

Answering the call of a changing world: nuclear technology today and in the future

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Nuclear science and technology may operate on scales invisible to the naked eye, but the impact of this atomic work is evident in many spheres of life. It is boosting food security by helping farmers grow more food, conserve water and stave off insect pests. Doctors and other health professionals use it to care for patients and save lives. Other uses include ensuring the safety of products like car tyres and aeroplanes, as well as cleaning up environmental pollution and preserving cultural artefacts.

But as the world changes, development challenges evolve as well, calling for novel tools and methods. It is the task of the nuclear science community, including the IAEA, to answer this call.

Researchers worldwide work with IAEA experts and in IAEA laboratories to use nuclear and isotopic techniques to tackle new global challenges, such as climate change, addressing the growing nutritional and medical demands of an increasing global population and supporting the expansion of industrialization for development.

Some of the innovative work we are already seeing in nuclear science includes new ways to manage insect pests, such as disease-carrying mosquitoes, using the sterile insect technique, and novel plant varieties that can withstand new climate conditions while still providing high yields. Scientists are also exploring the growing plastic pollution problem and how to deal with plastic particles that are entering our food chain via the ocean. New methods are also being developed to monitor deadly diseases and viruses, such as Ebola, and creating new, irradiated vaccines to help both animals and humans.

As nuclear technology continues to advance, scientists are finding new ways to more precisely and effectively use radiation to diagnose and treat diseases like cancer, saving more lives and improving patients' quality of life. They are also breaking into new areas

of medicine, such as neuropsychiatry and the use of molecular imaging for the early diagnosis of diseases like Alzheimer's.

Underlying this forward-looking research and development is the IAEA. The IAEA's Atoms for Peace and Development mandate reflects the broad scope and opportunity for nuclear science and technology to contribute to human wellbeing and sustainable development. The IAEA provides a platform for scientific collaboration, research and development and training across a broad spectrum of development areas, including food and agriculture, environmental protection, water management, industrial development and human health.

The benefits of nuclear science and technology touch all corners of the globe through the IAEA technical cooperation programme and coordinated research activities, which reach more than 145 countries every year, supported by the IAEA's 12 specialized laboratories in Austria and Monaco.

To help keep nuclear technology at the forefront of global development, several IAEA laboratories are undergoing a complete modernization, which will ensure they remain flexible and able to rapidly respond to emerging and emergency needs worldwide. A brand new Insect Pest Control Laboratory, completed in 2018, will further enhance the nuclear techniques essential to combating insect pests that can cripple crops and affect livestock and human populations. A Flexible Modular Laboratory, inaugurated in November 2018, houses three further laboratories that focus on the latest nuclear techniques linked to livestock production and health, including combating zoonotic diseases such as Ebola and Zika; food and environmental protection, which includes forensic techniques for tracing the origin of products to fight food fraud; and soil and water management and crop nutrition to preserve precious resources in agricultural production. In addition, a dosimetry bunker



to house a new linear accelerator is under construction. The linear accelerator is expected to become operational in 2019 and will provide dosimetry services to help hospitals to safely calibrate and use radiation to care for patients.

The IAEA's partnerships are further amplifying the reach of nuclear science and technology. To mention just a few, a unique joint division was established with the Food and Agriculture Organization of the United Nations in 1964. In 1976, the IAEA and the World Health Organization began a formal partnership. Now the IAEA's Environment Laboratories in Monaco host the Ocean Acidification International Coordination Centre. The ALMERA worldwide laboratory network was also established in 1995 to support work measuring environmental radioactivity levels in the event of accidental or intentional release of radioactivity.

The IAEA's partnerships also include 31 IAEA Collaborating Centres around the world (see box). These centres work with the IAEA to pursue research and provide training in nuclear science, which allows for the efficient sharing of resources, knowledge and expertise between scientists and the IAEA. This network will grow as countries and the IAEA work together to identify new Collaborating Centres.

The IAEA's support and its unique global network of laboratories, Collaborating Centres and partnerships are helping pave the way forward. As countries' development needs continue to evolve, the IAEA's support will be there to help them access and benefit from the use of atoms for peace and development. And with the ongoing innovations and advances in technology, the unique tools that the atom gives us will continue to contribute to the wellbeing of humankind for many years to come.

Connecting scientists around the world

IAEA Collaborating Centres form a network that stretches across all continents: from Africa, Asia and Australia to Europe, the Middle East and North and South America. A Collaborating Centre is a scientific institute or organization that offers a unique facility and skill set in a distinct area related to nuclear technology, such as food irradiation, environmental radioactivity measurement, the health effects of radiation, non-destructive testing or water resource management.

Centres are chosen for their ability, capacity and readiness to directly contribute to specific IAEA projects and activities. They work with the IAEA on a mutually agreed plan to support and amplify the use of nuclear science and technology worldwide. The cooperation is designed to encourage original research and development, while also helping scientists to share knowledge, resources and expertise, prepare reference materials, validate methods and provide training. These activities in turn help countries, both with Centres and without, get access to scientific support to pursue their development objectives and meet their targets under the United Nations Sustainable Development Goals (SDGs).

“Through the Collaborating Centre network, Member States can assist the IAEA by undertaking original research and development and training relating to nuclear technologies. This encourages scientific studies and cooperation across Member States, making Collaborating Centres one of the IAEA's key cooperative mechanisms,” said Sasha Damjanac, Head of the IAEA's Research Contracts Administration Section.

As of 2018, there were 31 active Collaborating Centres worldwide, with ongoing discussions in several countries to establish new Centres.

— By Sarah Kiehne