

IAEA 與 NEA 動態報告

2018/6/11- 6/22

報告摘要 (KEY INFORMATION)

1. 拉丁美洲國家開始與國際原子能總署及其夥伴合作防止新型螺旋蛆蟲再次於中、北美洲發生侵害。該物種曾於相關區域消失甚久，其存在會影響家畜生產及人體健康。新合作計畫將重點放在早期偵測能力、爆發時之應變能力以及透過昆蟲絕育技術(SIT)消滅整個族群。
2. 過去兩世紀密集性燃燒燃料及砍伐森林已經造成大氣二氧化碳含量比起工業化前多出 50%，並使海洋因吸收過多二氧化碳進而酸化。國際原子能總署因此將於 2019 年啟動一項 4 年期的協同研究計畫，以了解全球海洋酸化對海中食物之影響並探索水產養殖及海鮮工業之應對策略，其中核子與同位素技術在海洋酸化對海洋生物之影響研究中扮演重要腳色，例如測出鈣化沉積率。
3. 過去四年由國際原子能總署與來自 16 個國家與會專家共通建立一個嶄新工具，可協助建立核能動力建置之策略規劃，規劃出願景、達成目標之計畫、提高並監測長期運作之核能動力系統。此系統亦可從核能科技及架構之創新，找出國家如何獲得利益之途徑。
4. 評估現存環境輻射量對減輕暴露於輻射中之風險以及保護公共安全是相當重要的，故國際原子能總署透過其環境實驗室舉辦了為期 2 週之課程，培訓參與者擁有必要技術以使各自所屬國家能有能力在汙染地點評估相關風險。
5. 在國際原子能總署之協助下，馬來西亞原子能授證委員會就黎巴嫩及阿曼主辦一場技術拜訪，以協助強化其核能保安經驗。馬來西亞專家與來自這兩邊國家的同僚互相交換資訊，並分享針對核子保安主體建置之最佳實務經驗。這次拜訪協助了黎巴嫩及阿曼在建立核子保安支援系統時，包含所需之步驟。
6. 配合國家增加及改變能源需求以建立有效能源策略是很重要的。這個複雜過程能協助政府達到保護環境、改善市民健康、降低能源相關成本並使經濟穩定化。來自 19 個國家之專家與國際原子能總署聯合就國際原子能總署現有發展之能源系統分析規劃工具，討論如何提升其效益。未來將持續發展其工具並提供相關訓練課程。
7. 加拿大、日本及美國在第 9 屆潔淨能源部長會議發起 Clean Energy Future (NICE Future) 周邊會議，倡導核能在未來創新完整進階能源系統中扮演低碳電力來源角色。參與這個活動之國家包含了阿根廷、波蘭、羅馬尼亞、俄羅斯、阿拉伯聯合大公國以及英國。

國際原子能總署近日新聞

LATIN AMERICAN COUNTRIES COMBAT SCREWWORM PEST THROUGH IAEA PROJECT

拉丁美洲國家透過國際原子能總署規劃方案對抗螺旋蟲危害



Methods to combat the New World Screwworm, including the sterile insect technique (SIT), are discussed at a research centre operated by the Uruguayan Wool Secretariat. (Photo: IAEA)

Latin American countries have started work with the IAEA and its partners to prevent the re-introduction of the New World screwworm into Central and North America from where it has been eradicated and build capacity for the suppression and eventual eradication of this insect pest in some regions of South America and the Caribbean.

The screwworm affects both livestock production and human health. With the help of nuclear techniques, a new project to address the screwworm problem, organized by the IAEA in cooperation with the Food and Agriculture Organization of the United Nations (FAO), the United States Department of Agriculture (USDA) and the USA-Panama Commission for the Eradication and Prevention of the New World Screwworm (COPEG), is underway.

The new project will focus on strengthening surveillance systems for early detection of the pest, emergency response to pest outbreaks in screwworm-free areas and the development of capacity for progressive pest suppression and eradication through a comprehensive approach known as area-wide insect pest management. This approach targets the entire population of an insect throughout a large area, and incorporates the sterile insect technique (SIT). SIT involves the sterilization of large numbers of male flies with radiation in a mass-rearing facility before releasing them into the wild, where their mating produces no offspring. Over time, the pest population is reduced and can ultimately be eliminated.

Although the screwworm has been eliminated from the United States, Mexico and Central America using SIT in conjunction with other methods as part of an area-wide insect pest management approach, it persists in several areas throughout South America and the Caribbean.

During the project's first coordination meeting, held from 19-23 March in Montevideo, Uruguay, representatives from several countries in the region presented the status of the screwworm

and discussed how to continue improving efforts to prevent and combat the insect. “The workplan and activities were planned in accordance with the varying needs of each country involved in the project, though effective control of the pest requires a regional approach considering its transboundary nature,” said Walther Enkerlin, an entomologist in the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture.

The screwworm fly lays eggs in wounds and soft tissues in warm-blooded animals, including humans and livestock such as cows, causing a disease known as myiasis. When the larvae hatch from the eggs, they feed on the surrounding tissue, resulting in sores and lesions that are highly susceptible to bacterial infection. These infections can be deadly if left untreated. Since it was eliminated in the USA, Mexico and Central America, the economic benefit due to the eradication of the New World screwworm has amounted to

approximately US \$1.3 billion per year according to the New York Academy of Sciences.

“SIT has proven to be a highly effective technique, and it is important that we expand its implementation as part of an overall approach in Latin America,” said Moises Vargas, an international animal health expert, formerly at the FAO’s Regional Office for Latin America. “We are establishing a sound plan for the prevention and progressive control of the New World screwworm throughout the region.”

The next steps of the project, delivered through the IAEA’s technical cooperation programme, will include reviewing and updating a road map for the progressive control of the screwworm in the region, preparing a strategic plan and an economic feasibility assessment and continuing to build capacity in surveillance, diagnosis and emergency response to pest invasions in previously cleared areas. [\(原文鏈結\)](#)

NEW CRP: EVALUATING THE IMPACTS OF OCEAN ACIDIFICATION ON SEAFOOD - A GLOBAL APPROACH (K41018)

新協同研究計畫:評估海洋酸化對海中食物之影響-一個全球性方式(K41018)



Little is known about the long-term impact of ocean acidification (OA) on socioeconomically important seafood despite the potentially severe risk OA presents to marine organisms. (Photo: Marc Metian)

The IAEA is launching a new 4-year Coordinated Research Project (CRP) starting in 2019 to advance understanding on the effects of ocean acidification on seafood around the world and to explore adaptation strategies for aquaculture and seafood industries.

Intensive fossil-fuel burning and deforestation over the last two centuries has increased atmospheric carbon dioxide by 50 % above pre-industrial values. The global ocean currently absorbs roughly one third of this anthropogenic carbon dioxide, and its carbonate chemistry is fundamentally altered in the process. By doing so, the ocean undergoes a decrease in pH, referred to as ocean acidification.

Ocean acidification has been recognized as a major threat to marine ecosystems. Concern about the impacts of ocean acidification on socioeconomically important seafood is increasing worldwide, and ocean acidification is now an integral part of the United Nations 2030

Agenda for Sustainable Development. Furthermore, recent studies have demonstrated that ocean acidification may also impact the quality of seafood, and there is a growing body of literature documenting the biological response of seafood to ocean acidification. Long-term studies are essential to track the effects of ocean acidification, but there are few of these studies. Furthermore, data on economically and socially important seafood in developing countries are still largely lacking.

Therefore, this CRP will apply a common experimental approach to assess the long-term impacts of ocean acidification on key seafood species (e.g., oysters, mussels, shrimps, lobsters and/or fish) around the globe. Impacts will be assessed using both conventional and nuclear and isotopic techniques.

Nuclear and isotopic techniques are key tools to study the effects of ocean acidification on marine organisms. They can be used to measure parameters such as calcification rates, metabolomics, co-contamination, etc.

The data collected will lay the basis for the development and implementation of adaptive solutions.

CRP overall objective:

The primary goal of this CRP is to advance understanding about the quantitative and qualitative effects of

ocean acidification on key seafood species around the world and to explore adaptation strategies for aquaculture and food industries, using a standardized, collaborative approach.

Specific research objectives:

- Collect and compare worldwide data on the impacts of ocean acidification on key local seafood species through a collaborative approach involving Member States from across the globe.
- Expand international collaboration on ocean acidification using knowledge and research kits developed through the Ocean Acidification International

Coordination Centre (OA-ICC) capacity building activity and the TC INT7019 project.

- Explore innovative approaches to study the effects of ocean acidification on seafood security, including novel ways of applying nuclear and isotopic techniques to this field of study.

How to join the CRP:

For further information related to this CRP, potential applicants should write to the Research Contracts Administration Contact Point.

[\(原文鏈結\)](#)

IAEA PROJECT DEVELOPS ROADMAPPING TOOL FOR FUTURE NUCLEAR ENERGY SYSTEMS

國際原子能總署建立用於未來發展核能系統之藍圖工具



Nuclear energy systems have complex physical and institutional infrastructure that easily span several human generations. A new tool developed by the IAEA will make their planning and development easier. (Photo: ROSATOM)

A new tool is now available to help national authorities in making strategic decisions about the development of nuclear power. Developed over the last four years by experts from the IAEA and 16 countries, the new tool helps develop 'roadmaps', i.e. visions and plans of how to achieve, enhance and monitor an increasingly sustainable nuclear energy system in the long term. It can also be used to identify how countries can benefit from innovations in nuclear technology and infrastructure, both nationally and through cooperation with other countries.

A nuclear energy system encompasses all nuclear facilities from mining uranium through electricity generation to radioactive waste management and the permanent disposal of high-level waste, and the related institutional framework, both legal and regulatory.

Nuclear energy systems have complex physical and institutional infrastructure that easily span several human

generations. Also, developing or expanding these systems requires extensive planning, lead times and resources, especially for the design and commercialization of new and innovative components.

Experts from 16 countries last month finalized the results of the project on '*Roadmaps for a transition to globally sustainable nuclear energy systems*' – or ROADMAPS for short – and its final report, to be published by the IAEA.

"Undertaking roadmapping for a national nuclear energy system facilitates finding answers to several key questions," explained Vladimir Kuznetsov from the IAEA's International Project on Innovative Nuclear Reactors (INPRO) Section, who has led the project. "The major one is how to get from the present system to a future national nuclear energy system with enhanced sustainability, and to do that efficiently – without excessive investments in national infrastructure."

Sustainability refers to the establishment of a nuclear energy system in a way that – in line with the United Nations definition – can 'meet the needs of the present without compromising the ability of future generations to meet their own needs'.

To determine whether a system can be considered sustainable, it is assessed by applying the INPRO Methodology, a

complex and holistic assessment method of the entire nuclear energy system in several key areas: economics, infrastructure, waste management, proliferation resistance, safety and environment.

Other issues that roadmapping can address include the evolution of nuclear energy systems over time, the domestic production vs import of products and services such as entire nuclear power plants, fuel, maintenance and operations services, as well as preferences about innovative technologies and potential cooperation with other countries.

“Roadmapping that is performed in cooperation among technology users and suppliers could also provide strategic insights into international markets for products and services for the various peaceful uses of nuclear energy,” said Kuznetsov. With this,

technology suppliers could better plan expansions or reductions of their industrial capacities, while technology users would have a clearer picture from where the required products and services could be procured and where there could be bottlenecks.

Five countries, Armenia, Belarus, Romania, Russia and Ukraine had applied the ROADMAPS tool on a trial basis and developed examples of national plans. Their case studies provided valuable feedback for fine-tuning the approach.

The IAEA will make the roadmapping tool available to Member States and provide training in its application, as part of a new service that assists countries in scenario modelling and decision support analysis for the development of nuclear energy systems with enhanced sustainability.

[\(原文鏈結\)](#)

IAEA TRAINS MEMBER STATES IN USE OF COMPUTER MODELS FOR ASSESSING IMPACT OF ENVIRONMENTAL RADIOACTIVITY

國際原子能總署培訓會員國促使其能用電腦模型去評估環境輻射之影響



Course participants doing hands-on exercises to practice using the RESRAD computer model for assessing the impact of environmental radioactivity. (Photo: A. Iurian/IAEA)

Assessing the amount of radioactivity present in the environment is crucial for mitigating the adverse risks of radiation exposure and safeguarding public health. To this end, the IAEA, through its Environment Laboratories recently organized a two-week course to train participants in the necessary skills to develop their respective countries' capacities for radiological assessments on dose risk and authorized limits at contaminated sites. The course was attended by 15 participants from 12 Member States, supported by the IAEA Technical Cooperation programme and hosted by Argonne National Laboratory (ANL) in Illinois, USA from 30 April to 11 May 2018.

The course is part of ongoing cooperation between the IAEA Environment Laboratories and the Member States on monitoring environmental radioactivity and conducting environmental impact assessments. Impact assessments provide the basis for the management of radionuclides that are either naturally

present in the environment, or result from anthropogenic causes. The assessments inform Member States about the possible impact on humans and the environment of any radioactivity that is present so that appropriate actions may be taken.

The knowledge gained from this training will help in developing regulatory guidelines for radiation protection of human and biota.

-Ms. Mouza Ali Alzaabi, Analyst, Environmental Laboratory of the Federal Authority for Nuclear Regulation, United Arab Emirates

At the centre of the course was training in the 'family of codes' of RESRAD (RESidual RADioactivity), a computer model that estimates radiation doses and risks through various exposure pathways—for example, eating or drinking certain contaminated foods or water. Based on these types of complex estimates, regulators and government officials can decide how to manage any consequences of exposure to radioactivity. Since the participants all work in government authorities or organizations involved in radiological environmental assessment and monitoring, they can implement the family of codes in their respective countries' institutions and share what they learned with their peers.

Remarking on his participation in the course, Mr. Alex Twesigye, Nuclear Safety Officer in the Ministry of Energy and Mineral Development of Uganda

said, “The RESRAD codes will be integrated in the national regulatory processes and activities to ensure that human beings and biota are adequately protected from ionising radiation arising from contaminated sites. I will also be happy to transfer the knowledge and skills acquired to my colleagues at work to create a multiplier effect.”

Over the two weeks, participants in the course had the opportunity to take part in discussion sessions, coordinated exercises and lectures delivered by leading experts in the field as well as by staff at Argonne National Laboratory where the RESRAD family of codes were originally developed. The five codes covered in the training (RESRAD-BIOTA, RESRAD-ONSITE, RESRAD-OFFSITE, RESRAD-BUILD, RESRAD-RDD) involved different radiation exposure situations for both human and non-human biota, such as whether exposure takes place in a contaminated building or on top of contaminated soil or how long after a radiation release the exposure takes place.

“The most useful thing was that I could understand the codes and ask questions straight to the codes' developers,” said Ms. Rena Mikailova, Research Officer at the Russian Institute of Radiology and Agroecology (RIRAE) in the Russian Federation. “All the RESRAD codes-which we studied will be applicable to assess different radiological exposure situations for protecting members of the public and the environment as well as to derive different recommendations for further actions to take.”

Other topics covered in the training included ecological risk assessment, dose assessment and concentration ratios and transfer of radionuclides in the environment. Participants also took part in hands-on exercises that involved real-world scenarios such as reconstructing the wildlife dose from near the Fukushima Daiichi Nuclear Power Plant in Japan.

[\(原文鏈結\)](#)

MALAYSIA HELPS LEBANON AND OMAN IN DEVELOPMENT OF INTEGRATED NUCLEAR SECURITY

馬來西亞協助黎巴嫩與阿曼建立完整核子保安系統



Lebanese and Omani officials listen to a presentation on nuclear security by the Malaysian Atomic Energy Licensing Board, as part of a cooperation facilitated by the IAEA. (Photo: Malaysian Atomic Energy Licensing Board)

Under a cooperation facilitated by the IAEA, the Malaysian Atomic Energy Licensing Board has hosted a technical visit for Lebanese and Omani atomic energy authorities to help strengthen their nuclear security practices. Malaysian experts exchanged information with their colleagues from the two countries and shared best practices and lessons learned in the development of a regulatory body responsible for nuclear security. The visit helped Lebanon and Oman consider steps involved in setting up a Nuclear Security Support Centre (NSSC), which serves as a domestic hub for training and technical and scientific support. NSSCs also foster nuclear security culture and enhance national coordination among various national authorities. The IAEA helps countries improve capacity to sustain effective national nuclear security regimes, including through NSSCs and various other measures.

In Malaysia, the regulatory frameworks for nuclear safety and nuclear security are well-coordinated with one another, resulting in a harmonized system that has proven effective, said Muzna Assi, a technical advisor at the Lebanese Atomic Energy Commission. Over years of cooperation with the IAEA, many countries have identified the need to take integrated approaches to regulatory development in order to build capacity while also optimizing efficiency. This has been especially true for developing countries that may not already have infrastructure or expertise established.

“The safety-security interface could be one of the best options during the regulatory work in our country,” said Assi. “Many representatives from developing countries are interested in this approach.”

Effective coordination among all national stakeholders is a cornerstone of Lebanon’s Integrated Nuclear Security Support Plan (INSSP), which is a tailored approach to planning for nuclear security improvements that Member States can work with the IAEA to develop. This approach, which harmonizes all aspects of planning and operation of domestic nuclear security infrastructure, helps reduce redundancy and increase efficiency throughout the entire process. The support from Malaysia was a response to Lebanon and Oman’s request to the IAEA for assistance with

further implementation of their INSSPs. Such support from one developing country to another is often referred to as south-south cooperation, a framework of collaboration in the political, economic, social, cultural, environmental and technical domains. Developing countries share knowledge, skills, expertise and resources to meet their development goals through concerted efforts.

“The INSSP framework has assisted us in getting all the stakeholders involved in nuclear security in the country together,” Assi said. “It has also helped us organize the work and made it easier for the IAEA to provide the assistance we need.”

Over the years, cooperation between Malaysia and the IAEA has led to a number of similar technical visits, beginning in 2012. While they initially

focused primarily on sharing information about domestic nuclear security infrastructure in Malaysia, they quickly realized that the information exchange and experience sharing goes both ways among the countries involved. For cooperation with countries that are still developing their nuclear security infrastructure, Malaysia has become a common host country due to its mature programme and well-developed nuclear security infrastructure.

“It’s a good example of a country that has gone through the experience of having to develop nuclear security infrastructure and now is in a more mature place, voluntarily working with us to share that experience and contributing to nuclear security worldwide,” said James Conner, an IAEA nuclear security officer.

[\(原文鏈結\)](#)

EXPERTS REVIEW IAEA'S ANALYTICAL TOOLS FOR SUSTAINABLE ENERGY DEVELOPMENT

專家們就國際原子能總署發展之能源分析工具加以回顧評析



IAEA Energy Modeling Tools are computer based software programmes and manuals used to assess different energy options and strategies.

Developing effective national energy strategies is crucial to meet countries' expanding and shifting energy needs. It is a complex process that can help governments to protect the environment, improve the health of citizens, reduce energy related costs and lead to a sustainable economy.

Coming from 19 Member States, 20 experts in energy planning came together at the IAEA last week to discuss how to best enhance the IAEA's analytical tools for energy system analysis and planning, thereby strengthening the support to Member States in developing sustainable energy strategies. They identified future directions for development of these tools and related training programmes.

IAEA's comprehensive portfolio of energy system modelling tools and support services are critical for many Member States to build up the analytical skills needed to develop long term strategic energy plans.

-Guenter Conzelmann, Argonne National Laboratory, USA

"The Agency is committed to helping Member States with practical solutions for their energy planning," said Huang Wei, Director of the IAEA Division of Planning, Information and Knowledge Management, opening the *Technical Meeting to Review the IAEA's Methodologies and Analytical Tools for Sustainable Energy Development*.

"We continuously develop, maintain and upgrade various energy modelling tools that enable Member States to make smart energy choices in the context of Sustainable Development Goals and Paris Agreement."

Decisions on national energy strategies involve many key stakeholders to consider all possible energy supply and demand options. The IAEA provides technical assistance to its Member States, especially to developing countries, to improve their capabilities for performing integrated energy assessments and formulating long term strategies.

"There is no institution in the world that offers such a complex system of analysis and full scale approach to capacity building in the area of energy planning other than the one that the IAEA has developed," said Mladen Zeljko, a meeting participant, and Head of Department for Energy Generation and Transformation at the Energy Institute Hrvoje Požar, Croatia.

CLEW (*Climate, Land use, Energy, and Water*) – to analyse interactions among

key resource systems. ([原文鏈結](#))

核能署每月新聞稿-2018年6月

Nuclear Innovation: Clean Energy Future (NICE Future)

核能革新:擁有潔淨能源之未來(NICE FUTURE)



Canada, Japan and the United States launched the Nuclear Innovation: Clean Energy Future (NICE Future) initiative at a side event at the ninth Clean Energy Ministerial (CEM) on 24 May 2018 in Copenhagen, Denmark. The NICE Future initiative aims to highlight the role of nuclear energy as a low-carbon electricity source within the innovative, integrated and advanced energy systems of the future. It has already been joined by Argentina, Poland,

Romania, Russia, the United Arab Emirates and the United Kingdom. At the launch event opening remarks were provided by the United States Department of Energy Deputy Secretary Dan Brouillette, Canadian Parliamentary Secretary to the Minister of Natural Resources Kim Rudd, Japanese Parliamentary Vice-Minister of Economy, Trade and Industry Masaki Ogushi, and Poland's Secretary of State in the Ministry of Energy Michał Kurtyka. Mr Magwood, who also spoke at the event, noted that nuclear energy is one of the options in the global toolbox to stabilise the future global energy framework, and to address climate change.

[\(原文鏈結\)](#)