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IAEA 與 NEA 動態報告

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IAEA LABORATORY FOR OCCUPATIONAL RADIATION MONITORING RECEIVES INTERNATIONAL ACCREDITATION

國際原子能總署職業輻射監測實驗室接受國際認證

The IAEA's laboratory which provides services to many countries in occupational radiation monitoring has recently earned ISO re-accreditation, testifying that it meets the highest quality and procedural standards.

The IAEA Testing Laboratory, as it is officially known, advises laboratories in many countries, especially developing Member States, to monitor the radiation doses received by

報告摘要(KEY INFORMATION)

1. 國際原子能總署為許多國家提供職業輻射監測服務的實驗室最近獲得了 ISO 新認證，證明它符合最高質量和程序標準。
2. 剛果共和國衛生部長在評估了國際原子能總署今年 6 月對剛果癌症治理的能力和需求後，表示未來國家的目標是成立全區癌症控制的參考中心，迫切將癌症視為國家重點。
3. 利用同位素和核技術來測量與增加植物生長所需的氮素量攝取，貝寧農民在生長季節種植的玉米作物更加肥沃，也使貝寧家庭獲得了更多的食物與收入。
4. 國際原子能總署新型能源評估工具可以幫助會員國對不同能源進行比較評估，確定最適合一國的電力產生方式。
5. 國際原子能總署通過與尚比亞技術合作計劃，自 2002 年開始規劃支持尚比亞醫院，提供放射治療與癌症治療中心。
6. 核能署核安全法律工作組舉行了會議，匯集了來自 11 個成員國和國際原子能總署的 17 個代表，會議期間三個成員國和 NEA 秘書處提供了專題介紹，其中包括一個關於核管制活動的會議，以促進兩個機構之間的合作。
7. 核能署科學委員會（NSC）舉行了年度會議，審議了其各個工作領域的進展情況，包括反應器物理學，核燃料循環物化學、臨界安全、材料科學和輻射屏蔽等研究工作。

workers exposed to radiation and ensure that their exposure levels stay below legal thresholds.

The ISO/IEC 17025 re-accreditation was issued in June 2017 as a formal recognition by an independent international body and is valid for five years. It certifies the laboratory's managerial and technical competence, and serves as a global benchmark for clients, Member States and accreditation bodies around the world. The accreditation demonstrates the competence of staff, the thoroughness of methods and, most importantly, the accuracy of results, said Miroslav Pinak, Head of the IAEA's Radiation Safety and Monitoring Section, and technical manager of the laboratory.

"The accreditation is an important milestone," Pinak said. "It demonstrates to our clients in Member States that we practice what we preach: state of the art quality and management practices."

Supporting laboratories in Member States

For more than 50 years, the IAEA has served as a model for the radiation safety programmes of its Member States.

In the last decade, experts from countries including Azerbaijan, Brazil, Chile, Malaysia, Mongolia, Pakistan and Spain were trained in the laboratory on accredited methods to assess radiation doses and quality management systems. Such training events help local experts gain important skills needed to set up their own services and laboratories.

In addition, laboratory staff supports education and training activities such as annual IAEA-co-organized International School on Nuclear Security International Centre for Theoretical Physics in Trieste, Italy.

THE REPUBLIC OF THE CONGO SETS SIGHTS ON BEING A REFERENCE CENTRE FOR CANCER CONTROL

剛果共和國設立了作為癌症控制的參考中心

Following an assessment of the country's capacities and needs in cancer control conducted by the International Atomic Energy Agency (IAEA) in June this year, Minister of Health Jacqueline Mikolo said, "This review has been very timely, as important decisions are going to be made. Our country aims at being a centre of reference for cancer control in the whole region."

According to the International Agency for Research on Cancer (IARC), 2,200 new cancer

cases were detected in 2012 while 1,500 people died of the disease. Preliminary findings from the assessment indicate that these numbers have most likely increased in recent years. The WHO's Representative to the Republic of the Congo, Fatoumata Diallo, underlined the urgency of the situation stating that "cancer must be recognized as a national priority".

The Government requested the IAEA to conduct an imPACT review at the end of 2016. Such a review is often the first step that a country takes to better understand the extent of its cancer needs and to obtain an expert assessment of its current capacities to address this disease.

The review brought together experts from the IAEA, World Health Organization (WHO) and IARC to evaluate the key areas of cancer control: from prevention and screening, early detection, diagnosis and treatment to palliative care, as well as cancer control planning, cancer registry and radiation security.

Among the experts' recommendations is the need to urgently strengthen palliative care services in light of the large proportion of patients whose cancer is too advanced to be cured. Additional recommendations include the need to increase the number of doctors in the public health system in different cancer diagnosis areas (pathology, medical imaging and biochemistry) and to make cancer treatment services available to the population free of charge.

The country has already made some progress in building its cancer control capacity. For example, its small cancer registry is well regarded in the region in spite of its limited human and financial resources. Brazzaville's medical school has trained numerous oncologists from neighbouring countries.

Acknowledging that the fight against cancer is a priority in the country, the Ministry of Health is about to establish a cancer control unit to effectively manage and coordinate all cancer activities. In this regard, the imPACT review will provide essential information to prepare a comprehensive national cancer control plan.

The Government has also embarked on the establishment of 12 new hospitals across the country, two of which will provide the full range of cancer treatment services, including radiotherapy: the Hôpital de Combo in Brazzaville and the Hôpital de Patra in Pointe Noire.

ISOTOPIC TECHNIQUE HELPS BENIN FARMERS TRIPLE YIELDS AND IMPROVE LIVELIHOODS

同位素技術幫助貝寧農民提升產量和改善生活

Attinkpaye, Dassa-Zoume, Benin -- Soybean farmer Leonard Djegui never had the chance to go to school but he has learned two facts about nuclear science in recent years: atoms make up the soil and they have helped triple his income, allowing him to build a new house and send his children to university.

Djegui is not alone: around 14 000 farmers in central and northern Benin have achieved significant yield increases for both maize and legume crops such as soybean – providing more food for their families and much higher incomes than they could even dream of a few years ago.

"I did not go to school, but I do understand that science is important," Djegui said proudly showing his new house, made of bricks, replacing his previous mud hut. "It allows my maize and soya to grow taller and provides for a much richer harvest."

The secret: the use of isotopic and nuclear derived techniques to measure and properly increase the amount of nitrogen – necessary for plant growth – the crops take up (see Nitrogen uptake from the air). Legumes such as soybean and peanuts are able to take up nitrogen from the air, which they then deposit in the soil, making it more fertile also for the maize crop that farmers plant in the next season, explained Pascal Houngnandan, Vice President of the National University of Agriculture and Director of Soil Microbiology at the University of Abomey-Calavi, the country's main research institution just outside the capital Cotonou. This intercropping of maize and legumes results in an increase in the yields of both crops. Depending on the soil type, it also means no or little commercial fertilizer is required, saving farmers the additional expense.

The IAEA, in cooperation with the Food and Agriculture Organization of the United Nations (FAO), has supported the project by providing expert advice and helping Houngnandan and his team interpret the data. The IAEA, through its technical cooperation programme, has also provided much needed equipment and training that allow the researchers not only to conduct the experiments, but to also produce the bacteria required for the legumes to take up even more nitrogen from the air.

Scientists in 70 countries benefit from such assistance, including support to customize the method to their particular crops and soil types, said Joseph Adu-Gyamfi, soil fertility management specialist at the Joint FAO/IAEA

Division of Nuclear Techniques in Food and Agriculture.

Mixing seeds and bacteria

On this late June afternoon, at the beginning of the planting season, Djegui and his neighbours were busy mixing the bacteria received from the lab with soybean seeds that were to be planted in the following weeks. Meanwhile, other workers from this village of 1000 were clearing weeds from surrounding land that used to lay bare, so that more soybean can be grown.

Albert Ahotondji, one of Djegui's neighbours, is now growing soybean on 6 hectares of his land, up from 2 hectares two years ago. Previously he did not have the cash to buy seeds and fertilizer for all of his land, and was forced to leave some of it unused. He now has enough cash to till his entire land and can also put money aside for when his children will go to university. "I will be able to afford to rent a room for them in the city," he said proudly.

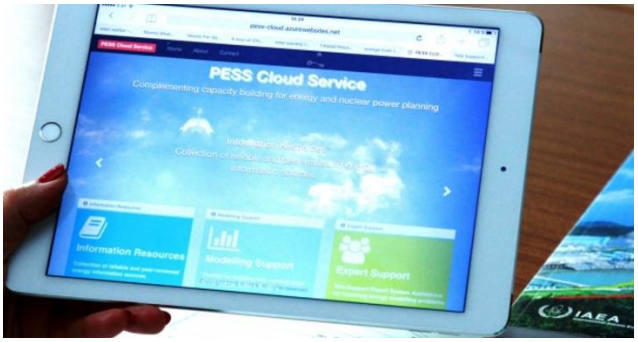
It is the fourth consecutive season the smallholder farmers of this village are making use of the bacteria they buy from the university through extension workers, who also showed them how to improve their farming practices.

There are 100 000 soy farmers around Benin, and the use of the new technique is spreading fast, said Fortuné Amonsou Biaou, Executive Director of the National Union of Soybean Producers of Benin. Seeing yields triple or even quadruple is very common, he said. Depending on the region, farmers used to harvest between 500 and 800 kilograms of soybean per hectare. This has now increased to between 1.2 and 2 tons. This is particularly important in this primarily agricultural country, where over half of the population is engaged in farming, which makes up 40% of the economy.

Soybean is used to make vegetable oil and animal fodder, and is also a major export crop on regional markets. "By also increasing maize yields, we increase food security for the rural population, while the higher soybean production increases their disposable income," Amonsou Biaou said.

IAEA TOOL HELPS ENERGY PLANNERS EVALUATE ENVIRONMENTAL IMPACTS OF VARIOUS SOURCES OF ELECTRICITY

國際原子能總署新工具幫助能源規劃師評估各種電力來源對環境影響



National energy planning process starts by evaluating a country's overall energy situation using a set of indicators that cover all aspects of sustainable development. An IAEA energy modelling tool can help Member States to make a comparative assessment of different energy sources. Such an assessment has a crucial role in determining the right technology for electricity production that best suits a country's specific needs and helps to fulfil commitments under the Paris Agreement on climate change.

Bringing together 16 energy planning specialists, environment and climate analysts from 14 developing countries, a Vienna workshop held early this month focused on the IAEA's Simplified Approach for Estimating Impacts of Electricity Generation (SIMPACTS) Model.

"The SIMPACTS modelling tool helps countries better understand their energy choices by calculating the potential costs of damage from pollutants and wastes to public health and agriculture," said David Shropshire, Head of the IAEA's Planning and Economic Studies Section. "These insights are invaluable for making economic and smart energy choices."

SIMPACTS allows Member States to estimate and quantify health and environmental damage costs, so-called 'externalities', of different electricity generation technologies. It is particularly useful for comparative analyses of fossil, nuclear and renewable electricity generation, siting of new power plants or cost effectiveness of environmental mitigation policies. Key strengths of SIMPACTS are that it already delivers useful results when only limited data are available and that it can be used on a regular personal computer.

Participants at the workshop studied economic and environmental impacts of different electricity sources and the SIMPACTS modelling tool to evaluate the associated costs. They developed case studies based on country-specific data for different electricity projects currently under consideration in their countries. The case studies focused on the evaluation of nuclear power, siting, research reactors, impacts of hydro and coal power plants to human health as inputs to national energy systems assessments and planning.

"Used in combination with other IAEA tools to measure carbon emissions, SIMPACTS can facilitate the development of energy policy decisions and updates to Nationally Determined Contributions under the Paris Agreement," David Shropshire emphasized.

Through the energy planning and economic studies mechanisms, the Agency assists Member States in capacity building in the area of national and regional energy systems analysis and planning, so they can independently chart out their own national energy strategies.

TEN YEARS OF SAVING LIVES: CONTROLLING CANCER IN ZAMBIA

尚比亞十年內控制癌症拯救無數生命

Lusaka, Zambia -- The wards may be full and the waiting times long, but at least the patients at the Cancer Diseases Hospital (CDH) in Lusaka, Zambia have a chance of surviving their illness.

Before the centre opened in July 2007, cancer sufferers who could not afford private care had two options: they either had to join a long waiting list for treatment in Zimbabwe or South Africa or, more often, they simply died.

The CDH is the first and only cancer treatment centre offering radiation therapy in this country of over 14 million people. In the past ten years, around 16 000 people have been diagnosed and treated at the hospital. The country has witnessed a three-fold increase in the number of cancer cases since the hospital opened. Seventy percent of cancer patients are women.

The IAEA, through its Technical Cooperation Programme, has supported the hospital since planning began in 2002.

Radiation medicine is a vital component of cancer control. Procedures such as X-rays, CT scans and mammograms are used for the early detection and diagnosis of cancer. Radiotherapy can treat and manage the disease and provide substantial pain relief for patients when cure is not possible.

Rebecca Siabwati received radiotherapy for cervical cancer at the CDH in 2010. The retiree now works voluntarily as a counsellor, encouraging women to be screened for cancer and supporting them before and after treatment. "In our community, there are a lot of myths," she said. "People just associate cancer with death, so they're afraid to come forward for screening."

"Sometimes they go to traditional African doctors, who give them herbs or medicines from trees. They even sell their cows and property to pay for this. But they're just wasting their money and time."

As part of her work, Siabwati attends gatherings in towns and rural areas where she informs women that cancer can be detected early and treated.

"At the hospital, I talk to patients. I give them hope. I tell them that I'm a cancer survivor, I'm not dead. If I survived, then there is hope for them too."

Rachel Mwale was treated for breast cancer, but the cancer spread to her lungs and she needs further treatment. "I felt very sad at first. I thought about my children. But now I have

hope. Sometimes when the doctors and nurses talk to you, they give you hope," said the 52-year-old. "This hospital is very good and the staff is very helpful."

IAEA support

The IAEA contributed to the design of the facility, arranged training for medical professionals, assisted in the establishment of radiation protection measures for patients and staff and even helped the Government secure a loan to finance the project.

"Without the assistance of the IAEA, it would have been very difficult for us to set up a highly technical centre like this one and care for so many patients," said Lewis Banda, the CDH's Senior Medical Superintendent.

The IAEA still plays an important role. It sends medical students from other African countries for two-year training programmes and continues to help the hospital acquire essential medical supplies.

The centre's two teletherapy machines administer 130 sessions of radiotherapy per day. Two brachytherapy units treat the rising number of patients with cervical cancer, the commonest cancer in Zambian women. There are also mammography services for the early detection and diagnosis of breast cancer.

Cancer care in the rest of Zambia

Outside Lusaka, the situation for cancer patients is very different.

At the central hospital in Livingstone, in Southern Province, there are facilities to screen and make a clinical diagnosis of cancer, but there are no services to treat cancer or even analyse tissue samples.

Chief Surgeon Kelvin Moonga said: "We don't even have a pathologist here, so we need to send samples to Lusaka. It can take up to a year to get results back. Sometimes we lose patients because it just takes too long."

When faced with a cancer diagnosis in Livingstone, patients are told that they need to make the seven-hour journey to Lusaka, at their own cost and often without their families and friends. "We tell patients the cancer treatment is free, but you have to get to Lusaka. They have to make multiple visits for treatment. This is expensive and most of our patients can't afford it," said Moonga.

He added that many patients do not even start their treatment, while others do not finish it.

To cope with the chronic lack of cancer treatment facilities, the Zambian Ministry of Health has launched an ambitious project to expand services throughout the country.

The towns of Livingstone and Ndola have been designated as the locations for the first phase of the expansion plans. The IAEA will be helping Zambia to prepare for this expansion through expert advice and training.

"If we have a cancer treatment centre here in Livingstone, it will mean there are no travel costs for the patients," said Moonga. "It's these

costs that sometimes stop them getting the treatment they need. And if they have direct access to treatment, they'll be more motivated to seek it, before it's too late."

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LEGAL ASPECTS OF NUCLEAR SAFETY

核能安全法律議題會議

On 20 June 2017, the NEA Working Party on the Legal Aspects of Nuclear Safety (WPLANS) held a meeting, bringing together 17 representatives from 11 member countries and the IAEA. During this meeting, three member countries and the NEA Secretariat provided topical presentations, including one on the NEA Committee on Nuclear Regulatory Activities (CNRA) with a view to promote collaboration between the two bodies. Participating members also discussed the different topics to be addressed by the WPLANS and decided to initially focus on the legal frameworks for long - term operation established by NEA member countries.

ADVANCING NUCLEAR SCIENCE

核子科學的推動

The NEA Nuclear Science Committee (NSC) held its annual meeting from 31 May to 2 June 2017 to review progress in each of its work areas, including reactor physics, fuel cycle physics and chemistry, criticality safety, material science and radiation shielding. The meeting featured a presentation on the new NEA TCOFF Project on the Thermodynamic Characterisation of Fuel Debris and Fission Products Based on Scenario Analysis of Severe Accident Progression at the Fukushima-Daiichi Nuclear Power Station. Participants noted the characterisation of the corium and fuel debris as an important first step in the decommissioning process. Subsequently they had an in-depth discussion on the role of nuclear science in decommissioning, which emphasised the strong links between the economics of decommissioning and the characterisation of the final waste product. The discussions underlined the importance of modelling and simulation in providing best estimates and credible uncertainties for key radionuclides in nuclear waste. The meeting also featured a special session entitled “Building a scientific community around material test reactors (MTRs) and establishing a systematic validation/qualification process for innovative fuels and materials”, during which the participants noted the recent advances in instrumentation and how these advances are being used to provide fundamental insights into material behaviour under irradiation. They agreed to organise a workshop on this topic in order to optimise experimental technologies for fuels and materials validation and qualification.