



行政院原子能委員會 106 年 年報  
Atomic Energy Council, Executive Yuan



ANNUAL REPORT  
2017 AEC



# 主委的話

## Words from the Chairman

原子能委員會是核能安全的主管機關，負責核電廠安全輻射防護，緊急應變以及核廢料安全的監督工作，目前也肩負原子能科技發展。

落實 2025 非核家園的政策，原能會在守護安全的職責下，除了專業創新、守護輻安，並以「如期廢核」及「核廢處理」的安全監督做為未來重要的施政主軸。原能會在這個主軸下將加強推動的工作，包括「落實政府非核家園政策施行」、「核廢料處理」、「嚴格監督輻安與核安」、「推動科技研發與創新」及「擴大公眾參與與社會溝通」。

核一廠 1 及 2 號機運轉執照期限分別為 107 年 12 月 5 日及 108 年 7 月 15 日，機組即進入除役階段；原能會已於 106 年 6 月完成審查「核一廠除役計畫」，以確保如期如質執行核一廠除役計畫，並要求台電公司應於 107 年及 110 年，分別提出核二廠及核三廠除役計畫，落實非核家園政策。

擴大民眾參與積極對外溝通，是原能會非常重視的；原能會同仁除持續秉持專業技術外，同時也會傾聽人民的聲音，積極站在社會大眾的角度思考問題、處理問題，才能符合民眾的期待，讓原能會可以成為「全民的原能會」。

主任委員







As the competent authority over nuclear safety, the Atomic Energy Council (AEC) is responsible for overseeing the affairs related to safety and radiation protection of nuclear power plants, nuclear emergency response, and radioactive waste management. As endowed by law, the AEC is also in charge of the development of atomic technology.

In order to implement the policy of a “nuclear-free homeland by 2025”, the AEC, with its responsibility to ensure safety, not only supports the spirits of “profession, innovation, and securing radiation safety”, but also sets the “On-Schedule Phase-Out of Nuclear Power” and “Radioactive Waste Management” as its two major administrative principles in the coming years. Under these principles, the AEC will strengthen its promotion of relevant tasks, including “Implementing the execution of a nuclear-free homeland policy”, “Radioactive waste management”, “Strictly overseeing radiation safety and nuclear safety”, “Encouraging technology research and innovation” and “Expanding public participation and social dialogue”.

The expiration dates of the operating licenses of Chinshan Nuclear Power Plant Unit 1 and Unit 2 are December 5, 2018 and July 15, 2019, respectively. The AEC completed the review of the “Decommissioning Plan of Chinshan Nuclear Power Plant” in June 2017 to ensure that the decommissioning of the nuclear power plant will be executed on schedule. In order to implement the “nuclear-free homeland” policy, the AEC also requires Taipower Company to submit the decommissioning plans for the Kuosheng and Maanshan Nuclear Power Plants in 2018 and 2021, respectively.

The AEC emphasizes the importance of expanding public participation and actively communicating with people. Therefore, staff members in the AEC not only oversee nuclear safety using their technical and professional capabilities, but also listen to the voices of the people, consider the issues and solve problems from the people’s viewpoints to meet their expectations and make the AEC become the “People’s Atomic Energy Council”.

ANNUAL REPORT  
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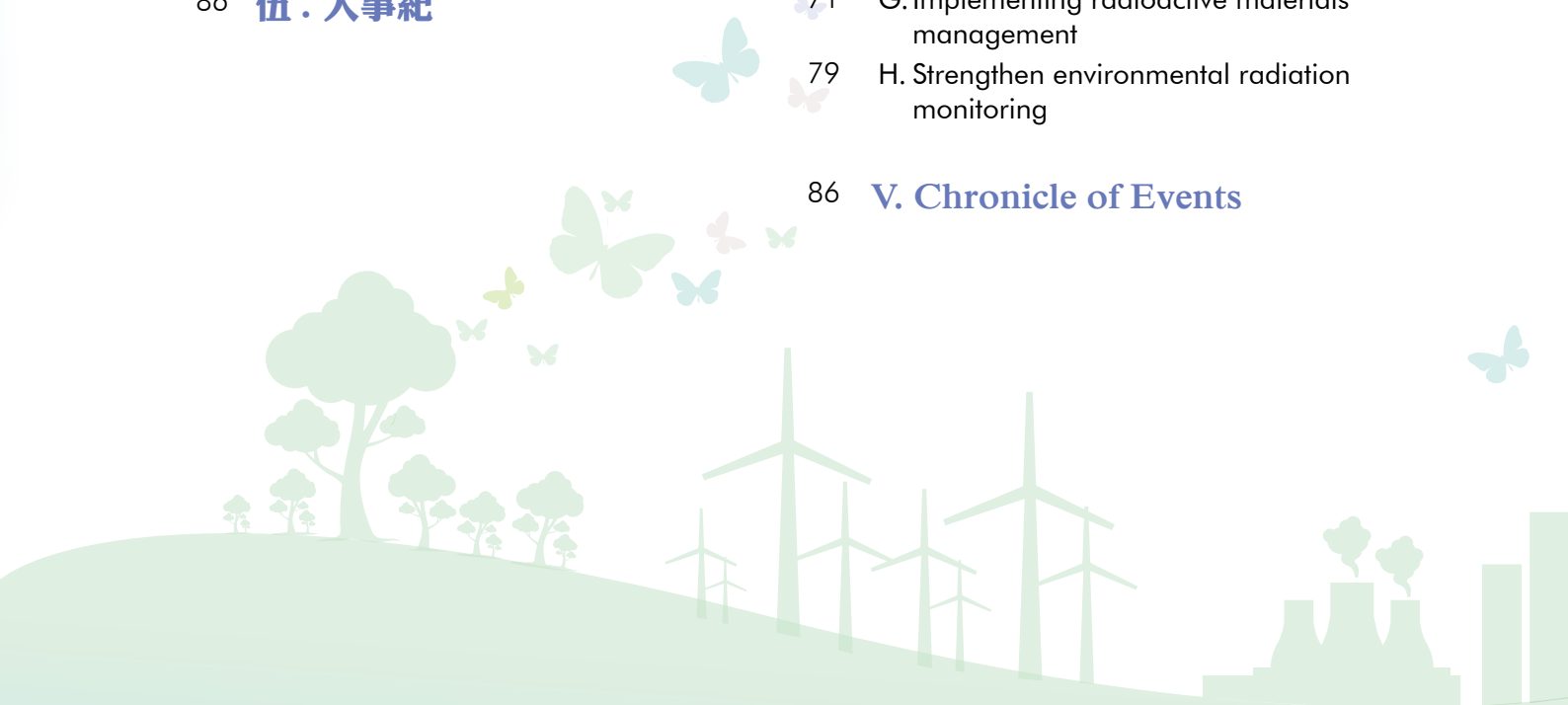
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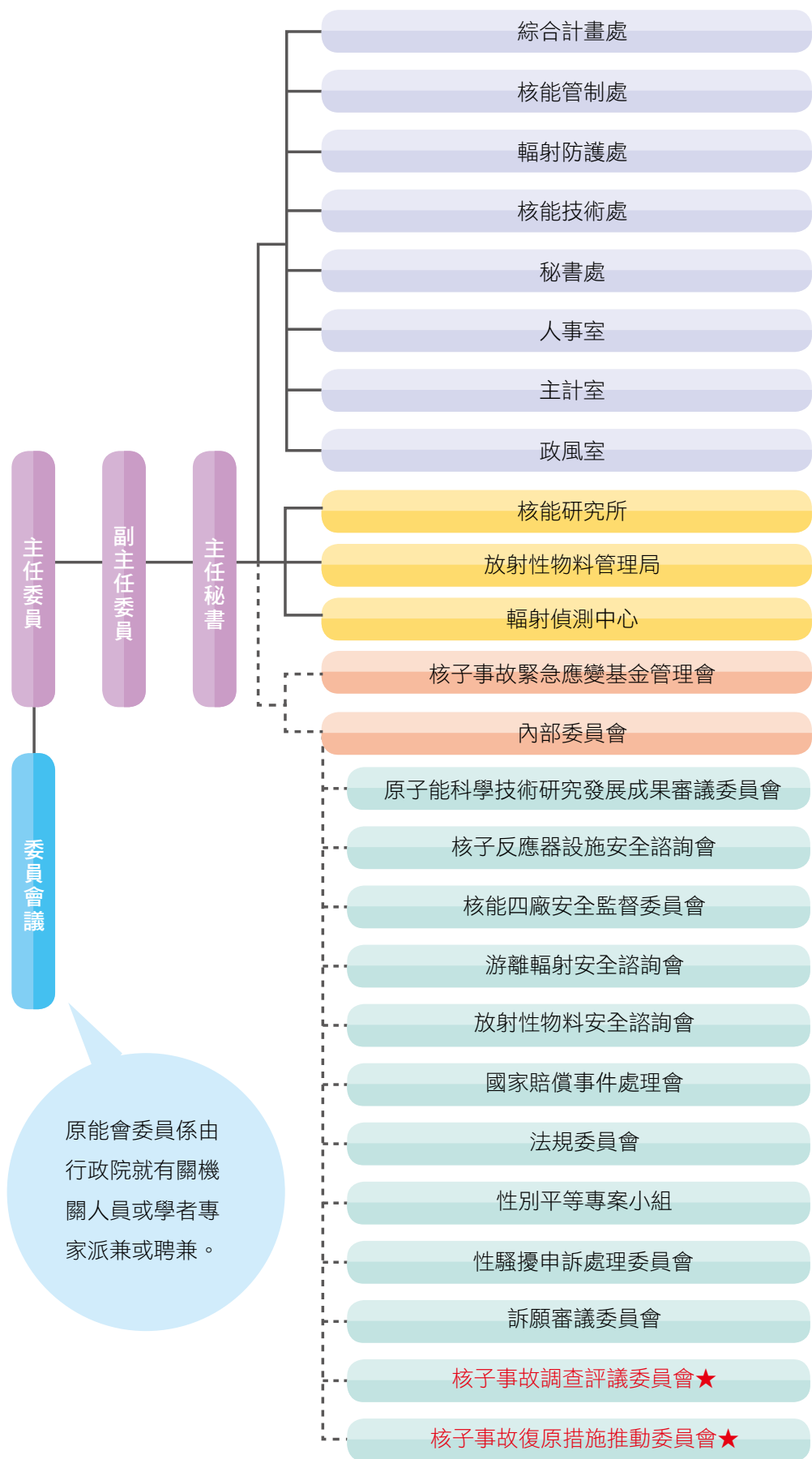
## 組織架構

Organizational  
Structure





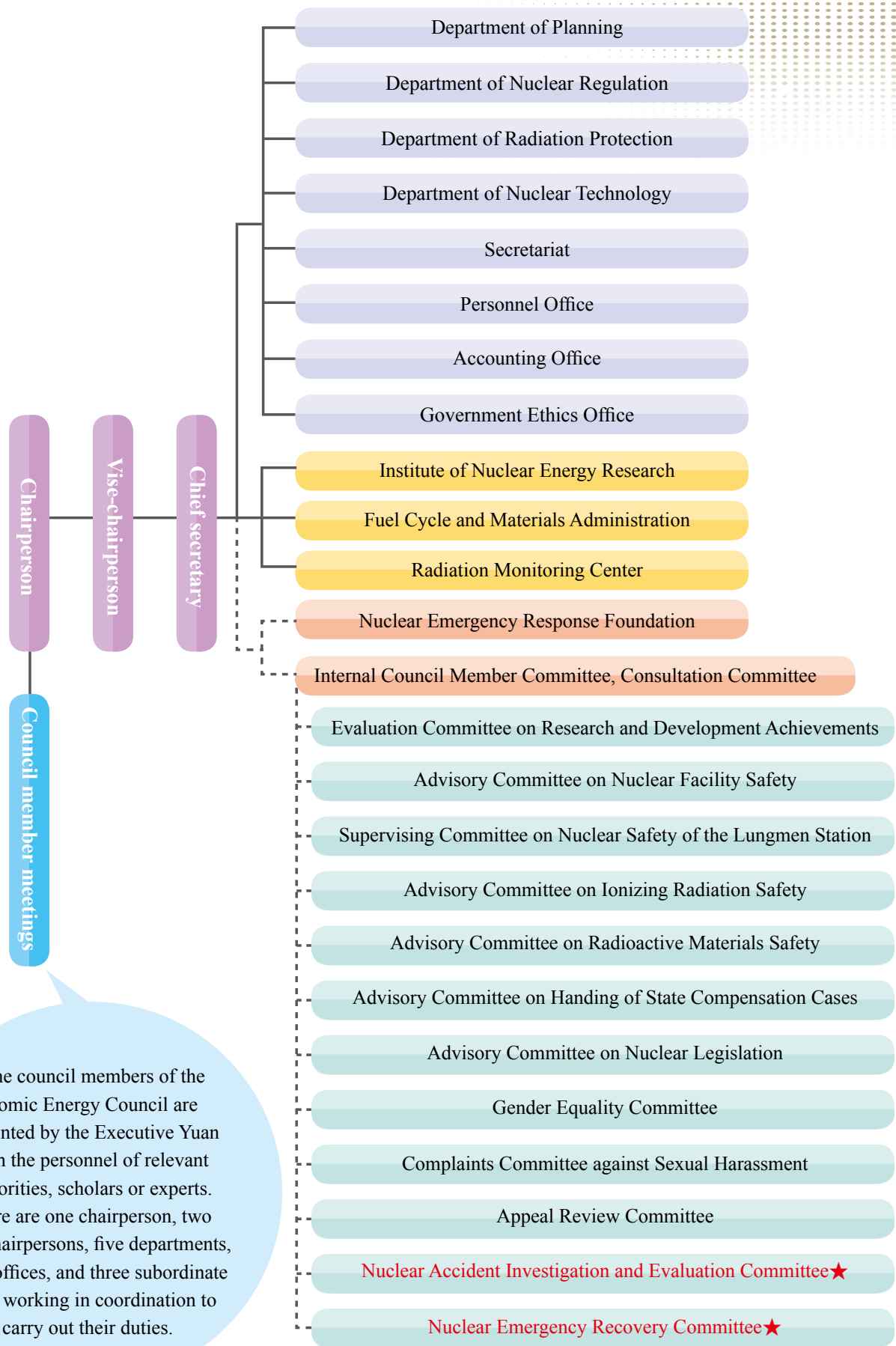




原能會委員係由  
行政院就有關機  
關人員或學者專  
家派兼或聘兼。

★為非常設之委員會





The council members of the Atomic Energy Council are appointed by the Executive Yuan from the personnel of relevant authorities, scholars or experts. There are one chairperson, two vice-chairpersons, five departments, three offices, and three subordinate units working in coordination to carry out their duties.

★non-standing committee



## 人力與經費

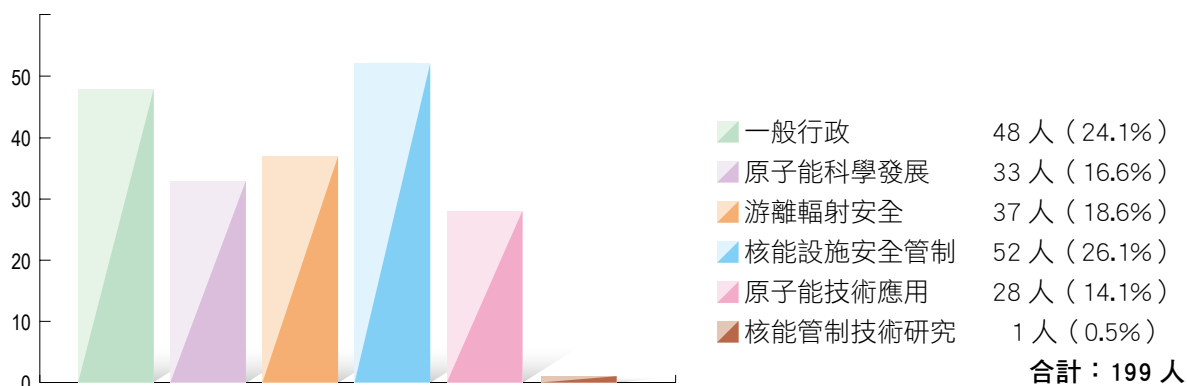
Manpower and Budget



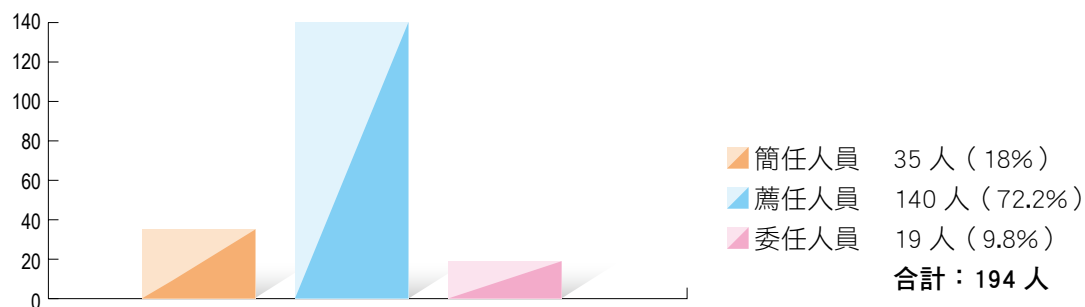


## 行政院原子能委員會

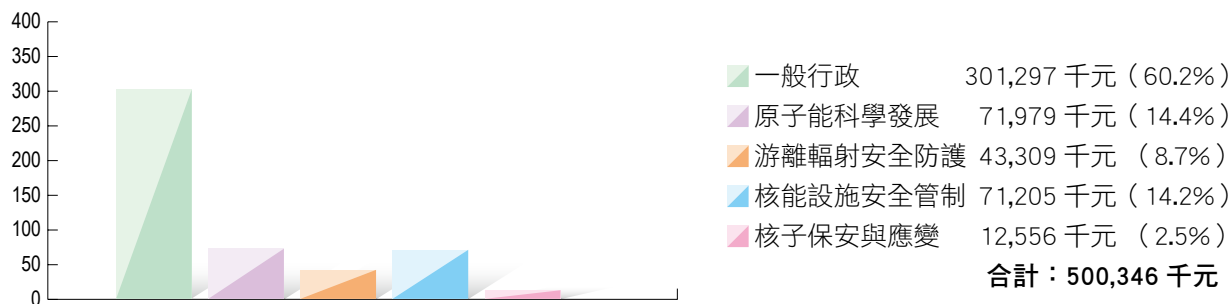
### 106 年度職員（含聘用人員 5 人）業務性質分配



### 106 年度職員官等分配



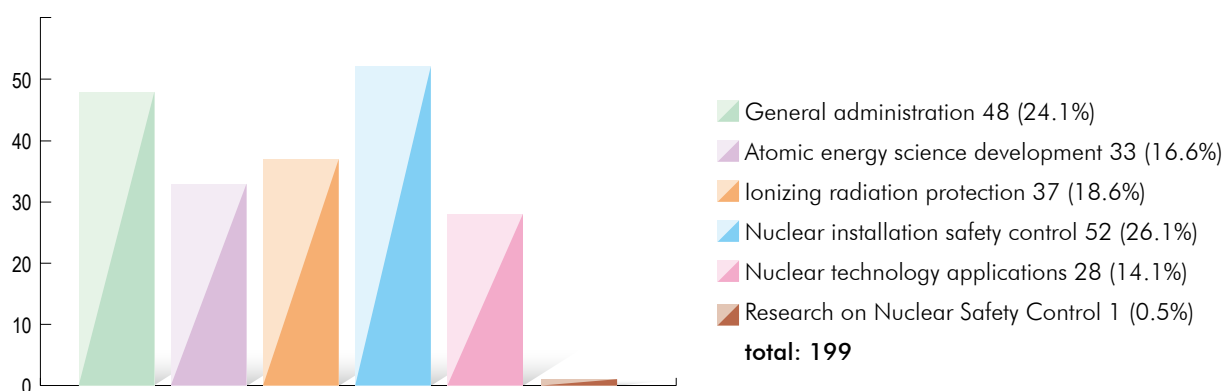
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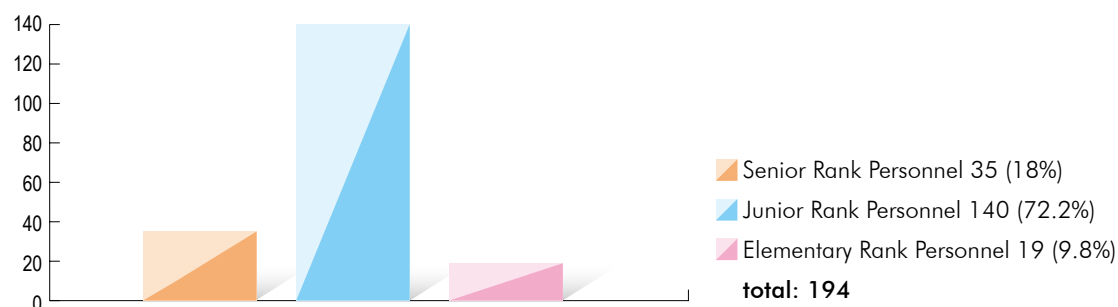


# The Atomic Energy Council

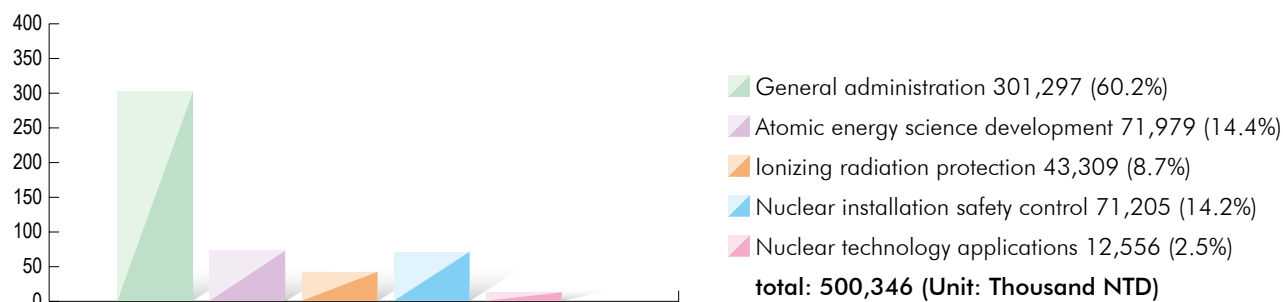
## 2017 Human Resources Breakdown (Including five hiring staffs)



## 2017 Employee Ranking Breakdown



## 2017 Budget/Expenditure Allocation





## 重要施政成果

Important Governance  
Outcomes







## 一、國際合作新境界，強化核安與經驗交流

### （一）強化核能安全管理國際合作交流，攜手共邁 2025 非核家園

106 年 7 月 10 日至 11 日赴東京參加「第 3 屆台日核能管制資訊交流會議」，會後參訪「東海、東海第二核電廠」及 JPDR 電廠，以瞭解日本在福島事故後採取的安全強化措施、乾貯與電廠除役等方面的管制情形。另為台日雙方政府於核子緊急事故或事件發生之際能迅速因應，雙方於 2017 年 9 月完成「2014 年管制資訊交流備忘錄修正案」之簽署，順利建立緊急事故通報及交流窗口。

12 月 12 日至 14 日於高雄舉行 2017 年台美民用核能合作年會，台美雙方共計近 90 人與會；配合 2025 非核家園政策目標，會中除簡報雙方核能管制現況外，亦涵蓋核廢料處置、核設施除役、海域輻射偵測等相關資訊交流。另為進一步強化與國際就核電廠除役安全管理方面之交流，亦與積極邁向非核目標且在除役方面已具相當經驗之德國接觸，於 12 月派員赴德國核安管制機關（BMU），了解其除役管制方面的經驗並分享我國核電廠相關管制近況。



▲ 第三屆「台日核能安全管理資訊交流會議」開會情景  
Third Taiwan-Japan Regulatory Information Exchange Meeting

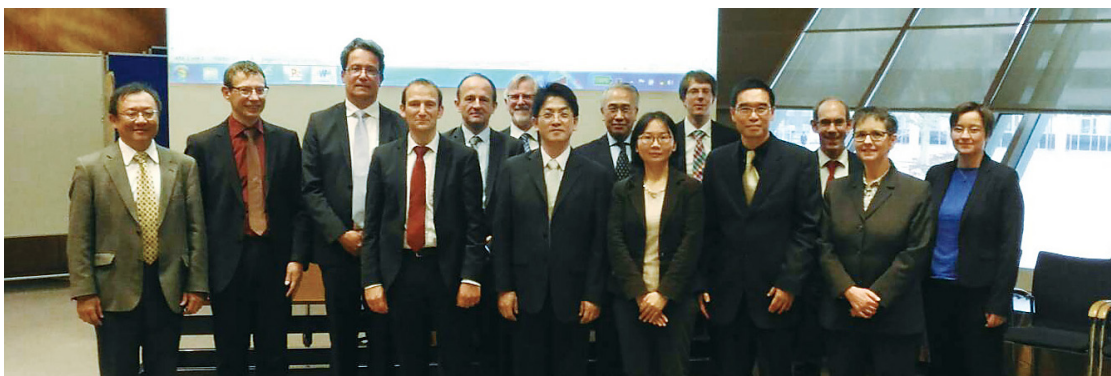


## A. New realm of international cooperation, strengthening nuclear safety and exchange of experience

### 1. Strengthening international cooperation of nuclear safety, on the way to reach the goal of “nuclear free homeland by 2025”

The Third Taiwan-Japan Regulatory Information Exchange Meeting was held on July 10-11, 2017 in Tokyo; after the meeting, Taiwan delegates also visited Toikai Nuclear Power Plant and Japan Power Demonstration Reactor to learn relevant regulatory experiences on implementation of post-Fukushima safety reinforcement, dry storage and decommissioning. Besides, in order to facilitate the response for Taiwan and Japan government in cases of nuclear emergencies and incidents, Taiwan and Japan signed “Modification for the 2014 Memorandum on Regulatory Information Exchange” in September to establish regular communication channel and information exchange in events of nuclear emergencies.

2017 TECRO-AIT JSC Meeting on Civil Nuclear Cooperation was held in Kaohsiung on December 12-14; approximately 90 persons attended the meeting. To comply with the goal of reaching “Nuclear-Free Homeland” by 2025, in addition to current regulatory status, topics such as radioactive wastes disposal, decommissioning of nuclear facilities and marine radiation monitoring were also discussed in the meeting this year. On the other hand, in order to strengthen the communication with the international society concerning regulation of nuclear facility decommissioning, AEC also learned experience from German, which has been on the way to reach the goal of nuclear-free and has gained experiences on decommissioning. On December 1, AEC delegates visited German’s nuclear safety authority, BMU, to learn its experience on regulation of nuclear facility decommissioning and to share our recent regulation status with it.



▲ 與德國核安管制單位（BMU）交流合影  
AEC-BMU Bilateral Meeting

## （二）宣告原子能和平用途

台灣於 1968 年率先簽署「防止核武蕃衍條約」，雖然自 1971 年退出聯合國，不再是總署的會員國，但是遵守「防止核武蕃衍條約」（Non-Proliferation Treaty, NPT）的精神，「不發展、不生產、不取得、不儲存、不使用」核武的一貫政策從未改變。長期以來，依據核子保防三邊協定及其補充議定書配合總署執行核子保防作業，全力防止核武器蕃衍的努力，獲得總署連續 11 年的肯定，宣告台灣為「所有核物料均用於核能和平用途」的國家之一。



▲ 2017 台美民用核能合作會議  
2017 TECRO-AIT JSC Meeting on Civil Nuclear Cooperation



## 2. “Remained in peaceful nuclear activities” as declared by the IAEA

The Republic of China (Taiwan) was one of the first states to sign the Non-Proliferation Treaty in 1968. Although we left the United Nations since 1971 and were no longer a member state of the IAEA since then, we still comply with content of NPT and never change the “five NOs” policy to the development, production, access, storage, and use of nuclear weapons. We have followed the trilateral agreement on Nuclear Safeguards among the IAEA, the United States and Taiwan, and its Additional Protocol, and fully cooperated with the IAEA through comprehensive communication as well as supportive relevant activities. By the honorable award of “all nuclear materials are in peaceful use” from the IAEA, Taiwan has been within the group since eleven years ago.



## 二、全面推動民眾參與及溝通

### （一）從全民角度思考，積極落實資訊公開與輿情回應

在邁向 2025 非核家園的過程，原能會除持續力求資訊公開，也考量民眾需求，於官網增置淺顯易懂的圖片以傳達施政理念及政府政策；此外，面對資訊快速傳播的時代，原能會對於安全管制措施及政策資訊，均第一時間瞭解問題的核心，主動對外說明或即時澄清。

為擴大民眾參與、共同監督的管道，凡與原子能安全管制業務相關之公開說明會或座談會等活動，多以線上同步直播方式，提供民眾最便利的參與管道，並辦理設施訪查、平行監測等活動；106 年計辦理 14 場，活動說明如下：

#### 1. 開放監督 推動民眾參與輻射監測作業

台電公司於 104 年 11 月提報核一廠除役計畫，原能會後續邀請專家學者共同進行的審查案，已於 106 年 6 月完成。為落實資訊公開、促進公眾參與，以使民眾瞭解核一廠除役作業，原能會除於官網設置除役專區，公開除役計畫相關文件與資訊外，亦於 106 年 6 月邀請新北市政府及石門區公所與當地里長、地方代表及環保團體等單位，參加核一廠除役計畫暨乾式貯存設施訪查活動，進行現地勘查與參訪除役核廢料保留區、乾貯設施及低放射性廢棄物一號貯存庫；另於 106 年 8 月邀請鄉親於新北市石門區公所參加核一廠除役計畫審查公開說明會。訪查活動或說明會均由原能會物管局劉局長主持，由台電公司報告核一廠的除役規劃及準備現況，原能會說明核一廠除役計畫的安全審查過程，並聽取與會代表建言，或與地方人士就其關心議題進行意見交流與溝通。



▲ 核一廠除役計畫暨乾式貯存設施訪查活動

The visit activity to the Chinshan NPP decommissioning plan and the dry storage facility





▲ 核一廠除役計畫審查公開說明會

The briefing session on the Chinshan NPP decommissioning plan

## B. Promoting public outreach and comprehensive communication

### 1. Thinking from people's perspective, actively implementing information disclosure and media response

On the way to reach the goal of “nuclear free homeland by 2025”, AEC will continue committing the policy of information transparency, and will also consider the public need to convey our regulatory concepts and government policies via easy-to-read pictures on the official website. In addition, facing an era of rapid information spreading, AEC actively grasps the core issue of nuclear safety regulation and policy information at the earliest, and is able to inform the public or clarify immediately.

In order to expand approaches of public participation and joint supervision, AEC will mostly live stream all public seminars or seminars related to the atomic energy safety regulation to facilitate public involvement. In addition, AEC conducts parallel facilities monitoring and other related activities; fourteen of those have been held in 2017 and are described as follows:

#### a. Open Supervision and Participation of General Public in Radiation Monitoring

Taiwan Power Company submitted the Chinshan NPP decommissioning plan to the AEC in November of 2015. The AEC then organized a review team by soliciting experts and scholars to carry out the review, which was completed in June of 2017. In order to strengthen the public participation, a visit to the dry storage facility along



▲ 106 年蘭嶼環境輻射平行監測活動（取樣）

The parallel monitoring activity for the environmental radiation around Lan-Yu(sampling)

為落實資訊公開、民眾參與及第三者驗證取樣偵測分析，原能會於 106 年 5 月邀請蘭嶼當地民眾、原住民族委員會、地方政府相關代表及台東縣環保局等共同參與「蘭嶼地區環境輻射平行監測活動」，於蘭嶼六個部落進行環境取樣，由各村落村長或民眾指定取樣地點，採集農產品、土壤、飲用水及草樣等環境式樣，交由「全國認證基金會（TAF）」認證之清華大學原子科學中心進行分析，並將結果直接寄到蘭嶼各村落辦公室。本次平行監測的結果，自 100 年起至 106 年歷年的環境試樣分析結果，均未發現輻射異常，所有監測報告均公布於官網。

## 2. 「攜手度量，守護輻安」，辦理輻射偵檢儀器操作研習活動

環境輻射一直是民眾長期關心的議題，為幫助民眾解答環境輻射的疑惑，傳遞正確觀念，原能會 106 年舉辦 2 場輻射偵檢儀器操作研習活動，透過「清楚講」、「動手量」、「現場問」的互動模式，讓參與的學員認識環境輻射，並學習輻射偵測儀器之特性與量測技術，希望更多有興趣的朋友加入守護輻射安全的行列。



▲ 辦理輻射偵檢儀器操作研習活動

Radiation Measurement Instruments workshop

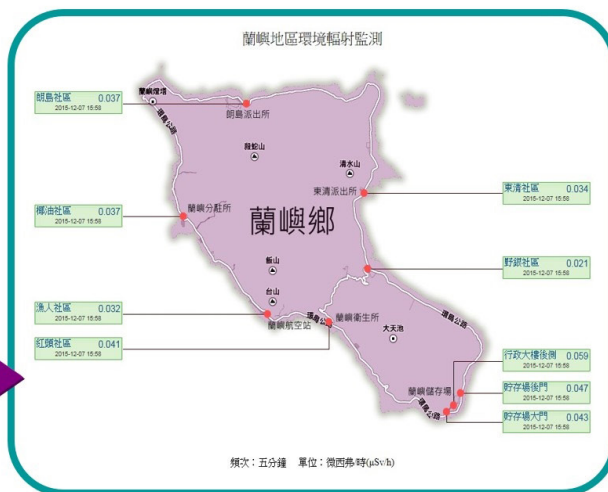


### 全國環境輻射即時監測 Real-time Environmental Radiation Monitoring System around Taiwan



<http://www.aec.gov.tw/gammadetect.html>

### 蘭嶼地區環境輻射監測 Real-time Environmental Radiation Monitoring System at Lanyu



<http://dnbm.taipower.com.tw/pub/lanyu.php>

#### ▲ 蘭嶼地區環境輻射監測狀況

The status of the environmental radiation monitoring around the Lan-Yu area

with a discussion of the Chinshan NPP decommissioning plan was held in June of 2017. New Taipei City government, Shimen District Office, village chiefs and local representatives at Shimen District, as well as environmental groups were invited to take part in the activities. A site surveys were taken, followed by a visit to low level radioactive waste storage facility and spent fuel dry storage facility. In addition to posting documents and information related to the Chinshan NPP decommissioning plan on the website, a briefing session was held in August to discuss the Chinshan NPP decommissioning plan, and was chaired by Dr. Liu, Director of Fuel Cycle and Materials Administration (FCMA) of the AEC, at Shimen District Office, New Taipei City. During the session, the FCMA briefed on the safety review process of the Chinshan NPP decommissioning plan, issues concerning local communities were discussed and communicated in order to improve their understanding of the safety reviews of the Chinshan NPP decommissioning plan.

In order to implement information disclosure, as well as to verify sampling and monitoring analyses participated in by the public and third party, the AEC has been annually holding the “parallel monitoring activity for the environmental radiation around the Lan-Yu area” since 2011. In May, the AEC invited Lan-Yu locals, the Council of Indigenous Peoples, representatives from local governments, and the Environmental Protection Department, Taitung County to take part in the carrying out of environmental sampling within the six tribal areas at Lan-Yu. Sampling methods and procedures were first explained to the participants, and the sampling locations



有關研習題材是以常見環境輻射及偵檢儀器原理介紹，加上偵測數據解讀教學，輔以實務操作，讓參加的學員從知識面至實務面，有系統性的學習；參加的學員包含民眾、環保團體、地方政府人員及消防員等，均對這次互動、交流及溝通的研習活動，表達高度肯定，為未來共同守護輻射安全的目標，奠定了良好的共識與基礎！

### 3. 公開透明 管制資訊一把抓

為落實管制資訊透明化，原能會除上網公開各核能設施放射性物料管制動態資訊，包含放射性廢液處理設施運轉安全評鑑報告、放射性廢棄物管制年報、固化放射性廢棄物年產量的計算結果，以及乾式貯存設施問題，亦提出最終處置計畫相關之執行成果、審查報告及年度工作計畫等。另對於民眾關心的核一廠除役相關資訊，於官網設置核電廠除役管制專區，公開除役安全管制大事紀要、除役相關法規、核一廠除役計畫、除役審查作業文件、地方說明會及公眾參與等資料，以期廣泛徵詢公眾意見，順利執行核一廠除役作業。

另為提供民眾即時、即地的輻射安全防護資訊，建置「全民原能會」APP 並於台北世貿一館「106 年資訊月」活動展示及示範，希望民眾藉由 APP 可隨手取得原子能安全管制訊息。

## （二）利用多元管道，與民眾共享原子能知識

原能會與台北市立大學合作辦理台北市、新北市及屏東縣新住民親子共學認識核災緊急應變民眾防護與輻射體驗研習活動，邀請新住民種子教師授課並輔以母語解說，以確保不同族群的民眾均可獲得原子能資訊。



▲ 106 年資訊月活動現場  
2017 Information Technology Month



were chosen by each tribal chief or the participating public. This year, environmental samples of agricultural products, soil, drinking water, and grasses were collected from the six tribal areas. The samples then were analyzed by the Nuclear Science and Technology Development Center of the National Tsing Hua University, which was accredited by the Taiwan Accreditation Foundation, and the results were sent directly to each tribal office on Lan-Yu. No abnormal radiation has been found in the analyzed results of environmental samples since the implementation of this activity in 2011. Monitoring reports from 2011 to 2017 are posted on the website for the general public to view.

#### **b. Radiation Measurement Instruments workshop**

For long, the public is always concerned about the issue of environment radiation. In order to clarify the misunderstanding and present the correct concept of environment radiation, AEC held two workshops of radiation measurement instruments in 2017. The workshop included lectures, interactive practice and Q&A, which helped the participants learn the general principles and practice skills of environment radiation measurement. AEC hopes more and more people can join us to protect the radiation safety.

Through systematic teaching, the participants can not only learn the measurement principle but also realize the meaning of different outcomes. Besides, participants of this workshop came from various areas, including civil service of local government, firefighters, environmental groups and public. The workshop built up a communication platform for all the participants to share different thinking and experience, and most of the participants gave praise to this workshop. Through establishing the foundation concern of environmental radiation, this event can help the public to work with AEC to protect the radiation safety in the future.

#### **c. Transparent Information and Implementing Information Disclosure and Communication**

In order to let the general public understand the present status of the radioactive materials regulations for each nuclear facility, and to implement transparent information regarding regulations, the AEC posts and updates information on its website, including: the safety assessment report of the radioactive liquid waste treatment facility, annual report on the radioactive waste regulation, the annual production amounts of solidified radioactive waste, the information related to the spent nuclear fuel dry storage facility, the low-level radioactive waste disposal program and its review report, as well as the progress report on the spent nuclear fuel final disposal program and its annual work plan which is of concern to the public. Regarding the various information about the review of the Chinshan NPP decommissioning plan, an exclusive official website of the NPP decommissioning



▲ 新住民「動手量輻射」親子共學研習活動  
AEC conducted activities for the “New Immigrant Parent-Child”

另為提升第一線醫護人員面對輻傷病患的處置能力，於北、中、南、東共辦理 12 場次醫護人員及相關類科學生的輻射醫療處置研習課程，內容包括醫療輻射防護、輻傷事件及處置，並體驗防護衣穿脫，共計有 588 人次參與研習。

此外，持續與國立台灣科學教育館合作推廣原子能科普教育，藉由參與縣市科學巡迴教育及全國科展活動，透過數位電子遊戲及輻射量測實驗，可增進參與活動的學生對原子能科普知識的學習興趣。另經營「輻務小站」粉絲頁，提供輕鬆、生活化的原子能知識貼文，並與網友互動，106 年經國家發展委員會不預警對行政院所屬二、三級機關的社群服務進行檢核，原能會的「輻務小站」在 60 個粉絲頁中獲排名第 1。



▲ 輻射傷害醫療研習課程  
Radiation medical treatment courses



was set up to post the memorabilia of decommissioning safety regulation, decommissioning related laws and regulations, the Chinshan NPP decommissioning plan, review documents of the decommissioning plan, and information in regards to local community briefing session as well as public participation, etc. Opinions from the general public are solicited in order to facilitate carrying out the Chinshan NPP decommissioning plan.

In order to provide real-time radiation safety protection information for the public, the “AEC of the public” (全民的原能會) APP was launched in “2017 Information Technology Month” exhibition at Taipei World Trade Center to demonstrate how to obtain atomic energy safety regulatory information by downloading and using the APP.

## **2. Utilization multiple approaches to share atomic energy knowledge with people**

In collaboration with Taipei City University, AEC conducted activities for the “New Immigrant Parent-Child” in Taipei City, New Taipei City and Ping-Tung County to learn about emergency response to nuclear disaster and radiation protection. We also invited new immigrant teachers to lecture via mother tongue to ensure people of different ethnic groups can obtain atomic energy information.

To enhance the ability of front-line medical staff to deal with patients suffering radiation injuries, AEC conducted twelve radiation medical treatment courses for medical staffs and related medical students in northern, central, southern and eastern area of Taiwan. The courses included medical radiation protection, injury incidents and treatment, protective costume dressing; a total of 588 people participated in the study.

AEC continues cooperating with the National Science Education Center of Taiwan to promote atomic science education, by using electronic games and radiation measurement experiments, through participation in county and city science tour education and “National Primary and High School Science Fair” activities to increase the participants’ interests in the knowledge of atomic energy science. In addition, AEC runs “Radiation Safety Facebook page”, featuring easy-to-read articles and other posts to interact with netizens. In 2017, the National Development Committee conducted a unannounced inspection on the community services to the Cabinet-level Organizations of the Executive Yuan. The AEC fan page was ranked first among 60 fan pages.

## 三、切實監督核電廠安全

### （一）精進核電廠安全監督管制

原能會是我國核電廠安全管制的最高權責機關，為監督各核電廠之安全性與可靠性，平時即透過每日駐廠視察、專案團隊視察、運轉中電廠大修駐廠視察與不預警視察、辦理管制會議及專案審查等作為，對核電廠進行嚴格監督。除此之外，原能會秉持強化管制效能之精神，持續精進相關管制作為，106 年即針對核電廠視察與審查及公眾溝通方面進行強化作為，以進一步提升管制成效，相關精進作業說明如下：

#### 1. 加強查核機組大修後再起動作業

原能會於核能機組大修作業期間除加派駐廠視察人員外，並組專案團隊赴現場查證相關作業，於核能機組完成機組大修填換燃料和系統設備維護作業項目後，依據「核子反應器設施停止運轉後再起動管制辦法」第九條規定，完成審查大修作業品質報告及稽查報告。自 106 年度起，除上述查核外，在同意機組起動運轉前，為進一步確認機組現場狀態符合起動要求，會再組視察團隊，赴現場進行加強整體性查證。

#### 2. 增加不預警視察次數

原能會針對運轉中電廠，於每年執行 2 次不預警視察，以確保核電廠各項作業需符合安全規定。106 年度起，原能會在兼顧人力調度及不影響電廠作業情況下，



▲ 原能會視察員現場查證核一廠反應器聯合廠房  
AEC inspectors inspected the equipment in the combined building of Chinshan NPP.



▲ 原能會視察員現場查證核一廠汽機廠房  
AEC inspectors inspected the equipment in the turbine building of Chinshan NPP.



## **C. Effectively supervising the safety of nuclear power plant**

### **1. Improvements on Safety Supervision Mechanism on Nuclear Power Plants**

AEC is the competent authority of nuclear power plant (NPP) safety in Taiwan. In order to ensure the safety and reliability of every NPP, AEC has devoted a great deal of efforts to conducting various types of inspections, e.g. daily resident inspection, project team inspection, resident inspection during the refueling outage in operating NPPs and unannounced inspection. AEC also holds regulatory and safety review meetings to make strict supervision on NPPs. Besides, AEC continues to refine its supervision mechanism. In 2017, AEC has made several improvements on inspections, safety reviews and enhancing transparency on information and public communication. Major achievements in 2017 are described as follows.

#### **a. Enhancement of inspection after the refueling outage**

Apart from adding one more resident inspector during the refueling outage, AEC also conducts on-site team inspections. After the utility company Taipower completes fuel reloading and maintenance of equipment and components during each refueling outage, AEC will review the quality assurance documents and surveillance reports in accordance to the requirements listed in Article 9 of the "Administrative Regulations for restarting nuclear reactor facility after shutdown". In 2017, AEC not only continues its foregoing review as described above, but also started conducting an extra on-site team inspection to reassure the outage unit meets the requirements of restarting before AEC issues the restart approval.

#### **b. Increasing unannounced inspection frequencies**

AEC conducts unannounced inspections twice a year on each operating NPPs to ensure that nuclear power plant operators follow the procedures of each NPP and meet the safety requirements. In 2017, AEC randomly added the unannounced inspections within the resources of AEC on three operating NPPs without affecting the operation. These actions will heighten shift operators' awareness of their responsibilities and enhance public confidence on nuclear safety. Regulatory activities were publically available on AEC website.

不定期增加運轉中電廠年度不預警視察次數，惕勵值班人員值勤時之警覺性，提升民眾對於核能安全的信心，並將視察結果公布於原能會官網。

### 3. 精進機組關鍵組件維護檢查作業

原能會對於 106 年核三廠發生 2 次跳機事件，除階段性加派每日駐廠人力外，並特別檢視發生跳機事件之機組近年來電力設備故障之處理及策略，要求台電公司強化系統之穩定性與可靠性。原能會除就核三廠跳機個案進行安全審查外，更要求台電公司應從運轉管理／策略、維護作業完整性、人員訓練，以及保守性決策／作為與核安文化等面向進行檢討強化，並對其他運轉中電廠通盤檢視及檢討關鍵組件，提出維護檢查精進方案與品保稽查計畫，確保機組之穩定運轉。

### 4. 精進地方政府參與核電廠視察作業機制

原能會已訂定「公務機關參與觀察行政院原子能委員會不預警視察核能電廠實施計畫」，讓地方政府經由不預警視察，瞭解原能會對核電廠安全管制的作業。於 106 年再增訂「地方政府參與觀察行政院原子能委員會核能電廠團隊視察實施計畫」，擴大地方政府參與之視察範圍，地方政府可依該計畫，派員進入核電廠觀察原能會之例行性視察活動，提出核安管制建言。透過此方式，地方政府可更瞭解核電廠安全營運方式與原能會安全監督作法，並提供面對面直接溝通的管道，以加強核電廠安全監督效能。

### 5. 擴大公眾參與重大審查案件

原能會於重大審查案件辦理期間，本於資訊公開原則，於官網公布相關管制說明與資訊，106 年起原能會為提升與公眾間之雙向交流，另依審查進度適時辦理公開說明會，於 106 年計完成「核一廠 2 號機降載延時運轉案審查」、「核二廠 1 號機燃料棒護套破損案之管制作業」、「核二廠 2 號機發電機避雷器箱受損案」、「核能電廠機組斷然處置措施之審查作業」等說明會，讓外界能夠瞭解審查案件辦理情形，並蒐集公眾的意見和建議，強化原能會管制作業。





▲ 原能會視察員現場查證核三廠汽機廠房  
AEC inspectors inspected the equipment in the turbine building of Maanshan NPP.



▲ 原能會視察員現場查證核二廠主控制室運轉狀況  
AEC inspectors inspected the operating status in the main control room of Kuosheng NPP

### c. Improvement for the maintenance procedure inspection on critical components

Both units of Maanshan NPP were automatically shutdown in 2017. AEC not only dispatched one more resident inspector after the second trip to enhance onsite inspection, but also reviewed the corrective actions taken by the plant operators. AEC also requested Taipower company (TPC) to enhance the stability and reliability on the critical systems. Aside from conducting safety review on these incidents, AEC requested TPC to strengthen its safety culture in several aspects, such as operation strategy, maintenance procedure, staff training and conservative decisions. AEC further demanded TPC to conduct reexamination of critical components on the operating NPPs, and make possible improvements on maintenance procedure and quality assurance programs to ensure stable and safe operation for each NPPs.

### d. Increasing local government's participation on NPPs' inspections

To increase local government's understanding on AEC's regulation over NPPs, AEC had issued "The Implementation Plan for Government Organization Representatives to Observe AEC's Unannounced Inspections over Operating NPPs". In 2017, AEC further issued "The Implementation Plan for Local Government Representatives to Observe AEC's Team Inspections over NPPs" to extend local government participations on NPPs' inspections. Based on the Plan, local government can send representatives to observe AEC's routine inspections and provide their comments or suggestions. The communicator between local government representatives and AEC's inspection team will be beneficial to the efficacy of supervision over NPPs, and improve operational safety on these plants.



▲ 核二廠裝載池修改案現場勘查  
Inspection of DCR in CLP in Kuosheng NPP

## （二）完成核二廠用過燃料池裝載區加裝格架申請案

台電公司因應核二廠用過燃料池貯存的空間接近滿儲，申請將用過燃料池之護箱裝載池改為用過燃料貯存空間。原能會接獲台電公司提出之「核二廠燃料廠房 3 樓裝載池設備修改及安裝工作」申請案後，經 8 個多月的嚴謹審查及現場查證，於 106 年 4 月 6 日同意本申請案，並於辦理公開之說明會後，於 5 月 19 日正式同意核二廠 1 號機之裝載池燃料貯存格架可啟用置放用過燃料，並將審查結論之安全評估報告公布於原能會官網。核二廠 1 號機自 106 年 6 月 9 日起重新起動，並穩定運轉。



▲ 核二廠裝載池修改案現場勘查  
Inspection of DCR in CLP in Kuosheng NPP





▲ 核二廠裝載池修改案地方說明會  
Public meeting of DCR in CLP in Kuosheng NPP



▲ 核二廠裝載池修改案視察後會議  
Meeting after inspection of DCR in CLP in Kuosheng NPP

### e. Extend public involvement on important safety reviews

AEC maintains an open and transparent environment on its reviewing processes. Final review reports and non-sensitive reference documents are publically available on AEC's website. AEC held several public meetings every year to solicit public comments and provide channels to receive public comments on important safety review results. There were several public meetings held in 2017, such as Chinshan NPP unit 2 reduced (flexible) power operation issue, Kuosheng NPP unit 1 fuel rod failure issue, Kuosheng NPP unit 2 main generator surge arrester damage issue, and reviewing result on the Ultimate Response Guideline (URG) provided by TPC.

## 2. Safety review and inspections on the application of rack installation inside the cask loading pool of Kuosheng nuclear power plant

Taipower company submitted a license amendment request (or design change request, DCR) to install spent fuel storage racks at cask loading pool (CLP) of Kuosheng nuclear power plant because there was no sufficient storage space in the spent fuel pool. After more than 8 months of strict reviews and on-site inspections, AEC approved TPC's application on April 6, 2017. AEC approved Kuosheng NPP to transfer its spent fuels to unit 1 cask loading pool racks on May 19, 2017, after holding a public meeting. AEC also released its safety evaluation report with findings and conclusions on AEC's website. Kuosheng NPP unit 1 started operating on June 9, 2017 and remained in stable operation since then.

### （三）積極辦理核電廠重要案件調查

#### 1. 核一廠 2 號機降載延時運轉案審核

台電公司為配合其電力系統調度需求，於 106 年 4 月 29 日將核一廠 2 號機由原 100% 全功率運轉降載至約 75% 功率運轉，原能會於降載當日獲悉後，即派視察員赴現場檢查，並依核子反應器設施管制法相關規定，限期要求台電公司將相關評估報告送原能會審查。原能會於 106 年 5 月 1 日收到台電公司提出之評估報告（降載延時運轉案）後，經嚴格審查並辦理公開說明會蒐集民眾意見，於 106 年 5 月 23 日同意核一廠 2 號機降載延時運轉案。此外，原能會為確保核電廠安全，於 106 年 5 月 10 日發布「核子反應器設施管制法第十四條規定之解釋令」，將未經適當安全評估之人為機組降載至非原設計全功率運轉之情事納入核子反應器設施管制法施行細則內，以避免未來台電公司再有類似案件，未向原能會報備之情事發生，以降低民眾對核能安全的疑慮。

#### 2. 龍門電廠資產維護管理計畫審查

為監督台電公司落實「龍門（核四）電廠資產維護管理計畫」之執行，確保目前存放於廠址內之新核子燃料、中子源及反應爐等重要設備及相關作業符合安全要求，以保障民眾及環境安全，原能會嚴格辦理龍門（核四）電廠資產維護管理計畫之審查，並於 106 年 3 月 6 日審查完畢。由於上述計畫辦理時程於 106 年年底屆期，台電公司於 106 年 8 月 31 日提出「107 年龍門電廠資產維護計畫」，



▲ 龍門電廠視察前會議  
Meeting before inspection in Lungmen NPP



### 3. Conducting investigation on important safety issues of nuclear power plants

#### a. Review of Chinshan NPP unit 2 reducing (flexible) power operation

Taipower company decided to reduce Chinshan NPP's unit 2 from 100% to 75% power level and extend the operation period to satisfy its forecast of electricity demand on April 29, 2017. After receiving the notification of Chinshan's power reduction, AEC sent inspectors to conduct on-site inspections on the same day. AEC also requested Taipower company to submit a safety assessment report in accordance with the rules of "Nuclear Reactor Facilities Regulation Act". AEC received the assessment report of reducing power operation from Taipower company on May 1, 2017. After strict reviewing and holding public meeting to collection public opinions, AEC approved TPC's application of Chinshan NPP unit 2 reducing power operation on May 23, 2017. To ensure safety of nuclear power plants, AEC also issued an supplement on article 14 of "Nuclear Reactor Facilities Regulation Act" on May 10, 2017 to clarify and include the reducing power operation into the "Enforcement Rules for the Implementation of Nuclear Reactor Facilities Regulation Act". The power reduction to the non-original designed full power level to extend the operation period by manually adjustment will be included in the enforcement rule, and TPC needs to submit its safety assessment report to AEC for review. It clearly requires Taipower to submit the application beforehand in the future and reduce public concerns on nuclear safety.



▲ 原能會視察員現場查證龍門電廠現場狀況  
Inspection in Lungmen NPP

原能會接獲該計畫後，即進行文件完備程序審查，並組成專案審查小組進行嚴格實質審查作業，經審查後，於 106 年 12 月 28 日同意台電公司所提計畫，並就相關審查情形與審查結論撰寫安全評估報告，併同審查核定之龍門電廠資產維護計畫等資料，於原能會官網公開，供大眾檢視。

### 3. 完成第三版國際核能安全公約中華民國國家報告

原能會為展現國內核能安全管制成效及落實「核能安全公約」（Convention on Nuclear Safety，簡稱 CNS）之精神，自 94 年開始主動參酌 CNS 機制來自我檢驗，並與美國核管會協商達成針對雙方報告互相執行同行審查之共識，確保我國核能安全水準與國際同步。106 年原能會已完成第三版「國際核能安全公約中華民國國家報告」，並執行與美方第三次同行審查，該報告依國際規範從各面相檢視國內核能安全現況，包括機組狀況、法規架構、安全管制、安全文化、財務與人力資源、人因考量、品質保證、輻射防護、緊急應變、廠址強健性再檢視、運轉經驗、福島經驗回饋等。原能會除完成英文版報告外，並將該報告翻譯，並增加補充內容，完成民眾易於瞭解之中文版報告，於 106 年 12 月 26 日於原能會官網公布。



▲ 第三版「安全公約報告」  
The Republic of China National Report  
for the Convention on Nuclear Safety  
(3rd edition)



#### **b. Review of the plan of property maintenance and management on Lungmen nuclear power plant**

In order to ensure that important equipment (such as new nuclear fuel, neutron source, reactor vessel, etc.) management meet the safety requirements to provide better protection of public and environment safety, AEC reviewed on the plan of property maintenance and management in Lungmen nuclear power plant. AEC completed the review on March 6, 2017 and agreed Taipower company to carry out the plan. The “Lungmen property maintenance and management plan” expired at the end of 2017, and Taipower company submitted the renewed version of the plan for the year 2018 (plan of property maintenance and management of Lungmen nuclear power plant in 2018) to AEC on August 31, 2017. After receiving the application, AEC conducted procedure review, followed by organizing a review panel and continuing the substantive review. AEC approved the renewed plan on December 28, 2017, and released the safety assessment report on AEC’s website. The safety assessment report and approved plan of property maintenance and management of Lungmen nuclear power plant are available to the public on AEC website.

#### **c. Completing third edition of The Republic of China National Report for the Convention on Nuclear Safety**

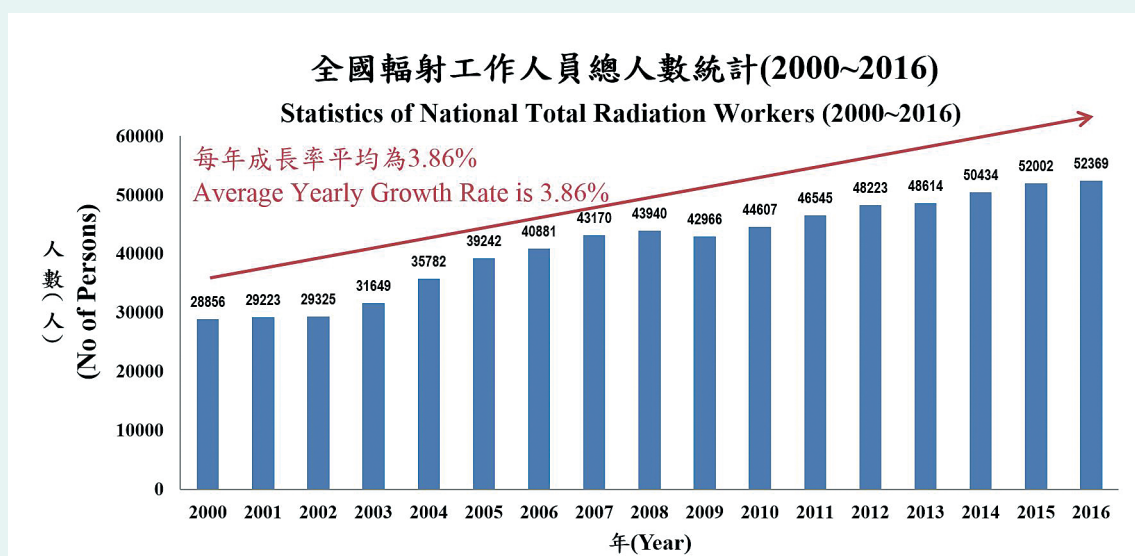
To show the effectiveness of nuclear regulation in Taiwan and make commitment to a spirit of Convention on Nuclear Safety (CNS), AEC has been actively in acting as a contracting party of the CNS to fulfill self-assessment since 2005. AEC also reached an agreement with US Nuclear Regulatory Commission (US NRC) for conducting a peer review of each CNS report to ensure the level of nuclear safety in our country being in line with the world. In 2017, AEC has completed “The Republic of China National Report for the Convention on Nuclear Safety (3rd edition)” and conducted peer reviews with the US NRC. This report evaluated the situation of nuclear safety in our country from different angles according to international standards, such as status of NPPs, regulatory framework, safety regulation, safety culture, financial and human resources, human factor, quality assurance, radiation protection, emergency preparedness, plant robustness review, operation experience, Fukushima lessons learned, etc. Aside from completing English version of the report, AEC also translated it into Chinese and added supplemental information to make it more readable for public. The report was published on AEC website on December 26, 2017.

## 四、嚴密輻射防護安全管理

### (一)「劑量管控，輻安心安」，嚴密監控職業輻射劑量，工作安全有保障

輻射工作人員接受劑量的多寡，可實際反映各國輻射安全管制的成效。為掌控全國輻射工作人員之輻射劑量，原能會於 89 年建立了「全國輻射工作人員劑量資料庫」，要求各劑量評定機構將每個月人員劑量資料傳送至資料庫，並進行資料彙整與統計分析，以利嚴密監控，確保工作人員輻射安全。

由於輻射在民生領域的應用越趨廣泛，我國輻射工作人員的數量也隨之逐年增加，現今大約有 5 萬 2 千餘人，分布於核能設施、醫療院所、學校研究機構、工業及軍警機關等。其中男性與女性的人數歷年來約為 7 比 3，以整體趨勢來看，女性人數的比例逐年微幅增加，自 96 年以後，即維持在 33% 以上。



▲ 全國輻射工作人員總人數統計  
Statistics of National Total Radiation Workers.

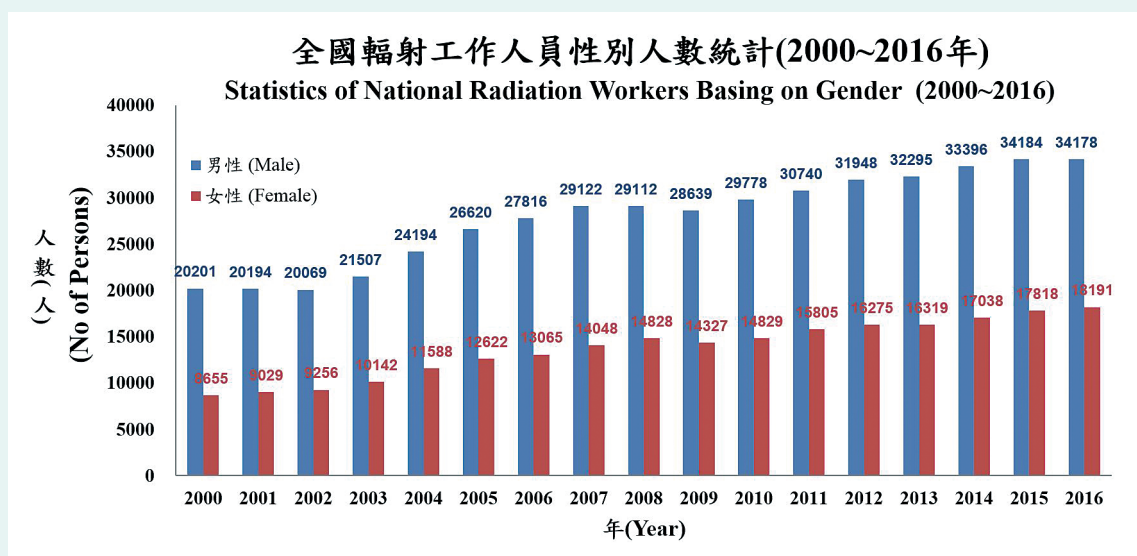


## D. Strict radiation protection safety management

### 1. Dosage control and regulation, radiation safety and ease of mind - strictly monitoring of occupational radiation dosage and protect safety of work

The amount of dosage received by radiation workers, reflect the achievement of radiation safety regulation in individual country. In order to handle and control the radiation dosage of radiation workers, the “National Radiation Workers Dosage Database” was established in 2000, requesting each dose assessment institution send the monthly dosage data to the database and undergo data compilation and statistical analysis to facilitate strict monitoring and ensure workers’ radiation safety.

Owing to extensive use of radiation in people’s livelihood, the number of radiation workers in our country increases year by year. So far, there are around 52,000 radiation workers, encompassing nuclear energy facilities, medical facilities and institutions, school research institutes, industrial sectors, and military and police departments, etc. The ratio of males to females has been around 7 to 3 over the years. Taking the overall trend, the proportion of females has increased slightly year by year, maintaining above 33% since 2007.



#### ▲ 全國輻射工作人員性別人數統計

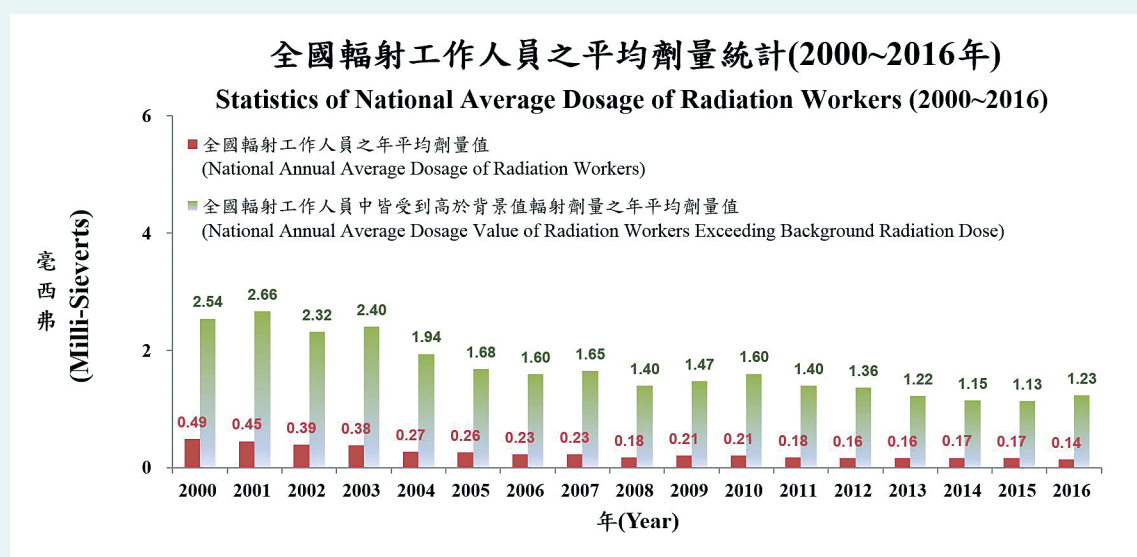
Statistics of National Radiation Workers Basing on Gender

統計顯示，全國輻射工作人員的年平均劑量，呈逐年下降的趨勢，由 89 年的 0.49 毫西弗降至 105 年的 0.14 毫西弗。其中，大多數人員的劑量是在背景值的範圍，以 105 年為例，全國 89% 的輻射工作人員都沒有接受到高於背景值的輻射劑量，而另外 11% 有接受到高於背景值輻射劑量的人員，其平均劑量值，也從 89 年 2.54 毫西弗降至 105 年 1.23 毫西弗，顯示我國輻射安全及曝露合理抑低之管制績效持續進步中。

各類別輻射工作人員中，以從事核電廠與核廢料管理之工作人員（核子燃料循環類）所接受的劑量最高，其次為工業用類與醫用類之工作人員。

除了掌握全國輻射工作人員的劑量統計資料，原能會也嚴密監控個別工作人員所接受的劑量，確保每位輻射工作人員所接受的劑量不超過法規限度並合理抑低，並自 97 年起施行除以往工作人員劑量限度每年不得超過 50 毫西弗的規定，再加上每連續五年週期之劑量不得超過 100 毫西弗的規定，更加保障工作人員的輻射安全。

劑量統計結果顯示，在 89 年有 2 位工作人員、90 及 91 年各有 1 位工作人員接受的年劑量大於 50 毫西弗，92 年至今，均未有工作人員接受的劑量大於 50 毫西弗。且全國輻射工作人員中，個人年劑量大於 20 毫西弗之人數，也從 89 年的 101 位，減少至 103 年後已無人員 1 年接受大於 20 毫西弗的劑量，顯示我國的輻射安全管制及輻射作業場所的自主管理均有相當的進步。



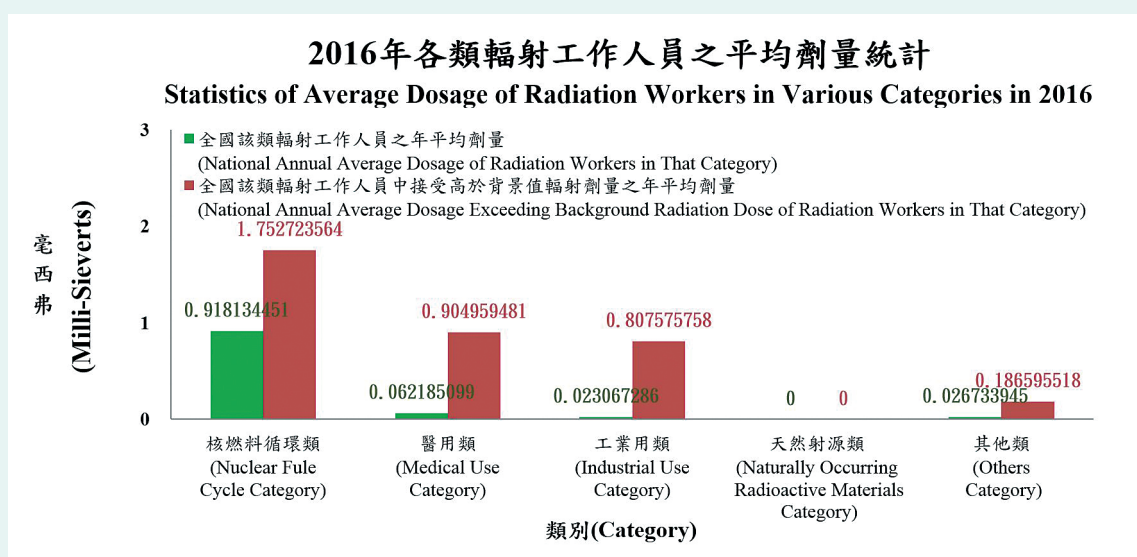
▲ 全國輻射工作人員之平均劑量統計  
Statistics of National Average Dosage of Radiation Workers



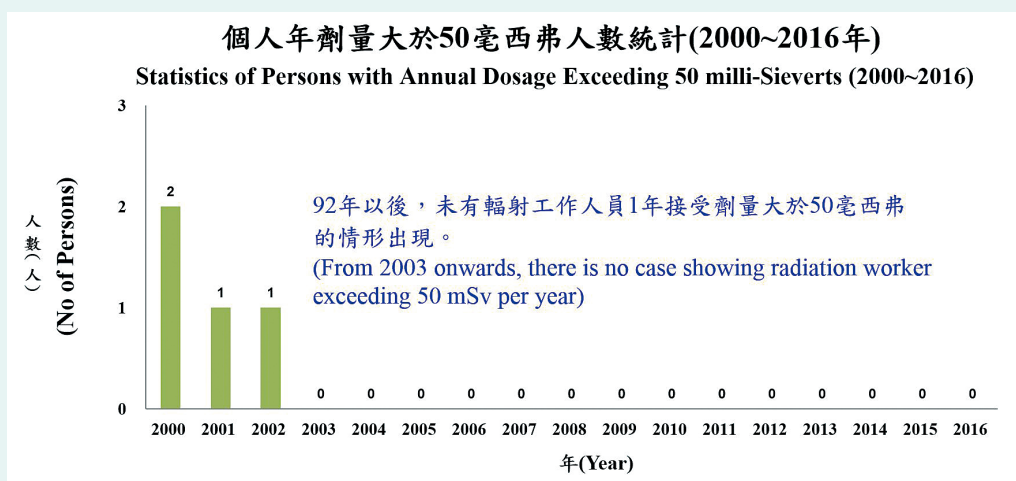
Statistics shows that the annual average dosage of radiation workers nationwide has been decreasing from 0.49 mSv in 2000 to 0.14 mSv in 2016, and mostly is within the range of background value range. Taking 2016 as an example, 89% of the radiation workers did not receive higher-than-the-background-valued radiation dosage, while the other 11% received higher-than-the-background-valued radiation dosage. The average radiation dosage also decreased from 2.54 mSv in 2000 to 1.23 mSv in 2016, indicating a continuous improvement in the achievement of radiation safety regulatory control and ALARA (As Low As Reasonably Achievable).

Among various categories of radiation workers, the highest dosage received are the workers in the nuclear power plants and nuclear waste management (nuclear fuel cycle category), followed by those in the industrial sectors and medical usage fields.

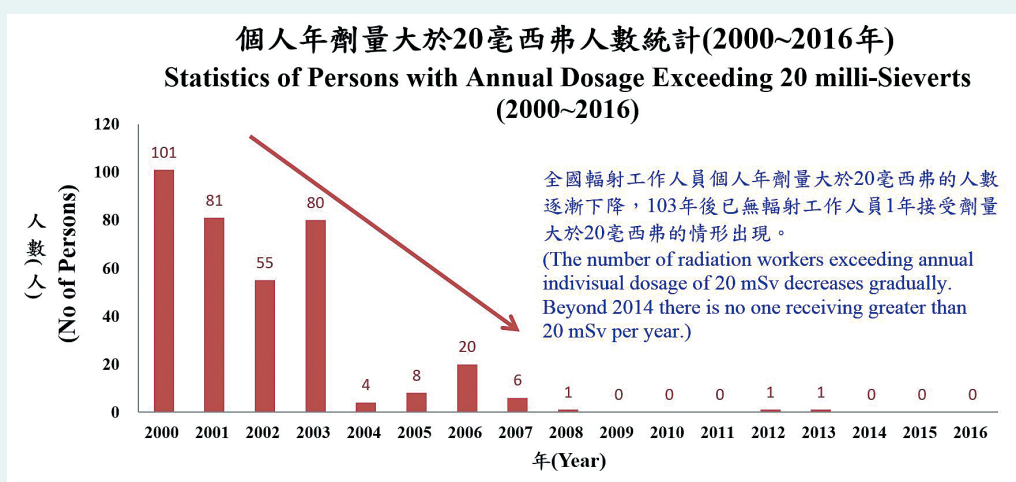
In addition to controlling the statistical data of radiation workers nationwide, AEC also strictly monitors the dosage received by individual radiation worker to ensure that the radiation dosage received by each radiation worker does not exceed the legal limit and follow ALARA principle. And since 2008, in addition to previous dosage limit of 50 mSv per year, the dosage limit of 100 mSv for each consecutive five-year cycle has been added. It further ensures the radiation safety of workers.



▲ 2016 年各類輻射工作人員之平均劑量統計  
2016 Average Dosage of Radiation Workers



▲ 個人年劑量大於 50 毫西弗人數統計  
Statistics of Persons with Annual Dosage Exceeding 50 milli-Sieverts



▲ 個人年劑量大於 20 毫西弗人數統計  
Statistics of Persons with Annual Dosage Exceeding 20 milli-Sieverts

## (二) 「醫療輻射保品質，民眾就醫好放心」，推動醫療曝露品質保證，建構安全就醫環境

原能會持續推動醫療曝露品質保證（簡稱醫療曝露品保），建構放射診斷與治療的安全就醫環境，每年嘉惠國人逾 405 萬人次。

已納入醫療曝露品保管制的設備，診斷類如：乳房 X 光攝影儀、電腦斷層掃描儀，治療類如：醫用直線加速器、含放射性物質之遙控後荷式近接治療設備、加馬刀、電腦刀、電腦斷層治療機等，原能會每年透過審查與檢查，確保其輻射安全與曝露品質合乎標準。此外，原能會亦對我國首部質子治療設施研擬曝露品保標準，輔導醫院自主執行，確保質子設施運轉之安全與品質。

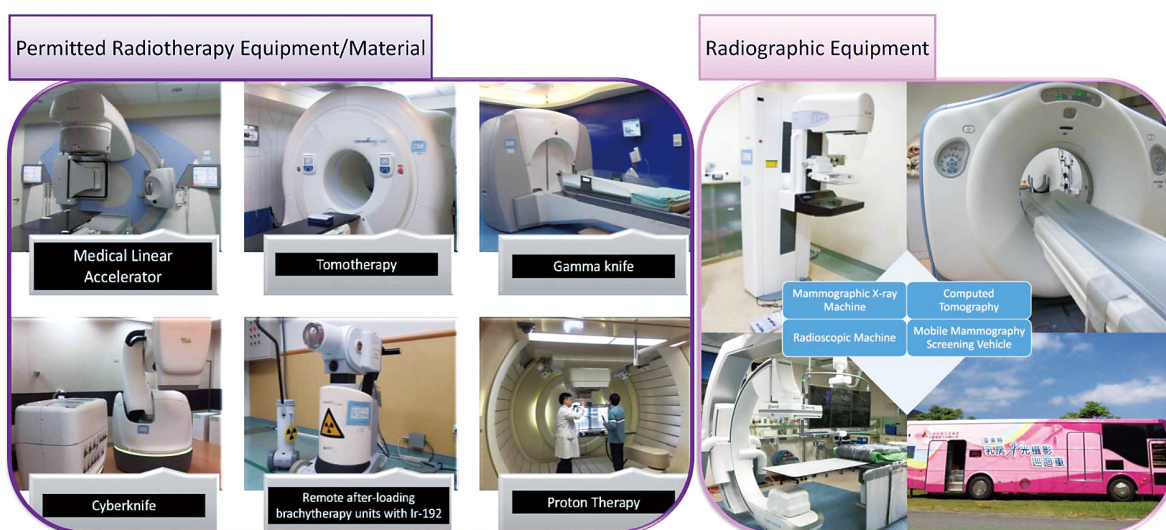


The results of dosage statistics show that there were two workers in 2000 and one worker in 2001 and 2002 each of whom receiving an annual dosage of more than 50 mSv. Since 2003 till now, none of the workers has received annual dosage greater than 50 mSv. Moreover, the number of radiation workers who have received annual dosage of more than 20 mSv also drops drastically from 101 in year 2000 to zero in year 2014 and beyond. It indicates that our country's radiation safety control and regulation and autonomous management in radiation workplaces have improved significantly.

## 2. Medical Exposure Quality Assurance Helps to Make People Feel at Ease While Getting Medical Care

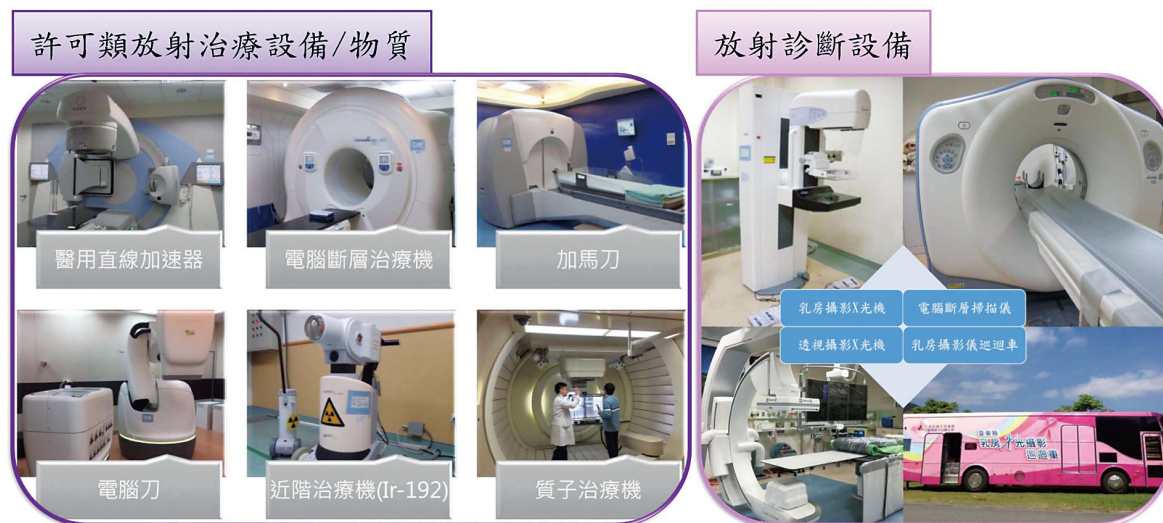
With AEC's continuous efforts on the implementation of the Medical Exposure Quality Assurance (MEQA) Program to make a safer medical care environment at providing radiography or radiotherapy, every year more than 4,050,000 person-times benefit greatly by the MEQA.

To ensure radiation safety and quality while providing radiography or radiotherapy, those implemented within the MEQA such as mammographic X-ray machine, computed tomography, medical linear accelerator, remote after-loading brachytherapy unit with radioactive material, gamma knife, cyberknife and tomotherapy etc., are reviewed and inspected every year by AEC; in addition, for the very first proton therapy facility has already operated in Taiwan, AEC is also working on the MEQA study specific to proton operation, and assists hospital in autonomous performing to ensure safety and quality of the facility operation.



▲ Medical Equipments under the MEQA in Taiwan

原能會於 106 年亦積極規劃執行透視攝影 X 光機的醫療曝露品保作業，進行綜合訪查、教育訓練及輻射安全宣導等，逐步推動透視設備醫療曝露品質保證，未來可更全面嘉惠國人。



▲ 我國醫療曝露品保管制設備

### 1. 放射治療設備醫療曝露品保檢查成效：

106 年完成 205 部放射治療設備的品保檢查，檢查結果均符合法規規定。

### 2. 乳房 X 光攝影儀醫療曝露品保檢查成效：

106 年完成 166 部乳房 X 光攝影儀的品保檢查，檢查結果均符合法規規定。自 97 年乳房 X 光攝影儀納入品保標準並實施至今，其影像品質指標（假體影像得分 12.4 分 \*法規要求至少 10 分）及輻射劑量指標（平均乳腺劑量 1.41 毫戈雷 \*法規限值 3 毫戈雷），相較於法規施行前，不僅影像品質提升，輻射劑量更低且影像品質維持，有助於提升我國婦女乳癌篩檢的輻射醫療品質。

### 3. 電腦斷層掃描儀醫療曝露品保檢查成效：

106 年完成 196 部電腦斷層掃描儀的品保檢查，檢查結果均符合法規規定。自 100 年電腦斷層掃描儀納入品保標準並實施至今，其輻射劑量指標（CTDI）於常規成人頭部、成人腹部及小兒腹部掃描檢查之平均值，分別為 49.62 毫戈雷 \*法規限值 80 毫戈雷、11.64 毫戈雷 \*法規限值 30 毫戈雷及 10.90 毫戈雷 \*法規限值 25 毫戈雷，相較於法規施行前，輻射劑量在不影響影像品質情形下已大幅改善，有助於保障受檢病友的輻射安全。



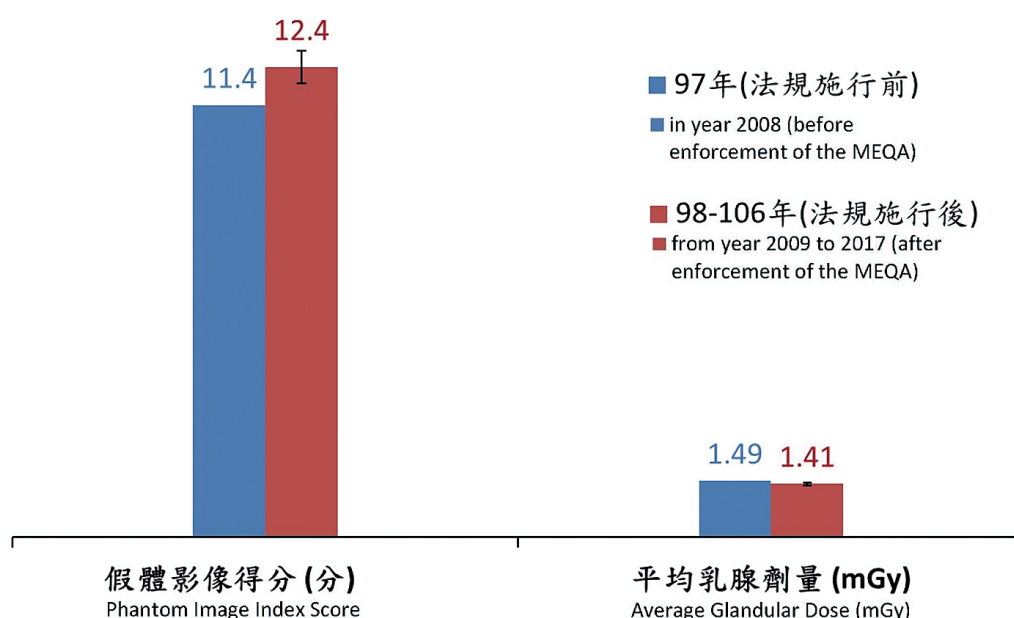
This year AEC has also put effort in the promotion of the MEQA on radioscopic machine. To achieve it, a pilot plan working on comprehensive inquiries and surveys, as well as holding hands-on drills and radiation safety trainings has been done. With the advancement of the MEQA, hopefully more people can be benefitted by it in the future.

#### a. Effectiveness of Implementation of the MEQA on Radiotherapy Equipment:

There were 205 radiotherapy equipment inspected this year. All the inspection results were pass in conformity with the MEQA standard.

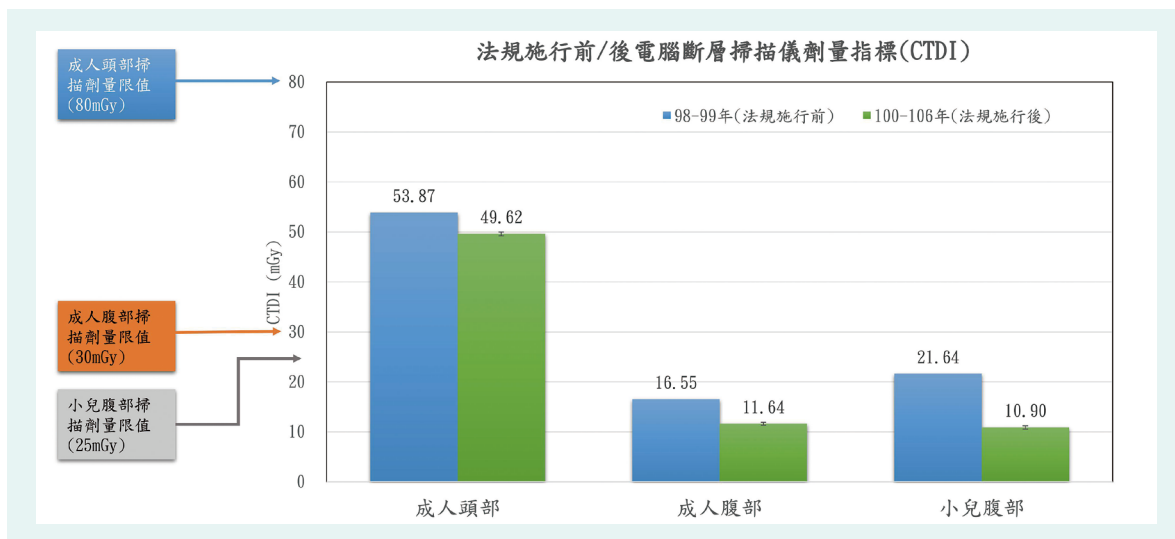
#### b. Effectiveness of Implementation of the MEQA on Mammographic X-ray Machine:

There were 166 mammography inspected this year. All the inspection results were pass in conformity with the MEQA standard. From the enforcement of the MEQA on mammographic X-ray machine in 2008 till now, the quality index of “phantom image” was scored at 12.4, which is better than the minimum requirement of 10 and “average glandular dose” was measured 1.41 mGy, which is lower than the dose limit of 3 mGy. Namely, the goal of optimizing mammography image quality with its radiation dose as low as reasonably achievable is achieved. It is helpful to improve breast cancer screening quality.



#### ▲ 乳房 X 光攝影儀影像品質及輻射劑量指標管制成效

Effectiveness of Implementation of the MEQA on Mammographic X-ray Machines



▲ 電腦斷層掃描儀輻射劑量指標管制成效

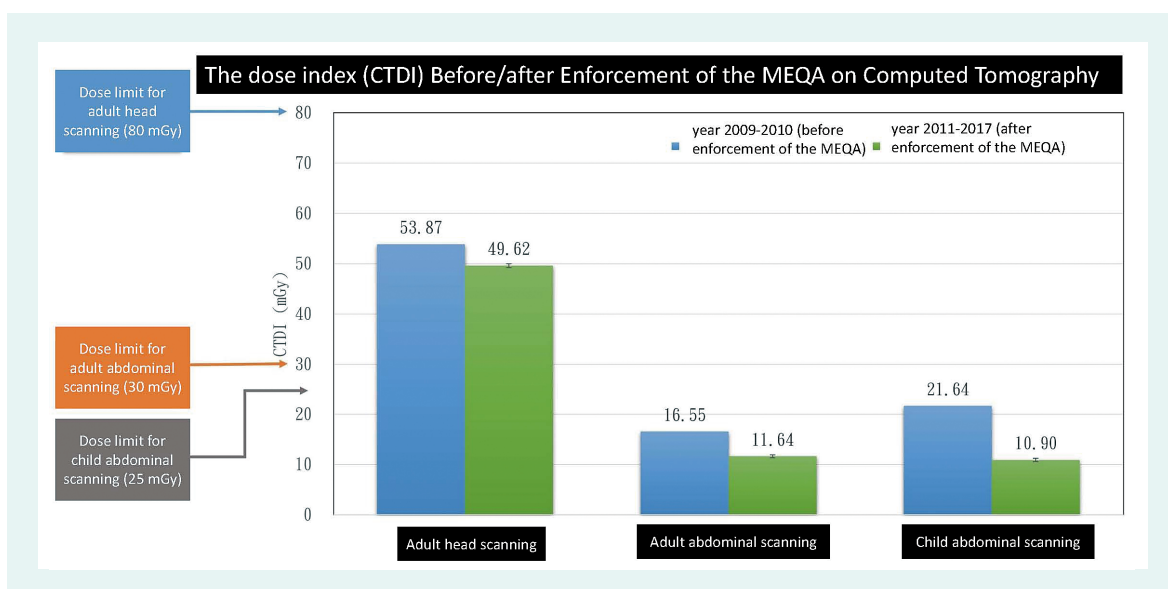
#### 4. 透視攝影 X 光機醫療曝露品保訪查及教育訓練成效：

106 年完成 150 部透視攝影 X 光機的綜合訪查，並辦理 6 場品保實作訓練課程，及 4 場輻射安全講習，累計培訓 245 位種子教師，及提升近 2,000 位相關從業人員的輻射安全素養。



### c. Effectiveness of Implementation of the MEQA on Computed Tomography:

There were 196 computed tomography (CT) inspected this year. All the inspection results were pass in conformity with the MEQA standard. From the enforcement of the MEQA on CT in 2011 till now, the radiation quality index of “CTDI” for routine adult head, adult abdominal and child abdominal scanning protocols, were measured 49.62, 11.64 and 10.90 mGy, respectively, which were all much lower than the corresponding dose limits (80, 30 and 25 mGy, respectively). This is to say that, for CT routine scans, radiation dose has been improved as low as reasonably achievable without jeopardizing image quality. This is quite helpful to radiation protection for patients.



▲ The Dose Index (CTDI) Before / After Enforcement of the MEQA on Computed Tomography

### d. Effectiveness of Surveys and Trainings for the MEQA on Radioscopy Equipment:

There were 150 radioscopy machines surveyed, and 6 hands-on drills and 4 radiation safety trainings held this year. As a consequence, a total of 245 seed teachers have been trained and nearly 2,000 workers were educated with enhancing their radiation safety knowledge.

## 五、強化輻災應變與整備能量

### （一）強化地方政府輻災防救災能量

為協助地方政府掌握地區輻射災害防救計畫之執行重點，原能會透過「輔導、訓練、演練」，提升地方第一線救災應變人員處理輻射災害的能力，強化國家整體輻射災害防救能量。

#### 1. 輔導：輻射災害防救業務輔導訪評

原能會於 106 年配合行政院之「106 年度災害防救業務訪評計畫」及「全民防衛動員準備方案」，派員赴全國 22 縣市進行輻射災害防救業務輔導訪評，督導地方政府落實輻射災害防救業務之推動，並審查輻射防護動員準備執行計畫，再輔以技術引入、實地訪查、雙向溝通及訓練講習等，多管齊下強化我國輻災防救能量。原能會的積極推動，也榮獲行政院肯定，獲頒「106 年行政院動員會報業務訪問之科技動員準備方案」優等殊榮。

#### 2. 訓練：輻射災害防救災人員教育訓練

為提供第一線應變人員處理輻射相關災害應變之指引，原能會於 106 年 5 月出版「輻射災害第一線應變人員手冊」，針對不同的輻射災害類別，彙整共通性及差異性的應變作為，並以應變任務為主軸，分別說明任務步驟及執行任務時應注意事項。



▲ 106 年地方政府輻射災害防救講習  
2017 Local Government Radiation Disaster Prevention and Response Workshop.



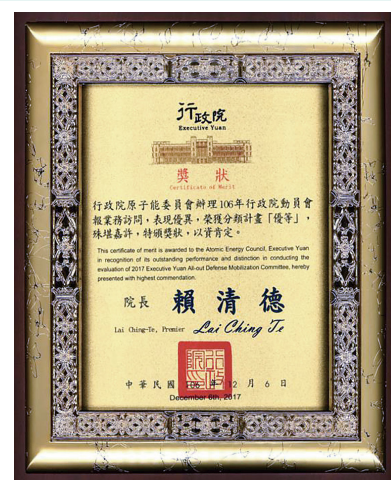
## E. Strengthening capability of radiological emergency response and preparedness

### 1. Strengthening capability of local government's radiation accident prevention and response

To assist local government in implementing regional radiation disaster prevention and response plan effectively, the AEC enhances the first responder's abilities to deal with radiological emergency, and increase the overall capability in radiation accident prevention and response, via "counseling, training and drills", across the country.

#### a. Counseling: evaluation and validation on the radiation accident prevention and response programs of local government

In support of the "2017 Disaster Prevention and Response Evaluation & Validation Plan" and the "All-out Defense Mobilization Readiness Program", AEC dispatched personnel to 22 counties and cities nationwide in 2017 to conduct the evaluation & validation on the Radiation Accident Prevention and Response Programs, and to supervise local government's implementation of Radiation Accident Prevention and Response Program, and to review the Preparation and Implementation Plan of Radiation Defense Mobilization Readiness Plan, supplemented by technology introduced, on-site audit visits, communication and training seminars to strengthen Taiwan's radiation accident prevention and response capability. AEC's enthusiastic promotion has earned the Executive Yuan's recognition, and was awarded the honor of the "Executive Yuan All-out Defense Mobilization Committee".



#### ▲ 原能會獲頒 106 年行政院動員會報業務訪問優等獎狀

AEC was awarded the certificate of the Executive Yuan All-out Defense Mobilization Committee



▲ 2017 臺北世大運期間輻射應變技術隊整裝出動  
RERT participated in the 2017 Taipei Summer Universiade.



▲ 輻射應變技術隊參與「106 年度國家關鍵基礎設施板橋共構車站防護演練」  
RERT participated the "2017 Critical National Infrastructure Protection Drills (Banqiao Union Station)".

此外，原能會並辦理「106 年地方政府輻射災害防救講習」，另結合地方政府自辦之救災人員常年訓練，讓應變人員更清楚輻射防護要領、熟習基礎偵測作業等應變知能，在救災同時也能維護自身安全；106 年共辦理 58 場次相關訓練，共計 4004 人參訓。

### 3. 演練：

為強化地方與中央的聯合應變體系，原能會已成立「輻射應變技術隊」任務編組，可提供地方政府輻射應變技術的專業協助。106 年除參與新竹市及苗栗縣政府舉辦之全民防衛動員暨災害防救（民安 3 號）演習，演練放射性物質使用場所事故及運送意外，協助相關應變人員熟習輻射事故應變流程，亦參與交通部鐵路局的反恐演練「106 年度國家關鍵基礎設施板橋共構車站防護演練」，模擬執行板橋車站輻射彈爆炸現場環境輻射偵測與管制，並配合司法蒐證進行證物管制等作業，為民眾輻射安全把關。

另為確保參加 2017 臺北世大運賽事的各國選手及觀眾安全，原能會主動協助台北市政府進行場地全面輻射偵檢作業與輻射事件防範及應變任務。在世大運期間，動用專業人員 280 餘人次及各式輻射偵測儀器超過百具，完成臺北體育園區 2 萬 2 千餘坪及周邊道路偵檢 2 次，開、閉幕日進場人員偵檢近 5 萬人次、車輛偵檢 300 餘輛次，以及重要賽事場館與選手村周邊區域車載巡邏偵檢，任務圓滿成功。



## **b. Training: education and training for first responders to radiological emergency**

To provide the first responders with guidance in handling radiological emergencies, AEC published the “Manual for First Responder to a Radiation Accident” in May 2017. The manual is in light of different types of radiation accidents, and has compiled the responses of commonalities and differences, and through a response task to explain steps and matters should be done when performing the task.

In addition to hosting the “2017 Local Government Radiation Disaster Prevention and Response Workshop”, AEC also integrated it along with local government’s other training on responders to help them to understand the radiation protection essentials and to be skillful in radiation detection. Meanwhile, they can safeguard themselves when conducting a rescue operation. In 2017, there were 58 aforementioned trainings held, which have drawn 4,004 participants.

## **c. Drills:**

To strengthen the joint response operation of the central and local governments, AEC established the task grouping of the “Radiological Emergency Response Team (RERT)” to provide local government with professional assistance in a radiological emergency. In 2017, the RERT attended the All-out Defense Mobilization and Disaster Prevention Exercise (Min-An No.3) hosted by Hsinchu City and Miaoli County Governments, to carry out a drill on radioactive materials retrieve from a transportation accident, as well as to help responders to be skillful in the response procedures in a radiation accident. Moreover, they participated in an anti-terrorism drill, the “2017 Critical National Infrastructure Protection Drills (Banqiao Union Station)”, hosted by the Taiwan Railways Administration under the Ministry of Transportation and Communications to conduct a radiation detection and area control after a “dirty bomb” explosion in Banqiao Station, and to cooperate with the judicial authority to secure the evidence.

Besides, to ensure the safety of the players and audiences attending the 2017 Taipei Summer Universiade, AEC assisted Taipei City Government in radiation screening, adverse event prevention, and response to radiological emergency. During the event, more than 280 technical personnel and hundreds of radiation detectors were employed, conducting twice radiation detection at the Taipei Dome Complex (more than 72,710m<sup>2</sup>) and its surrounding roads. There were about 50,000 people in the opening and closing ceremonies, and more than 300 vehicles, and major stadiums and athletes’ villages were under radiation monitoring, and no malicious event involving radioactive material occurred.



▲ 核二廠模擬操作中心事故機組搶救  
Unit recovery drill at Kuosheng Nuclear Power Plant simulation center.



▲ 台大醫院金山分院輻傷醫療—傷患醫療處置  
Radiation medical treatment drill in Jin-shan Branch of National Taiwan University Hospital.

## （二）強化輻射事故安全防護網，確保人員安全

### 1. 核安第 23 號演習

106 年核安第 23 號演習於 9 月 26 日辦理兵棋推演，於 9 月 21 日至 23 日進行實兵演練，並由中央與地方政府、國軍及民眾協力完成，另邀請國際外賓進行交流，參與人數超過 1 萬人，為歷年最高。更首次同步透過災防告警細胞廣播訊息服務（CBS），進行新北市及基隆市全區民眾通知作業。此外，並首次於假日期間執行跨區收容安置演練，以及適時下達無預警狀況，驗證各單位對於緊急狀況之應變處置能力及增加壓迫性與臨場感。透過演習，完備核子事故平時整備作業，也讓民眾瞭解政府防災及救災的做法。

演習，就是演練加學習，透過實地演練所發掘之問題，及值得再深入研討的議題，原能會將協調相關單位共同研討，並於後續演習中持續改進，以符合真實災害之多樣化、複雜化、難度化，強化複合式災害之整體防救能力。

### 2. 以多元化方式加強民眾核子事故緊急應變及輻射防護之知能

核安演習僅是平時防災整備的一環，參與年度「核安演習」並非是讓民眾了解事故防護行動的唯一方式，與民眾溝通須長期持續透過各種方式進行，為了讓緊急應變計畫區之民眾瞭解防護要領，除演習前辦理的民眾說明會外，並透過家庭訪問、逐里宣導、園遊會等多元化方式，讓大家瞭解政府防災和救災的做法，包括：辦理新北市、基隆市及屏東縣逐里宣導及疏散演練共 43 場 4,569 人、新北市及基隆市地區核安演習民眾說明會 4 場 500 人、特定團體溝通宣導 9 場 581 人、地方政府應變人員訓練 54 場 3,740 人，參與人數共計 9,390 人；另辦理園遊會 3 場，以簡淺易懂的遊戲方式建立民眾的防災意識；結合原能會官方粉絲頁「輻





▲ 野柳地質公園遊客勸離疏散  
Evacuation drill of the tourist in Yehliu Geopark



▲ 學生預防性疏散  
Precaution Evacuation drill at school

## 2. Strengthening the radiation protection and ensuring public safety

### a. 2017 National Nuclear Emergency Exercise

The 2017 National Nuclear Emergency Exercise had two parts, table-top on September 26<sup>th</sup> and full participation exercise on September 21<sup>st</sup> to 23<sup>rd</sup>, and was successfully conducted with the cooperation of the central and local governments, military and the residents. International experts were also invited for observing and providing insights. With more than 10,000 attendees, the exercise had the highest numbers of attendance over the years. It was also the first time delivering alert notification through Cell Broadcast Service (CBS) to the public in New Taipei City and Keelung City. In addition, it was the first time that a drill on cross-county relocation was performed on weekends, and unannounced tests were conducted, to test response organization's ability to handle emergency situations and make the exercise more responsive and challenging. Through the exercise, we have verified capabilities of response organizations, and enhanced the resident's understanding on the public protection actions.

Exercise means testing and learning. For findings discovered on-site and issues needed more discussion, AEC would work in coordination with related agencies to resolve and verify in subsequent drills, and strengthen the overall capability in preventing and response to a complex disaster.

### b. Increasing resident's knowledge on nuclear emergency response and radiation protection in various channels

Nuclear Emergency Exercise is only a part of emergency preparedness. Attending the annual "Nuclear Emergency Exercise" is not the only way for the public to understand protective actions. To help the resident in the emergency planning zone familiar

務小站」辦理『核』睦相處網路有獎徵答系列活動，總參與人數超過 6 萬，並吸引 6 千餘人成為「輻務小站」粉絲。

106 年 11 月針對新北市核電廠緊急應變計畫區內的萬里區、金山區、石門區、三芝區等 4 區 38 個里辦理家庭訪問計畫，共計完成 12,000 餘戶訪問。除蒐集核子事故緊急應變整備相關資訊及民眾需求，也使民眾熟悉災害發生時的應變措施及防護知識，落實政府在核子事故的平時整備作業。

### 3. 法規精進、強化應變功能

因應 105 年 4 月 13 日災害防救法修正施行，將輻射災害列為災害類別之一，原能會依此陸續增修相關法規，以健全輻射災害應變機制；106 年共計完成「核子事故警報訊號之種類、內容、樣式、方法及其發布時機」及「輻射災害潛勢資料公開辦法」的修訂。

106 年 10 月 2 日修正發布「核子事故緊急應變法施行細則」，針對核子事故書面通報、演習頻次及核子事故緊急應變基金收取額度進行內容修正。此外，為落實核子事故緊急應變基金有效運用與管理，完成「核子事故緊急應變基金考核作業規定」及「核子事故緊急應變基金管理會設製及作業要點」內容修正，並函頒實施。



▲ 園遊會  
Festival.



▲ 家庭訪問計畫  
Family survey project.



with the protection tips, a continuous communication with the resident should be implemented through different ways. Not only conducting pre-exercise community communication but also having various approaches such as family survey project, village promotion and festival: 43 seminars of village promotion and evacuation drills conducted in New Taipei City, Keelung City and Pingtung County with 4,569 participants; nine seminars for focus groups with 581 participants; 54 training for local government first responder with 3,740 participants. The total number of participants was 9,390. Three festivals hosted to increase awareness of the public's disaster prevention and response via interactive games. With the AEC Facebook fan page, we hosted the "Nuclear Safety" Online Contest. The total number of participants was over 60,000, attracting more than 6,000 people to join the AEC Facebook fan page.

In November 2017, AEC conducted a family survey project for 38 villages in four Districts: Wanli, Jinshan, Shimen and Sanzhi Districts, located within the nuclear power plant emergency planning zone in New Taipei City, and more than 12,000 households were visited. The purpose of this survey activity is not only collecting the information on nuclear emergency preparedness and the resident needs, but also trying to increase the public awareness of protective measure to protect themselves from radiation hazard during emergency.

### **c. Amendment of laws and regulations to strengthen the response capability**

For the revised Disaster Prevention and Response Act on April 13th, 2016, a radiation disaster was listed as a category of disasters. AEC has revised the related laws accordingly, in order to improve the response mechanism of radiation accident. In 2017, "Classification, Content, Model, Method and Announcement Timing of Alarm Signal needed during the Nuclear Emergency Response" and "Regulations on the Disclosure of Information about Potential Radiation Disasters" were issued.

The "Enforcement Rules for the Implementation of the Nuclear Emergency Response Act" were revised and issued on October 2nd, 2017. The revision was based on the written notification of nuclear accidents, frequency of exercises, and the amount of emergency response fund charged for nuclear emergency preparedness and response. In addition, to effectively use and manage the nuclear emergency response funds, the content of the "Regulations on Nuclear Emergency Response Fund Assessment Practice" and "Establishment and Operations of the Nuclear Emergency Fund Management" were revised and promulgated for implementation.

另外，為使「核子事故緊急應變法」更臻完善，原能會已參考美、日與國際原子能總署相關法規及實務作法，將核電總體檢與歷年核安演習經驗納入修正草案，以強化核子事故緊急應變措施實務作為，依法規作業程序完成修正草案之公告及「法規政策影響評估報告」，並於 12 月 27 日函送行政院審議。

### （三）導入資訊安全管理制度，持續強化資通安全

依據「政府機關（構）資通安全責任等級分級作業規定」，原能會為資訊安全責任等級 B 級機關，為保護資訊資產的機密性、可用性與完整性，提升資安防護水準，原能會積極進行資訊安全管理制度（ISMS）導入及驗證作業，除成立推動會，並成立工作小組以利執行相關工作。

原能會選定「核子保防管制系統」及「進出口簽審系統」為 ISMS 驗證項目，並於 106 年通過驗證，且於 10 月 19 日取得 ISO 27001 證書。





In addition, to revise the “Nuclear Emergency Response Act,” AEC has incorporated the “Post-Fukushima Re-examination on nuclear power plant” and the practice of the nuclear emergency exercise over the years into the draft amendment, by referring to the relevant regulations and practices of the U.S., Japan and International Atomic Energy Agency (IAEA), in order to strengthen the nuclear emergency response practices. The draft amendment has completed the announcement and the “Regulatory Impact Analysis” in compliance with the statutory procedure. It has been submitted to the Executive Yuan on December 27th for deliberation.

### **3. Introducing Information Security Management System (ISMS) to strengthen cyber security**

According to the “Direction on Classification of Information Security System for Government Agencies” AEC was classified to Level B. To ensure the confidentiality, availability and integrity of information assets, and enhance information security standards, AEC has introduced the Information Security Management System (ISMS). In addition to setting up the Steering Committee, AEC also designated a task force for implementation and execution.

For ISMS verification the “Nuclear Safeguards Control System” and “The Integrating Customs, Import and Export Licensing System” were selected and verified in 2017. AEC has earned the ISO 27001 certificate on October 19<sup>th</sup> 2017.

## 六、精進原子能科技研發

### （一）新南向綠電契機—澎湖東吉嶼微電網供電系統

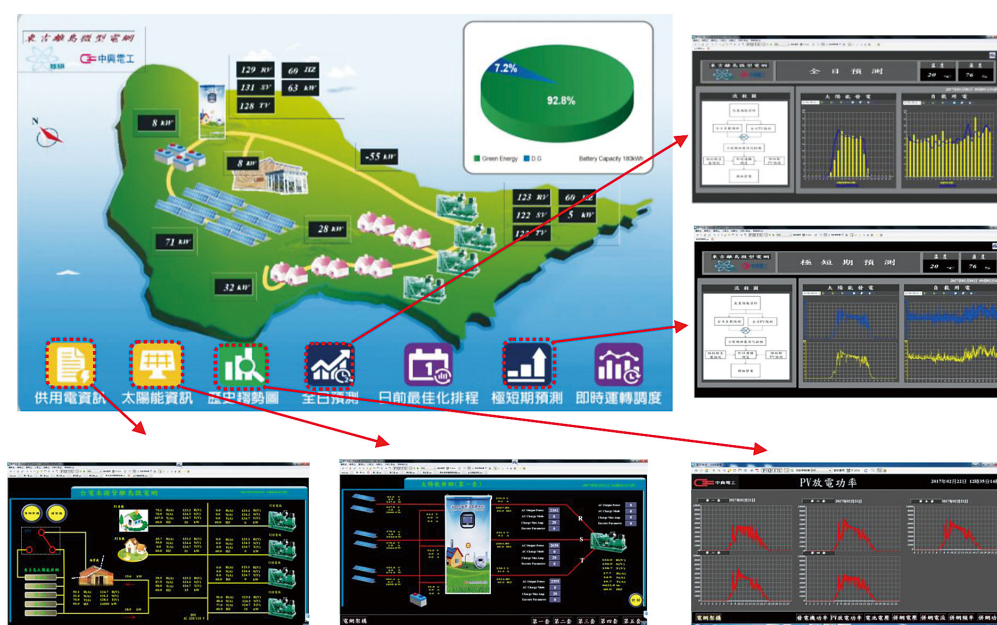
#### 1. 目前離島用電面臨問題及再生能源微電網（Microgrid）系統簡介

離島用電因燃油運輸成本高，一直是台灣和東南亞國家財政負擔及迫切待解決的問題。東吉嶼為台電未接管之島嶼，由澎湖縣政府自營發電，為節省燃油，縣府規劃建置再生能源發電。然而，再生能源為間歇性能源，易有電壓浮動問題，進而影響電網供電的穩定性。

微電網系統是再生能源穩健運作的心臟與神經系統，也是近年世界各國電力科技的發展重點，具穩定電壓及頻率功能，配合微電網能源預測及排程調度管理功能，可有效提昇離島電網再生能源之使用率，達到降低離島發電成本及節能減碳之目的。

#### 2. 澎湖東吉嶼微電網供電系統建置規模

在科技部能源國家型計畫與澎湖縣政府支持下，核能研究所（以下簡稱核研所）技術移轉中興電工公司，於東吉嶼建置國內首座離島再生能源微電網供電系統。目前東吉嶼微電網系統規模：包含 86 kW 太陽能發電系統、180 kWh 儲能電池、200 kW 柴油發電機及 3 條電力負載饋線。藉由國人自主研發之先進微電網能源



▲ 先進微電網能源管理系統（μEMS）  
Advanced Micro Energy Management System (μEMS)



## F. Advanced atomic energy technology R&D

### 1. New Southbound Green Power Opportunity-Penghu Dongji Islet Microgrid Power Supply System

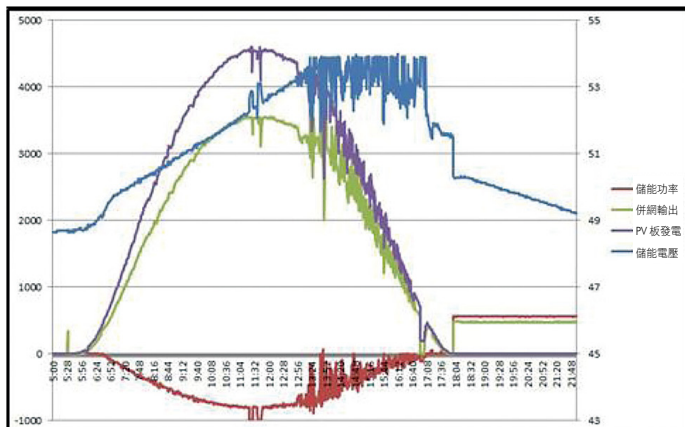
#### a. Current Offshore Island Power Generation Problems and Introduction of Renewable-energy Microgrid System

The offshore island power generation has high fuel transportation cost, which is always the national financial burden of Taiwan and Southeast Asian countries, and the most urgent problem to be solved. The power supply of Dongji Islet has not been taken over by TPC, so the Penghu county government is in charge of the power generation. In order to save more fuel, the county government plans to develop renewable electricity generation. However, as the renewable energy is intermittent energy, the problem of voltage fluctuation will be incurred after a large amount of renewable energy is grid-connected with the offshore island grid, which will influence the stability of the power supply of the grid.

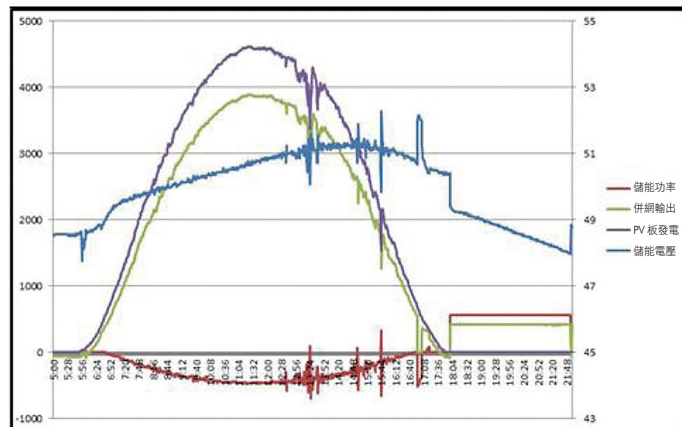
The microgrid system is the heart and the nervous system for the stable operation of the renewable energy, so the renewable-energy microgrid system is the development point of the electricity technology of the countries around the world. The microgrid has the functions of stabilizing voltage and frequency, which can be integrated with the energy forecasting and scheduling management system to effectively increase the usage rate of the offshore islands, reduce the power generation cost of the offshore islands, and achieve the energy saving and carbon reduction.

#### b. Scale of Penghu Dongji Islet Microgrid Power Supply System

As being supported by National Energy Program of Ministry Science and Technology, Institute of Nuclear Energy Research made a successful microgrid control technique to CHUNG-HSIN ELECTRIC & MACHINERY MFG. CORP., transfer which built up the first Taiwan's high-renewable-energy generation microgrid system in Dongji Islet of Penghu County. Currently, the microgrid system of Dongji Islet includes 86 kW solar power generation system, 180 kWh energy storage batteries, 200 kW diesel power generator, and 3 power load feeders. We aim to introduce the advanced micro energy management system ( $\mu$ EMS) developed by our country, and realize the grid connection between the system, and the renewable energy power generation and load power consumption forecasting to properly control the energy storage system, perform the optimized economic distribution, finish the power regulation of the energy storage system and the development of the voltage stabilization program of Dongji Islet, and remain the stable charging status so as to extend the service life of the energy storage system.



無穩壓控制 (Without voltage stabilization control)



實施穩壓控制 (With voltage stabilization control)

#### ▲ 東吉嶼儲能系統功率調控與穩壓控制

Power regulation and voltage stabilization control of power storage system of Dongji Islet, Penghu

管理系統 ( $\mu$ EMS)，結合再生能源發電及負載用電預測，協調控制儲能系統，進行最佳化的電力調度，並完成東吉嶼儲能系統功率調控與穩壓控制的程式開發，讓儲能系統可保持穩定的充電狀態，延長使用壽命。

### 3. 獲獎榮譽與經濟效益

「澎湖東吉嶼微電網供電系統」參加 2017 年亞太經合會議 (APEC) 能源智慧社區倡議 (ESCI) 智慧電網最佳案例競賽，於 21 個國家 197 競爭案例中脫穎而出，榮獲銀質獎，並於 4 月 24 日於新加坡領獎。

統計 106 年 3 月至 12 月底，經有效利用再生能源及儲能系統後，太陽能已併聯發電約 65,200 度電，約節省柴油機發電至少 143 萬元之成本（台經院資料東吉嶼發電成本為 22 元／度），同時估計東吉嶼微電網系統全年可降低二氧化碳排放約 58 噸。

### 4. 開創新南向綠電契機

核研所將攜手國內微電網相關產業，配合政府新南向政策，推廣本土微電網相關技術，並應用於東南亞國家電力迫切需求之島嶼，以期拓展國際外交與促進經貿發展，創造新南向綠電契機。



### **c. Award honors and economic efficiency**

Our R&D team attended Best Practice Award of The Energy Smart Communities Initiative (ESCI) of 2017 Asia-Pacific Economic Cooperation (APEC), and won the silver award from 197 competitive practices of 21 countries; the award was granted to us on April 24.

According to the statistics data from March to the end of December, 2017, the power generation in parallel connection of solar energy is about 65,200 kWh after the renewable energy and energy storage system are effectively utilized, and about NTD\$1.43 million of the cost of the power generation of diesel machines is saved (the power generation cost of Dongji Islet is NTD\$22/kWh according to the data of Taiwan Institute of Economic Research); meanwhile, it is estimated that Dongji Islet microgrid power supply system can reduce the CO<sub>2</sub> emission by about 58 ton over the whole year.

### **d. Create New Southbound Green Power Opportunity**

INER will cooperate with the domestic relevant microgrid industries and comply with the new southbound policies of the government to promote our microgrid technologies, and apply which to the islands in urgent demand so as to expand the international diplomacy, promote the economic and trade development, and create new southbound green power opportunity.

## **2. The first Food-specific Radioactivity Testing laboratory in Taiwan - Food Radioactivity Testing Team.**

In response to the 311 Fukushima nuclear power plant accident in Japan, the INER has assisted government agencies such as the Food and Drug Administration (FDA), the Council of Agriculture, the governmental and other non-governmental enterprises since 2003 to detect radioactivity in various types of food. As of the end of December 2016, more than 100,000 foods samples have been tested.

The Consultation Meeting of Citizens' Groups was held by the Food and Security Office of the Executive Yuan on April 26, 2017, NGO and scholar experts attending the meeting unanimously recommended that an independent food radioactive testing laboratory should be set up and this specialized laboratory should obtain TAF food certifications. INER has completed the following measures:

## （二）我國第一間食品專屬放射性檢測實驗室—食品放射性檢測團隊

因應 311 日本福島核電廠事故，核研所自 100 年 3 月起，配合國家食安政策需求，協助政府機關及民間企業，檢測各類食品中放射性含量。統計至 106 年 12 月底止，已完成超過 10 萬件食品放射性檢測。

106 年 4 月 26 日行政院食安辦召開之公民團體諮詢會議，與會之 NGO 及學者專家一致建議，有關食品放射性檢測實驗室，可由現有之環測實驗室精進，並取得 TAF 食品認證，核研所完成之具體措施如下：

### 1. 擴增檢測量能及便民參觀溝通措施

為方便民眾參觀食品輻射檢測過程，並避免干擾檢測作業的執行，將現有食品檢測實驗室搬遷至空間大 1.5 倍之新實驗室，配置 5 部高精密檢測專用的純鍺偵檢器，培訓增加檢測人力，使檢測數量可提升 20% 以上，大幅增進食品的檢測量能與效率。此外，實驗室外牆開設透明玻璃窗，製作說明海報看版、影音介紹短片及規劃民眾參觀動線，並將食品檢測情況公開上網，以及透過媒體採訪，宣傳量測分析程序及政府為食安把關的決心，讓民眾能「食得安心」。

### 2. 申請 TAF 食品放射性檢測增項認證

核研所環境試樣放射性核種分析實驗室（EMRAL），於 89 年通過全國認證基金會（TAF）之環境試樣放射性分析 ISO/IEC 17025 品質認證，另於 106 年 3 月向 TAF 申請實驗室食品增項認證，並於 106 年 6 月通過評鑑後取得食品放射性檢測認證證書，為我國第一間通過 TAF 的食品專屬放射性檢測實驗室。藉由擴充檢測

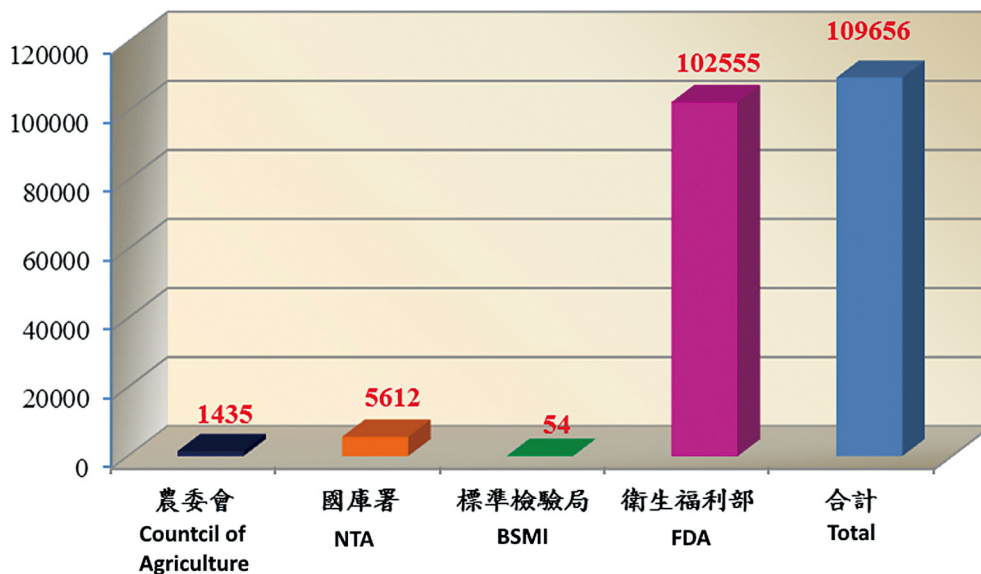


▲ 檢測儀器純鍺偵檢器  
High-purity germanium spectrometers



▲ 核研所食品放射性檢測實驗室  
The Foods radioactivity test laboratory in INER





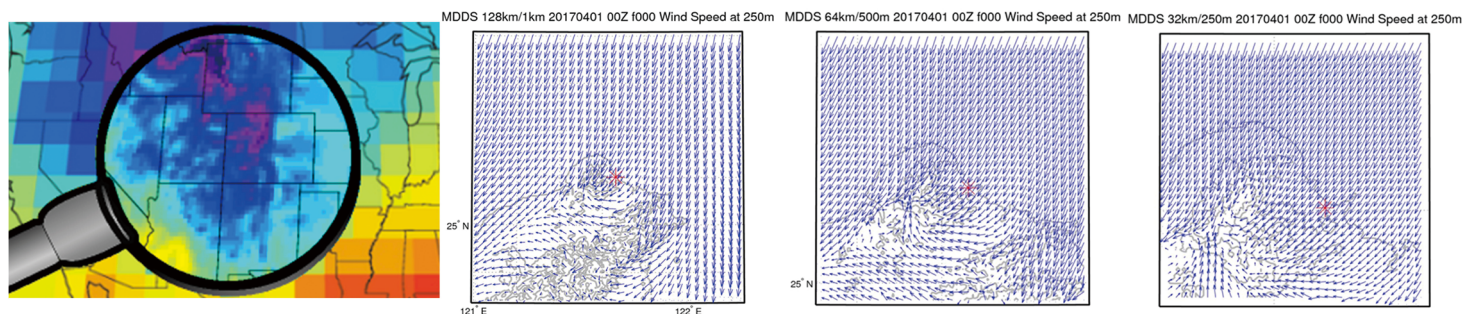
▲ 核研所食品放射性檢測數量統計  
The numbers of Foods radioactivity test samples by INER

#### a. The testing capability expansion and providing convenience to public visits and communication measures

In order to facilitate the public visit to the food radiation detection process and yet to avoid interference in the implementation of testing operations, the existing food testing laboratory relocated to a new laboratory which is about 1.5 times larger than the original one, equipped with five pure germanium detectors with high-precision, and training to increase the detection of manpower, so that the number



▲ TAF 食品認證證書  
Certificate of Accreditation



#### ▲ 降尺度預報氣象場產製

Downscaling forecasting meteorological Data generation

量能，建立健全完善食品安全管理機制，使核研所的檢測結果更具有專業性及公信力。除可提升政府機關對食品安全管理所需之技術服務外，亦符合行政院「提升檢驗量能」、「取得民眾信任」及「便於民眾參觀」之目標，有效確保國人食品之輻射安全。

### （三）核爆輻射塵威脅的第一道防線—劑量評估系統團隊

核研所長期與中央氣象局合作，整合氣象預報，大氣擴散，劑量評估等專業，致力於輻射事故緊急應變擴散分析與劑量評估能力之技術研發。日本福島事故後，及近年來朝鮮半島局勢緊張造成可能核武衝突之威脅，使得輻射污染由境外經大氣擴散傳輸，對台灣影響之議題，受到大眾關切。

本研發成果為發展全球核／輻射事故擴散模擬評估系統，建立例行化作業機制，以期能在境外核災／核爆事故發生時，第一時間提供分析資訊予政府決策部門，以利向民眾傳達正確資訊，並協助預估國內農漁牧產品之影響，便於對可能受污染區域之產品，進一步進行輻射量測與管制作為，避免大規模影響民生物資，衝擊消費者信心。

本系統之氣象預報資訊係應用氣象局與美國國家海洋與大氣總署（NOAA）之全球系統組（GSD）合作發展的複雜地形區三維連續變分降尺度系統。可於不降低太多精確度前提下，大幅縮短高解析度氣象預報場產製時間。



of tests can increase by 20% or more hopefully to significantly increase the detection efficiency. In addition, transparent glass windows were set up on the external walls of the laboratory, panel posters and introduction video clips were made, and visitor flow was planned. Video clips of food testing are also uploaded to the Internet. Through media interviews, the measurement and analysis procedures as well as the government's determination on food safety are also announced. So that people can "eat safely".

#### **b. Apply for TAF food radioactive detection accreditation**

The INER's Environmental Media Radioanalytical Laboratory (EMRAL) passed the ISO / IEC 17025 Quality Assurance Certification for Environmental Specimens of the Taiwan Accreditation Foundation (TAF) in 2000. In March 2017, INER filed an application for TAF Food Radioactive Testing Laboratory Quality Assurance Certification. In June 2017, EMRAL obtained the certification and INER became the first laboratory in Taiwan that passed the TAF food radioactive testing and certification. The laboratory has established a complete food safety management system through the expansion of test capability, which has made INER's testing results more professional and credible. Aside from fulfilling the requirements of government agencies for food safety management as well as technical services, the laboratory achieved the multiple objectives of "enhancing the quality of inspection," "gaining the confidence of the public," and "facilitating the public visits and understanding" so as to effectively ensure the radiation safety of food for the general public.

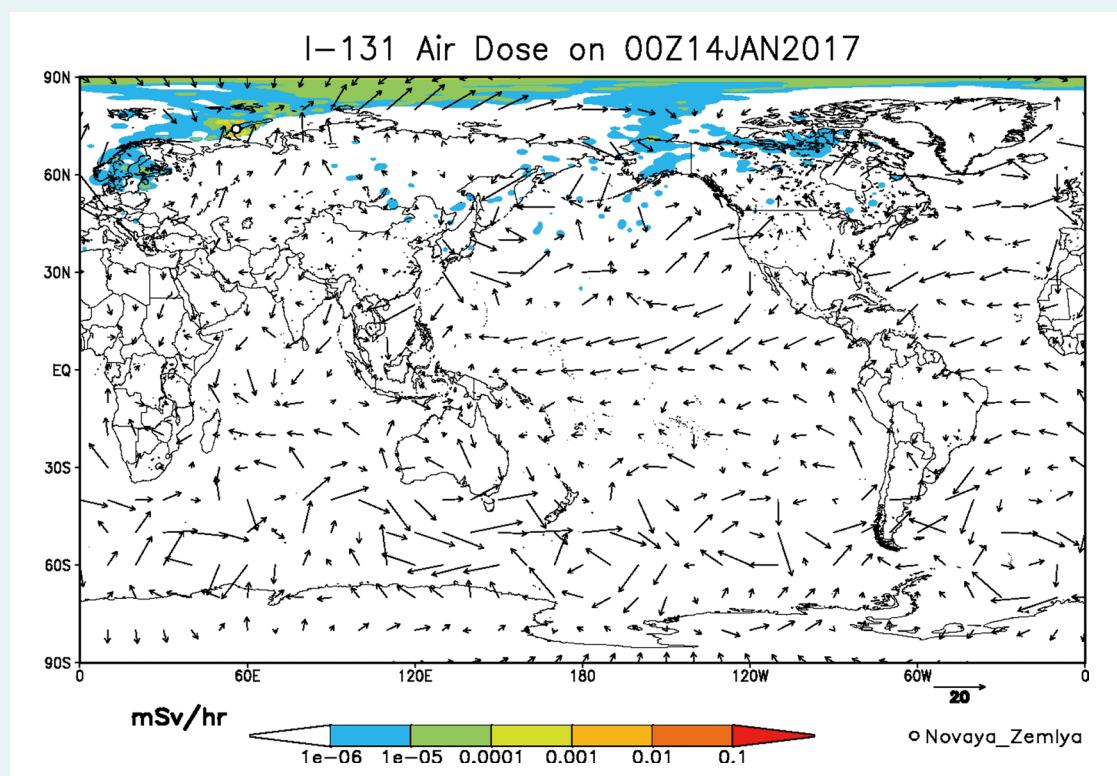
### **3. The First Warning Line for Radioactive Pollutants by Nuclear Test-Team of Dose Assessment System**

INER and Central Weather Bureau (CWB) have focused on integrating meteorological forecasting, atmospheric dispersion and dose assessment technologies for years. The impact of transboundary radioactive pollutants has been major public concern since Fukushima accident of Japan and the nuclear threat from Korean Peninsula recently.

This project has developed global nuclear/radiation accident dispersion evaluation system. The routine operation has been established to provide simulation and analysis information for decision making within the shortest possible time once the nuclear accident/explosion abroad happened.

大氣擴散係將原 A2Ct&d 模式中，結合劑量計算模式，並參考 NOAA 之 HYSPLIT 模式中乾溼沉降的判斷與計算方法，改寫後加入 A2Ct&d 模式，使得空氣中煙陣具有因沉降造成移除的效應。

106 年 4 月，北韓進行多次飛彈試射，引發朝鮮半島情勢緊張。本計畫也於該時期，模擬北韓可能發射核彈攻擊所造成的輻射擴散影響。9 月 3 日北韓進行氫彈試爆，亦配合於 9 月 3 日至 16 日完成二週之追蹤，根據大氣擴散趨勢，掌握對台灣地區可能之輻射影響，供原能會新聞發佈之用，適時澄清國人對於輻射塵是否侵台的疑慮。



▲ 疑似極地地區核試爆模擬

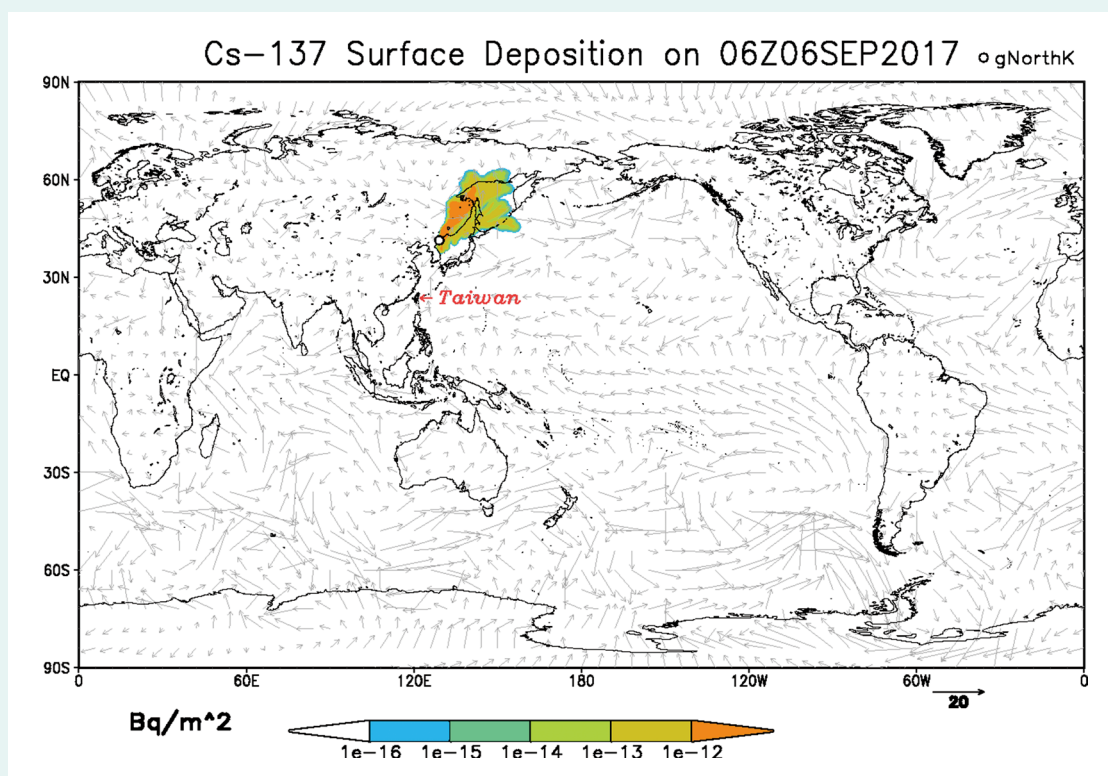
Simulation for possible nuclear test on polar regions



The downscaling technology applied to generate meteorological forecasting data was developed by CWB and National Oceanic and Atmospheric Administration (NOAA). It could highly reduce the computing time to make high resolution forecasting data without losing much detail.

The dose evaluation model was integrated to atmospheric dispersion model. Deposition mechanism was adopted and modified from HYSPLIT model to take puff depletion effect into account.

In April 2017, North Korea has conducted many ballistic missile tests, which reignited tensions in the Korean Peninsula. This project has simulated the dispersion of radioactive materials from the hypothetical nuclear attacks by North Korea. On 3rd September 2017, North Korea conducted a test of a hydrogen bomb. From the 3rd to the 16th of September 2017, the two-week-long track of the hydrogen bomb test has also been completed. According to the simulation analysis that brought the whole picture of the dispersion tendency of radioactive materials, the AEC could keep abreast of the possible effect upon Taiwan and issue a press release to clarify the public doubts as to whether the radioactive fallout would influence Taiwan.

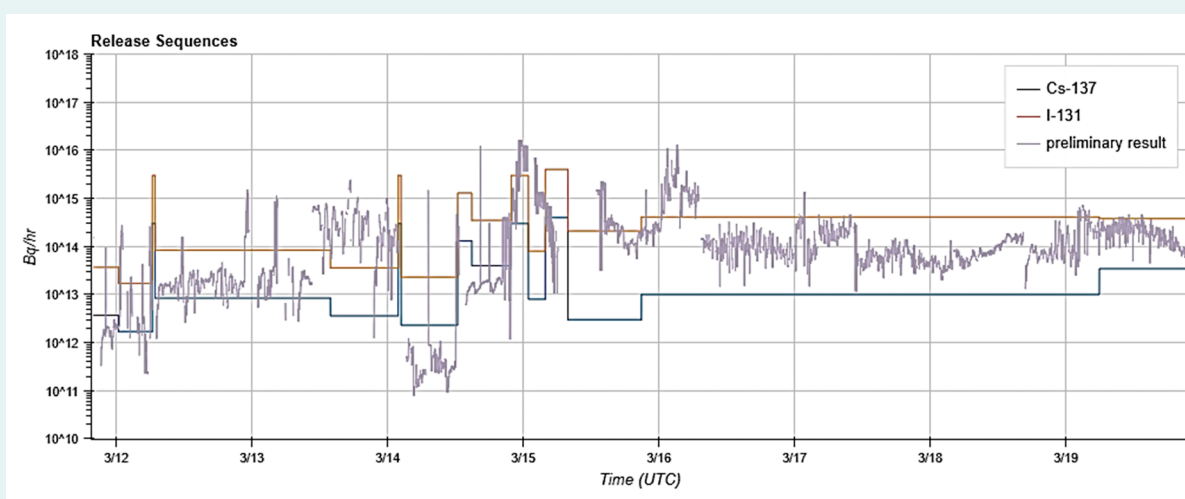


#### ▲ 106.9.3 北韓氫彈試爆模擬


Simulation for hydrogen bomb test by North Korea on 3rd Sep. 2017

福島事故經驗回饋，在缺乏外釋射源項之情況下，劑量評估系統將無法提供有效資訊。利用環境輻射偵測資料配合大氣擴散模擬回推外釋量與外釋時序，為目前國際間共同之因應對策並致力研發之技術。

未來本計畫將持續在擴散評估之應變領域深耕技術，規劃將結合氣象預報與觀測資訊，提升風場預報資訊精確度。深度整合境內境外擴散模式與劑量評估系統，強化圖像顯示介面，以作為民眾溝通之橋梁。建立制度化系統維運機制，同時拓展技術應用層級。



▲ 銫-137 回推結果（紫色）與日本原子力研究開發機構（JAEA）結果比較（紅色碘-131 與藍色銫-137）  
Reverse estimation of Cs-137 (purple line) by this project and Cs-137 (blue line) and I-131 (red line) by JAEA



Fukushima lesson learned revealed that the dose evaluation system could not provide valid information without the released source terms. Follow the international major study, the reverse estimation by radiation monitoring data has been developed in this project to get the initial released source term. The methodology has been verified by utilizing monitoring data from Fukushima daiichi nuclear power plant.

The future work of this project will combine forecasting and observing meteorological data to enhance the forecasting accuracy. Integrate domestic and global system for both dispersion and dose evaluation models, and strengthen the graphic display of simulation result for better public communication material. Establish the standard routine operation and maintenance procedure, and extent the applications of this technology.



## 七、落實放射性物料管理

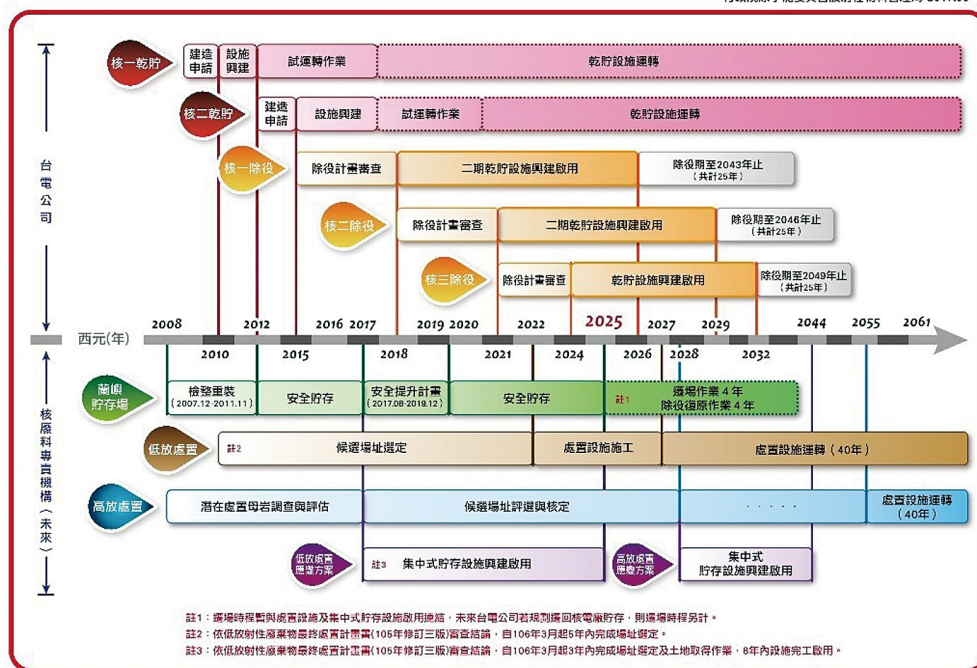
### (一) 凝聚共識 積極面對除役及核廢處理的安全

為展現政府實現非核家園的決心，原能會於 106 年 6 月完成台電公司「核一廠除役計畫」審查，為 2025 非核家園政策向前邁出一大步。另原能會也依法要求台電公司於 107 年及 110 年，提出核二廠及核三廠除役計畫，以如期展開除役作業；並於 106 年 6 月成立「核電廠除役安全管制專案小組」，強化核電廠除役安全管制，以確保公眾安全與環境品質。

由於核一廠用過核子燃料若無法自核反應器移出，將會影響核電廠除役之拆除工作，因此原能會於核一廠除役計畫之審查結論，要求台電公司核一廠第二期乾式貯存設施，應採具社會共識之室內貯存型式，並於 115 年底完工啟用，以利拆廠作業。另為增進民眾接受度並紓解安全疑慮，原能會將參照美國早期對乾式貯存設施核照案例，先發給 20 年運轉執照，屆期前 2 年台電公司得提出換照申請。

### 核電廠除役及核廢料重要議題時程

行政院原子能委員會放射性物料管理局 2017.03



▲ 核電廠除役及核廢料管制整體規劃及重要時程

## G. Implementing radioactive materials management

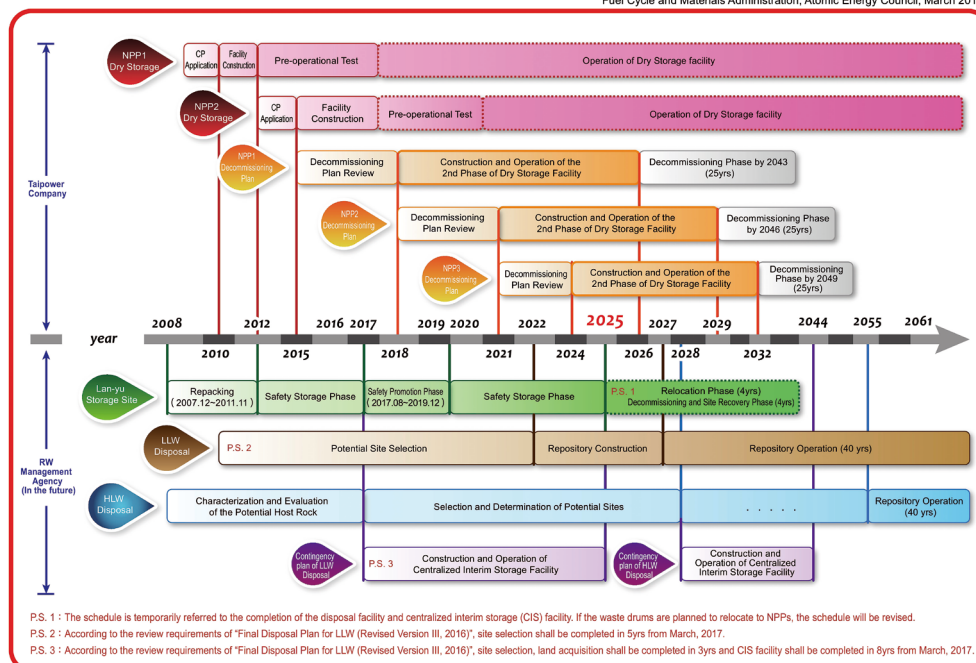
### 1. Regulatory control on NPP decommissioning plan and radioactive waste disposal program

In June of 2017, the Atomic Energy Council (AEC) completed the review of the “Chinshan NPP decommissioning plan” submitted by Taiwan Power Company (TPC). This demonstrated the government’s determination to fulfill the 2025 nuclear-free homeland policy. The AEC requested TPC to submit by law the decommissioning plans of Kuosheng and Maanshan NPPs by 2018 and 2021, respectively. In June of 2017, the AEC also set up a “Task Force on NPP Decommissioning Safety Regulation” to strengthen the safety regulations on the NPP decommissioning project, and ensure public safety and environmental quality.

The spent nuclear fuel of Chinshan NPP is currently unable to be removed from the reactor core and that will affect the dismantlement of the NPP facility. The AEC requested TPC to implement the second phase of the dry storage program of Chinshan NPP. This phase consists of the construction of the indoor dry storage facility which shall be completed and commence operation by 2026 in order to facilitate the proceeding of decommissioning and dismantlement operations.

#### Major Plan and Schedule of NPP Decommissioning and RW Management

Fuel Cycle and Materials Administration, Atomic Energy Council, March 2017



- ▲ The overall planning and the important schedules of the NPP decommissioning and the radioactive waste disposal



▲ 2017 台美核電廠除役審查及管制研討會  
The 2017 Taiwan-US workshop on NPP decommissioning review and regulation.



▲ 2017 台日核電廠除役技術經驗交流研討會  
The 2017 Taiwan-Japan workshop on NPP decommissioning technology.



▲ 用過核燃料室內乾式貯存安全審查及管制研討會  
The 2017 Taiwan-German workshop on the safety review and regulation over the spent nuclear fuel indoor dry storage.

為精進核電廠除役及用過核子燃料與放射性廢棄物之管制技術能力，原能會於 106 年 4 月邀請三位德國專家，來台舉辦「核能電廠用過核燃料室內乾式貯存安全審查及管制研討會」；另於 8 月、11 月分別邀請美國核能管制委員會（NRC）及日本原子力除役研究會，與國內專家學者共同舉辦「核能電廠除役審查及管制研討會」、「台日核能電廠除役技術交流研討會」，以吸取國外除役技術與經驗。

## （二）安全至上 強化蘭嶼貯存場的安全管制

由於台電公司未能如期選定低放射性廢棄物最終處置的候選場址，原能會要求台電公司於 105 年底提報「蘭嶼貯存場遷場規劃報告」，包括「回運原產地」、「送至集中式貯存設施」二項實施方案，並於 106 年 2 月完成方案審查，要求台電公司送請經濟部轉請行政院國家永續發展委員會「非核家園推動專案小組」研議，以尋求社會共識，擇定最佳可行方案，以及早落實遷場計畫。

在廢棄物桶尚未遷出蘭嶼前，原能會要求台電公司提出「提升蘭嶼貯存場營運安全實施計畫」，並加強地方溝通說明。為確保蘭嶼貯存場重裝作業安全，保障蘭嶼居民健康及環境品質，原能會要求台電公司就先前之檢整重裝作業進行檢討，提報重裝作業整備檢討報告，以落實積極自主管理；另應擬定重裝作業專案稽查計畫，派員駐場稽查，以落實三級品保作業。同時原能會亦擬定專案檢查計畫，以強化重裝作業之安全管制，並持續辦理蘭嶼地區環境輻射平行監測，以強化公眾參與，並於官網建置重裝安全管制作業專區刊登有關資訊，以落實資訊公開。



In order to improve regulatory capabilities in regards to the NPP decommissioning and the management of spent nuclear fuel and radioactive waste, the AEC also invited three experts from Germany to hold a workshop on the safety review and regulations in regards to the NPP spent nuclear fuel indoor dry storage in April of 2017. The AEC also invited experts from the U.S. Nuclear Regulatory Commission (USNRC) to hold a workshop on the Oversight of NPP decommissioning in August and the Association for Nuclear Decommissioning Study (ANDES) of Japan to hold a Taiwan-Japan workshop on discussing NPP decommissioning technology in November of 2017, respectively.

## **2. Strengthening Safety Regulations for the Lan-Yu Storage Facility**

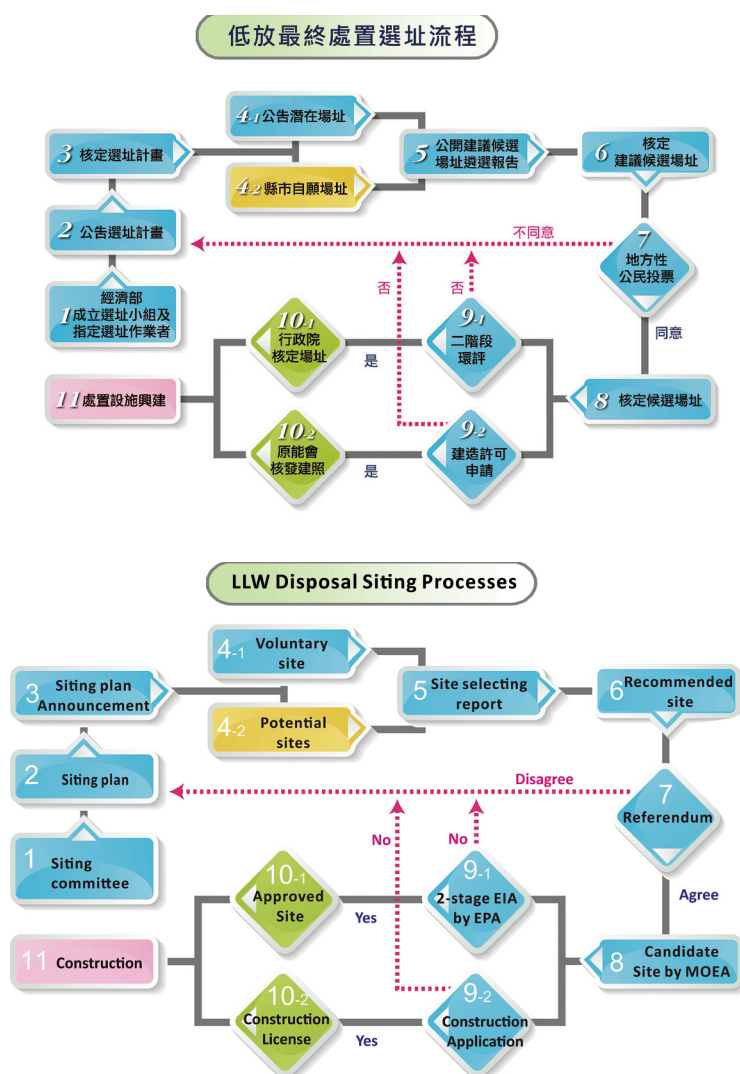
Because TPC has been unable to find a site for the low-level radioactive waste disposal facility, the AEC requested TPC to submit the “Report on the Relocation of the Lan-Yu Storage Facility” by the end of 2016. Two implementation options were addressed on the report, which were shipping back the waste to where it was produced or shipping it to a centralized interim storage facility. The review of this report was completed by the AEC in February 2017. The AEC requested TPC to submit these options through the Ministry of Economic Affairs (MOEA) to the Nuclear-free Homeland Task Force of the National Council for Sustainable Development for deliberations and seek social consensus for the best option in order to implement the relocation plan as soon as possible.

Before the low-level radioactive waste can be shipped out of the Lan-Yu Storage Facility, the AEC requested TPC to submit an implementation plan for improving safety management of the Lan-Yu Storage Facility as well as strengthen the communication with local communities.

In order to ensure safety of repackaging operations at the Lan-Yu Storage Facility, protect the health of Lan-Yu residents, and preserve environmental quality, the AEC requested TPC to review and provide feedback from previous experiences of repackaging operations. The TPC set up an audit program to ensure three-level quality management system. The AEC also set up an inspection program in order to strengthen the safety regulations on repackaging operation, as well as a parallel monitoring program for the environmental radiation around the Lan-Yu area in order to enhance public participation and information disclosure.

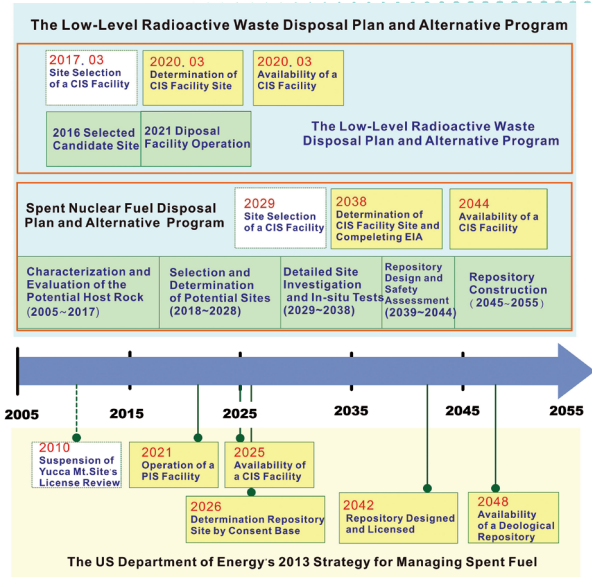
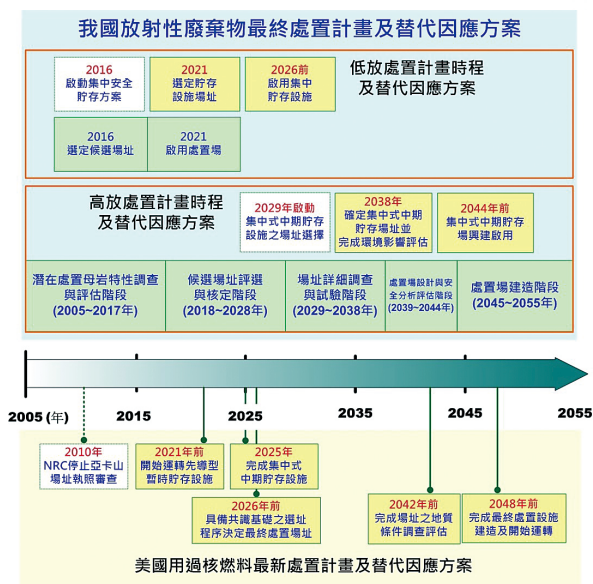
### （三）前瞻管制 推動放射性廢棄物最終計畫

依據放射性物料管理法之規定，督促台電公司積極執行低放射性廢棄物最終處置計畫的選址工作，並配合選址作業主辦機關經濟部辦理場址調查、安全分析及公眾溝通等工作。經濟部於 101 年 7 月核定並公告台東縣達仁鄉及金門縣烏坵鄉二處為建議候選場址，唯地方政府未配合辦理地方公投，原能會已多次促請經濟部研提辦理地方公投之具體規劃。低放射性廢棄物最終處置計畫執行方面，原能會已於 106 年 2 月審定低放處置計畫替代應變具體實施方案，要求台電公司應依原核定低放處置計畫之集中貯存設施時程完成設施興建，以利儘早遷移蘭嶼核廢料及做好核電廠除役準備，落實非核家園政策。



▲ 低放處置場選址作業流程

The flowchart of siting for the low-level radioactive waste disposal facility.



#### ▲ 低放處置替代／應變方案

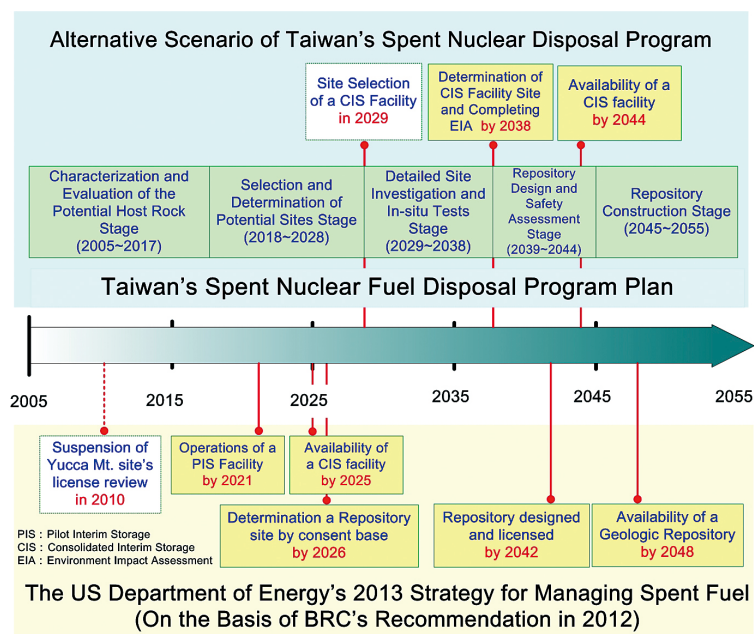
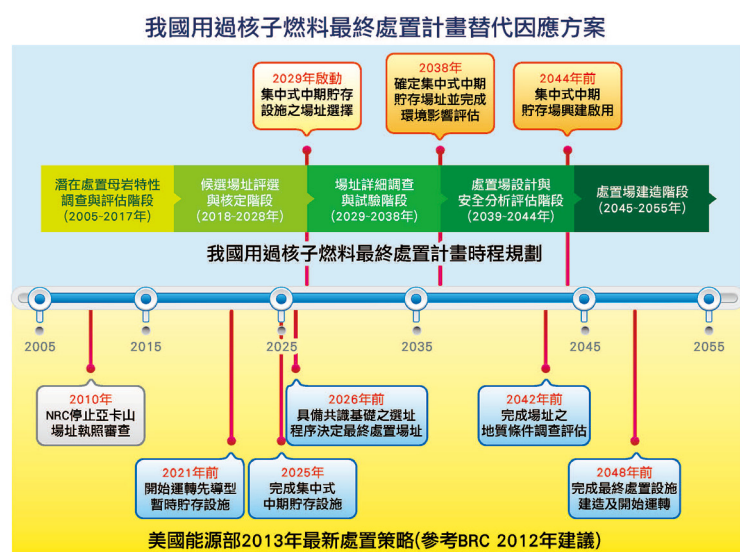
The alternative/contingency program of the low-level radioactive waste disposal.

### 3. Forward-looking Regulation and Promoting Radioactive Waste Final Disposal Programs

According to the provisions of the Radioactive Materials Management Act, the AEC will supervise TPC in carrying out the siting operation for the low-level radioactive waste disposal facility and be in coordination with the siting implementing agency, the MOEA, to proceed with site investigation, safety analyses, and public communication. In July of 2012, the MOEA had approved and announced two recommended candidate sites located in Daren Township, Taitung County and Wuqiu Township, Kinmen County. However, the two local governments were not cooperative towards holding local referendums. Regarding the implementation of the low-level radioactive waste final disposal plan, the AEC in February approved the contingency plan, requesting TPC to establish a centralized interim storage facility according to the schedule set up in the original approved low-level waste disposal plan. This will facilitate the shipping out of the radioactive waste from the Lan-Yu Storage Facility and the preparation for NPP decommissioning in order to implement the “nuclear-free homeland” policy.

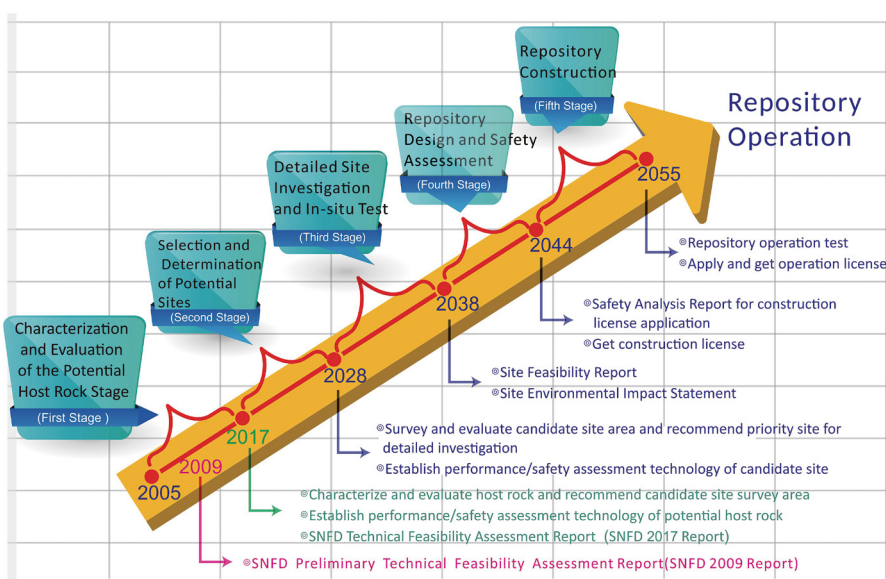
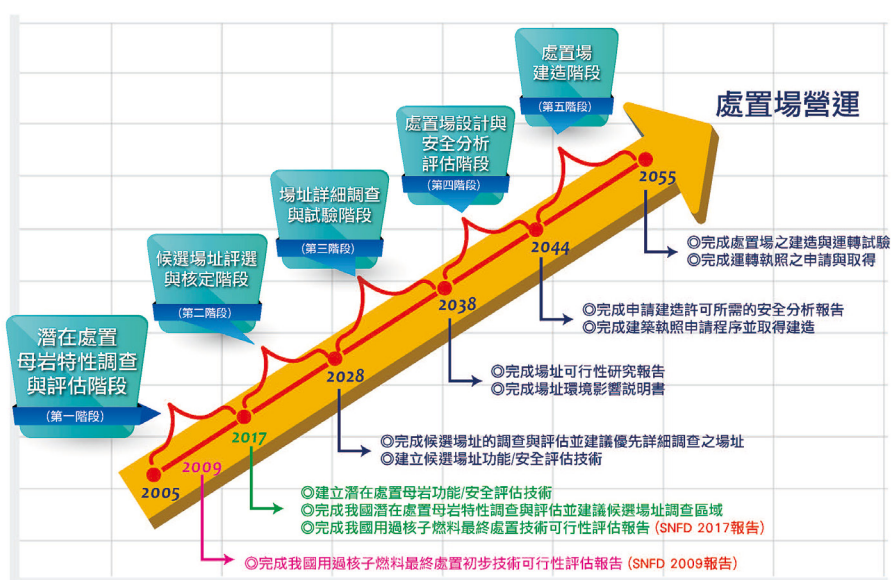


依據放射性物料管理法規定，台電公司提報「用過核子燃料最終處置計畫」，共分五個階段，預定於 2055 年完工啟用。第一階段「潛在處置母岩特性調查與評估階段（2005～2017 年）」工作成果，原能會已要求台電公司應依最終處置計畫時程切實推動，另台電公司於 106 年 12 月提出我國用過核子燃料最終處置技術可行性評估報告，該報告須經國內專家學者及國際專家同行審查，以確保符合國際水準。



- ▲ 用過核燃料處置計畫替代方案  
The alternative plan for the spent nuclear fuel disposal.

In accord with the provisions of the Radioactive Materials Management Act, TPC submitted the spent nuclear fuel final disposal program, includes five specific phases, which will result in the scheduled commencement of the facility operation in 2055. The AEC requested TPC to follow the schedules set up in the final disposal program and effectively promote the first phase (2005~2017) potential host rock characterization and assessment program. TPC submitted the “Spent Nuclear Fuel Disposal Program -2017 Progress Report” to demonstrate the technical capability of spent nuclear fuel final disposal in Taiwan in December of 2017. AEC has requested TPC to carry out an international peer review to ensure the sufficiency and credibility of the report.



▲ 用過核燃料處置計畫時程

The tentative schedules of the spent nuclear fuel disposal.



▲ 進口飲料類  
Imported Soft Drinks.



▲ 自來水樣  
Tap Water Samples.

## 八、強化環境輻射監測

### （一）加強國人食品與飲水之輻射安全監測

國人對於食品之輻射安全日益關心，原能會所屬輻射偵測中心定期至消費市場抽驗國內主要民生消費食品、縣市農特產品、國外進口食品及沿海地區海產物食品等，進行放射性含量分析，並評估國人攝食的輻射劑量；106 年各類食品放射性含量分析 526 件次，結果皆符合衛生福利部公告食品中原子塵或放射能污染容許量標準，國人可以安心食用。

另為確保國人飲用水之輻射安全，定期採取台灣自來水公司所屬各淨水廠與臺北自來水事業處所屬給水廠之飲用水樣品，並至消費市場購買各品牌瓶裝水試樣進行放射性含量分析，106 年共分析 132 件次，分析結果均符合法規規定，無輻射安全顧慮。

各項分析結果均刊載於「台灣地區放射性落塵與食品調查」半年報中，相關訊息亦同時公布於原能會官網，民眾可上網查詢及下載。





▲ 樣品前處理作業  
Pre-treatment Process



▲ 消費市場抽驗  
Sampling at the Supermarket

## H. Strengthen environmental radiation monitoring

### 1. Strengthening Radiation Safety Monitoring in Food and Drinking Water

As the general public's awareness of food radiation safety increases, the Radiation Monitoring Center of the Atomic Energy Council (AEC) has been conducting periodic radiological analyses of consumable commodities, domestic agricultural products, foreign imported products, and seafood products of coastal regions. In 2017, a total of 526 tests of food samples all met the maximum allowable level of radioactive residues as regulated in the Standards for the Tolerance of Atomic Dust and Radioactive Contamination in Food. The general public should therefore have no concerns about radioactivity when consuming these commodities as mentioned above.

In order to ensure radiation safety, 132 drinking water samples were taken periodically from each water purification plant of the Taiwan Water Cooperation and water plants of the Taipei Water Department. Additionally, bottle water samplings were randomly checked and analyzed for radioactive nuclides from supermarkets. Results showed that all samples were below the regulatory limit and involved no radioactive safety concerns.

The results of items assessed above are listed in the Semi-Annual report of "Radioactive Fallout and Food Investigation." Other relevant information is also available at the website of AEC. The public is welcome to search and download the information.

## （二）自動監測數據公開及提供加值應用

原能會在台灣本島及金門、馬祖、澎湖、蘭嶼等離島地區共設立 46 座環境輻射監測站，其中各直轄市及縣（市）至少設立 1 站，進行全天候 24 小時即時環境輻射劑量率監測，各站監測值每隔 5 分鐘自動傳回原能會輻射偵測中心，並顯示於原能會核安監管中心 24 小時監控網頁，以確保核設施及台灣地區民眾健康及環境輻射安全。

各項環境輻射即時監測數據除透過網路上傳於原能會官網公開，亦配合行政院資料開放政策，建置與國發會政府資料開放平台之介接機制，提供「全國環境輻射偵測」開放資料（open data），民眾可透過平臺，自行下載或介接加值應用，截至 106 年 12 月 31 日「環境輻射即時監測數據」已高達 5 萬多次的下載使用量，顯示此項資訊開放作業已有顯著具體成效。

## （三）啟動海洋輻射調查

台灣四面環海，海岸線長且沿岸地區蘊藏非常豐富之生物資源，居民許多活動及飲食與海洋有密切關係。2011 年日本福島核電廠事故後，屢次傳出放射性物質洩漏流入海洋造成海洋污染，引起民眾恐慌。為掌握台灣鄰近海域輻射狀況，並評估日本福島核災事件及大陸沿海核電廠排放對台灣海域之輻射影響，原能會啟動海洋輻射調查計畫，透過跨部會合作執行海水等環境樣品取樣及放射性核種分析，期建立台灣海域放射性核種含量背景調查基本資料，以掌握台灣海域環境輻射現況。



▲ 原能會輻射偵測中心輻射監測系統監控中心  
Real-time monitoring data control room, Radiation Monitoring Center

## 2. Opening Real-time Monitoring Data and Providing Value-Added Applications

The AEC established a total of 46 real-time Environmental Monitoring Stations all over Taiwan, as well as the offshore islands of Kinmen, Matsu, Penghu, and Orchid Island. Each city or county has at least one station, with 24/7 real-time environmental radiation dose rate monitoring. The data from each monitoring station is sent back to the Radiation Monitoring Center of AEC every five minutes and is updated on the 24/7 monitoring website of AEC's Nuclear Safety Duty Center to ensure the radiation safety level of nuclear facilities, the public's health, and the environment in Taiwan.

Apart from updating real-time monitoring data on the AEC's website, AEC also joins the interface mechanism with National Open Data Portal of National Development Council in accordance with the Open Data Policy promoted by Executive Yuan, so as to provide the general public with open data for National Environmental Radiation Monitoring results. The general public can freely download the open data or interface with value-added applications via this portal. As of December 31, 2017, Real-time Environmental Radiation Data has been downloaded more than 50,000 times, highlighting the impressive and substantial impact of this open data policy.

## 3. Launching Marine Radiation Investigation

Being surrounded by the ocean, Taiwan has a long coastline and rich biological resources, and our residents have had a close relationship with the ocean in terms of activities and food. Following Japan's Fukushima Nuclear Plant Accident in 2011, there have been cases of radioactive materials leaking into the ocean and contaminating the water, which panicked the public. In order to fully understand the ambient marine radiation status near Taiwan and evaluate the impact of Fukushima nuclear accident and the radioactive release of nuclear power plants of China on Taiwan's coastal areas, the AEC has launched the Taiwan Marine Radiation Monitoring Investigation Project, through which inter-agency cooperation results in environmental samplings and radioactive nuclide analyses. It is our goal to establish a database to include background investigation results of Taiwan marine radioactive nuclide dosage so as to comprehensively obtain the first-hand coastal environmental radiation status.



自 106 年 2 月起開始執行「台灣海域輻射監測調查計畫」，取樣地點採矩形網格將台灣劃分 8 個沿岸地區，涵蓋基隆八斗子漁港、新竹南寮漁港、彰化王功漁港、嘉義東石漁港、高雄西子灣、宜蘭南方澳漁港、花蓮港、台東大武及成功漁港等 9 個點，樣品包含海水、海產物及岸沙等，取樣頻率分為上、下半年各執行一次，每個點取 1 個海水（60 公升）、1 個岸沙、3 個海產物進行放射性含量分析；分析結果沿岸 9 處 18 件岸沙樣品均未測得任何人造核種；海產物共 54 件，測得銫-137 最大活度值為每公斤鮮重 0.5 貝克；海水 18 件，測得銫-137 最大活度值為每公升 2.1 毫貝克，皆符合法規規定。

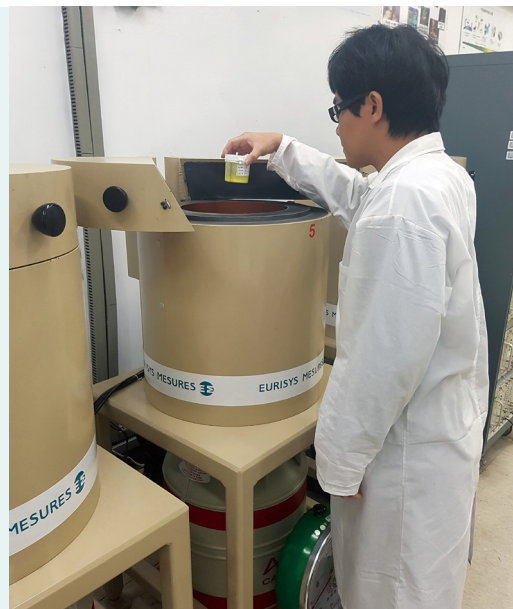
106 年 4 月至 12 月，完成離岸海水樣品分析作業共 20 件，分析結果銫-137 最大活度值為每公升 2.0 毫貝克，無輻射異常現象。

#### （四）國內住宅氡氣調查結果

氡氣是自然界存在的放射性氣體，世界衛生組織（WHO）於 2009 年提出警告，氡氣是室內僅次於香菸的肺癌致病因子，呼籲各國政府須注意室內氡氣的問題。原能會輻射偵測中心 25 年前曾對室內氡氣進行調查，結果顯示平均濃度為每立方公尺 10 貝克。由於現今生活型態、環境狀況等改變，因此重新進行調查。



▲ 60 公升海水銫-137 前處理  
Cs-137 Pre-treatment Process of 60 liters of Sea Water.



▲ 加馬能譜分析作業  
Gamma Spectroscopy Analysis.

The Taiwan Marine Radiation Monitoring Investigation Project began in February 2017, dividing Taiwan into eight coastal areas in a rectangular grid, and sampling nine sites encompassing Badouzi Fishing Port in Keelung, Nanliao Fishing Port in Hsinchu, Wanggong Fishing Port in Changhua County, Dongshih Fishing Port in Chiayi, Sizih Bay in Kaohsiung, Nanfangao Fishing Port in Yilan, and Hualian Port as well as Dawu and Chenggong Fishing Ports in Taitung. Samplings include seawater, seafood products, and coastal sand, taken periodically every six months. One sample of seawater (60 liters), one of coastal sand, and three of seafood products are taken from each site and analyzed for radiation dosage. The tests indicate that no artificial nuclides were found out of 18 coastal sand samplings from nine sites; of 54 seafood products, Cs-137 was found with the maximum activity of 0.5 Bq/kg; and of 18 seawater samples, Cs-137 was found with the maximum activity of 2.1 mBq/liter. All the above results are below the regulatory limit. Twenty offshore seawater samples were analyzed from April to December 2017, and Cs-137 was found with the maximum activity of 2.0 mBq/liter, showing no abnormal radiation symptoms.

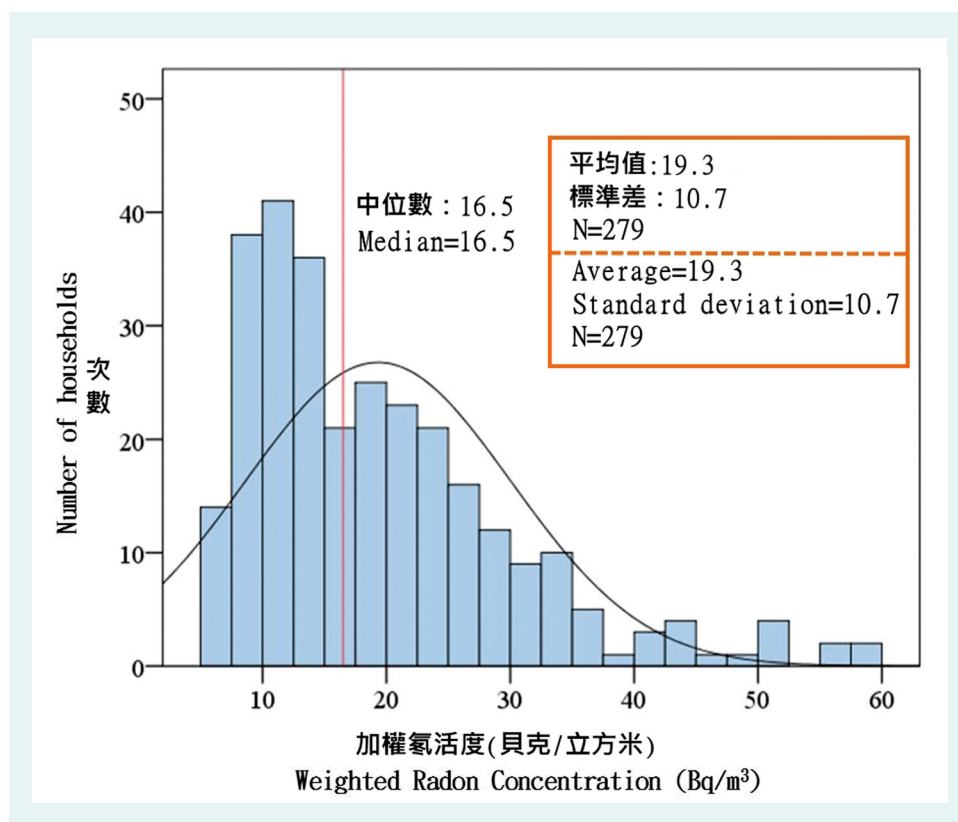
#### **4. Domestic Residential Radon Investigations**

Radon, a naturally occurring radioactive material in air, was found by the World Health Organization (WHO) in 2009 to be a factor in causing lung cancer, second only to tobacco. WHO has warned and suggested that every government should be concerned with the indoor radon issue. The AEC conducted an indoor radon investigation 25 years ago and found the average concentration was 10 Bq/m<sup>3</sup>.

Due to drastic changes in lifestyle and environment, the AEC re-conducted an indoor radon investigation project. The recent study focused on living rooms and bedrooms and tested 279 dwellings. Since background radiation varies only slightly within Taiwan, and households share a similar architectural structure with steel and cement materials, no significant radon activity difference occurs in the region, and while the average radon concentration in the bedroom is slightly higher than in the living room, statistical differences are not significant. It is suspected that air conditioners might cause poorer air ventilation for the bedroom, leading to the accumulation of higher radon concentration. The statistical results found that the indoor average radon concentration is 19 Bq/m<sup>3</sup>, almost twice as high as levels of 25 years ago. It is suspected that air conditioners and air-tight windows are widely used, leading to the decrease in air flow. Yet the household radon concentration investigated in the study is lower than 100 Bq/m<sup>3</sup>, the suggested mitigation level by the WHO.

本次調查以居家經常活動的區域如客廳與臥房為主，共計量測 279 戶，由於台灣地區天然背景輻射差異不大，且各地區住宅建築結構與材質類似，大多以鋼筋混凝土為主，因此量測結果顯示室內氡氣活度沒有地域性差別，但臥房的氡氣濃度平均值略高於客廳，可是並無統計上的顯著性，推估因為空調的使用，使得臥房通風狀況較客廳差，易累積較高的濃度。統計結果室內平均濃度為每立方公尺 19 貝克，約為過去量測值的兩倍，活度比 25 年前高的原因研判係空調與氣密窗普遍使用，通風率降低所致。所有住家氡氣濃度皆低於世界衛生組織建議改善濃度每立方公尺 100 貝克。

依據國際劑量評估參數，當處於氡氣濃度每立方公尺 100 貝克一年所受輻射劑量相當於 3.3 毫西弗，評估氡氣對台灣地區的國民輻射劑量約為每年 0.68 毫西弗。比 25 年前的評估值每年 0.36 毫西弗高 88%，但僅約為聯合國公布世界平均值每年 1.2 毫西弗的 57%。雖然目前調查結果氡氣濃度無輻射危害之虞，為了維持室內空氣品質，仍呼籲住家要注意換氣通風以維持健康環境。



▲ 調查國內 279 戶住宅加權室內氡活度分布圖  
Indoor Radon Weighted Activity Profile of 279 Dwellings in Taiwan



For international dosimetry conversion factor, living in 100 Bq/m<sup>3</sup> of radon concentration per year is equal to 3.3 mSv/year of radiation dosage. Hence, the average radiation dosage for the general public in radon consumption is about 0.68 mSv/year, 88% higher than the average 0.36 mSv/year tested 25 years ago and about 57% of the world average 1.2 mSv/year announced by the United Nations. Although current radon concentration values suggest no radiation harmful effect, it is recommended that each household should maintain indoor air ventilation to ensure good air quality and a healthy environment.

## 大事紀 Chronicle of Events





- 01.13 修正發布「核子事故警報訊號之種類、內容、樣式、方法及其發布時機」。  
AEC revised and issued the "Classification, Content, Model, Method and Announcement Timing of Alarm Signal Required in Nuclear Emergency Response".
- 01.13 蔡副主委主持「核研所高溫電漿熔融處理技術」技轉簽約儀式及記者會。  
Vice Minister Tsai hosted the technical transfer signing ceremony and press conference of the "Plasma Melting Fly Ash technology document".
- 01.19 辦理年終記者會，向外界說明原能會推動的工作項目及未來業務重點。  
A year-end press conference was held to introduce the work items and the priorities of upcoming events in the future of the council to the public.
- 01.25 完成「核三廠 1 號機 106 年 1 月 24 日急停事件綜合檢討報告」審查，確認符合「核子反應器設施停止運轉後再起動管制辦法」規定後，同意再起動申請。  
AEC reviewed Maanshan NPP unit 1 automatic shutdown report and issued the restart approval in accordance with "Administrative Regulations for restarting nuclear reactor facility after shutdown".



- 02.15 審定台電公司「蘭嶼貯存場遷場規劃報告」及「低放射性廢棄物最終處置替代應變方案之具體實施方案」，要求台電公司切實辦理。

AEC reviewed and approved the “planning report on the Lan-Yu Storage Facility relocation” and the “specific implementation program for the low-level radioactive waste final disposal plan” submitted by TPC who was requested to handle the programs effectively.

- 02.16 邀集相關部會與民間團體召開「外電報導核廢料傾倒台灣海域案」跨部會調查專案小組會議，並續完成「外電報導核廢料傾倒台灣海域案」初步查證報告。

AEC invited related agencies and NGOs to hold the multi-agency investigation task force meeting on the “foreign report on the case of radioactive waste dumped in Taiwan waters”. The preliminary investigation report on the “foreign report on the case of radioactive waste dumped in Taiwan waters” was completed and posted on the website.

- 02.23 提供美國核管會（NRC）國際核能安全公約中華民國國家報告英文第三版資料，並進行同行審查。

AEC provided third edition of The Republic of China National Report for the Convention on Nuclear Safety to US NRC and executed peer review with US NRC.

- 03 由核研所技轉，於澎湖東吉嶼建置之國內首座離島再生能源微電網系統商轉成功，並以該商轉案例參加 2017 年亞太經濟合作會議（APEC）能源智慧社區倡議（ESCI）智慧電網最佳案例競賽，榮獲銀質獎。

INER made a successful microgrid control technology transferring to Chung-Hsin Electric & Machinery Mfg. Corp., building up Taiwan's first high-renewable-energy-penetration microgrid system at Dongji Islet of Penghu county. This microgrid system went into commercial operation in March 2017 and reached the maximum instant renewable energy penetration ratio of 92.8%. In April, the research team participated in the 2017 APEC Energy Smart Communities Initiative Best Practices Awards Program. Among 197 competition practices from 21 countries, INER's microgrid control technology and its practice won the Silver Award.

- 03.02 辦理「核電廠環境輻射監測管制及全民監督」座談會。

Sponsoring the “Environmental Radiation Monitoring Control and Civic Supervision of Nuclear Power Plants” Symposium.

- 03.03 增訂發布「輻射災害潛勢資料公開辦法」。  
AEC amended and issued the "Regulations on the Disclosure of Information about Potential Radiation Disasters".
- 03.08 與公民團體共同執行核二廠環境輻射平行監測。  
Joint execution of parallel monitoring of environmental radiation at Kuosheng Nuclear Power Plant with civic groups.
- 03.17 內政部警政署保六總隊於核研所辦理「106 年防制暴力重大危安事件實警演練」，狀況演練由保六總隊第一大隊第五中隊主導，合計 170 人參加。  
The "2017 Real-Time Police Drills on Prevention of Violent Major Dangerous Events" was held at INER by Special Police sixth headquarters. The situation exercises were conducted with 170 participants and attendee.
- 03.20 執行「106 年度核二廠火災防護」專案視察。  
|  
03.24 AEC conducted fire protection inspection in Kuosheng NPP in 2017.
- 03.23 國際原子能總署（IAEA）視察人員到核研所物料平衡區執行 2017 年核子保防例行檢查，各項核物料帳目存量盤點，及核設施與燃料池現場查證，均無異常。  
|  
03.24 International Atomic Energy Agency (IAEA) inspector came to INER's material balance area TWL for nuclear facility design information verification and to perform physical inventory verification. It shows no abnormality.
- 03.23 依據原住民族基本法第 31 條規定，修正之「低放射性廢棄物最終處置設施場址禁置地區之範圍及認定標準」、「高放射性廢棄物最終處置設施場址規範」及「集中式放射性廢棄物貯存設施場址規範」公告發布。  
Based on the amendment to Article 31, the Indigenous Peoples Basic Law, the AEC announced the "area and standards for the site exclusion zone of the low-level radioactive waste final disposal facility," the "guideline on the site of the high-level radioactive waste final disposal facility," and the "guideline on the site of the centralized radioactive waste interim storage facility".
- 03.30 國際原子能總署來台與原能會共同召開「核子保防實施更新措施技術會議」。  
|  
03.31 The International Atomic Energy Agency (IAEA) came to Taiwan to held a technical meeting on "the Safeguards Approach Update" with AEC.

04 | 05 執行「106 年核二廠 1 號機護箱裝載池設備修改案現場施工」專案視察，並辦理「核二廠護箱裝載池設備修改案管制作業」說明會。

AEC conducted inspection of design change request in cask loading pool in Kuosheng NPP unit 1 and held a public meeting.

04.06 105 年台灣地區環境輻射監測年報於官網公開。

Annual report (2016) of environmental radiation surveillance for Taiwan was posted on the website.

04.07 舉辦第 1 場「攜手度量 守護輻安～輻射偵檢儀器操作研習」活動。

AEC conducted the 1st Session of “Hand in Hand Measuring, Guard against Radiation Safety” “Radiation Detection Instrument Operations and Training” Workshop.

04.07 | 06.15 執行「核三廠 2 號機第 23 次大修作業視察」及完成「核三廠 2 號機再起動與併聯申請」審查。

AEC conducted inspection during the refueling outage (EOC-23) in Maanshan NPP unit 2 and issued the restart approval.

04.13 德國聯邦國會環境委員會主席霍恩（Bärbel Höhn）一行拜訪原能會。

MP Bärbel Höhn and the Delegation from Germany visited AEC on April 13th.

04.13 召開放射性物料安全諮詢會第一次會議。

AEC held the first meeting of the radioactive materials safety consultation committee.

04.18 邀請德國專家，辦理「核能電廠用過核燃料室內乾式貯存安全審查及管制研討會」。

German experts were invited to participate in the “workshop on the safety review and regulation for NPP’s spent nuclear fuel indoor dry storage facility”.



- 04.21 召開第 15 屆第 4 次「游離輻射安全諮詢會」。  
AEC convened the 4th Meeting of 15th "Advisory Committee on Ionizing Radiation Safety (ACIRS)".
- 04.21 執行「核二廠燃料廠房護箱裝載池設備修改案」現場施工作業聯合視察。  
AEC conducted onsite inspection of design change request on cask loading pool in Kuosheng NPP unit 1.
- 04.24 原能會與經濟部國貿局共同邀請國際原子能總署來台辦理「防止核擴散研討會—  
核相關採購之資訊分析」座談會。  
04.26 AEC and the BOFT (Bureau of Foreign Trade) jointly invited the International Atomic Energy Agency (IAEA) to Taiwan to hold a workshop on "export control and awareness of proliferation risks".
- 04.25 原能會委員及公民團體查訪「核二廠燃料廠房護箱裝載池設備修改案」現場施工作業。  
AEC conducted onsite inspection with an AEC commissioners and citizen groups of design change request in cask loading pool in Kuosheng NPP unit 1 .
- 04.29 舉辦 106 年度第 1 次「輻射防護人員證書測驗及操作人員輻射安全證書測驗」。  
AEC held the 1st 2017 "Radiation Protection Personnel Certificate Test and Operational Personnel Radiation Safety Certificate Test".
- 04.29 完成「核一廠 2 號機降載延時運轉案」審查，並於 5 月 8 日辦理說明會。  
05.23 AEC Reviewed Chinshan NPP unit 2 reducing (flexible) power operation and held a public meeting.

- 05.03 邀請地方民眾及團體代表辦理「106 年度蘭嶼地區環境輻射平行監測」活動。  
|  
05.04 The locals and representatives from the concerned groups were invited to take part in the activity of the “2017 parallel monitoring of the environmental radiation around the Lan-Yu area”.
- 
- 05.03 辦理原能會「核子保安與緊急應變視察員專業訓練」。  
|  
05.11 AEC conducted “Inspector Training on Nuclear Security and Emergency Response”.
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- 05.12 召開「核二廠燃料廠房護箱裝載池設備修改案」地方說明會。  
AEC held a public meeting on the topic of “design change request in cask loading pool in Kuosheng NPP unit 1”.
- 
- 05.15 邀請美國能源部國家核子保安局（NNSA）專家來台辦理「2017 大型活動輻射事件應變訓練」。  
|  
05.19 AEC invited experts from the National Nuclear Security Administration, Department of Energy (DOE/NNSA), USA to conduct “The International Radiological Assistance Program Training for Emergency Response – Major Public Event, I-RAPTER-MPE”.
- 
- 05.18 「輻射應變技術隊」分別參與新竹市及苗栗縣之 106 年民安 3 號演習。  
、  
05.23 The “AEC Radiological Emergency Response Team” participated in the 2017 Min-An No.3 Civil Protection Exercise in Hsinchu City and Miaoli County.
- 
- 05.19 同意「核二廠 1 號機之裝載池燃料貯存格架可啟用置放用過燃料」。  
AEC approved Kuosheng NPP to transfer its spent fuels to unit 1 cask loading pool racks.

05.23 核研所助理研究員賴文祺榮獲行政院 106 年度績優研考人員，並於雲林科技大學接受頒獎。

Assistant Researcher Lai, Wun-Ci of INER won the honor of "Executive Yuan's 2017 Excellent Project Control Staff". Mr. Lai received the award at National Yunlin University of Science and Technology.

05.24 辦理「核二廠 1 號機燃料破損案之管制作業」說明會。

AEC held a public meeting on the topic of "Kuosheng NPP unit 1 fuel rod failure regulatory activities".

05.25 出版「輻射災害第一線應變人員手冊」。

AEC published "Manual for First Responder to a Radiation Accident".

05.25

06.16 執行「106 年度第 1 次核一廠、核二廠及核三廠不預警視察」。

AEC conducted first unannounced inspections in each operating NPPs in 2017.

06.21

05.26 辦理 106 年低放處置計畫專案視察作業及用過核子燃料最終處置計畫專案視察作業。

AEC held the project inspection on the 2017 low-level radioactive waste final disposal program and the project inspection on the spent nuclear fuel final disposal program.





- 06 核研所建置完成我國第一間食品專屬放射性檢測實驗室，並獲得財團法人全國認證基金會食品放射性檢測 ISO/IEC 17025 認證證書。  
INER re-built and established ROC's first food-specific radioactivity testing laboratory and obtained the first domestic TAF food radioactivity testing ISO/IEC 17025 certification.
- 06.02 原能會全球資訊網改版完成為「響應式設計（RWD）」並上線。  
AEC launched a revamped website, using fully Responsive Web Design (RWD).
- 06.05 邀請美國能源部國家核子保安局（NNSA）專家來台辦理「保安計畫訓練」，強化核子保安之專業知能。  
06.09 AEC invited experts from the National Nuclear Security Administration, Department of Energy (DOE/NNSA), USA to conduct the "Security Plan Training," in order to strengthen the professional knowledge of nuclear security.
- 06.12 派員赴國際原子能總署維也納總部見習。  
06.16 AEC recommended a new staff to consultation on NMA and AP at the International Atomic Energy Agency (IAEA) headquarters in Vienna.
- 06.12 辦理「核能安全管理相關作為」記者會，由謝主委向媒體說明就任一年多來的施政作為。  
"Nuclear power safety measures and respective actions" press conference was held. It was hosted by AEC Chairmen Hsieh to brief about his administration under his first year leadership.
- 06.14 召開第 49 次核子設施類輻射防護管制會議。  
AEC held the 49th Meeting of "Regulatory Meeting of Radiation Protection (RMRP) on Nuclear Facilities".
- 06.16 國際原子能總署於該署網站公布 2016 年全球核子保防實施總結報告，宣告我國連續第 11 年為「所有核物料均用於核能和平用途」國家。  
The International Atomic Energy Agency (IAEA) published the Safeguards Implementation Report (SIR) for 2016 on its website, declared that for the 11th year in succession Taiwan has been a country where "all nuclear material remained in peaceful activities".

- 06.20 辦理「105 年度放射性廢棄物最終處置計畫執行成效評核會議」。  
AEC held the 2016 assessment of the implementation performance of the radioactive waste final disposal programs.
- 06.23 邀請地方民眾及團體代表參加「核一廠除役計畫暨乾式貯存設施訪查」活動。  
AEC invited locals and representatives from concerned groups to held the “Visit to the Chinshan NPP decommissioning plan and the dry storage facility”.
- 06.26  
|  
06.30  
、  
10.23  
|  
10.27  
執行「106 年度核二廠、核三廠電力系統」專案視察。  
AEC conducted electric system inspection in Chinshan and Maanshan NPPs in 2017.
- 06.28 審定完成「核一廠除役計畫」，落實非核家園政策，並設置「核電廠除役安全管制專案小組」。  
The “Chinshan NPP decommissioning plan” was finally approved to implement the nuclear-free homeland policy. On the same day, the AEC set up the “NPP decommissioning safety regulation task force”.
- 06.29 原能會開立台電公司低放處置三級違規之訴願案，行政院訴願會決定維持原處分，駁回台電公司訴願。  
TPC’s appeal to the Executive Yuan Appeal Board for their previous ruling on TPC’s Level-III violation of the low-level radioactive waste final disposal plan was denied and the original ruling by the Board sustained.
- 6.30 與臺北市府簽署 2017 臺北世界大學運動會維安合作意向書，共同宣誓守護 2017 臺北世大運維安之決心。  
AEC signed a Letter of Intent on Security of the 2017 Taipei Summer Universiade with Taipei City Government, jointly vowing the determination to ensure the security of 2017 Taipei Summer Universiade.

- 07.01 發布我國「105 年度全國輻射工作人員劑量統計年報」。  
AEC released the 2016 "National Occupational Radiation Exposure Statistics Annual Report".
- 07.06 輻射監測站歷史監測資訊下載平台建置完成，可供民眾下載加值運用。  
The radiation monitoring system database was completed and accessible to the public.
- 07.06 函請經濟部督促台電公司切實執行核一廠除役計畫及核二廠第一期用過核燃料乾貯計畫。  
Requested the MOEA to urge TPC to implement effectively the Chinshan NPP decommissioning plan and the Kuosheng NPP spent nuclear fuel dry storage first phase plan.
- 07.10 派員赴日本東京參加「第 3 屆台日核能管制資訊交流會議」。  
Third Taiwan-Japan Regulatory Information Exchange Meeting was held on July 10-11,  
07.11 2017 in Tokyo, Japan.
- 07.14  
|  
07.17  
、  
08.07 執行「106 年度核二廠、核一廠、核三廠人員訓練與資格鑑定」專案視察。  
AEC conducted "staff training and qualification" inspections on each operating NPPs in  
08.10 2017.  
、  
09.04  
|  
09.08
- 07.17 派員參加於日本東京舉行之「第 30 屆台日核能安全研討會」並發表 4 篇專題報告。  
The 30th Taiwan-Japan Nuclear Safety Seminar was held in Tokyo, Japan. The seminar  
07.21 focused on "nuclear facilities decommissioning", at which INER delegation presented four special reports.
- 07.20 參加「106 年度國家關鍵基礎設施板橋共構車站防護演練」兵棋推演，及「板橋車站髒彈爆炸處置」實兵演練。  
AEC attended the "2017 Critical National Infrastructure Protection Drill (Banqiao Union Station)" table-top exercise and "Dirty Bomb" field drill.
- 07.21 辦理「核二廠 2 號機發電機避雷器箱受損案」說明會。  
AEC held a public meeting on "Kuosheng NPP unit 2 main generator surge arrester damage issue".
- 07.24 完成「核三廠 2 號機 106 年 7 月 23 日急停事件綜合檢討報告」審查，確認符合「核子反應器設施停止運轉後再起動管制辦法」規定後，同意再起動申請。  
AEC reviewed Maanshan NPP unit 2 automatically shutdown report and issued the restart approval in accordance with "Administrative Regulations for restarting nuclear reactor facility after shutdown".



- 07.25 | 受國立臺灣科學教育館及雲林縣政府之邀請，參與「第 57 屆中小學科展科學博覽會」活動。
- 07.29 AEC was invited to participate in the “57th National Primary and High School Science Fair” hosted by the National Taiwan Science Education Center and the Yunlin County Government.

- 08 | 於 FB 輻務小站粉絲專頁辦理『核』睦相處網路有獎徵答系列活動。  
10 AEC hosted “Nuclear Safety” Online Contest with the AEC Facebook fan page.
- 08.01 發布我國「105 年游離輻射應用與管理統計」年報。  
AEC released the 2016 “Ionizing Radiation Application and Management Statistics Annual Report”.
- 08.05 | 核研所指派支援人員及相關儀器設備，配合原能會進行 2017 台北世大運偵測演  
08.18 練及開幕前場館偵檢，並於 8 月 19 日參與 2017 台北世大運開幕觀眾進場人／車  
輻射偵測管制及利用車載 SPARCS 進行場館周圍道路之行動偵檢，順利達成任務。  
INER arranged staff and related equipment, carried out the venue inspection and detection drill of the 2017 Summer Universiade. INER also took part in the detection mission of the opening ceremony on August 19 and used the mobile SPARCS to carry out motion detection and inspection around the venue. The mission as well as successful conclusion of the 2017 Summer Universiade were achieved.
- 08.07 |  
08.11 、  
11.27 執行「106 年度核三廠、核二廠、核一廠核能安全總體檢」專案視察。  
| AEC conducted “Post Fukushima Safety Reassessment” inspections in each operating NPPs in 2017.  
12.01  
、  
12.04  
|  
12.08
- 08.10 辦理「核一廠除役計畫審查」地方說明會。  
AEC held the “briefing session to locals on the review of the Chinshan NPP decommissioning plan”.
- 08.15 邀請美國核管會專家辦理「2017 核能電廠除役審查及管制研討會」。  
AEC invited USNRC experts and held the “2017 workshop on the NPP decommissioning review and regulation”.

- 08.17 訂定發布「放射性物料設施設計修改及設備變更申請審核作業規範」。  
The “review guideline on the application for radioactive materials facility design modifications and equipment changes” was promulgated.
- 08.17 辦理「核二廠 2 號機發電機避雷器箱受損案安全管制作業」說明會。  
AEC held a public meeting on the topic of “Kuosheng NPP unit 2 main generator surge arrester damage case regulatory activities”.
- 08.18 召開第 15 屆第 5 次「游離輻射安全諮詢會」。  
AEC convened the 5th Meeting of 15th “Advisory Committee on Ionizing Radiation Safety (ACIRS)”.
- 08.18 | 08.30 派遣輻射應變技術隊執行「2017 臺北世大運」輻射事件防範及應變作業，針對開幕進場之人、車，進行輻射偵測管制及以車載 SPARCS 進行場館周圍道路之行動偵檢。  
AEC Radiological Emergency Response Team was dispatched to conduct the “2017 Taipei Summer Universiade” radiation event prevention and response operation, including radiation detection for people and vehicles attending the opening and closing ceremonies, and conduct radiation survey surrounding all the stadiums using SPARCS.
- 08.23 完成「核一、二、三廠防海嘯能力提升評估規劃報告」審查。  
AEC reviewed assessment plan report of enhanced tsunami prevention on each operating NPPs.
- 08.24 召開放射性物料安全諮詢會第二次會議。  
AEC held the second meeting of the radioactive materials safety consultation committee.

- 09.06 核備台電公司「低放射性廢棄物最終處置技術評估報告」。  
AEC reviewed and approved TPC’s “report on the low-level radioactive waste final disposal technology assessment”.
- 09.15 核研所舉辦「監測與診斷中心（M&D Center）」技術研討會，共有包括台灣電力公司綜合研究所等 14 個單位及 63 位專家參與盛會。  
INER held the “M&D Center Technology Seminar”, in which a total of 14 units including Taiwan Power Research Institute and 63 experts participated the seminar.

- 09.18 | 09.22 派員參加國際原子能總署第 61 屆會員國大會。  
The AEC delegation attended the 61st General Conference of the International Atomic Energy Agency.
- 09.19 函請新北市政府，積極辦理台電公司核一、二廠用過核燃料乾式貯存設施水土保持相關審查作業。  
AEC requested the New Taipei City Government to review actively the soil and water conservation plans of the dry storage facilities of Chinshan and Kuosheng NPPs.
- 09.21 台日核安管制資訊交流備忘錄之修正案生效。  
Modification to the Memorandum between Taiwan and Japan for Regulatory Information Exchange entering into force on September 21, 2017.
- 09.21 | 09.23 於核二廠及鄰近地區舉行 106 年核安第 23 號演習。  
AEC conducted the 2017 Nuclear Emergency full-scale Exercise at the Kuosheng Nuclear Power Plant and its adjacent areas.
- 09.22 、 09.29 、 11.17 執行「106 年度第 2 次核一廠、核二廠、核三廠不預警視察」。  
AEC conducted second unannounced inspections on each operating NPPs in 2017.
- 09.26 於核一廠模擬操作中心辦理 106 年核安第 23 號演習兵棋推演。  
AEC conducted the 2017 Nuclear Emergency Exercise table-top exercise, and set up the National Nuclear Emergency Response Center Forward Command Posts located at the Simulation Operation Center of Chinshan Nuclear Power Plant to carry out a joint exercise.
- 09.27 參與 OECD/NEA「核電廠組件運轉經驗、劣化與老化研究計畫（CODAP）」第三期合作計畫研商會議。  
AEC organized the first meeting to discuss the continuation of participating in the third OECD/NEA CODAP meeting.
- 09.28 完成資安管理制度（ISMS）導入，並於 10 月 19 日取得 ISO 27001 證書。  
AEC completed the implementation of the Information Security Management System (ISMS), and obtained the ISO 27001 certificate on October 19th.



# October

- 10.02 修正發布「核子事故緊急應變法施行細則」。  
AEC revised and issued "Enforcement Rules for the Implementation of the Nuclear Emergency Response Act".
- 10.14 與臺北市立聯合醫院仁愛院區共同主辦「106 年度輻射屋居民聯歡會」。  
AEC co-hosted the "2016 Radiation Contaminated House Resident Get-Together Party" with Taipei City Hospital Jen-Ai branch.
- 10.18 國際原子能總署來台與原能會共同召開「2017 年核子保防業務協調會議」。  
| The International Atomic Energy Agency (IAEA) came to Taiwan to held "2017 Annual Technical Safeguards Implementation Meeting" with AEC.
- 10.19 核研所「高占比再生能源離島微電網技術發展與應用」計畫，獲第二期能源國家型科技計畫評選為第二名之績優計畫。  
Voted by the evaluation committee of the National Energy Program (NEP-II), the project "Development and Application of High-Penetration Renewable Energy System Technology for Island Microgrid" conducted by INER and applied at Penghu Dongji islet won the second place award as an excellent project.
- 10.28 舉辦 106 年度第 2 次「輻射防護人員證書測驗及操作人員輻射安全證書測驗」。  
AEC held the 2nd 2017 "Radiation Protection Personnel Certificate Test and Operational Personnel Radiation Safety Certificate Test".
- 10.31 辦理「核能電廠機組斷然處置措施之審查作業」說明會。  
AEC held a public meeting on the topic of "Ultimate Response Guideline reviewing process".
- 10.31 完成「進出口簽審系統」導入資訊安全管理制度 (ISMS)，通過 ISO 27001 認證。  
AEC completed embedding work of "The Integrating Customs, Import and Export Licensing System" into Information Safety Management System (ISMS), and passed ISO 27001 certification.

# November

- 11 針對新北市萬里區、金山區、石門區、三芝區等位於核電廠緊急應變計畫區內的 38 個里，辦理家庭訪問計畫，計完成 12,000 餘戶訪問。  
AEC conducted a family survey project for 38 villages in four Districts: Wanli, Jinshan, Shimen and Sanzhi Districts, located within the nuclear power plant emergency planning zone in New Taipei City, and completed more than 12,000 visits.
- 11.08 行政院資通安全稽核團隊至原能會進行實地稽核。  
The information security audit team of Executive Yuan visited AEC to conduct an audit on Information Security Management.

- 11.09 邀請放射性物料安全諮詢委員參加核一廠除役計畫暨乾式貯存設施訪查活動。  
The members of the radioactive materials safety consultation committee were invited to visit the Chinshan NPP decommissioning plan and the dry storage facility.
- 11.14 辦理「2017 台日核電廠除役技術經驗交流研討會」。  
2017 Taiwan-Japan Workshop on Nuclear Power Plant Decommissioning Technology was held.
- 11.15 與公益財團法人日本分析中心進行 2017 年台日環境試樣放射性分析比較實驗年會。  
|  
11.16 The 2017 Annual Meeting on the Memorandum for Technical Cooperation with Japan Chemical Analysis Center (JCAC).
- 11.16 執行「106 年度第 3 次核二廠、核三廠、核一廠不預警視察」。  
、  
12.01 AEC conducted third unannounced inspections in each operating NPPs in 2017.  
、  
12.09
- 11.16 就台電公司未依計畫時程確實執行低放射性廢棄物最終處置計畫，按年從重裁處 3,000 萬元罰鍰。  
AEC issued civil penalty against TPC severely year by year for NTD 30 millions (about USD one million) for not complying with the planned schedule to carry effectively out the low-level radioactive waste disposal plan without any progress and improvement, which violated the Radioactive Materials Management Act.
- 11.24 舉辦第 2 場「攜手度量 守護輻安～輻射偵檢儀器操作研習」活動。  
AEC conducted the 2nd Session of “Hand in Hand Measuring, Guard against Radiation Safety” “Radiation Detection Instrument Operations and Training” Workshop.
- 11.27 派員參加於日本大阪召開之第六屆東亞放射性廢棄物論壇（2017EAFORM），並發表 4 篇論文。  
|  
11.29 The 6th East Asia Forum on Radwaste Management Conference (2017EAFORM) was held in Osaka, Japan. INER delegation, leaded by Dr. Wei, Cong-Yang, delivered 4 papers at the conference.
- 11.30 執行 106 年度輻射污染建築物居民醫療服務諮詢及後續醫療照護計畫，完成 689 位輻射屋居民健康檢查。  
AEC executed the 2017 “Medical Service Consultation and Follow-Up Medical Care Planning of Radiocontaminated Buildings Residents”, benefiting 689 people.

- 12 舉辦 3 場「106 年放射線照相檢驗業輻射安全防護管制宣導會」。  
AEC held three sessions of 2017 “Radiographical Testing Service Operator’s Radiation Safety and Protection Control Promotion Seminar”.
- 12.01 派員赴德國核安管制機關（BMU）交流。  
AEC-BMU Bilateral Meeting was held on December 1, 2017.
- 12.05 | 邀請日本河西基博士等 7 位專家來台參加「2017 高放射性廢棄物研討會暨  
12.06 NUMO/TPC 高放地質處置年會」，研討台日高放處置基本政策及技術發展現況。  
The “2017 Highly-radioactive Waste Workshop and Annual NUMO/TPC Geological Disposal Conference” was held by INER. Dr. He Xiji and six other experts from Japan were invited. There were about 120 technicians participated in the discussion of “Taiwan-and-Japan’s high-level radioactive waste disposal of basic policies and technology development” issue.
- 12.06 | 參加台北世貿一館「106 年資訊月」活動，推廣「全民原能會」App 應用程式。  
12.11 AEC participated in the “2017 Information Technology Month” exhibition at the Taipei World Trade Center Hall to promote the “AEC of the public”（全民的原能會）App.
- 12.09 核研所「銻 -68 / 鎂 -68 放射性核種發生器之構造裝置」與「環保創新高階隔熱節能膜量產技術」兩項技術產品，獲頒社團法人國家生技醫療產業策進會主辦之第 14 屆國家新創獎。  
INER was awarded from the “14th National Innovation Awards” by the Institute for Biotechnology and Medicine Industry. Two items, the “Ge-68/Ga-68 Radioisotope Generator and Innovate Method of Construction Thereof” and the “Innovative Mass Production Technology of Hi-end Solar Control Films”, were awarded.
- 12.12 於高雄舉行 2017 年台美民用核能合作年會。  
12.14 2017 TECRO-AIT JSC Meeting on Civil Nuclear Cooperation was held on December 12-14, 2017.
- 12.15 原能會簡易版全球資訊網建置完成，於 107 年 1 月 1 日上線。  
AEC created the brief version of AEC Website, which was online on January 1st, 2018.
- 12.15 於核研所召開第 15 屆第 6 次「游離輻射安全諮詢會」，會後並參觀國家游離輻射標準實驗室等設施。  
“The 6th Meeting of the 15th Ionizing Radiation Safety Consultation Conference” was held in INER and co-chaired by Commissioner Chen, Fu-Dou and Director Liou, Wun-Si of AEC Radiation Protection Department. After the meeting, the delegation visited National Radiation Standards Laboratory (NRSL) and other facilities.



- 12.16 建置完成原能會無線網路環境，作為外單位來會參加會議人員或洽公訪客使用。  
AEC established the wireless network environment in AEC. The wireless network is for guest to use.
- 12.20 召開放射性物料安全諮詢會第 3 次會議。  
AEC held the third meeting of the radioactive materials safety consultation committee.
- 12.21 召開第 50 次核子設施類輻射防護管制會議。  
AEC held the 50th Meeting of “Regulatory Meeting of Radiation Protection (RMRP) on Nuclear Facilities”.
- 12.25 舉辦「106 年度原子能安全績優獎暨放射性物料研究發展傑出貢獻及安全營運績優獎」頒獎典禮。  
The awards ceremony for the “Awards to the Atomic Energy Security Excellence, Outstanding Contribution to Radioactive Materials R&D and to Safety Management Performance” was held.
- 12.26 完成並公布「國際核能安全公約中華民國國家報告中、英文第三版資料」。  
AEC Completed third edition of The Republic of China National Report for the Convention on Nuclear Safety and released the report on AEC’s website.
- 12.27 「核子事故緊急應變法」修正草案函送行政院審議。  
AEC submitted the draft amendment of the “Nuclear Emergency Response Act” to the Executive Yuan for deliberation.
- 12.28 完成「107 年龍門（核四）電廠資產維護管理計畫」審查。  
AEC reviewed the plan of property maintenance and management on Lungmen nuclear power plant for 2018.
- 12.28 最高行政法院駁回 103 年 5 月由電廠附近居民提起核一乾式貯存設施熱測試行政訴訟案之上訴，原能會取得勝訴判決確定。  
On 28 Dec., 2017, the Supreme Administrative Court has decided to reject an appeal against the AEC’s approval of Hot Test campaign of Chihshan spent fuel dry storage facility. The administrative litigation was filed by local residents at Chihshan NPP in May 2014.
- 12.29 2017 年版「用過核子燃料管理安全與放射性廢棄物管理安全聯合公約」國家報告書中文版於官網公開。  
The 2017 Chinese version of the National Report as referred to the “Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management” was posted on the website.

## 國家圖書館出版品預行編目資料

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