COUNCIL FOR SECURITY COOPERATION IN THE ASIA PACIFIC
Nuclear Energy Experts Group

Institutionalizing Nuclear Governance in the Asia Pacific

Saigon Da Lat Hotel, Vietnam
November 11-12, 2013

A Conference Report by
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The growth forecast for utilization of nuclear power has been revised downward in the Asia Pacific. The so-called 'nuclear renaissance' will not be as sweeping as many once predicted. Still, despite the March 2011 nuclear accident at the Fukushima Daiichi nuclear power plant in Japan, the region will experience *considerable* expansion in nuclear power plants in the foreseeable future and, with it, an important increase in nuclear materials, creating significant challenges to nuclear safety, security, and nonproliferation. Moreover, there is a growing concern surrounding the safe and secure management of radioactive sources in the Asia Pacific. In a region with several nuclear-armed states, where maritime and territorial disputes are severe and growing (and could increase proliferation pressures), where terrorism, insurgency, and piracy activity are important, and where border and export controls are relatively weak and a safety/security culture often lacking, it has become paramount – even urgent – to reflect on how nuclear governance can be strengthened.

To this end, the Nuclear Energy Expert Group (NEEG) of the Council for Security Cooperation in the Asia Pacific (CSCAP) met in Da Lat, Vietnam on Nov. 11-12, 2013, under the auspices of the CSCAP Study Group on Countering the Proliferation of Weapons of Mass Destruction in the Asia Pacific (the WMD Study Group). It brought together 36 specialists from 18 countries from throughout the Asia-Pacific region and beyond, all attending in their private capacity. They joined two days of off-the-record discussions on the nuclear safety and security regimes, the Nuclear Security Summit process, the Northeast Asian nuclear security centers of excellence, and the role of regional organizations to address nuclear safety and security. Participants also visited the Da Lat Nuclear Research Reactor, where they received briefings from scientists and technical staff affiliated with the facility.

The report that follows reflects the views of the chair; while it has been reviewed by all participants for accuracy, it is not intended to be a consensus document. Most meeting presentations are available at http://csis.org/event/nuclear-energy-experts-group-meeting-neeg

The Nuclear Safety Regime

Jorshan Choi (*University of California, Berkeley*) kicked off the meeting with an overview on the global nuclear safety regime, the role of the International Atomic Energy Agency (IAEA) in nuclear safety, and the relationship between nuclear safety and security. The global nuclear safety regime is an institutional, legal, and technical framework that involves several national players (regulators, industry, and technical organizations) and international entities (intergovernmental organizations such as the IAEA, global industry, multinational networks, and nongovernmental organizations). It consists of a number of conventions, codes of conduct, and ad hoc groups. The Convention on Nuclear Safety (CNS) is at the center of the global nuclear

safety regime. It is meant to achieve and maintain a high level of nuclear safety worldwide through enhancement of national measures and international cooperation. The CNS legally commits contracting parties to establish and maintain effective defense in nuclear installations against potential radiological hazards to protect individuals, society, and the environment.

The role of the IAEA in nuclear safety has expanded over time. While it only had an advisory function before the Chernobyl nuclear accident of April 1986, a Nuclear Safety Department was subsequently established and became the depositary for all nuclear safety conventions. After the Sept. 11, 2001 attacks against the United States, an Incident and Emergency Center was established and the Nuclear Safety Department began to address nuclear security. In the aftermath of the Fukushima Daiichi nuclear accident in March 2011, the role of the IAEA evolved again, with attempts, so far unsuccessful, to make its nuclear safety standards compulsory. In effect, the IAEA is gradually becoming the global focal point for emergency preparedness/response and research and development and capacity building.

Nuclear safety is important because even though the risks of a nuclear accident are low, the consequences can be disastrous. With the expansion of nuclear power (especially in the Asia Pacific), it is essential to work toward the harmonization of nuclear safety policies and regulations and toward effective and coordinated emergency preparedness/response. Even though nuclear safety requirements (which include greater openness and transparency) sometimes comes into conflict with nuclear security (which requires a measure of secrecy), it is also paramount to reconcile, insofar as possible, the two issues because the consequences of a nuclear safety accident and a nuclear security incident are the same. Of note, the responsibility for nuclear safety and security rests on the states.

Le Quang Hiep (*Ministry of Science and Technology, Vietnam*) focused his presentation on Vietnam's approach to nuclear safety and security. Vietnam uses a number of radioactive sources and possesses a pool-type 500KW research reactor for radioisotope production, neutron activation analysis, basic and applied research on nuclear physics, and scientific training. (The reactor was partially converted from highly enriched uranium (HEU) to low enriched uranium (LEU) by the IAEA and with US and Russian support in 2007 and the process was completed in mid-2013.) Vietnam is on the road to develop nuclear power, with the first nuclear power plant unit set to be put into operation in 2020 in Ninh Thuan Province.

Vietnam, therefore, takes nuclear safety and security (and nonproliferation) seriously. At the 2010 and 2012 nuclear security summits, the Vietnamese delegation expressed support for the Global Initiative to Combat Nuclear Terrorism (GICNT) and committed to implement stringent nuclear safety and security measures. In 2008, Vietnam's National Assembly adopted the 'Law on Atomic Energy' to regulate the safe, secure, and peaceful use of atomic energy, including the participation in and implementation of international nuclear treaties and conventions. In 2012, Vietnam ratified the Additional Protocol it had signed in 2007 and it acceded to the Convention on the Physical Protection of Nuclear Material (CPPNM); Vietnam also ratified the CPPNM Amendment that same year.

Vietnam's regulatory agency in charge of safeguards, safety, and security (the 3 S's) is the Vietnam Agency for Radiation and Nuclear Safety (VARANS), which sits under the Ministry of Science and Technology. Vietnam is installing security equipment under the Megaports Initiative and in cooperation with the IAEA, the European Union, and others to deter, detect, and interdict the illicit trafficking of special nuclear and other radioactive sources at seaports and other borders. In short, Vietnam is pursuing nuclear power and making sure to do so in a safe, secure, and proliferation resistant manner.

Sabar Bin Md Hashim (*Tenaga Nasional Berhad, Malaysia*) gave the presentation of Jamal Khaer Ibrahim (Malaysia Nuclear Power Corporation), who had to cancel his participation in the meeting at the last minute. He explained that Malaysia is heading toward an expansion of the peaceful applications of nuclear technology from traditional non-power sectors in industry, hence the creation of the Malaysia Nuclear Power Corporation (MNPC) in 2011 to function as the country's Nuclear Energy Program Implementing Organization (known as NEPIO in IAEA jargon). Placed under the Prime Minister's Cabinet, MNPC's main function is to plan and coordinate the implementation of a nuclear energy development program and take necessary actions to realize the development of the first nuclear power plant in Malaysia. A 12-year development plan was outlined to deliver a twin-unit nuclear power plant with an electricity generating capacity of 2,000 MWe, to be operational by 2022. This plan assumes there will be public acceptance for the project, Malaysia will ratify all relevant international treaties and conventions, an adequate regulatory framework will be put in place, and approval on plant sites will be obtained.

Malaysia is revising its 1984 Atomic Energy Licensing Act (Act 304) to become a 'new comprehensive nuclear law.' Malaysia's new law will enable the country to ratify or accede to the international treaties and conventions to which it is not yet a party. It will also provide for the establishment of a new, more independent national atomic energy regulatory commission. Significantly, the new law will also provide for a comprehensive prohibition of nuclear weapons.

During the discussion, several participants stressed that the nuclear safety regime has come a long way since the 1980s (when it was first created in a comprehensive manner), but that it remains voluntary. Moreover, while nuclear safety treaties, conventions, and codes are important elements of the regime, they are only a piece of the puzzle. Training people for emergency preparedness/response is critical and it is a dimension that has not received sufficient attention. Although nuclear safety should be a concern to all states (in part because nuclear materials are constantly in transit), countries operating or planning to operate nuclear power plants should be keenly aware of the need to invest in human resource development to ensure that the highest nuclear safety standards are maintained.

Whether nuclear power plants are at risk of cyber attacks has become a major point of discussion among safety and security experts. Several participants argued that while much progress has been achieved in recent years to deal with these issues, important risks remain. This, again, points to the need for constant training of safety and security personnel.

Although nuclear safety and nuclear security are fundamentally distinct issues, they are increasingly seen and approached as a whole by experts and policymakers. For instance, the IAEA now has a 'Nuclear Safety and Security' Department. This means countries, particularly countries pursuing new nuclear power programs or expanding existing ones, will have to remain alert on both fronts. It is a challenging endeavor because the requirements of enhancing nuclear safety (such as through greater openness and transparency) can sometimes conflict with nuclear security, which requires a measure of secrecy.

The Nuclear Security Regime

Manpreet Sethi (*Center for Air Power Studies, India*) explained that the primary goal of nuclear security is to address the threat of nuclear terrorism. This is done by raising global awareness of the threat, requiring strong national legislation and enforcement, enhancing national protection and control systems, setting international benchmarks for controls, and promoting voluntary

national reporting and information sharing to facilitate international cooperation. It is mainly a national commitment with some opportunities to coordinate at the regional and global levels.

In recent years, largely thanks to the Nuclear Security Summit process, much progress has been made. Domestic laws and regulations have been strengthened in numerous countries and a number of instruments have emerged at the global level. For instance, the 2005 CPPNM Amendment extends treaty protection to nuclear material from international to domestic use, storage, and transport. It provides for enhanced cooperation mechanisms to locate and recover stolen/smuggled nuclear material and mitigate the radiological consequences of sabotage. Also in 2005, the International Convention for the Suppression of Acts of Nuclear Terrorism (ICSANT) was concluded. Over time, the IAEA role to address nuclear security has also expanded considerably.

There remain several shortcomings, however. First, there is a lack of uniformity regarding the nuclear terrorism threat and, not surprisingly, a lack of rigor in implementing nuclear security, as exemplified by the lack of universality of multilateral treaties and conventions. Second, finding the right balance between national sovereignty and international responsibility is often challenging because nuclear security always requires a measure of secrecy. Third, noncompliance on nuclear security has no consequences: it is a voluntary regime. Finally, voluntary accounting and reporting on nuclear security is perceived by many as 'burdensome,' especially for developing countries, which have other priorities.

Given these circumstances, it is important to keep in mind that nuclear security is a journey, not a destination. In other words, there is a constant need to improve nuclear security governance, be it for the storage, use, transportation, or disposal of nuclear materials, and, significantly, parallel efforts must be conducted in nonproliferation and disarmament. Options to improve the current regime include sharing technologies for detection, sharing advances in nuclear forensics, sharing good practices and experiences in enforcement, and sharing information on how to manage spent fuel and nuclear waste.

Mohamed Dani, Suharyanta, and Muhamad IIlman A. Abidin (*BAPETEN, Indonesia*) gave an overview of Indonesia's approach to nuclear security. BAPETEN, Indonesia's nuclear energy regulatory agency, is the country's coordinator in nuclear security, dealing with the physical protection of nuclear material and nuclear facilities and the security of radioactive materials and radiation facilities. In recent years, Indonesia concluded a number of important security-related regulations, including Government Regulation No. 54/2012 on Safety and Security of Nuclear Installation. It also ratified the CPPNM Amendment and is working toward ICSANT ratification and the conclusion of a comprehensive nuclear security act. Indonesia has been working with the IAEA and the European Union to install a sophisticated detection system (such as radiation portal monitor) to deal with illicit trafficking and has been actively engaged in providing emergency preparedness/response training for security personnel and front-line officers.

A number of challenges remain, however. First is the dynamic character of the nuclear terrorism threat and the need to develop and maintain an appropriate nuclear security culture that constantly adapts to this threat. Second, interagency coordination is often difficult. The plan to build a center of excellence on nuclear security and emergency preparedness/response (which would be both for national and regional purposes) is meant to address this problem and contribute to global nuclear security efforts.

Robert Finch (*Sandia National Laboratories*) focused on international cooperation on nuclear forensics in Southeast Asia. He began by defining nuclear forensics which, according to the

IAEA, is the “analysis of intercepted illicit nuclear or radioactive material and any associated material [that can be used] to provide evidence for nuclear attribution.” In other words, nuclear forensics provides for the detailed technical characterization of seized nuclear and radiological materials. International cooperation in this field includes technical capacity building and/or assistance with analyzing interdicted materials.

Nuclear forensics has been hailed as an essential element of the nuclear security regime at previous Nuclear Security Summits and it is addressed at the international level in several forums, namely the IAEA, the US Department of Energy, the European Union's CBRN Centers of Excellence, the GICNT, and the Nuclear Forensics International Technical Working Group (a technical forum of scientists and law enforcement personnel where comparative laboratory analysis exercises are conducted). Nuclear forensics could also be taken up by the newly-established ASEAN Network of Regulatory Bodies on Atomic Energy (ASEANTOM) in the future. Building national nuclear forensics libraries, i.e., national databases of nuclear and radioactive materials, is a critical first step, as is the development of detection, monitoring, and forensics technology, to make advances in nuclear forensics. Developing a common nuclear forensics lexicon and curricula (for courses provided by centers of excellence) would also be helpful to enhance international cooperation in this field. Finally, the sharing of good practices in investigative procedures as well as enhanced communication between first responders and the forensics scientific community is needed to improve the odds of successful threat assessment, characterization, interpretation, and attribution.

During the discussion, it became clear that awareness and perceptions of nuclear security threats (and nuclear safety risks) vary considerably among Asia-Pacific countries. That is why the priority attached to these issues is uneven, both at the policy and implementation levels. Some participants suggested that joint threat/risk assessments and peer reviews of safety/security standards could help raise awareness of problems. Others countered that this approach is unlikely to be accepted by some states, especially those that fear exposing nuclear safety and/or security gaps or limitations would be detrimental to them or that this could result in penalties or sanctions. A middle-of-the-road option would seek to enhance confidence building and mutual trust through information sharing and exchanges of good practices. Regardless, a few participants argued that tailored incentives should be integrated to ensure effective implementation of high nuclear security (and safety) standards.

Several participants stressed that the focus of nuclear security efforts has been prevention. While important, it is equally essential to emphasize detection and response preparedness, which are key elements of a sound nuclear security regime. Maintaining a comprehensive and current nuclear forensics library, i.e., an inventory of all fissile materials in use within a country or jurisdiction, is critical and should be a priority for all states. Some participants expressed reservations, however, because such libraries could help confirm the origin of the material involved in a nuclear incident (or accident), thereby exposing that country to blame. Others countered that such libraries would help confirm the origin of the material involved in a nuclear incident or accident and eliminate countries with a full accounting of materials from suspicion. While acknowledging that more than prevention is needed to enhance nuclear security efforts, participants were divided over how to make more room for detection and response preparedness capabilities.

The Nuclear Security Summit Process

Miles Pomper (*James Martin Center for Nonproliferation Studies*) explained that there were dreams of a 'nuclear renaissance' in the mid-2000s, particularly in the Asia Pacific and in the

Middle East, but that the Fukushima accident has put many of these plans on hold and led to a number of power plant construction cancellations. Four states even decided to phase out nuclear power: Belgium, Germany, and Switzerland; Taiwan has decided not to expand. In Japan, there are now only two nuclear reactors in operation and, according to its new Nuclear Energy Regulatory Authority, the country is on the road to transition toward a 'more stable energy mix' within the next ten years. In China, the Fukushima accident led authorities to conduct a complete review of safety standards both at operating reactors and those under construction. As a result, China's massive construction program of over two dozen reactors has been delayed but remains underway.

The Fukushima accident is not the only reason the 'nuclear renaissance' of the mid-2000s has been delayed. Other factors have put a damper on the expansion of nuclear power, including the economic crisis (and the corresponding decreasing energy demand), the attractiveness of other energy sources such as gas or oil (especially for the United States), concerns about spent fuel accumulation, and nonproliferation and nuclear security considerations. These latter considerations are addressed by the IAEA through the promotion of multilateral approaches to the fuel cycle, while the Nuclear Suppliers Group has adopted new rules on enrichment and reprocessing (ENR) transfers. Meanwhile, the United States remains undecided about whether its bilateral nuclear cooperation agreements should be based on the 'gold standard' (no ENR development) or concluded on a case-by-case basis. This is currently in question as South Korea seeks advanced consent to ENR of US origin fuel, the US-Taiwan agreement is up for renewal, and the US-Vietnam agreement is being negotiated.

Nobumasa Akiyama (*Hitotsubashi University, Japan*) began by explaining that a highlight of the Seoul Nuclear Security Summit Communique was the need to build a global nuclear security architecture. It is of particular significance for the Asia Pacific, however, because the region has nuclear weapon states, nuclear power states, nuclear power plants being constructed or under consideration, and several countries with HEU used as fuel for research reactors and as targets in the production of isotopes. Moreover, a number of security challenges exist in the region: terrorist activities, maritime and territorial disputes, poor border and export controls, lack of administrative and technological capacities, and a relatively weak security culture.

The current nuclear security regime is weak because it relies on voluntary, norm-driven implementation. A universal, legally binding regime is needed. Yet it is unclear whether the establishment of such a regime is feasible given the traditional focus on sovereignty and noninterference in the region and the fact that states such as North Korea or Pakistan do not make a clear distinction between civilian nuclear power generation and military establishments. Peer reviews, namely those conducted by the IAEA's International Physical Protection Advisory Service (known as IPPAS), can enhance nuclear security, but they remain controversial due to the high confidentiality attached to nuclear security. As a result, sharing good practices is a preferred approach. Information sharing and cooperation is important because it creates habits of working together and can help enhance understanding and mutual trust over time.

Teofilo Leonin (*Philippines Nuclear Research Institute*) stressed that ASEAN issued a Summit Statement in 2007 stating that its members would "pay close attention to the security, environmental, health, and safety dimension of the energy sector and we tasked our officials to look into a regional nuclear safety regime." This commitment to uphold high nuclear safety and security standards was reiterated in a Joint Statement of the 29th ASEAN Energy Ministers Meeting that took place in Brunei Darussalam on Sept. 20, 2011.

The Philippines has played its part in advancing nuclear security, supporting the goals of UN Security Council Resolution 1540 and, more recently, hosting the 5th ASEAN Regional Forum Inter-Sessional Meeting on Nonproliferation and Disarmament in 2013. It has yet to ratify the ICSANT and the CPPNM Amendment, but is a member of the GICNT and has collaborated in a number of nuclear security-related projects, including the US Department of Energy's Megaports Initiative and the Australian Nuclear Science and Technology Organization's Regional Security of Radioactive Sources Project.

During the discussion, participants acknowledged that the Nuclear Security Summit process has been pivotal in helping raise awareness of the threat of nuclear terrorism and the need for enhanced nuclear security at the global level. It has also helped synergize the previously fragmented nuclear security regime. Nevertheless, the regime remains weak and underdeveloped, and its future appears uncertain without high-level political support over the long term, i.e., even after the fourth Nuclear Security Summit, which is scheduled to take place in Washington in 2016.

Some participants suggested that the Nuclear Security Summit process should continue after 2016. Others countered that many states are reluctant to extend the process for political reasons and that it would not make sense because, as one participant put it, 'the issues are getting increasing narrow and no longer lend themselves to a summit mechanism.' A few participants suggested that the IAEA should take over from the Summit process. Others pointed out that the IAEA is not well suited to develop an effective nuclear security regime: it is a technical organization with a clearly defined statute which allows primarily for promotion of the peaceful uses of nuclear technology and implementation of nuclear safeguards. Given that aiming for the conclusion of a nuclear security treaty or convention as comprehensive as the Nuclear Nonproliferation Treaty is likely to lead nowhere, more appropriate would be the establishment of a legally binding framework convention which, with high-level political support, would seek to knit together the current nuclear security conventions, rules, and standards. In the absence of such a framework convention, however, the IAEA may be the default organization responsible for nuclear security. Should this become the only option, its budget would need to be increased and regularized for nuclear security. Plainly, the development of a comprehensive systematic approach to nuclear governance remains essential and Asia Pacific countries have a key role to play in helping develop it.

Nuclear Security Centers of Excellence in Northeast Asia

Sharon Squassoni (*Center for Strategic and International Studies*) explained that the nuclear security regime is no more than a patchwork of agreements. There is no established mechanism to measure or review progress. It is unclear what will happen after the Nuclear Security Summit process finishes in 2016. Will there still be regular summits? Will it transform into a ministerial process? Or will it go back to 'business as usual,' with the IAEA as the main organization in charge of nuclear security? There remain numerous unresolved issues: the vast majority of nuclear materials are in nuclear weapon states (and half in military sectors), radioactive sources are poorly managed, and national sovereignty issues continue to stand in the way of greater cooperation. There has been progress in several areas: it is now more widely recognized that greater integration of nuclear safety, security, and nonproliferation is critical and that the development of safety and security cultures is equally essential, for instance. Nevertheless, sound nuclear governance is yet to be built and it is an urgent task given the likely growth in nuclear energy in the region.

The emerging centers of excellence in the Asia Pacific, notably those in Japan, South Korea, and soon in China, can contribute to building nuclear governance. These centers do not have the same priorities: some focus on domestic capabilities, while others concentrate on safeguards and security training, for instance. It is important to enhance cooperation and harmonization among the centers to better manage the supply and demand for training. Japan, South Korea, and China all have a stake in promoting nuclear security both in Northeast Asia and Southeast Asia, particularly in countries desirous of developing nuclear power programs such as Vietnam, Malaysia, Indonesia, Thailand, and Singapore. Japanese, South Korean, and Chinese centers of excellence could collaborate on establishing technical points of contact for information exchange, setting and implementing standards for training, conducting regional threat briefings, tracking implementation of nuclear security, and assessing the impact of fuel cycle choices on nuclear security. Information sharing in non-sensitive areas, in particular, should be promoted. (Significantly, the Nuclear Security Governance Experts Group (NSGEG) is helping the centers of excellence in establishing an international disclosure system, publishing regularly about training efforts, strengthening collaboration among domestic parties, and establishing a qualification system in each country.) A joint Japan-South Korea-China gift basket for the next or the 2016 Nuclear Security Summit would be a positive development.

Kazuko Hamada (*Japan Atomic Energy Agency*) presented on Japan's Integrated Support Center for Nuclear Nonproliferation and Nuclear Security (ISCN), which was established pursuant to Japan's national commitment at the 2010 Nuclear Security Summit to build a center of excellence. The ISCN, which is part of JAEA, is not a regulator, but a provider of technical support for the government to promote nonproliferation and nuclear security. It focuses on three activities: capacity building assistance through human resources development, including education and training; assistance for infrastructure development; and technology development and support. The ISCN also cooperates with numerous domestic, regional, and international organizations.

The ISCN focuses on knowledge- and experience-sharing and offers hands-on training for nuclear material accounting and control and physical protection. It provides various courses, including nuclear security courses and courses on safeguards and state system of accounting for and control of nuclear material (SSAC) and on nonproliferation. The ISCN has also conducted research and development in various measurement and detection technologies of nuclear materials, namely in nuclear forensics.

Chang-Hoon Shin (*Asan Institute for Policy Studies, South Korea*) presented on South Korea's International Nuclear Security Academy (INSA), which also was established pursuant to South Korea's commitment at the 2010 Nuclear Security Summit to build a center of excellence. Established in 2013 under the auspices of the Korea Institute of Nuclear Nonproliferation Control, the INSA will come into operation in March 2014 with a vision to advance education and training in nonproliferation and nuclear security. Its targets are nuclear regulator and facility personnel and/or customs, which it aims to train in physical protection, safeguards, and export controls through various programs.

Wang Haihan (*China Institute of International Studies*) explained that China, as a nuclear weapon state, takes nuclear safety and security seriously and that standards have improved in recent years. China also actively participates in and promotes international cooperation in nuclear security. In January 2011, China and the United States signed a Memorandum of Understanding on the Establishment of the Nuclear Security Center of Excellence. The facility will be jointly built by China's Atomic Energy Authority and the US Department of Energy. The center will focus on international exchange and cooperation, education and training, and

science and technology research in nuclear security, helping build mutual trust and cooperation among countries of the region and beyond. It is expected to come into operation in 2015.

During the discussion, many participants acknowledged that the nuclear security centers of excellence in Northeast Asia (and others being developed throughout the Asia Pacific) are promising organizations to elevate understanding of nonproliferation and nuclear security issues and provide education and training to professionals in the field, namely nuclear operators. They are particularly useful to complement the efforts of the IAEA and, in theory, they should be more suited to tackle regional needs and specificities, for which they cater more directly.

Although they are still new projects (and the Chinese center is yet to come into operation), many participants suggested that strong relationships among these centers should be developed and that they should coordinate activities to avoid duplication of efforts and take advantage of economies of scale and comparative advantages. As technical organizations, they should strive to remain immune to political issues. Unfortunately, however, cooperation has so far been limited, if not nonexistent.

Regional Organizations and Nuclear Safety and Security

Phiphat Phruksarojanakun (*Office of Atoms for Peace, Thailand*) gave a presentation on the newly-established ASEANTOM, which is a key component of the ASEAN Community's pillar on political-security issues. First proposed in Bangkok in September 2011, a concept paper was subsequently proposed in the Senior Official Meeting of the 20th ASEAN Summit in March 2012. When the project received positive feedback, Thailand drafted and circulated draft terms of reference for ASEANTOM in August 2012. The first ASEANTOM meeting was held in Thailand in September 2013, where an action plan for 2014-2015 was concluded.

ASEANTOM aims to enhance regulatory activities and further strengthen nuclear safety, security, and safeguards within the ASEAN Community. ASEANTOM will also ensure that Southeast Asia remains a nuclear-weapon-free zone, as is enshrined in the Southeast Asian Nuclear-Weapon-Free Zone Treaty. It aims to promote cooperation among the regulatory bodies and relevant authorities of the ASEAN Member States by sharing good practices and experiences, building capacity on human resources development, and providing assistance to help member states better adhere to and implement IAEA standards and guidelines.

Khin Maung Latt (*Ministry of Science and Technology, Myanmar*) gave an overview of Myanmar's Department of Atomic Energy and the country's approach to nuclear safety, security, and safeguards. Located within the Ministry of Science and Technology, the Department is subdivided into three divisions: radiation protection, radiation application, and reactor and isotope. The radiation protection division addresses issues pertaining to food and environmental monitoring, occupational and medical exposure, waste management and transport, and regulatory control. The radiation application division is composed of a nuclear technique section, an irradiation center, a radiation biological research section, and a health physics section.

Myanmar's nuclear safety, security, and safeguards activities are regulated by its Atomic Energy Law, which was promulgated in June 1998. While the current law focuses mainly on safety, the new law currently in the works will provide a more equal treatment of the 3 S's. In recent months, Myanmar has considerably increased cooperation with various organizations to enhance its approach to and further integrate the 3 S's, including with the US Department of Energy and the Australian Nuclear Science and Technology Organisation. (Much work is also being conducted following its recent conclusion of an Additional Protocol.) Myanmar is also

engaged in a Regional Cooperative Agreement under IAEA auspices to enhance research and development and conduct a number of training projects in nuclear science and technology.

During the discussion, participants first focused on ASEANTOM, stressing that it was a positive development for the region because it had the potential to play a key role in promoting the safe, secure, and peaceful uses of nuclear energy. Although it shares several characteristics with the European Atomic Energy Community (EURATOM), ASEANTOM is fundamentally different because it is a network, not a treaty-based governance mechanism. A relationship between ASEANTOM and EURATOM already exists, however, with EURATOM providing advice and sharing experience to help better establish ASEANTOM. For the time being, however promising it may appear, ASEANTOM remains a new, underdeveloped initiative which is informal in nature and plans to focus on sharing information and good practices mainly on nuclear safety. Neither its strategy nor its goals and objectives have been firmly defined.

The discussion moved on to the need to develop a more coherent nuclear safety and security governance architecture and to the roles and responsibilities of the Asia Pacific in it. Several participants argued that efforts to strengthen the nuclear safety and security regimes cannot be conducted in isolation. In other words, they have to be undertaken in the broader context of nonproliferation and disarmament considerations. While they are distinct issues conducted in different diplomatic processes, they remain connected. There was widespread agreement among participants that these issues are mutually reinforcing components of the global nuclear governance architecture. Few concrete ideas were advanced about the shape such an architecture should take, however. In the Asia Pacific, preliminary discussions suggest that both top-down and bottom-up approaches are needed to improve nuclear governance. While there was agreement that nuclear security centers of excellence can provide excellent bottom-up support, it is unclear which regional organization is best suited to offer top-down leadership. ASEAN Plus One and/or ASEAN Plus Three may offer the most conducive mechanism and it was suggested that linkages to the Southeast Asian Nuclear-Weapons-Free Zone Treaty should be established to reach out to the P-5. These suggestions require in-depth analysis.

General Observations, Concluding Remarks, and Next Steps

In the final session, Carl Baker and David Santoro (*Pacific Forum CSIS*) laid out the meeting preliminary key findings and recommendations. They pointed out that, pending available funding, the next iteration of the NEEG should:

- Provide a thorough analysis of the similarities and differences between nuclear safety and nuclear security and examine the implications, in particular in the Asia Pacific.
- Reflect on what incentives would ensure effective implementation of nuclear safety and security standards in the Asia Pacific.
- Explore the benefits, risks, and costs of investing in detection and response preparedness capabilities to address nuclear safety and security issues.
- Conduct an in-depth needs assessment for nuclear forensics capabilities in the Asia Pacific.
- Determine the specific types of nuclear safety and security training required, how it should be conducted, and by whom in the Asia Pacific.
- Research how greater coordination and cooperation can be promoted among the Northeast Asian and other emerging regional nuclear security centers of excellence.
- Provide recommendations on the goals and objectives that ASEANTOM should prioritize and how it should implement them.
- Study how nuclear governance can be strengthened and better institutionalized at the global level and in the Asia Pacific specifically.

In the lead-up to the visit of the Da Lat Nuclear Research Reactor (DNRR), Nguyen Nhi Dien (*Nuclear Research Institute, Vietnam*) gave a briefing on his Institute's activities as they relate to reactor operation and nuclear safety, security, and nonproliferation. He explained that the Nuclear Research Institute (NRI) is a research agency of the Vietnam Atomic Energy Institute (known as VINATOM), which sits under the Ministry of Science and Technology. Staffed by 190 engineers, scientists, and technical experts, the Institute consists of a 500kW research reactor, two Co-60 sources for research purposes, facilities for radioisotope and radiopharmaceutical production, several laboratories and facilities, as well as environmental monitoring stations in Da Lat and Ho Chi Minh City.

Since the mid-1980s, the DNRR has operated for radioisotope production, neutron activation analysis, basic and applied research in nuclear physics, research on reactor physics and thermo-hydraulics, and personnel training and education. The process of partially converting the reactor to LEU was completed in 2004-2007 and its full conversion was finalized in July 2013, making Vietnam a HEU-free country. This was done with the support of the IAEA, the US Department of Energy, and Russia.

In the afternoon of November 12, meeting participants visited the DNRR and received additional briefings at the facility.