



Nuclear Governance in the Asia Pacific Challenges, Old and New

**A Conference Report of the
Nuclear Energy Experts Group Meeting**

**by
David Santoro**

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Key Findings and Recommendations

Nuclear Energy Experts Group

February 27-28, 2017, Singapore

The Pacific Forum CSIS, with support from the Carnegie Corporation of New York and in collaboration with Singapore's S. Rajaratnam School of International Studies, held the Sixth Nuclear Energy Experts Group (NEEG) Meeting in Singapore on Feb. 27-28, 2017. About 35 senior scholars and officials as well as 6 Pacific Forum CSIS Young Leaders attended, all in their private capacity. The off-the-record discussions focused on nuclear power development and nuclear governance in the Asia Pacific, the physical protection of nuclear facilities, cyber nuclear security threats, radioactive source management, and public opinion and education and training. Key findings from this meeting include:

Nuclear power development is uneven in the Asia Pacific. While it is flourishing in China and India (and plants are slowly re-opening in Japan), the prospects for expansion elsewhere in the region are bleak. Taiwan plans to close its plants within the next ten years and it is unlikely that any plant will operate in Southeast Asia before the 2030s, at the earliest.

The 2016 decision by Vietnam to suspend its nuclear power plant project was made because of rising costs, lower power demand projections, and a need to further develop human resources and infrastructure. Given Hanoi's considerable investment in the project, this decision is a reminder of the difficulty (and costs) involved in opting for nuclear energy.

The Vietnamese decision could have negative spillover effects on similar projects in Southeast Asia, all of which are much less advanced. Nevertheless, the Philippines has made clear it remains committed to its project to revive its Bataan nuclear power plant, and others continue to express interest in nuclear energy.

Russia is increasingly reaching out to provide nuclear assistance throughout the region. Cambodia, Myanmar, and Laos have recently signed nuclear cooperation agreements with Russia.

As large nuclear power facilities are seen negatively due to excessive cost and public resistance, "small modular reactors," either floating or land-based, may be attractive options, especially for Southeast Asia. Yet beyond safety and security concerns, there are political, legal, and environmental issues that require research to assess their desirability and feasibility. Liability and transportation are also key concerns.

The four Nuclear Security Summits have helped raise awareness on the importance of securing nuclear and radioactive materials, universalizing several international benchmarks, and improving understanding of the interface among nuclear safeguards, safety, and security, known as the 3 S's.

The nuclear security regime is based on a patchwork of largely voluntary standards and there is little appetite for a treaty imposing stringent requirements on states. The best way

to improve the regime is a bottom-up approach that encourages compliance with standards outlined in IAEA Nuclear Security Series No. 20.

The radiological security regime is weak and poorly implemented in many parts of Asia. There are also few regional initiatives and national measures to address radiological security. Given that all regional states use radioactive sources, it is paramount that they build up this regime and explore alternatives to the most sensitive sources.

ASEANTOM and the ASEAN Nuclear Energy Cooperation Sub-Sector Network have a key role to play in developing a sense of awareness on nuclear and radiological security and safety among Southeast Asian states. Workshops can help enhance capacity.

Radioactive source materials are problematic because there is a lack of national policy and liability laws regarding improper disposal. There is also a general perception that alternative sources are more expensive. Fortunately, the development of national policies to enhance source accounting methods and create greater penalties for improper disposal have improved compliance in some states. Additionally, with recent innovations in accelerator technology, the cost of alternative sources is becoming less prohibitive.

Strengthening nuclear and radioactive security begins with improving the physical security of key facilities, which means management must be aware of the potential risks and threats and deploy the appropriate measures to combat them. Facility management must also “own” the responsibility of any problem that may arise.

Nuclear and radioactive security involves protecting against cyber attacks, a growing problem that still remains largely ignored today. In the first report of its kind published last year, the Nuclear Threat Initiative explores ways to address the cyber-nuclear nexus.

Including cyber threats to nuclear power facilities within the context of the overall cyber threat to critical infrastructure helps ensure the issue receives proper attention in response planning and management. However, the unique remediation requirements associated with nuclear power facilities require special attention in preventing cyber-attacks.

Public education and training is paramount to alleviate fears about nuclear power. A key to success is deep collaboration between nuclear regulators and operators. Another is trust between government authorities and the public.

Nuclear Governance in the Asia Pacific Challenges, Old and New

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By David Santoro*

The Pacific Forum CSIS, with support from the Carnegie Corporation of New York and in collaboration with Singapore's S. Rajaratnam School of International Studies, held the Sixth Nuclear Energy Experts Group (NEEG) Meeting in Singapore on Feb. 27-28, 2017. About 35 senior scholars and officials as well as 6 Pacific Forum CSIS Young Leaders attended, all in their private capacity. The off-the-record discussions focused on nuclear power development and nuclear governance in the Asia Pacific, the physical protection of nuclear facilities, cyber nuclear security threats, radioactive source management, and public opinion and education and training on nuclear issues.

Nuclear power development in the Asia Pacific

Julius Trajano (S. Rajaratnam School of International Studies, Singapore) kicked off our meeting by discussing the current status of and future plans for nuclear power development in the Asia Pacific. Nuclear power development is vastly uneven in that region. While it is flourishing in China and India (and plants are slowly re-opening in Japan), the prospects for expansion elsewhere are bleak. Taiwan plans to close its plants within the next ten years and it is unlikely that any plant will operate in Southeast Asia before the 2030s, at the earliest.

The 2016 decision by Vietnam to suspend its nuclear power plant project was made because of rising costs, lower power demand projections, and a need for a longer timeframe to develop human resources and infrastructure. Given Hanoi's considerable investment in the project, this decision is a reminder of the difficulty (and costs) involved in opting for nuclear energy. The Vietnamese decision could have negative spillover effects on similar projects in Southeast Asia, all of which are much less advanced. The Philippines, however, has made clear that it remains committed to its project to revive its Bataan nuclear power plant. Other Southeast Asian states also continue to express interest in nuclear energy. Russia is exploiting that interest. Moscow has been increasingly reaching out to provide nuclear assistance throughout the region. Cambodia, Myanmar, and Laos have all recently signed nuclear cooperation agreements with Russia.

Because large nuclear power facilities are seen negatively due to excessive cost and public resistance, Anthony Wetherall (National University of Singapore) stressed that small modular reactors (SMR), also known as transportable nuclear power plants (TNPP), may be more attractive options, especially for Southeast Asia. SMR/TNPP can be either floating or land-based facilities and are considerably less expensive than "regular" facilities. Yet beyond safety and security concerns, there are numerous

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political, legal, and environmental issues that require research to assess their desirability and feasibility. Liability and transportation are also key concerns.

Nuclear governance in the Asia Pacific and the physical protection of nuclear facilities

Manpreet Sethi (Center for Air Power Studies, India) pointed out that the four Nuclear Security Summits (NSS) have helped raise awareness on the importance of securing nuclear and radioactive materials, universalizing several international benchmarks, and improving understanding of the interface among nuclear safeguards, safety, and security, known as the 3 S's. The NSS have also promoted voluntary reporting and the sharing of information and best practices to facilitate international cooperation. Moreover, they have helped increase understanding of key linkages. For instance, the NSS' interest has expanded from the sole protection of nuclear materials to also include the security of radiological sources and nuclear facilities, as well as transportation issues. The security of sensitive information pertaining to nuclear and radiological materials has also increasingly been taken into account and, as will be discussed at more length below, so have the threats of cyberattacks and ways to counter them.

Still, the nuclear security regime is and remains based on a patchwork of largely voluntary standards. The same is true of the nuclear safety regime. Only the safeguards/nonproliferation regime imposes legally-binding requirements (subject to verification) on states. While the International Agency Energy Agency (IAEA) may take on a role to help further improve the nuclear security regime, its prospects for success are dim because the Agency suffers from budgetary limitations and lack of enforcement authority. As a result, some have argued for a separate, overarching nuclear security treaty framework, but states are unlikely to accept it because of sensitivity issues and fear that a treaty would impose burdensome regulations. There is also the risk that a new treaty may end up less demanding than current voluntary standards. In these circumstances, the best way to improve the nuclear security regime seems to adopt a bottom-up approach that encourages compliance with the (voluntary) standards outlined in IAEA Nuclear Security Series No. 20.

Yutthana Tumnoi (Office of Atoms for Peace, Thailand) gave a presentation on the ASEAN Network of Regulatory Bodies on Atomic Energy. He explained that ASEANTOM, which aims to strengthen nuclear safety, security, and safeguards, can and should play a key role in the Asia Pacific to help build the nuclear security regime. Research is needed, however, to identify how ASEANTOM's specific role would be most valuable to strengthen the regime.

Jorshan Choi (UC Berkeley Nuclear Research Center) and Douglas Osborn (US Department of Energy) explained that strengthening nuclear (and radioactive) security should begin with improving the physical security of key facilities. Doing so requires facility management to be aware of the potential risks and threats and deploy the appropriate measures to combat them. Facility management must also "own" the responsibility of any problem that may arise.

Cyber nuclear security threats

Based on the findings of the NTI Project on Priorities for Cybersecurity at Nuclear Facilities (see: www.nti.org/about/projects/priorities-cybersecurity-nuclear-facilities), Page Stoutland (Nuclear Threat Initiative) explained that cyber threats are becoming a major security challenge, including to nuclear facilities. Many nuclear facilities have already been the subject of cyberattacks, in Asia and Europe. This is not surprising given that nuclear facilities are heavily dependent on digital systems. Cyberattacks on such facilities are a considerable challenge because they can have physical consequences, as the Stuxnet experience has shown.

At present, there is no overarching strategy to address cyber threats to nuclear facilities. There is also a lack of global technical capacity to deal with this problem. “Air gaps,” i.e., network isolation, are often advanced as an option to protect against cyberattacks. Experts point out that this is not an effective strategy, however, because air gaps can be bridged using removable media (such as flash drives) and because all systems need regular online upgrades. Air gaps also do not take into account the insider threat. With these considerations in mind, NTI has identified four policy recommendations to improve cybersecurity in nuclear facilities. They include: 1) institutionalizing of cybersecurity; 2) mounting an active cyber defense; 3) reducing systems complexity (because complexity is “the enemy of security”); and 4) pursuing transformation through the establishment of new, modern systems, including non-digital systems. These recommendations are described in the NTI report “Outpacing Cyber Threats – Priorities for Cybersecurity at Nuclear Facilities,” accessible at https://www.nti.org/documents/2119/NTI_CyberThreats_FINAL.pdf

During the discussion, it quickly became clear that including cyber threats to nuclear power facilities within the context of the overall cyber threat to critical infrastructure can help ensure the issue receives proper attention in response planning and management. The unique remediation requirements associated with nuclear power facilities require special attention in preventing cyber-attacks, however.

Radioactive source management

Miles Pomper (James Martin Center for Nonproliferation Studies), Zhu Xuhui (China Arms Control and Disarmament Association), and Wen-Chuan Chen (Taiwan independent consultant) discussed the threat of radiological terrorism, the radiological security regime, and more broadly the problems associated with radioactive source materials. All concurred that the threat of radiological terrorism remains a considerable challenge to international security and that this threat is rapidly evolving. Even after the work undertaken as a result of the NSS process, much more remains to be done to prevent non-state actors from obtaining radioactive materials that can be used for malicious purposes. The main problem is that the radiological security regime is weak, even in comparison with the nuclear security regime. It is also poorly implemented, in general and in many parts of Asia in particular. There are also few regional initiatives and national measures to address radiological security. Given that all Asian states use

radioactive sources, it is paramount that they contribute to building up this regime and, insofar as possible, that they explore alternatives to the most sensitive sources. This should be a priority for the region. Significantly, ASEANTOM and the ASEAN Nuclear Energy Cooperation Sub-Sector Network have a key role to play in developing a sense of awareness on nuclear and radiological security and safety among Southeast Asian states. Specialized workshops on these topics can help enhance capacity and should therefore be considered by regional states.

More generally, radioactive source materials are problematic because there is a lack of national policy and liability laws regarding improper disposal. There is also a general perception that alternative sources are more expensive. Fortunately, the development of national policies to enhance source accounting methods and create greater penalties for improper disposal have improved compliance in some states. Additionally, with recent innovations in accelerator technology, the cost of alternative sources is becoming less prohibitive.

Public opinion and education and training

Emily Larson (US Nuclear Regulatory Commission) and Bum Jin-Chung (Kyung Hee University, Korea) both explained that public engagement is paramount to alleviate fears about nuclear power, which is often widespread, including in the Asia Pacific. A key to success is deep collaboration and trust between nuclear regulators and operators. Another is trust between government authorities and the public at large: public involvement in, and information about, a nuclear regulatory body's activities is the cornerstone of strong, fair regulation of the nuclear industry.

Appendix A

COUNCIL FOR SECURITY COOPERATION IN THE ASIA PACIFIC Nuclear Energy Experts Group Meeting, Feb. 27-28, 2017, Singapore

Agenda

Sunday, February 26, 2017

18:30 **Opening Dinner**

Monday, February 27, 2017

8:30 **Registration**

9:00 **Session 1: Nuclear power development in the Asia Pacific**

This session will discuss the status of nuclear power development and plans in the Asia Pacific. What are the prospects of nuclear power growth in the Asia Pacific? What is the outlook in Southeast Asia? What is the significance of Vietnam's recent decision to scrap its nuclear power project? Which new technologies have the greatest potential for making nuclear energy more easily accessible to newcomers?

Presenters: Anthony Wetherall; Julius Trajano

10:45 **Coffee Break**

11:00 **Session 2: Nuclear governance in the Asia Pacific**

This session will explore options for nuclear governance in the Asia Pacific. How can nuclear governance be improved in the region? What role can INFCIRC/869 play in implementing international commitments? Is there value in establishing a new "connect framework" to enhance cooperation and information-sharing? Could the ASEAN Network of Regulatory Bodies on Atomic Energy fulfill that role? What would this entail? What roles should the nuclear security centers of excellence play?

Presenters: Manpreet Sethi; Yutthana Tumnoi

12:30 **Lunch**

13:45 **Session 3: Physical protection of nuclear facilities**

This session will explore ways to ensure and strengthen the physical protection of nuclear facilities. What are the international standards for the physical protection of nuclear material and facilities? How are these rules and norms implemented in the Asia Pacific? What are the challenges? What role does nuclear security culture play in enhancing physical protection standards?

Presenters: Jorshan Choi; Douglas Osborn

15:15 **Coffee Break**

15:30 **Session 4: Cyber nuclear security threats**

This session will examine cyber nuclear security threats and ways to address them. What are the cyber threats to nuclear facilities? What is the current approach to address them? Looking to the future, what should be the priorities for governments and industry to counter these threats? What is the outlook in the Asia Pacific?

Presenter: Page Stoutland

17:00 **Session adjourns**

18:30 **Dinner**

Tuesday, February 28, 2017

9:00 **Session 5: Radioactive sources management**

This session will look at ways to manage radioactive sources in a safe and secure manner. What are the institutional/legal measures at the national, regional, and international levels? How much have Asian countries signed up to or fulfilled them? Are these measures sufficient? How are disused sources managed in the Asia Pacific? What are the alternatives to radioactive sources?

Presenters: Miles Pomper; Zhu Xuhui; Wen-Chuan Chen

10:30 **Coffee Break**

10:45 **Session 6: Public opinion and education and training**

This session will explore the role of public opinion as well as education and training on nuclear power and nuclear accident/incident response. What communication strategies are most effective to deal with public doubts and fears about nuclear power and nuclear and radioactive waste? What messages should be conveyed? Who should convey these messages? What is the role of education and training? What forms should they take?

Presenters: Emily Larson; Bum-Jin Chung

12:00 **Wrap-Up and Next Steps**

This session will summarize the meeting's key findings and reflect on next steps to enhance nuclear safety and security governance in Asia.

12:30 **Lunch**

13:30 **Meeting Adjourns**

Appendix B

COUNCIL FOR SECURITY COOPERATION IN THE ASIA PACIFIC Nuclear Energy Experts Group Meeting, Feb. 27-28, 2017, Singapore

Participant List

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University of California, Berkeley
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