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## **Nuclear Safety in Southeast Asia: Lessons from the Nuclear Pioneers**

*By Julius Cesar I. Trajano*

### **Synopsis**

*Southeast Asian states interested in acquiring nuclear energy may take lessons from the cumulative experience of 31 nuclear-powered states gained over the past 60 years. They need to study evolving international frameworks on safety regulation, human resources development and waste management.*

### **Commentary**

NUCLEAR POWER is now enjoying a period of popularity worldwide, particularly in Asia. While the Fukushima accident in 2011 tempered what could have been an unprecedented nuclear energy growth in the region, the global nuclear industry is now pinning its hopes on Asian economies, as highlighted in the recently concluded Nuclear Power Asia Summit in Kuala Lumpur.

There are now 439 nuclear reactors operated by 31 countries; two-thirds of the 69 nuclear reactors under construction are in Asia, led by China, India and South Korea. A growing number of countries in Southeast Asia are considering building nuclear power plants to meet increasing energy needs of their growing economies while decreasing their greenhouse gas emissions.

### **Nuclear newcomers and regulatory independence**

Taking pride in its nuclear energy preparatory plan, Vietnam is determined to commission its first NPP after 2020, while Malaysia has started conducting a feasibility study on exploiting nuclear energy including public acceptance. Nuclear planning agencies in Indonesia and Thailand have come up with their respective nuclear energy proposals. As part of the process of evaluating the use of nuclear energy, Indonesia is planning to build a small experimental power reactor.

Given the dramatic improvements that have been made to nuclear safety all over the world since the Fukushima accident, there are valuable lessons that nuclear 'newcomers' in Southeast Asia can derive from nuclear-powered states in ensuring safe commissioning of NPPs.

IAEA's chief, Mr Yukiya Amano, himself has repeatedly emphasised that regulatory independence leads to greater transparency and improves public acceptance. The Fukushima accident accentuated

the importance of an independent nuclear safety regulatory body. The Japanese parliament's investigation on the accident concluded that collusive relationships between Fukushima plant operators, ministries promoting nuclear energy, and government regulators compromised safety.

Hence, a new regulatory framework was approved by the parliament, establishing an independent Nuclear Regulation Authority whose enhanced mandate now includes upholding transparency in conducting NPP safety inspections and decision-making independent from the interference of nuclear industry and ministries. Meanwhile, the U.S. Nuclear Regulatory Commission has studied the lessons of Fukushima accident and has since enhanced its regulatory function with the utilisation and implementation of new technology, safety protocols and emergency procedures.

In Southeast Asia, Vietnam which has the most advanced NPP plan in the region, has yet to legislate a framework on regulatory independence. Vietnam's regulatory body is just 'partly independent' as it remains under the Ministry of Science and Technology, the chief promoter of nuclear energy, while it does not have control over NPP construction and operation licenses. Vietnam, Malaysia and Indonesia still need to legislate domestic laws for them to effectively implement and comply with IAEA's conventions on nuclear safety and emergency preparedness for nuclear accidents.

### **Human resources development**

Another issue that arises early in the planning is the need for an experienced nuclear workforce, which probably does not exist when the decision is taken to introduce nuclear power. Several nuclear-powered states such as France and the United States have developed robust education and training programmes to maintain a local pool of nuclear engineers and technicians and ensure knowledge transfer from an aging nuclear workforce to the next generation of workers.

France created the International Institute of Nuclear Energy which brings together academic institutions, research organisations and nuclear companies in order to come up with the best solutions in education and training for the development of human resources in nuclear energy. The US Department of Energy's Nuclear Energy University Programmes engages US colleges and universities to support student education thereby helping to sustain a world-class nuclear energy workforce.

Both the US and French governments have established programmes that facilitate collaboration between the nuclear industry, academe and research institutions. By doing so, the needed skills and technology in the nuclear industry are addressed by educational and research institutions while funding and future employment of nuclear engineering students are provided by the nuclear industry.

From a long-term perspective, ASEAN states may emulate the French and US capacity-building programmes in sustaining a local pool of highly qualified nuclear engineers and technicians. Unlike three decades ago, specialised knowledge is now accessible via international and bilateral cooperation to help new-comers establish human infrastructure. Nuclear technology exporters like France and the US offer short and long-term education and training programmes to foreign countries. Evidently, this has been a selling strategy of nuclear exporting states but ASEAN states may consider participating in these capacity-building programmes. For instance, Russia and Japan, which both have nuclear commercial deals with Vietnam, have been training Vietnamese students.

### **Nuclear waste management**

The failure of advanced NPP states to address the disposal of high-level nuclear waste (i.e., spent/used reactor fuel) from the day they started exploring nuclear energy should serve as crucial take-away for newcomers in Southeast Asia. Presently, there is still no final repository site for high-level waste accumulated globally over six decades. Nevertheless significant progress has been made in France and Finland in developing deep geological disposal sites.

But the IAEA has strongly advised newcomers in Asia to first address the waste issue by developing national policy and infrastructure for radioactive waste management, even before commissioning NPPs. Vietnam, in fact, has yet to come up with a permanent disposal strategy. As part of its nuclear deal with Moscow, its future spent fuel will be reprocessed in Russia but the treated wastes will still be returned to Vietnam which will still require a disposal facility.

Indeed, a nuclear energy programme is a long-term commitment that may take decades from planning, through construction, to operation, waste management and capacity building. It is a sophisticated technology that requires rigorous planning, yet new-comers now can stand on the cumulative experience of 30 nuclear-powered states acquired in the past six decades.

In upholding the culture of nuclear safety in Southeast Asia, one important key is for the ASEAN countries to examine the milestones that have been achieved by the pioneers of civilian nuclear energy and their expensive mistakes that should now be avoided.

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