



Nuclear  
Sciences and  
Applications



## Securing A Better Future For All **Nuclear Techniques for Global Development and Environmental Protection**

# Nuclear Sciences and Applications

## Applying 21st Century Nuclear Science to 21st Century Problems

### Integrating Nuclear Techniques for Development

By enhancing the integration across various thematic areas, the IAEA plays a role in helping to address today's emerging challenges. In radiation medicine, for example, nuclear technology is used for the diagnosis and treatment of major non-communicable diseases such as cancer and cardiovascular disorders. The Human Health Campus at <http://humanhealth.iaea.org> provides on-line resources and learning for health professionals working in radiation medicine. Responding to the world cancer crisis, the IAEA developed a unique initiative, the Programme of Action for Cancer Therapy which works closely with the World Health Organization (WHO) through the WHO-IAEA Joint Programme on Cancer Control. The programme aims at providing assistance to Member States to adopt comprehensive national cancer control programmes that encompass early detection, prevention, cancer diagnosis and treatment and palliative care.

In a joint division with the Food and Agriculture Organization of the United Nations, the IAEA assists Member States in applying nuclear techniques to alleviate challenges in food safety, food security and sustainable agricultural development. The IAEA has made significant contributions to helping developing countries adopt sterile insect techniques to suppress and eradicate insect pests that pose a threat to human and to animal health.

Using scientific methods based on the tracing of isotopes, the IAEA is improving the management of the world's freshwater resources, a key aspect of sustainable development in the face of climate change. The IAEA also helps Member States monitor known sites of radioactive contamination, as manifested by their ongoing efforts in Japan after the incident at Fukushima.

Radioisotope products and radiation technology are essential components for applications across all fields, be it medicine, industry, or agriculture. The demand for the most used radioisotopes has been steadily increasing, such as, for example, fission produced  $^{99}\text{Mo}$  and  $^{99\text{m}}\text{Tc}$ , used for more than 30 million medical procedures worldwide per year. As a result, many countries seek support from the IAEA in integrating these technologies into their development plans, which include strengthening quality assurance practices and regulatory compliances as well as facilitating human resources development.



*"Fostering global socioeconomic development while promoting and maintaining a clean, sustainable environment is essential in order for modern civilizations to prosper. To help achieve this, the Department of Nuclear Sciences and Applications, in cooperation with the Department of Technical Cooperation and the rest of the IAEA, help Member States use nuclear and isotopic techniques to attain sustainable development objectives in food and agriculture, human health, water resource management, marine and terrestrial environments and industrial applications."*

The continuing widespread adoption of radiation and nuclear techniques for non-energy applications is a major driver of the IAEA's continued involvement in strengthening nuclear science capabilities in Member States. The adoption and use of credible atomic and nuclear data are crucial, as such data provide accurate descriptions of the underlying processes that are harnessed in both energy and non-energy studies, including nuclear fusion, medicine and environmental monitoring. To encourage the use of peaceful nuclear techniques, the IAEA serves as the central agency for the collection and dissemination of data worldwide.



*The IAEA laboratories for nuclear sciences and applications—a unique facility in the United Nations system—provide reference material, quality control and quality assurance services and training courses to Member States, while also setting international standards and conducting ground breaking R&D in a variety of developmental and environmental issues.*

*Harnessing the power of nuclear science helps countries around the world to address issues such as food security, climate change, water resource scarcity and the looming cancer epidemic in the developing world. By sharing nuclear data, resources and expertise, the IAEA contributes to the capacity building of its Member States and promotes the peaceful uses of nuclear sciences and applications to address basic human development needs.”*

**Daud Mohamad**

Deputy Director General  
Department of Nuclear Sciences  
and Applications

## Working as a Part of the Global Community

Contributing to the Millennium Development Goals, the IAEA's role is to accelerate and enlarge the contribution of nuclear science and technology to global peace, health and prosperity. This requires the sustainable cooperation of Member States, intergovernmental and non-profit organizations, educational and research institutes and laboratories in a variety of fields.

The IAEA works alongside a long list of IAEA collaborating centres, which contribute their own research, training and facilities, and has developed coordinated research activities with experts around the world across various fields related to nuclear science and technology. The training offered by the IAEA sets a high standard for procedures and practices, improves the use of technologies and ensures the reliability of data generated by national and regional laboratories.

The establishment and maintenance of a sound infrastructure in nuclear science is essential to capacity building in a wide range of applications, from health care and agriculture to industry and the environment. By offering training and promoting the transfer of technology, techniques, knowledge, data and expertise in nuclear sciences, the IAEA, through its technical cooperation programme, offers developing Member States a means of achieving sustainable development objectives.



The technical expertise and multilateral mandate of the IAEA allows its many collaborating centres and laboratories around the world to deliver the benefits of nuclear technologies and maximize their sustainability. Given the growing emphasis on utilizing existing capabilities and expanding the use of networks for programme delivery, the collaboration across fields and between the many Member States is likely to grow in the years to come.