
# ASEAN's Nuclear Landscape – Part 1

By David Santoro

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# Acknowledgements

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Although there is currently no operational nuclear power plant in the ten countries comprising the Association of Southeast Asian Nations (ASEAN), regional governments have begun investing seriously in such programs. They have been motivated by several factors ranging from rising electricity demands to the perceived need to seek energy security, energy autonomy, and the diversification of supply. Prestige considerations associated with entering the "nuclear club" and a strong marketing push by vendors may have also played a role in guiding their decisions.

The pursuit of nuclear power by ASEAN countries has continued more or less uninterrupted even in the aftermath of the Fukushima Daiichi nuclear disaster in Japan (March 2011). This has raised a number of concerns because Southeast Asia is prone to earthquakes, tsunamis, floods, and volcanic eruptions, and because corruption is rampant and there is a lack of well-rounded safety culture. Moreover, the presence of home-grown terrorist (and piracy) activity, such as the *Jemaah Islamiyah* network, exposes the region to serious nuclear security concerns, which would only be de-multiplied with the presence of nuclear waste.

This paper is the first product of a multi-year project supported by the US Department of Energy's National Nuclear Security Administration. The project is intended to give background information on the civilian nuclear activities conducted in each ASEAN country (which includes, but is not limited to, nuclear power), map out and describe their key organizations and offices responsible for managing such activities, and provide an update on their implementation of the so-called "three s's," i.e. nuclear safeguards, safety, and security. This first paper examines each of these three dimensions in the Philippines, Thailand, and Vietnam.

## Philippines

### Background on Civilian Nuclear Activity

The Philippines's history of nuclear research and development dates back to a bilateral agreement with the United States signed in 1955.[1] The goal of the agreement was to develop cooperation on nuclear energy and assistance for the construction of a nuclear research reactor program.

Under the US Atoms for Peace program, the Philippines received a small research reactor, which went online in 1963. Supplied by US company General Atomics, the facility was originally a one-megawatt open general-purpose reactor. In 1988, it was converted to a three-megawatt "Training, Research, Isotopes, General Atomic" (TRIGA)-

[1] For a comprehensive historical background, see "Philippines" in *Preventing Nuclear Dangers in Southeast Asia and Australasia* (London: The International Institute for Strategic Studies, 2007), pp. 119-130.

type design. This conversion enabled it to use low-enriched uranium (LEU), as opposed to highly-enriched uranium (HEU). However, shortly after being restarted in 1988, the reactor pool suffered a leak, leading to its permanent shut down. Initial efforts to repair it in collaboration with the International Atomic Energy Agency (IAEA) were abandoned and a decision was made to proceed with its decommissioning in 2005. Although the so-called Philippines Research Reactor-1 (PRR-1) was chosen by the IAEA Research Reactor Decommissioning Demonstration (R2D2) as the model reactor upon which to demonstrate the decommissioning process, its decommissioning schedule did not correlate with the R2D2 project schedule and other facilities were needed to host the demonstration workshops.[2]

Operated by the Philippines Atomic Energy Commission (PAEC), which was reconstituted as the Philippines Nuclear Research Institute (PNRI) in 1987, PRR-1 is located on the campus of the University of the Philippines Diliman in Quezon City. It was used for radioisotope production, neutron spectrometry, neutron activation analysis, reactor physics, and training purposes.

Over the years, the Philippines has also collaborated extensively with the IAEA, which it joined in 1958, to enhance and widen its nuclear expertise. PAEC and then PNRI have participated in numerous national, regional, and interregional IAEA technical cooperation projects in numerous areas ranging from human resource development (HRD) in nuclear science and technology to uranium prospecting.

The Philippines's most significant nuclear undertaking, however, was the construction of the Baatan nuclear power plant (BNPP), which took place between 1976 and 1985. Equipped with a 621-megawatt Westinghouse light-water reactor, BNPP is located in the municipality of Morong, at the foot of Mount Natib. The project was initiated by the Marcos administration in response to the 1973 oil crisis, in an attempt to decrease the Philippines's dependence on imported oil. Yet, after Marcos was driven from power in February 1986, and after the Chernobyl nuclear accident two months later, the succeeding Aquino administration decided not to bring the plant into operation on safety grounds. (Significantly, in 1979, construction work had been briefly suspended following the Three Mile Island nuclear accident, and a subsequent survey had highlighted numerous defects in the plant and raised concerns about its earthquake-prone location.) Successive governments strained to pay off the debt incurred by BNPP's construction, which was completed in 2007. Attempts were also made to upgrade BNPP and to convert it to a gas-fired power plant, but they were eventually abandoned.

In the early 1990s, a long-term energy plan released by the Ramos administration forecast a role for nuclear power production in the Philippines from 2005 to 2025. As a result, a Nuclear Power Steering Committee was established in 1995 to aim for the development, management, and setting-up of policies and strategies which will involve nuclear power generation. Ten potential sites were identified for the construction of a new nuclear plant, excluding the option of rehabilitating BNPP. Few practical steps were taken to move in this direction, however.

[2] "The R2D2 Project," http://www-ns.iaea.org/projects/r2d2project/

Cast in terms of the Philippines's desire for energy self-sufficiency, considerations for the development of a domestic nuclear power program became high-profile again in the late 2000s. In 2008, a bill mandating the immediate re-commissioning of BNPP was tabled in the House of Representatives and, that same year, a team of surveyors led by the IAEA was commissioned to assess the possible rehabilitation of the plant; they recommended thorough technical inspections and economic evaluations of the plant's status and the implementation of general requirements for start a nuclear power program, including proper infrastructure and safety standards.[3] In 2009, the Korea Electric Power Corporation (KEPCO) and the National Power Corporation (NPC), the Filipino state-owned company that serves as the largest provider and generator of electricity in the country, performed an 18-month feasibility study on BNPP, recommending in favor of BNPP's refurbishment. These results were validated by Filipino government, which went on to undertake a site safety.[4] In 2010, House Bill No. 1291 was tabled, which is "an act mandating an immediate validation process which satisfies internationally accepted nuclear power industry norms to determine the BNPP's operability culminating in either the immediate rehabilitation, certification, and commercial operation or the immediate permanent closure and salvage value recovery of the BNPP, appropriating funds therefore and for other purposes." If passed, the bill will hasten the nuclear program and operation of BNPP.

For the Philippines's first operational nuclear power plant, it is anticipated that the front end of the nuclear fuel cycle would be sourced through foreign expertise. Technology for on-site interim storage of spent fuel would be used. Although plans to develop reprocessing technology are not currently in the works, if a decision were made on the reprocessing of spent fuel for conversion into fuel again, this fuel would be sent to a country where industry is already in place. With regard to waste management, PNRI, through IAEA technical and financial assistance, has already identified suitable sites for the construction of a national radiological waste repository center. At the moment, PNRI operates a Radioactive Waste Management Facility for the collection, segregation, treatment, and interim storage of radioactive waste.[5]

**Key Organizations and Offices**

Philippines Nuclear Research Institute

PNRI (PAEC until 1987) is a government agency currently under the Department of Science and Technology (DOST). It was established by the Republic Act No. 2067 (or "Science Act") in 1958 with a dual mandate: promote the peaceful applications of atomic energy and license and regulate the use of radioactive materials. In 1968, Republic Act No. 5207 (or "Atomic Energy Regulatory and Liability Act") established then-PAEC's comprehensive nuclear regulatory function, providing it with the authority to issue licenses for the construction, possession, and operation of any atomic energy facility and

[3] "IAEA Advises Philippines on Next Steps for "Mothballed" NPP," *IAEA News*, July 18, 2008.
[4] "Cost of Bataan nuke plant rehab set at $1-B," *BusinessWorld*, February 2, 2010.
[5] See http://www.pnri.dost.gov.ph/index.php/services/radiation-protection

to serve as a basis for the promulgation of rules and procedures in the licensing of nuclear power plants.

PNRI is the sole agency in the Philippines mandated to undertake research and development activities on the peaceful uses of nuclear energy (and in the broader field of nuclear science and technology), to institute regulations on said uses, and to carry out the enforcement of said regulations, as well as to protect the health and safety of radiation workers and the general public. More specifically, its core functions are the following:

- Conduct research and development on the application of radiation and nuclear techniques, materials, and processes;
- Undertake the transfer of research results to end-users, including technical extension and training services;
- Operate and maintain nuclear research reactors and other radiation facilities; and
- License and regulate activities relative to production, transfer, and utilization of nuclear radioactive substances.

Headed by a director and a deputy director, PNRI consists of five divisions:

- The Atomic Research Division, which focuses on research and development programs in a range of sectors, such as agriculture or health.
- The Nuclear Services and Training Division, which is the service-oriented arm of the Institute, engaging clients from industry, business, government, the medical and academic sectors, and the Institute's research staff.
- The Nuclear Regulatory Division (formerly the Nuclear Regulations, Licensing, and Safeguards Division), which performs the regulatory functions of the Institute in licensing and regulating the possession and use of nuclear and radioactive materials and facilities. The Division also implements the Institute's Policy on Internal Nuclear Regulatory Control Program and coordinates nuclear and radiological emergency preparedness and response activities. Moreover, the Division undertakes activities in support of international commitments on nuclear safety, nuclear safeguards, and nuclear security. (Significantly, this makes PNRI the Philippines's point of contact in these areas: the Institute represents the country as a member state in the IAEA and signs cooperative agreements with states as well as with regional and international organizations.)
- The Technology Diffusion Division, which increases awareness and understanding of local and international stakeholders and the public on the various aspects of nuclear science and technology and takes charge in the transfer and commercialization of technology and business development.
- The Finance and Administration Division, which provides advice and assistance in policy formulation relative to fiscal and administrative matters.

PNRI, therefore, combines both operational and regulatory functions relating to nuclear science and technology and nuclear energy. This is a deficiency that the IAEA has offered the Philippines to help solve. In 2007, House Bill No. 3696 (or "Comprehensive Nuclear Regulation Act") was tabled and, as of June 2013, remains under consideration. The bill proposes to create a separate and independent nuclear regulatory authority and address the gaps in the present laws, e.g., radioactive waste, emergency planning, nuclear security and physical protection, and safeguards.

For more information about PNRI, visit: www.pnri.dost.gov.ph/

Department of Energy

The Department of Energy (DOE) is the executive department of the government responsible for preparing, integrating, coordinating, supervising, and controlling all plans, programs, projects, and activities of the government relative to energy exploration, development, utilization, distribution, and conservation.

DOE, as the focal governmental institution for the nuclear power program, is leading an interagency discussion among the concerned governmental organizations, the academic sector, and the private sector to thresh out the responsibilities of rebuilding local technical capability in nuclear sciences and engineering. Because numerous nuclear engineers have retired/are retiring, the government is putting a premium on HRD as a necessary prelude to considering nuclear power as a long-term energy option.

For more information about DOE, visit: www.doe.gov.ph/

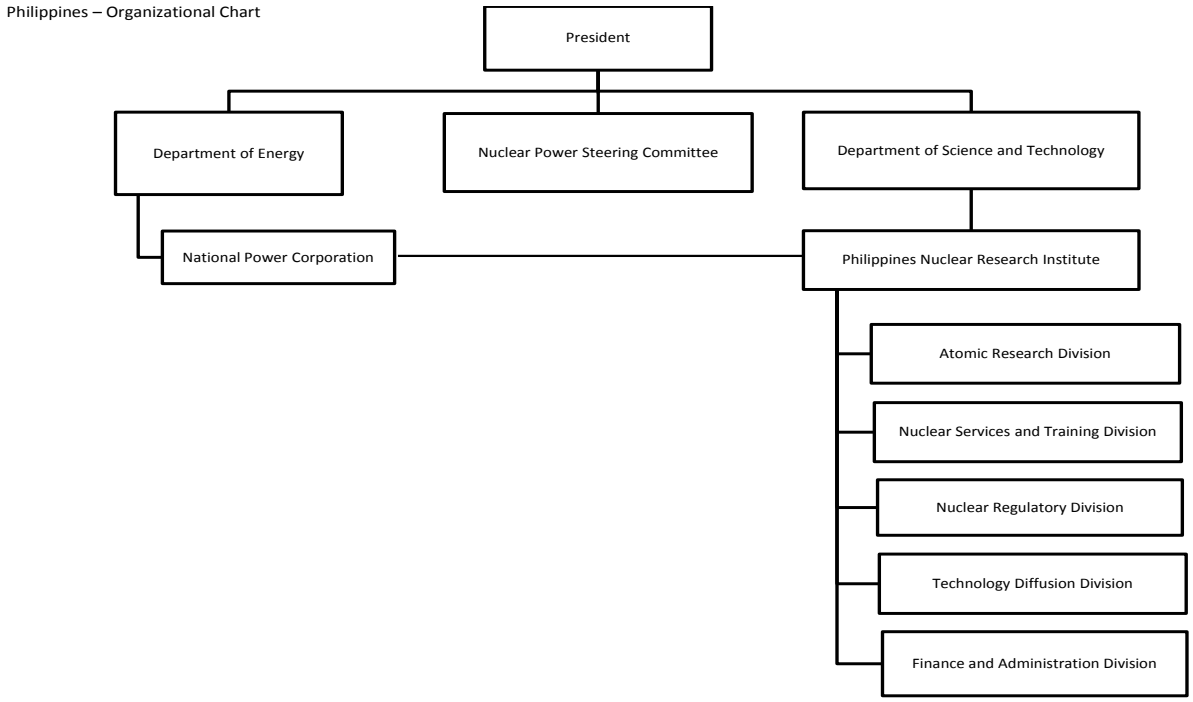
National Power Corporation

NPC is a state-owned company that serves as the largest provider and generator of electricity in the Philippines. With Republic Act No. 6395 (1971), it was authorized to establish and operate nuclear power plants.

NPC has started to set up the initial organization and studies for the implementation of a Philippines nuclear project. NPC would be the main player involved in the construction of new nuclear power plants as well as in the possible re-commissioning of BNPP. (Significantly, since BNPP's construction was completed in 1985, a team from NPC has been working to preserve the plant's condition.) NPC has its own engineering, technical services and project management organizations, which are well equipped to handle the pre-construction activities, construction stage, operation and maintenance, and decommissioning of a nuclear power plant.

NPC is also implementing a "BNPP Communication Plan" to raise the level of awareness among the public, the media, and decision-makers and stakeholders (in the Philippine Congress, notably) on the benefits of nuclear power, address the issues raised by anti-BNPP groups, and create an environment conducive to the revival of BNPP as a viable option to address the lack of electricity generation.

For more information about NPC, visit: www.napocor.gov.ph/




**Status on Nuclear Safeguards, Safety, and Security**

A member of the IAEA since 1958, the Philippines signed the Nuclear Nonproliferation Treaty (NPT) in 1968 and ratified it in 1972. Manila subsequently concluded a Comprehensive Safeguards Agreement (CSA) in 1974 and signed an Additional Protocol (AP) in 1997. The AP, however, did not enter into force before 2010 because members of the Senate, who are mainly focused on domestic issues, refused to give priority to what they considered a complicated international text of little positive impact on Filipinos' lives. Since its AP entered into force, PNRI has been in active cooperation with the IAEA, hosting three Complementary Access visits to its safeguarded facilities (PRR-1 and BNPP). PNRI has also benefited from cooperation with the US Department of Energy and the Australian Safeguards and Nonproliferation Office to help implement its AP.

The Philippines recognizes the importance of abiding by the highest levels of nuclear safety and security. It is a party to most nuclear safety conventions, and ratification is underway for those it has not yet endorsed. It is also a party to the Convention on the Physical Protection of Nuclear Material (CPPNM) and it has signed the International Convention for the Suppression of Acts of Nuclear Terrorism (ICSANT), which it plans to ratify. As of June 2013, it had neither signed nor ratified the CPPNM Amendment, however.

Significantly, pursuant to its stated willingness (in its UN Security Council Resolution 1540 report) to develop more stringent border control, stronger physical protection of sensitive facilities, as well as enhance and upgrade container and cargo security in several seaports, the Philippines's PNRI has formulated a National Nuclear Security Plan in cooperation with several government agencies (and the IAEA).[6] Moreover, PNRI has cooperated extensively with the US Department of Energy's Global Threat Reduction Initiative (GTRI) to implement security upgrades at key locations, install security alarms in medical institutions with Category 1 sources, conduct security assessment of Category 2 sources, and train personnel on security incident response. PNRI has also collaborated with the US Department of Energy through the Megaports Initiative, to interdict nuclear and other radioactive materials at seaports, and through other programs to help strengthen security of radioactive materials during transport. The Philippines has been part of the Regional Security of Radioactive Sources (RSRS) project, co-funded by the Australian Nuclear Science and Technology Organization and the US Department of Energy, to help strengthen its regulatory infrastructure of Category 1 and 2 radioactive sources and review information related to the security of vulnerable or missing radioactive sources. Significantly, in March 2013, the EU Chemical, Biological, Radiological, and Nuclear Centers of Excellence established its regional secretariat in Manila to coordinate EU-funded projects in Southeast Asia. Finally, the Philippines has been an active member of the Global Initiative to Combat Nuclear Terrorism (GICNT), the Proliferation Security Initiative (PSI), and it has recently joined the G8 Global Partnership, all of which aim to enhance nuclear and radiological security (as well as biosecurity and chemical security).

| Instrument | Date Signed/Ratified or Acceded |
|---|---|
| International Atomic Energy Agency Membership | 1958 |
| Nuclear Nonproliferation Treaty (1968) | 1968/1972 |
| Small Quantities Protocol | N/A |
| Comprehensive Safeguards Agreement | 1974 (In Force) |
| Additional Protocol | 2010 (In Force) |
| Convention on Early Notification of a Nuclear Accident (1986) | 1997 (Acceded) |
| Convention on Assistance in the Case of Nuclear Accident or Radiological Emergency (1986) | 1997 (Acceded) |
| Convention on Nuclear Safety (1994) | 1994 (Signed Only) |
| Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (1997) | 1998 (Signed Only) |
| Code of Conduct on the Safety and | Formal Support |

[6] "Statement by the Philippines - Dr. Amelia P. Guevara," International Conference on Nuclear Security: Enhancing Global Efforts, Vienna, July 5, 2013, http://www-pub.iaea.org/iaeameetings/cn203p/Philippines.pdf

| | |
|---|---|
| Security of Radioactive Sources (2003) | |
| Vienna Convention on Civil Liability for Nuclear Damage (1963) | 1963/1965 |
| Protocol to Amend the 1963 Vienna Convention on Civil Liability for Nuclear Damage (1997) | 1998 (Signed Only) |
| Convention on Supplementary Compensation for Nuclear Damage (1997) | 1998 (Signed Only) |
| Optional Protocol Concerning the Compulsory Settlement of Disputes to the Vienna Convention on Civil Liability for Nuclear Damage (1999) | 1963/1965 |
| Joint Protocol Relating to the Application of the Vienna and the Paris Convention (1992) | 1988 (Signed Only) |
| Convention on the Physical Protection of Nuclear Material (1979) | 1980/1981 |
| Amendment to the Convention on the Physical Protection of Nuclear Material (2005) | Neither Signed Nor Ratified |
| International Convention for the Suppression of Acts of Nuclear Terrorism (2005) | 2005 (Signed Only) |

## Thailand

### Background on Civilian Nuclear Activity

Thailand's nuclear research and development began in the 1954 with the appointment of the Committee on Atomic Energy, which was renamed the Thai Atomic Energy Commission (Thai AEC) two years later.[7] Subsequently, in 1957, Thailand joined the IAEA and, in 1961, the first Atomic Energy For Peace Act established the Office of Atomic Energy for Peace Act (OAEP); it was renamed the Office of Atoms for Peace (OAP) in 2002.

Under the US Atoms for Peace program, the US Curtiss-Wright Corporation supplied Thailand with a TRIGA-type research reactor at Bangkhen, Bangkok. The so-called Thai Research Reactor-1 (TRR-1) was commissioned in 1961, operating with one megawatt of power between 1962 and 1975. It was shut down in 1975 for upgrade and, since 1977, has operated as a nominal two-megawatt, multipurpose TRIGA Mark-III reactor for applications such as neutron-activation analysis, radioisotope production, gem irradiation, neutron radiography, and research work. TRR-1 is a light-water-cooled and heavy-water-moderated reactor, and its LEU is supplied by the United States.

[7] For a comprehensive historical background, see "Thailand" in *Preventing Nuclear Dangers in Southeast Asia and Australasia*, pp. 137-150.

In 1993, the OAEP launched a second reactor project at the Nuclear Research Center in Ongkharak in Nakhon Nayok province to conduct research for medical, industrial, and agricultural purposes. Supplied by US firm General Atomics, the project was to include a ten-megawatt TRIGA-type research reactor, and the construction of facilities for isotope production and waste processing and storage was to be carried out by a consortium of firms from the United States, Japan, and Australia. During the 1997 Asian financial crisis, however, the project was abandoned, and subsequent attempts to reinstate it under a different arrangement failed over cost, transparency, and safety concerns.

Over the years, Thailand's nuclear research and development has benefited from extensive technical and financial assistance from the IAEA. This has included funding and expertise in the use of radioisotopes in agriculture, health, and industry. Also significant has been the provision of an IAEA technical assistance project for nuclear power planning, to add to external assistance that Thailand has received for HRD for its nuclear infrastructure and to prepare for nuclear power development.

Thailand's proposals for the development of a nuclear power program, however, never materialized. The first proposal for the construction of a nuclear power plant was made in 1966 by the Electricity Generating Authority of Thailand (EGAT), a state-owned power utility enterprise that owns and manages the majority of Thailand's electricity generation capacity, as well as the nation's transmission network. It was approved by the government (and the IAEA in 1970), but was eventually shelved the project for economic reasons. In 1976, the EGAT proposal came back to the fore, received government approval, and even reached the bidding stage, but it was again abandoned over safety concerns and a weak economic rationale. Nuclear power plans in the 1980s did not go anywhere either, and the Three Mile Island and Chernobyl nuclear accidents reinforced the public's safety concerns. In the 1990s, the Asian financial crisis removed any appetite for the launch of a nuclear power program.

The situation changed in the late 2000s. Taking stock of its need to diversify its energy mix (most of which relies on natural gas), Thailand revived its interest in developing nuclear power. In 2007, Thailand's National Energy Policy Committee (NEPC) approved a Power Development Plan (PDP) aiming for the generation of 2,000 megawatts of nuclear power by 2020 (via two nuclear power plant units), and another 2,000 megawatts by 2021 (again, via two nuclear power plant units).[8] A Nuclear Power Infrastructure Preparation Committee (NPIPC), later renamed the Nuclear Power Infrastructure Establishment Coordination Committee (NPIECC), was appointed to plan for nuclear power infrastructure and to conduct activities for a nuclear planning utility. The study outcome was reported in the form of a "Nuclear Power Infrastructure Establishment Plan" (NPIEP), which was conducted with advice and guidance from IAEA experts and approved by the Thai cabinet.[9]

[8] National Energy Policy Committee, "Thailand's Power Development Plan - 2007-2021," June 2007.
[9] Presentation by Mr. Prichard Karasuddhi, "Thailand's Preparation for Starting a Nuclear Power Program," http://www-pub.iaea.org/mtcd/meetings/PDFplus/2008/35095/p35095/03_PRICHA%20IAEA%20WORKSHOP.ppt

NPIEP is divided into five phases and considers all aspects related to the introduction and implementation of a nuclear power program. Its initial focus is on the establishment of the basic infrastructure, i.e. preparation for the setting-up of the regulatory body and regulatory framework on nuclear power, the development program on industrial and commercial infrastructure, technology and transfer, human resources, as well as safety and environmental protection. Significantly, in 2008, the Nuclear Power Program Development Office (NPPDO) was created to coordinate NPIEP implementation.

In 2010, the Thai cabinet approved a new PDP with a more ambitious nuclear program of five nuclear power plants units to be put online in 2020, 2021, 2024, 2025, and 2028.[10] Meanwhile, EGAT signed various agreements to receive support on building nuclear power plants as well as advice on compiling specifications, bidding procedures, and training engineers. That same year, NPPDO also conducted a "self-evaluation" for the IAEA and the latter recommended that Thailand make a clear national commitment to implement the highest standards of nuclear safeguards, safety, and security, essential improvements to its safety culture (through the passing of laws and regulations and the adoption of key international instruments), and that it enhance HRD in nuclear science and technology.[11] This became a focus of the Thai government, which has been working on drafting a comprehensive nuclear act and has tasked OAP to draft a detailed HRD plan and to engage the public about the benefits of nuclear power development.

The Fukushima nuclear accident, however, led the Thai government to put its nuclear power plans on hold. Immediately after the accident, in April 2011, Thai authorities decided to cut the project down to four units and delay it by three years, i.e., the first reactor would only be put into operation in 2023.[12] Last year, Thai authorities announced that the project would be further cut down to two units as well as postponed by an additional three-year period; a decision was also made that the country would as a consequence increase its reliance on renewable and clean coal energy sources.[13]

**Key Organizations and Offices**

Thai Atomic Energy Commission

The Thai AEC, first called the Committee on Atomic Energy, is the regulatory authority of Thailand issuing licenses and regulating facilities and activities concerning radiation and nuclear uses. It is a government agency under the Prime Minister's office and is composed of 17 sub-committees focused on medical, agricultural, industrial

[10] Presentation by Mr. Karol Takabut, "Status of Nuclear Power Development in Thailand, Aug. 26, 2010, http://www.tfta.or.th/PDF/Status_of_NPP_Development_in_Thailand.pdf

[11] Presentation by Mr. Pongkrit Siripirom, "NPP Infrastructure Development in Thailand," March 18-21, 2013, http://www.iaea.org/NuclearPower/Downloadable/Meetings/2013/2013-03-18-03-21-TM-NPE/20.siripirom.pdf

[12] K. Steiner-Dicks, "Thailand to Delay Nuclear Plans by Three Years," *Weekly Intelligence Brief*, April 28, 2011.

[13] "Govt scales down nuclear plan," *Pattaya Mail*, June 12, 2012.

applications, licensing of radioisotopes and nuclear materials, nuclear law, and reactor safety, among other areas.

Office of Atoms for Peace

OAP (OAEP until 2002) is a government agency part of the Ministry of Science and Technology. It is Thailand's regulatory body and has responsibilities in regulation (of nuclear and radioactive materials and installations); policies and strategic plans; coordination of and support for national nuclear security plan; research and development in the fields of nuclear and radiation safety, security, and safeguards; emergency preparedness and response; and illicit trafficking, especially to support the Thai AEC.

OAP consists of an Office of the Secretary General and four bureaus dedicated to radiation, nuclear safety, atomic energy, and technical support: the Bureau of Nuclear Safety Regulation, the Bureau of Radiation Safety Regulation, the Bureau of Technical Support for Safety Regulation, and the Bureau of Atomic Energy Administration. Until the mid-2000s, nuclear research and development was conducted under OAP auspices, but in 2006, the Thailand Institute of Nuclear Technology (TINT), also part of the Ministry of Science and Technology, was created separately for this purpose.

For more information about OAP, visit: www.oaep.go.th/

Thailand Institute of Nuclear Technology

TINT is a technical and scientific support organization responsible for seven nuclear research and development programs: radioactive waste management, radioisotope production, research reactor and nuclear technology operation, radiation and nuclear safety, irradiation for agricultural research, chemistry and materials science research, and physics and advanced technology research. It works in coordination with universities teaching nuclear science, technology and engineering, as well as physics.

For more information about TINT, visit: www.tint.or.th/

Energy Policy and Planning Office

Energy Policy and Planning Office (EPPO) is a government agency part of the Ministry of Energy which formulates and administers energy policies and plans for Thailand.

For more information about EPPO, visit: www.eppo.go.th/

National Energy Policy Committee

NEPC is responsible for managing the energy sector in Thailand, including granting energy operating licenses and issuing energy pricing regulations. It is a government agency under the Prime Minister's office.

Nuclear Power Infrastructure Establishment Coordination Committee

NPIECC was appointed by NEPC to work on NPIEP. It consists of seven subcommittees:

- The Sub-Committee on Legal System, Regulatory System, and International Protocols.
- The Sub-Committee on Nuclear Power Utility Planning Coordination.
- The Sub-Committee on Industrial and Commercial Infrastructure, Technology Development and Transfer, and Human Resources Development.
- The Sub-Committee on Nuclear Safety and Environmental Issues.
- The Sub-Committee on Public Information and Public Participation.
- The Sub-Committee on the Readiness Report Preparation.
- The Sub-Committee on International Agreements and Conventions.

Nuclear Power Program Development Office

NPPDO acts as the coordinating body for NPIEP implementation. It is placed under the responsibility of a minister and has a director. Its organizational structure includes a legal and regulatory team; a public information and public consultation officer; technical, commercial, and policy consultants; an electric market and generation mix assessment team; a nuclear power program technology and fuel cycle assessment team; an environmental assessment and siting team; and an economic and technology localization assessment team.

Electricity Generating Authority of Thailand

EGAT, which is part of the Ministry of Energy, is a state-owned power utility enterprise that owns and manages the majority of Thailand's electricity generation capacity, as well as the nation's transmission network.

EGAT has started a site survey for nuclear power plants, along with a consultant company which has been engaged for site selection. As the operator, EGAT will undertake construction, operation, and decommissioning of nuclear power plants. (OAP, as the regulatory body, will approve the decommissioning plan and will follow up, regulate, and inspect the activities carried out by EGAT.)

For more information about EGAT, visit: www.egat.co.th/

Chulalongkorn University

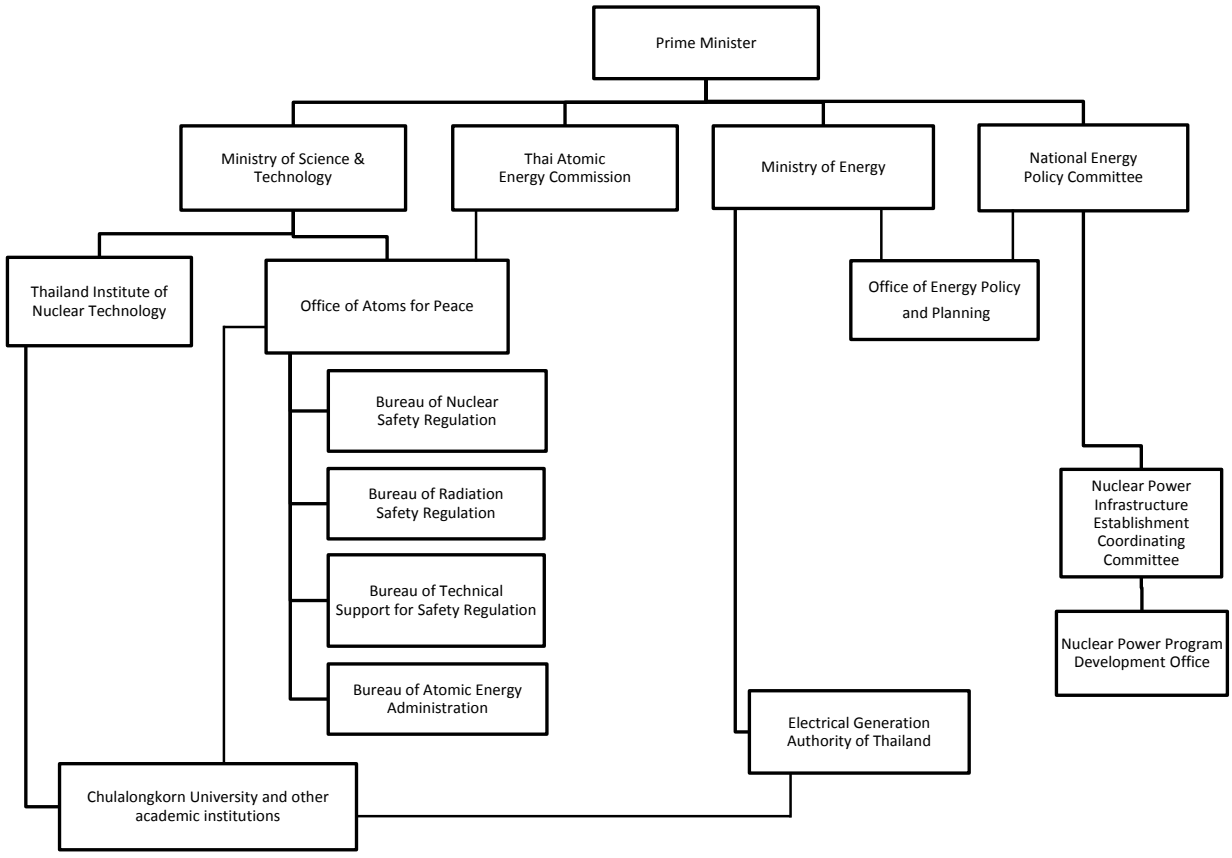
Leading HRD in nuclear science and technology is Chulalongkorn University's Department of Nuclear Engineering, based in Bangkok. First established in 1972 to

support HRD for Thailand's first nuclear power program initiatives, it is the only educational institution that offers nuclear engineering degrees in the country. It offers a variety of graduate courses on nuclear electronics and instrumentation, health physics, medical imaging, power plant engineering, environmental applications and waste management, nuclear materials, plasmas and nuclear fusion, nuclear chemistry, and, starting October 2013, nuclear security and safeguards. It has a number of on-site facilities (computer simulation, radiation measurement, and nuclear electronics and instrumentation laboratories) and works in collaboration with TINT and Chulalongkorn Hospital. Before the Fukushima accident and the subsequent funding cuts for HRD due to the postponement of Thailand's nuclear power plans, the Department had planned to offer a Bachelor's Degree in Nuclear Engineering; this project has been halted.

Another academic institution involved in HRD in nuclear science and technology is Kasetsart University's Department of Applied Radiation and Isotopes. Various government programs also offer students study abroad scholarships.

For more information about Chulalongkorn University, visit: www.chula.ac.th/cuen/

Thailand – Organizational Chart



**Status on Nuclear Safeguards, Safety, and Security**

Thailand has been a member of the IAEA since 1957. In 1972, it acceded to the NPT and, two years later, it concluded a CSA with the IAEA. Bangkok also signed an AP in 2005, but as of June 2013, it had yet to ratify it. Legislative backlog probably accounts for much of the delay in bringing the AP into force, although the resistance to rapidly endorse additional safeguard measures heavily promoted by Western powers should also be taken into consideration.

With regard to nuclear safety and security, Thailand's endorsement of the main treaties and conventions leaves much to be desired, which is cause for concern given that there have been a number of small-scale yet not insignificant nuclear incidents and accidents on Thai soil over the years. As of June 2013, Thailand was only a party to the Convention on Early Notification of a Nuclear Accident (CENNA) and the Convention on Assistance in the Case of Nuclear Accident or Radiological Emergency (CACNARE), and it extended its formal support to the IAEA Code of Conduct on the Safety and Security of Radioactive Sources. Significantly, it is neither a party to the Convention on Nuclear Safety (CNS) nor to the CPPNM and its Amendment, and although it has signed the ICSANT, as of June 2013, it had yet to ratify it. Efforts are reportedly underway, however, to accede to the CPPNM and ratify the ICSANT.

Nevertheless, Thailand has cooperated with the IAEA and individual states on a number of nuclear safety and security projects. For example, in the 1990s, Bangkok cooperated with the US Department of Energy to repatriate unsecured spent fuel elements to the United States. In more recent years, it has cooperated with partners to prevent, detect, and respond to the illicit trafficking of nuclear and related materials through projects such as the Megaports Initiative and the Container Security Initiative (CSI), and it has been an active participant in the GICNT; very recently, Thailand has joined the PSI. Thai authorities have also been working to enhance effective emergency preparedness, response, and mitigation systems to address both nuclear safety and security through the National Nuclear and Radiological Emergency Plan, which they adopted in 2010.[14]

At the regional level, Thailand's OAP hosted the first International Conference on Safety, Security, and Safeguards in Nuclear Energy in Bangkok in September 2011. The objectives of the conference were to exchange information on the so-called "three s's" for regulatory bodies, enhance harmonization of regulatory activities, and establish a network for the three s's in Southeast Asia. In this vein, a network of "ASEANTOM" has since been initiated to promote collaborations (e.g. through the exchange of best practices, transparency measures, and various other forms of cooperation) among regional nuclear regulatory bodies and other relevant authorities. Finally, Thailand co-hosted two ASEAN Regional Forum (ARF) workshops on nuclear forensics (December 2011) and on UN Security Council Resolution 1540 Implementation (May 2013).

[14] Seoul Nuclear Security Summit, "Thailand's Progress on Nuclear Security," March 26-27, 2012.

| Instrument | Date Signed/Ratified or Acceded |
|---|---|
| International Atomic Energy Agency Membership | 1957 |
| Nuclear Nonproliferation Treaty (1968) | 1972 (Acceded) |
| Small Quantities Protocol | N/A |
| Comprehensive Safeguards Agreement | 1974 (In Force) |
| Additional Protocol | 2005 (Signed Only) |
| Convention on Early Notification of a Nuclear Accident (1986) | 1987/1989 |
| Convention on Assistance in the Case of Nuclear Accident or Radiological Emergency (1986) | 1987/1989 |
| Convention on Nuclear Safety (1994) | Neither Signed Nor Ratified |
| Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (1997) | Neither Signed Nor Ratified |
| Code of Conduct on the Safety and Security of Radioactive Sources (2003) | Formal Support |
| Vienna Convention on Civil Liability for Nuclear Damage (1963) | Neither Signed Nor Ratified |
| Protocol to Amend the 1963 Vienna Convention on Civil Liability for Nuclear Damage (1997) | Neither Signed Nor Ratified |
| Convention on Supplementary Compensation for Nuclear Damage (1997) | Neither Signed Nor Ratified |
| Optional Protocol Concerning the Compulsory Settlement of Disputes to the Vienna Convention on Civil Liability for Nuclear Damage (1999) | Neither Signed Nor Ratified |
| Joint Protocol Relating to the Application of the Vienna and the Paris Convention (1992) | Neither Signed Nor Ratified |
| Convention on the Physical Protection of Nuclear Material (1979) | Neither Signed Nor Ratified |
| Amendment to the Convention on the Physical Protection of Nuclear Material (2005) | Neither Signed Nor Ratified |
| International Convention for the Suppression of Acts of Nuclear Terrorism (2005) | 2005 (Signed Only) |

## Vietnam

### Background on Civilian Nuclear Activity

Vietnam's history in nuclear research and development dates back to the 1960s.[15] Under the US Atoms for Peace program, the US firm General Atomics supplied the then-anticommunist South Vietnam a 250-kilowatt pool-type TRIGA Mark-II research reactor, built in the central highlands of Dalat, as well as HEU fuel for its operation. The Dalat Nuclear Research Reactor (DNRR) reached criticality in 1963 and was subsequently operated for training, research, and radioisotope production. However, during the war, i.e., between 1968 and 1975, research work was suspended and the reactor was shut down. As the war was coming to an end, Washington launched a clandestine operation to remove unused fuel rods from the reactor and ship them back to the United States. Immediately after the war, the newly-formed communist government of Vietnam established the Vietnam Atomic Energy Commission (VAEC), later renamed the Vietnam Atomic Energy Institute (VINATOM), to manage its nuclear activities and, in the early 1980s, VAEC received Soviet assistance to restore and upgrade the DNRR to a 500-kilowatt Russian VVR-M design. The Soviet Union also helped train a group of scientific and technical staff to develop nuclear technology for agricultural and medical purposes.

In 2007, under the Russian-American Reduced Enrichment for Research and Test Reactors program, and with the support of the US Department of Energy's GTRI, the DNRR was converted from 36 percent HEU fuel to under 20 percent LEU fuel, and approximately 4.3 kilograms of unused HEU fuel was returned to Russia. Physical protection upgrades were also made to the reactor and to other facilities with radiological sources, most of which are located in Hanoi and Ho Chi Minh City. Pursuant to a US-Vietnam bilateral agreement concluded in late 2010, the reactor has recently been fully converted and HEU spent fuel was returned to Russia.[16] The DNRR, which is light-water moderated and cooled, is currently Vietnam's only reactor, although Russia has agreed to build a new 15-megawatt research reactor in Dalat, for operation from late 2018.

Over the years, Vietnam has been involved in numerous national, regional, and interregional technical cooperation projects with the IAEA, which it joined in 1957, as well as with individual states. These projects have covered many nuclear power-related aspects, such as energy and electricity planning, nuclear safety and security, and the development of a legislative system through the provision of equipment, materials, experts, and manpower training.

Although the establishment of VAEC in 1976 was driven mainly by a willingness to promote the peaceful use of nuclear energy, Vietnam's interest in developing nuclear power only began to take shape in the early 1980s, as the DNRR was being upgraded. A

[15] For a comprehensive historical background, see "Vietnam" in *Preventing Nuclear Dangers in Southeast Asia and Australasia*, pp. 151-164.
[16] "US, International Partners Remove Last Remaining HEU from Vietnam, Set Nuclear Security Milestone," *National Nuclear Security Administration Press Release*, July 2, 2013.

number of studies were conducted. Yet, it was not until 1996 that the first comprehensive study about the desirability and feasibility of nuclear power in Vietnam was produced. Based on Vietnam's growing energy needs, this study recommended the introduction of nuclear power by 2015. This led to several studies and, in 2002, the Prime Minister signed a "Decision on Establishment of the Governmental Steering Committee for Pre-Feasibility Studies on the Construction of Nuclear Power Plants in Vietnam." Two years later, the Prime Minister endorsed the "Strategy for Vietnam's Electricity Development 2004-2010," which includes exploring, researching, and preparing facilities for the first nuclear power plant and opens the door to nuclear energy development in Vietnam.

The formal decision to introduce nuclear power in Vietnam was embodied in the "Strategy for Peaceful Uses of Atomic Energy up to 2020," which the Prime Minister signed in 2006.[17] This document lays out the rationale for nuclear power and describes a target of bringing a 2,000-megawatt nuclear power plant online by 2020 and of gradually raising the ratio of nuclear power in the national energy mix, totaling a nuclear power generation capacity of 20,000 megawatts by 2040. It also calls for a complete exploration of uranium reserves, the development of the technical and personnel infrastructure in nuclear science and technology, and the use of nuclear technology in other applications, namely in the medical field.

A year later, the Prime Minister approved the "Strategy Implementation Master Plan for Electricity Development up to 2020 and Vision to 2050," which sets out Vietnam's nuclear energy plan in detail.[18] The construction of two 1,000-megawatt reactors in Phuoc Dinh, the southern Ninh Thuan province, scheduled to be begin in 2015 and expected to come into operation in 2020 was announced, as well as the construction of another 2,000-megawatt nuclear power plant (with two reactors) in Vinh Hai, also in the Ninh Thuan province, expected to come online by 2021 with a further 6,000-megawatt by 2030. Subsequently, in 2008, the National Assembly approved the "Atomic Energy Law," providing a comprehensive legal framework for the development of nuclear energy and clearing the way to choose a reactor design.

In 2010, in an effort to provide additional guidance on its nuclear power plans, the Prime Minister established the State Steering Committee for the Ninh Thuan Nuclear Power Project, which operates as a Nuclear Energy Program Implementing Organization (NEPIO). Later that year, Vietnam also announced that it plans to build 14 nuclear reactors at eight sites in five provinces by 2030. Four more units were added to the first two sites in Ninh Thuan, then six more at six sites: Binh Tien (Ninh Thuan province), Xuan Phuong (Phu Yen province), Hoai My (Binh Dinh province), Duc Thang (Quang Ngai province), Duc Chanh (Quang Ngai province), and Ky Xuan (Ha Tinh province). Subsequently, in October 2010, Vietnam signed an agreement with Russia for the construction of the country's first nuclear power plant: Ninh Thuan-1 at Phuoc Dinh, using two VVER-1000 or 1200 reactors, increased later by two more units. ("VVER" is

[17] Nguyen Trieu Tu, "Vietnam: Ensuring Safety and Security for Peaceful Uses of Atomic Energy," *Atoms for Peace: an International Journal*, Volume 1, Issue 2-3, July 2006, pp. 186-190.
[18] Presentation by Doan Phac Le, "Programme for Nuclear Power Development in Vietnam," Vienna, March 22-23, 2012.

Russian for "water-pressurized reactor.") The 4 X 1000-megawatt Ninh Thuan 1 site will be built by Atomstroyexport, a subsidiary of Russia's Rosatom Nuclear Energy State Corporation. Mostly financed by Russia, the construction is due to start by 2014 and the first unit to be commissioned and connected to the national grid by 2020. Also in October 2010, an agreement with Japan was signed for construction of a second nuclear power plant: Ninh Thuan-2 at Vinh Hai in Ninh Thuan province, with its two reactors to come on line in 2024-25. The Japanese consortium International Nuclear Energy Development of Japan will construct the 4 X 1000 MW Ninh Thuan-2 site, which will be mostly financed by the Japanese government.

Following the Fukushima nuclear accident of March 2011, a working group headed by the Deputy Minister of the Ministry of Science and Technology was set up. While highlighting the need to pay greater attention to safety, it recommended the pursuit of current plans. Significantly, in March 2012, it was announced that Vietnam and South Korea would start a feasibility study for the construction of four Korean-developed Advanced Nuclear Power Reactors (APR)-1400, additional to the nuclear power plants signed with Russia and Japan.[19] In December 2012, IAEA experts conducted their eighth mission in Vietnam, finding that the introduction of nuclear power enjoyed strong government support and that significant progress had been achieved to establish the proper technical and human infrastructure for nuclear energy development.[20] (Vietnam is planning to send 2,000 workers and engineers to Russia and Japan for two-three years of training in nuclear power construction, starting in late 2013.)

Vietnam's nuclear power plants will use imported nuclear fuel. Cooperative relationships with the countries of high uranium reserves will be sought, although Vietnam will aim to diversify its suppliers to secure nuclear fuel supply. A survey and exploration of Vietnam's uranium reserve will also be conducted to determine capability for processing nuclear fuel from domestic uranium. With regard waste management, the absence of a national repository or even any plan for waste control suggest that Vietnam will follow the common international practice of temporarily storing spent fuel on site, initially in spent fuel ponds and then in dry storage in casks, until an international central storage facility can be developed. Significantly, Vietnam's Ministry of Construction is conducting a study on "Site Planning for Radioactive Waste Disposal," which is scheduled to be submitted to the Prime Minister by the end of 2015.

**Key Organizations and Offices**

The Prime Minister and a deputy prime minister lead the preparation for the nuclear power program, and they are assisted by an inter-ministerial steering committee, which consists of the Ministry of Industry, vice-ministers, and senior officials from relevant ministries, agencies, and institutions.

Numerous ministries, organizations, and universities have also been involved in Vietnam's nuclear energy plans, namely:

[19] Kim Tae-gyu, "Korea to build nuclear plant for Vietnam," *Korea Times*, March 28, 2012.
[20] "IAEA Reviews Vietnam's Progress in Nuclear Power Development," *IAEA News*, Jan. 25, 2013.

- The Ministry of Industry and Trade (MOIT) and its subsidiary body, the Vietnam Electricity (EVN);
- The Ministry of Science and Technology (MOST) and its subsidiary bodies: VINATOM, the Vietnam Agency for Radiation and Nuclear Safety (VARANS), and Vietnam Atomic Energy Agency (VAEA);
- The Ministry of Construction (MOC), to prepare for local civil engineering participation.
- The Ministry of Planning and Investment (MPI);
- The Ministry of Finance (MOF);
- The Ministry of Education and Training (MOET), to conduct domestic education, including nuclear engineering and overseas education cooperation;
- The Ministry of Natural Resources and Environment (MONRE), to conduct studies on the environmental impact of building nuclear power plants;
- The Ministry of Defense (MOD) and the Ministry of Public Security (MOPS), to build capacity to ensure security and emergency response;
- The Ministry of Information and Communication (MOIC);
- The Ministry of Foreign Affairs (MOFA); and
- The Ninh Thuan People's Committee.

To direct and manage the implementation of the two Ninh Thuan projects, as well as HRD, the following organizations were created:

- The State Steering Committee for Ninh Thuan Nuclear Power Project, led by a deputy prime minister, to provide general direction and develop strategies for nuclear power development, make policies, supervise and coordinate activities, and advise the Prime Minister.
- The State Steering Committee for Project on Training and Developing Human Resources in the Field of Atomic Energy up to 2020, led by a deputy prime minister and with the Minister of the MOET as permanent vice-head. Its task is the implementation of the "Master Plan on Training and Developing of Human Resources in the Field of Atomic Energy from Now Until 2020," which was approved by the Prime Minister in 2010. The Master Plan's goal is to focus on Hanoi National University, Ho Chi Minh National University, Hanoi University of Technology, Dalat University, University of Electric Power, as well as on VINATOM's Nuclear Training Centre; recently, Vietnam also announced that it was planning to send 2,000 people to Russia and Japan for nuclear power construction training.
- The Ninh Thuan Nuclear Power Plant Projects Management Board, under EVN.

- The National Council for Atomic Energy Development and Application, under MOST.

Ministry of Industry and Trade

MOIT is responsible for the two nuclear power plant projects. It is also responsible for conducting (pre-) feasibility studies.

For more information about MOIT, visit: www.moit.gov.vn/

Vietnam Electricity

EVN, which is part of MOIT, is responsible for conducting (pre-)feasibility studies and is the investor, owner, and operator of the Ninh Thuan 1 and 2 projects. Under EVN sits the Ninh Thuan Nuclear Power Project Management Board, which was established in 2011.

For more information about EVN, visit: www.evn.com.vn/

Ministry of Science and Technology

MOST is responsible for formulating the "Vietnam Strategy for Peaceful Utilization of Atomic Energy up to 2020" and for conducting studies and elucidation of the aspects of nuclear power development in Vietnam. In 2008, MOST established an interagency working group headed by a vice-minister to coordinate the preparation of the Master Plan's projects in order to implement the Atomic Energy Strategy. In 2010, MOST was also assigned to implement a "National Project on Public Relations and Communication on Nuclear Power Development in Vietnam." In 2013, a new National Council for Atomic Energy Development and Application was established to identify strategies and priorities, advise the government, and coordinate ministries, agencies, governmental bodies in developing nuclear energy and crafting nuclear power programs. This Council will also have a role in international nuclear cooperation activities with organizations and individual countries.

For more information about MOST, visit: www.most.gov.vn/

Vietnam Atomic Energy Institute

VINATOM (formerly VAEC) is an administrative and scientific agency that operates under MOST with functions to carry out scientific research and development of nuclear technology and atomic energy, serve for state management activities on atomic energy, and participate in providing technical supports for State management agencies in radiation and nuclear safety. More specifically, VINATOM has the following functions and duties:

- Conduct fundamental and applied research on nuclear science and engineering, nuclear reactor technology, nuclear fuel and material, radiation protection and nuclear safety, and radioactive waste management technology;
- Develop technology, production, and technical services in atomic energy and related fields;
- Study and formulate directions, strategies, planning, and plans for atomic energy development, participate in the formulation of law projects and regulatory documents in relation to atomic energy, and participate in the implementation of nuclear policies approved by the government. Significantly, VINATOM has been central in promoting the benefits of nuclear energy development since the mid-1990s;
- Perform international cooperation in the field of atomic energy and participate in the implementation of international treaties and other agreements endorsed by Vietnam;
- Provide technical support on radiation protection and nuclear safety in the appraisal of radiation protection and nuclear safety, carry out radioactive environment monitoring, calibrate radiation facilities and dosimeters, and develop technical infrastructure in the preparedness and response to radiological and nuclear incidents and accidents; and
- Participate in the planning and training of scientific and technical professionals in the field of atomic energy.

VINATOM consists of an Administrative Office; a Department of Organization and Personnel; a Department of Finance and Planning; a Department of International Cooperation; a Department of Legislation and Nuclear Policy; a Department of Nuclear Information; a Department of Technical Support; and a Department of Inspection. Four institutes sit under its Nuclear Power Development and Technical Support Sector: the Institute for Nuclear Science and Technology (INST) in Hanoi, the Institute for Technology and Radioactive and Rare Elements (ITRRE) in Hanoi, the Dalat Nuclear Research Institute (DNRI), and the Nuclear Training Center (NTC). There are six institutes under its Research Development of Radiation and Isotope Application Sector: the Center for Application of Nuclear Technique in Industry (CANTI) in Dalat, the Centre for Nuclear Techniques (CNT) in Ho Chi Minh City, the Research and Development Center for Radiation Technology (VINAGAMMA), the Hanoi Irradiation Center (HIC), the Danang Institute of Radiation Application (DIRA), and the Non-Destructive Evaluation Center (NDE). VINTOM is also home of a Technology Application and Development Company (NEAD) and a Nuclear Application Development and Investment Joint Stock Company.

Other similar research and development organizations have been involved in studying nuclear energy development in Vietnam, namely the Institute of Energy (IE) and the National Research Institute of Mechanical Engineering (NARIME), both of which are part of MOIT, or the Institute of Energy Science (IES) or the Institute of Material

Sciences, both of which are part of the Vietnam Academy of Science and Technology (VAST); VAST studies natural sciences and develops technologies based on key government orientations.

For more information about VINATOM, visit: vinatom.gov.vn/

Vietnam Agency for Radiation and Nuclear Safety

VARANS, which is part MOST, is the regulatory body responsible for managing radiation and nuclear safety, security, safeguards, and control in Vietnam.

It has assumed the responsibilities formerly carried out by the Vietnam Radiation Protection and Nuclear Safety Authority (VRPNSA) (1994-2003) and the Vietnam Agency for Radiation and Nuclear Safety and Control (VARANSAC) (2003-2007). Under the new organization, the Division of International Cooperation, Legislation, and Information was separated into the Division of International Cooperation and the Division of Legislation and Information, and the Division of Nuclear Safety and Safeguards was established. The functions of VARANS are more clearly defined, namely as they relate to radiation and nuclear safety; the security of radioactive sources, nuclear materials, nuclear facilities; nuclear control for preventing nuclear proliferation; and other activities supporting management activities.

The organizational mechanism of VARANS includes eight units:

- The Division of Administration and Personnel.
- The Division of Licensing.
- The Division of Nuclear Control.
- The Division of Nuclear Safety and Safeguards.
- The Division of Legislation and Information.
- The Division of Inspection.
- The Division of International Cooperation.
- The Division of Training.

VARANS is also host of a Centre of Technical Assistance on Radiation and Nuclear Safety.

VARANS participates in the building of the legislative documents. It makes and submits to the Minister various policies and programs, and it organizes and implements the notification, registration, licensing, renewal, amendment, and withdrawal of licenses. VARANS also conducts regulatory inspections and it maintains a system of records for data and information, organizes and develops international cooperation activities, and participates in the implementation of international treaties and other agreements, among

other functions and duties. It has signed cooperation agreements with its foreign counterparts; for instance, it has a cooperation agreement with the US Nuclear Regulatory Commission to share technical information on nuclear energy and to exchange information about regulations, environmental impact, and safety of nuclear sites.

Significantly, due to its structure, VARANS is not a truly independent regulatory body. This is recognized as an issue by VARANS officials. Various options are being considered to address it, namely as part of the work conducted on amending the 2008 "Atomic Energy Law."

For more information about VARANS, visit: www.varans.vn/

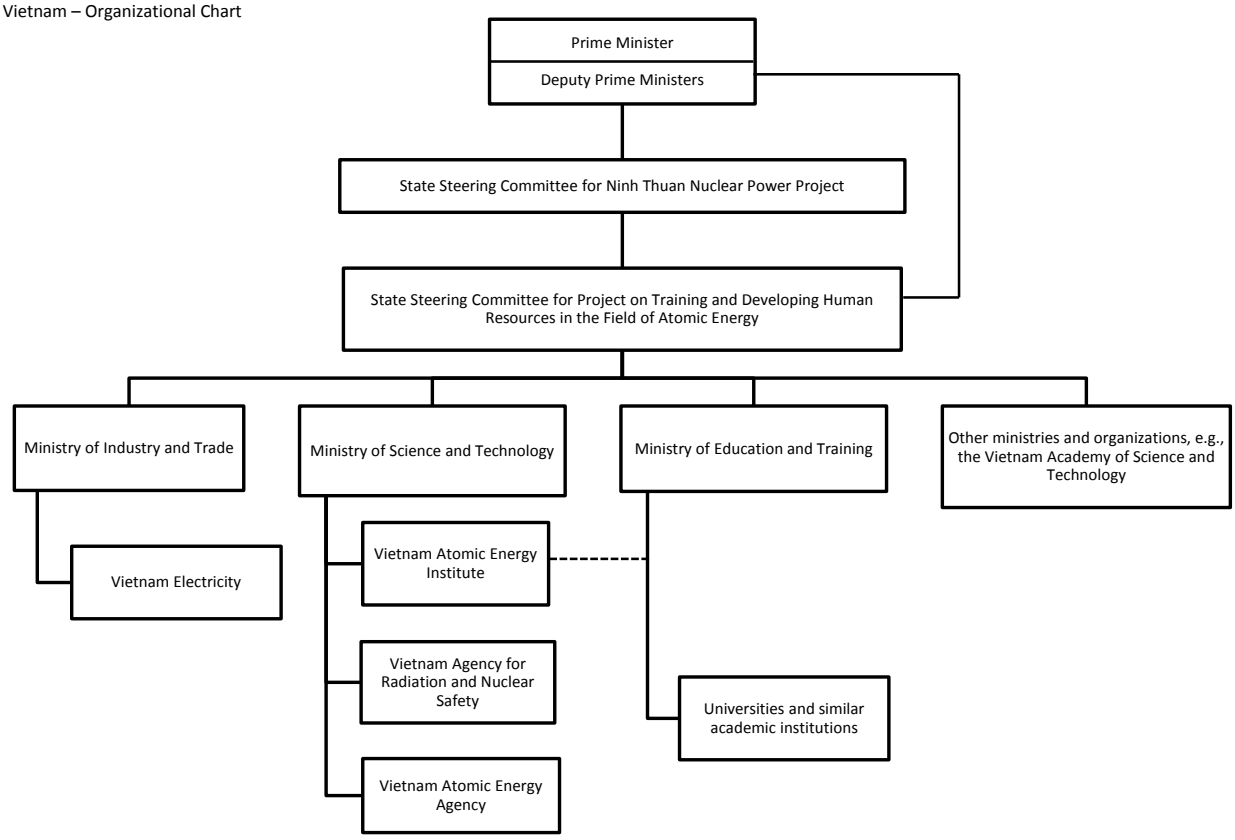
Vietnam Atomic Energy Agency

VAEA is an agency under MOST which advises and assists the Minister in implementing the management for research, application and development activities of atomic energy in the whole country, and performs public and technical services to support the Agency's management functions.

VAEA consists of a Department of Atomic Energy Policy, a Department of Atomic Energy Information, a Department of International Cooperation, and a Department of Nuclear Science and Technology Management. It is also host of a Center for Nuclear Technology Use Promotion and a Center for Atomic Energy Technical Service.

For more information about VAEA, visit: vaea.gov.vn/

Vietnam – Organizational Chart




## Status on Nuclear Safeguards, Safety, and Security

Vietnam joined the IAEA in 1957, acceded to the NPT in 1982, and ratified a CSA in 1990. Just under a year before passing its "Atomic Energy Law" (2008), it also signed an AP, which it brought into force in 2012. In terms of its commitment to nuclear safety conventions, Vietnam is a party to the CENNA, the CACNARE, and, more recently, it also acceded to the CNS. Significantly, with regard to nuclear security conventions, as of June 2013, Vietnam had neither signed the CPPNM and its Amendment not the ICSANT; it is reportedly finalizing internal procedures to ratify the CPPNM.[21]

Vietnam, however, has cooperated extensively with the IAEA and with individual states (namely with the United States, through the US Department of Energy's GTRI, and with Russia) to enhance nuclear safety and the physical protection of nuclear and radiological materials. Vietnam is also increasingly developing nuclear safety and security cooperation with other states. Recently, for instance, Vietnam and South Korea have also announced a pilot project supported by the IAEA to establish a real time tracking system for radiological materials in Vietnam: the project will use GPS-based system developed by the Korean Institute for Nuclear Security (KINS) and aim to

[21] "Vietnam active in international efforts for nuclear security," *VietnamNet Bridge*, March 28, 2012.

improve the ability of states to ensure the physical protection and transport security of radioactive materials.[22]

| Instrument | Date Signed/Ratified or Acceded |
|---|---|
| International Atomic Energy Agency Membership | 1957 |
| Nuclear Nonproliferation Treaty (1968) | 1982 (Acceded) |
| Small Quantities Protocol | N/A |
| Comprehensive Safeguards Agreement | 1990 (In Force) |
| Additional Protocol | 2012 (In Force) |
| Convention on Early Notification of a Nuclear Accident (1986) | 1987 (Acceded) |
| Convention on Assistance in the Case of Nuclear Accident or Radiological Emergency (1986) | 1987 (Acceded) |
| Convention on Nuclear Safety (1994) | 2010 (Acceded) |
| Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (1997) | Neither Signed Nor Ratified |
| Code of Conduct on the Safety and Security of Radioactive Sources (2003) | Formal Support |
| Vienna Convention on Civil Liability for Nuclear Damage (1963) | Neither Signed Nor Ratified |
| Protocol to Amend the 1963 Vienna Convention on Civil Liability for Nuclear Damage (1997) | Neither Signed Nor Ratified |
| Convention on Supplementary Compensation for Nuclear Damage (1997) | Neither Signed Nor Ratified |
| Optional Protocol Concerning the Compulsory Settlement of Disputes to the Vienna Convention on Civil Liability for Nuclear Damage (1999) | Neither Signed Nor Ratified |
| Joint Protocol Relating to the Application of the Vienna and the Paris Convention (1992) | Neither Signed Nor Ratified |
| Convention on the Physical Protection of Nuclear Material (1979) | Neither Signed Nor Ratified |
| Amendment to the Convention on the Physical Protection of Nuclear Material (2005) | Neither Signed Nor Ratified |
| International Convention for the Suppression of Acts of Nuclear Terrorism (2005) | Neither Signed Nor Ratified |

[22] Seoul Nuclear Security Summit, "ROK, Vietnam and the IAEA to Pilot Radioactive Source Tracking System," March 27, 2012.

# About the Author

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