposition from some quarters, the Philippine authorities appeared determined to restore operations at BNPP, having taken incremental steps towards this objective. This was largely spurred by an anticipated electricity shortfall by 2010-2011. In mid-May 2009, Pio Benavidez, senior vice-president of the National Power Corporation (NAPOCOR), stated to the press that Manila would spend about US$ 800 million to revive BNPP. Earlier in 2009, NAPOCOR had signed an agreement with the Korea Electric Power Corporation (KEPCO) to conduct a pre-feasibility study on BNPP, which would be completed by October 2009, barring unforeseen circumstances. In early June 2009, House Bill 4631 (the 'Bataan Nuclear Power Plant Commissioning Act of 2008') which seeks to validate whether BNPP could be rehabilitated and commercially operated or shut down, was submitted to the plenary of the House of Representatives despite resistance from some constituencies.

Thailand

Thailand's interest in nuclear power is mainly spurred by growing domestic electricity demands. Since 1977 under a United States-supported programme, Thailand has had experience in operating a small research reactor. In June 2007, Bangkok announced plans for a single 4,000-MWe NPP, with construction due to begin in 2015 and ready for commission by 2020. Nuclear power is envisaged by the Thai government to constitute 5 per cent of the overall national power mix by 2020, and 10 per cent in 2021.

Bangkok powering ahead

To date, significant progress had been made by the Thai authorities, through firmer central government support and realistic energy projections, towards realising the project. To finance the preparatory work, construction and promote public acceptance,

Bangkok in April 2008 established a nuclear energy development fund which originates from power consumption taxes. Also, in September 2008, the Electricity Generating Authority of Thailand (EGAT) sent about 20 personnel to Japan for overseas training and orientation in nuclear power operations, and was where Thailand drew inspiration from for nuclear development. This move was made in readiness for the completion of a 20-month feasibility study, which was conducted in late 2008 with American support.

In November 2008, EGAT announced that a decision on whether to pursue the programme would be reached by late 2011.

The Thai authorities had also appeared to ramp up popular support for nuclear energy development through public awareness campaigns. One such example was the August 2008 National Science and Technology Fair – dubbed the largest national science and technology exhibition – in which no less than four booths attempted to disseminate knowledge about nuclear energy to youths, in particular. Since December 2008 the authorities have embarked on site surveys, taking into account community resistance; and in April 2009, four provinces were identified as potential locations for the NPP. Barring any unforeseen circumstances, Thailand's NPP project looks set to take off.

"Compared to hydroelectric power, which currently satisfies more than half of national energy needs, nuclear power is clearly favoured by Hanoi. Nuclear power falls within a hefty national energy investment plan for 2009. A major chunk of the effort was directed to make up the projected shortfalls in electricity production and to provide power to all rural households by 2020, thus furthering socio-economic development."

Vietnam

Hanoi's interest in nuclear energy is not new, having already operated a small research reactor at Da Lat with Russian technical assistance. Vietnam's quest for nuclear power was necessitated by growing domestic electricity consumption, which is expected to grow from 40 billion kWh in 2003 to 100 billion kWh in 2010.

Compared to hydroelectric power, which currently satisfies more than half of national energy needs, nuclear power is clearly favoured by Hanoi. Nuclear power falls within a hefty national energy investment plan for 2009. A major chunk of the effort was directed to make up the projected shortfalls in electricity production and to provide power to all rural households by 2020, thus furthering socio-economic development. As part of the plans to meet increasing needs, the Vietnamese government announced in February 2006 that a 2000-MWe NPP would be built and operational by 2020. However, this plan was later altered to a total of four 1000-MWe NPPs instead – the first of which is to be operational by 2020, with the remaining three by 2021-2024.

Nuclear power almost guaranteed for Vietnam

To demonstrate its resolve, the Vietnamese authorities established an Atomic Energy Law which, according to the Vietnamese Ministry of Science and Technology, took effect from 1 January 2009. This 11-chapter, 93-article legislation essentially outlined various responsibilities of the relevant institutions and, more importantly perhaps, safety and security matters in NPP operations. Phan Minh Tuan, the head of the nuclear project's investment board, stressed the 'safety first' theme during a visit in September 2008 to the central province of Ninh Thuan, the site chosen for the two 1000-MWe NPPs (NT-1). The NT-1 project, according to Tran Huu Phat, chairman of the Vietnam Atomic Energy Commission, should be licensed in 2012-2013.

As preparatory work was ongoing for the first two NPPs, a pre-feasibility study for the other two NPPs, designated NT-2, would be submitted for government approval sometime in 2009. In all, a total nuclear capacity of 10,000 MWe was planned by 2030, followed by 20,000 MWe in a decade's time. Hot on the heels of its nuclear development, the Vietnamese government was reported in April 2009 to be earmarking a total of US$ 117.6 million for a nuclear science and technology training programme designed to produce a sufficient number of skilled manpower to operate and maintain the first NPP by 2020.

Like Thailand, Vietnam's nuclear power project has gained strong government commitments. Thus, it would be safe to assume that Hanoi's nuclear quest would remain at the forefront of Southeast Asia's nuclear development alongside Bangkok's.

Malaysia

Kuala Lumpur has been showing keen interest in the nuclear option, in large part attributed to a desire to reduce dependence on fossil fuels and to meet future demands. However, the pressure on Malaysia to adopt nuclear energy is not as much compared with its neighbours, given its status as one of the world's major oil and gas producers. Nevertheless, the nuclear option remains attractive for the country,

in view of depleting global fossil fuel supplies, which would become more costly. Moreover, other alternative energy sources are judged to be either too expensive or unreliable in ensuring energy security.

In October 2008, a proposal outlining directions on nuclear power for Malaysia was submitted for deliberation by the Cabinet. It was then mentioned by Deputy Science, Technology and Innovation Minister Fadillah Yusof that nuclear energy for Malaysia would only become a reality after 2020.

A comprehensive study on the national energy policy, including consideration of nuclear energy, is still in progress and due for completion before 2010. In late May 2009, head of the energy unit of state-owned utilities Tenaga Nasional Bhd Dr Zamzam Jaafar announced the Malaysian government's intention to commission its first NPP by 2025, and that KEPCO would embark on a pre-feasibility study. It would appear that pursuing the nuclear option is inevitable for Malaysia.

At a briefing held in Terengganu in early June 2009, Dr Jaafar remarked that the nuclear path would be essential to ensure reliable and affordable electricity supplies. Around the same time, Malaysian Prime Minister Najib Tun Razak expressed his country's interest in emulating South Korea in operating a small-scale NPP, touted to be safe and costing one-third of that for coal-fired power plants in electricity generation.

Other ASEAN Countries

The allure of nuclear power appears irresistible to some other ASEAN countries. Singapore as well as the less-developed Cambodia emerged lately as perhaps the most unlikely aspirants for nuclear energy. This was mostly driven by pragmatic considerations with regard to future fossil fuel supplies, rising costs and geopolitical complications.

Nuclear power on Singapore's radar

Back in November 2008, members of the International Advisory Panel on Energy proposed that nuclear power could form part of Singapore's evolving energy strategy, adding also that nuclear research and eventually an NPP should not be precluded from Singapore's long-term energy options.

In fact, the nuclear option was already studied by the Singapore government. Minister for the Environment and Water Resources, Dr Yaacob Ibrahim, pointed out during a parliamentary meeting in February 2009 that while nuclear energy represented an alternative option for Singapore, safety issues remain for the island-state in view of its small size and high population density.

Phnom Penh mulls nuclear power

Nuclear power has been tipped as an appealing choice to fuel Cambodia's small but growing economy. During his first Cabinet meeting in September 2008, Prime Minister Hun Sen expressed hopes to build a NPP to meet future energy demands and reduce reliance on imported oil. Later that same month, local newspaper *Phnom Penh Post* reported that Cambodia might develop its first NPP as early as 2020.

However, given the fact that Cambodia remains one of the poorest countries in the world, and notwithstanding recent economic growth, such prospects look unlikely. Nonetheless, as one of the first steps towards the nuclear path, the Cambodian authorities in March 2009 approved a law banning the production, possession or transport of nuclear and other weapons of mass destruction on its home soil. This non-proliferation stance could be seen as a precursor to future nuclear plans.

Cause for Optimism

The current global scramble for nuclear energy is a trend that is indicative of the limitations of harnessing other renewable energy types for short-term purposes. Nuclear energy, therefore, constitutes an especially appealing choice for countries which wish to reconcile energy supply needs with the requirement to exercise environmental responsibility – a quandary from which ASEAN would not be able to escape in the long run.

In the absence of viable options in other forms of alternative energy sources, nuclear energy was identified as the way to go. Despite avid regional support, progress has been uneven among the major ASEAN nuclear aspirants.

Major ASEAN nuclear aspirants such as Indonesia and to some extent, the Philippines, continue to experience intense domestic debates among politicians and civil society on the feasibility of inducting nuclear energy. Lack of political will could help explain the slow, arduous pace of nuclear energy development in these two countries.

In stark contrast, Bangkok and Hanoi appear to possess the political resolve to realise their nuclear goals, as evident in the notable progress they had made to date. In Malaysia, which is slowly joining the league of major ASEAN nuclear aspirants, the political commitment also appears to be considerable. On the whole, nuclear energy development in Southeast Asia has a generally positive outlook.

However, this positive outlook would translate into reality only if a host of challenges could be

surmounted. Pragmatic considerations such as economic and technical viability aside, the wave of opposition against nuclear energy in Indonesia and the Philippines is representative of inherent public suspicions grounded in issues of nuclear safety and institutional transparency. These revolve around the notion of public acceptance and governance, and would be explored in the next part of this NTS Alert on nuclear power in Southeast Asia.

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