行政院原子能委員會
Atomic Energy Council

2022
ANNUAL REPORT
行政院原子能委員會111年年報

行政院原子能委員會 編印

2022

ANNUAL REPORT

行政院原子能委員會111年年報

Atomic Energy Council, Executive Yuan

行政院原子能委員會
Atomic Energy Council

主委的話
Message from the Minister

原能會負責我國原子能安全的管制工作，所以運轉中及除役中核電廠與放射性廢棄物的安全監督、核電廠事故或輻射災害應變，以及原子能安全應用有關的輻射防護管制、環境輻射偵測等都是原能會的職責，另外還肩負原子能科技發展與應用的推動工作。

在111年，日本政府宣布將以海洋排放方式處置貯放於福島第一核電廠之含氚廢水，以及發生俄烏戰爭有關札波羅熱核電廠輻射安全的議題，均是民眾關心之國際事件。因此原能會除於官網建置「放射性物質海域擴散海洋資訊平台」，使民眾可查詢台灣海域的輻射監測狀況，並2次組成專家觀察團赴日，與日方就環境監測、核種分析及排放作業技術評估等議題交流；另於111年核安演習也參考俄烏戰爭情境，模擬廠內遇大範圍火災時的應變對策，驗證核電廠面對複合式災害的應變能力。

此外，國際核醫藥物之生產線受COVID-19疫情與航運不穩等因素影響，造成國內供藥短缺，為補足國人之用藥缺口，111年也積極投入核醫藥物的生產，緊急供應予國內各醫院，造福病患約75,800人次。至於在與民眾溝通、傳遞正確原子能資訊方面，除主動公開資訊、辦理多元公眾參與活動外，基於110年首次辦理的原子能科技科普線上研習活動之良好成效，111年的原子能科普也持續採實體與線上雙軌並行的方式進行推廣。

未來將面臨長達數十年的核電廠除役與核廢料處理，原能會除做好安全管制的監督工作，更要以嚴謹的態度將資訊公開，從閱聽者的角度認真思考，以淺顯易懂的表達方式和多元的溝通管道，積極與各界說明和互動，以爭取民眾的信任；並站在社會大眾的角度思考問題、解決問題，為民眾的安全把關。

主任委員

張靜文

The Atomic Energy Council (AEC) is responsible for the regulation of atomic energy safety in Taiwan, including the oversight of safety of operating and decommissioning nuclear power plants and radioactive waste, response to nuclear power plant accidents or radiological disasters, regulation of radiation protection related to safe application of nuclear energy, and environmental radiation monitoring. Also, the AEC is in charge of promoting the development and application of atomic energy technology.

The Japanese Government's decision to dispose of tritium containing water stored at Fukushima Daiichi nuclear power plant through ocean discharge, and the Zaporizhzhia nuclear power plant's radiological safety concerns during the Russia-Ukraine War were both international events that public cares most in 2022. The AEC therefore not only installed the "Ocean Radioactive Information System (TW-ORIS)" at the AEC's official website to help the public check radiation monitoring data of Taiwan's surrounding waters, but also organized two observation teams to Japan to exchange views on issues relevant to environmental monitoring, nuclide analysis and technical evaluation concerning the discharge operations. Besides, during the "2022 Nuclear Emergency Exercise", the scenarios with reference to the Russia-Ukraine War were adopted in simulating response strategies to massive fires within the nuclear power plant, and validating emergency response capabilities of nuclear power plant facing complex disasters.

In addition, due to the impact of COVID-19 on international nuclear medicine production and the unstable transportation situation, there were domestic shortages of pharmaceuticals. To fill the gap in radiopharmaceutical supply, the AEC actively launched a production program to supply domestic hospitals with radiopharmaceuticals, from which approximately 75,800 patients were benefited. In the aspect of public communication and conveying correct information on nuclear energy, the AEC not only engaged in pro-active information disclosure and organizing a variety of public events, but also continued holding both virtual and physical atomic science fairs in 2022 based on the successful experience in 2021.

Facing decades-long effort on the decommissioning of nuclear power plants and disposal of nuclear waste ahead, in addition to carrying out our role as the safety regulator, the AEC must also disclose information prudently and think from the audience's viewpoint during public communications, so that we will actively interact with all sectors of society to gain the public trust by using terms that even laymen can understand, and adopting a greater variety of communication channels. At the same time, the AEC will examine and solve problems from the perspective of the general public in order to ensure public safety.

Minister of Atomic Energy Council

Ching-Wen Chang

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AEC

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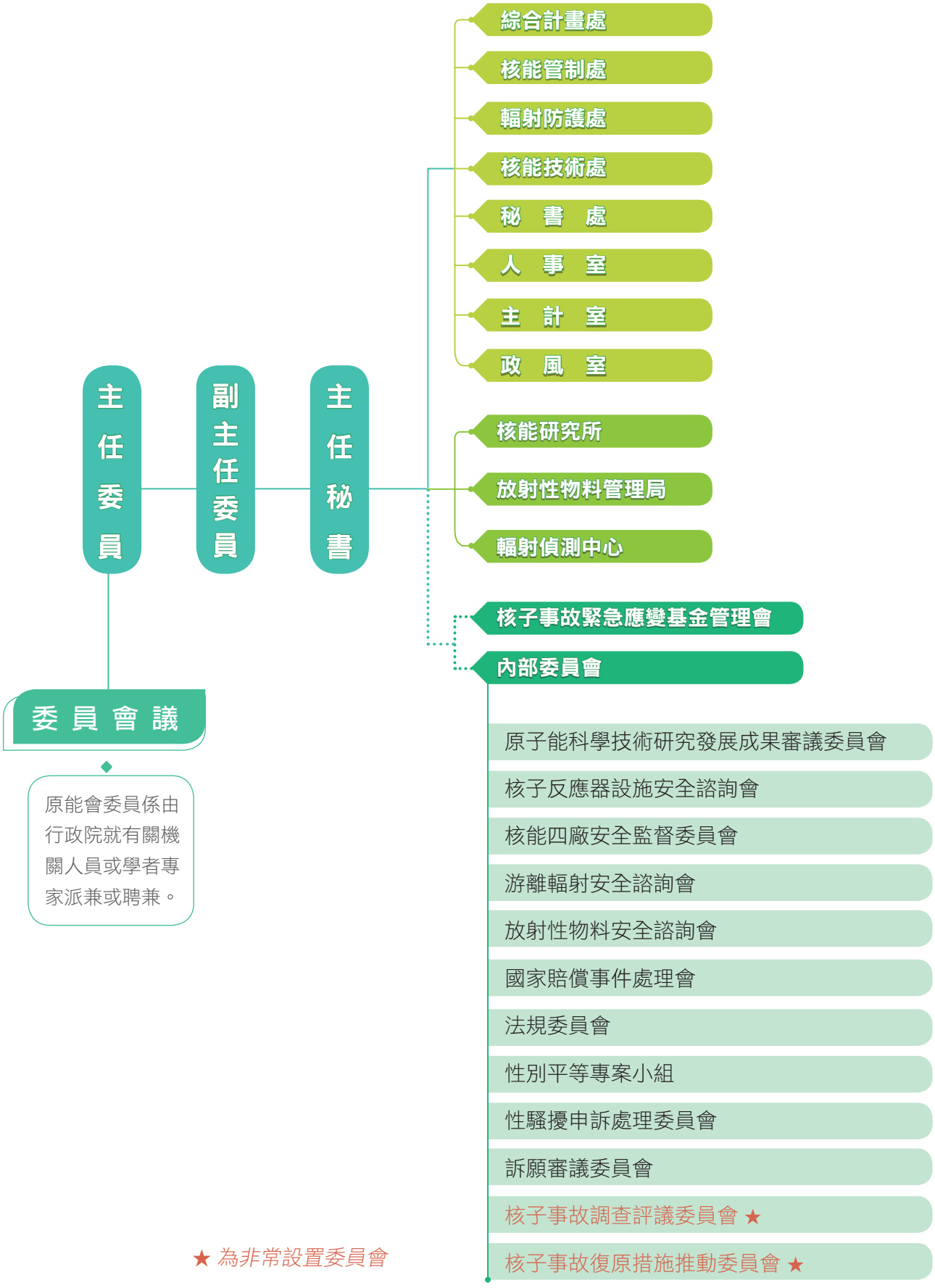
Organizational Structure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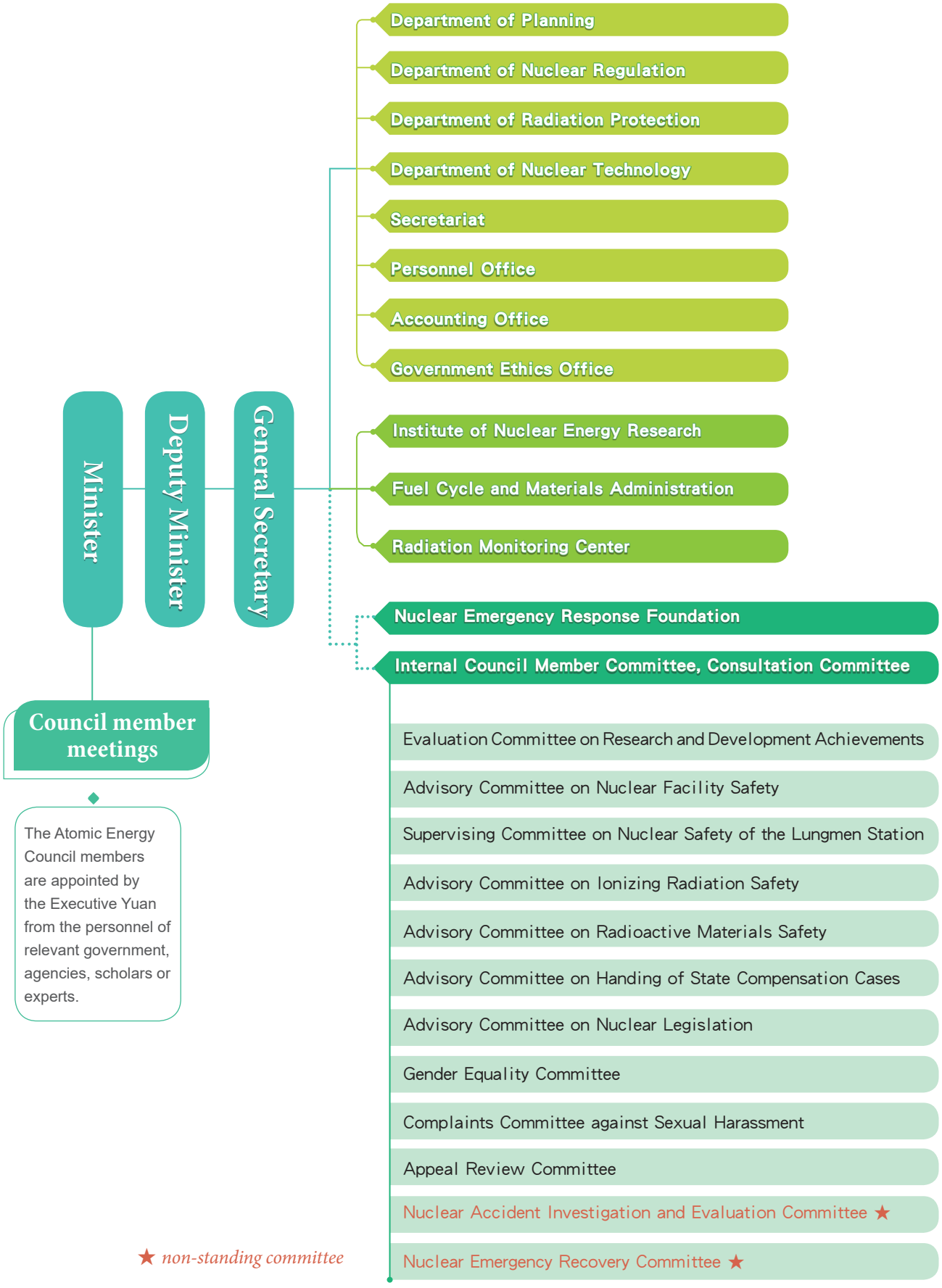
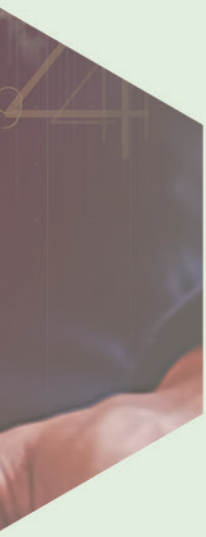
副主任委員
主任秘書
綜合計畫處
核能管制處
輻射防護處
核能技術處
秘　書　處
人　事　室
主　計　室
政　風　室
核能研究所
放射性物料管理局
輻射偵測中心
核子事故緊急應變基金管理會
內部委員會
委員會議
原能會委員係由行政院就有關機關人員或學者專家派兼或聘兼。
原子能科學技術研究發展成果審議委員會
核子反應器設施安全諮詢會
核能四廠安全監督委員會
游離輻射安全諮詢會
放射性物料安全諮詢會
國家賠償事件處理會
法規委員會
性別平等專案小組
性騷擾申訴處理委員會
訴願審議委員會
核子事故調查評議委員會 ★
核子事故復原措施推動委員會 ★
★ 為非常設置委員會


Minister
Deputy Minister
General Secretary
Department of Planning
Department of Nuclear Regulation
Department of Radiation Protection
Department of Nuclear Technology
Secretariat
Personnel Office
Accounting Office
Government Ethics Office
Institute of Nuclear Energy Research
Fuel Cycle and Materials Administration
Radiation Monitoring Center
Nuclear Emergency Response Foundation
Internal Council Member Committee, Consultation Committee
Council member meetings
The Atomic Energy Council members are appointed by the Executive Yuan from the personnel of relevant government, agencies, scholars or experts.
Evaluation Committee on Research and Development Achievements
Advisory Committee on Nuclear Facility Safety
Supervising Committee on Nuclear Safety of the Lungmen Station
Advisory Committee on Ionizing Radiation Safety
Advisory Committee on Radioactive Materials Safety
Advisory Committee on Handing of State Compensation Cases
Advisory Committee on Nuclear Legislation
Gender Equality Committee
Complaints Committee against Sexual Harassment
Appeal Review Committee
Nuclear Accident Investigation and Evaluation Committee ★
Nuclear Emergency Recovery Committee ★
★ non-standing committee


AEC



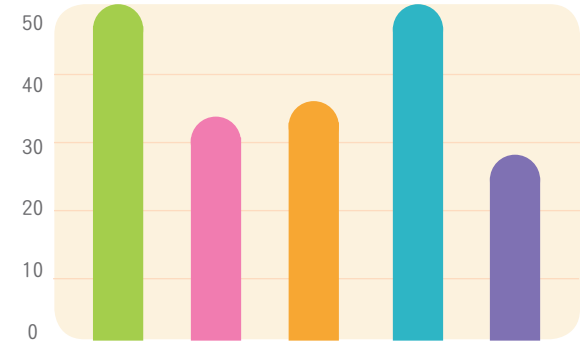
參

人力與經費

Manpower and Budget

行政院原子能委員會

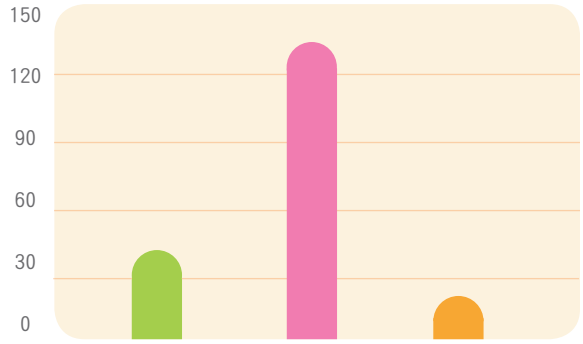
（一）111年度職員（含聘用人員7人）業務性質分配



一般行政	50 人（25.4%）
原子能科學發展	32 人（16.2%）
游離輻射安全	36 人（18.3%）
核能設施安全管制	50 人（25.4%）
原子能技術應用	29 人（14.7%）

合計：197 人

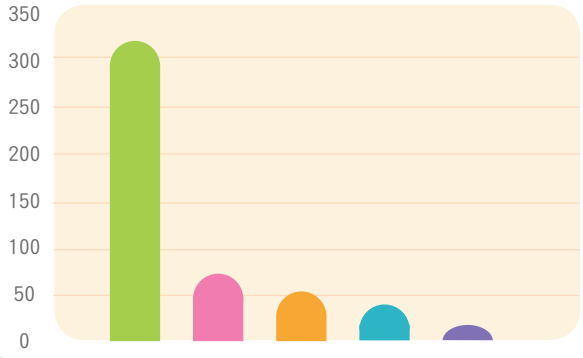
（二）111年度職員官等分配



簡任人員	34 人（17.9%）
薦任人員	139 人（73.2%）
委任人員	17 人（8.9%）

合計：190 人

（三）111年度經費支用概況

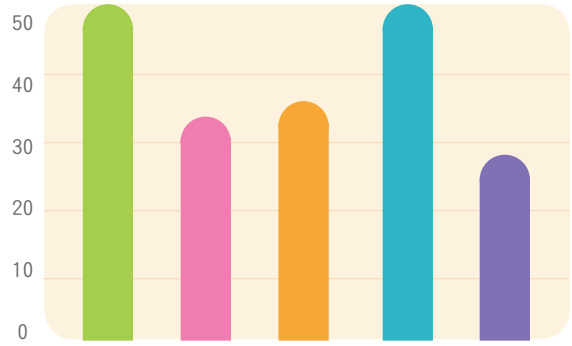


一般行政	314,962千元（65.02%）
原子能科學發展	63,050千元（13.02%）
游離輻射安全防護	50,145千元（10.35%）
核能設施安全管制	43,487千元（8.98%）
核子保安與應變	12,745千元（2.63%）

合計：484,389 千元

The Atomic Energy Council

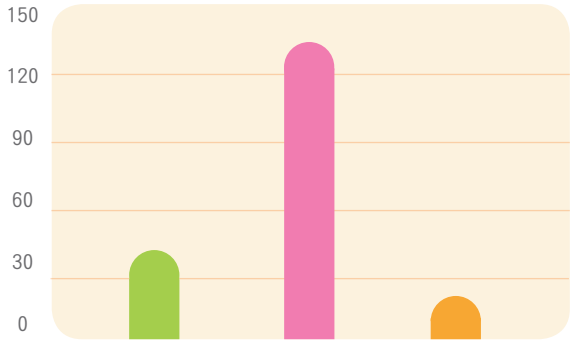
A. 2022 Human Resources Breakdown (Including seven hiring staffs)



General administration	50 (25.4%)
Atomic energy science development	32 (16.2%)
Ionizing radiation protection	36 (18.3%)
Nuclear installation safety control	50 (25.4%)
Nuclear technology applications	29 (14.7%)

total：197 people

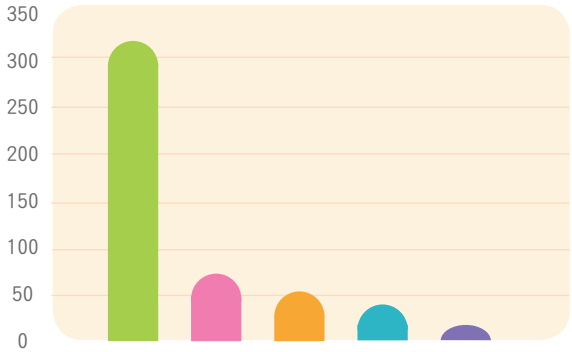
B. 2022 Employee Ranking Breakdown



Senior Rank Personnel	34 (17.9%)
Junior Rank Personnel	139 (73.2%)
Elementary Rank Personnel	17 (8.9%)

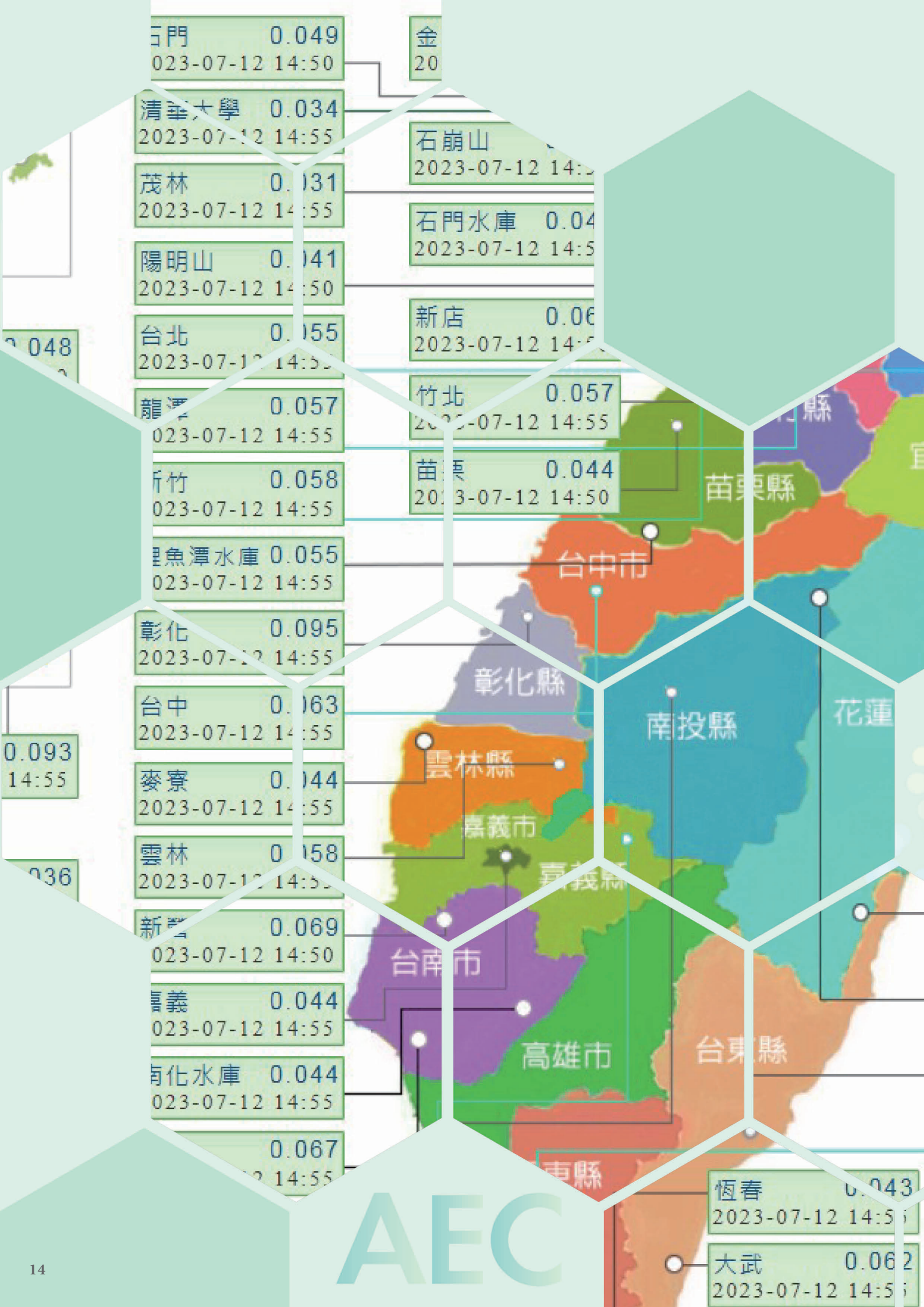
total：190 people

C. 2022 Budget/Expenditure Allocation



General administration	314,962 (65.02%)
Atomic energy science development	63,050 (13.02%)
Ionizing radiation protection	50,145 (10.35%)
Nuclear installation safety control	43,487 (8.98%)
Nuclear technology applications	12,745 (2.63%)

total：484,389 (Unit: Thousand NTD)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2023-07-12 14:50
清華大學 0.034
2023-07-12 14:55
茂林 0.031
2023-07-12 14:55
陽明山 0.041
2023-07-12 14:50
台北 0.055
2023-07-12 14:55
龍潭 0.057
2023-07-12 14:55
新竹 0.058
2023-07-12 14:55
日月潭水庫 0.055
2023-07-12 14:55
彰化 0.095
2023-07-12 14:55
台中 0.063
2023-07-12 14:55
麥寮 0.044
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新營 0.069
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嘉義 0.044
2023-07-12 14:55
南化水庫 0.044
2023-07-12 14:55
0.067
2023-07-12 14:55
金
20
石崩山
2023-07-12 14:55
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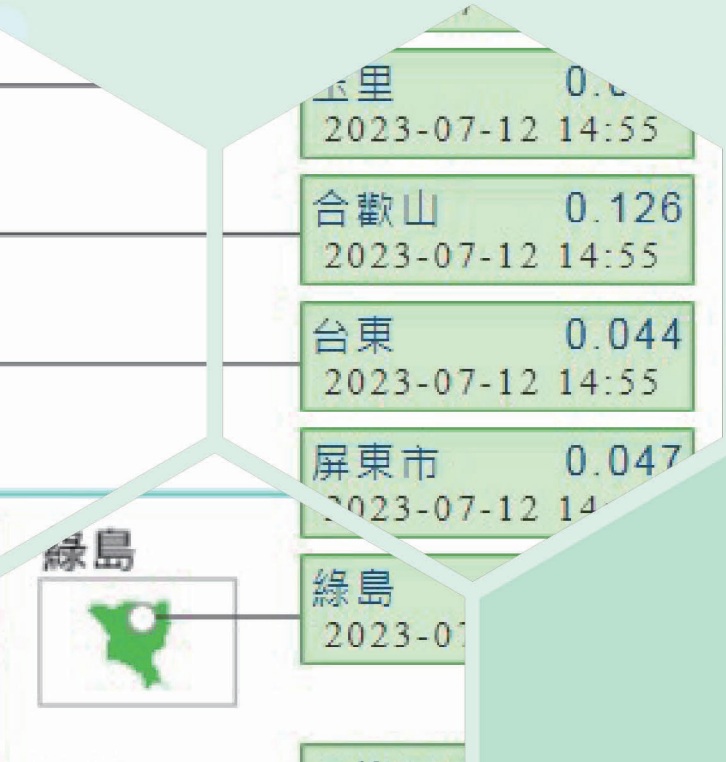
2023-07-12 14:55
新店 0.06
2023-07-12 14:55
竹北 0.057
2023-07-12 14:55
苗栗 0.044
2023-07-12 14:50
0.048
0.093
14:55
0.036
苗栗縣
台中市
彰化縣
南投縣
花蓮
雲林縣
嘉義市
嘉義縣
台南市
高雄市
台東縣
恆春 0.043
2023-07-12 14:55
大武 0.062
2023-07-12 14:55

肆

重要施政結果

Important Governance Outcomes



一、全民參與　資訊透明

（一）開放監督　以公眾參與強化除役乾貯安全管制

為使民眾充分瞭解核一廠除役及乾貯作業之安全管制，以落實資訊公開並促進公眾參與，原能會於 111 年 5 月 25 日辦理第 19 次核一廠除役及乾式貯存設施訪查活動，邀請新北市政府、石門區公所與里長、地方代表及環保團體等約 50 餘人參加。訪查活動除說明核一廠除役作業及室內乾式貯存設施辦理進度，及核一廠乾式貯存設施統合演練成果，另透過播放除役作業及統合演練之縮時解說影片與介紹，讓訪查代表瞭解各項作業的辦理過程及進度。

原能會已於 109 年修正完成「放射性廢棄物處理貯存最終處置設施建造執照申請審核辦法」，要求台電公司於申請廢棄物設施建造執照前，應舉辦公開說明會，以使設施場址所在地民眾與關心團體充分瞭解申請案相關內容及充分表達意見。爰此，台電公司 111 年 11 月 28 日公告於核一廠內再興建一座現代化的低放射性廢棄物貯存庫之資訊及安全分析說明資料，並於 12 月 29 日在新北市石門國中體育館辦理公開說明會，原能會於會議中已明確說明法規要求及管制立場，並澄清公眾疑慮。原能會後續將於受理台電公司提出的建造執照申請案後，依放射性物料管理法嚴格進行審查並辦理聽證，以確保設施符合相關安全規範，保障民眾健康與安全。

核一廠除役及乾式貯存訪查活動會議
Site visit meeting on the Chinshan NPP's decommissioning and dry storage facilities.

原能會本於持續推動公眾參與與資訊公開，訪查活動有關訊息及訪查活動代表所提核廢料管理議題、乾貯設施安全、強化公眾溝通等提案之辦理情形，皆登載於原能會網站，藉由落實資訊公開透明，讓民眾可以瞭解、安心、放心。

I. Transparency through Public Engagement

A. Open to scrutiny: Enhancement of Dry Storage Safety Regulations during the Decommissioning Period through Public Participation

The 19th Public Observation Program for the Decommissioning and Dry Storage Facilities in the Chinshan NPP was held by the AEC on May 25, 2022. The program ensures transparency and promotes public engagement by providing the general public with a full picture of the safety regulations for the decommissioning of the Chinshan NPP and dry storage operations. Over 50 people were invited to participate including representatives from the New Taipei City Government, Shimen District Office, as well as village chiefs and environmental protection groups. Current progress on the decommissioning of the Chinshan NPP, its indoor dry storage facilities, as well as the results of its integration drill were explained during the site visit. Time-lapse videos of decommissioning operations and the integration drill with accompanying introductions were also played for the site visit representatives to keep them informed of the process and progress.

The Regulations for the Review and Approval of Applications for Construction License for Radioactive Waste Treatment, Storage, and Final Disposal Facilities amended by the AEC in 2020. The Taipower Company (TPC) is required to hold a public explanatory meeting before it applies for a construction license for waste treatment facilities. The public explanatory meeting would provide local residents at the proposed site of facilities and interested groups with a full understanding of the proposed application and the opportunity to express their opinions. Information on the proposed construction of a new modern, low-level radioactive waste storage facility within the Chinshan NPP and its safety analysis report were therefore announced by TPC on November 28, 2022. A public explanatory meeting was then held in the gymnasium of Shimen Experimental Junior High School in New Taipei City on December 29. The AEC outlined the regulatory requirements, its position on safety regulations, and clarified public concerns during the meeting. Once the application for a construction license is submitted by TPC in the future, the AEC will conduct a rigorous review and hold public hearings pursuant to the Nuclear Materials and Radioactive Waste Management Act to protect public health and safety by ensuring that the proposed facilities comply with the relevant safety guidelines.

As part of the AEC's continued efforts to promote public engagement and transparency, all the information of the public observation program and the responses concerning nuclear waste management, the safety of the dry storage facilities, and public communication improvement brought up by the invited representatives were published on the official website of the AEC, whereby the public could gain a clear understanding.

（二）民眾參與　辦理蘭嶼地區環境平行監測活動

原能會為增加民眾參與、落實資訊公開及第三者驗證取樣偵測分析工作，於 111 年 5 月 3 日至 4 日，連續第 12 年辦理蘭嶼地區環境平行監測作業，並於現場採樣活動前邀請原民會、台東縣政府、蘭嶼鄉公所、蘭嶼鄉代會、蘭嶼各村村長、蘭嶼當地環保團體及鄉民一同參加。

考量 COVID-19 疫情，為避免人群聚集，這次平行監測活動取消行前說明會，改以寄送作業說明資料的方式，讓參與人員能瞭解現場採樣作業的流程與方式。現場採樣也由參與民眾指定採樣地點，分別採集蘭嶼六個部落的農產品、土壤、水樣及草樣等環境試樣。各試樣檢測分析工作則委由通過全國認證基金會認證之國立清華大學原科中心執行，並同時分送樣品至偵測中心及台電公司放射試驗室進行計測分析，以同步比對驗證。

蘭嶼地區環境平行監測活動 - 採集土樣
Parallel Monitoring Activity on Environmental Radiation on the Orchid Island: collecting soil samples.

清華大學原科中心完成試樣分析後，將分析結果報告直接寄送參與單位。原能會則將本次蘭嶼平行監測分析結果報告公開於網站，提供民眾閱覽，分析結果顯示自 100 年起，歷年的偵檢分析結果均在背景輻射劑量變動範圍內，並沒有發現輻射異常。

B. Public Engagement: Promoting Local Involvement in the Parallel Monitoring Activity on Environmental Radiation on the Orchid Island (Lanyu)

To promote public engagement, information disclosure, and environmental radiation sampling and analysis by a third party, the AEC organized the Parallel Monitoring Activity on Environmental Radiation on the Orchid Island for the 12th consecutive year from May 3 to 4, 2022. Officials from the Council of Indigenous Peoples, Taitung County Government, Lanyu Township Office, and Lanyu Township Representative Council, as well as village chiefs, representatives from local environmental groups, and residents were invited to take part in the environmental radiation sampling process in Orchid Island.

The briefing session for the parallel monitoring activity was canceled due to COVID-19 social distancing protocol. An information pack on the sampling procedure and method was instead mailed out in advance to the participants. Sampling locations were also designated by participating members of the public. Environmental samples of agricultural products, soil, water, and grass were taken in each of the six Lanyu tribal villages. Sample analysis was conducted by the Nuclear Science and Technology Development Center (NSTDC) of the National Tsing Hua University (NTHU), which has been accredited by the Taiwan Accreditation Foundation (TAF). Other sets of samples were also sent to the AEC's Radiation Monitoring Center and TPC's Radiation Laboratory for analysis, comparison, and validation.

Once the samples were analyzed by the NTHU NSTDC, the report was mailed directly to all participants. The latest parallel monitoring report was published on the AEC website for the public to view. The results showed that no abnormal radiation has been detected since 2011 and all radiation doses fell within the variation range of background radiation.

蘭嶼地區環境平行監測活動 - 採集水樣

Parallel Monitoring Activity on Environmental Radiation on the Orchid Island: collecting water samples.

（三）原子能科普活動走透透 玩中學習接地氣

原能會為破除「男理工　女人文」性別刻板印象，以吸引更多女學生進入科技領域，再度於 3 月 12 日，接受國立清華大學跨領域科學教育中心邀請，參與「2022 國際女性科學日」科學市集活動，除以攤位解說員提供新竹在地高中女學生深入學習原子能科普知識外，還提供「彭汪嘉康 - 用知識改變世界的女性」影片於活動廣場播放，以傳達科學研究是不分性別;追求成功的道路上，在家庭的照顧也是要男、女互相體諒、共同分擔。

在兼顧防疫措施之下，原能會仍努力以科普活動與民眾溝通原子能資訊，包括積極參與科教館及國科會辦理的各項科普活動；主動於 2 月及 7 月在台北華山文創產業園區，為北部的大、小朋友籌劃 2 場原子能科普盛宴，策展內容以「輻射應用」、「緊急應變」、「除役核廢」及「綠能科技」為主題，讓參展民眾依自身興趣選擇參觀路線；另與國立中山大學在高雄文化中心戶外廣場共同辦理「原子 GO 探險趣 量子就在生活中」科普展，提供高雄在地高中 60 位學生深度學習解說服務之機會，並配合時事，增加「海洋保育」主題展區，使民眾瞭解日本排放氚廢水有關的海水取樣及氚水輻射偵測等監測資訊，3 場次共吸引 17,527 人次到場參加。

不分年齡、性別與族群，大家一起參與原子能科普展

Everyone irrespective of age, gender and ethnicity took part in the atomic energy science education exhibition.

小朋友扮演小小獸醫師，為寵物進行模擬 X 光檢查

Children dressed up as junior vets gave pets a simulated X-Ray exam.

C. The Nuclear Energy Science Education Activities on the Go Makes a Down-To-Earth Fun Learning

To overcome gender stereotypes in STEM (science, technology, engineering, and mathematics) and attract more female students into the technology sector, the AEC accepted an invitation from the NTHU Interdisciplinary Science Education Center to take part in the science bazaar as part of the "International Day of Women and Girls in Science" on March 12. In addition to hosting a booth to provide local female high school students in Hsinchu with an in-depth introduction to nuclear science, the video "Jacqueline Whang-Peng - A woman who changed the world with knowledge" was also played on the day to convey how scientific research is not constrained by gender, and how both men and women need to understand and support each other in taking care of their families during their pursuit of success.

The AEC continues to communicate atomic energy information to the public while maintaining epidemic prevention protocol by participating in science education activities for all age groups organized by the National Taiwan Science Education Center and the National Science and Technology Council. In February and July, the AEC organized two atomic energy science education extravaganzas at Huashan 1914 Creative Park on topics such as "Radiation Applications", "Emergency Response", "Nuclear Decommissioning and Radioactive Waste", and "Green Energy Technology." Participants were invited to choose their own route based on their personal interests; the "Atomic Adventures - Quantum In Your Life" science education exhibition was co-organized with National Sun Yat-sen University at the outdoor plaza of the Kaohsiung Cultural Center to provide 60 local high school students with the opportunity to serve as in-depth learning tour guides. An "Ocean Conservation" pavilion was added in keeping with current affairs to educate the general public about seawater sampling and radiation detection relating to the discharge of tritium-contaminated wastewater by Japan. These three exhibitions attracted 17,527 attendance in total.

師生在原能會的科普展進行校外教學

Teachers and students went on an excursion to the AEC science education exhibition.

高中生進行服務學習與實際解說

High school students engaged in service learning and giving guided tours.

由於民眾參加實體科普活動的意願會受疫情影響而降低，為使原子能科普資訊能夠普及化，原能會持續以數位傳播，提供分齡分眾的網路影音課程與手作教材，透過網路無遠弗屆的效能，使其他包括偏鄉地區的國小、國中及高中學生均有機會認識原子能與綠能的科普知識。此外，原能會另於「原能會 輻務小站」官方粉絲頁規劃「科學實驗王」活動，讓參加民眾自製實驗影片，加深科學學習的興趣，總計有7,091位學生參與線上研習活動。

「製作 X 光片 - 骨頭現形記」數位學習課程
"Making of an X-Ray Slide - The Bones Revealed" e-learning course.

（四）全民參與委員會來監督　公眾溝通向前行

原能會持續推動公眾參與，111 年共辦理 2 次「全民參與委員會」會議，對民眾關心「核廢料管制的公民參與作法」及「核電廠的除役現況」等議題，與委員進行討論及意見交流，以精進原能會在安全管制事務上的溝通成效。原能會另於 9 月底完成「全民原能會」防災型 APP 的改版更新作業，除加快連線速度及抓取使用者在地氣象資料外，還新增「放射性海域擴散資訊平台」、「輻射防護測驗報名」網頁，以優化使用界面，並即時公開日本排放含氚廢水訊息，滿足全民「知」的需求，以及提供輻射安全有關人員資訊服務，增進政府服務效能。

「全民原能會」APP 使用界面之優化
Optimization of the user interface for the " 全民原能會 " APP.

111 年第 1 次全民參與委員會
1st Meeting of the Committee on Public Participation in 2022.

「科學實驗王 - 彩繪溶鹽畫」民眾自製影片成果
"Science Experiment Master - Creative Salt Painting Science for Kids" home-made video.

Public willingness to take part in physical science education activities were affected by COVID-19 pandemic so the AEC continued to use digital broadcasting for science education by providing online video courses and DIY teaching materials for different age groups. The power of Internet connectivity was harnessed to allow elementary, junior high, and senior high school students from even rural regions to have the chance to learn about atomic and green energy. The AEC also organized the "Science Experiment Master" event through the "AEC - Radiation Safety" Facebook fan group. Participating members of the public were invited to produce their own videos of experiments to boost their interest in learning about science. A total of 7,091 students took part in the online learning activity.

D. Advancing Public Communication under the Supervision of the Committee on Public Participation

The AEC continued to promote public participation in 2022 by hosting two meetings of the "Committee on Public Participation." Discussions and exchanges of opinion were conducted with members of the committee on topics such as "Public participation in nuclear waste management" and "Current progress on decommissioning of nuclear power plants" to enhance the AEC's communication performance in nuclear safety regulatory affairs. The "People's AEC" disaster prevention app was also updated by the AEC at the end of September. In addition to faster link and provision of local weather data, the user interface was also optimized through the addition of the "Ocean Radioactive Information System" and "Radiation Protection Examination Registration" web pages. Real-time disclosure was also provided on the discharge of Tritium-contaminated wastewater by Japan to fulfill the "need to know" for the public and enhance government services by providing information for the radiation safety related personnel.

（五）辦理核電廠除役計畫現場訪查活動

原能會為核電廠除役安全管制機關，除嚴格執行除役安全管制作業外，也持續推動公眾參與。原能會於核三廠除役計畫審查期間，在 111 年 3 月 29 日至 30 日辦理 2 次現場訪查活動，邀請屏東縣立委、屏東縣政府、恆春鎮民代表會、滿州鄉民代表會及公民團體等，到核三廠實地瞭解除役規劃情形，並藉由本次活動聽取各方的意見。

訪查活動期間，台電公司與原能會分別說明核三廠除役作業規劃與除役計畫審查現況，再請參與人員至核三廠 2 號低放射性廢棄物貯存庫預定地、用過核子燃料乾式貯存設施預定地及低放射性廢棄物貯存庫等地，瞭解核三廠除役現場作業規劃。

參與人員於現場訪查結束後，針對除役相關議題進行意見交流與討論，討論內容包含乾式貯存設施、放射性廢棄物管理、拆除與除污作業、再生能源規劃、地方就業與公眾溝通等。

參與人員所提意見及回復說明等資訊皆公布在原能會網站，並將地方鄉親與公眾所提意見納入審查作業之參考。原能會將秉持專業嚴格審查核三廠除役計畫，並持續推動公眾參與及落實資訊公開。

與會人員參訪台電公司核三廠低放射性廢棄物貯存庫

Participants visited the low-level radioactive waste storage facility at the Maanshan NPP.

E. Conducting Site Visits for the Review of NPP Decommissioning Plans

Nuclear power plant decommissioning is an issue of all stakeholders' concern. Being the safety regulator of nuclear power plant decommissioning, the AEC continues to promote public engagement and strictly regulate all the decommissioning activities. During the review process of the Maanshan NPP decommissioning plan, the AEC conducted two site visits on March 29 and 30, 2022, inviting Pingtung County legislators, the Pingtung County Government, Hengchun Township Representative Council, Manzhou Township Representative Council, and civic groups to visit the Maanshan NPP in order to collect opinions on the decommissioning plan from all stakeholders.

During the two site visits, both the TPC and the AEC provided an update on the Maanshan NPP decommissioning plan and the review progress of the decommissioning plan. The participants then visited the proposed site for the No. 2 low level radioactive waste storage facility, the proposed site for the spent fuel dry storage facility, and the low-level radioactive waste storage facility in order to have a better understanding of the decommissioning activity planning for the Maanshan NPP.

After each field tour, the participants then engaged in an exchange of opinions and a discussion on decommissioning topics such as dry storage facilities, radioactive waste management, dismantling and decontamination activities, renewable energy planning, local employment, and public communication.

All the opinions raised by the participants and explanations provided are posted on the AEC's website. Feedback from local residents and the general public will be taken into account for the review process. The AEC will review the Maanshan NPP decommissioning plan in a strict and professional manner while continuing to promote public engagement and information transparency.

原能會說明核三廠除役計畫審查現況

The AEC presented the review progress of the Maanshan NPP decommissioning plan.

與會人員於核三廠除役計畫現場訪查活動表達意見

Participants raised their opinions during one of the site visits.

緊急應變計畫區家庭訪問
Home Visit Program in the EPZ.

新北市防災園遊會
New Taipei city disaster prevention fair.

基隆市緊急應變計畫區內溝通宣導活動
Outreach activity within the EPZ of Keelung City.

原能會 112 年核安防護月曆及創意週曆
The 2023 Preparedness Calendar, and Creative Weekly Calendar.

（六）分眾辦理多元化溝通宣導活動，增加民眾參與，友善核安防護

1. 緊急應變計畫區家庭訪問

111 年原能會於屏東縣緊急應變計畫區內執行家庭訪問，僱用核電廠附近在地民眾擔任家訪員（包括東南亞籍新住民），除協助蒐集瞭解核子事故發生時之民眾需求外，另提供民眾緊急應變整備相關資訊，讓民眾熟悉災害時之應變措施及防護知識，此次共成功訪問 9,600 餘戶住戶，訪查過程亦依住戶需求提供「核子事故發生時怎麼辦？」宣導單（版本包括國語、英語、泰語、印尼語、越南語），並發送 112 年防護月曆，希望藉由月曆長期懸掛之特性，讓防護資訊垂手可得。

2. 參與地方政府緊急應變計畫區內溝通宣導活動

除年度核安演習外，原能會也參與地方政府辦理的宣導活動，地方政府平時會以『里』為單位，鼓勵民眾參與逐里疏散演練，並深化社區自主防災意識，以提升民眾自助、互助之能力，強化民眾核安防護作為。總計新北市辦理 8 場次、基隆市辦理 9 場次，共有 2,663 人次參與。

3. 製作 112 年核安防護月曆及創意週曆

以「全民原能會」為主軸，蒐集原能會於全國佈設 63 處環境輻射監測站之鄰近人文風俗、區域風景等素材，並加入民眾防護圖卡與核安防護知識，除發放予核電廠緊急應變計畫區內家戶，原能會官方臉書也提供粉絲索取，以提升傳遞核安防護知識之成效。

4. 配合地方政府防災園遊會及 921 國家防災日

原能會參與新北市及台北市防災園遊會設攤活動，並設計闖關遊戲與宣導防護要點，現場亦邀請民眾加入「原能會 輻務小站」臉書及下載「全民原能會」APP，讓民眾對於輻射安全知識及緊急應變防護有更深入瞭解，參與民眾共 2,150 人。

F. Multiple Groups of Communication and Outreach to Enhance Public Participation on Nuclear Safety and Protection

a. Home Visit Program in the Emergency Planning Zone

The AEC conducted a home visit program within the Emergency Planning Zone (EPZ) of Pingtung County in 2022. Local residents, including new immigrants from Southeast Asia, were recruited to participate in household visit in the EPZ. In addition to understanding the residents' needs in case of a nuclear accident, they also provided information on nuclear emergency preparedness to increase the public's awareness of nuclear protective measures. More than 9,600 households were visited. The flyer (5 languages available: Chinese, English, Thai, Indonesian and Vietnamese) with the title of "what to do in case of a nuclear accident" and the 2023 calendar that featured information on protective actions were provided to the residents, making it easier to access the safety information throughout the year.

b. Participation in Local Government Village-level Evacuation Drill within the EPZ

In addition to the annual nuclear emergency exercise, the AEC also participate in village-level evacuation drill organized by the local government. Local governments routinely conduct village-level evacuation drills to encourage public participation and enhance people's awareness of disaster prevention and response within the community. The drill also enhances residents' ability to help themselves and each other, and to strengthen their nuclear safety and protection knowledge. Such events were hosted 8 times by the New Taipei City and 9 times by the Keelung City with a total of 2,663 participants in 2022.

c. Production and Distribution of the 2023 Preparedness Calendar, and Creative Weekly Calendar

The 2023 preparedness calendar was designed under the theme of 'AEC of the People' and features creative materials collected from the local people, culture, and customs surrounding the 63 environmental radiation monitoring stations by the AEC nationwide. The calendars also included public protection flash cards and information on nuclear safety and protection. They were distributed to households within the EPZs, and made public available on request through AEC's Facebook page, aiming to enhance the communication of nuclear safety and protection knowledge.

d. Collaborating with Local Government to Host a Disaster Prevention Fair

The AEC set up a booth at the disaster prevention fairs held at both the New Taipei City and Taipei City to promote the public protective tips through interactive games. Additionally, the public was encouraged to visit the AEC Facebook page and download the "全民原能會" App to enhance their knowledge of radiation safety, emergency response and protection. These events drew a total of 2,150 participants in 2022.

二、國際核安管制交流紀要

（一）第 8 屆台日核能管制資訊交流會議

原能會與日本原子力規制委員會於 8 月 23 日以視訊方式辦理管制資訊交流會議，會中雙方除分享核電廠除役作業的管制現況外，日方也將福島第一核電廠核災含氚廢水排放的審查管制與監測作業等事項向我方說明並交換意見。

第 8 屆台日核能管制資訊交流會議／ 8th AEC-NRA Nuclear Safety Information Exchange Meeting.

（二）2022 台美民用核能合作會議

「2022 台美民用核能合作會議」於 11 月 29 日至 12 月 1 日假美國阿岡國家實驗室舉行 (Argonne National Laboratory, ANL)，會中台美雙方針對核電廠運轉安全管制、核電廠除役管制及技術研發、放射性廢棄物管理與安全管制，以及緊急應變管理及民眾防護行動等主題交流相關意見與經驗，並就來年雙方核能合作項目之規劃進行商討。

II. Summary of the International Exchange on Nuclear Safety Regulations

A. The AEC held the "8th AEC-NRA Nuclear Safety Information Exchange Meeting"

The Nuclear Safety Information Exchange Meeting was held on August 23 by the AEC and Japan's Nuclear Regulatory Authority (NRA) via a video conference. In addition to updating each other on recent regulatory activities related to NPP decommissioning, the NRA also explained the regulations review and operations monitoring for the discharge of tritium-contaminated wastewater from the Fukushima Daiichi NPP. Opinions were also exchanged between two agencies.

B. 2022 TECRO-AIT Joint Standing Committee Meeting on Civil Nuclear Cooperation

The "2022 TECRO-AIT Joint Standing Committee Meeting on Civil Nuclear Cooperation" was held at the Argonne National Laboratory (ANL) in the US from November 29 through December 1. During the meeting, representatives from Taiwan and the US exchanged opinions and experiences on safety regulations for NPP operations, NPP decommissioning regulations and R&D, radioactive waste management and safety regulations, emergency responses and public protection actions. Plans for future bilateral cooperation on nuclear energy were also discussed.

2022 台美民用核能合作會議之參與人員合影
Group photo of participants at the 2022 TECRO-AIT Joint Standing Committee Meeting on Civil Nuclear Cooperation.

三、切實監督核電廠安全

(一)嚴密監督運轉中核電廠安全

1. 執行核二廠 2 號機組大修視察與大修安全管制作業

原能會於核二廠 2 號機第 27 次大修前，先就大修計畫進行審查，確認台電公司已妥善規劃大修作業，並組成大修視察團隊，查證電廠大修維護與安全管理作業執行情形，確認大修重要作業符合規定。另因應 COVID-19 疫情，查核大修期間電廠防疫措施執行狀況，避免因疫情影響大修作業品質。

在核二廠 2 號機完成大修相關工作，提出再起動申請時，原能會即依程序進行送審文件審查，並派員執行加強查核。經綜整書面審查、大修期間現場查證及加強查核結果，確認可符合起動要求後，於 111 年 3 月 30 日同意該機組再起動申請。另針對併聯申請案，亦經書面審查及起動過程現場查證，確認機組狀態符合併聯要求後，於 111 年 4 月 6 日同意機組併聯。

原能會執行核二廠 2 號機第 27 次大修專案視察
Taskforce inspections of the 27th Kuosheng NPP Unit 2 refueling outage, conducted by the AEC.

2. 執行各項專案團隊視察

原能會除派員執行核電廠駐廠視察外，並依規劃辦理核安管制紅綠燈視察、核安總體檢檢視察等專案團隊視察作業，針對視察發現的問題或缺失，已開立注意改進事項，要求台電公司檢討改善。另為惕勵核電廠人員於夜間及假日均能保持良好精神狀態，亦執行不預警專案視察，確認電廠運作符合安全要求。

原能會執行 111 年第 4 季核二廠核安管制紅綠燈視察 (火災防護查證)
The AEC conducted the 2022 Q4 reactor oversight process inspection (fire protection) at the Kuosheng NPP.

III. Effective Oversight of Nuclear Power Plant Safety

A. Strictly Overseeing the Safety of Operating nuclear power plants

a. Safety inspections and regulations of Kuosheng NPP Unit 2 during its refueling outage

The AEC reviewed the outage plan for Kuosheng NPP Unit 2 submitted by the TPC prior to its 27th refueling outage in order to confirm that the TPC has properly planned all the required work items. A refueling outage inspection team was organized to inspect the implementation of all maintenance and safety management measures in order to ensure the TPC's compliance with all related regulations during this refueling outage. Besides, the implementation of COVID-19 prevention measures during the refueling outage was also inspected by the team in order to prevent the COVID-19 situation from impacting the refueling outage.

The application for restarting the unit was submitted to the AEC after all the required refueling outage work items were completed. The AEC reviewed the application documents in accordance with related procedures and dispatched several inspectors to conduct enhanced inspections accordingly. After assessing the results of the application document review, the on-site inspections during the refueling outage and the enhanced inspections, it was determined that the unit had met all the restart requirements. The AEC approved the restart of Kuosheng NPP Unit 2 on March 30, 2022. The application for synchronizing to power grid also underwent a document review process and an on-site inspection was conducted accordingly. After it was confirmed that the unit met all the pertinent requirements, the AEC approved the application for synchronizing to power grid on April 6, 2022.

b. AEC Project-Team Inspections

In addition to dispatching inspectors to conduct resident inspections of the NPPs, the AEC also conducted project-team inspections with regard to the reactor oversight process and the post-Fukushima safety enhancement measures. Improvement notices regarding problems or deficiencies found during the inspections were issued to the TPC for further corrective actions. To ensure the alertness of NPP personnel working on night shifts and on public holidays, unannounced inspections were conducted in order to ensure that all NPP operational activities met pertinent safety requirements.

原能會執行核三廠核安管制紅綠燈視察(火災防護)
The AEC conducted the 2022 Q2 reactor oversight process inspection at the Maanshan NPP.

（二）嚴謹執行核電廠除役安全管制作業

1. 執行核一廠除役作業視察及核二廠除役準備作業專案視察

核一廠已進入除役階段，因核一廠乾式貯存設施尚未啟用，用過核子燃料仍暫存於爐心期間，原能會比照運轉期間安全管制作法，持續辦理核能安全管制紅綠燈視察、核能安全總體檢、維護作業視察等專案團隊視察，確認電廠依規定執行相關作業，以確保用過核子燃料貯存安全。另為督促台電公司落實除役計畫，亦執行每季專案視察，由原能會相關業務單位組成視察團隊，赴現場實地查證核一廠除役相關作業及重要管制追蹤案件辦理情形。

核二廠 1 號機已於 110 年 12 月 27 日運轉執照屆期，進入除役。原能會為瞭解核二廠對於除役作業準備情形，於 111 年間執行兩次 1 號機除役準備作業專案視察，就人員訓練、系統評估再分類與過渡 (SERT)、台電公司核安處駐廠安全小組稽查以及視察備忘錄處理等作業進行查證，針對視察所發現可再強化精進事項，要求台電公司改善，並持續追蹤台電公司後續辦理情形，以確認核二廠妥善執行除役準備作業。

視察核一廠規劃拆除之氮氣槽／ An inspection of the nitrogen tanks planned to be dismantled.

B. Strictly implementing safety regulation of NPP decommissioning

a. Conducting inspections of decommissioning activities at the Chinshan NPP and taskforce inspections of the preparations for Kuosheng NPP decommissioning

The Chinshan NPP is now in the decommissioning phase but the spent fuel assemblies are temporarily stored in the reactors because the dry storage facilities at the Chinshan NPP have not yet been commissioned. The AEC therefore will continue to conduct team inspections with regard to the reactor oversight process, the post-Fukushima safety enhancement measures, and maintenance activities in accordance with related regulations. The inspections ensure the safety of spent fuel storage by confirming that the TPC complies with related decommissioning regulations. Quarterly project inspections are conducted in order to ensure the proper implementation of the decommissioning plan by the TPC. The inspection team, consisting of staff members from relevant AEC departments, conducted on-site inspections to inspect the status of decommissioning activities as well as the progress of primary regulatory issues of the Chinshan NPP.

The Kuosheng NPP Unit 1 is now in the decommissioning phase as its operating license expired on December 27, 2021. Two taskforce inspections of the preparations for Kuosheng NPP Unit 1 decommissioning were conducted in 2022 by the AEC. The two inspections covered personnel training, System Evaluation, Re-classification, and Transition (SERT), the performance of TPC's resident safety team from the Department of Nuclear Safety, and corrective actions taken in accordance with inspection memoranda. The TPC was notified to take corrective actions in order to address the inspection findings and make further improvements. The AEC also followed up the TPC's subsequent corrective actions in order to ensure that the preparations for Kuosheng NPP decommissioning are properly implemented.

視察核一廠氣渦輪機廠房拆除後場地狀況
An inspection of site conditions after the dismantling of the gas turbine building.

2. 執行核電廠除役安全審查作業

(1)「核一廠除役期間天然災害綜整報告」審查：為督促核電廠於除役期間的天然災害應變能力，原能會針對台電公司提出之「核一廠除役期間天然災害綜整報告」進行審查，要求台電公司針對除役期間廠址自然特徵有關之評估，定期滾動檢討，如有發現天然災害之新事證，應立即通報並提出調查評估報告。

(2)「核一廠停機餘熱移除 (RHR) 冷卻系統停轉備用案」審查：為確認除役期間用過核子燃料貯存安全，原能會針對核一廠依 RHR 系統停轉備用案測試驗證計畫所提出之測試結果報告，邀請會外學者專家協助審查，確認符合安全分析報告之分析結果，並在電廠執行測試期間，派員執行現場查證，確認依計畫執行。

(3)「核二廠除役過渡階段前期整體性維護管理方案」審查：為嚴密用過燃料仍暫存於反應爐期間之安全管制作業，原能會針對台電公司就核二廠除役過渡階段前期所提出之整體性維護管理方案，邀請學者專家及原能會內同仁組成專案審查小組進行審查，共召開 3 次審查會議，提出 117 項審查意見，並確認台電公司已依相關審查意見提出澄清說明，修訂方案內容，於 111 年 7 月 6 日審查同意。

(4)「核三廠除役計畫」審查：為嚴謹核三廠除役許可申請審查作業，原能會邀請相關領域學者專家與會內各局處同仁共同組成審查團隊，執行核三廠除役計畫審查作業，並辦理現場勘查及兩梯次公眾團體現場訪查活動，蒐集各方意見，納入審查參考。審查期間提出審查意見 355 項，並於 111 年 10 月進入審查總結階段，預定於 112 年 4 月完成審查。有關除役計畫、審查意見結案情形、安全審查報告、公眾關切事項之回應等，已依審查進程陸續公布於網站，供各界參閱。

核三廠除役計畫審查委員現場勘查

On-site inspection by the Maanshan NPP Decommissioning Plan review team.

核三廠除役計畫第二回合綜合審查聯席會議

Second joint review meeting for the Maanshan NPP Decommissioning Plan.

b. Safety Review of NPP decommissioning

(a) Review of the "Summary Report of Natural Hazards During the Chinshan NPP Decommissioning Period": The AEC reviewed the "Summary Report of Natural Hazards During the Chinshan NPP Decommissioning Period" submitted by the TPC in order to ensure that the Chinshan NPP can maintain its capability to respond to natural hazards during its decommissioning period. The TPC was required to carry out rolling reviews of natural hazard characteristic assessments of the NPP site during its decommissioning period. Any new evidence of natural hazards should be reported to the AEC immediately and an investigation report regarding the issue should then be submitted to the AEC.

(b) Review of the "Standby Program for the Residual Heat Removal (RHR) System at the Chinshan NPP": To ensure the safety of spent fuel storage during the decommissioning period, the AEC invited several external experts to review the test report of the RHR System Standby Program Validation Plan submitted by the TPC and to verify the results of the safety analyses. Inspectors were also dispatched to the NPP in order to confirm that related tests were carried out according to plan.

(c) Review of the "Integrated Maintenance and Management Plan for the Pre-defueled Stage of the Transition Phase of Kuosheng NPP Decommissioning": To ensure that safety regulations are strictly enforced while the spent fuel assemblies are temporarily stored in the reactors, a taskforce was assembled by the AEC. The team consisted of several external experts, along with a number of AEC staff members to review the "integrated maintenance and management plan for the transition phase of Kuosheng NPP Decommissioning" proposed by the TPC. Three review meetings were held, and 117 review comments were raised. The revised plan was approved on July 6, 2022 after confirming that the TPC had responded to all the review comments and had revised the plan accordingly.

(d) Review of the Maanshan NPP decommissioning plan: For rigorously reviewing the application for the decommissioning of the Maanshan NPP, the review team made up of external experts in related fields, as well as staffers from various AEC departments were formed by the AEC to review the decommissioning plan for the Maanshan NPP. On-site inspections and two on-site visits by civilian groups were organized to collect and incorporate feedback from interested parties into the review. A total of 355 review items were proposed during the review period. Entering the closing round of review in October 2022, the review of TPC's decommissioning plan for Maanshan NPP is scheduled to be completed in April, 2023. The decommissioning plan, status of review items, the safety review report, and response for public concerns were published on the website for public viewing as the review progressed.

（三）精進核安管制效能及技術能量

1. 參加國際技術交流會議

111 年因 COVID-19 疫情，原能會透過視訊方式參與下列國際安全管制會議，蒐集並交流國際管制資訊。

(1) 電廠組件運轉經驗和老化計畫 (CODAP) 會議：於 9 月派員參加 CODAP 第 24 次會議，就 CODAP 資料庫發展計畫進行討論，檢視核電廠事件新增案例內容，蒐集國外電廠設備老化、劣化案例與安全管制經驗及國際核能安全技術發展趨勢等資訊，以作為我國未來執行安全管制之參考。

(2) 美國核管會核能管制資訊會議 (RIC)：派員參與 111 年 3 月美國核管會 (NRC) 管制資訊會議，就 NRC 組織轉型、COVID-19 疫情期間核安管制、風險告知管制作法、核電廠除役管制、極端氣候危害等議題，蒐集 NRC 與其他核能國家管制機關的處理作法及因應措施，以作為我國核能安全管制作業精進之參考。

2. 強化人員專業訓練與精進核安管制作業程序

為精進管制人員技術能力，除舉辦核電廠除役消防法規、廠址地下水防護等管制技術專題演講外，並辦理品保、除役管制、安全度分析 (PRA) 及視察員等各項訓練。另外，亦持續滾動檢討增修訂管制作業程序書，包含大修期間駐廠視察、風險度評估工具 (PRiSE) 操作、核電廠重要安全分析報告審查、核電廠運轉人員執照測驗、核安管制紅綠燈視察等作業程序書，以完善管制作業程序。

核電廠安全度分析 (PRA) 訓練
Probabilistic risk assessment (PRA) training for the NPP

基礎視察員訓練
Basic inspector training.

C. Enhancement of nuclear safety regulation effectiveness and technical capabilities

a. Participation in international technology conferences

The AEC took part in the following international safety regulation conferences via video conferencing due to COVID-19 in 2022 to gather and share international regulatory information.

(a) Component Operational Experience, Degradation, and Ageing Programme (CODAP) meeting: AEC staff were dispatched in September to attend the 24th CODAP meeting where they took part in the discussion of the CODAP database development program, examination of new NPP incidents, gathered cases of ageing or degraded equipment as well as experience with safety regulations at overseas NPPs, and international trends in the development of nuclear safety technology. The information will serve as a reference for the future implementation of safety regulations in Taiwan.

(b) US NRC Regulatory Information Conference (RIC): AEC staffers were dispatched to attend the Regulatory Information Conference (RIC) hosted by the U.S. Nuclear Regulatory Commission (NRC) in March 2022 where they collected the practices and response measures of the NRC and other national nuclear regulatory agencies in terms of organization transformation of the NRC, nuclear safety regulations during COVID-19, risk-informed regulatory practices, NPP decommissioning regulations, and the threat posed by extreme weather. The information will serve as a reference for the further improvements of nuclear safety regulations in Taiwan.

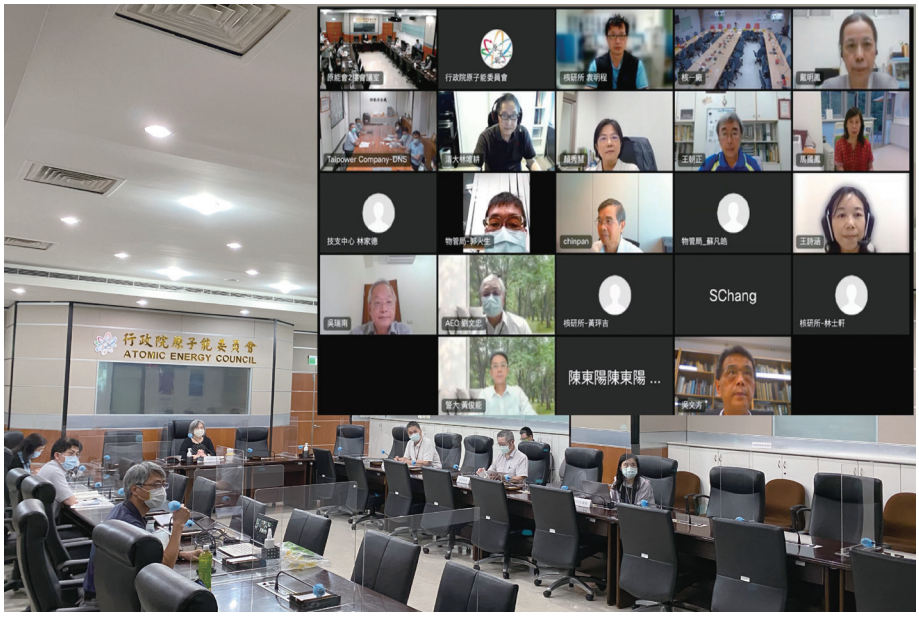
b. Strengthening personnel training and refinement of regulatory procedures

In addition to hosting topical lectures on fire protection regulations for NPP decommissioning and ground water protection at NPP sites, additional training on quality assurance, decommissioning regulations, probabilistic risk assessment (PRA), and inspector qualifications were conducted to enhance the technical abilities of regulation staff. Rolling reviews and amendments were also made to the regulatory procedures including resident inspection during the refueling outage, utilization of the probabilistic risk assessment tool (PRiSE), review of NPP important safety analysis report, NPP operator licensing examination, and reactor oversight process to improve the regulation procedures.

3. 辦理核安諮詢及核能管制會議

為提升核電廠運轉及除役安全管制效能，111 年召開核子反應器設施安全諮詢會議 4 次、核電廠除役安全管制專案小組會議 2 次、核電廠除役管制作業溝通會議 2 次，討論議題包含核電廠設備維護與監測、除役拆除作業執行策略、拆除作業計畫排程管理機制、除役拆除設備離廠偵檢與查驗及公眾參與等，並將討論意見作為管制參考；另召開核能管制及除役管制會議各 2 次，就運轉及除役安全管制相關議題，與台電公司進行意見交流與討論。

原能會辦理 111 年第 1 次核電廠除役管制會議
The 1st Regulatory Meeting on Nuclear Power Plant Decommissioning of 2022 was held by the AEC.



原能會召開 111 年第 2 次核子反應器設施安全諮詢會議
The 2nd ACNS meeting of 2022 was convened by the AEC.

c. Holding Advisory Committee on Nuclear Safety and NPP Regulation meetings

To improve the regulatory performance of operation and decommissioning safety of NPPs, a total of four Advisory Committee on Nuclear Safety (ACNS) meetings, two NPP decommissioning safety regulation taskforce meetings, and two NPP decommissioning regulation communication meetings were convened during 2022. Topics discussed included NPP equipment maintenance and monitoring, dismantling strategy for decommissioning, management mechanism for scheduling of dismantling activities, testing and inspection on dismantled equipment leaving from NPP during decommissioning, and public engagement. Opinions from the discussions were used as references for safety regulations; NPP operation regulation and decommissioning regulation meetings were each convened two times as well to share and discuss opinions on operational and decommissioning regulation issues with the TPC.

原能會召開核電廠除役安全管制專案小組第 18 次會議

The 18th Meeting of the Safety Regulation Taskforce for Nuclear Power Plant Decommissioning of 2022 was convened by the AEC.

四、精進輻射防護安全管理

（一）完成輻射防護偵測業年度輔導檢查，確保輻射偵檢品質

我國 80 家輻射防護偵測業是保障輻射作業安全之第一線尖兵，為確保業者執行輻射偵檢作業品質，並落實輻射防護計畫及各認可項目之作業程序，原能會 111 年度篩選其中 30 家業者，執行「輻射防護偵測業年度輔導檢查」。

依據「輻射防護服務相關業務管理辦法」，國內輻射防護偵測業務主要申請業務內容如下：

1. 可發生游離輻射設備、放射性物質及其工作場所之輻射防護偵測。
2. 可發生游離輻射設備及放射性物質之工作場所輻射安全評估。
3. 放射性物質運送有關之輻射防護及偵測。
4. 鋼鐵業輻射偵檢作業之輔導與稽核。
5. 建築物輻射偵測。
6. 鋼鐵建材輻射偵測。
7. 其他經主管機關指定者。

原能會 111 年度輔導檢查重點包括：輻射防護專職人員是否與原能會執照系統登載內容相符，輻射工作人員每年是否確實執行劑量監測、接受教育訓練及定期健康檢查，輻射防護計畫及各程序書內容是否依最新輻射防護相關法規更新，品質保證計畫書之稽核事項是否確實執行，輻射偵測儀器是否每年校正並保存校驗紀錄備查，查核 110 年度業務統計表及偵測報告之保存紀錄，並執行醫用、非醫用、鋼鐵業門框式輻射偵檢器功能測試、建築物輻射偵測現場作業檢查，以及輔導業者有關醫用登記類設備、具移動功能之牙科型 X 光機輻射安全測試報告填報之注意事項等。

IV. Enhancing Radiation Protection and Safety Management

A. Completion of annual counseling and inspection on radiation protection and detection industry to ensure the quality of radiation detection.

The 80 radiation protection and detection companies in Taiwan are at the frontline in ensuring the safety of radiation practices. The AEC selected 30 companies for the "Annual Counseling and Inspection of the Radiation Protection and Detection Industry" to provide assurance on the quality of radiation detection practices in the industry, as well as the proper implementation of the Radiation Protection Plan and accredited operating practices.

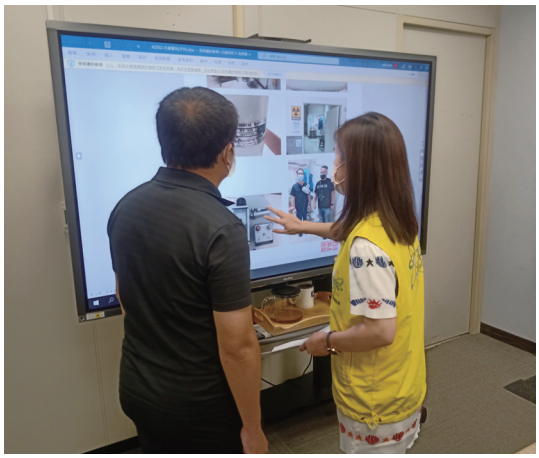
Under the Regulations for the Administration of Radiation Protection Service-Related Business, domestic radiation protection and detection companies mainly apply to engage in the following business activities:

a. Radiation protection and detection for equipment capable of producing ionizing radiation, radioactive materials, and their workplaces.
b. Radiation safety assessment for equipment capable of producing ionizing radiation and workplaces where radioactive materials are stored.
c. Radiation protection and detection relating to the transportation of radioactive materials.
d. Counseling and inspection of radiation detection practices in the steel industry.
e. Radiation detection of buildings.
f. Radiation detection of steel construction materials.
g. Other activities as designated by the competent authority.

The AEC focused on the following areas during the 2022 counseling and inspection: Whether radiation protection specialist matched the records of the AEC licensing system; whether personal radiation dose monitoring, education and training, and routine health exams were carried out by radiation workers; whether radiation protection plans and procedures were updated in accordance with the latest radiation protection regulations; whether quality assurance programs were properly executed; whether radiation detection instruments were calibrated annually and the calibration records retained for review; inspection of the 2021 business records and detection reports; function testing of medical, non-medical, and steel industry door frame radiation detectors; inspection of site reports from building radiation detection; as well as counseling of businesses on how to properly fill out radiation safety test reports for registered medical devices and portable dental X-ray machines.

111 年度輔導檢查結果顯示，各輻射防護偵測業者均能依輻射防護計畫執行，無違規情事發生。原能會並就業者輻射防護偵測服務內容，個別輔導提供精進建議，藉由法規宣導與相互溝通，期勉業者提升輻射偵檢的品質，讓我國的輻射安全防護網絡更加周延，以確保民眾、工作人員及環境之輻射安全。

輻射防護偵測業年度輔導檢查檢討會議
Review meeting for annual counseling and inspection of the radiation protection and detection industry.



輻射安全測試報告電子紀錄查核
Reviewing of electronic radiation safety test reports.

（二）推動我國空勤人員輻射劑量管理，守護空勤人員輻安

宇宙射線存在於天然生活環境中，屬於天然背景輻射範疇，泛指從太陽或太空入射到地球大氣層的輻射，其輻射劑量受高度、緯度及太陽週期等因素影響。在高空環境工作之空勤人員，受宇宙射線影響程度較地面高，國際間已逐漸重視空勤人員宇宙射線安全管理的議題，國際放射防護委員會 (ICRP) 亦發布第 132 號報告，提出空勤人員宇宙射線輻射防護合理的劑量範圍及相關管理指引建議。

國際對於宇宙射線安全管理趨勢，通常需考量社會及經濟因素，訂定合理的劑量管理範圍，因此 ICRP 建議空勤人員劑量參考水平為每年 5 至 10 毫西弗。針對空勤人員輻射劑量之管理方式，由航空公司採用經過驗證或主管機關授權之劑量評估程式，執行所屬空勤人員之劑量評估，並依據評估結果調整空勤人員之航線、航班或相關管理措施，以保障空勤人員輻射安全。

Based on the results of the 2022 counseling and inspection, all radiation protection and detection companies were in compliance with their radiation protection plans and found no violations. The AEC also counseled individual companies with recommendations on how to improve their radiation protection and detection services. Regulatory outreach and two-way communication were employed to promote businesses to improve their radiation detection quality in order to build a more comprehensive national radiation safety net to ensure the radiation safety of the general public, workers, and the environment.

牙科 X 光室輻射檢測驗證 -1
Radiation testing and verification for dental X-Ray room - 1.

牙科診間 X 光輻射檢測驗證 -2
Radiation testing and verification for dental X-Ray room - 2.

B. Promotion of radiation dose management to ensure the radiation safety of aircrews in Taiwan

Cosmic radiation from the sun or space is a part of the natural environment and is classified as natural background radiation. The level of exposure is influenced by altitude, latitude, and solar cycles. Aircrews are exposed to more cosmic rays while in flight. The issue of cosmic radiation safety management is now drawing increasing international attention. A report (Publication 132) issued by the International Commission on Radiological Protection (ICRP) proposed reasonable dose ranges for cosmic radiation protection and associated management guidelines.

International trends in cosmic radiation safety management must take socio-economic factors into account when setting a reasonable range for dose management. The ICRP therefore recommended a dose range of 5 to 10 mSv for aircrews each year. To carry out radiation dose management for aircrews, airlines should assess their employees receiving doses using a verified or government-approved dose assessment program. Then adjust flight routes, and crew members' work schedules, or take related management measures based on the outcomes of the assessment to ensure their radiation safety.

原能會為合理抑低空勤人員之輻射曝露，並接軌國際輻射防護管理趨勢，已積極推動空勤人員接受宇宙射線之輻射防護管理措施，111 年度執行成果說明如下：

1. 參考國際放射防護委員會第 132 號報告及國際管理經驗，研提「空勤人員輻射防護管理指引 (草案)」，建立相關管理措施，保障空勤人員的輻射安全。
2. 邀請民航局、飛航及輻射防護專家學者，召開「國際飛航宇宙射線之安全管理趨勢及國內因應對策」專家會議，就國際宇宙射線之安全管理趨勢及國內因應對策等議題進行交流與討論，有助於空勤人員宇宙射線安全管理制度之推動。
3. 辦理「國際飛航宇宙射線之安全管理趨勢及國內因應對策」座談會，邀請民航局及我國籍航空公司，就國內推動空勤人員宇宙射線管理議題，提出看法與意見，以使管理措施更加完善。

原能會規劃於 112 年與民航局共同合作，推動空勤人員宇宙射線安全管理試辦計畫，透過試辦計畫瞭解國內空勤人員劑量分布範圍，逐步輔導航空公司建立劑量及輻射防護管理制度。

一般游離輻射劑量比較圖 (往返台北紐約一趟，約接受 0.092~0.14 毫西弗的輻射劑量) (歡迎至原能會官網下載)

Comparison chart of ionizing radiation dose received. (Individual dose is approximately 0.092 - 0.14 mSv in a Taipei-New York round trip.) (Available for download from the AEC website).

Radiation protection management measures for aircrews are now being actively promoted by the AEC to keep their exposure to cosmic rays as low as reasonably achievable (ALARA) and in line with international trends in radiation protection management. The implementation outcomes in 2022 are outlined below:

a. The AEC proposed the "Management Guidelines on Radiation Protection for Air Crews (Draft)" and established associated management measures based on ICRP Publication 132 and international management experience to ensure the radiation safety of aircrews.

b. The AEC invited the Civil Aeronautics Administration (CAA) as well as aviation and radiation protection experts and held the expert conference on "International Trends in Cosmic radiation Safety Management in Aviation and Domestic Response Measures." The discussion on international trends in cosmic radiation safety management and domestic response measures will facilitate promoting the cosmic radiation safety management mechanism for aircrews.

c. Held the "International Trends in Cosmic Radiation Safety Management in Aviation and Domestic Response Measures" forum, inviting the CAA and three Taiwanese airlines to provide their opinions and recommendations on the introduction of cosmic radiation management for aircrews in Taiwan to refine the management measures.

The AEC plans to collaborate with the CAA in 2023 to conduct a trial on cosmic radiation safety management for aircrews. The trial will investigate the distribution of radiation dose for aircrews in Taiwan and assist the airlines to establish radiation dose and radiation protection management mechanisms.

邀請民航局及專家學者召開專家會議
Expert conference with the CAA and experts.

邀請民航局及航空公司辦理座談會
Forum with CAA and airlines.

五、強化輻災應變與整備能量及資通安全防護

（一）演練定期做，應變有把握，落實執行核安第 28 號演習

111 年核安第 28 號演習以運轉中之核三廠為模擬事故電廠，參照電廠現況可能發生之事故危害程度，務實檢視核子事故相關整備與應變作業，以儲備應變量能，並持續邀請 NGO 團體代表及評核委員成立無預警狀況設計小組，於現場下達無預警狀況及臨時抽演，以強化無預警演練的效果。演習以「兵棋推演」與「實兵演練」兩階段實施，分別說明如下：

1. 兵棋推演

8 月 4 日於核子事故中央災害應變中心前進協調所（屏東縣消防局車城分隊）舉行，並與屏東縣災害應變中心、輻射監測中心、國軍支援中心前進指揮所、台電公司、核三廠、原能會緊急應變小組等應變單位，模擬在疫情、地震及湧浪等天然災害併同核子事故發生的情境，以及因應國際情勢之核電廠關鍵基礎設施防護作為，共同實施推演與應變處置。各參演單位相互協調合作，妥善應處，順利完成推演，共計 280 人參與。

核子事故中央災害應變中心前進協調所演練
Drill at the Forward Coordination Post, National Nuclear Emergency.
Response Center

輻射監測中心演練
Drill at the Nuclear Emergency Radiation Monitoring and Dose Assessment Center.

台電公司（含核三廠）演練
Drill at the TPC (including the Maanshan NPP).

V. Enhancing Radiological Emergency Preparedness and Cybersecurity Protection

A. Ensuring emergency preparedness through regular exercises-Conduction of 2022 Nuclear Emergency Exercise (No. 28)

Nuclear emergency preparedness and response were tested based on the severity of potential incidents at Maanshan NPP to ensure that response capabilities were in place. An unannounced scenario design team was established comprised of NGO representatives and evaluation committee members. Unannounced and randomly selected drills were ordered on the spot to boost the effectiveness of the contingent response. The exercise was conducted in two stages: a "Table-top Exercise" and a "Field Exercise." Each stage is described below:

a. Table-top Exercise

The exercise was held on August 4 at the Forward Coordination Post of the National Nuclear Emergency Response Center (Checheng Branch of the Pingtung County Fire Department). Participants included the Pingtung County Emergency Response Center, Nuclear Emergency Radiation Monitoring and Dose Assessment Center, Forward Command Post of the Nuclear Emergency Support Center, TPC, Maanshan NPP, and the AEC Emergency Response Team. The tabletop exercise was based on complex scenarios, including COVID-19 pandemics, earthquakes, and storm surges occurring at the same time during a nuclear accident. The exercise also included critical infrastructure (NPP) protection in response to recent international situation. A total of 280 participants took part in the 2022 exercise.

屏東縣災害應變中心演練
Drill at the Pingtung County Emergency Response Center.

2. 實兵演練

實兵演練原訂規劃區分為「民眾安全防護演練」及「應變人員功能性綜合演練」，因國內 COVID-19 疫情嚴峻，「民眾安全防護演練」暫停辦理，部分演練項目仍適度併入 9 月 6 日至 7 日實兵演練呈現，參與人數計 2,962 人，並區分三項成效說明如下：

(1) 強化應變作業量能

為惕勵應變編組人員警覺性及應變時效，執行台電公司及核電廠人員非上班時間無預警動員測試（另於 9 月 3 日星期六假日實施）；驗證廠內水源及電源的多重性與多樣性，例如移動式第二熱沉引接；參考烏俄戰爭情境，模擬廠內遇大範圍火災時應變對策，以及協請屏東縣消防隊支援；首次由國軍部隊與內政部空中勤務總隊分別展現空中輻射偵測作業量能，提供大範圍區域的污染分布圖與輻射熱點位置等資訊；將環境試樣後送設於國立屏東科技大學之核子事故南部備援實驗室檢測，藉以檢視如何避免試樣交叉污染及實驗室設備污染之因應作為；國軍支援維星車、高雄市政府消防局支援通信平台車以及中華電信公司提供行動基地台，強化多元通訊鏈結之救災能量；於高雄醫學大學附設中和紀念醫院，進行廠內應變人員後送輻傷醫療救護。

陸海空域環境輻射偵測演練
Land, sea, and airborne radiation monitoring and radiation detection drill.

高雄醫學大學附設醫院輻傷救護演練
Radiation injury treatment drill at Kaohsiung Medical University affiliated Hospital.

b. Field Exercise

The field exercise was organized into the "Public Safety and Protection Exercise" and "Functional Joint Exercise of Emergency Response Personnel." Due to COVID-19 concerns, the "Public Safety and Protection Exercise" was suspended, with several items incorporated into the field exercise between September 6 and 7 where appropriate. A total of 2,962 people took part in the exercise, and the three following outcomes were achieved:

(a) Strengthening of Emergency Response Capabilities

An unannounced mobilization drill was conducted for TPC and NPP personnel to keep response team members on alert and the response time was also tested at the same time(on September 3rd, Saturday). To validate the redundancy and variety of NPP water and power supplies, actions such as connection of the second mobile heat sink was practiced. The simulation of response strategy for large extensive fires within the NPP based on the Ukraine-Russia war experience, and requested assistance from the Pingtung County fire brigade were conducted for the first time. The Armed Forces and National Airborne Service Corps (NASC) demonstrated their aerial radiation monitoring capabilities to map contamination spread over a large area and identify radiation hot spots. The collected environmental samples were sent to the Radioactivity Analysis Backup Laboratory at the National Pingtung University of Science and Technology for analysis and exercised how to avoid cross-contamination of samples and the response to contamination of laboratory equipment. The satellite communications vehicles provided by the Armed Forces, communications platform vehicle supplied by the Kaohsiung City Fire Department, and mobile base cell stations provided by Chunghawa Telecom were also employed to strengthen emergency response capacity by providing enhanced multiple communication links. In case of radiation injuries, NPP response personnel were sent to Kaohsiung Medical University affiliated hospital for treatment.

民眾防護與防災社區運作演練
Public protection and community disaster prevention operations drill.

(2) 全方位訊息發布

發放核子事故警報，並進行多元訊息通知，包括災防告警細胞廣播 (CBS)、手機簡訊 (LBS)、民政廣播系統、警察廣播電臺及車輛巡迴廣播等管道通知民眾。

(3) 運用網路資通訊科技

為達資訊公開，本次實兵演練亦透過線上直播方式，讓更多民眾在做好自我防疫管理下，亦能瞭解政府應變作為。

防護站開設執行人車輻射偵檢、除污及登記編管作業
Establishment of a contamination screening station to carry out radiation detection, decontamination, and registration operations for vehicles and personnel.

核三廠大範圍火災消防演練
Large-scale firefighting drill at the Maanshan NPP.

（二）納入戰災威脅考量，強化核電廠防護量能

1. 正視戰爭威脅，督導強化核電廠整備，結合演習情境操練

由於烏俄戰爭帶來核電廠新型態的危機，以及我國面臨軍事威脅升高，原能會於 4 月 22 日與台電公司召開「核能電廠面臨戰爭威脅之應變與防護措施盤點討論會」，要求台電公司全面檢視核電廠對戰爭災害的因應措施，除考量軍事威脅特有情境的整備與應變規劃，盤點現有程序與資源，並檢討須強化之搶救量能與廠外兵警消醫護支援管道，相關整備措施納入原能會視察項目，也設定為演習情境。111 年核安第 28 號演習，已在兵棋推演中演練「平變轉換」情境，並於實兵演習中演練核三廠「廠區大範圍火災」的應變作為。此外，111 年核二廠廠內緊急應變計畫演習中，除了廠區大範圍火災，也加入「控制室失能撤離」的情境，都是針對戰爭災害的應變演練。

(b) Comprehensive Dissemination of Information

Notifications were sent to the general public through various channels with the nuclear accident alert, including the Cell Broadcast Service (CBS), Location Based Service (LBS), civil defense broadcasting system, and police broadcasting service.

(c) Use of online information and communication technology

To increase information transparency, the field exercise was livestreamed to provide the public with a better understanding of the government's response, while to practice COVID-19 protection measures as well.

永安老人養護中心弱勢族群疏散演練
Evacuation drill for vulnerable groups at Yong-an Senile Care Center.

B. Enhancing NPP Security to confront the risk of conflict

a. Taking the threat of war into consideration, enhancing preparedness at NPP, and incorporating scenario-based exercises

In response to the new type of threats to NPPs observed in the Ukraine-Russia war and the increased military threat of Taiwan, the AEC and TPC convened the "Conference on Response and Protective Measures for Nuclear Power Plants Threatened by War" on April 22. TPC was instructed to conduct a thorough examination of NPP's responses to war-related damage. The review revealed the necessity to strengthen the emergency rescue capacity and off-site military, police, fire, medical, and nursing assistance. TPC's preparedness measures were included into the AEC's inspection items and designated as exercise scenarios. The "Transition of Situation from Normal Operation to War Crisis" scenario was part of the table-top exercise and the "Large-scale Fire On-site" drill was conducted in the field exercise during 2022 Nuclear Emergency Exercise (No.28) at the Maanshan NPP. In addition, "Evacuation Following Control Room Failure" drill was combined with large-scale fire on-site drill at Kuosheng NPP annual exercise, as part of preparedness for the war-induced damage.

2. 精實保安演練，確實執行核電廠視察，持續國際技術交流

因應 COVID-19 疫情，原能會以視訊與實地方式執行運轉中及除役中核電廠的核子保安與緊急應變整備及演習視察，以及不預警動員測試，並持續精進視察方法，確保核電廠緊急應變與核子保安及資安防護量能。為檢視核電廠對於保安事件的應變程序與量能，核三廠執行軍、警、海巡聯合保安實兵演練，核一、二廠實施核子保安與反恐無腳本兵推演練，以紅藍軍對抗方式，檢視實體防護弱點，精進保安效能。此外，為了提升核子保安文化意識與應變武力效能，原能會持續與美國能源部國家核子保安局（DOE/NNSA）合辦「核子保安（含資安）文化」與「核子保安應變武力個案研究」技術交流，以視訊方式並藉由實際案例，深入探討加強核設施保安與資安人員提升危機意識的實務做法，以強化我國核電廠的安全。

核三廠核子保安與防恐實兵演練

Full-scale security and anti-terrorism drills at the Maanshan NPP.

核二廠核子保安及反恐無腳本兵棋演練

Unscripted security and anti-terrorism table-top drills at the Kuosheng NPP.

（三）提升我國輻射災害應變量能，強化動員應變成效

輻射災害之整備應變有賴中央及地方共同合作，因此本年度持續透過訓練、演練及業務訪評，多管齊下輔導地方政府之輻災防救業務推動，並針對原能會協助地方政府應處輻射災害之「輻射應變技術隊」，加強應變技術開發與精進，以提升我國輻射災害整體動員成效，說明如下：

1. 原能會配合行政院災害防救業務及動員業務訪評，派員赴全國 22 個地方政府，實地了解業務辦理情形與需求，並提供精進建議。另為強化地方政府第一線應變人員專業知能，原能會亦辦理 4 場次「地方政府輻射災害防救講習」，透過案例分享及推演實作等方式，使地方政府第一線應變人員對輻災防救現場作業更加熟稔。

b. Conducting rigorous security exercises, enforcing of NPP inspections, and participating in international technical exchanges

The AEC continuously inspects nuclear security, emergency preparedness, unannounced mobilization tests and drills at both operational and decommissioning NPPs. The combined use of video conferencing and on-site inspection are included in response to the COVID-19 pandemic. To assess the effectiveness of nuclear security response procedure and capabilities at a NPP, a full-scale joint exercise including military, police, and coast guard units was conducted at the Maanshan NPP. Unscripted table-top exercises for nuclear security and anti-terrorism were carried out at the Chinshan and Kuosheng NPPs. Rival groups competition was used to identify NPP's vulnerabilities in the physical protection and improve its security performance. Additionally, the AEC has continued to cooperate with the National Nuclear Security Administration of the U.S. Department of Energy (DOE/NNSA) on technical topics of "Nuclear Security (including cybersecurity) Culture" and "Nuclear Security Use of Response Forces Case Study". The use of video conference and case study also helped improving nuclear facilities security and enhancing the crisis management of cybersecurity personnel through these cooperation.

C. Strengthen Taiwan's radiological response capacity and mobilization effectiveness

Collaboration between central and local governments is crucial for radiological emergency preparedness and response. A multi-faceted approach involving training, exercises, and operational evaluations has been maintained to guide local governments on preparing radiological emergency rescue operations. To improve the mobilization effectiveness of Taiwan's radiological emergency response team, technical development and upgrades have been implemented for the "Radiological Emergency Response Team (RERT Team)" which was established by the AEC to assist local governments handling radiological emergency incidents.

a. The AEC collaborated with the Executive Yuan on assessing emergency response and mobilization by dispatching personnel to 22 local governments in Taiwan. Local operational information and requirements were collected to provide recommendations for further improvement. Moreover, AEC organized four "Radiological Emergency Response Workshop for Local Governments" sessions, aimed at strengthening the professional competency of local government's first responders. These sessions utilized case studies and simulated training to help first responders familiar with radiation incident on sites.

2. 原能會輻射應變技術隊年度訓練，使用新建置之輻射事件應變資訊平台進行桌上模擬推演，透過科技導入，使應變之通報、動員及現場狀況掌握更加精確即時，強化指揮與決策作業。此外，原能會輻應隊協助彰化縣、臺南市、桃園市及臺北市輻射災害防救演練，提供專業諮詢及現場支援等事宜，增進與地方政府第一線應變人員合作機制。

業務訪評與地方政府實地交流
Response Plan evaluation and information exchange with the local government.

原能會輻應隊協助地方政府輻災防救演練
AEC's Radiological Emergency Response Team supported local government performing radiological emergency response drill.

（四）檢討修訂輻災相關法規，加強輻災整備實務

為使輻災整備實務規劃更能依據現況檢討調整，本年度完成核電廠緊急應變計畫區檢討評估事宜，並進行公告作業。另考量現今極端氣候影響，為使核電廠緊急應變計畫區評估可因應實況滾動調整，爰修訂「核子事故緊急應變法施行細則」，並提高核電廠緊急應變計畫區及民眾防護措施分析及規劃等之檢討頻次，使輻災整備作為更貼近實務。

b. The AEC RERT Team's annual training utilized the recently developed radiation incident response information platform for table-top exercises. The new technology enhanced command and control by providing a more accurate and up-to-date information on reporting, mobilization, and handling of the situation at the site. The AEC RERT Team also provided professional advice and direct support to Changhua County, Tainan City, Taoyuan City, and Taipei City during their radiological emergency response exercises. The collaboration mechanism with local government improves cooperation with these first responders.

原能會建置之輻射事件應變資訊平台

Radiation incident response information platform developed by the AEC.

原能會辦理地方政府輻射災害防救講習

Radiological Emergency Response Workshops for Local Governments organized by the AEC.

D. Revision of radiological emergency regulations and strengthening of radiological emergency preparedness

To evaluate and adjust radiological preparedness practices based on actual conditions, the review and assessment of NPP Emergency Planning Zones (EPZ) were completed and the results were posted to the public in 2022. To account for the impact of the extreme climate, the Enforcement Rules for the Nuclear Emergency Response Act were amended to enable continuous adjustments to NPP EPZ assessments based on actual conditions. The frequency of evaluation and planning for EPZs and public protection measures was increased to bring radiological preparedness in line with actual practice.

（五）全面強化資訊系統韌性、對抗資安攻擊

1. 強化資訊系統韌性及資安防護能力

為因應日漸嚴峻之資安威脅，原能會依循行政院之各項資安推動方向及規定，積極強化網站韌性，原能會官網導入內容傳遞網路機制 (CDN)，以增加對分散式阻斷服務 (DDoS) 攻擊之防護能力。

原能會除依據資安法規定，針對伺服器主機及個人電腦導入資安弱點通報機制 (VANS)，強化資通系統資產之弱點管理，並以更高標準自我要求，導入端點偵測及應變機制 (EDR)，偵測端點系統上異常活動，以期能及早發現駭客活動跡象，降低後續可能引發之資安風險。

原能會於風險管理、環境韌性及偵測應變等各方面，積極提升資安防護能力，堅定守護資通安全。另積極協助所屬機關及所管財團法人符合法遵要求，辦理相關資安稽核作業，強化受稽單位資安防禦程度，以期及早發現資安缺漏並輔導改善。

2. 強化資訊系統服務效能

原能會官網及其他緊急應變系統，為我國核能及輻射等相關資訊之主要發布管道，配合核安監管中心 24 小時值勤人員的監控作業，即時傳遞正確資訊，協處各種輻射相關緊急事態，確保核安輻安的目標。

本年度除已完成英文版官網改版，並完成「值勤人員告警系統」建置，同時積極改善內部資訊系統效能，例如新增「線上網頁更新申請表」及「知識平台電話表」系統，並規劃建立「線上 PC 叫修系統」等，皆為強化作業時效並減少紙張使用之有力工具。

資訊業務以服務為導向，規劃中之重點項目尚包括：中文版官網改版、新增「線上值勤日誌」系統等，期能進一步提升業務單位之作業效率，達成各項業務目標。

全面強化資訊系統韌性、對抗資安攻擊
Strengthening information system to improve resilience against cybersecurity attacks.

E. Strengthening the information system to improve resilience against cybersecurity attacks

a. Enhancing information system resilience and cybersecurity protection

To address the increasing cybersecurity threats, the AEC has taken active measures to strengthen the resilience of its website in accordance with the cybersecurity policies and regulations issued by the Executive Yuan. The AEC website has implemented the Content Delivery Network (CDN) to improve protection against Distributed Denial of Service (DDoS) attacks.

To strengthen vulnerability management for IT system assets in accordance with the Cyber Security Management Act, the AEC has introduced the Vulnerability Alert and Notification System (VANS) for servers and personal computers. The AEC has also introduced Endpoint Detection and Response (EDR) mechanism to detect abnormal activities on endpoint systems, thus improving the internal standards for risk management, environmental resilience, network detection and response. Early detection of malicious hacker activity is expected to reduce cybersecurity risks.

The AEC is actively working to improve its cybersecurity protection and safeguard its information security, and supporting subordinate agencies to achieve compliance. Cybersecurity audits have been organized to enhance the cybersecurity protection, enabling IT vulnerabilities to be identified and corrected promptly.

b. Improving IT system service performance

The AEC website and other emergency response systems are the primary sources of information on nuclear safety and radiation protection in Taiwan. To ensure the timely delivery of correct information on radiation-related emergencies, on-duty personnel at the Nuclear Safety Duty Center monitors these systems on 24 hours a day, 7 days a week.

Efforts were made this year including updating of the AEC's English version web site and establishing of the "Duty Staff Alert System". The inclusive of the "Online Web Page Update Application" and "Knowledge Platform Telephone List" systems are prime examples of efforts to enhance the performance of internal IT systems. Additionally, an "Online PC Repair Request System" is currently in development to further improve processing times and reduce paper work.

A service-oriented approach has been adopted for information operations. Key planned projects include: Update of AEC Chinese version website, and addition of an "Online Duty Log" system. These projects could increase the efficiency for all offices and meet AEC regulatory goals.

六、精進原子能科技研發

(一)低碳生產、低成本之創新電致變色玻璃量產技術

1. 核研所電致變色玻璃簡介

核研所以「低碳生產、低成本之創新電致變色玻璃量產技術」勇奪素有「科技產業奧斯卡獎」美譽之稱的「2022 年全球百大科技研發獎 (R&D 100 Awards)」，此技術所開發的電致變色節能窗產品，具有下列優異特性：

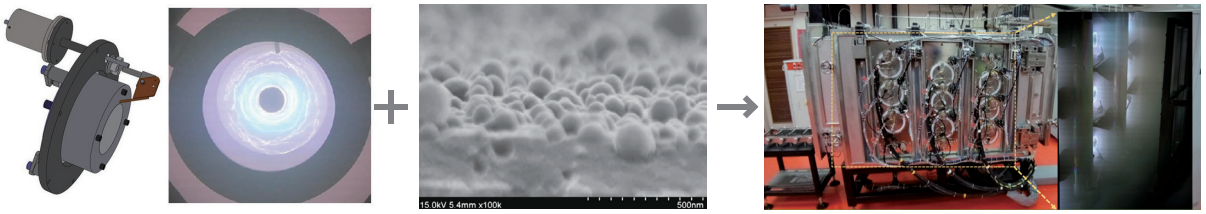
(1) 省電：只有在操作顏色變化時需耗能，且最大功率僅 2.5W。
(2) 記憶效應佳：移除驅動電源 4 天後，顏色僅變化 4%。
(3) 隔熱效果佳：有效隔絕太陽光所造成高紅外線輻射熱與紫外線傷害，上色狀態紅外線阻隔率達 99.1%，退色狀態紅外線阻隔率亦有 67.3%。
(4) 可見光透光率變化大：上色時透光率 8%，退色時透光率 60%，透光率變化達 52% (≥ 50% 商規標準)。

各項性能均優於目前市場上領導品牌所生產的電致變色節能窗玻璃主流商品。

核研所技術開發電致變色節能窗
Electro-chromatic energy-efficient window based on INER technology.

2. 電致變色玻璃量產技術對環境影響

核研所電致變色玻璃量產技術主要是一種創新高密度電弧電漿源及其量產製程設備技術，成功提升電弧電漿鍍膜技術至奈米薄膜等級，開發出新穎奈米級多孔性材料，進而研製低耗能快速電致變色薄膜。此技術相較目前主流的濺鍍 (Sputtering) 製程，其製程速度可提升 5 至 10 倍之多，且消耗電能大幅減少至四分之一，符合綠色製造之低碳生產、低能耗、低汙染之條件，因此可大量減少溫室氣體排放，減緩地球暖化及環境日益嚴重污染之問題，兼顧經濟發展與環境保護。



技術創新：創新高密度電弧電漿源
Technological innovation: Innovative high-density arc plasma source.

材料創新：新穎奈米級多孔性薄膜材料
Material innovation: Novel nanoscale porous thin film materials.

生產與環境永續：低碳環保、低成本電致變色量產機台
Production and environmental sustainability: Low-carbon, environmentally friendly, and cost-effective mass production equipment for electrochromic devices.

核研所電致變色玻璃量產技術／ INER's mass production technique for electro-chromatic glass.

VI. Advancing the Research and Development of Atomic Energy Technology

A. Low-carbon and low-cost mass production technique for innovative electro-chromatic glass

a. Introduction to INER electro-chromatic glass

The "low-carbon and low-cost mass production technique for innovative electro-chromatic glass" developed by the Institute of Nuclear Energy Research (INER) won the "2022 R&D 100 Awards", widely considered to be the Oscars of the technology industry. The electro-chromatic energy-efficient window product based on this technology has the following outstanding attributes:

(a) Energy Saving: Energy is only consumed when changing colors and the maximum power rating is just 2.5W.

(b) Excellent Memory Effect: Just 4% color change after 4 days when disconnected from a power supply.

(c) Excellent Thermal Insulation: Effectively blocks IR radiant heat and UV damage from sunlight. Colored mode blocks up to 99.1% of infra-red and uncolored mode still blocks 67.3%.

(d) Large Variance in Visible Light Transmission Rate: Light transmission when colored is 8% and 60% when uncolored gives variance of up to 52% (≥ 50% of commercial standard).

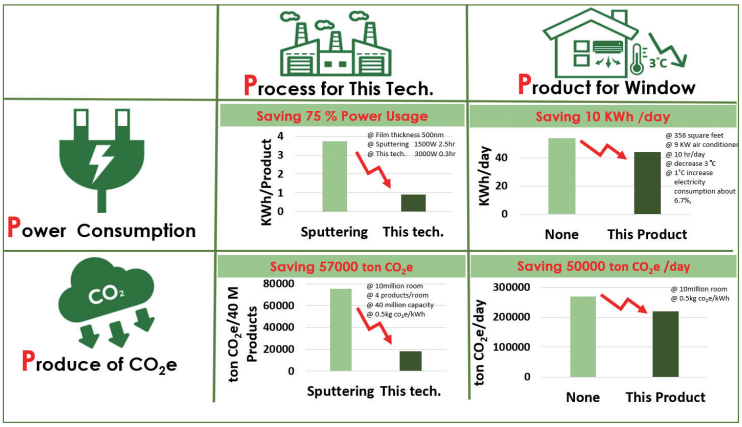
Product performance exceeds mainstream electro-chromatic energy-efficient glass products produced by leading brands on the market.

b. Environmental impact of mass production technique for electro-chromatic glass

The mass production technique for electro-chromatic glass developed by INER is based on a type of innovative high-density arcing plasma source and its mass production hardware. The technique successfully upgraded arcing plasma coating technology to the nano level. An energy-efficient and responsive electro-chromatic coating was developed based on the novel nano porous material. The INER technique is 5 to 10 times faster than the sputtering process now in mainstream use. Power consumption is also reduced by up to 75% so it qualifies as a green production technique with low-carbon, low energy consumption, and low contamination. The major reduction in greenhouse gas emissions balances economic development and environmental protection by mitigating global warming and reducing environmental pollution.

除此之外，成本的有效降低，將有助於廠商提升市場競爭力及民眾對產品的接受度，可望解決目前電致變色節能窗產品因高單價無法普及化問題。運用本技術開發出低碳生產之商用規格電致變色節能窗，產品除操控省電外，並具有隔絕紅外線熱源能力之特點且符合綠建材規範，可有效減少空調能源消耗，同時保有室內採光需求，友善生態環境，達到產品與生態共榮。

本技術以「綠色製造」為本質，在生產產品的製造過程中，減少碳排放與降低製造任何有害環境的汙染物，同時，低電力消耗製程降低生產成本，藉此商品較具商業競爭性且親民的價格，有利於消費者採用，達成環境、企業與消費者的「三贏局面」。



核研所電致變色玻璃量產技術在製造端及消費端皆能降低能源使用
INER's mass production technique for electro-chromatic glass reduces energy consumption on both the manufacturing and consumer ends.

(二)交感神經功能診斷利器「核研心交碘 -123 注射劑」

1. 核研心交碘 -123 注射劑背景簡介

「核研心交碘 -123 注射劑」(INER MIBG <I-123> Injection) 之有效成分為 Meta-iodobenzylguanidine (簡稱 MIBG)，其化學結構類似於交感神經傳遞物正腎上腺素 (norepinephrine)，已被證實在交感神經分布的組織有高吸收率 (例如心臟、唾腺及腫瘤)，特別是神經源起及神經內分泌源起的腫瘤。碘標誌之 MIBG 已被應用於嗜鉻細胞瘤、及神經母細胞瘤等癌症的診斷及療效評估。近年來，碘 -123 MIBG 應用於心臟交感神經功能之診斷漸受重視，可應用於預測潛在的心律失常及評估心衰竭高危險群病患，提供臨床治療決策之重要資訊。許多研究也指出碘 -123-MIBG 對於路易氏體失智症或巴金森症等腦神經退化疾病提供臨床診斷資訊，做為鑑別診斷之利器。

「核研心交碘 -123 注射劑」所獲之藥品許可證 (衛部藥製字第 R00037 號)

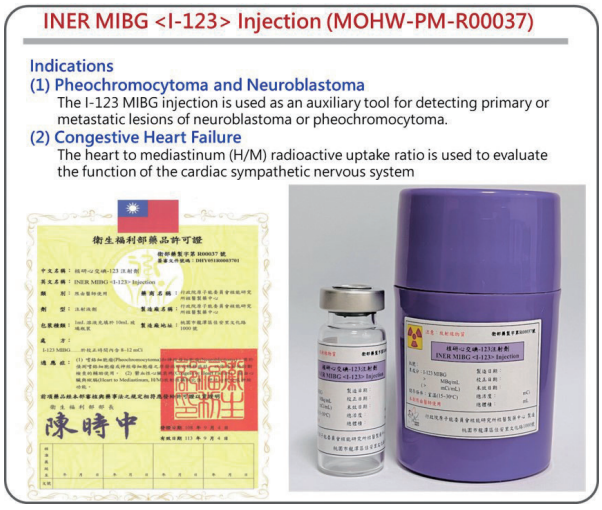
The effective reduction in costs will help vendors boost their competitiveness in the market and increase public acceptance of the product. The high unit cost of electro-chromatic energy-efficient windows has been an obstacle to their widespread adoption and the new technique will hopefully offer a solution. The commercial-grade electro-chromatic energy-efficient window products manufactured using this low-carbon production technique are not just energy-efficient to operate. They also block IR heat and comply with green building material standards. Air-conditioning therefore require less energy and natural lighting is retained indoors, making it a product that is better for the environment.

The emphasis on "green production" in this technique reduces carbon emissions and the production of other environmentally harmful pollutants during the production process. The reduction in power consumption also reduces production costs. The result is a more commercially competitive product at affordable prices that consumers will be more willing to adopt to achieve a win-win outcome for the environment, business, and consumers.

B. INER MIBG I-123 Injection for Assessment of Sympathetic Nervous System Function

a. Introduction to the INER MIBG I-123 Injection

The active ingredient in the "INER MIBG <I-123> Injection" is meta-iodobenzylguanidine (MIBG). MIBG has a similar chemical structure to the neuro-transmitter norepinephrine in the sympathetic nervous system (SNS) and has been confirmed to have a high uptake rate in tissues with SNS (e.g., the heart, salivary glands, and tumors), particularly those that originate from neural crest or neuroendocrine cells. Radioactive labeling with MIBG is already used for diagnosis and treatment outcome assessments of cancers such as phenochromocytoma and neuroblastoma. The use of I-123 MIBG for diagnosing cardiac sympathetic nerve function has drawn increased attention in recent years. Applications include prediction of potential arrhythmia and assessment of patients at high risk of cardiac failure to provide important information for clinical treatment and decision-making. Many studies have also concluded that I-123 MIBG can provide information for clinical diagnosis of neurodegenerative diseases such as Lewy Body dementia or Parkinson's Disease.



Pharmaceutical permit obtained by INER MIBG <I-123> Injection (MOHW-PM-R00037).

2. 核研心交碘 -123 注射劑研製技術與發展進程簡介

核研所具有台灣唯一能生產碘 -123 之 30 百萬電子伏特 (MeV) 中型迴旋加速器，可以產製多種醫用放射性同位素，並設有符合 PIC/S GMP 規範的核醫製藥中心，開發與研製核醫藥物，供應臨床診療應用。為研製國內首創之碘 -123 MIBG 注射劑，核研所建立放射性碘標誌研製技術，並開發出合成系統，可由電腦控制自動 / 半自動化操作，提高產物品質一致性，生產品質優良之核醫製劑供應臨床使用，本合成系統已獲得中華民國、日本及美國的專利。核研所也應用此合成系統，建立化學、製造與管制 (CMC) 等技術性文件，申請藥品查驗登記，並於 108 年順利取得「核研心交碘 -123 注射劑」藥品許可證 (衛部藥製字第 R00037 號)。考量中南部醫院需求，為提升藥品使用之有效期限，經歷原物料重新入庫檢驗、製程測試、與人員訓練後，完成連續三批次「核研心交碘 -123 注射劑」製程確效合併經時安定性試驗，各項品管檢驗皆合格，已於 111 年經衛福部審查核准變更本藥品之有效期限至 10 小時，並例行供應各需求醫院進行臨床試驗使用。

核研心交碘 -123 注射劑」核醫藥物製劑作業區
Radiopharmaceutical production area for the INER MIBG <I-123> Injection.

111 年「核研心交碘 -123 注射劑」所獲獎項
Awards won by the “INER MIBG <I-123> Injection” in 2022.

核研心交碘 -123 注射劑研發團隊以「核研心交碘 -123 注射劑」之創新自動化研製技術」，獲得衛福部與經濟部共同主辦的「2022 國家藥物科技研究發展獎」之製造技術類銅質獎。另外，以交感神經功能診斷利器「核研心交碘 -123 注射劑」，榮獲財團法人生技醫療科技政策研究中心主辦的第十九屆國家新創獎 (學研新創獎)。現階段穩定供應「核研心交碘 -123 注射劑」予各醫院進行學術臨床試驗，執行核醫心臟神經方面研究。未來，待完成建置符合 PIC/S GMP 規範的第一條無菌製備示範生產線暨相關製藥設施，及新自動化合成「核研心交碘 -123 注射劑」系統，核研所將可全面提供高品質核醫藥物與提升研究量能。

b. Introduction to the INER MIBG I-123 Injection technology and its development

The INER operates the only 30 MeV medium-sized cyclotron capable of producing I-123 in Taiwan. The cyclotron can produce a variety of medical radioisotopes and the PIC/S GMP-certified Radiopharmaceutical Production Center develops and produces radiopharmaceuticals for clinical diagnosis and treatment use. Radioactive iodine labeling technology was developed by the INER to create Taiwan's the first I-123 MIBG injection. A computer-controlled synthesis system with automatic or semi-automatic control was also developed to improve the consistency of product quality and produce high-quality radiopharmaceuticals for clinical use. The synthesis system is now patented in the ROC, Japan, and the US. The synthesis system was also used by the INER to establish chemistry, manufacturing, and control technical (CMC) documentation and apply for pharmaceutical registration. Pharmaceutical registration for the "INER MIBG <I-123> Injection" was approved in 2019 (MOHW-PM-R00037). To increase the shelf-life of drug to meet the needs of hospitals in central and southern Taiwan, restocking inspection, process testing, and personnel training were carried out before three consecutive batches of "INER MIBG <I-123> Injection" were produced and tested for efficacy/stability. All quality assurance requirements were met so the MOHW approved an extension of the shelf-life to 10 hours in 2022 and the injection is now routinely supplied to hospitals for clinical trials on request.

The innovative automated production technology developed by the "INER MIBG <I-123> Injection" research team won the bronze award in the manufacturing technology category at the "2022 National Pharmaceutical Technology Research and Development Awards". The "INER MIBG <I-123> Injection" for assessment of sympathetic nerve function also won the Innovative Academic Research Award at the 19th National Innovation Awards organized by the Research Center for Biotechnology and Medicine Policy. A stable supply of "INER MIBG <I-123> Injection" is now being provided to hospitals for academic and clinical trials in nuclear medicine for studying cardiac and central nerve function. Once the PIC/S GMP-compliant pilot sterile production line and pharmaceutical production facilities are completed and integrated with the new automated synthesis system for "INER MIBG <I-123> Injection", the INER will be able to supply high-quality radiopharmaceuticals for all applications and support more R&D.

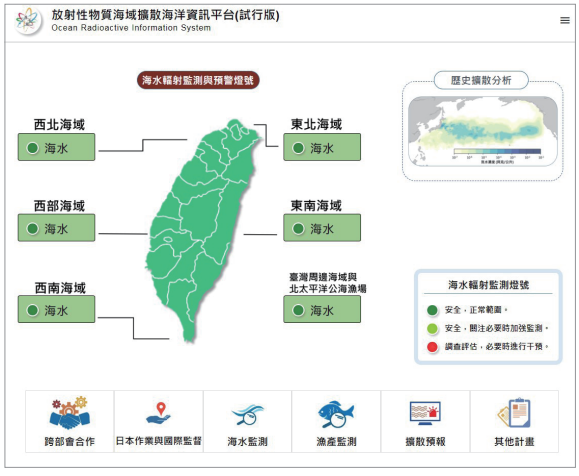
（三）國家海域放射性物質環境輻射監測及安全評估整備計畫

為應對日本預計於 112 年排放福島事件後產生的含氚處理水入海，核研所超前部署邀請氣象局、國海院成立「國家海域放射性物質環境輻射監測及安全評估整備計畫」，由跨領域整合國家型任務來解決含氚處理水排放事件，以主動災害防護的觀點進行應變整備工作，其成果包含：(1) 建立公開透明的資訊整合平台供民眾即時查詢，降低日本排放福島含氚處理水事件對我國漁業的損害衝擊，達到安定民心的效果；(2) 結合海流趨勢預測建立前瞻海洋輻射預警系統，提前分析預警福島含氚處理水排放的影響趨勢；(3) 建立生物氚檢測技術，取得海域生態背景基線數據，確保海域輻射安全。

1. 放射性物質海域擴散海洋資訊平台 (TW-ORIS)

為提供民眾有關日本含氚處理水排放的單一資訊窗口，建立「放射性物質海域擴散海洋資訊平台 (TW-ORIS)」(網址：https://tworis.aec.gov.tw)，整合海域輻射監測數據與地理資訊地圖，以視覺化方式，供民眾方便查詢我國近海及北太平洋漁場的輻射監測結果，並彙整國內外相關資訊，包括日本與國際原子能總署 (IAEA) 之管制檢查狀況排況、政府跨部會因應平台訊息等，以及透過科普圖卡、影片與常見問答，協助解答民眾疑慮。

112 年起，原能會將進一步整合跨部會專業量能，強化臺灣海域輻射監測，結合海象進行放射性物質海域擴散的即時預報，相關結果都將公布於此資訊平台，並依使用者經驗回饋持續精進平台功能，協助民眾可快速、方便取得正確資訊，讓民眾安心放心。



「放射性物質海域擴散海洋資訊平台」入口網頁

Portal web page for the Ocean Radioactive Information System (TW-ORIS)

我國海域輻射監測結果查詢介面

Interface for querying radiation monitoring results in Taiwanese waters.

C. Development of Preparation Measures for Oceanic Radionuclides Monitoring and Safety Analysis system

Japan is planning to discharge Tritium contaminated wastewater generated by the Fukushima disaster into the sea from 2023 onwards. The INER took the precaution planning to invite the Central Weather Bureau (CWB) and National Academy of Marine Research (NAMR) to set up the "Development of Preparation Measures for Oceanic Radionuclides Monitoring and Safety Analysis system" as a national multi-disciplinary task force to deal with the discharge of Tritium contaminated wastewater. The following preparations were carried out under the proactive disaster prevention and protection approach: (1) Established an open and transparent information integration platform to respond to and allay public concerns in a timely manner, and reduce any harmful impact on our national fisheries from Japan's discharge of Tritium contaminated wastewater from Fukushima; (2) Established a pioneering ocean radiation early warning system based on ocean currents to analyze the impact of Tritium contaminated wastewater discharged from Fukushima; and (3) Develop bio-Tritium detection technology to obtain background baseline data on sea ecology and ensure the radiation safety area of sea areas.

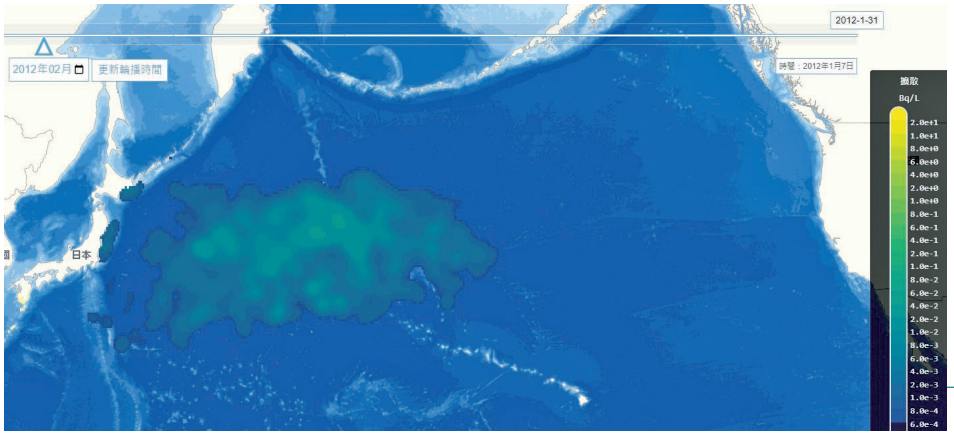
a. Ocean Radioactive Information System (TW-ORIS)

The "Ocean Radioactive Information System (TW-ORIS)" (URL: https://tworis.aec.gov.tw) was set up to provide the public with a consolidated window for information on discharge of Tritium contaminated wastewater by Japan. Sea radiation monitoring data and geological information system maps were combined to provide the public with a convenient way to check radiation monitoring results from Taiwan's coastal waters and Pacific fisheries. Local and overseas information including Japanese and IAEA controls, and the government's response platforms were also compiled. Science education cards, videos, and FAQs were used to answer public concerns.

From 2023 onwards, the AEC will consolidate the professional capabilities of different government departments and strengthen radiation monitoring of Taiwanese waters. Real-time forecasts on the dispersion of radioactive materials in the waters will be provided and all outcomes published on the information platform. Platform functionality will continue to be upgraded in response to user feedback. Swift and convenient access of correct information will ensure public peace of mind.

2. 福島含氚處理水排放影響趨勢分析

核研所吸收過去與氣象局在「核子事故大氣擴散劑量評估」合作之經驗，針對含氚處理水排放建立專屬的海洋擴散預警分析系統，於 111 年度透過福島事件發生後 10 年歷史海流資料，完成案例擴散趨勢評估，作為擴散預警系統之發展雛形。同時進一步納入氣象局海象中心之海流預報模式，配合日本 112 年開始排放含氚處理水之時程，擴散例行化預報，提供氚水擴散分析結果，以類似氣象預報之方式公布於 TW-ORIS 平台，作為預警應對之重要依據。



氣象局福島十年歷史案例擴散評估
Dispersion assessment based on 10 years of CWB historical data for Fukushima.

3. 成立國內第 1 間生物氚檢測實驗室，強化檢測量能及背景數據庫

核研所於 111 年 8 月 31 日舉行「生物氚檢測實驗室」揭牌儀式，由原能會、核研所、國海院、食藥署、漁業署與氣象局共同揭牌成立國內第 1 間生物氚檢測實驗室，目前實驗室已建置 2 部冷凍真空乾燥機、2 部管型高溫爐及 2 部超低背景液態閃爍計數儀，生物氚檢測之最低可測活度 (MDA，Minimum Detectable Activity) 已與日本東京電力公司海域監測計畫所訂定之 MDA 相當，量測技術已達國際專業實驗室水準。生物氚檢測實驗室將持續建立日本含氚處理水排放前海域生態物種的輻射背景基線，並於 112 年起與農委會、衛福部、海委會合作執行台灣海域海水、魚類取樣及食品後市場氚含量檢測，守護台灣漁業，確保水產食品輻射安全，讓國人食的安心。

生物氚實驗室揭牌儀式
Plaque unveiling ceremony for the Tritium Analysis Laboratory.

b. Trend analysis on the impact of Tritium contaminated wastewater from Fukushima.

The INER drew on its past experience from cooperating with the CWB on "Assessment of Atmospheric Dispersion During Nuclear Emergencies" to develop a dedicated ocean dispersion early warning and analysis system for Tritium contaminated wastewater. A case assessment of dispersion trends based on 10 years of historical ocean current data after the Fukushima incident was completed in 2022 to serve as the prototype of a dispersion early warning system. The sea current forecasting model of the CWB Marine Meteorology Center was then incorporated to provide routine forecasting and analysis of Tritium contaminated wastewater dispersion after Japan may begin discharging Tritium contaminated wastewater in 2023. The information was published on the TW-ORIS platform in a format similar to weather forecasts and provides an important reference for early warning and response.

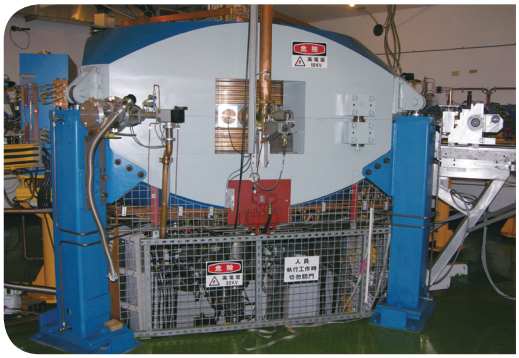
c. Established the first domestic biological Tritium detection laboratory to strengthen testing capacity and background database

The plaque unveiling ceremony for the "Tritium Analysis Laboratory" was held by the INER on August 31, 2022. The first laboratory of its kind in Taiwan was jointly unveiled by the AEC, INER, NAMR, FDA, Fisheries Agency, and CWB. The laboratory is currently equipped with two vacuum freeze-drying machines, two tube furnaces, and two ultra-low background liquid scintillation counter instruments. Minimum Detectable Activity (MDA) for bio-Tritium is now equal to the MDA set by the sea monitoring program of TEPCO and in line with top international professional laboratories. The laboratory will work continuously to establish the baseline background radiation for biological species in sea areas before the discharge of Tritium contaminated wastewater by Japan. From 2023 onwards, the Council of Agriculture (COA), MOHW, and Ocean Affairs Council (OAC) will jointly test the Tritium content of seawater and fish from Taiwanese waters as well as food post market. The laboratory will protect Taiwan's fisheries by ensuring the radiation safety of seafood products for Taiwanese people's peace of mind.

（四）我國必要藥品 - 鉈 201 心臟造影劑輸入困難，核研所戮力維運加速器暨製藥中心，穩定備援造福國人

1. 中型迴旋加速器暨核醫藥物製藥中心簡介

核研所具有全國唯一 30 MeV 中型迴旋加速器，於 82 年建置，可生產碘 -123、鉈 -201、鎵 -67 及銦 -111 等醫用放射性同位素，提供國內各研究單位、醫院等進行臨床試驗及醫學診斷，而核醫製藥中心於 86 年成立，經歷多年演進，於 107 年通過國際醫藥品稽查協約組織藥品優良製造規範認證 (PIC/S GMP 含第三部：運銷)，核定三條無菌製劑生產線及冷鏈運輸，定期接受衛福部稽核，提供核醫藥物供國內外使用，並協助核研所及國內生技業者臨床試驗及查驗登記之申請及執行，加速新藥開發。

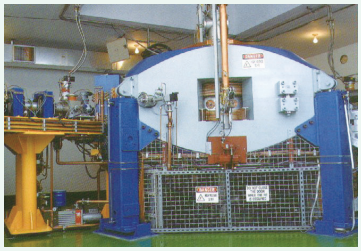


TR30/15 迴旋加速器
TR30/15 cyclotron.

核研氯化亞鉈 [鉈 -201]- 注射劑
INER Thallous Chloride (Thallium-201) – Injection.

2. 核研氯化亞鉈 [鉈 -201] 注射劑產製

國內短半化期核醫藥物主要仰賴國外進口，自 109 年因 COVID-19 疫情影響導致國際航班不穩定，造成進口藥物短缺。此時，核研所便發揮在地生產優勢，30MeV 迴旋加速器暨核醫製藥中心立即緊急投入藥物生產，及時解決國內氯化亞鉈 [鉈 -201] 藥物需求的缺口。



照射靶
Target

TR30/15 Cyclotron

固、液、氣體靶照射產製各項放射性核種

Production of various radionuclides through irradiation of solid, liquid, and gaseous targets.

生產鉛室 ・Production Lead Room

放射性核種之化學分離純化，產製化學等級 Tl-201, Ga-67, In-111,

Radionuclides are isolated and purified here to produce chemical-grade Tl-201, Ga-67, In-111, and I-123.

D. Due to the difficulty of importing Thallium-201 for myocardial imaging, the INER is now focusing on the operation and maintenance of the cyclotron and pharmaceutical center to provide a reliable backup supply for the people of Taiwan.

a. Introduction to the Medium-sized Cyclotron and Radiopharmaceutical Production Center

The 30 MeV medium-sized cyclotron at the INER is the only one of its kind in Taiwan and was constructed in 1993. The cyclotron can produce medical radioisotopes such as Iodine-123, Thallium-201, Gallium-67, and Indium-111 for clinical trials and medical diagnosis at research units and hospitals in Taiwan. The Radiopharmaceutical Production Center (RPC) was established in 1997 and has continued to evolve over the years. Pharmaceutical Inspection Co-operation Scheme Good Manufacturing Practice (PIC/S GMP including Appendix 3: Distribution) certification was obtained in 2018. The RPC is authorized to operate three sterile drug production lines and their cold chain logistics with regular audits by the MOHW. In addition to supplying radiopharmaceuticals for domestic and overseas use, the RPC also accelerates the development of new drugs by assisting the INER and domestic biotechnology companies with their application and execution of clinical trials and registration.

b. Production of Thallous Chloride (Thallium-201) Injection by the INER

Taiwan is dependent on imports for most short half-life nuclear medicine drugs. Disruptions to international flights due to the COVID-19 pandemic from 2020 onwards led to shortages of imported drugs. The INER stepped into the breach by leveraging its localized production advantage. The 30 MeV cyclotron and RPC were immediately assigned for emergency drug production and helped make up for the domestic shortfall in Thallous Chloride (Thallium-201).

核醫製藥中心・Radiopharmaceutical Production Center

產製 GMP 等級之放射針劑及凍晶製劑

Production of GMP-grade Radio-injections and Lyophilized Injection

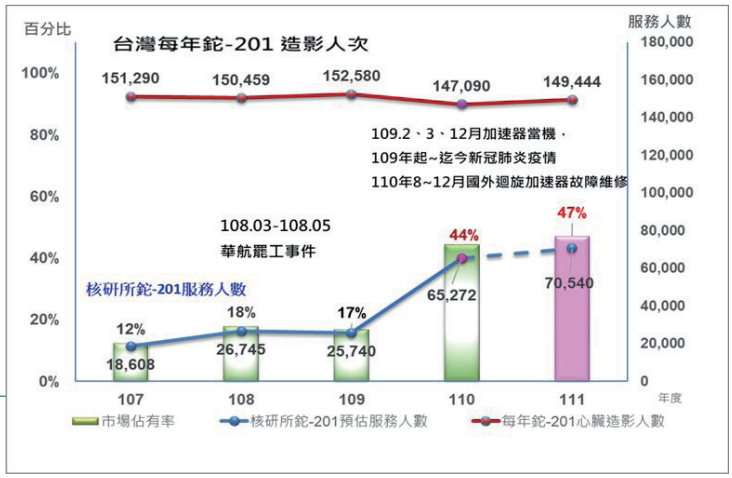
核研氯化亞鉈 [鉈 -201] 注射劑

INER Thallous Chloride (Thallium-201) Injection.

核研氯化亞鉈 [鉈 -201] 注射劑利用其亞鉈離子 (Tl+) 與鉀離子 (K+) 相似之生化性質，可被心肌攝取，其攝取量與冠狀動脈的血流成正比，可應用於心肌梗塞及缺氧功能性診斷，由加速器照射及生產鉛室化學分離純化後，再透過核醫製藥中心無菌無塵室製成核研氯化亞鉈 [鉈 -201] 注射劑提供國人使用。

3. 疫情期間，緊急供應補充國內缺口

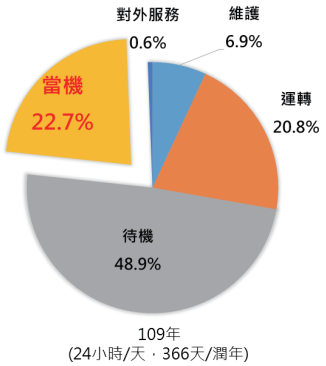
於國內 COVID-19 疫情期間 (109 年 4 月 20 日至 111 年 12 月 31 日) 合計生產供應約 402,400mCi，約提供 160,900 人次病患造影使用；其中自 111 年 1 月 1 日至 12 月 31 日提供約 70,540 人次病患造影使用，使心臟病患服務人次由 109 年至 111 年增加約 4.5 萬人次的服務，履行核研所之社會責任。

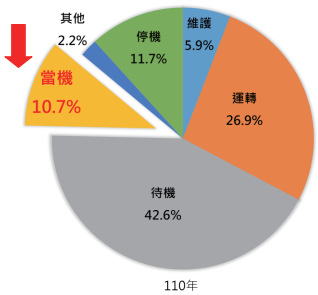


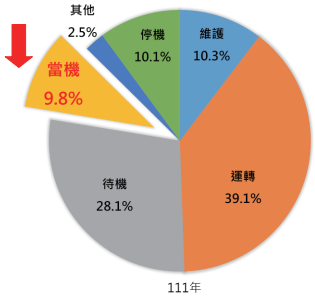
核研氯化亞鉈 [鉈 -201] 注射劑 107 年 -111 年服務人次

4. 運維管理，降低當機率

核研所 30MeV 迴旋加速器營運至今已超過 29 年，因應國內核醫藥物需求攀升，核研所強化運維管理，透過與核研所核工組跨組合作導入國內核電廠常用的量化風險評估技術，協助評估迴旋加速器設備老化與可靠度問題，於 110 年完成加速器重要組件 - 中央上襯墊 (liner) 老化維修，接續於 111 年 9 月 28 日至 10 月 13 日，完成另項重要組件 - 射頻放大器備源系統建立，並持續依量化風險評估結果規劃逐年編列爭取預算，進行中型迴旋加速器系統之精進與更新，使當機率明顯改善，由 109 年 22.7%、110 年 10.7% 下降至 111 年的 9.83%。



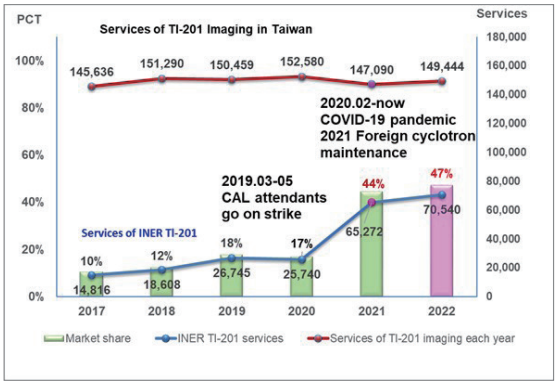




The biochemical characteristics of the Thallous Chloride (Thallium-201) Injection are similar to the Thallium ions (Tl+) and Potassium ions (K+) allowing it to be absorbed by the heart muscle. Uptake is directly proportional to coronal artery blood flow so it can be used for functional diagnosis of cardiac arrest and oxygen-starvation. Cyclotron output is isolated and purified in the Production Lead Room before being used to produce the Thallous Chloride (Thallium-201) Injection in the RPC sterile clean room for domestic use.

c. Emergency supply to make up for domestic shortfall during COVID-19

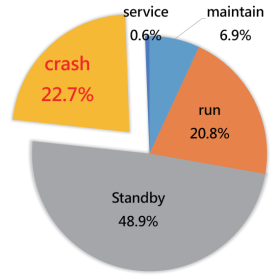
A total of 402,400-mCi were produced and supplied during the COVID-19 pandemic (April 20, 2020, through to December 31, 2022) to perform 160,900 patient scans. Approximately 70,540 patients were scanned between January 1 and December, 2022. The number of cardiac patients served grew by approximately 45,000 people between 2020 and 2022 to fulfill the social responsibility of the INER.



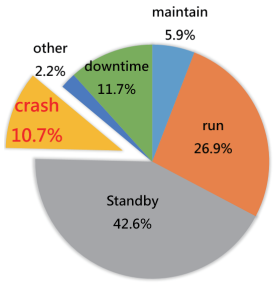
Number of people serviced by the Thallous Chloride (Thallium-201) - Injection between 2018 and 2022.

d. Operation and maintenance management to lower risk of failures

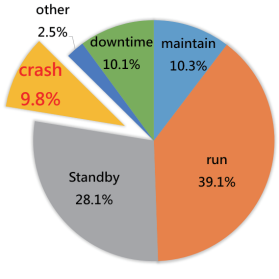
The INER 30 MeV cyclotron has now been in operation for more than 29 years. The INER is strengthening its O&M management in response to growing domestic demand for radiopharmaceuticals. The INER nuclear engineering team worked with other teams to introduce the probabilistic risk assessment (PRA) techniques commonly used in domestic NPPs and helped assess aging and reliability problems with the cyclotron. In 2021, maintenance was performed on the aging liner. Between September 28 and October 13, 2022, the INER completed the installation of another key components (Radiofrequency amplifiers redundancy system). The results of the probabilistic risk assessment are now used to forecast the budget for each year. The medium-sized cyclotron was refined and updated significantly. The annual budget was assigned in accordance with the probabilistic risk assessment outcomes. The improvement and updating of the medium-sized cyclotron produced a significant improvement in failure probability. These started at 22.7% in 2020, followed by 10.7% in 2021, and dropped refinement and update of 9.83% in 2022.



2020
(24 hours/day · 366 days/year)



2021
(24 hours/day · 365 days/year)



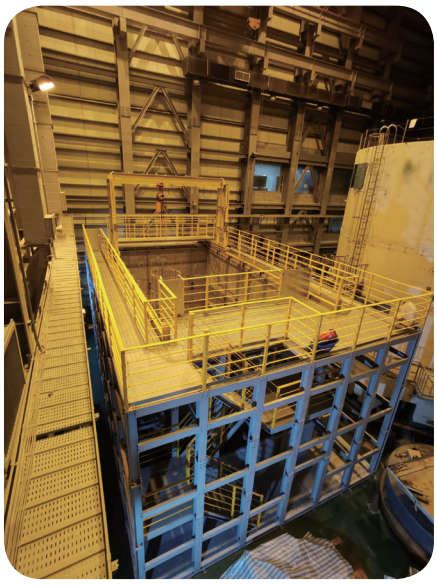
2022
(24 hours/day · 365 days/year)

七、落實放射性物料管理

（一）滾動管控 如期推展研究用反應器設施除役

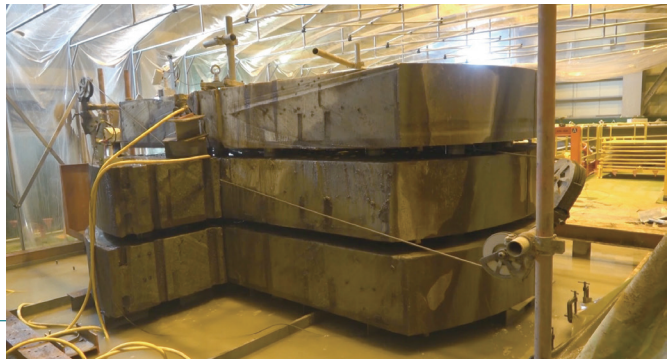
核研所的台灣研究用反應器 (TRR) 於 77 年停止運轉後，原能會於 93 年 4 月核發除役許可，並由核研所展開除役作業，依法應於 118 年 3 月前完成所有除役工作，其除役作業範疇包括：附屬設施濕貯槽及緊急冷卻水塔拆除、燃料池清理、核子燃料乾貯場 (DSP) 清除、反應器爐體廢棄物拆解、5 座附屬廢棄物處理及貯存設施除役等。原能會為持續嚴密管制除役作業執行進度， 111 年度審定除役作業計畫修正版及年度執行成果報告，滾動管制核研所各項除役工作進度，以管控除役作業廢棄物產量及確保除役作業安全。

TRR 除役過程長達 20 餘年，現已完成附屬設施濕貯槽、緊急冷卻水塔、燃料池等項目之拆除及清理工作；而針對除役作業未完成部分，原能會於 111 年度審定「台灣研究用反應器爐體廢棄物拆解計畫書 (第 2 版)」及「核子燃料乾貯場 (DSP) 清除計畫書 (第 3 版) 」，另核發可燃性廢棄物貯存庫及高活度廢棄物地下貯存庫之除役許可。此外，原能會於除役作業期間，持續派員辦理除役作業各項檢查，並要求核研所完備各項作業程序書，加強作業人員之操作訓練及演練，充分落實三級品保作業要求，避免工安、輻安等意外事件發生，讓除役工作推展順遂。



研究用反應器爐體大型濕式切割站
Large wet cutting station for the research reactor vessel.

核研所為配合 TRR 除役作業需求，亦積極發展各項遙控技術與機具設備，包含濕式切割站之水下圓盤鋸、水下帶鋸機及石墨反射體吊運裝置等，並建立反應爐爐心組件吊卸及切割機等自主研發能力。而原能會也要求核研所應建立除役各項運載及切割作業之標準作業程序書，辦理冷測試作業及相關意外事故演練；原能會於各項作業及演練期間，均派員查核相關作業辦理情形，以嚴格管制除役作業安全。



研究用反應器爐體切割作業
Cutting of the research reactor vessel.

VII. Nuclear Material and Radioactive Waste Management

A. Rolling Controls: Ensuring that the research reactor is decommissioned on schedule

The Taiwan Research Reactor (TRR) of the INER has been ceased operation since 1988 and its decommissioning plan was approved by the AEC in April 2004. The decommissioning process is undergoing and should be completed by March, 2029, in accordance with regulations. The scope of decommissioning include: Dismantling of the attached wet storage tank and emergency cooling tower, clean-up of the fuel pool, removal of the nuclear fuel dry storage pit (DSP), dismantling of reactor vessel waste, processing of waste from five affiliated facilities, and decommissioning of the storage facilities. Decommissioning progress is being closely monitored by the AEC. The amended decommissioning plan and annual progress report were reviewed in 2022 with rolling controls on the progress of each decommissioning task to keep track of waste produced by decommissioning and ensure the safety of decommissioning operations.

The decommissioning process for TRR is scheduled to take more than 20 years. The dismantling and removal of the attached wet storage tank, emergency cooling tower, and fuel pool have now been completed. The "TRR Waste Dismantling Plan (Ver. 2)" and "Dry Storage Pit Removal Plan (Ver. 3)" were approved by the AEC in 2022. Approval was also issued for the decommissioning of the combustible waste storage and underground high-level waste storage facilities. The AEC continues to conduct inspections to oversee the decommissioning. The INER has continually set up the proper operating procedures, strengthened its operator training and exercises, and enforced three-tier quality control requirements. The prevention of industrial and radiation safety accidents ensures that everything goes smoothly during the decommissioning.

The INER has also actively developed the remote control and mechanical equipment in support of TRR decommissioning requirements. These included an underwater saw for the wet cutting station, underwater band saw, and graphite reflector crane. An independent R&D capability for the lifting and cutting of the reactor vessel and core barrel components was also established. AEC has requested INER to prepare the standard operating procedures for all transportation and cutting operations during decommissioning, as well as organize test runs and emergency exercises. The AEC will continually oversee the decommissioning process to ensure the safety of decommissioning.

（二）強化安全 積極落實廢棄物設施營運管制

原能會長年來均嚴格管制核電廠低放射性廢棄物處理及貯存設施的運轉安全，並要求低放射性廢棄物貯存設施於運轉期間，每 10 年應實施貯存設施安全狀況再評估作業；111 年 2 月原能會已審定「核三廠低放射性廢棄物貯存庫再評估報告」，確保該設施的貯存安全。有關貯存設施運轉安全強化部分，原能會於 111 年 9 月已審定「核二廠減容中心結構補強施工計畫書」，後續於結構補強作業期間，原能會將持續派員進行安全檢查。另原能會也持續要求核電廠積極落實放射性廢棄物減量措施，目前國內三座核電廠低放射性固化廢棄物桶數量已降至每年 200 桶以下之歷史低點，且 111 年度達成無工安及無輻安事件的目標。

原能會持續管制國內核電廠各項除役作業之進度，在核一廠貯存壕溝除役作業部分，監督台電公司落實各項除役作業安全，並在確認貯存壕溝除役作業符合放射性物管 法規相關安全要求後，於 111 年 8 月准予解除除役管制。另有關核一廠汽機廠房除役拆除廢棄物安全管制部分，原能會已於 110 年要求台電公司參酌國際原子能總署相關規範及國際核能電廠除役經驗，擬定核一廠汽機廠房主發電機相關設備離廠偵檢作業方案送原能會審查，原能會經嚴密審查後，於 111 年 8 月同意核備，並要求台電公司做好相關離廠偵檢前置整備作業及加強民眾溝通宣導工作，以有效抑減廢棄物產量，取得民眾支持與認同，確保除役作業安全。另為提升離廠偵檢作業管制效能，於 111 年 10 月舉辦除役廢棄物離廠輻射量測查驗訓練課程及實體操作訓練，期望與國際除役放射性廢棄物管制技術同步接軌，達成核廢減量及安全管理等目標。

B. Enhancing Security: Proactive regulation of facilities operations

The operational safety of treatment and storage facilities of low-level radioactive waste from NPPs has been strictly regulated by the AEC for many years. The storage facilities for low-level radioactive waste are also required to conduct a facility safety re-assessment after every 10 years of operation; the review of the "Maanshan NPP Low-level Radioactive Waste Storage Facility Re-assessment Report" was reviewed and approved by the AEC in February, 2022, and storage safety at the facility was confirmed. For improvements to the operational safety of storage facilities, the "Structural Reinforcement Plan for the Kuosheng NPP Volume Reduction Center" was reviewed and approved by the AEC in September 2022. The AEC will continue to dispatch personnel and conduct safety inspections while the structural reinforcement is being carried out. The AEC has also been continuing to require NPPs to actively implement radioactive waste volume reduction measures. The three NPPs in Taiwan have now reduced their barrel count for low-level radioactive solidified waste to a new historical low less than 200 a year. The goal of zero industrial safety and radiation safety accidents during 2022 was also achieved.

The AEC is continuing to monitor the progress of all decommissioning operations at domestic NPPs. For the decommissioning of the Chinshan NPP storage trench, the AEC is supervising the TPC to ensure safety during every decommissioning process. Decommissioning regulations were subsequently lifted in August 2022 after verifying that the decommissioning of the storage trench complied with the relevant safety requirements of radioactive material management regulations. To ensure the safe management of waste from the dismantling of the Chinshan NPP turbine building, in 2021 the AEC directed the TPC to draw on the relevant IAEA regulations and international experience on NPP decommissioning to develop and submit a proposal for inspection of generator equipment removed from the Chinshan NPP turbine building to the AEC for review. Approval was granted in August 2022 with TPC also being required to make proper preparations for an exit inspection and public communication. Effective curbing of waste output will help winning over the general public and ensure the safety of decommissioning operations. To improve the effectiveness of exit inspections, a training course with hands-on training for the measurement and detection of radiation from NPPs during the exit inspection was carried out in October 2022. The AEC expects that synchronization with international radioactive waste management technologies will help achieving the goals such as nuclear waste reduction and safety management

同時，原能會為確保放射性廢棄物處理設施之運轉人力素質並提升運轉安全，於111 年 7 月辦理放射性廢棄物處理設施運轉人員測驗，並配合疫情指揮中心防疫政策，落實相關防疫措施，使測驗順利圓滿結束。此外，為增進放射性物料設施營運安全，提升作業人員危機意識與應變能力，原能會於 111 年 9 月會同核二廠相關人員辦理「核二廠放射性廢棄物意外事故聯合應變演練」，強化核電廠意外事故應變能力，確保設施及人員安全。

核二廠放射性廢棄物意外事故聯合應變演練
Joint emergency response exercise for radioactive waste at the Kuosheng NPP.

（三）邁向除役 督促推動用過核子燃料乾式貯存設施

乾式貯存設施為核電廠除役之必要設施，台電公司參採社會共識，提出核一、二、三廠室內乾式貯存設施興建計畫，皆已獲行政院同意興建；爰此，原能會本於安全監督之職責，持續督促台電公司加速推動乾式貯存興建計畫，期望儘早移出核反應器及燃料池內之用過核子燃料，使拆廠及除役作業順遂推展。原能會於 111 年 8 月准予解除核一廠廢棄物壕溝除役管制，以作為核一廠室內乾貯設施室內乾貯用地。而有關核二、三廠室內乾貯設施興建計畫，台電公司現正辦理設施基礎設計作業，原能會亦將持續督促台電公司積極推動室內乾式貯存設施，並以核電廠除役停機過渡階段期間完成興建啟用為目標。

At the same time, to maintain the quality of personnel at radioactive waste treatment facilities and improve operational safety, the Operator Training for Radioactive Waste Facility exam was conducted in July 2022. Epidemic prevention measures were successfully implemented in accordance with the epidemic prevention policy issued by the Central Epidemic Command. To enhance the operational safety of radioactive material facilities as well as boost operator crisis awareness and response skills, the AEC organized the "Joint Emergency Exercise for Radioactive Waste at the Kuosheng NPP" in concert with Kuosheng NPP personnel in September 2022. The exercises strengthened the emergency response capability of the NPP to ensure the safety of facilities and personnel.

離廠量測檢查重點簡介及儀器操作訓練
Introduction to an exit inspection and operator training for instruments.

C. Step Forward to Decommissioning: Overseeing the implementation of dry storage facilities for spent fuel

Dry storage facilities are an essential part of NPP decommissioning. The TPC took the social consensus into account by proposing the construction of indoor dry storage facilities for the Chinshan, Kuosheng, and Maanshan NPPs. As the safety regulator, the AEC has been continuing to push the TPC to accelerate its dry storage construction plan so that spent fuel inside the reactor vessels and fuel pools can be removed as soon as possible to facilitate the dismantling and decommissioning of the NPPs. In August 2022, the AEC approved the decommissioning deregulation on the Chinshan NPP waste trench so that the site can be used for the Chinshan NPP's indoor dry storage facility. The initial design for the indoor dry storage at the Kuosheng NPP and Maanshan NPP is now underway at the TPC. The AEC will continue to oversee the construction progress of indoor dry storage facilities by the TPC to facilitate the completion and commissioning of the facilities during the shutdown and transitional phase of NPP decommissioning.

原能會為督促台電公司積極推動乾式貯存計畫，每月均辦理乾式貯存設施管制討論會議，要求台電公司於會議中說明辦理進度，並就室內乾式貯存設施相關安全技術議題進行先期溝通討論，以順遂未來設施申照審查作業；並且邀集經濟部及台電公司召開溝通會議，檢討核電廠乾式貯存設施興建計畫，並請經濟部督促台電公司積極推動室內乾式貯存設施興建，以利核電廠之除役作業。

核一乾貯統合演練作業
Integration drill at the dry storage facilities in the Chinshan NPP.

核一乾貯設備維護檢查
Inspection of dry storage equipment at the Chinshan NPP.

為維持熱測試作業人力及技術能量，原能會持續要求台電公司定期辦理核一廠設備組件維護保養及年度統合演練作業，作業期間原能會均派員執行專案檢查，查核台電公司執行成效。而核二廠第一期乾式貯存設施部份，台電公司持續辦理密封鋼筒及其組件製造作業，原能會每季組成檢查小組辦理專案檢查作業，追蹤台電公司三級品保作業的執行成效。

為超前部署乾式貯存作業的安全管制，原能會已要求台電公司先期執行核一、二廠乾式貯存設施待貯存燃料啜吸檢驗作業，台電公司於 111 年度完成核一廠 551 束及核二廠 436 束用過核子燃料完整性抽樣檢驗作業，原能會並於作業期間派員檢查，嚴格查核相關作業程序及品質紀錄，以確保未來燃料乾式貯存安全。

The AEC has been currently holding monthly meetings with the TPC to move ahead on the dry storage plan. In addition to requiring the TPC to provide progress updates during the meetings, early stage communication and discussions are also held on safety and technical issues related to the dry storage facilities to expedite the review of construction permits in the future. Communication meetings are also held with the MOEA and TPC to discuss the construction plans for NPP dry storage facilities. The MOEA has also been asked to supervise the TPC's progress on construction of dry storage facilities to facilitate NPP decommissioning.

The AEC has been continuing to require the periodic maintenance of plant equipment and annual integration drill at the Chinshan NPP by the TPC to maintain the manpower and technical capabilities for hot testing. The AEC performs inspection during such operations to verify relevant effects. The TPC is continuing to fabricate dry storage equipment for the phase 1 dry storage facilities of the Kuosheng NPP, and the AEC conducts quarterly inspections and track the implementation of 3-level quality assurance by the TPC.

核二廠密封鋼筒製造檢查／ Inspection of dry storage equipment fabrication for the Kuosheng NPP.

As part of the advance preparations on safety regulatory of dry storage, the AEC requested the TPC to conduct sipping tests for spent fuel of the Chinshan NPP and Kuosheng NPP. The TPC completed integrity testing for 551 bundles of spent fuel at the Chinshan NPP, and 436 bundles of spent fuel at the Kuosheng NPP during 2022. To ensure the future safety of spent fuel in dry storage, the AEC implemented relevant inspection periodically to examine all operating procedures and quality assurance activities.

（四）督促遷場 持續強化蘭嶼貯存場安全

我國政府及社會長年來關注及重視核廢料遷出蘭嶼議題，總統府原住民族歷史正義與轉型正義委員會於 110 年 4 月指示經濟部核廢料最終處置地點是國家重大議題之一，未來應持續推動該議題進程。原能會亦配合積極督促台電公司辦理蘭嶼遷場作業，除要求台電公司依蘭嶼貯存場遷場規劃報告審定結果，積極辦理遷場作業外，並定期邀集經濟部及原民會召開跨部會討論會議，共同督促台電公司辦理蘭嶼核廢料遷場事宜。此外亦要求台電公司每季提報蘭嶼貯存場遷場辦理情形報告，送行政院非核家園推動專案小組列管，並要求台電公司針對公民與政治權利國際公約及經濟社會文化權利國際公約第三次國家報告國際審查會議第 37 點結論性意見與建議，每半年提出核廢料遷出蘭嶼之執行情形說明。

原能會要求台電公司應做好遷場前的準備作業，監督台電公司執行蘭嶼貯存場所有核廢料的重裝作業，台電公司已於 111 年 10 月完成「提升蘭嶼貯存場營運安全實施計畫」全數工項。另原能會為強化未來遷場作業運送船舶輻射安全管制，於 111 年 6 月發布「低放射性廢棄物海洋運送船舶輻射安全規範」，以做為遷場作業運送船舶輻射安全設計之依據。

為進一步強化核廢料遷出蘭嶼前的貯存安全，原能會已要求台電公司執行貯存壕溝結構體完整性檢測與評估，以及處理中心與鋼構廠房之結構耐震評估、老化管理評估等相關安全檢測作業。在核廢料桶尚未搬離蘭嶼之前，原能會將持續嚴格監督台電公司提升核廢料貯存場安全，同時嚴密監督蘭嶼地區的環境輻射。

蘭嶼貯存場已完成重裝安全貯存
Repackaging for safe storage completed at the Orchid Island storage site.

D. Overseeing Site Relocation - Continue to Strengthen the Safety of the Orchid Island Storage Site

The removal of nuclear waste from Orchid Island has been a topic that our government and society have taken a strong interest in over the years. In April 2021, the Presidential Office Indigenous Historical Justice and Transitional Justice Committee directed the MOEA to continue making progress on this issue as the final disposal of nuclear waste is a national priority. The AEC is therefore continuing to push for the TPC to proceed with the relocation of the Orchid Island storage site. In addition to requiring the TPC to relocate the Orchid Island storage as soon as possible in accordance with the review outcome of the Planning Report on the Orchid Island Storage Site Relocation, inter-ministry conferences are also regularly convened with the MOEA and Council of Indigenous Peoples (CIP) to supervise TPC to make progress on relocation of the Orchid Island storage site. The TPC is also required to submit quarterly progress reports on the relocation of the Orchid Island storage site to the Executive Yuan's Nuclear-Free Homeland Task Force for tracking purposes. Progress updates must also be provided every 6 months by the TPC on the relocation of nuclear waste from Orchid Island in accordance with the concluding observations and recommendations from Item 37 of the international review meeting on the 3rd Country Report for International Covenant on Civil and Political Rights (ICCPR) and International Covenant on Economic Social and Cultural Rights (ICESCR).

The AEC has directed the TPC to complete all preparations for the relocation and is supervising the re-sealing of all nuclear waste at the Orchid Island storage site by the TPC. All tasks in the "Implementation Plan for Enhancement of Operational Safety at the Orchid Island Storage Site" were completed by the TPC in October 2022. To strengthen radiation safety management for shipping used for relocation in the future, the "Vessel Radiation Safety Regulations for Marine Transportation of Low-level Radioactive Waste" were issued by the AEC in June 2022 to serve as a basis for radiation safety design of transport ships used for relocation of the storage site.

To strengthen storage safety at the Orchid Island storage site before the nuclear waste is relocated, the AEC has directed the TPC to carry out integrity testing and assessment of the storage trench structure. Other safety inspections including a seismic assessment and aging management assessment of the processing center and steel-framed workshops were also required. The AEC will continue to closely supervise the TPC on upgrades to the safety of nuclear waste storage site before the barrels of nuclear waste are removed from Orchid Island. Environmental radiation on Orchid Island will also be closely monitored.

八、強化環境輻射監測

(一) 111 年台灣海陸域輻射調查計畫

輻射偵測中心 111 年繼續執行台灣及離島周邊海域、山區及核設施周圍土壤及西部地區稻米的環境輻射監測專案計畫，藉由跨部會合作，由海巡署、水產試驗所、漁業署協助離島與近海海水、海產物及岸沙等海域樣品取樣；另由農業試驗所協助山區土壤及西部稻米等陸域樣品取樣。樣品皆由偵測中心進行放射性核種分析，其中鉀-40、釷系、鈾系為天然放射性核種，相關分析結果皆無輻射異常現象。

111 年海陸域輻射調查樣品種類、分析件數及核種

樣品種類	分析件數	分　析　核　種
海水	517	銫-134、銫-137、氚、鍶-90
岸沙	22	銫-134、銫-137、鉀-40、鈷-60、釷系、鈾系
海產物	301	銫-134、銫-137、鉀-40、碘-131、釷系、鈾系、鍶-90
土壤	277	銫-134、銫-137、鉀-40、釷系、鈾系
稻米	206	銫-134、銫-137、鉀-40、釷系、鈾系

由於日本政府宣布福島第一核電廠核災後含氚處理水將於 112 年排放至海洋，偵測中心邀集水產試驗所、漁業署、海保署、海巡署、國海院及核研所成立「海域輻射監測工作小組」定期召開工作小組會議，執行海洋環境輻射監測計畫 (包括台灣海域海水氚之輻射監測)。

VIII. Strengthening Environmental Radiation Monitoring

A. 2022 Environmental Radiation Survey of Marine and Terrestrial Areas in Taiwan

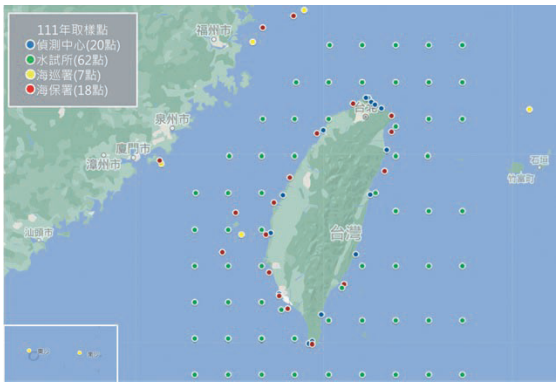
In 2022, the Radiation Monitoring Center (RMC) continued to execute the environmental radiation monitoring program for marine areas around Taiwan and its offshore islands, soil from mountain areas and around nuclear facilities, and rice from western Taiwan. The multi-agency effort includes the Coast Guard Administration, Fisheries Research Institute, and Fisheries Agency assisting with the collection of marine samples such as seawater from offshore islands and coastal waters, seafood, and beach sand. The Taiwan Agricultural Research Institute assisted with the sampling of soil from mountain areas and rice grown in western Taiwan. All samples underwent radioactive nuclide analysis by the RMC. Potassium-40, Thorium series, and Uranium series are all natural radioactive nuclides and analysis found no radiation anomalies.

Types of samples, number of analyzed samples, and analyzed nuclides for the 2022 Environmental Radiation Survey of Marine and Terrestrial Areas.

Sample Type	Number of Analyzed Samples	Analyzed Nuclides
Seawater	517	Cesium-134, Cesium-137, Tritium, Strontium-90
Beach Sand	22	Cesium-134, Cesium-137, Potassium-40, Cobalt-60, Thorium series, Uranium series
Seafood	301	Cesium-134, Cesium-137, Potassium-40, Iodine-131, Thorium series, Uranium series, Strontium-90
Soil	277	Cesium-134, Cesium-137, Potassium-40, Thorium series, Uranium series
Rice	206	Cesium-134, Cesium-137, Potassium-40, Thorium series, Uranium series

The Japanese government announced that Tritium contaminated wastewater from the Fukushima Daiichi accident will be discharged into the ocean from 2023 onwards. The RMC invited the Fisheries Research Institute, Fisheries Agency, Ocean Conservation Administration, Coast Guard Administration, National Academy of Marine Research, and INER to set up the "Marine Radiation Monitoring Working Group." The working group meets regularly to carry out the marine environmental radiation monitoring program (including radiation monitoring of Tritium in the seawater of Taiwanese waters).

偵測中心於台灣沿岸主要漁港、核電廠附近海域、離島海域、近海海域、主要漁場 62 個測站等計 107 個點位進行海水樣品取樣及分析作業，共分析海水中氚活度計 418 件。分析結果顯示，除核電廠周圍海域檢出微量之氚活度外，其餘地區之海水樣品氚含量檢測結果皆小於最低可測值（MDA 為 2.03 貝克 / 升），而核電廠周圍海域之氚活度均遠低於「環境輻射監測規範」水樣氚之調查基準 1100 貝克 / 升，無輻射異常現象。



台灣海域海水氚分析取樣位置全圖
Map of all sampling locations for seawater Tritium in Taiwanese waters.

（二）國民輻射劑量調查研究計畫

偵測中心從 108 年至 111 年，執行為期 4 年之國民輻射劑量調查，包含 (1) 背景輻射 (2) 醫療輻射 (3) 消費性產品 (4) 產業活動與 (5) 職業曝露等五類。至 111 年底，計畫已完成整體國民輻射劑量範圍的調查與評估。

111 年完成的醫療診斷輻射劑量調查係委託專業團隊 (財團法人中華民國輻射防護協會) 執行「國民醫療輻射劑量調查研究計畫」，歷經 3 年 6 個月 (108 年 1 月至 111 年 6 月) 的時間，透過分析全民健保資料庫資料、到取樣醫院進行實地調查、量測各檢查序列輻射劑量、建構劑量評估模型、用軟體進行模擬評估及劑量計算等步驟，共完成 14 萬多筆的醫療輻射曝露資料蒐集，與其相應檢查的有效劑量評估，是目前國內醫療輻射曝露最完整的資料，也是國際間罕見的醫療輻射劑量調查，結果顯示醫療輻射所導致每位國民平均每年的輻射劑量為 1.51 毫西弗。

偵測中心 111 年亦自行執行 (1) 吸菸行為 (2) 搭乘航空器行為 (3) 農業肥料所導致的輻射曝露三項 (屬於消費性產品類) 調查評估，吸菸行為部分，首先需測量香菸中放射性核種釙-210 之含量，配合國際間認可的體內劑量轉換因子，並參考衛福部國健署之國人吸菸行為調查，根據不同性別及年齡層吸菸比例進行劑量評估，推估出吸菸行為所導致的國民輻射年劑量為 0.047 毫西弗。搭乘航空器行為部分，先引用民航局所提供國人飛航行為調查結果，針對國際線、兩岸線與國內線的旅遊人次進行熱門航線探討，再分別以台灣自行開發的劑量評估軟體 NTHU FDC 與法國開發之 SIEVERT 飛航劑量評估軟體執行飛航劑量計算，最後評估出國人因搭乘飛機所造成之國民輻射年劑量為 0.010 毫西弗。

The RMC established 107 monitoring stations including at key fishing ports on the Taiwanese coast, sea areas near NPPs, sea areas of offshore islands, coastal sea areas, and 62 key fisheries for the collection and analysis of seawater samples. A total of 418 samples were analyzed for Tritium activity in seawater. The results of the analysis found that trace levels of Tritium activity were only detected in sea areas around NPPs and below the Minimum Detectable Activity (MDA is 2.03 Bq/L) threshold in all other areas. Tritium activity in the sea areas near NPPs were all below the study baseline of 1100 Bq/L set by the "Environmental Radiation Monitoring Guidelines."

B. Survey Project on population radiation dose

The RMC conducted a 4-year population radiation dose survey from 2019 through 2022 that examined the following five exposure categories: (1) background radiation, (2) medical radiation, (3) consumer products (4) industrial activity, and (5) occupational exposure. The range of population radiation dose was fully surveyed and analyzed by the end of 2022.

The medical diagnostic radiation dosimetry survey completed in 2022 was carried out as the "Survey Project effective dose per individual in the Taiwan population by medical exposure" by a professional team (Radiation Protection Association R.O.C.). The project ran for three years and six months (from January 2019 to June 2022) and involved the analysis of the National Health Insurance database, field work at hospitals, measuring the radiation dose of each test sequence, constructing a dosimetry assessment model, as well as the assessment and calculation of dosimetry with software. More than 140,000 records on medical radiation exposure were compiled and assessed on the effective dose of their corresponding tests. This is the most comprehensive set of data on medical radiation exposure in Taiwan so far and one of the studies on medical radiation dosimetry carried out internationally. The findings of the survey determined that medical radiation resulted in each citizen receiving a 1.51 mSv radiation dose per year.

The RMC studied radiation exposure caused by (1) smoking, (2) civil aviation, and (3) agriculture fertilizer (classified as of the consumer products type) in 2022 as well. For smoking behavior, the Polonium-210 content of the cigarette was measured and internationally accepted in vivo dose conversion factors were applied. The survey on smoking behavior in Taiwan conducted by the Health Promotion Administration of MOHW was also used as a reference for dose assessment of smoking ratio among different genders and age groups. Smoking behavior was then estimated to create a 0.047 mSv of annual dose for Taiwan nationals. For the civil aviation, the results of the survey on flying behavior of Taiwanese people provided by the CAA were cited to examine popular international, cross-strait, and domestic routes, The NTHU FDC dosimetry assessment software developed by Taiwan and the Sievert aviation dose assessment software developed by France were used to calculate the dose of flight. The population radiation dose from civil aviation was estimated to be 0.010 mSv of annual dose for Taiwan nationals.

農業肥料部分，使用高純度鍺輻射偵檢器測量國內製造的 13 件市售肥料，分析所含鐳-226、釷-232 和鉀-40 的放射性核種活度濃度，先計算肥料樣品施作於農地後於乾燥空氣離地表面 1 公尺處所造成的吸收劑量，考量農民受肥料所含天然放射性物質的每日平均曝露時間、吸收劑量與有效劑量的轉換因子，最後計算出肥料施作於農地後所造成的國民輻射劑量為 0.000025 毫西弗，因消費性產品所導致的輻射劑量為每位國民平均每年 0.057 毫西弗。

在產業活動導致的國民輻射劑量評估部分，偵測中心完成核設施所導致的輻射曝露，為偵測中心自行研究。國內核設施分為核一廠、核二廠、核三廠、清華大學研究用反應器、核研所、台電公司蘭嶼低放貯存場等，共計 6 座核設施，引用各項核設施監測報告，包含「放射性物質排放報告」、「台灣地區核設施環境輻射監測年報」、「核能研究所場所外環境輻射監測報告書」及「低放貯存場環境輻射監測報告」等報告中數據進行國民輻射劑量之評估，評估結果國內核設施造成之國民輻射劑量為 $3.9x10^{-7}$ 毫西弗。

職業曝露評估部分，更新 110 年民用航空機組人員之評估結果，偵測中心參採聯合國原子輻射效應科學委員會 (UNSCEAR)、美國及日本之做法，以國際認可評估方式結合本土數據再次進行民用航空職業曝露劑量之推估；國內 104 年至 109 年民用航空飛航工作人員約有 10,780 人，我國飛航人員之個人年有效劑量約為 1.97 毫西弗，據以推算出民用航空之集體有效劑量約為每年 21.24 人 - 西弗，由天然射源 (民航空勤人員) 職業曝露所貢獻的國民輻射年劑量為 0.0009 毫西弗。結合 108 年至 110 年的評估結果，國民輻射劑量調查評估結果詳如下表。

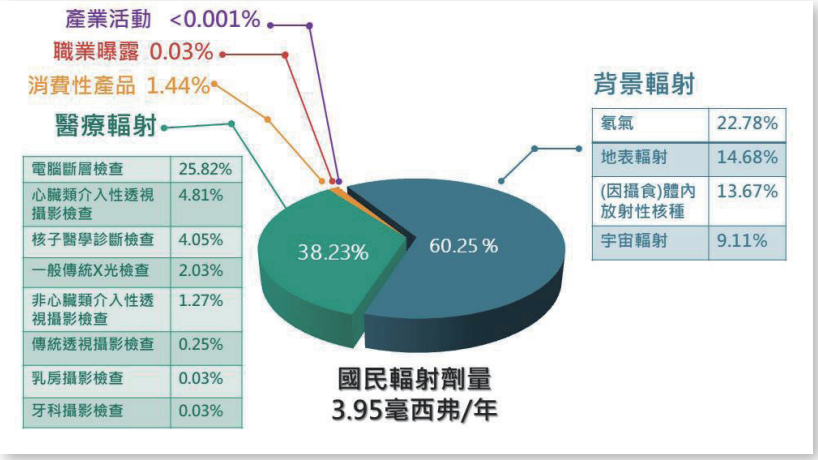
In terms of agricultural fertilizer, 13 fertilizer products produced and sold domestically were measured using high-purity germanium detectors to analyze the radionuclide activity and concentration of Radium-226, Thorium-232, and Potassium-40. First, the fertilizer samples were applied to farmland and absorbed dose from 1m above the ground in dry air was calculated. Farmer's average daily exposure situation and conversion factors for absorbed dose and effective dose from natural radioactive materials contained in fertilizer were then considered. Finally, the annual effective dose caused by the application of the fertilizer to farmland was calculated. Radiation dose due to industry activity was calculated to be 0.000025 mSv per person each year and all were due to the application of fertilizer. The findings of the survey determined that consumer products resulted in each citizen receiving a 0.057 mSv radiation dose per year.

To assess population radiation dose due to industry activity, the RMC conducted internal studies on radiation exposure caused by nuclear facilities. The six domestic nuclear facilities include the Chinshan NPP, Kuosheng NPP, Maanshan NPP, NTHU Research Reactor, INER, and TPC Lanyu Low-level Storage Site. Population radiation dose was assessed using data from the monitoring reports of these nuclear facilities including the "Radioactive Material Discharge Report", "Annual Report of Environmental Radiation Surveillance for Nuclear Facilities of Taiwan", "INER External Environmental Radiation Monitoring Report", and "Environmental Radiation Monitoring Report for Low-level Storage Site". The population dose from nuclear facilities was estimated to be 3.9×10^{-7} mSv per year for Taiwan nationals.

In terms of occupational exposure, the assessment outcomes for civilian air crews for 2021 were updated. The RMC used the methodology of the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR), the US, and Japan to re-estimate the occupational exposure dose of civilian air crews using internationally accepted methods and local data. Between 2015 and 2020, there were 10,780 civilian aviation workers in Taiwan. The annual effective dose of air crews in Taiwan was approximately 1.97 mSv so the collective effective dose in civil aviation was 21.24 person-Sv. The contribution from occupational exposure from natural radiation sources (civilian air crews) to annual population radiation dose was 0.0009 mSv. The outcomes of the population radiation dose survey based on data from 2019 through to 2021 were as follow:

國民輻射劑量調查評估結果

項　　目	年有效劑量（毫西弗）	百分比 (%)
醫療輻射 - 電腦斷層檢查	1.02	25.82%
背景輻射 - 氡氣	0.90	22.78%
背景輻射 - 地表輻射	0.58	14.68%
背景輻射 -(因攝食) 體內放射性核種	0.54	13.67%
背景輻射 - 宇宙輻射	0.36	9.11%
醫療輻射 - 心臟類介入性透視攝影檢查	0.19	4.81%
醫療輻射 - 核子醫學診斷檢查	0.16	4.05%
醫療輻射 - 一般傳統 X 光檢查	0.08	2.03%
醫療輻射 - 非心臟類介入性透視攝影檢查	0.05	1.27%
消費性產品 - 吸菸	0.047	1.19%
消費性產品 - 飛航	0.010	0.25%
醫療輻射 - 傳統透視攝影檢查	0.01	0.25%
醫療輻射 - 乳房攝影檢查	0.001	0.03%
醫療輻射 - 牙科攝影檢查	0.001	0.03%
職業曝露 - 天然射源 (主要為民航空勤人員)	0.0009	0.02%
職業曝露 - 人工射源 (含核燃料循環、醫學應用、工業應用、其他應用類之輻射工作人員)	0.00028	<0.01%
消費性產品 - 農業	0.000025	<0.01%
總　　計	3.95	100%



國民輻射劑量調查評估結果圖
Mapping of outcome from survey project on population radiation dose.

Outcome of survey project on population radiation dose.

Item	Annual Effective Dose (mSv)	Percentage (%)
Medical Radiation – Computed Tomography	1.02	25.82%
Background Radiation – Radon Gas	0.90	22.78%
Background Radiation – Terrestrial Radiation	0.58	14.68%
Background Radiation – (Ingested) In Vivo Radionuclides	0.54	13.67%
Background Radiation – Cosmic Radiation	0.36	9.11%
Medical Radiation – Interventional Cardiac Fluoroscopy	0.19	4.81%
Medical Radiation – Nuclear Medicine Examination	0.16	4.05%
Medical Radiation – Conventional Radiography	0.08	2.03%
Medical Radiation – Interventional Non-cardiac Fluoroscopy	0.05	1.27%
Consumer Product – Tobacco Smoking	0.047	1.19%
Consumer Product –civil aviation	0.010	0.25%
Medical Radiation – Conventional Fluoroscopy	0.01	0.25%
Medical Radiation – Mammogram	0.001	0.03%
Medical Radiation – Dental Radiography	0.001	0.03%
Occupational Exposure – Natural Radiation Sources (mainly civilian air crews)	0.0009	0.02%
Occupational Exposure – Artificial Radiation Sources (radiation workers of medical applications, industrial applications, and other applications)	0.00028	<0.01%
Consumer Product – Agriculture	0.000025	<0.01%
Total	3.95	100%

（三）強化台灣東部地區輻安預警監測

龍門（核四）電廠自 104 年 8 月進入封存，最後一批核燃料棒於 110 年運離廠區，原偵測中心於龍門電廠周圍設有 5 座輻安預警自動監測系統監測站，為因應現實狀況，考量監測資源有限，偵測中心將龍門電廠 5 座環境輻射監測站中的 2 站移至台灣東部區域，以利資源有效利用，提高國家環境輻射監測效能，保障民眾輻射安全。

偵測中心目前於全國共設置 63 座環境輻射監測站，扣除離島 12 站，台灣本島計有 51 站，本島東部只有 4 站，西部監測站則有 47 站，為加強東部環境輻射監測，偵測中心將龍門電廠附近之三港及龍門環境輻射監測站遷移至台東大武氣象站及花蓮縣消防局玉里分隊，可使東部沿岸環境輻射站分布較為均勻。

台灣東部地區環境輻射監測站（大武、玉里為新設）

Environmental radiation monitoring stations in eastern Taiwan (Dawu and Yuli were newly added).

本次遷移在氣象局及花蓮縣消防局協助下，於 111 年 11 月順利完成大武及玉里環境輻射監測站之設置，12 月完成驗收並進行試運轉，且於 112 年 1 月 1 日起正式為民眾服務，保障民眾環境輻射安全。

玉里環境輻射監測站完工

Completion of the Yuli environmental radiation monitoring station.

C. Strengthening of Radiation Safety Early Warning Monitoring in Eastern Taiwan

The Lungmen NPP was mothballed in August 2015 and the last batch of fuel rods was removed from the site in 2021. The RMC had placed five automatic radiation safety monitoring stations around the Lungmen NPP. Considering the limit of resource, RMC moved two stations to eastern Taiwan from Lungmen NPP to optimize the effective use for radiation safety of the public.

The RMC currently has 63 environmental radiation monitoring stations throughout Taiwan. There are 12 stations on offshore islands and 51 stations on main island of Taiwan. There are only 4 stations in eastern Taiwan while there are 47 stations in western Taiwan. Therefore, RMC relocated Sangang and Lungmen stations to the Dawu station in Taitung and Yuli station in Hualien to improve consistent distribution in eastern Taiwan.

The relocation of the Dawu and Yuli environmental radiation monitoring stations was successfully completed and tested in November 2022 with the help of the Central Weather Bureau (CWB) and Hualien County Fire Department. Trial operation commenced in December after passing acceptance inspection and the monitoring stations formally started operating to protect the environmental radiation safety of the public on January 1, 2023.

大武環境輻射監測站完工／ Completion of the Dawu environmental radiation monitoring station


AEC

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大事記

Chronicle of Events

01 January

1月1日至12月31日

因應 COVID-19 疫情期間國內進口核醫藥物短缺問題，核研所緊急投入生產「氯化亞鉈 (鉈-201) 注射劑」及「檸檬酸鎵 (鎵-67) 注射劑」核醫藥物，111 年全年供應約 75,800 人次病患造影使用。

Emergency production of "INER THALLOUS CHLORIDE (T1-201) INJECTION" and "INER GALLIUM CITRATE (GA-67) INJECTION" was implemented by the INER in response to the shortage of imported radiopharmaceuticals during the COVID-19 pandemic. Approximately 75,800 scans were supplied in 2022.

1月4日至5月24日、3月7日至3月11日、5月31日至9月23日 6月13日至6月17日、9月19日至9月23日、12月5日至12月13日

執行核一廠 1 號機第 2 次維護測試週期作業專案視察。

AEC conducted the inspection of the operation for the 2nd maintenance surveillance cycle (MSC) of the Chinshan NPP Unit 1.

執行核一廠第 1 季除役計畫定期視察。

AEC conducted the Q1 inspection of the decommissioning plan implementation at the Chinshan NPP.

執行核一廠 2 號機第 2 次維護測試週期作業專案視察。

AEC conducted the inspection of the operation for the 2nd maintenance surveillance cycle (MSC) of the Chinshan NPP Unit 2.

執行核一廠第 2 季除役計畫定期視察。

AEC conducted the Q2 inspection of the decommissioning plan implementation at the Chinshan NPP.

執行核一廠第 3 季除役定期視察暨核能安全總體檢視察。

AEC conducted the Q3 inspection of the decommissioning plan implementation and the 2022 post-Fukushima safety enhancement measures at the Chinshan NPP.

執行核一廠第 4 季除役定期視察暨核安管制紅綠燈視察。

AEC conducted the Q4 inspection of the decommissioning plan implementation and the reactor oversight process at the Chinshan NPP.

1月6日

審定核研所 016 館核子原 (燃) 料貯存設施除役計畫書，並核發除役許可。

AEC reviewed the decommissioning plan of the nuclear materials and fuel storage facility of the INER and issued the decommissioning approval.

1月19日、7月19日

辦理 2 次「全民參與委員會」委員會議。

AEC organized two meetings of the "Committee on Public Participation."

1月20日

派員至消費市場及年貨大街購買進口香菇、腰果、干貝、鮑魚、螺肉、草菇、百果、核桃、木耳、葵瓜子、雪蓮子、水果乾、黑棗、化核梅、蝦米、開心果等 38 件，進行放射性含量檢測，檢測結果皆符合國家法規標準，相關結果公布於原能會網站。

RMC dispatched personnel to consumer markets and New Year's shopping areas to purchase 38 types of products including imported mushrooms, cashews, scallops, abalone, escargot, straw mushrooms, gingko, walnuts, Jew's ears, sunflower seeds, chickpeas, dried fruits, prune dates, seedless plums, dried shrimp, and pistachio nuts for radioactivity testing. All samples were found to comply with the national standards and the results were published on the AEC website.

1月21日

召開 111 年度核子保防管制會議。

AEC convened the 2022 Regulatory Meeting on Nuclear Safeguards.

1月22日

核備核研所六氟化鈾運送計畫及安全管制計畫。

AEC reviewed the uranium hexafluoride transportation and safety control plan of the INER.

1月24日、8月1日、8月9日

完成「111 年上半年翡翠水庫集水區域水樣放射性含量分析結果」，並將結果函送臺北翡翠水庫管理局。

完成臺北自來水事業處所屬淨水場及翡翠水庫集水區域水樣放射性含量分析結果分別為 10 件及 2 件，並將結果函送臺北自來水事業處及臺北翡翠水庫管理局。

The "Radioactive Analysis Result of the Water Sample Radiation Content in the Catchment Area of the Feitsui Reservoir in the first half of 2022" was completed and the results were sent in writing to the Taipei Feitsui Reservoir Administration.

Ten water samples from the catchment area of the Feitsui Reservoir and two water samples from the water treatment plants of the Taipei Water Department were tested for radioactivity. The analysis results were sent to the Taipei Feitsui Reservoir Administration and Taipei Water Department.

1月26日

召開第 9 次日本福島核災含氚廢水跨部會因應會議。

AEC convened the 9th inter-ministerial response meeting for the tritium contaminated wastewater from the Fukushima nuclear accident in Japan.

1月至11月

執行 111 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 633 位輻射屋居民健康檢查。

AEC implemented the "2022 Medical Consultation and Subsequent Medical Care Program for residents of radioactively contaminated buildings" and provided health examinations for the related 633 residents .

1月至12月

執行全國 45 家放射線照相檢驗業者之輻射作業現場不預警安全稽查，強化輻射管制。

AEC implemented unannounced radiation work site inspections for 45 radiographic inspection firms to improve the quality of radiation protection regulation.

辦理 111 年度低污染建物居民到府健康關懷計畫，完成 357 戶到府健康關懷訪視。

AEC organized the "2022 Home Visiting Program for Residents of Buildings With Low Levels of Radioactive Contamination." Home visits were completed for 357 households.

02 February

2月8日

完成「台灣地區 111 年環境輻射監測計畫」，並上網公開。

The "2022 Environmental Radiation Monitoring Plan in the Taiwan Area" was completed and published online.

2月9日

完成台灣海陸域環境輻射調查計畫 110 年度執行報告，並上網公開。

The "2021 Environmental Radiation Investigation Plan in the Marine and Terrestrial Areas of Taiwan" was completed and published online.

2月9日、2月16日、2月23日

協助高雄市政府辦理消防人員輻射災害訓練研習班，並派員擔任講師。

RMC assisted the Kaohsiung City Government with organizing radiological emergency training workshops for firefighters and dispatched personnel to serve as instructors.

2月10日

核定公告核一、二、三廠緊急應變計畫區 8 公里範圍。

AEC approved and noticed 8 km Emergency Planning Zones for the Chinshan, Kuosheng, and Maanshan NPPs.

2月11日

行政院蘇院長視察核研所食品放射性檢測實驗室檢測作業。

Premier Su inspected the Radionuclides in Foods Testing Laboratory at INER.

2月14日至2月18日、4月25日至4月29日、9月26日至9月30日

執行核三廠第 1 季及第 2 季核安管制紅綠燈專案視察。

AEC conducted the Q1 and Q2 inspection of the 2022 reactor oversight process at the Maanshan NPP.

執行核三廠核安總體檢專案視察。

AEC conducted the inspection of the 2022 post-Fukushima safety enhancement measures at the Maanshan NPP.

2月17日

核備核三廠低放射性廢棄物貯存設施十年再評估報告。

AEC approved the 10-year re-assessment report for low-level radioactive waste storage facilities at the Maanshan NPP.

2月25日至2月28日、7月15日至7月18日、12月10日至12月11日

於台北辦理 2 場、高雄辦理 1 場原子能科技科普展，透過面對面溝通，讓管制工作和研發成果貼近民眾，3 場次共吸引 17,527 參觀人次。

AEC organized 2 atomic energy science education exhibitions in Taipei and 1 in Kaohsiung to show the safety regulation and the R&D achievements of atomic energy through face-to-face communication with the public. Attendance at the three sessions totaled 17,527.

2月26日至4月6日、3月30日、4月6日

執行核二廠 2 號機第 27 次大修作業視察 (含防疫強化措施)。

AEC conducted the inspection of the 27th refueling outage (including pandemic prevention enhancement measures) for the Kuosheng NPP Unit 2.

同意核二廠 2 號機第 27 次大修後再起動臨界申請。

AEC approved the restart and criticality application of the Kuosheng NPP Unit 2 after the 27th refueling outage.

同意核二廠 2 號機第 27 次大修後併聯申請。

AEC approved the synchronizing to power grid application of the Kuosheng NPP Unit 2 after the 27th refueling outage.

2月至12月

密切關注俄烏戰爭烏克蘭核子設施遭受攻擊訊息，評估對我國輻射安全之影響，發布相關訊息。

AEC closely monitored reports of attacks on Ukrainian nuclear facilities during the Russo-Ukrainian War to assess their impact on radiation safety in Taiwan and publish related information.

03 March

3月3日

審定並備查台電公司低放射性廢棄物最終處置技術評估報告 (2020 年版)。

AEC reviewed the TPC assessment report on the final disposal technology for low-level radioactive waste (2020 Version).

3月8日、5月17日、7月6日、10月26日

完成台電公司「核二廠對於 GEH 公司 CRD 安全評估報告之適用性評估報告」程序審查，發函台電公司進入實質審查。

AEC completed the acceptance review of the "Assessment Report on the Applicability of the CRD Safety Assessment Report from GEH to the Kuosheng NPP" submitted by the TPC and notified the TPC to begin the technical review.

召開「核二廠除役過渡階段前期 CRD 系統隔離停用評估報告」第 1 次至第 3 次審查會議。

AEC held the first to third review meetings for the "Assessment Report on Isolation and Suspension of CRD System During the Transition Phase of Kuosheng NPP Decommissioning".

3月18日、3月31日、6月2日至6月16日

執行 111 年度第 1 次核二廠、核三廠、核一廠不預警視察。

AEC conducted the 1st unannounced inspection at the Kuosheng, Maanshan, and Chinshan nuclear power plants in 2022.

3月18日、6月17日、9月2日、12月21日

完成 110 年第 4 季及 111 年第 1 至 3 季「台灣地區核設施環境輻射監測季報」，並上網公開。

RMC prepared and published online the "Quarterly Report on the Environmental Radiation Monitoring of Nuclear Facilities in the Taiwan Area" for Q4 2021 to Q3, 2022.

3月23日至3月27日

核研所徐副所長率領「日本氚水排放觀察團」至日本考察，與日方專家進行技術討論，實地參訪福島電廠含氚處理水排放及儲存之設施，藉此取得氚水排放事件之關鍵資訊，供國內應對之參考。

INER Deputy Director-General Hsu traveled to Japan with the "ALPS Treated Water Discharge Observer Group" and engaged in technical discussions with Japanese experts. The group visited the ALPS treated water (i.e. Tritium treated water) discharge and storage facilities at Fukushima to obtain critical information on ALPS treated water and their discharge for domestic reference.

3月25日、6月24日、9月30日、12月30日

召開第 17 屆核子反應器設施安全諮詢會。

AEC held four meetings for the 17th Advisory Committee on Nuclear Safety.

3月25日、10月21日

完成 110 年下半年及 111 年上半年「台灣地區放射性落塵與食品調查半年報」，並上網公開。

The semi-annual report of the "Radioactive Fallout and Food Investigation" for the second half of 2021 and first half of 2022 was completed and published online.

3月29日至3月30日、8月16日至8月17日

辦理核三廠除役計畫現場訪查活動。

AEC held site visits for the general public regarding the review of the Maanshan NPP Decommissioning Plan.

辦理核三廠除役計畫審查委員現場勘查活動。

AEC held site visits for members of the Maanshan NPP Decommissioning Plan review task force.

04 April

4月1日、5月30日、6月21日、8月2日

完成台電公司「核二廠剪裂帶細部調查報告」程序審查，發函台電公司進入實質審查。

AEC completed the acceptance review of the "Detailed Report on Investigation of the Shear Zone at the Kuosheng NPP" submitted by the TPC and notified the TPC to begin the technical review.

函送台電公司「核二廠剪裂帶細部調查報告」第 1 次審查意見。

AEC notified the TPC the review comments from the first review of the "Detailed Report on Investigation of the Shear Zone at the Kuosheng NPP".

召開台電公司「核二廠剪裂帶細部調查報告」第 1 次及第 2 次審查會議。

AEC held the first and second review meetings for the "Detailed Report on Investigation of the Shear Zone at the Kuosheng NPP".

4月7日

函報行政院備查 111 年至 114 年「原子能科技民生應用發展策略藍圖」，並分行有關部會參辦。

The "Development Strategy Blueprint for Civilian Application of Atomic Technology" for 2022-2025 was submitted to the Executive Yuan for reference and distributed to the relevant ministries for further action.

核研所與印度旁遮普省 (Punjab) 能源發展署 (PEDA) 與科學及能源機構 (PSCST)，完成異地簽署三方合作備忘錄，同意透過生質精煉技術的產業化應用，解決旁遮普省空氣汙染問題，同時開發潔淨能源及綠色產品。

INER signed a tripartite memorandum of understanding with the Punjab Energy Development Agency (PEDA) and Punjab State Council for Science and Technology (PSCST). Under the agreement, INER agrees to support Punjab to solve its air pollution problem through the industrialization of biorefinery technology. Clean energy and green products will be developed as well.

4月12日、9月13日

召開核三廠除役計畫第二及第三回合綜合審查聯席會議。

AEC held the second and third joint review meetings for the Maanshan's decommissioning plan.

4月14日、7月28日、11月3日

完成 111 年第 1 至 3 季「台灣地區自來水試樣放射性分析結果」函送台灣自來水公司，各季檢測 124、110 及 123 件皆符合「商品輻射限量標準」之規定。

"Analysis Result of Tap Water Sample Radiation Content in the Taiwan Area" for Q1 to Q3 of 2022 is available and the results were sent in writing to the Taiwan Water Corporation. The 124, 110, and 123 cases tested in each quarter met the requirements of the Commodities Radiation Limitation Standards.

4月18日至5月6日

核研所辦理員工健康檢查，檢查對象除原能會、核研所及物管局同仁外，並由鄰近地區里長安排里民參加。

INER commissioned physical examinations for employees. In addition to the employees of the AEC, INER, and FCMA, the head of the neighborhood arranged for local residents to participate in the examinations as well.

4月20日、8月24日、12月14日

召開第 7 屆第 4 次至第 6 次放射性物料安全諮詢會。

AEC convened the fourth to sixth meetings of the Seventh Advisory Committee on Radioactive Materials Safety.

4月21日、5月3日、6月23日、10月27日

完成台電公司「核三廠區內設置再生能源發電設施審查案」程序審查，發函台電公司進入實質審查。

AEC completed the acceptance review of the "Proposal to Install Renewable Energy Generation Facilities Within the Maanshan NPP" submitted by the TPC and notified the TPC to begin the technical review.

召開「核三廠區內設置再生能源發電設施審查案」第 1 次至第 3 次實質審查會議。

AEC completed the first to third technical review meetings of the "Proposal to Install Renewable Energy Generation Facilities Within the Maanshan NPP".

4月22日、8月26日、12月9日

召開第 18 屆第 1 次至第 3 次「游離輻射安全諮詢會」。

AEC convened the first to third sessions of the 18th "Ionizing Radiation Safety Advisory Board".

4月25日至5月27日

辦理核一廠乾式貯存設施 111 年度統合演練專案檢查。

AEC conducted special inspection for the 2022 Integration Drill of the Dry Storage Facilities in the Chinshan NPP.

4月27日

召開第 10 次日本福島核災含氚廢水跨部會因應會議。

AEC convened the 10th inter-ministerial response meeting for the tritium contaminated wastewater from the Fukushima nuclear accident in Japan.

05 May

4月28日

完成「台灣地區核設施 110 年環境輻射監測年報」，並上網公開。

RMC completed and published online the "2021 Annual Report on the Environmental Radiation Monitoring Plan of Nuclear Facilities in the Taiwan Area."

4月30日、10月22日

辦理 111 年度第 1 次及第 2 次「輻射防護專業測驗及操作人員輻射安全證書測驗」。

AEC organized the first and second exam of "2022 Certification Examination for Radiation Protection Personnel and Radiation Operators on Radiation Safety."

5月2日至5月3日

完成空中輻射偵測硬體操作及維修訓練。

RMC completed operator and maintenance training for aerial radiation detection hardware.

5月3日至5月4日

執行 111 年度蘭嶼地區環境平行監測作業。

AEC implemented the 2022 Parallel Monitoring Activity on Environmental Radiation in the Orchid Island.

5月4日

行政院核定原能會「2023～2026 國家海域放射性物質環境輻射監測及安全評估應對計畫」。

The AEC "2023-2026 Environmental Radiation Monitoring and Safety Assessment Countermeasure Plan for Radioactive Materials in the National Sea Areas" was approved by the Executive Yuan.

5月6日

辦理「游離輻射設備製造業個人資料檔案安全維護管理辦法說明會」。

AEC organized the " Briefing on Regulations Governing Personal Information File Security Maintenance and Administration for Ionizing Radiation Equipment Manufacturing Enterprise."

5月10日

函請經濟部督促台電公司積極辦 低放射性廢棄物最終處置設施及暫時貯存設施之選址作業。

AEC issued a formal request to the MOEA to supervise the TPC on selection of a site for final disposal and temporary storage of low-level radioactive waste.

5月16日

同意核研所 TN9/3 用過核子燃料運輸鉛罐申請換發使用許可。

AEC approved the license renew for the TN9/3 spent nuclear fuel transportable cask in INER .

5月25日

辦理 111 年度核一廠除役暨乾貯設施訪查活動。

AEC conducted the 2022 Public Observation Program for the Decommissioning and Dry Storage Facilities in the Chinshan NPP.

辦理「氚及鍶-90 核種前處理及計測程序培訓教育訓練」，協助屏東科技大學南部備援實驗室及地方衛生局了解氚及鍶-90 樣品前處理、計測及數據誤差分析等。

RMC organized the "Pre-processing and Measurement Training for Tritium and Strontium-90 Nuclides" to support the Southern Backup Laboratory at the National Pingtung University of Science and Technology as well as the local health department to understand the preprocessing, measurement, and analysis of data errors in Tritium and Strontium-90 samples.

5月27日、7月13日至7月14日

赴核三廠、核二廠、核一廠進行年度查訪。

AEC conducted annual dialogue with the TPC and inspections at the Maanshan, Kuosheng, and Chinshan nuclear power plants.

06 June

6月1日、11月16日

召開核電廠除役管制會議。

The Regulatory Meetings on Nuclear Power Plant Decommissioning were held in 2022.

6月7日至6月9日、11月15日至11月17日

辦理美國能源部國家核子保安局（DOE/NNSA）「核子保安（資安）文化」、「核子保安應變武力個案研究」視訊訓練。

AEC organized virtual training courses on "Nuclear Safeguarding (Cybersecurity) Culture" and "Nuclear Safeguarding Use of Force Case Studies" with the National Nuclear Security Administration, U.S. Department of Energy (DOE/NNSA).

6月8日

完成 110 年至 111 年碘片採購案驗收作業，並分別送往國家碘片儲存庫、新北市政府、基隆市政府及屏東縣政府，接續由地方政府進行民眾換發作業。

AEC completed acceptance inspection of iodine tablet procurement for 2021 to 2022. The iodine tablets were then delivered to the National Iodine Repository, New Taipei City Government, Keelung City Government, and Pingtung County Governments. Local governments will then manage the replacement of iodine tablets to the population.

6月12日

核研所於台大集思會議中心辦理「2022 年核醫藥物分子影像發展應用研討會」，採現場與網路視訊同步舉行，出席總人數為 680 人。

The "2022 Symposium on the Developmen of Nuclear Medicine and Molecular Imaging Applications" was held at GIS NTU by the INER. The event was held concurrently as an on-site and online conference, with a total of 680 participants.

6月13日至6月17日、10月3日至10月14日

執行核二廠第 2 季核安管制紅綠燈視察暨 1 號機除役作業專案視察。

AEC conducted the Q2 inspection of the reactor oversight process and Unit 1 decommissioning activities at the Kuosheng NPP.

執行核二廠第 4 季核安管制紅綠燈視察、核安總體檢現場查證及 1 號機除役作業專案視察。

AEC conducted the Q4 inspection of the reactor oversight process, post-Fukushima safety enhancement measures, and Unit 1 decommissioning activities at the Kuosheng NPP.

6月16日、11月14日、11月16日、11月21日、12月8日

召開「108 年至 111 年國民輻射劑量調查評估計畫」審查會，共 5 場。

RMC convened five review meetings for the “Survey Project on Population Radiation Dose from 2019 to 2022”.

6月17日

國際原子能總署公布「2021 年全球核子保防實施總結報告」，我國連續第 16 年被宣告為「所有核物料均用於核能和平用途」國家之列家。

The International Atomic Energy Agency (IAEA) published the “Safeguards Statement for 2021”, declaring Taiwan is a country where “all the nuclear materials that have been used for peaceful purposes” for 16 consecutive years.

6月21日

預告「游離輻射防護法」部分條文修正草案 60 日。

AEC preannounced the draft amendment to some provisions of the "Ionizing Radiation Protection Act" for 60 days.

修正「放射性物料設施興建申請聽證程序要點」。

AEC amended the “Procedural Guidelines for Public Hearings on Construction of Radioactive Material Facilities”.

6月22日

發布施行「低放射性廢棄物海洋運送船舶輻射安全規範」及「低放射性廢棄物盛裝容器使用申請書導則」。

AEC issued and implemented the “Vessel Radiation Safety Regulations for Marine Transportation of Low-level Radioactive Waste” and “Guidelines on Applications for Use of Containers for Holding Low-level Radioactive Waste”.

6月22日、12月19日

召開核電廠除役安全管制專案小組第 18 次及第 19 次會議。

The 18th and 19th Meetings of the Safety Regulation Project Team for Nuclear Power Plant Decommissioning were held.

6月23日、6月27日至7月1日

以視訊方式辦理 110 年度「行政院原子能委員會委託研究計畫」成果發表會，邀請產、學、研各界參加，8 場次共計 289 人。

INER organized a video conference to present the results of the “2021 Research Project Under Commission of the Atomic Energy Council, Executive Yuan”. A total of 289 persons from industry, university, and institute partners were invited to participate over eight sessions.

6月24日、12月16日

召開蘭嶼真相調查後續遷場及補償事項第 9 次及第 10 次討論會議。

AEC held the ninth and tenth meetings on the Review Meeting for Site Relocation and Compensation following the Truth Investigation on the Setup of the Orchid Island Storage Site.

6月28日

公布我國「110 年度全國輻射工作人員劑量統計年報」。

AEC published the "2021 Annual Statistical Report on Occupational Radiation Exposure in Taiwan."

6月29日、12月28日

召開核能管制會議。

The Regulatory Meetings on Nuclear Power were held in 2022.

07 July

7月1日

啟用「放射性物質海域擴散海洋資訊平台」單一窗口 (網址：https://tworis.aec.gov.tw)。

AEC launched the web portal for the "Ocean Radioactive Information System" (TW-ORIS). (URL: https://tworis.aec.gov.tw)

7月5日

完成審查同意核備核研所「核能研究所台灣研究用反應器 (TRR) 111 年修正版及 110 年度執行報告」。

AEC reviewed the "2022 Amendments and Annual Report of the Decommissioning Plan for the Taiwan Research Reactor (TRR) of the INER.

7月12日、9月6日至9月7日、11月10日

執行核一、三、二廠緊急應變計畫演習視察。

AEC conducted inspections of emergency response exercises at the Chinshan, Maanshan, and Kuosheng NPPs.

7月12日、11月23日

召開「國際飛航宇宙射線之安全管理趨勢及國內因應對策」專家會議及航空業者座談會。

AEC convened expert and aviation industry conferences on the "International Trends in Cosmic Ray Safety Management in Aviation and Domestic Response Measures."

7月13日

辦理 111 年放射性廢棄物處理設施運轉人員測驗。

AEC organized the 2022 Examination for Operators of Radioactive Waste Treatment Facilities.

完成「106 至 110 年進口及風險較高食品輻射監測結果評估報告」，並作為後續監測取樣之參考。

RMC completed the "Report on the Enhanced Radiation Monitoring and Assessment of Imported Food Between 2017 and 2021" as a reference for future sampling and monitoring operations.

7月20日

召開第 11 次日本福島核災含氚廢水跨部會因應會議。

AEC convened the 11th inter-ministerial response meeting for the tritium contaminated wastewater from the Fukushima nuclear accident in Japan.

7月20日、7月22日、7月25日

辦理 3 場「111 年度游離輻射防護法修正草案說明會」。

AEC organized three sessions of the "2022 Briefing on the Draft Amendment of Ionizing Radiation Protection Act."

7月25日至7月27日、8月2日至8月4日、8月9日至8月12日

執行台電公司核安處駐核一廠、核二廠、核三廠安全小組績效視察。

AEC conducted the inspection of the performance of the Independent Safety Evaluation Group stationed at the Chinshan NPP, Kuosheng NPP, and Maanshan NPP by the TPC Department of Nuclear Safety.

7月29日

原能會英文版官網改版上線。

AEC revised the English version of the AEC website.

08 August

8月3日

核研所積彭講座邀請前副總統現任中央研究院基因體研究中心陳建仁院士主講「COVID-19 大流行與疫後堅韌再造」，陳院士於演講後參訪核研所核醫製藥中心及綠能研發成果展示室。

Academician Dr. Chen Chien-jen, former Vice President and current Director of the Genomics Research Center, Academia Sinica, was invited by the INER Ji-Peng Lectures to give a speech on "COVID-19 Pandemic and Post-Pandemic Reform for Resilience". Dr. Chen then visited the INER Radiopharmaceutical Production Center and gallery of green energy R&D projects after the speech.

8月4日

辦理 111 年核安第 28 號演習兵棋推演。

AEC conducted the 2022 No. 28 Table-top Nuclear Emergency Exercise.

8月5日至8月19日

配合行政院成立資安警戒專案小組，執行相關監控及應辦事項。

AEC established an information security alert task force as directed by the Executive Yuan to carry out related cybersecurity monitoring and tasks.

8月6日、8月12日、9月1日

執行 111 年度第 2 次核二廠、核三廠、核一廠不預警視察。

AEC conducted the 2nd unannounced inspection at the Kuosheng, Maanshan, and Chinshan nuclear power plants in 2022.

8月8日

召開空中輻射偵測演練協調會議。

RMC convened a coordination meeting for aerial radiation detection exercises.

8月10日

於台中市新社區陸軍航特部完成空中偵測儀器裝載及飛行實作訓練。

RMC completed the installation of aerial detection instruments and flight training at the Aviation and Special Forces Command in the Xinshe District of Taichung City.

8月12日至8月14日、11月5日至11月6日、11月11日至11月13日

受邀參與科教館辦理「第 62 屆全國科展科學博覽會」及「第三屆臺灣科學節」活動。

AEC was invited to participate in the "62nd National Science Fair" and "3rd Taiwan Science Festival" organized by the National Taiwan Science Education Center.

8月17日

同意核一廠廢棄物壕溝解除除役管制，以作為核一廠室內乾式貯存設施預定用地。

AEC approved the removal of decommissioning controls on the Chinshan NPP waste trench so that the site can be used for the Chinshan NPP's indoor dry storage facility.

8月19日

辦理臺大癌醫中心合作交流會議，洽談國內電子元件開發輻射驗證環境。

A cooperation and exchange meeting was held with the NTU Cancer Center to discuss the domestic development of the radiation verification environment for electronic components.

8月22日

修正發布「行政院原子能委員會輻射災害支援協助處理項目及程序要點」。

AEC amended and issued the "Procedural Guidelines for Assistance and Response to Radiological Emergencies."

2022 全球百大科技研發獎 (R&D 100 Awards) 公布獲獎名單，核研所以「低碳生產、低成本之創新電致變色玻璃量產 (IDIMPT) 技術」參賽且獲獎。

The winners of the 2022 Global Top 100 R&D Awards were announced, and the INER participated in the competition and won a prize with its "Innovative, low-cost, and low-carbon technology for mass-producing electrochromic glass ".

8月23日

召開第 8 屆台日核能管制資訊視訊會議。

AEC convened the "8th AEC-NRA Nuclear Regulatory Information Exchange Meeting" through video conferencing.

8月25日

核研所於台大集思會議中心辦理「福島第一核電廠含氚廢水排放之輻射擴散模擬與量測技術國際研討會」，採現場與網路視訊同步舉行，現場共計 11 個單位、122 位人員參加。

The "International Symposium on Radiation Dispersion Simulation and Measurement Technology for Discharge of Tritium-contaminated Wastewater From the Fukushima Daiichi Nuclear Power Plant" was held by the INER at GIS NTU. The symposium was conducted in parallel both online and in-person, and 122 people from 11 organizations attended this symposium.

09 September

8月26日

核研所辦理「111 年核設施除役技術國際研討會」，邀請台電公司、學界、產業界等專家學者與會，以組成台灣核電廠未來除役工作所需之團隊為目標。

INER organized the “2022 International Workshop of Nuclear Facility Decommissioning Technologies”and invited experts from the TPC, academia, and industries for the workshop in order to form the teams for supporting the future decommissioning activities of the nuclear power plants in Taiwan.

8月31日

核研所生物氚檢測實驗室正式揭牌成立，預計每年可達 500 件檢測量能。

The Tritium in Organisms Testing Laboratory at INER was formally established with a capacity for testing up to 500 samples each year.

核備核一廠汽機廠房主發電機相關設備離廠偵檢作業方案。

AEC approved the "Detection Program of Exemption and Clearance Waste for Chinshan NPP Turbine Building Decommissioning".

8月31日、9月6日

辦理主管財團法人核能與新能源教育研究協進會、核能資訊中心、中華民國輻射防護協會及核能科技協進會業務查核會議，就法人人事、財務、績效、資安及法遵等面相促其良善運作。

AEC organized business review meetings for the Nuclear and New Energy Education and Research Foundation (NNEERF), Nuclear Information Center (NIC), Radiation Protection Association R.O.C. (RPA), and Nuclear Science and Technology Association (NuSTA) of their personnel, financial, performance, cybersecurity, and regulation compliance related affairs.

9月2日

辦理「111 年核安第 28 號演習實兵演練說明」記者會，向媒體說明演習之特色、演練地區及項目。

The “Briefing on the 2022 No. 28 Nuclear Emergency Full Exercise” press conference was held to provide the media with information on key features, location, and tasks.

9月3日、9月6日至9月7日

於核三廠及鄰近地區辦理 111 年核安第 28 號演習實兵演練。

AEC conducted the 2022 No. 28 Full Participation Nuclear Emergency Exercise in Maanshan NPP and surrounding area.

9月3日、12月10日

執行核三廠及核二廠緊急應變組織非上班時間無預警動員測試。

AEC performed unannounced mobilization and communication tests outside of business hours for the emergency response organizations at the Maanshan NPP and Kuosheng NPP.

9月5日、9月7日

於恆春半島完成陸軍航特部與空勤總隊空中偵測儀器裝載及飛行實作訓練。

RMC completed the installation of aerial detection instruments and flight training with the Aviation and Army Special Forces Command and the National Airborne Service Corps on the Hengchun Peninsula.

9月7日

執行核三廠核子保安及反恐實兵演練視察。

AEC conducted inspection of full-scale nuclear security and anti-terrorism exercises at Maanshan NPP.

9月14日、9月28日、10月12日、10月19日

於北、南、東、中區辦理「地方政府輻射災害防救講習」。

AEC organized the "Radiation Disaster Prevention and Rescue Workshops for Local Governments" in northern, central, southern, and eastern Taiwan.

9月15日、9月20日

辦理 2 場「111 年輻射醫療曝露品質保證作業相關法規修正說明會」。

AEC organized two sessions of the "2022 Briefing on Amendments to the Regulations Relating to the Standards for Medical Exposure Quality Assurance."

9月26日

辦理 110 年「原子能科技合作研究計畫」成果發表會。

AEC hosted the 2021 "Atomic Science Collaborative Research Program" presentation.

9月29日至9月30日

辦理 111 年核子保防專業技術會議。

AEC hosted the 2022 Technical Meeting on Nuclear Safeguards.

9月29日、10月28日

執行核二、一廠核子保安及反恐無腳本兵棋推演視察。

AEC conducted inspection of unscripted table-top nuclear security and anti-terrorism exercises at Kuosheng NPP and Chinshan NPP.

10 October

10月1日至10月30日

執行屏東縣緊急應變計畫區家庭訪問作業。

AEC completed EPZ home visit program in Pingtung County.

10月5日

修正發布「核子事故緊急應變法施行細則第 4 條、第 5 條及第 17 條」。

AEC issued amendments to "Article 4, Article 5, and Article 17 of the Enforcement Rules for the Nuclear Emergency Response Act."

10月6日

辦理輻射應變技術隊年度訓練。

AEC performed annual training for the Radiological Emergency Response Team.

10月11日、11月25日、12月13日

完成台電公司「核二廠護箱裝載池復原案安全分析報告」程序審查，發函台電公司進入實質審查。

AEC completed the acceptance review of the "Report on Safety Analysis of the Cask Loading Pool Restoration Plan for the Kuosheng NPP" submitted by the TPC and notified the TPC to begin the technical review.

召開「核二廠護箱裝載池復原案安全分析報告」第一次審查會議。

AEC held the first review meeting of the "Report on Safety Analysis of the Cask Loading Pool Restoration Plan for the Kuosheng NPP."

赴核二廠執行「核二廠護箱裝載池復原案安全分析報告」審查案現場視察。

AEC conducted the on-site inspection at the Kuosheng NPP for the review of the "Report on Safety Analysis of the Cask Loading Pool Restoration Plan for the Kuosheng NPP".

10月12日

原能會資通安全管理制度 (ISMS) 通過 ISO 27001 外部稽核，證書持續有效。

The AEC Information Security Management System (ISMS) has passed the external audit of ISO 27001, and the certificate remains valid.

10月13日、10月20日

參與 111 年衛福部高屏區緊急應變中心輻傷緊急醫療應變演練並協助評核作業。

RMC participated in the 2022 MOHW Kaohsiung-Pingtung Emergency Operation Center Emergency Response Training for Radiation Injuries and assisted with its evaluation process.

10月14日

「2022 台灣創新技術博覽會」發明競賽獎公布獲獎名單，核研所獲得 2 面鉑金、3 面金牌、5 面銀牌及 5 面銅牌。

The winner list of the "2022 Taiwan Innotech Expo" competition was announced, and INER won two platinum awards, three gold medals, five silver medals, and five bronze medals in the competition.

10月14日、10月31日

辦理 111 年「媒體溝通與輿情回應技巧」訓練課程，以增進原能會同仁於傳播溝通時運用圖卡，及對業務有關錯假訊息之澄清能力。

AEC organized the 2022 "Media Communication and Public Opinion Response Skills" training course to enhance the ability of AEC staff to use picture cards for communication and clarify misinformation relating to their work.

10月19日

樹人醫護管理專科學校醫學影像暨放射技術科共 44 人參訪輻射偵測中心。

A group of 44 people from the Department of Medical Imaging and Radiology at the Shu-Zen Junior College of Medicine and Management visited RMC.

10月21日

國際原子能總署 (IAEA)Mohamed Lamari 處長等 4 名官員至核研所參訪，參訪地點為 TWC-(020 館熱室)、TWL-(036 館 A/K/U 中央貯存庫) 及所區內部周圍。

Director Mohamed Lamari and three other officials from the International Atomic Energy Agency (IAEA) visited the Institute of Nuclear Energy Research Institute. The locations visited included the TWC- (Hot Cells in Building 020), TWL- (Central storage facility in Building 036A/K/U), and the surrounding areas.

加馬劑量校正實驗室通過財團法人全國認證基金會延展認證。

Accreditation of the Gamma Dose Calibration Laboratory of RMC was extended by the Taiwan Accreditation Foundation.

辦理純鍺半導體偵檢器加馬能譜分析系統實務訓練，協助地方衛生局 (包含食藥署中區管理中心、新北市、高雄市、台中市及台南市等衛生局) 及屏東科技大學南部備援實驗室了解加馬能譜分及析原理實務運作、效率曲線建置及品保實務等。

RMC organized a training workshop for gamma spectrometer systems with pure Germanium semiconductor detectors. The workshop helped the local health agencies (including the FDA Central Center, as well as the Health Departments of New Taipei City, Kaohsiung City, Taichung City, and Tainan City) and the Southern Backup Laboratory at the National Pingtung University of Science and Technology to get familiar with gamma spectrometer principles and its operation, establishment of efficiency curves, and quality assurance practices.

10月24日

受邀參與國科會辦理之「2022 年臺灣科普環島列車 - 內灣站」活動。

AEC was invited to participate in the "2022 Taiwan National Science Train - Neiwan Station" event organized by the National Science and Technology Council.

10月24日至12月16日

辦理 111 年原子能線上科技科普研習活動，針對國小、國中及高中學生分別設計不同課程，共有 7,091 位學生參與。

AEC organized the 2022 Online Atomic Science Workshop, and a total of 7,091 students took part in courses designed for elementary, junior high, and senior high schools.

10月25日、10月27日

辦理 111 年除役廢棄物離廠輻射量測查驗訓練。

AEC organized 2022 radiation detection training for exemption and clearance waste of NPPs decommissioning.

10月26日

召開第 12 次日本福島核災含氚廢水跨部會因應會議。

AEC convened the 12th inter-ministerial response meeting for the tritium contaminated wastewater from the Fukushima nuclear accident in Japan.

10月27日

紐西蘭商工辦事處 (NZCIO) 政務代表 Mark Pearson 及商務代表 Tina Wilson 等人，與紐西蘭廠商 BioForestry、翰森應用生技公司至核研所參訪，據以作為後續持續協助台紐合作案，加速推動發展木片循環經濟產業。

Political Representative Mark Pearson, Commerce Representative Tina Wilson, and others from the New Zealand Commerce and Industry Office Taipei along with representatives of the New Zealand companies BioForestry and Inspira Applied Bio Solutions Company visited to the INER. The visit served to lay the foundations for further Taiwan-NZ collaboration to accelerate the development of the wood chip circular economy industry.

10月28日、11月23日、12月3日

執行 111 年度第 3 次核三廠、核二廠、核一廠不預警視察。

AEC conducted the 3rd unannounced inspection at the Maanshan, Kuosheng, and Chinshan nuclear power plants in 2022.

10月31日

公布我國「110 年游離輻射應用與管理統計」年報。

AEC published the "2021 Annual Statistical Report on Application and Management of Ionizing Radiation in Taiwan."

11 November

11月1日

召開輻射災害防救業務計畫修訂會議。

AEC convened meeting for amending the Radiological Emergency Response Plan.

11月2日

核研所以「氫燃料電池車」項目參加經濟部智慧財產局「2022年產業專利分析與布局競賽」，榮獲第一名。

The INER entered the MOEA Intellectual Property Office "2022 Competition for Patent Portfolio Analysis" and won the first place with its "Hydrogen Fuel Cell Car" project.

辦理111年核一、二廠乾式貯存設施興建計畫執行現況專案檢查。

AEC conducted a special inspections on the 2022 construction progress of the dry storage facilities in Chinshan NPP and Kuosheng NPP.

11月2日、11月8日

辦理南、北兩場次「111年度核子事故緊急應變主管決策人員進階訓練」。

AEC arranged two sessions of "2022 Advanced Training for the Emergency Response Officers and Decision Makers Responsible for Nuclear Accidents" in northern and southern Taiwan.

11月4日

提出「原子能民生應用輻射安全管理躍昇社會發展計畫」。

AEC proposed the "Social Development Acceleration Plan Through Radiation Safety Management in Civilian Applications of Atomic Energy."

11月7日

2022年IAEA能力試驗結果公布，偵測中心參與項目均通過(含水樣加馬/氚/鍶-90/總貝他/鈽-239/釙-210、表面汙染試樣濾紙銫-137、土壤加馬圖譜電子檔分析)。

The results of the 2022 IAEA proficiency tests were announced and RMC passed all the tests that it participated in (including water samples with gamma/Tritium/Strontium-90/Gross Beta/Plutonium-239/Polonium-210, filter paper with surface contamination of Cesium-137, and electronic file for gamma-ray spectrometry analysis of soil samples).

11月8日、11月15日、11月16日

於北、中、南辦理3場「111年度放射線照相檢驗業輻射安全宣導說明會」。

AEC convened three sessions of the "2022 Radiation Safety Briefings for the Radiographic Inspection Operators" in northern, central, and southern Taiwan.

11月9日

辦理國家太空中心技術交流會議，研商太空產業抗輻射技術要項及實務需求。

AEC organized a technical exchange meeting with the Taiwan Space Agency to discuss anti-radiation technology projects and practical requirements in space industry.

11月10日

財團法人生技醫療科技政策研究中心公布第 19 屆國家新創獎得獎名單，核研所榮獲 2 項「學研新創獎」。

The Research Center for Biotechnology and Medicine Policy announced the winner list of the 19th National Innovation Award and the INER won two "Research and Innovation Awards".

11月19日至12月31日、12月30日

執行核三廠 1 號機第 27 次大修作業視察 (含防疫強化措施)。

AEC conducted the inspection of the 27th refueling outage (incl. pandemic prevention enhancement measures) for the Maanshan NPP Unit 1.

同意核三廠 1 號機第 27 次大修後再起動臨界申請。

AEC approved the restart and criticality application of the Maanshan NPP Unit 1 after the 27th refueling outage.

11月25日

召開第 55 次核子設施類輻射防護管制會議。

AEC convened the 55th Session of "Radiation Protection and Regulation for Nuclear Facilities."

11月29日

核研所「Dolacga 核研多蕾克鎵肝功能造影劑」以藥物科技研究發展獎勵辦法，參加衛福部與經濟部共同主辦之「藥物科技研究發展獎」，榮獲「藥品類」金質獎。

INER Dolacga Liver Imaging Agent won the gold award in pharmaceuticals categogy of the Pharmaceutical Technology & Research Development Award (PTRD) jointly hosted by the Ministry of Health and Welfare and the Ministry of Economic Affairs in accordance with the Regulations Governing Incentive Rewards for Research and Development of Pharmaceutical Technology.

11月29日至12月1日

赴美國出席 2022 年台美民用核能合作會議。

AEC participated in the 2022 TECRO-AIT Joint Standing Committee Meeting on Civil Nuclear Cooperation held in the U.S.

11月30日

完成內容傳遞網路機制 (CDN) 導入，以及網頁竄改切換程式建置。

AEC led in leveraged Content Delivery Network (CDN) mechanism and installed programs for website defacement detection and static website switching.

12月9日

核定核研所 015F 可燃性廢棄物貯存庫除役完成報告，並解除設施管制。

AEC approved the "Completion Report of the 015F Combustible Waste Storage facility Decommissioning" of the INER.

12月30日

「游離輻射防護法部分條文修正草案」函送行政院審議。

AEC submitted the "Draft Amendment to the Ionizing Radiation Protection Act" to the Executive Yuan for review.

12 December

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