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## **Fukushima Six Years After: East Asia's Nuclear Energy Conundrum**

*By Julius Cesar Trajano*

### **Synopsis**

*Human factors such as complacency and lack of questioning attitude have been identified as key contributors to the Fukushima nuclear disaster. But six years after the incident, East Asian states have yet to address human factors to make nuclear energy safe and secure in the region.*

### **Commentary**

JAPAN COMMEMORATED the sixth anniversary of the Fukushima-Daiichi nuclear disaster on 11 March 2017. Since the tsunami-triggered disaster, qualified observers assess that the biggest risk associated with nuclear power comes not from the technology of the infrastructure but from human factors. The Fukushima incident must be regarded as a technological disaster triggered not just by “unforeseeable” natural hazards (earthquake, tsunami), but also human errors.

Comprehensive reports on Fukushima, including findings made by the Japanese parliament and the International Atomic Energy Agency (IAEA), examine how human factors such as the complacency of operators due to ‘safety myth’, the absence of regulatory independence from the nuclear industry, and reluctance to question authority all contributed to the “accident”. The Fukushima incident, like others before it, accentuates the utmost importance of addressing human and organisational factors so as to prevent nuclear accidents from occurring, or mitigate their consequences if they do occur.

### **Human Errors Compromising Safety-Security Culture**

Critical to the development and wider use of nuclear technology in both power and

non-power applications is the availability of “soft infrastructure” which involves qualified human resources. While both nuclear safety and nuclear security consider the risk of inadvertent human error, nuclear security places additional emphasis on deliberate acts that are intended to cause harm. The principal shared objective of security culture and safety culture is to contain the risk resulting from nuclear materials and associated facilities.

This objective is largely based on common principles, e.g. a questioning attitude and rigorous and prudent approaches to prevent complacency. Avoiding complacency is essential to ensuring nuclear safety and security and can be achieved by instilling a questioning attitude in every staff -- from the operator at a nuclear reactor challenging a ‘safety-myth’ assumption of his superiors, to the doctor in a cancer treatment centre questioning an unexpected change in treatment parameters.

However, despite the post-Fukushima technological improvements that have been made by the nuclear industry, nuclear safety culture and security culture among nuclear operators and regulators still need to be deepened. Major users of nuclear power in East Asia, for instance, have yet to strengthen human and organisational factors that contribute to safety and security, including the complexity of the interrelationships between them.

China's National Nuclear Safety Administration (CNNSA) in October 2016 made public 16 safety failures that occurred in China's nuclear plants during the year, all involving breach of operational guidelines and mistakes made by power plant staff members, although the incidents did not result in a radioactive leak, sabotage, or pose a direct public safety and security threat.

Meanwhile, according to the IAEA's Integrated Regulatory Review Service (IRRS) to Japan's Nuclear Regulation Agency (NRA), the questioning attitude of the NRA staff is still lacking, which serves as a stumbling block to strengthening safety culture in Japan's nuclear facilities despite the lessons derived from the causes of the Fukushima accident. The IAEA report recommends that the training for inspectors should take a holistic approach and include the development of a questioning attitude.

### **Implications for Southeast Asia**

The rising nuclear safety concerns in China, particularly over human factors have implications for the region. While there are no nuclear plants currently in Southeast Asia, a nuclear disaster in China may still affect the region in light of Chinese nuclear power plants located near Vietnam and possible future deployment of offshore reactors in the South China Sea. The cancellation of Vietnam's Ninh Thuan NPP project should not stall the regional efforts to build joint nuclear emergency preparedness and response in ASEAN.

Vietnam and the rest of Southeast Asia should stay vigilant and be prepared for a nuclear incident near the region's borders. Three Chinese nuclear stations are located near the Vietnamese border and one of them, Yangjiang NPP in Guangdong Province, has recorded an operational blunder and subsequent cover-up attempt by operators in 2015.

Northeast Asian states have been viewed as key nuclear vendors while Southeast Asia is seen as a potential market for nuclear technology. While Vietnam has cancelled its NPP project, nuclear plans in Malaysia, Indonesia, the Philippines and Thailand remain in place while awaiting their national decisions. As China has embarked on rapid nuclear power development with 36 nuclear power reactors in operation, with 21 under construction, and more about to start construction, it has also been promoting its nuclear technology overseas, including in Southeast Asia.

For instance, China General Nuclear Power Corp (CGN), which owns and operates Yangjiang NPP, has already set up a representative office in Thailand and its regional headquarters for Southeast Asia in Malaysia to enhance its cooperation on nuclear power with ASEAN Member-States. Since 2015, CGN has been co-organising, together with ASEAN Centre for Energy, the ASEAN-China Capacity-Building on Nuclear Energy Workshop. Through the annual capacity-building workshop, CGN works with ASEAN to carry out nuclear technical training with the objective of sharing CGN's experience in developing nuclear energy.

Like China, Japan has also been promoting its nuclear reactor technology to Southeast Asia and was supposed to build Vietnam's second NPP by 2030 prior to Hanoi's decision to scrap its NPP projects. Japan's nuclear agencies such as Japan Atomic Energy Agency and Japan Atomic Energy Commission have been providing robust technical training assistance to the Philippines, Malaysia, Vietnam, Indonesia and Thailand in improving their capacity to enhance nuclear safety and security.

### **Regional Cooperation and Safety-Security Culture**

To make the ASEAN's capacity-building cooperation with China and Japan more comprehensive, it is indeed important to complement technical training on nuclear energy with human resource development, especially human and organisational factors in nuclear safety and security, based on key lessons from Northeast Asian nuclear industry. While there are no NPPs yet in Southeast Asia, radioactive sources are already being widely used in industrial factories, research reactors, universities and hospitals in the region.

It is therefore crucial to include human factors in the joint activities, technical workshops, and meetings of the ASEAN Network of Regulatory Bodies on Atomic Energy (ASEANTOM) and the ASEAN Nuclear Energy Cooperation-Subsector Network (NEC-SSN). With the transboundary risks of nuclear accidents or stolen radioactive sources ever present, it is indeed urgent for ASEAN Member States to apply the lessons from Japan and China by collectively building the necessary skills and mindset that will discourage complacency and promote a questioning attitude in using nuclear energy.

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