2017/2/20

IAEA 動態報告
2017/2/6- 2/17

HOW THE IAEA ASSISTS NEWCOMER COUNTRIES IN BUILDING THEIR WAY TO SUSTAINABLE ENERGY

國際原子能總署如何幫助新手國家建設他們的可再生能源之路

As the world anticipates the climate policies that will unfold following the 2015 Paris Agreement and the adoption of the Sustainable Development Goals (SDGs), more countries are likely to include nuclear power in their national energy mixes. Newcomer States — countries introducing nuclear power for the first time — are requesting the IAEA's assistance in developing the proper infrastructure to establish safe, secure and sustainable nuclear power programs and cope with the challenges posed by the rise in global demand for energy and the need to mitigate climate change.

報告摘要(KEY INFORMATION)

1. 首次引進核電的國家正在請求國際原子能總署協助發展適當的基礎設施，以建立安全、可靠和可持續的核電計劃，並應付全球能源需求上升所帶來的挑戰，以減緩氣候變化。
2. 國際原子能總署的科學家正與古巴(Cuba)的研究人員合作，以研究檢測和測量海洋生物體中的生物毒素，並開發監測和相關量測工具。
3. 伯利茲(Belize)，在 2017 年 2 月 4 日的世界癌症日之前 - 第一夫人 Kim Simplis Barrow 正在為變革而發言，並根據國際原子能總署的建議，開拓增加癌症護理的機會。
4. 在世界癌症日前，國際原子能總署和國際製藥商協會（IFPMA）簽署了一項協議，內容包含培訓保健專業人員與促進中低收入國家癌症控制工作。
5. 受益於國際原子能總署支持的兩名非洲學生最近獲得了年度年輕科學家獎。 來自納米比亞(Namibia)的 Josefina Hamutoko 正在研究如何更好地管理該國的地下水資源，來自加納(Ghana)的 Francis Hasford 正在努力改善前列腺癌的診斷和治療。
6. 2017 年 1 月 23 - 26 日，在核能緊急事項工作會議上（WPNEM），來自 20 個國家的 45 名代表與其他相關組織機構討論一份關於從核事故吸取的經驗教訓之專家報告。
7. 國際核子法規學院(ISNL)是 OECD 核能署所辦理為期兩周的課程，目的是使參與人士全面了解如何有效率與安全使用核能的各種法律問題。

"The potential role for nuclear energy has greatly increased since the historic adoption of the SDGs and the Paris Agreement," said David Shropshire, Head of the IAEA's Planning and Economic Studies Section. "The decision to use nuclear is now easier since there are only a few other large-scale, uninterrupted energy options that come with small environmental footprints."

The Paris Agreement was adopted at the Paris Climate Change Conference (COP21), at which 195 countries agreed to the first universal, legally binding agreement on climate. The Agreement confirmed the target of keeping the rise in global temperature below 2 degrees Celsius by the end of the century as compared to preindustrial times.

To address this target and the energy–climate challenge (see The energy–climate challenge), several countries are re-evaluating their energy mixes and the potential role of nuclear energy. "Instead of being recognized as just a power source to propel economies, nuclear is now linked to climate action," Shropshire said. "Countries investing in nuclear power not only get dependable energy but also a key resource to not exceed the 2°C target."

The Polish answer

Poland, for example, plans to generate nuclear power, not only to ensure long term electricity supply and stimulate national economic growth, but also to mitigate climate change.

"Poland recognizes the importance of the Sustainable Development Goals, including the reduction of emissions of carbon dioxide and other air pollutants from the energy sector," said Józef Sobolewski, Director of the Nuclear Energy Department at Poland's Ministry of Energy. "Part of our strategy stipulates that introducing nuclear power — a zero-emission, clean and efficient energy source — is one of the means to achieve that reduction." A nuclear power programme would also be a strong stimulus for the domestic research and development sector, he added.

The IAEA is an essential resource hub for newcomer States such as Poland and other countries considering nuclear power. They can access the IAEA's energy planning tools and tap into its knowledge of nuclear power to make informed decisions about the role of this energy source in their countries.

"Once a Member State decides to use nuclear power, the IAEA can provide advice and review the development of the required infrastructure," Shropshire said.

SAFER SEAFOOD: IAEA DEVELOPS TOOLS TO HELP FIGHT TOXIC ALGAL TOXINS

更安全的海鮮：國際原子能總署開發工具以幫助對抗毒性藻類毒素

When tiny marine organisms grow uncontrolled, forming what is called a harmful algal bloom, their toxins can make people sick, harm ocean life and cause millions of dollars in lost seafood revenues. To help mitigate the effects of these toxins, scientists at the IAEA are working with researchers in Cuba to detect and measure biotoxins in ocean organisms and to develop monitoring and reference tools that will help identify such outbreaks worldwide.

"With a better understanding of how harmful algal blooms behave and how their toxins enter the food chain, it will be easier for countries to monitor toxins and control the consumption of contaminated seafood," said Marie-Yasmine Dechraoui Bottein, a research scientist at the IAEA leading this collaborative project with the Centre de Estudios Ambiantales de Cienfuegos (CEAC) in Cuba. "Harmful algal blooms have a particularly big impact on small island states that rely heavily on their fisheries and tourism."

In Cuba, the fishing and sale of thirteen fish species including groupers, snappers and jacks have been prohibited year-round since 1996 due to a high risk of ciguatera fish poisoning – due to toxic algae. It is only recently that Cuban scientists, with the help of the IAEA, acquired the capability to measure ciguatera toxins in seawater and in fish and shellfish using a nuclear technique called radioligand receptor binding assay (RBA). This method is based on the specific interaction between the toxins and the receptor they bind (pharmacological target), in which a radiolabeled toxin competes for a limited number of receptor binding sites with the toxin in the sample being analysed, allowing quantification of the toxicity of the sample.

Developing reference material

During the course of a recent field mission in Cuba, a team of IAEA scientists and local fishermen collected fish and algae samples at different depths to study the distribution of toxic harmful algal bloom species.

Once the samples have been processed in Cuba, they will be tested at the IAEA's marine laboratory in Monaco. As a result, the IAEA will develop the first-ever reference material for ciguatoxin monitoring worldwide. Such reference materials are critical for national authorities in managing marine environments and adhering to fish trade regulations.

While the exact number of people affected and economic losses are difficult to estimate, the impacts of harmful algal blooms are

nevertheless considerable. “With these data and reference materials, we can refine how we monitor toxins to help minimize their impact,” said Dechraoui-Bottein. “It is important to keep in mind that ciguatera fish poisoning remains the most common non-bacterial seafood intoxication worldwide.”

The damage caused by harmful algae blooms

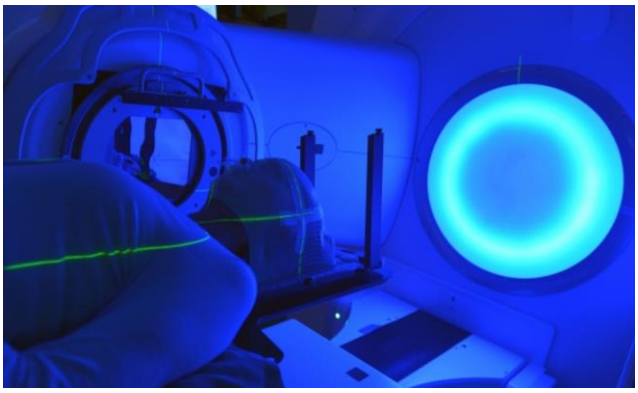
Harmful algal blooms are conglomerations of ocean-borne microorganisms that can be red, blue, pink or even invisible to the naked eye. Under certain circumstances, some species can produce natural toxins such as neurotoxins, which may accumulate in marine fish and shellfish to quantities that are dangerous for human consumption. Eating seafood contaminated with these biotoxins can cause a range of symptoms, from gastrointestinal problems to severe neurological effects and, in rare cases, even death.

Harmful algae bloom outbreaks affect many regions around the world, from the Americas to North Africa to Asia. In the last few years, outbreaks of harmful algal blooms have plagued areas of coastline and inland lakes of the Americas.

For example, in February 2016, harmful algal blooms in Chile decimated 40 000 metric tons of salmon, causing a loss of around $500 million for the local fishing industry as well as a hike in the price of salmon. In 2014, a large bloom in Lake Erie disrupted the water supply of 500 000 Ohio residents for three days.

WORLD CANCER DAY: BELIZE FOCUSES ON INCREASING ACCESS TO CARE

世界癌症日：伯利茲著重增加獲得照護的機會



The Coordinated Research Project (CRP) E35010 titled “Applications of biological dosimetry methods in radiation oncology, nuclear medicine, diagnostic and interventional radiology” (MEDBIODOSE) is being launched in Section of Applied Radiation Biology and Radiotherapy, Division of Human Health at the Department of Nuclear Sciences and Belize, a country of just 330,000 inhabitants and limited resources, is bringing cancer care to the fore. In

the run up to World Cancer Day —taking place on 4 February 2017— First Lady Kim Simplis Barrow is speaking up for change and is campaigning to increase access to cancer care, based on recommendations from the IAEA.

"I am a cancer survivor because I was one of the lucky ones," Simplis Barrow said. "For many in Belize, this is not the case." In October 2011, Simplis Barrow found out she had breast cancer and managed to receive treatment abroad.

Cancer patients in Belize who do not have the means to be treated in another country have little hope, Simplis Barrow said. Even many of those who manage to find treatment abroad do not survive because their diagnoses are given too late or because there is no follow up treatment available locally. Her aim is to make sure Belize establishes a cancer care facility where Belizeans can be treated.

Cancer care

Last December, a team of international experts led by the IAEA assessed the country's cancer control capacity. After the mission, known as imPACT review, the experts presented the government with priority recommendations.

The experts —nominated by the IAEA, the World Health Organization (WHO) and the International Agency for Research on Cancer (IARC)— recommended the establishment of a cancer control unit in the Ministry of Health and a national cancer registry to collect and analyse cancer data. These are important first steps that help policymakers decide on future interventions and investments for cancer patients in Belize. Ultimately, they will facilitate moving towards the long-term goal of providing closely integrated services to reduce cancer risks, detect cases early and treat patients.

Work on the establishment of a national cancer centre, which would provide various treatment services, could start soon, the experts said.

" Any country committed to introduce radiotherapy is embarking on a long and challenging journey," said Beatrix Lahoupe, Section Head at the IAEA's Programme of Action for Cancer Therapy (PACT). "It needs qualified staff, adequate buildings, the right equipment, the necessary radiation safety infrastructure and a plan for sustaining it all."

The imPACT team recommended that Belizean health authorities —while deciding on the best course of action— establish agreements with cancer centres in neighbouring countries to which doctors can refer patients in need of radiotherapy and other treatment options not currently available locally.

Introducing nuclear medicine

Belizean health authorities also aim to improve the country's diagnostic imaging infrastructure with the support of the IAEA — and use modern equipment to diagnose not only cancer but also various non-communicable diseases, such as cardiovascular diseases and diabetes, which have a high prevalence in the country.

"The appropriate use of diagnostic imaging can help Belizean doctors improve the management of patients with a myriad of health conditions, including cancer," said Diana Paez, Head at the IAEA's Division of Human Health. "Belize has a lot of potential and the IAEA will help the country live up to it."

Through a technical cooperation project, the IAEA will train Belizean health professionals in the use of imaging techniques such as X rays and ultrasound images, support the set-up of the adequate infrastructure and equipment, and guide authorities on radiation safety.

Health with safety

Protecting patients from the harmful effects of ionizing radiation is another area in which the IAEA supports countries such as Belize that are working to introduce radiotherapy and nuclear medicine.

"We need radiation to help cure our people, but for that we also need to ensure that the radiation is used safely," said Randall Sheppard, legal expert at the Government of Belize. "The application of the IAEA safety standards will ensure the safety of our workers, our patients, the public and the environment."

In 2010 and 2012, IAEA safety experts visited Belize to evaluate its radiation safety regulatory status and recommend steps to take. Subsequently, Belize's government has expressed its commitment to follow the Code of Conduct on the Safety and Security of Radioactive Sources. In January, IAEA experts trained a group of technical and legal personnel from CARICOM countries, including Sheppard, on drafting radiation safety regulations. National radiation safety law is also under development. Following IAEA standards, the government will establish a regulatory body for radiation safety in accordance with the national law.

The law and regulations will provide a framework for the safe use of radiation technologies. The corresponding regulatory control will ensure delivering proper doses to patients and protecting workers, using well-functioning equipment, training qualified personnel and empowering a regulatory body to control all activities involving radiation.

"Our work involves people's lives, so we have no time to lose," First Lady Simplis Barrow said. "We must act now."

To commemorate World Cancer Day 2017, First Lady of Belize Simplis Barrow participated in a high-level discussion on "Global Action – National Needs" taking place at IAEA Headquarters in Vienna, Austria, on 3 February.

IAEA PARTNERS WITH IFPMA TO TACKLE GLOBAL CANCER EPIDEMIC

國際原子能總署與 IFPMA 合作解決全球癌症流行

Ahead of World Cancer Day, the International Atomic Energy Agency (IAEA) and the International Federation of Pharmaceutical Manufacturers and Associations (IFPMA) today signed an agreement to train health professionals and boost cancer control efforts in low- and middle- income countries, where many people lack access to basic cancer diagnosis and treatment services.

The collaboration will initially focus on stepping up the IAEA's Virtual University for Cancer Control (VUCCnet). This e-learning platform provides health professionals with customized, high-quality and free training across all stages of cancer care. After a successful pilot phase that trained 500 African health professionals – estimated to have benefited 10,000 cancer patients in Ghana, Uganda, Tanzania and Zambia – VUCCnet is planned to be extended to 33 sub-Saharan African countries.

"Building skills within the health workforce is vital in order to provide adequate, quality cancer care," said Nelly Enwerem-Bromson, Director of the IAEA's Programme of Action for Cancer Therapy. "This partnership helps us to create bridges with the private sector to increase life-saving investments in cancer control for most affected countries."

Globally, cancer kills more than 8.2 million people every year – more than HIV/AIDS, tuberculosis and malaria combined. Low- and middle- income countries (LMICs) bear the brunt of the cancer burden. The International Agency for Cancer Research (IARC) reports that over half of new cancer cases occur in these countries, and estimates that this could rise to 60 per cent by 2020. LMICs, however, have only 5 per cent of the total global resources available to them to provide cancer care services.

Demographic and lifestyle changes, coupled with poor or non-existent cancer control infrastructure and a shortage of a properly trained health workforce, make the situation more urgent.

"We are delighted to support the IAEA in strengthening cancer control knowledge and training capacity in LMICs," said Thomas Cueni, IFPMA Director General. "Through focused programmes like the VUCCnet, we help catalyze new partnerships and advance the resources and knowledge needed to enable countries to reverse the increasing burden of non-communicable diseases," he added.

The IAEA estimates that over 5,000 radiotherapy machines will be required in LMICs

to meet the current demand for cancer care. In addition to this essential equipment, 10,000 additional radiation oncologists, 6,000 medical physicists, 3,000 dosimetrists and 20,000 radiation therapists would be required for adequate care.

The new collaboration will help the IAEA engage in public-private partnerships to mobilize resources for cancer control projects. It also foresees support for a joint project between the IAEA, the World Health Organization and the IARC to help countries devise and implement targeted cancer control programmes.

TWO AFRICAN STUDENTS SUPPORTED BY IAEA RECEIVE SCIENCE AWARD

由國際原子能總署支持的兩名非洲學生獲得科學獎

Two African students who had benefited from IAEA support have recently received a Young Scientist of the Year award. Josefina Hamutoko, from Namibia, is studying ways to better manage her country's groundwater resources, and Francis Hasford, from Ghana, is working to improve the diagnosis and treatment of prostate cancer.

More water for Namibia

Hamutoko, a PhD student at the University of Namibia, won a national award for scientists under 30 for her study of groundwater recharge in the parched aquifers of the Cuvelai-Etosa Basin. For her study, she used an isotope analysis machine provided by the IAEA in 2010.

"Without the machine, we would've had to send the sample to a lab in another country, which we could have afforded to do only once a year," Hamutoko said. By contrast, she and her team can now do many measurements a year, accelerating their research. "Groundwater is dynamic and is affected by climate, space and time, so we need many samples to get the best results," she said.

They study the isotopes in water to estimate, for example, the groundwater's origin, interactions and evaporation processes. Their

research so far indicates that the aquifer is recharged by rain water. Her results are expected to help policymakers protect the groundwater from pollution and improve overall access to safe drinking water.

"We need to understand how to manage water in a sustainable way, and we cannot do this if we don't understand our groundwater systems," Hamutoko said. She won the award not only for her contributions to research in Namibia but for her ability to present her work in various parts of the world, including Vienna in May 2015, where she attended an IAEA international symposium on isotope hydrology.

Better diagnosis and treatment for Ghana

Hasford's story is quite different. He became the first African to ever win the international Young Scientist of the Year award in the field of medical physics, which is given to the best performing young scientist below the age of 40 working in pure or applied physics.

Hasford studied the use of nuclear medicine to diagnose and treat prostate cancer, and participated in an IAEA fellowship programme that led him to undertake part of his PhD research in South Africa.

For his research, he used positron emission tomography system (PET-CT) and ultrasound to generate medical images, and a special software programme to create a vision of the organ by overlaying these images. This method can lead to more precise diagnosis and treatment.

" Studying in South Africa gave me the possibility to use the PET-CT technique, which we don't have in Ghana," Hasford said. His aim is to continue his research and eventually have this method implemented in medical practice.

Hasford's motivations to do research in the diagnosis and treatment of this type of cancer are twofold. Firstly, prostate cancer is one of the leading causes of death in Ghana. "We need more studies in prostatic cancer management to generate better treatment outcomes and avoid complications for patients," he said. His second motivation is personal, he said, because his own father suffered from the disease.

Thanks to the IAEA fellowship, Hasford conducted his research at the School of Nuclear and Allied Sciences of the University of Ghana and at the University of Witwatersrand of the Charlotte Maxeke Johannesburg Academic Hospital in South Africa.

His message to fellow scientists in the region?

"Most of us coming from Africa face more challenges as scientists because we lack the most-needed equipment and we don't have the right infrastructure. But we must not give up. The knowledge is there. No matter where you are, what you do today in the corner of your research lab could have a positive impact on science and could potentially save lives tomorrow."

NUCLEAR EMERGENCY POLICY, PLANNING, PREPAREDNESS AND MANAGEMENT

核能緊急政策、規劃、準備和管理

On 23-26 January 2017, at the meeting of the NEA Working Party on Nuclear Emergency Matters (WPNEM) 45 delegates from 20 countries interacted with other relevant OECD bodies and international organisations, including the European Commission Joint Research Centre (JRC), World Health Organization (WHO) and the International Atomic Energy Agency (IAEA), to discuss a unique expert report on lessons learnt from non-nuclear accidents. The report provides a comparison between nuclear power plant emergency preparedness and response (EPR) and the emergency management of situations caused by natural and technological disasters. While revealing that there are no gaps in nuclear power plant emergency management, the report aims to enable planners to review the lessons learnt from non‑nuclear accidents and to enhance their own programmes as necessary. The contributions to this report reinforce the value of an "all hazards" approach to emergency management. The meeting also featured presentations on the key results of the NEA's fifth International Nuclear Emergency Exercise (INEX-5), allowing participants to identify areas which would benefit from further discussion during the forthcoming INEX-5 international workshop, scheduled to take place in October 2017.

APPLICATIONS NOW OPEN FOR THE INTERNATIONAL SCHOOL OF NUCLEAR LAW

國際核子法規學院現在開始申請

The International School of Nuclear Law (ISNL) is a two-week course which has been designed to provide participants with a comprehensive understanding of the various legal issues relating to the safe, efficient and secure use of nuclear energy. To date, the ISNL has provided a unique educational opportunity to more than 800 graduate students and young professionals worldwide. The next session of the ISNL will take place from 21 August to 1 September 2017 in Montpellier, France. Applications may be submitted online between now and 31 March 2017. For more information on the course and to apply, see: oe.cd/Ug.