

出國報告（出國類別：其他）

參加 2022 年第 29 屆
全球核能婦女會年會出國報告
（視訊報告）

服務機關：行政院原子能委員會

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派赴國家/地區：台灣，中華民國

出國期間：111 年 05 月 23 日~111 年 05 月 26 日

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摘 要

全球核能婦女會 (WiN Global) 全球會員已逾 35,000 人，遍及逾 129 個國家/地區，包含 53 個分會，仍持續成長中。WiN Global 每年舉辦年會邀集會員經驗與資訊交流，本 (2022) 年度邁入第 29 屆，係由日本分會 (WiN Japan) 主辦，於 5 月 23~26 日東京都舉行，惟因 COVID-19 疫情持續影響，限制全球許多會員實體參與，故本次會議採取實體與視訊複合方式同步舉行。

本次年會以「Evolution of Decommissioning & Reconstruction ~11 Years after Fukushima Accident~」為主題，會議除了安排例行性會員大會之外，主要安排多項與主題相關之議題如：福島核電事故的教訓、核設施除役經驗、災區重建故事及日本核能未來前行之路等，係由日本進行經驗分享；此外，也有氣候變遷、性別平衡、多樣性和創新技術等多項議題在大會上交流討論，這些議題係屬全球性的重要議題，也是 WiN Global 長年以來不間斷投入努力的地方；會議最後一天，大會還安排實體與會者親赴福島現場參訪福島第一核能電廠和東日本大地震紀念博物館。

WiN Global 自 1993 年成立以來，我國每年均派代表出席年會，從未間斷。今年我國亦派赴 5 位代表以視訊會議方式參加，包括本會黃茹絹 (WiN Taiwan 會長)、本會黃立元 (WiN Taiwan 委員)、台電公司王亭懿 (WiN Taiwan 副會長)、工業技術研究院鄭憶湘 (WiN Taiwan 顧問) 以及輻射防護協會顏麗娜 (WiN Taiwan 委員)，主要任務為出席 WiN Global 執行理事與理事會議 (the Executives and Board Meeting)，以及參加 WiN Global 年會，吸收國際新知與經驗交流。

依據大會資訊顯示，本次會議之參與情形，實體與會者約 300 人，線上與會者約 200 人，全球參與熱烈。我國代表團因僅能以視訊方式與會，無法實地交流及現地參訪福島是較為可惜之處，但即使如此，透過本次會議，我們仍舊獲得豐富的後福島發展資訊，以及來自許多分會的成功經驗分享，整體亦是收穫滿滿。

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壹、目的

全球核能婦女會 (Women in Nuclear Global, WiN Global) 是全球性非營利組織，於 1992 年 11 月於瑞士成立，由全球各國從事原子能相關專業領域之女性專家學者所組成，目前全球會員人數已逾 35,000 人，遍及逾 129 個國家/地區，包含 53 個分會，仍持續成長中。全球核能婦女會每年舉辦一次全球年會，使原子能、輻射防護、核子醫學等之專業女性達到技術與經驗之傳承與交流。我國核能婦女委員會 (Women in Nuclear Taiwan, WiN Taiwan) 是 WiN Global 的台灣分會，成立於 1993 年，目前會員人數逾 200 人，除聯繫國內原子能各相關領域且跨單位之女性專家學者之情誼，建立技術與經驗之交流外，並致力於參與全球核能婦女會會務，持續增強國際關係。

參與 WiN Global 年會是 WiN Taiwan 每年重要的國際事務活動，自 1993 年成軍以來從不缺席。今 (2022) 年第 29 屆 WiN Global 年會於 5 月 23~26 日在日本東京舉辦。本會黃茹絹技正為 WiN Taiwan 現任會長暨擔任 WiN Global 理事，黃立元助研員為 WiN Taiwan 現任委員，及其職務與國際原子能總署保防業務協調有序，故奉派與會與各國代表進行技術與經驗交流；此外，我國代表團尚有台電公司王亭懿 (WiN Taiwan 副會長)、工業技術研究院鄭憶湘 (WiN Taiwan 顧問) 以及輻射防護協會顏麗娜 (WiN Taiwan 委員)，共同與會增進國際事務交流。

以下，謹摘要本次與會之目的與任務：

- (一)代表我國 WiN Taiwan 出席 2022 年 WiN Global 之執行理事與理事會議 (the Executives and Board Meeting)，瞭解 WiN Global 會務及專案發展方向，積極參與會務；
- (二)製作台灣分會報告 (附件 1) 及分會英文介紹影片 (附件 2)，向與會者分享我國原子能發展現況與 WiN Taiwan 會務，並與各國女性核能從業人員進行技術交流

與經驗分享，維繫我國與各國之情誼；

(三)出席 2022 年 WiN Global 年會各議題會議，並參與討論，汲取技術新知與國際經驗。

貳、 議程

第一天 會議行程：

| 台灣時間 | 主 題 |
|-------------|--------------------------------------|
| 5 月 23 日(一) | |
| 12:00~14:00 | WiN-Global Executive & Board meeting |
| 13:00~14:00 | WiN Japan General Assembly |
| 14:45~20:00 | Cultural Tours (僅實體與會者參加) |

第二天 會議行程：

| 台灣時間 | 主 題 |
|-------------|--|
| 5 月 24 日(二) | |
| 08:00~09:00 | Opening Session |
| 09:00~09:30 | Coffee Break |
| 09:30~11:30 | General Assembly |
| 11:30~12:30 | Lunch |
| 12:30~13:30 | Communication meeting |
| 13:30~14:30 | Photo & Coffee Break |
| 14:30~16:00 | Fukushima Session Mentoring Workshop Security Workshop |
| 18:00~20:00 | Gala Dinner (僅實體與會者參加) |

第三天 會議行程：

| 台灣時間 | 主題 |
|-------------|----------------------------------|
| 5月25日(三) | |
| 08:00~09:15 | Panel Session I |
| 09:15~09:45 | Coffee Break |
| 09:45~11:00 | Panel Session II |
| 11:00~12:00 | Lunch |
| 12:00~13:15 | Panel Session III |
| 13:15~13:45 | Coffee Break |
| 13:45~14:10 | Coffee Break & WiN Global Awards |
| 14:10~14:20 | Poster Award |
| 14:20~14:25 | Flag Passing Ceremony |
| 14:25~14:35 | Egypt ER |
| 14:35~14:40 | Closing Remarks |
| 15:00~19:00 | Tokyo -> Fukushima (僅實體與會者參加) |

第四天 參訪行程（僅實體與會者參加）：

| 台灣時間 | 主題 |
|-------------|---|
| 5月26日(四) | |
| 08:00~15:00 | 1. Technical Tour: Fukushima Daiichi Nuclear Power Station 2. The Great East Japan Earthquake and Nuclear Disaster Memorial Museum |
| 15:00~19:00 | Fukushima -> Tokyo(僅實體與會者參加) |

參、 行程內容

全球核能婦女會 (WiN Global) 全球會員已逾 35,000 人，遍及逾 129 個國家/地區分會，仍持續成長中。WiN Global 每年舉辦一次年會，由歐洲、美洲、亞洲、非洲輪流主辦，年會上各國代表報告自己國家的核能發展及活動現況，並就核能安全、核能科技發展、放射性廢料管理、核醫學應用、輻射防護、核能教育及兩性平權等議題經驗交流。本 (2022) 年度邁入第 29 屆，係由日本分會 (WiN Japan) 主辦，於 5 月 23~26 日東京都舉行。因 COVID-19 疫情持續影響，限制全球許多會員實體參與，故本次會議採取實體與視訊複合方式同步舉行，實體會場位在東京港城竹芝辦公大樓 (Tokyo Port City Takeshiba Office Tower)，臨近浜松町車站 (Hamamatsucho Station)。

本次年會係以「Evolution of Decommissioning & Reconstruction ~11 Years after Fukushima Accident~」為主題(如圖 1)，會議除了例行性會員大會之外，主要安排多項與主題相關之議題如：福島核電事故的教訓、核設施除役經驗、災區重建故事及日本核能未來前行之路等，由日本進行經驗分享；此外，也有氣候變遷、性別平衡、多樣性和創新技術等多項議題在大會上交流討論，這些議題係屬全球性的重要議題，也是 WiN Global 長年以來不斷投入努力的地方；會議最後一天，大會還安排實體與會者親赴福島現場，參訪福島第一核能電廠和東日本大地震紀念博物館。



圖 1、2022 WiN Global 年會 (圖資來源：WiN Japan 官網截圖)

依據大會資訊顯示，本次會議之參與情形，實體與會者約 300 人，線上與會者約 200 人，全球參與熱烈。實體現場與線上與會情形如圖 2~4 之照片所示。



圖 2、實體會議現場（圖資來源：大會提供）



圖 3、實體會場與部分線上與會人員大合照（圖資來源：大會提供）



圖 4、我國線上與會情形：最上排左二為黃茹絹（視訊會議之部分截圖）

一、The Executives and Board Meeting

本次執行理事與理事會議（the Executives and Board Meeting）於會議的第一天 5 月 23 日以實體與視訊同步方式舉行，由黃茹絹會長及王亭懿副會長共同出席，聽取理事長與各執行委員會之專案報告與活動摘要，確立會務事項。以下謹摘要說明 WiN Global 所推動之七大會務之推動成果：

1. WiN Global 積極參與 Nuclear for Climate 相關活動，努力提升能見度，2021 年 11 月出席於英國 Glasgow 舉辦的第 26 屆聯合國氣候變遷大會（COP26），並製作影片溝通、提出專業立場白皮書、進行辯論演講、大力連署支持。現正準備參加 2022 年 11 月埃及的 COP 27 會議，理事長 Dominique Mouillot 並積極爭取擔任主講人。
2. WiN Global 積極於世界核能相關舞台上展現組織專業，例如：每二年舉辦一次之世界核能大展（World Nuclear Exhibition）設有核能創新獎項，其中核能安全創新（Innovation in Nuclear Safety）獎以及管理能力與知識創新（Innovation in Competencies Management and Knowledge）獎上，WiN Global 就有 5 位現任委員擔任其評委。此外，也受邀擔任國際會議主講者 或擔任國際級師徒培訓制度之導師。WiN Global 將自身化身為專家學者之國際網絡之一，已與下列 6 個女性國際專家組織建立合作關係，此外，現亦正和 SMRs（小型模組化核子反應爐）專業組織建立未來合作關係。
 - (1) 國際原子能總署放射藥物科學之女性組織（Women in Radiopharmaceutical Sciences, WIRS）。
 - (2) 國際原子能總署核子保防處之女性參與核子保防組織（Women In Nuclear Security Initiative, WINSI）。
 - (3) 摩洛哥國家能源核科學與技術中心（CNESTEN）之女性於核子事故整備與應

變之組織 (Women in Nuclear in Emergency Preparedness and Response, WINEPRI)。

- (4) CNESTEN 之女性參與核子醫學之組織 (Women in Nuclear Medicine Initiative, WINMI)。
 - (5) 法國電力公司 (EDF) 之女性參與核能電廠除役組織 (Women In Nuclear Decommissioning Initiative, WINDI)。
 - (6) 世界核能協會 (WNA) 之核能創新女性組織 (Women In Nuclear Innovation, WINI)。
3. 持續強化核能溝通工作，增進公眾對原子能和平應用之認識，並於溝通上兼顧性別平衡、氣候變遷以及風險溝通等多元性。
 4. WiN Global 已建立年輕世代組織 (WiN Global Young Generation)，為核能發展的世代之間搭建技術與經驗傳承之橋樑。
 5. WiN Global 透過設立女性專屬獎項 (Honorary Award, Excellence Award, Future Award)，積極參與國際性別平等相關會議，以及製作社群網路宣導推廣影片等方式，彰顯組織在性別平等議題上扮演關鍵角色。
 6. 持續擴大並鞏固 WiN Global 之贊助夥伴關係與合作夥伴關係。
 7. 持續健全組織運作制度，以推動龐雜的全球會務與組織治理。
 - 指導層級：Steering Committee
 - 決策層級：Executive Level
 - 執行層級：Operational Level

二、Communication Session

WiN Global 自 1992 年成立至今，致力於將核能科學推廣至人群及社會，並不斷提升社會溝通之品質與次數，以期社會大眾得以了解核能科學於民生之貢獻。本場次內容豐富，主辦單位邀請來自韓國、美國、阿根廷以及墨西哥之講者分享關於社會溝通之經驗。其中，韓國 WiN Korea 副會長以聚焦溝通之重要性為題，說明韓國從過去至今所經歷之溝通議題與經驗；阿根廷講者則於其演講之一開始，有感而發道出性別與溝通在核能界不是一個常見的討論議題，因此在演講中分享一些可討論之問題以及針對女性於核能領域中角色之看法。以下謹分享阿根廷講者之演說重點：

1. 關於社會許可 (Social License)，講者提出四大要點，包含依據 IPCC 報告提到之氣候危機、核子相關研究計畫遭社會反對、核能界內女性較容易被拒絕、社區工作及溝通與成功息息相關。講者並以實際發生於 2017 年之案例說明上述四點之重要性。2017 年一名國外記者報導，阿根廷政府官員宣布將興建該國第五座核電廠，興建地點除為阿根廷核能發源地之外，亦為核能科技發展之重要城市。然而當消息一釋出，該地居民特別是女性即強烈反對此興建案。講者表示，當反對聲浪出現時，政府並未安排說明會與民眾對話溝通，以至於最終當地以通過法令禁止於該區域建造核電廠落幕。
2. 關於性別觀點之核能溝通 (Gender perspective in nuclear communication)，講者提出三論點，包含女性參與對話、增加專業之女性聲量、以對話方式進行溝通，而非教育。講者並以 UNSCEAR 之 Gerry Thomas 如何以對話方式進行溝通之實例，強化她的論點。
3. 關於性別與緊急應變風險管理 (Gender and emergency management)，講者更提出應於緊急與風險管理時納入性別考量，並舉例福島事件之後，女性因輻射而害怕哺乳等產生之問題與影響。

三、Fukushima Session



圖 5、福島事故專題演講之會議現場，主持人與二位講者（圖資來源：大會提供）

呼應大會主題，本專題演講以日本福島事故後 11 年來之除役與重建之路的經驗為分享，邀請東京電力公司執行副總及日本原子能研究開發機構（Japan Atomic Energy Agency）執行長，向與會者報告福島電廠之現況與未來預計之發展。以下謹就報告內容重點摘錄如下：

（一）、東京電力公司執行副總之報告包括下列面向，主要說明東京電力公司對於福島電廠事故後之中期與長期除役規劃，以及相關輻射監測計畫：

1. 2011 年 3 月所發生之福島電廠四部機組之事故狀況，其中 1、2、3 號機組皆發生爐心熔損，1、3、4 號機（4 號機之氫氣係為 3 號機經由管線傳遞）發生氫氣爆炸；
2. 東京電力公司針對福島電廠中期、長期之除役規劃，包含用過燃料池中用過燃料之移出、燃料熔渣回收及設備之拆解；
3. 運用 Advanced Liquid Processing System (ALPS) 系統處理受污染之廢

水及對民眾與環境造成之劑量；

4. 強化海水監測系統之計畫；
5. 11 年來之環境輻射劑量遞減說明；
6. 未來將持續結合在地人力完成福島電廠除役相關工作。

(二)、日本原子能研究開發機構執行長之報告則著重於除役進度現況，並說明於除役之輻射防護工作中研究導入人工智慧應用：

1. 福島電廠之除役需大量跨領域之研發人員，包含輻射特性、輻射防護、放射性廢棄物處理、安全與風險評估；
2. 核燃料移出現況，目前 3、4 號機用過核燃料已全數移出；
3. 中期除役規劃，目的包括維持電廠穩定性、減少輻射污染及劑量、移出用過燃料池中之燃料、移出燃料熔渣、設備之拆解及放射性廢棄物之處置；
4. 研究包封容器中之氫氣與空氣混合火焰之行為研究；
5. 於輻射防護中之人工智慧應用與導入之研究；
6. 使用生物監測器進行放射性核種遷移研究。

(三)、座談期間，主持人再邀請二位講者，就福島事故後所學到的課題和教訓為分享：

1. 日本原子能研究開發機構執行長首先表示，該事故發生至今已邁入第 12 年，過程中所學最重要的事情主要有三，其一為勿小看大自然的力量。講者說明在福島事故之前，日本人民未曾想過海嘯可以帶來如此大的災害，亦或是日本會有如此大的海嘯發生，並舉例說明 2004 年印度尼西亞發生大海嘯後，日本人民及核電廠仍舊過度樂觀與自信，而未從中學習到應提高警覺與採取防範措施；其二，核電廠安全措施應不斷調整；其三，資訊公開透明化是取得人民對政府信任的唯一方式。
2. 東京電力公司執行副總則表示，福島事故之後，該公司經由分析與檢討總

結出三面向應不斷求強化精進，分別為安全文化 (Safety culture)、專業技術 (Technical skill/expertise)、溝通 (Communication)，而當中首要者為安全文化。所謂安全文化，即應不斷自我詢問是否已有足夠之安全，並持續追求進步。

四、Panel Sessions

本次 Panel sessions 共有三場次，主題分別著重在除役、零碳 (Zero carbon) 以及性別平衡。主辦單位邀請來自加拿大、法國、日本、美國、非洲、巴西、阿根廷、埃及、國際原子能總署以及 Thomas Thor¹等講者，分享國際間正值除役期間之核電廠除役現況、核能發電於碳中和 (carbon neutrality) 及減碳之努力，以及各國與各組織致力於原子能相關領域之性別平衡 (gender balance) 之努力與成果。

Panel Session I: Status and issues of decommissioning's currently underway worldwide

第一場座談會議由加拿大、法國及日本之講者，共同分享該國與國際間目前之除役現況，三篇報告重點摘要如下：

1. 加拿大講者提及該國目前有 CANDU 核子反應器進入除役階段，為全球首座除役中的 CANDU 核子反應器（除役後廠址可能轉為建置小型模組化反應器），許多工程皆須極新之研發技術，故人才與經費是一大挑戰。加拿大為了長期之各電廠之除役工程，創建加拿大核能永續發展中心，其認為惟有妥善處理除役及廢棄物處理與處置，核能發電才得以永續發展，發展中心主要關注之領域包括除役、廠址再利用、廢棄物之管理與國際合作；除技術研發外，也致力於建立強大且安全的社區連結，透過開放且透明的溝通與當地居民與原住民進行合作，並對當地年輕世

¹ Thomas Thor 為一成立於 2009 年之國際組織，主要任務為致力於建立和維持全球核勞動力 (workforce)，並協助核工業內機構間之橫向連結以及專業需求支援。

代之 STEM 教育 (Science 科學、Technology 技術、Engineering 工程、Math 數學) 給予支持與贊助。

2. 法國講者說明在 2020 年底，全球約 200 座核能機組進入除役，可見世界各國放射性廢棄物貯存場之大興土木，也因此投入大量經費與資源進入廢棄物減量及再利用與處置之研究領域，透過電腦模擬軟體、人工智慧、研發機器人及遙控設備儀器進行管路的切割及廢棄物之包裝，來進而減少工作人員之人員劑量，提高工作安全。
3. 日本講者分享在廣大且長期之除役工作中，溝通議題之重要性幾乎等同於技術議題，除役工作的進行不僅是企業也是日本人民及當地居民之責任，以達到穩定安全且高效率。高效率之除役工程需具備四要件：組織及員工面對除役工作皆有正確的核安文化及穩定心態、確保用過燃料及低階放射性廢棄物之去向、除役工程所需之經費與會計系統、合理的除役法規與運作。

Panel Session II : Role of nuclear power in achieving carbon neutrality

第二場座談會，主辦單位邀請美國、非洲、巴西、日本及世界核能協會 (WNA) 之講者，共同分享核能發電於碳中和及減碳之努力。其中，許多講者提到於 COP 26 會議中有幾項重點：核能發電作為減碳為一大利器，透過興建新型核子反應器或 SMR 皆可達到減碳之目的。各國之高科技產業及傳統產業皆需要大量能源，而核能發電可增進國家之能源安全，進而確保國家不會因戰爭等因素導致能源短缺。核能，除了能為業界提供穩定電力，亦可為工業界提供產氫之功能。

Panel Session III : Gender balance in the nuclear power sector

第三場座談會，則由阿根廷、埃及、日本、國際原子能總署及 Thomas Thor 之講者，共同分享各國及各組織致力於原子能相關領域中性別平衡之努力與成果。以下謹綜合整理所有講者之報告內容，重點摘要如下：

1. 目前多數國家皆建立完善與男性同等之年輕女性學子教育；
2. 業界中也有許多國家或組織皆為鼓勵女性從業人員，擴大中高階層管理階級晉用女性主管，並給予女性從業人員生育之完善補助與職涯規劃措施，儘可能降低女性因生育所造成落後男性從業人員之可能性；
3. 發展中國家（例如南美洲國家或非洲國家）近年來較為女性意識抬頭，但截至目前為止，女性學生接受到平等教育之成效仍然有限，且多數企業或組織之領導人仍皆為男性。
4. 透過導師導生制度（Mentoring Program）及人際網絡活動之培養，儘可能的提升女性從業人員之比例；
5. 核能領域，與大眾的溝通極為重要，透過女性特質，較容易與社群溝通及和平討論，由女性出面與大眾溝通較能被大眾所接受及理解。

五、WiN Global Awards

WiN Global 設有三個女性專屬的獎項，分別為 Nuclear Future Award、Excellence Award 和 Honorary Award，分別對應到所欲提攜鼓勵的族群就是年輕世代、青壯世代和資深世代。如此之設計，除了為了表達對那些於核能界有實質貢獻之獲獎人感謝與肯定之意外，也有著一股正面性質的激勵，亦即無論妳是處於哪一種世代年紀，均鼓勵全球女性應大膽且熱情地持續投入智慧、知識與技術於核能科技領域，彼此正面刺激與相長，以達到核能技術與經驗傳承之目的。

今年度，該三獎項經過理事票選後，分別選出一位獲獎人，得獎人如下：

- 阿根廷 Estefania Orcellet 獲頒 2022 WiN Global Nuclear Future Award；
- 韓國 Eunok Han 獲頒 2022 WiN Global Excellence Award；
- 英國 Loretta Browne 獲頒 2022 WIN Global Honorary Award。



Estefania Orcellet



Eunok Han




Loretta Browne

圖 6、2022 WiN Global Awards 三位獲獎人（圖資來源：大會資料）

六、Poster Awards


今年會議，除上述演講會議內容以外，亦設有 E-posters 專區，經歷徵稿、網路票選活動以及 Poster Awards 之頒獎程序。E-posters 共有 54 篇投稿，投稿領域包含社會溝通、輻射量測、放射性同位素之應用、環境變遷相關議題、性別平衡、核廢料處理、保健物理等面向，由實體與會者以及線上與會者參與投票，最後選出獲獎之 E-poster 一則。經過大會之投票結果，獲獎人為來自日本的發表者 Miki Hirata 等人，Miki Hirata 等人以「We have provided the Glass Badges to residents in Fukushima Prefecture to monitor their individual dose since 2011.」為題，發表分享自 2011 年福島核能事故之後，其所任職之日本千代田科技公司（Chiyoda Technol Corporation）曾為福島縣非疏散區域之當地居民提供個人劑量監測服務，設計發放玻璃個人劑量計（Glass Badge）供居民配戴，個人劑量採季監測並記錄。此外，該公司也與日本產業技術綜合研究所（National Institute of Advanced Industrial Science and Technology）合作，聯合設計發明一種稱為 D-shuttle 的個人電子式劑量計，提供有需要的居民輔助配戴，可以隨時知道自己受到的年累積劑量。依據該報告的結果顯示，結果上雖未明確說明當地居民受到的劑量分布究竟是多

少，而僅提供監測次數的長期統計趨勢分布，然而自 2012 年開始，可觀察到監測次數有逐年下滑之趨勢，作者說明此係因當地居民在透過個人劑量監測結果後，已能確定當地環境之背景輻射水平已下降，居民自覺已無輻射安全疑慮後，就逐漸不再配戴劑量計為監測。




29th Win Global Annual Conference
Evolution of Decommissioning Reconstruction - 11 Years after Fukushima Accident -

Miki Hirata, Chiyoda Technol Corporation
*K. Murayama, *Y. Inukai, *Chiyoda Technol Corporation



Japan

No.09 We have provided the Glass Badges to residents in Fukushima Prefecture to monitor their individual dose since 2011.



1. Introduction

A personal dosimeter is the device to determine individual dose. Primarily, the personal dosimeters are designed only for radiation workers and not prepared for the general population. Therefore, **we redesigned a personal dosimeter for the general population** after the Fukushima Daiichi Nuclear Power Plant accident in 2011.

2. Method

Glass Badge
We provided Glass Badges to monitor the individual dose for general population. The individual doses were measured quarterly. The purpose is to determine the radiation dose of general population in areas not subject to evacuation.

D-Shuttle
D-shuttle had been jointly developed by the National Institute of Advanced Industrial Science and Technology and Chiyoda Technol Corporation. We provided D-Shuttle for general population who wanted to know time series data themselves. Annual inspections were done after D-shuttles had been used in a year.


- The number of usages of Glass Badge was observed from 2011 to 2020. On the other hand, the number of inspections of D-Shuttle was done from 2013 to 2020.
- The maximum numbers were taken as 100%.

3. Result

The charts show the number of measurements of Glass Badge and inspections of D-Shuttle. Note that the numbers of measurements and inspections do not correspond to the number of users. The bar indicates the numbers of measurements or inspections. The line graph shows the ratio against the maximum number.

Glass Badge


- The cumulative number of measurements was reaching 1.32 million by 2020.



Upper photo: Children with Glass Badges (Original photos by Asahi Shimbun)

D-Shuttle

- The number of inspections of D-shuttles fluctuates from 2015 to 2017.
- The cumulative number of annual inspection was 44,000 units by 2020.



Upper photo: D-Shuttle with Handy Indicator

4. Discussion

- ✓ The number of measurements by Glass Badge has consistently decreased since 2012. The result suggests that more people confirmed the safety and relieved by the measurement.
- ✓ The decrease is more gradual in the D shuttle. There are two reasons and their balances caused a gradual decline in D shuttles.
 - The expanded evacuation order lifting area generated new demand for those who return. The needs to check the environmental radiation level remain as a result of comparing time series data with behavior history.
 - Some people would need measurements no longer if they could get reassured by measurements at the place.

5. Conclusion

The number of personal dosimeters we provide has decreased today. The primary reason of this is that the environmental radiation level has also decreased. We are going to provide the service for general population as long as the people need the measurements.

圖 7、2022 WiN Global 獲獎之電子報導 (E-poster)

肆、 明年年會預告

2023 年第 30 屆 WiN Global 年會將在埃及盧克索 (Luxor, Egypt) 舉辦，大會主題訂為「Women in Nuclear are Privileged. Women Working in the Field Peaceful Nuclear Applications」，時間訂於 112 年 12 月 3~7 日，將以實體和視訊同步會議方式舉行。



圖 8、2023 WiN Global 宣傳海報

伍、心得與建議

- (一)、 本次會議主辦國為日本，該國因福島事件取得之教訓與課題與世界分享，並同時成為各國核能界之借鏡與自我檢視之對象；然而值得注意的是，即便核電廠除役為會議主軸之一，且日本前後雖經歷東日本大地震及福島事件造成核災，導致所有核能電廠暫停運轉以進行全面性風險評估，數年之後核能仍然是日本之能源生產來源之一。此說明日本著實如在本次會議演講中所說，花費許多心力於民眾溝通以及重新取得民眾信任，以至於雖經過致災性嚴重事故，日本民眾仍願意繼續使用核能，並且重新相信政府。
- (二)、 WiN Global 近年對於核能溝通議題討論熱烈，顯見世界各國在核能使用上均遇到相同問題，然而每個國家的溝通能力、方式與相對應帶出的成效有所別。2017 年阿根廷發生之事件，因溝通問題，導致以禁令收場；2011 年福島事件，因溝通而使日本核能電廠得以重新恢復運轉，此兩事件顯見，若要使核能得到民眾的支持或是取得國民之信任，除了資訊公開透明化以外，溝通之智慧以及耐心仍為一重要關鍵。
- (三)、 溝通之能力為職場上必備之技能，WiN Global 除了專業領域之分享以外，亦有軟性議題進行討論與學習，建議鼓勵會內同仁參與，除可提升專業知識之外，亦可於軟性議題中有所收穫，進而提升處理公務所需之知能。
- (四)、 WiN Global 提倡性別平衡與多樣性包容，並未限制其會議僅能女性會員參加，反而鼓勵有志朋友，不分性別與所長，均歡迎一起加入國際討論與資訊交流行列。考量我國多項政策均走向國際化，本會亦有國際事務關係需長期經營與增進連結，故建議鼓勵本會同仁（包含駐外人員）未來能一起出席參與 WiN Global 相關國際會議或課程，親自參與並了解世界發展動態，學習國際經驗與提升視野，尤其未來 WiN Global 所開設的研討會議均以實體與視訊同步會

議方式進行，更利於同仁國際參與，有助於強化國際事務交流與合作，增進且深耕國際情誼，強化國際關係。

附件 1：WiN Taiwan 台灣分會報告

29TH WIN GLOBAL ANNUAL CONFERENCE: CHAPTER REPORT



| WiN Taiwan | |
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| Chapter president | Ju-Chuan HUANG - 2016 |
| Chapter board members | Ju-Chuan HUANG, President - 2016 Ting-Yi WANG, VP - 2015 Ling-Wen CHEN - 2004 Li-Fang KAO - 1993 Tsuey-Lin TSAI - 2012 Hui-Yu TSAI - 2007 Li-Na Rina YEN - 2013 Zih-Min JIANG - 2020 Li-Yuan HUANG - 2020 |
| Number of members | Local/Global: 229/ 56 |
| Chapter Contact | Ruei-Ying LIAO ✧ ring808663@gmail.com ✧ u808663@taipower.com.tw Ju-Chuan HUANG ✧ jchuang@aec.gov.tw ✧ juchuanhuang@gmail.com |
| Chapter accepted by WiN Global | 1993 |
| Nuclear power infrastructure | The government's energy policy of phasing out nuclear power remains firm; there will be no license renewal beyond their 40-year licensed operation for all existing nuclear power plants (NPPs). The use and development |

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| | <p>of green energy and renewable energy industries, such as wind and solar, are expected to accelerate in the coming years so as to achieve the ultimate goal of phase-out of nuclear power.</p> <p>There are three NPPs at Chinshan, Kuosheng and Maanshan, operated by state-run utility Taipower, with two units at each site. They contributed to around 11.22% of the total electricity in 2020. The 40-year operating license of these NPPs first expired in December 2018 for Chinshan Unit 1, and is followed by Unit 2 in July 2019, then Kuosheng Units 1&2 in December 2021 and March 2023, and finally Maanshan Units 1&2 in July 2024 and May 2025, respectively. Each of these nuclear power reactors will be getting into decommissioning period when its 40-year operating license expires.</p> <p>In addition, the decision of mothballing the long-troubled two ABWRs at the fourth plant, Lungmen, was made in 2014, in response to growing public concerns over the safety of nuclear power following the Fukushima nuclear accident of 2011. The construction of the two units at Lungmen began in 1999, and its construction permit expired in December 2020. After the expiration date of the construction permit, no construction work is allowed at Lungmen unless Taipower resubmits the application for the construction license with a thorough safety assessment pursuant to Article 5 of the Nuclear Reactor Facilities Regulation Act.</p> <p>In a referendum held in 2018, 59.5% of voters supported overturning legislation enacted in 2017 that would end all use of nuclear power</p> |
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| | <p>by 2025. However, the administration has stated that it still intends to push for a nuclear-free Taiwan, just that after the referendum results, which are legally binding, it no longer has a deadline of 2025 to realize a nuclear-free Taiwan. Moreover, another referendum was held in 2021, which proposed to decide whether or not the Lungmen Site to be activated for commercial operation. Unfortunately, the referendum proposal failed due to 52.8% disapproval.</p> <p>The present government continues to strive toward its goal of nuclear-free homeland, which indicates that the existing nuclear power plants shut down permanently as their 40-year operating licenses expire.</p> |
| <p>Nuclear medical applications</p> | <p>The two proton therapy centers located at the Linkou Chang Gung Memorial Hospital and the Kaohsiung Chang Gung Memorial Hospital, respectively, have been in full operation for a few years. We are currently commissioning the third proton one at the Taipei Medical University Hospital and the first heavy ion therapy facility at the Taipei Veterans General Hospital. There are three another proton therapy facilities under construction in Taiwan.</p> <p>In addition, there are 13 cyclotrons for radiopharmaceutical production in Taiwan, one of which is at the Institute of Nuclear Energy Research (INER), one at a pharmaceutical factory and 10 at 9 hospitals. There are also large numbers of various medical equipment and facilities in Taiwan, for diagnostic radiography, nuclear medicine and radiotherapy. Comprehensive quality assurance programs have been implemented for</p> |

mammography equipment, computed tomography (CT) and various radiotherapy facilities.

INER has engaged in the new radiopharmaceutical research for more than 20 years. Tc-99m Trodat-1 was the first Tc-99m-labeling radiopharmaceutical for dopamine-transporter imaging in the world which could be used for the diagnosis of Parkinson's and related diseases. In 2015, the techniques and documents of Tc-99m Trodat-1 was licensed out to the local industry, it greatly enhanced the nuclear medicine application in the world. DOLOCAGA kit, labeling with Ga-68, is a brand-new radiopharmaceutical developed by INER for liver residual functional assessment. INER received the approval of Phase I clinical trial from the Taiwan Food and Drug Administration (TFDA). In January 2019, INER started the Phase I clinical trial at the National Taiwan University Hospital. The result demonstrated its highly liver-targeting characteristic and the safety in healthy volunteers. From the late of 2021, we have started the comparative phase II clinical trial with the Chang Guang Memorial Hospital to assess the accuracy and reliability of the Ga68-Dolacga compared to traditional CT and indocyanine green retention tests in scheduled surgery operation patients.

INER's Radiopharmaceutical Manufacturing Center has obtained 17 radiopharmaceutical drug licenses from the TFDA. The center received the approval of PIC/s-GMP certification which is the newest manufacturing standard in Taiwan, and an NDA (new drug application) of I-123 MIBG Injection was filed to the TFDA. I-123 MIBG

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| | <p>will be used as a new diagnostic tool for heart failure and Lewy body dementia in Taiwan's Nuclear Medicine.</p> <p>Since the outbreak of COVID-19 pandemic, the unstable international flights for the imported Tl-201 cardiac imaging agent caused the shortage of domestic demand in nuclear medicine. INER immediately expanded the capacity of Tl-201 production to stabilize the supply of Tl-201 radiopharmaceutical for patient benefit in time.</p> |
| <p>Nuclear applications in other fields</p> | <p>There have been extensive uses of nuclear technology in various non-medical fields in Taiwan. For example, static elimination and ion implantation are widely used nuclear applications in the semiconductor manufacturing process. Such instruments are mostly imported. Domestically manufactured static eliminators became available in recent years, but only account for a small share of the market.</p> <p>Radiation sterilization processing services have been commercially available for 30 years in Taiwan to healthcare, laboratories, pharmaceuticals, food, packaging, cosmetics and other related industries. ISO/OHSAS certifications have been obtained to help products accepted in the international market.</p> <p>Industrial radiography (IR) is another widely used nuclear application in Taiwan, in evaluating material integrity and construction process. A non-profit organization on the non-destructive testing (NDT) industry has existed for over 40 years in Taiwan which provides education and training, conducts qualification</p> |

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| | <p>examinations, and manages personnel qualification and certification in NDT, inclusive of IR.</p> <p>As far as nuclear applications close to our daily life, a good example would be gold purity analyzers or karat-meters using X- ray fluorescence technology. The device is available at nearly every gold jewelry shop, as collection and gift-giving of pure gold jewelry and ornaments is a tradition in Taiwan.</p> |
| <p>Waste management philosophy</p> | <p>The strategies for low-level waste (LLW) management are “volume reduction, safe storage and final disposal.” Since the volume reduction strategy program was launched in 1990, Taipower has successfully reduced its annual output of solidified LLW to about 189 (55-gal) drums in 2018, which is only 1.5 % of over 12 thousand drums in 1983. Currently, the accumulated amount of LLW is about 232 thousand drums; roughly half stored at NPPs, half at the LLW storage site at Orchid Island, and about 8% at INER.</p> <p>In order to lay down a legal process for site selection of a LLW final disposal facility, the “Act on Sites for Establishment of Low-Level Radioactive Waste Final Disposal Facility” was promulgated in 2006. The Ministry of Economic Affairs selected two locations as Recommended Candidate Sites in July, 2012. Local referendum is required by law; however, local governments have not been cooperating with the central government in conducting such referendum due to significant pressure from anti-nuclear groups. Communications among all stake holders are much needed in order to move forward.</p> |

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| | <p>The strategies for spent fuel management are “storage in spent fuel pools for the near term, onsite dry storage for the medium term, and final disposal for the long term” .</p> <p>Currently, all spent nuclear fuels are stored in NPP storage pools. For onsite dry storage, the first phase (small scale) storage projects at Chinshan and Kuosheng plants have both been delayed, pending approval by the local government on water & soil conservation and waste water reduction requirements, respectively. An indoor storage strategy as favored by public opinion will likely be adopted for the second phase (large scale) onsite dry storage developments. As to the final disposal, Taipower submitted the "Spent Nuclear Fuel Disposal Program - 2017 Progress Report (SNFD 2017 report)" to demonstrate the technical capability of spent nuclear fuel final disposal in Taiwan in December 2017. The Fuel Cycle and Materials Administration of AEC completed a 12-month review process on this report in January 2019. The latest version of the disposal plan was approved in January, 2020 by AEC.</p> |
| Research | <p>INER, a government research institute founded in 1968 has long been dedicated to R&D on nuclear safety and radiation applications and protection, while bearing the mission of developing radiopharmaceuticals for the public well-being. In conformity with the national energy policy toward nuclear phase-out, INER has in recent years not only focused its technical work on nuclear facility decommissioning and radioactive waste treatment and disposal technology, but also expanded its research to include the development of green energy such as new and</p> |

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| | <p>renewable energy, energy conservation and carbon emission reduction, in addition to participating in the energy-related economic policy research.</p> <p>Recently, INER has also obtained the financial support from our government to execute a 70-MeV-cyclotron setup project that will be starting from 2023. It could not only play an important role for the medical isotope production, but also provide the neutron source for basic material research and industrial application.</p> <p>Among the various research activities conducted by a large size of faculty at its College of Nuclear Science and Nuclear S&T Development Center, the National Tsing Hua University (NTHU) operates an open-pool reactor named the THOR, for research and medical isotope production. All other research reactors in Taiwan have been decommissioned.</p> |
| Chapter Updates | <p>WiN21 Annual Conference - <i>17-21 October 2021</i>. The 28th annual conference of WiN Global was held virtually, due to the COVID-19 pandemic. Prior to the conference, the Taiwan chapter contact person, Ruei-Ying Liao and the current president, Ju-Chuan Huang attended the Executive & Board online meeting via zoom app. Then, the delegation of Taiwan chapter, including Jessie Chiu, Ju-Chuan Huang and Li-Yuan Huang of AEC, Ruei-Ying Liao and Ting-Yi Wang of Taipower, Tsai-Yueh Luo of INER, Yi-Hsiang Cheng of Industrial Technology Research Institute and Hui-Yu Tsai of NTHU, joined the conference via the virtual platform, pheedloop. The host country of the conference, WiN Canada, was ingenious,</p> |

with its aboriginal culture greeting and blessing to all the attendee, bringing unforgettable every day to the conference.

Saturday Spring Outing - *6 March 2021*. An outing to Tamsui in New Taipei City. It was a precious journey during the COVID-19, with networking among WiN Taiwan members and recharging with deep learning of the history and culture of Tamsui.

WiN Taiwan Annual Meeting - *27 October 2021*. The annual meeting was held jointly with the Taiwan Young Generation in Nuclear (TYGN) virtually. We invited Prof. Yun-Nung Chen from the National Taiwan University to talk a topic of "The Magic of Artificial Intelligence - why did she give up Microsoft's job offer and return home to teach AI?" .

2021 Taiwan Women in Science and Technology Conference - *11 December 2021*. The Conference was jointly organized by 53 academies, associations and guilds, including WiN Taiwan, to advocate the "Support Women" action plan. There were more than 1100 people registered for the conference, of which 30% were students and 17% were men. Gender-friendly study and work environment, diverse and inclusive teamwork and leadership were the core issues in the Conference.

Chung-Hwa Nuclear Society (CHNS) Annual Meeting - *17 December 2021*. WiN members of Taiwan actively participated in the annual meeting of its mother society CHNS. At the meeting, the keynote speeches focused on two topics, one of which was A Brief Introduction on the National Project in Neutron and Proton Science: New Construction of 70 MeV

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| | <p>Cyclotron, and the other one was about an introduction of Small Modular Reactors. Besides, the 7th President of WiN Taiwan, Ms. Shin Chang won the Bao-Xi Chu Memorial Award, the highest honor in nuclear industry in Taiwan. Ms. Chang is the first woman ever in Taiwan history got the award.</p> <p>Spring Webinar - <i>14 April 2022</i>. Prof. Wei-Chen Lin from the National Cheng Kung University was invited to talk about human microbiome, bringing more health knowledge to the audience.</p> <p>Coming up:</p> <p>WiN Global 2022 Annual Conference - <i>23-26 May 2022</i>. Themed on Evolution of Decommissioning & Reconstruction: 11 Years after Fukushima Accident.</p> <p>WiN Taiwan Annual Meeting - <i>16 June 2022</i>.</p> |
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附件 2：WiN Taiwan 4 分鐘英文介紹影片（截圖呈現）及簡報內容



Chapter Overview

- Chapter President: Ju-Chuan Huang
- Chapter Vice President: Ting-Yi Wang
- Contact Person: Ruei-Ying Liao
- Total Number of Members: 229
- Membership of WiN Global since: 1993

Board Members

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|--|---|---|--|---|--|---|--|--|--|
|  Ju-Chuan Huang (President) |  Ting-Yi Wang (Vice President) |  Ruei-Ying Liao (Contact Person) |  Li-Fang Kao |  LingWen Chen |  Hui-Yu Tsai |  Li-Na Rina Yen |  Tsuey-Lin Tsai |  Li-Yuan Huang |  Zhi-Min Jiang |
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Industry update

Nuclear power infrastructure

1 The energy policy of phasing out nuclear power by 2025 remains firm. There will be no license renewal beyond their 40-year licensed operation for all the existing NPPs.

2 The construction of the two units at Lungmen Site began in 1999, and its construction permit expired in December 2020. After the expiration date, no construction work is allowed.

3 A referendum was held in 2021, which proposed to decide whether or not the Lungmen Site to be activated for commercial operation. As a result of 52.8% disapproval, the referendum proposal failed.

Industry update

Nuclear medical applications

Proton therapy facility:
2 in full operation
1 in commissioning
3 in construction
Heavy ion therapy facility:
1 in commissioning

Radiotherapy
including linear accelerators, proton and heavy ion therapy

Diagnostic Radiography
medical exposure quality assurance programs implemented for mammography and CTs

Nuclear medicine
supported by 13 cyclotrons of radiopharmaceutical production

Industry update

Nuclear nonmedical applications

Radiation sterilization

Industrial radiography

Non-medical fields
Ex. static elimination, ion implantation, gold purity analyzers etc.

Researches
Ex. THOR in NTHU, Radiopharmaceutical manufacturing center in INER, etc.

Recently, INER has also obtained the financial support from our government to execute a 70MeV-cyclotron setup project that will be starting from 2023. It could not only play an important role for the medical isotope production, but also provide the neutron source for basic material research and industrial application.

Industry update

Waste management philosophy

Low-Level Waste Management

Volume Reduction

Currently, the accumulated amount of LLW is about 232 thousand drums; roughly half stored at NPPs, half at the LLW storage site at Orchid Island, and about 8% at INER.

Safe Storage



Final Disposal

The Ministry of Economic Affairs selected two locations as Recommended Candidate Sites in 2012. Local referendum is required by law; however, local governments have not been cooperating with the central government in conducting such referendum. Communications among all stake holders are still needed in order to move forward.

Spent Fuel Management

Storage in Spent Fuel Pools for the Near Term

Currently, all spent nuclear fuels are stored in NPP storage pools.

Onsite Dry Storage for the Medium Term

The first phase storage projects at Chinshan and Kuosheng plants have both been delayed, pending approval by the local government. An indoor storage strategy will likely be adopted for the second phase.

Final Disposal for the Long Term

Spent Nuclear Fuel Disposal 2017 report has been reviewed. The latest version of the disposal plan was approved in January, 2020 by AEC.



Chapter Updates

WiN 2021 Annual Conference – 17-21 October 2021.

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| Ruel-Ying Liao Rueying Liao, TAIWAN POWER COMPANY | Yi-Hsiang Cheng Yi-Hsiang Cheng, ITRI | Hello all! Nice to see you all! Ting-Yi Wang, Taiwan Power Company | Great to be here with you all – happy together! With love from Taiwan Jesse Chiu, Atomic Energy Council |
| | | | |
| Congratulation for the excellent conference Tsaiyueh Luo, Institute of nuclear energy research | Glad to be here, greetings from Taiwan! :) Li-Yuan Huang, Atomic Energy Council, Taiwan | Happy WIN Global & WIN Taiwan! Cathy Tsai, National Tsing Hua University | Thank you so much for all of this done. Greeting from Taiwan. Ju-Chuan Huang, Atomic Energy Council |

Chapter Updates

Spring Outing to Tamsui – 6 March 2021.



WiN Taiwan Annual Meeting—
27 October 2021.

**Chapter
Updates**



2021 Taiwan Women in Science
and Technology Conference—
11 December 2021.

**Chapter
Updates**



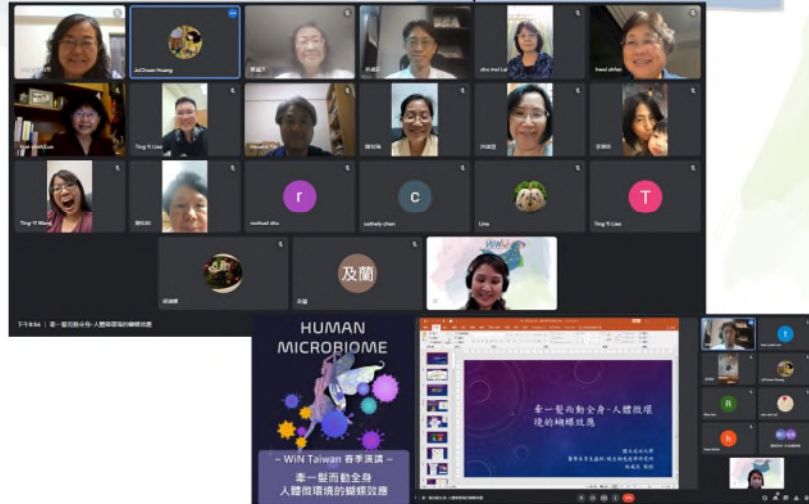
Chung-Hwa Nuclear Society
(CHNS) Annual Meeting—
17 December 2021.

**Chapter
Updates**



Spring Webinar –
14 April 2022.

Chapter Updates



Hope you enjoy our report

