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International Atomic Energy Agency

2024

Technical Cooperation Report for 2024

REPORT BY THE DIRECTOR GENERAL

TECHNICAL COOPERATION REPORT FOR 2024

Report by the Director General

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Preface

The Board of Governors has requested the transmission to the General Conference of the attached Technical Cooperation Report for 2024, the draft of which was considered by the Board at its June 2025 session.

The Director General is also hereby reporting in fulfilment of the request contained in resolution GC(68)/RES/10 on “Strengthening of the Agency’s technical cooperation activities”.

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Summary

The Technical Cooperation Report for 2024 provides an overview of the Agency's technical cooperation (TC) activities during the year, covering actions to strengthen the TC programme, programme resources and delivery, and programme activities and achievements. The Annex lists the TC programme fields of activity, grouped for reporting purposes. The report responds to General Conference resolution GC(68)/RES/10.

Part A covers the context for the TC programme in 2024, opening with an overview of the 2024 Ministerial Conference on Nuclear Science, Technology and Applications and the Technical Cooperation Programme, and the Agency's participation in global development dialogue. It covers the role of the major initiatives ZODIAC, NUTEC Plastics, Rays of Hope and Atoms4Food in supporting and facilitating the delivery of Agency development activities — in particular TC activities that require major funding for high-cost equipment — by mobilizing funds, conducting awareness raising, and bringing together partners. It describes technical cooperation efforts to build human capacity, including through youth outreach, specialist schools, postgraduate support and legislative assistance. Part A also describes how the programme is tailored to the needs of Member States, giving an overview of South–South and triangular cooperation, and the Agency's support to least developed countries and small island developing states. It also details the Agency's response to emergencies through the TC programme. It closes with an overview of efforts to make the programme more efficient and effective, addressing strategic partnerships, improvements to project design and quality monitoring, and female participation.

Part B presents a summary of financial and non-financial programme delivery indicators. It reviews the resources received for the TC programme through the Technical Cooperation Fund (TCF) and mobilized through extrabudgetary and in-kind contributions. Payments to the TCF in 2024 totalled €91.2 million[1], or 95.0% of the TCF target set for the year.[2] New extrabudgetary resources for 2024 came to €34.1 million and in-kind contributions were €0.3 million. Overall, implementation for the TCF reached 86.0% in 2024. Food and Agriculture, Health and Nutrition and Nuclear Knowledge Development and Management[3] were the top areas of disbursement for the TC programme.

Part C highlights programme activities and achievements, and covers assistance to Member States in the peaceful, safe and secure application of nuclear science and technology. It highlights regional and interregional TC activities and project achievements in 2024 according to thematic area, covering health and nutrition, food and agriculture, water and the environment, industrial applications, energy planning and nuclear power, radiation protection and nuclear safety, and nuclear knowledge development and management, and presents an overview of the activities of the Programme of Action for Cancer Therapy (PACT).

Annex 1 lists the TC programme fields of activity.

[1] This figure does not include National Participation Costs, assessed programme cost arrears and miscellaneous income.

[2] Total payments received in 2024 include €0.2 million either of deferred or of additional payments by 11 Member States. Excluding these payments, the 2024 rate of attainment on payments would have been 94.8%.

[3] Note that when and if nuclear security activities are implemented under TC projects, funding is provided from the Nuclear Security Fund and not from the TCF.

The Agency's Technical Cooperation Programme in Figures

151

including **36** least developed countries (LDCs)

Countries/territories receiving support

146
Revised Supplementary Agreements (as at 31 December 2024)

26 (3)
Country Programme Frameworks (CPFs) signed (extended) in 2024

3063
Expert and lecturer assignments

6030
Meeting participants and other project personnel assignments

1783
Fellows and scientific visitors

3710
Participants in training courses

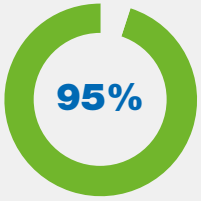
180
Regional and interregional training courses

Note: These figures include 115 virtual activities supported by the Agency in 2024.

This graph shows the distribution of assistance through TCF and extrabudgetary disbursements according to technical field in 2024.[4]

[4] Throughout this report, percentages in charts may not add up to 100% exactly, due to rounding. Unless otherwise stated, all figures are denominated in euros. Note that when and if nuclear security activities are implemented under TC projects, funding is provided from the Nuclear Security Fund and not from the TCF.

€96 000 000
2024 target for voluntary contributions to the Technical Cooperation Fund (TCF)



Rate of attainment on payments at the end of 2024

€168 625 280
TC 2024 year-end budget[5] (TCF, extrabudgetary resources and in-kind contributions)

TCF implementation rate

€135 382 621
New resources for the technical cooperation (TC) programme

- **€101.0 million** Technical Cooperation Fund, NPCs, APCs, miscellaneous income
- **€34.1 million** Extrabudgetary resources[6]
- **€0.3 million** In-kind contributions

[5] Year-end budget is the total value of all TC activities approved and funded for a given calendar year plus all approved assistance brought forward from previous years but not yet implemented.

[6] Includes donor contributions and government cost-sharing. Please refer to Table A.5 of the Supplement to this report for details.

TECHNICAL COOPERATION REPORT FOR 2024

Report by the Director General

A. Strengthening the Agency's Technical Cooperation Programme[7]

[7] Section A responds to section 1. General, section 2. Strengthening technical cooperation activities, section 3. Effective execution of the technical cooperation programme, section 4. Technical cooperation programme resources and delivery, section 5. Partnership and cooperation, and section 6. Implementation and reporting, of resolution GC(68)/RES/10, Strengthening of the Agency's technical cooperation activities.

A.1. Delivering the technical cooperation programme

The technical cooperation programme is the IAEA's primary mechanism for transferring nuclear technology to Member States, helping them to address key development priorities across a broad spectrum of topic areas. The programme is funded by Member State contributions to the Technical Cooperation Fund. In addition, the programme is supported by extrabudgetary contributions.

In 2024, the programme delivered support to 151 countries and territories through around 1400 projects, contributing to national and regional efforts to address priorities in health and nutrition, food and agriculture, water and the environment, industrial applications, and nuclear knowledge development and management. The programme also helped Member States to identify and meet future energy needs, and assisted in improving radiation and nuclear safety worldwide, including through the provision of legislative assistance.

The major IAEA initiatives, ZODIAC, NUTEC Plastics, Rays of Hope and Atoms4Food, made strides in supporting IAEA technical cooperation activities, particularly those requiring major funding for high cost equipment, by mobilizing funds, conducting awareness raising, and bringing together partners.

A.2. Technical cooperation in 2024: An overview

A.2.1. Global developments in 2024: The context for the technical cooperation programme

Ministerial Conference on Nuclear Science, Technology and Applications and the Technical Cooperation Programme

The IAEA Ministerial Conference on Nuclear Science, Technology and Applications and the Technical Cooperation Programme was held in Vienna in November 2024. The event brought together some 50 high level speakers and over 1500 experts, scientists and senior policymakers and decision makers from 143 countries. Delegates discussed the role of nuclear science and technology in addressing current global challenges, addressing food security and safety, climate change, health, and water resource management, as well as the role of women in science. The conference programme emphasized cross-cutting initiatives launched by the IAEA to generate impact in several of these areas: Atoms4Food (together with the Food and Agriculture Organization of the United Nations), NUclear TEChnology for Controlling Plastic Pollution (NUTEC Plastics), Rays of Hope and Zoonotic Disease Integrated Action (ZODIAC). Twenty-one exhibitions, including five on the work of the IAEA, were displayed, and a total of 40 side events took place.

The conference was opened by IAEA Director General Rafael Mariano Grossi, together with the Co-chairs of the conference, H.E. Kai Mykkänen, Minister of Climate and the Environment, Finland, and H.E. Kwaku Afriyie, Minister for Environment, Science, Technology and Innovation, Ghana, and senior representatives from the Food and Agriculture Organization of the United Nations (FAO), the World Health Organization (WHO), the OPEC Fund for International Development, the World Bank, and Anglo American Crop Nutrients.

The Ministerial Declaration adopted at the conference recognized the important role of the TC programme in transferring, expanding and further accelerating Member State access to nuclear technology, materials, equipment and expertise for peaceful purposes, and in building, strengthening and maintaining Member State capacity to use nuclear technology in a safe, secure and sustainable manner.[8]

[8] China, France, Korea and the United States of America provided generous support, both financial and in-kind, to the Ministerial Conference.

IAEA Director General Rafael Mariano Grossi speaks at the opening of the Ministerial Conference on Nuclear Science, Technology and Applications and the Technical Cooperation Programme in Vienna, Austria, 25 November 2024. (Photo: D. Calma/IAEA)

"At the IAEA we focus on action: science, technology and impact. Our technical cooperation programme is a major mechanism to transfer, expand and accelerate access to this expertise, and its role is vital in our efforts to build a prosperous and dignified global future."

Rafael Mariano Grossi
IAEA Director General

Global development dialogue

The Agency continued to raise awareness about nuclear and nuclear-related technologies and their applications in the international arena, supporting tangible socioeconomic progress in Member States.

The Agency presented its ongoing initiatives at the United Nations High-level Political Forum during plenary sessions focused on food security, energy planning and development advances in Africa and small island developing States (SIDS). An Agency side event featured interventions on science, technology, and innovation from representatives of the International Telecommunication Union, the United Nations Office for South–South Cooperation (UNOSSC), and representatives from China, Namibia, the Philippines, South Africa and the United States of America (USA).

The Agency continued to engage with the Inter-Agency Mechanism for South–South and Triangular Cooperation, the Inter-Agency Task Force on Financing for Development, and the Inter-Agency Task Team on Science Technology and Innovation for the Sustainable Development Goals (SDGs). IAEA Deputy Director General and Head of the Department of Technical Cooperation Hua Liu represented the Agency at the High-level Forum of South–South Cooperation in Climate Change and at a side event focused on UNOSSC's recently launched South–South and Triangular Cooperation Solutions Lab.

At the 80th Session of the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) in April, IAEA Deputy Director General and Head of the Department of Technical Cooperation Hua Liu delivered a keynote statement entitled 'Leveraging Digital Innovation for Sustainable Development in Asia and the Pacific'. (Photo: G. Wolde/IAEA)

At the Fourth International Conference on Small Island Developing States held in Antigua and Barbuda in May 2024, the Agency presented an overview of its assistance to SIDS and organized a side event together with Antigua and Barbuda, the United Nations Environment Programme (UNEP), UNOSSC and the USA on harnessing environmental data for the benefit of SIDS. The Agency raised awareness of its activities at events including the Paris Peace Forum and the Annual Meeting of the United Nations Commission on Science and Technology for Development.

IAEA Director General Rafael Mariano Grossi delivers remarks virtually at the opening 9th Energy Week organized by the Latin American Energy Organization. (Photo: D. Calma/IAEA)

IAEA Director General Rafael Mariano Grossi greets members of the Nuclear Youth Group in the IAEA Pavilion at COP 29 in Baku. (Photo: D. Calma/IAEA)

The Agency participated in the 29th session of the Conference of the Parties to the United Nations Framework Convention on Climate Change (COP 29) in Baku. Side events of particular relevance to technical cooperation included an event with Italy's Special Envoy for Climate Change, hosted by the Consultative Group on International Agricultural Research, which looked at the benefits of South–South cooperation for Atoms4Food. An event entitled 'Welcoming the Next Nuclear Generation' brought together young nuclear professionals to foster intergenerational dialogue. Side events co-chaired by Azerbaijan and China showcased the Agency's 12 years of assistance to Member States in nuclear power infrastructure development and the deployment of small modular reactors (SMRs).

In 2024, the Agency continued to participate in the meetings of the Interdepartmental Task Force on African Affairs convened by the United Nations Office of the Special Adviser on Africa (UNOSAA), which focused on Africa's digital transformation to foster the SDGs and Agenda 2063.

In October, the Agency held a session on nuclear energy perspectives for Latin America and the Caribbean during the 9th Energy Week organized by the Latin American Energy Organization and promoted the Agency's energy planning support.

Agency inputs to key development papers

- The Agency provided inputs for the report of the Secretary-General on the Implementation of the Programme of Action for the Least Developed Countries for the Decade 2022–2031, for the 2024 Substantive Session of the United Nations Economic and Social Council, and for the 79th Session of the United Nations General Assembly.
- Inputs were provided in the context of the preparatory committees for the Fourth International Conference on Small Island Developing States, as well as the preparatory committee for the Fourth International Conference on Financing for Development to be held in 2025.

- The Agency also participated in the proceedings of the Commission on Science and Technology for Development and in several thematic sessions of United Nations Regional Commissions.
- As requested by UNOSAA, the Agency provided inputs relevant to the implementation of the Third Industrial Development Decade for Africa, which covers the period 2016–2025.
- For the fourth consecutive year, the Agency provided inputs to the annual *G20 Report on Actions against Marine Plastic Litter*, published in September 2024.

Advocating for access to cancer care

Through Rays of Hope, the Agency continued to advocate for improved access to quality cancer care in low and middle income countries (LMICs). This included participation in key events, such as the Global Breast Cancer Initiative informal partners' forum, London Global Cancer Week, the joint UK/US initiative on the Sustained Dialogue on Peaceful Uses, the World Cancer Congress and the 77th World Health Assembly, where the Agency emphasized the need to integrate radiation medicine into national cancer control planning. PACT also participated in the workshop to implement the US–Portugal Memorandum of Understanding on Cooperation on Cancer Research, Prevention, Control and Management in Lusophone African Countries. PACT continued to raise awareness of the role of radiation medicine among the global health community by participating in meetings of the World Health Organization (WHO) Regional Committees for the Americas and South-East Asia. In May, the Agency attended the WHO South-East Asia Regional Workshop on Scaling Up Services for Cancer and Implementing the South-East Asia Cancer Grid, which was held in Kathmandu together with organizations including the International Agency for Research on Cancer (IARC), St. Jude Children's Research Hospital (USA), and countries from the region.

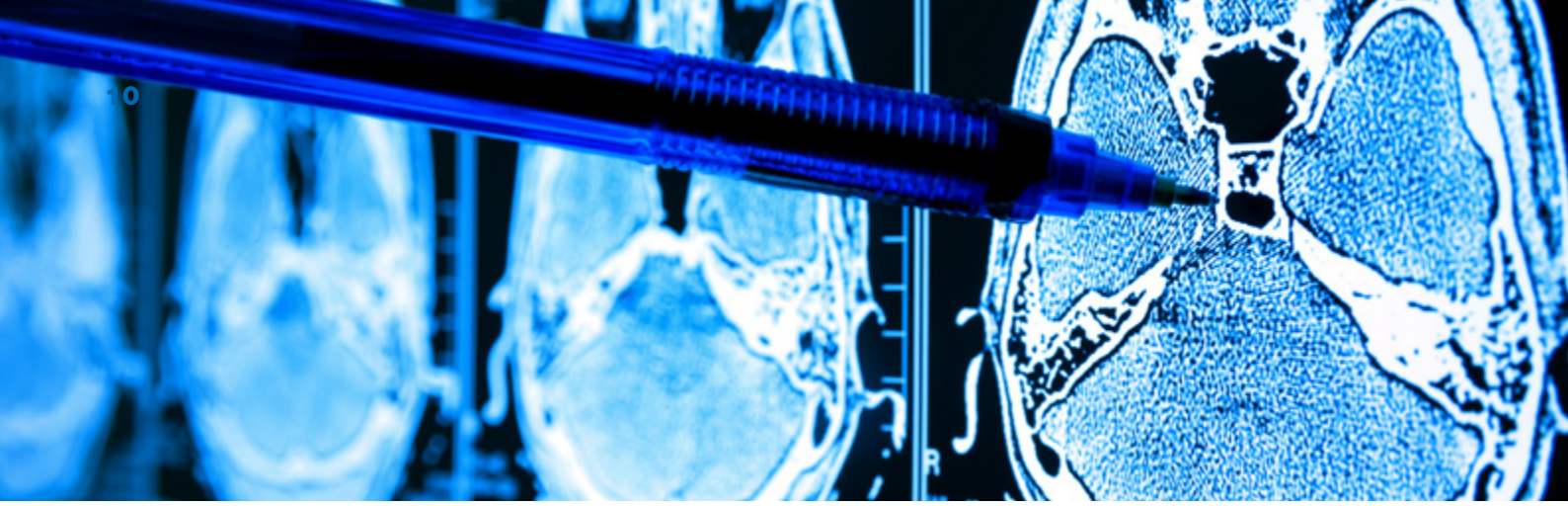
Sixteen emerging cancer leaders received funding through PACT to attend the World Cancer Congress in Geneva, Switzerland, where they gave oral or poster presentations on radiation medicine projects. (Photo: J. Russell/IAEA)

A.3. Contribution of the major initiatives

The major initiatives support the work of the Agency and the technical cooperation programme by raising awareness, building partnerships and mobilizing resources.

"For decades, the IAEA has led the way in helping countries harness the great potential of nuclear science and technology. Together we have succeeded in touching the lives of many around the world. But seeing the scale of the challenges, we need to do more. That is why I launched several flagship initiatives to expand the use of nuclear techniques in critical areas such as food, health and the environment."

Rafael Mariano Grossi
IAEA Director General



Rays of Hope

IAEA RAYS OF HOPE CANCER CARE FOR ALL

The IAEA's Rays of Hope initiative is dedicated to reducing global disparities in access to quality radiation medicine for cancer care. More than 90 Member States across Africa, Asia and the Pacific, Europe and Central Asia, and Latin America and the Caribbean are seeking or already benefiting from technical assistance under the initiative.

So far, donors and other partners have allocated €75.1 million to Rays of Hope, with €72.1 million allocated to TC activities.

In 2024, 82 countries participated in Rays of Hope. The IAEA conducted nine imPACT Review missions and two follow up missions, as well as providing support for the elaboration of national cancer control programmes in four countries. Findings from the imPACT missions are supporting the development of national action plans as well as the mobilization of resources through Rays of Hope. With the support of the IAEA, five new cancer centres have been opened since the launch of the initiative, and more than 80 medical physicists, nuclear medicine specialists and oncologists have been trained. The IAEA has supported procurement activities for cancer care management as part of Rays of Hope, with a total value of approximately €22.3 million[9]. Eleven Anchor Centres have been designated to date, and partnerships in the private sector and with industry are mobilising resources and equipment. The Agency is also supporting Member States in the development of strategic funding documents (bankable documents) intended to enable resource mobilisation from international financial institutions, development agencies and other partners, including at the national level – eleven countries received this support in 2024.

The Rays of Hope Forum held at the Agency's Headquarters in Vienna in February 2024 highlighted Member States' progress in enhancing access to cancer care, presented the work of the Rays of Hope Anchor Centres, and insights from imPACT Reviews and an update on the development of bankable documents. The forum, which was attended by 350 participants, connected traditional and non-traditional partners in the fight against cancer.

Additional info

Elekta, GE Healthcare, IBA Dosimetry, PTW Dosimetry, Siemens Healthineers and Standard Imaging are Rays of Hope partners. In 2024, GE Healthcare provided an in-kind contribution to support clinical training for nuclear medicine and radiology practitioners in LMICs, and signed a Letter of Intent for the donation of a mammography machine to the Seibersdorf laboratories, also supporting training for LMIC fellows. Elekta signed a Contribution Agreement for the donation of brachytherapy equipment to the Seibersdorf laboratories, which will be used

[9] This amount includes requisitions.

to train LMIC professionals in the treatment of cervical cancer. IBA Dosimetry and Standard Imaging made announcements to support Rays of Hope Anchor Centres with in-kind donations to the combined value of €200 000.

The Nuclear Medicine Research Infrastructure at the Steve Biko Academic Hospital in South Africa became an Anchor Centre, joining insitutions in Algeria and Morocco to support cancer education, research and training on the African continent. Argentina's National Atomic Energy Commission became the first Anchor Centre in Latin America and the Caribbean. Five countries in the Asia and the Pacific region host Anchor Centres: Japan, Jordan, the Republic of Korea, Pakistan and Thailand. Two Anchor Centres have been designated in Europe so far, in Slovenia and Türkiye. A train the trainers course for Anchor Centres was held at the IAEA's Dosimetry Laboratory in Seibersdorf in December.

PHOTO 1. The Agency signed agreements in support of Rays of Hope with Elekta and GE Healthcare at an event held on the margins of the IAEA Ministerial Conference on Nuclear Science, Technology and Applications and the Technical Cooperation Programme in November 2024. (Photo: O. Yusuf/IAEA)

PHOTO 2. IAEA Director General Rafael Mariano Grossi delivers remarks at an event in January 2024 to advance Rays of Hope in Latin America and the Caribbean. (Photo: D. Calma/IAEA)

82 Member States are participating in Rays of Hope

AFRICA

Algeria, Angola, Benin, Botswana, Burkina Faso, Burundi, Cabo Verde, Cameroon, Chad, Comoros, the Congo, Côte d'Ivoire, Democratic Republic of the Congo, Djibouti, Egypt, Eswatini, Ethiopia, Gambia, Ghana, Kenya, Lesotho, Liberia, Libya, Madagascar, Malawi, Mali, Mauritania, Mauritius, Morocco, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, South Africa, Sudan, Togo, Tunisia, Uganda, United Republic of Tanzania, Zambia, Zimbabwe

ASIA AND THE PACIFIC

Cambodia, Fiji, Indonesia, Iraq, Japan, Jordan, Lao People's Democratic Republic, Lebanon, Marshall Islands, Mongolia, Pakistan, Papua New Guinea, Republic of Korea, State of Palestine, Syrian Arab Republic, Thailand, Vietnam, Yemen

EUROPE AND CENTRAL ASIA

Albania, Armenia, Kazakhstan, Kyrgyzstan, Moldova, Slovenia, Tajikistan, Türkiye, Turkmenistan, Ukraine, Uzbekistan

LATIN AMERICA AND THE CARIBBEAN

Argentina, Bahamas, Belize, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Honduras, Jamaica, Mexico, Panama, Paraguay, Peru, Plurinational State of Bolivia, Uruguay, Bolivarian Republic of Venezuela

11 Anchor Centres have been designated in Member States

ANCHOR CENTRE MEMBER STATES

Algeria, Argentina, Japan, Jordan, Morocco, Pakistan, Republic of Korea, Slovenia, South Africa, Thailand, Türkiye

DONORS IN 2024

Albania, Australia, Belgium, France, Germany, Republic of Korea, Latvia, Philippines, Russian Federation, Saudi Arabia, United States of America, Onchikai General Incorporated Foundation (Japan).

NUTEC Plastics

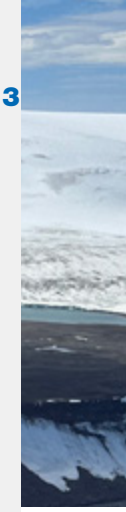
The Nuclear Technology for Controlling Plastic Pollution (NUTEC Plastics) initiative brings together countries and partners to enhance marine plastic monitoring and develop innovative recycling technologies with irradiation, accelerating the transition to a circular plastic economy. Eighty-eight countries now participate in NUTEC Plastics through the technical cooperation programme, with China becoming the ninth pilot country joining Argentina, Brazil, Ghana, Indonesia, Malaysia, Mexico, Philippines and Thailand. China will focus on implementing and testing radiation technology for plastic upcycling with the aim of accelerating regional advancements in plastic waste management.

In July 2024, 63 Member States attended the first coordination meeting for an interregional Agency project to establish a global network of laboratories to monitor microplastics in the ocean and identify trends. The Global NUTEC Plastics Monitoring Network will support the exchange of data, knowledge and best practices. In October, the project supported the Interregional Meeting on the Architecture and Development of the NUTEC Plastic Database for Marine Microplastic Monitoring, as well as the first international meeting on harmonization of criteria for the technical proposal for reporting indicator SDG 14.1.1b (level III) on microplastics in coastal areas. Participants agreed on specifications for harmonized reporting criteria for visualization of data

So far, donors and other partners have allocated €8.9 million to NUTEC Plastics, with €5.1 million allocated to TC activities.

Additional info

IAEA Director General Rafael Mariano Grossi greets participants at the opening of the Meeting on Advancing the Global Monitoring of Marine Plastic Pollution under the NUTEC Plastics Initiative. (Photo: R. Fraga Pazos/IAEA)



on microplastic abundance, and to report to UNEP on indicator SDG 14.1.1b, level III. The NUTEC Plastics Database will complement the Global Partnership on Plastic Pollution and Marine Litter Digital Platform, which allows for the visualization of global datasets of indicators for microplastics in surface water, beach sand and sediments with a view to inspiring policy and action in this area.

In the Asia and the Pacific region, collaboration with key industrial partners has been formalized in Indonesia (with PT Viro), Malaysia (with AlamFlora and HDD Tech) and the Philippines (with Envirotech). These partnerships focus on using radiation technology to enhance recycling and upcycling processes. Support for marine monitoring in the region has focused on delivering training to enhance Member States' capacity to manage plastic waste, including microplastics, in marine environments, and on conducting practical field sampling exercises, in particular in coastal environments such as beach sand and seawater.

The Agency is collaborating on the United Nations Decade of Ocean Science for Sustainable Development with ESCAP, FAO, the Global Plastic Action Partnership's regional working group for Africa, the G20, the Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization, the United Nations Development Programme, UNEP, the United Nations Industrial Development Organization (UNIDO), and the World Economic Forum.

These partnerships and private sector relationships support efforts to tackle the global problem of plastic pollution.

88 Member States are participating in NUTEC Plastics through the TC programme[10]:

- → **86** in marine monitoring and assessment
- → **30** in plastic recycling using nuclear technology

MARINE MONITORING AND ASSESSMENT

Afghanistan, Albania, Algeria, Antigua and Barbuda, Argentina, Azerbaijan, Bahamas, Bangladesh, Barbados, Belize, Bosnia and Herzegovina, Brazil, Bulgaria, Burkina Faso, Cambodia, Chile, China, Colombia, Comoros, Costa Rica, Croatia, Cuba, Cyprus, Czech Republic, Djibouti, Dominica, Ecuador, Egypt, El Salvador, Estonia, Eswatini, Ethiopia, Georgia, Ghana, Greece, Guatemala, Guyana, Honduras, Indonesia, Iraq, Jamaica, Jordan, Kenya, Kuwait, Lebanon, Lithuania, Madagascar, Malaysia, Mauritius, Mexico, Mongolia, Montenegro, Morocco, Myanmar, Namibia, Nicaragua, Nigeria, Pakistan, Palau, Panama, Peru, Philippines, Qatar, Romania, Saudi Arabia, Senegal, Serbia, Slovenia, South Africa, Sri Lanka, St Kitts and Nevis, Saint Vincent and the Grenadines, Sudan, Syrian Arab Republic, Tajikistan, Thailand, Togo, Trinidad and Tobago, Tunisia, Türkiye, Ukraine, United Arab Emirates, Uruguay, Bolivarian Republic of Venezuela, Viet Nam, Yemen

PLASTIC RECYCLING

Argentina, Azerbaijan, Bangladesh, Brazil, Chile, China, Costa Rica, Croatia, Cuba, Czech Republic, Ecuador, Egypt, Ghana, Hungary, Indonesia, Malaysia, Mexico, Myanmar, Panama, Peru, Philippines, Poland, Serbia, Sri Lanka, Thailand, Tunisia, Türkiye, Uruguay, Bolivarian Republic of Venezuela, Viet Nam

DONORS IN 2024

Japan, United States of America

[10] List of countries participating in NUTEC that receive support through related TC projects.

ZODIAC

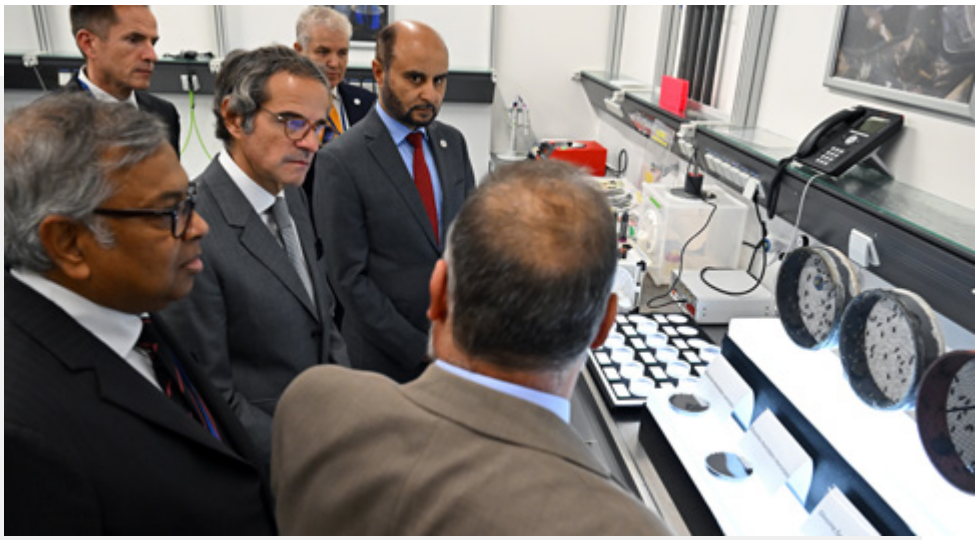
Launched in 2020, the Zoonotic Disease Integrated Action (ZODIAC) initiative aims to enhance the ability of countries to prepare for and respond to zoonotic diseases. Standard operating procedures (SOPs) for the production of secondary standard reference materials are being developed, and in 2024, with the support of regional TC projects, SOPs for capture and sampling of vectors and wildlife were developed and are under clearance.

So far, 52 Zodiac National Laboratories (ZNLs) have received equipment and training and are now fully equipped for serology and molecular diagnostics or genetic sequencing. In 2024 the Agency supported 11 three-month fellowships for staff from 6 ZNLs that have received whole genome sequencing equipment (1 ZNL from Africa, 2 from Latin America, 2 from Eastern Europe and Central Asia, and 1 from Asia and the Pacific).

Twenty-six participants from 13 countries were trained in antimicrobial resistance surveillance, good animal husbandry practices and diagnostic methods under a regional project launched in 2024 to strengthen regional and national surveillance capacity for priority animal, zoonotic and potential vector-borne diseases. Nineteen participants from 13 Member States have gained knowledge of the main vectors and potential carriers of animal and zoonotic diseases, such as mosquitoes, culicoides, sand flies and ticks, and 35 participants from 13 Member States received certification from manufacturers in the maintenance, verification and calibration of biosafety cabinets, a major biosafety component in diagnostic laboratories.

So far, donors and other partners have allocated €15.0 million to ZODIAC, with €9.2 million allocated to TC activities.

Additional info



IAEA Director General Rafael Mariano Grossi tours the Animal Production and Health Laboratory in Seibersdorf, Austria, with HE Mr.Abdulhamid Alkhalifa, President of the OPEC Fund for International Development. (Photo: D. Calma/IAEA)

In October 2024, 24 staff from 22 ZNLs in Africa attended a training course on generic verification of SOPs for serology and molecular diagnostic in Sebeta, Ethiopia. Workshops were held to identify priority gaps in over 130 veterinary laboratories and ZNLs. Equipment for serology and molecular diagnostics was procured for several ZNLs in the region. Representatives of 34 African ZNLs attended a Regional Meeting on the Implementation of ZODIAC in Africa, held in Morocco in November 2024, to review achievements and identify opportunities for regional collaboration and for cooperation with ongoing initiatives in Africa under the One Health approach.

Diagnostic animal health laboratories were strengthened in 20 countries in Latin American and the Caribbean. Three training courses were conducted in 2024 to improve the detection of five diseases: classical and African swine fever, brucellosis, Newcastle disease, and avian influenza. In Chile, 21 participants completed training in the genomics and bioinformatics of animal diseases; and in Paraguay, 22 participants increased their knowledge of the production of secondary reference materials. Laboratories continued to be supplied with reagents, and Uruguay was sponsored to participate in an international meeting in France on vaccination and surveillance for highly pathogenic avian influenza.

151 Member States officially appointed a ZODIAC National Coordinator

129 Member States officially designated a ZODIAC National Laboratory

AFRICA

ZODIAC National Laboratories
Algeria, Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Comoros, the Congo, Côte d'Ivoire, Democratic Republic of the Congo, Djibouti, Egypt, Eritrea, Eswatini, Ethiopia, Ghana, Guinea, Kenya, Lesotho, Libya, Madagascar, Malawi, Mali, Mauritania, Mauritius, Morocco, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Seychelles, Sierra Leone, South Africa, Sudan, Togo, Tunisia, United Republic of Tanzania, Zambia, Zimbabwe

ZODIAC National Coordinators
Algeria, Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Comoros, the Congo, Côte d'Ivoire, Democratic Republic of the Congo, Djibouti, Egypt, Eritrea, Eswatini, Ethiopia, Ghana, Guinea, Kenya, Lesotho, Libya, Madagascar, Malawi, Mali, Mauritania, Mauritius, Morocco, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Seychelles, Sierra Leone, South Africa, Sudan, Togo, Tunisia, Uganda, United Republic of Tanzania, Zambia, Zimbabwe

ASIA AND THE PACIFIC

ZODIAC National Laboratories
Afghanistan, Bahrain, Bangladesh, Cambodia, China, Indonesia, Iraq, Islamic Republic of Iran, Jordan, Kuwait, Lebanon, Malaysia, Marshall Islands, Mongolia, Nepal, Oman, Pakistan, Philippines, Qatar, Sri Lanka, Syrian Arab Republic, Thailand, Vanuatu, Viet Nam, Yemen

ZODIAC National Coordinators
Afghanistan, Australia, Bahrain, Bangladesh, Cambodia, China, India, Indonesia, Iraq, Islamic Republic of Iran, Israel, Japan, Jordan, Korea, Kuwait, Lebanon, Malaysia, Marshall Islands, Mongolia, Myanmar, Nepal, New Zealand, Oman, Pakistan, Philippines, Qatar, Saudi Arabia, Singapore, Sri Lanka, Syrian Arab Republic, Thailand, Vanuatu, Viet Nam, Yemen

EUROPE AND CENTRAL ASIA

ZODIAC National Laboratories
Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Estonia, Finland, France, Georgia, Germany, Greece, Hungary, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Malta, Montenegro, North Macedonia, Poland, Portugal, Republic of Moldova, Romania, Russian Federation, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Tajikistan, Türkiye, Ukraine, Uzbekistan

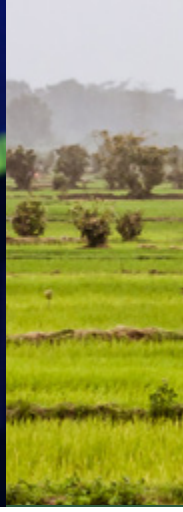
ZODIAC National Coordinators
Albania, Armenia, Azerbaijan, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Estonia, Finland, France, Georgia, Germany, Greece, Hungary, Ireland, Italy, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Malta, Montenegro, Netherlands, Kingdom of the, North Macedonia, Poland, Portugal, Republic of Moldova, Romania, Russian Federation, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Tajikistan, Türkiye, Ukraine, United Kingdom, Uzbekistan

NORTH, CENTRAL AND SOUTH AMERICAS AND CARIBBEAN

ZODIAC National Laboratories
Antigua and Barbuda, Argentina, Belize, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Saint Lucia, Saint Vincent and the Grenadines, Uruguay, Bolivarian Republic of Venezuela

ZODIAC National Coordinators
Antigua and Barbuda, Argentina, Bahamas, Belize, Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Cuba, Dominica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Honduras; Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Saint Lucia, Saint Vincent and the Grenadines, Trinidad and Tobago, Uruguay, United States of America, Bolivarian Republic of Venezuela

DONORS IN 2024
Bulgaria



Atoms4Food

Launched in 2023 by the Agency and FAO, Atoms4Food helps countries to boost their food security by harnessing nuclear and other advanced technologies to enhance agricultural and livestock productivity, manage natural resources, reduce food losses, ensure food safety, improve nutrition and adapt to climate change. In July 2024, a roadmap to facilitate implementation and engagement with Member States was announced.

So far, donors and other partners have allocated €10.0 million to Atoms4Food, with €6.4 million allocated to TC activities.

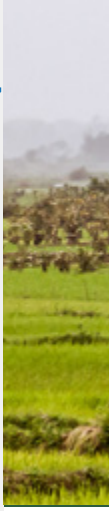
The 2024 IAEA Scientific Forum, with the theme 'Atoms4Food: Better Agriculture for Better Life', showcased innovations in nuclear science and technology for sustainable farming, partnership building and resource mobilization. At the Forum, the United States of America announced a contribution of Euro 1 million in support of Atoms4Food. At a side event during the IAEA Ministerial Conference on Nuclear Science, Technology and Applications and the Technical Cooperation Programme, successful stories from the Global South in applying nuclear techniques to address food security challenges were highlighted. Agreements were signed with Paraguay and Peru in 2024 to enhance food and agriculture through the initiative.

Several countries in Africa have joined the Atoms4Food initiative, and meetings have been held with the ministers of agriculture of Benin and Burkina Faso. The delivery of equipment packages to enhance crop and livestock production has begun in 16 countries.

More than 300 laboratory professionals and regulatory staff from 22 Member States and territories in the Asia and the Pacific region have been trained in food safety control with Agency support. Laboratory equipment and consumables have been procured for 16 countries in the region, including four least developed countries (LDCs): Bangladesh, Cambodia, Laos People's Democratic Republic and Myanmar. In 2024, a Regional Meeting on Proficiency Testing Scheme Review and Inter-Laboratory Collaboration was held in Xiamen, China, as well as a Regional Training Course on Multiclass Food Hazard Monitoring/ Surveillance Programme.

In Latin America and the Caribbean, collaboration under Atoms4Food with FAO, the Inter-American Institute for Cooperation on Agriculture (IICA), the International Regional Organization for Plant and Animal Health (OIRSA), the World Organisation for Animal Health (WOAH), the Pan American Center for Foot-and-Mouth Disease and Veterinary Public Health and the United Nations Industrial Development Organization (UNIDO) is contributing to more resilient and sustainable agri-food systems.

PHOTO 1. IAEA Director General opens the IAEA Scientific Forum 2024, themed Atoms4Food: Better Agriculture for a Better Life and focused on how nuclear technology can help tackle global food insecurity. (Photo: D. Calma)



23 countries joined Atoms4Food by the end of 2024

AFRICA
Benin, Burkina Faso, Côte d'Ivoire, Eritrea, Eswatini, Ethiopia, Ghana, Kenya, Mauritania, Niger, Sierra Leone, Sudan, United Republic of Tanzania

ASIA AND THE PACIFIC
Bangladesh, Cambodia, Oman, Pakistan, Philippines, Qatar

LATIN AMERICA AND THE CARIBBEAN
Argentina, Cuba, Peru, Uruguay

DONORS IN 2024
Japan, United States of America

The Agency is also taking part in efforts to address the New World screw worm (NWS) reinfestation in Central and North America. In March, a regional workshop on emergency response to an NWS outbreak was held in cooperation with IICA and OIRSA in Golfito, Costa Rica. A regional meeting on the establishment and implementation of NWS eradication programmes was held in Montevideo in October 2024, attended by Uruguay's Minister of Livestock, Agriculture and Fisheries, Directors of Animal Health from eighteen countries in the region, as well as from the US Department of Agriculture, the Panama–United States Commission for the Eradication and Prevention of Screwworm, FAO, IICA, OIRSA and WOAH.

Under Atoms4Food, the Agency mobilized extrabudgetary funding to support the establishment and implementation of Uruguay's NWS eradication programme. This was used to equip a diagnostic laboratory and the national dispersion centre at the Durazno national air base, which will manage the logistics of aerial and ground release of sterile flies as part of area-wide integrated pest management (AW-IPM).

Additional info

PHOTO 2. In October 2024, Qatar hosted a regional training course for 16 ARASIA State Parties participants on bioinformatics and genetic improvement for crops and methodologies for screening biotic stress. This course has contributed to capacity building for the mutation breeding of essential crops in the region, supporting climate-smart and sustainable agricultural practices. (Photo: Qatar Ministry of Municipality)

A.4. Building human capacity

A regional meeting on nuclear science and technology education held at Shenzhen University, China, in August 2024, brought together 40 educators, practitioners and policymakers to advance collaboration and strategic planning for nuclear science and technology education across the Asia and the Pacific region. Participants agreed on priority targets and activities for 2025–2029, a finalized work plan for the Asian Network for Education in Nuclear Technology (ANENT) and the International Nuclear Science and Technology Academy (INSTA), and pathways for collaboration with the Agency under new TC projects.

Educators, practitioners and policymakers met to advance collaboration and strategic planning for nuclear science and technology education across the Asia and the Pacific region, at Shenzhen University, China, in August. (Photo Shenzhen University)

Students and teachers conduct environmental sampling in Okuma, Fukushima Prefecture, Japan. (Photo: M. B. Mishar/IAEA)

The Agency, in collaboration with Osaka University and ANENT, organized a pilot regional training course on environmental radiation in Fukushima, Japan, in September 2024. Twenty students and educators from Indonesia, Malaysia, the Philippines and Saudi Arabia learned from the 2011 Fukushima Daiichi accident recovery experience through immersive activities including site visits, sampling, measurements, and discussions with local residents. The IAEA also trained 13 countries at the United States' Argonne National Laboratory to engage secondary students on nuclear science. Participants acquired knowledge, skills and resources to develop and deliver engaging educational programmes, hands-on training sessions, workshops, and exhibits focused on nuclear science.

Youth engagement and education

The first International Nuclear Science Olympiad took place in Pampanga, the Philippines, in August 2024. Fifty-five high school students from 14 countries in the Asia and the Pacific region participated in theoretical and experimental challenges, with four additional observer countries. The event fostered cross-cultural exchanges, team building, and intellectual and interpersonal growth.

The 2024 Asia and the Pacific Youth Virtual Challenge, launched on Virtual Worlds Day on June 14, engaged more than 200 high school and university students in developing innovative solutions to address sustainability challenges. Using the Minecraft Education platform, high school teams focused on designing plastic recycling facilities utilizing nuclear technology to support a circular plastic economy, while university teams tackled strategies for sustainable radioactive waste management, with the aim of achieving net zero emissions by 2050. The initiative highlighted the role of nuclear technology in achieving the SDGs and inspired youth to create impactful real-world solutions.

The first International Nuclear Science Olympiad took place in the Philippines in August 2024, attended by 55 competitors, 27 team leaders and 14 observers from 20 Asian countries. (Photo: DOST-Philippine Nuclear Research Institute)

Students participating in an activity at Hiroshima University's Phoenix Programme Summer School. (Photo: Hiroshima University)

Doctoral and postgraduate support

In 2024, nine radiation therapists received training in Chile as part of the fourth iteration of the year-long master's degree programme in advanced radiotherapy for Latin America and the Caribbean. To date, 30 radiation oncologists from 15 countries in the region have successfully completed this course.

In 2024, six Masters students from Africa and the Asia and the Pacific region attended an International Master's Program in Nuclear Engineering and Management in China, with Agency support. This two-year professional academic degree programme supports 30 students each year. In 2024, three doctoral students from Bangladesh, Pakistan and Jordan started a programme in China, designed for professionals in the fields of nuclear technology applications, uranium mining and metallurgy, nuclear safety, radiation protection and nuclear waste disposal.

In 2024, three Agency-supported doctoral fellows from Iraq, Mongolia and the Philippines completed their studies at Hiroshima University under the Hiroshima University Phoenix Leader Education Programme for Renaissance from Radiation Disaster. A further two fellows from Mongolia and Pakistan are currently enrolled. The first Phoenix Programme Summer School Fellowship in Hiroshima, held in August and September 2024, was attended by 14 participants from the Asia and the Pacific region. The school improved the participants' knowledge of radiation emergency preparedness and radiation environmental and social awareness, equipping them with the skills, knowledge and mindset to effectively respond to and manage the complex challenges associated with radiation incidents.

Specialized schools

In 2024, 26 professionals attended the third IAEA School of Nuclear and Radiological Leadership for Safety for Latin America and the Caribbean, held in Mexico with the support of the National Commision for Nuclear Security and Safeguards. The school, which was established to support the implementation of requirements outlined in *Leadership and Management for Safety* (IAEA Safety Standards Series No GSR Part 2), combined presentations with exercises, group discussions and games, enabling participants to improve their leadership skills.

The fifth School of Radiation Emergency Management for Latin America and the Caribbean was held in Argentina with the support of the country's Nuclear

Regulatory Authority. Participants at the three-week school attended lectures on key emergency preparedness and response (EPR) topics, including emergency management systems, public communication and medical response. These were complemented by case studies, drills and tabletop exercises that simulated real-world scenarios, enabling participants to apply their knowledge in a controlled setting. Site visits to the National Atomic Energy Commission and Atucha nuclear power plant (NPP) provided opportunities to observe emergency arrangements and response practices first hand.

Postgraduate Educational Course in Radiation Protection and the Safety of Radiation Sources

Each year, the Agency supports several iterations of the six-month Postgraduate Educational Course (PGEC) in Radiation Protection and the Safety of Radiation Sources, which equips young professionals with a sound basis in radiation protection and the safety of radiation sources in line with the Agency's safety standards. By offering a rigorous, multidisciplinary curriculum, the course helps to maintain a pipeline of staff for national regulatory authorities and advisers in radiation safety.

ASIA AND THE PACIFIC:

- → **25** radiation protection professionals trained in Bangi, Malaysia, in English, between May and November 2024.
- → **22** participants trained in Jordan, in Arabic, between August 2024 and January 2025.

EUROPE:

- → **20** students from 16 countries, including 2 participants from Caribbean Community (CARICOM) Member States, trained in English at the Greek Atomic Energy Commission in Athens, starting in October 2024.

LATIN AMERICA AND THE CARIBBEAN:

- → **15** students trained at Argentina's Nuclear Regulatory Authority.

Participants in the Postgraduate Educational Course in Radiation Protection and the Safety of Radiation Sources, hosted in Bangi, Malaysia, visit a radiological and nuclear medicine facility, May 2024. (Photo: Malaysian Nuclear Agency)

Legislative and drafting assistance

The 2024 Nuclear Law Institute brought 64 participants from 59 Member States to Vienna to acquire an understanding of nuclear law and hands-on practical experience in drafting comprehensive nuclear legislation at the national level. Agency support also enabled 15 people to participate in the OECD/NEA International School of Nuclear Law in Montpellier, France. In addition, the Agency's first advanced Interregional Training Course on Nuclear Law was organized in Belgrade, which brought together 33 lawyers and officials from 29 Member States.

The IAEA Legislative Assistance Programme covers all branches of nuclear law and includes interregional, regional, subregional and national activities to raise awareness among decision makers, policymakers and legislators to assess, review and draft nuclear laws. These activities also support the promotion of, adherence to, and effective implementation of the relevant international legal instruments. In 2024, 15 Member States received assistance in the form of advice on draft and enacted national nuclear legislation. Bilateral meetings were held with decision makers, policymakers, senior officials and legislators in 11 Member States. In addition, national workshops on nuclear law were held in 6 Member States.

Several countries in Africa received legislative assistance, including in the form of reviews of national nuclear legislation in Côte d'Ivoire, Gabon, Ghana and Uganda. National workshops were held in the Congo, Egypt, Kenya and Uganda, while Côte d'Ivoire and Egypt hosted subregional workshops on nuclear law in French and English. Twenty-nine representatives from 19 Member States attended the subregional workshop in Côte d'Ivoire, and 25 representatives from 16 Member States attended the subregional workshop in Egypt.

The Agency continued to provide legislative assistance to Member States in Europe and Central Asia in 2024, providing, for instance, comments and advice on Estonia's draft national nuclear legislation.

In the Asia and the Pacific region, the Agency organized a subregional workshop on nuclear law hosted by the Philippines, which focused on nuclear safety, security, safeguards and liability. Bilateral meetings with legislators from Brunei Darussalam, China, Iraq, the Philippines, Qatar and Sri Lanka were held to provide advice on draft and enacted national nuclear legislation. A national workshop on nuclear safety and liability was held in Pakistan.

A High-Level Meeting on Nuclear Law for Pacific Islands States was held at the Agency's Headquarters in September, attended by eight participants from Papua New Guinea and the Marshall Islands. The meeting was also attended by non-Member States, namely Maldives, Nauru, Solomon Islands and Timor Leste. Participants gained a broad knowledge of all aspects of nuclear law

A High-Level Meeting on Nuclear Law for Pacific Islands States was held at the Agency's Headquarters in September. (Photo: A. Troubat/IAEA)

Participants in the 'Specialization in Nuclear Law' postgraduate programme at the University of Buenos Aires visit the Atucha II NPP in Argentina. (Photo: C. Dominguez)

and a comprehensive overview of relevant international legal instruments, and discussions were held on a tailored approach to national nuclear law.

Legislative support for Latin America and the Caribbean was provided in 2024 to the Bahamas, Barbados, Colombia, El Salvador, Honduras, and Saint Kitts and Nevis. Bilateral meetings with Colombia, El Salvador and Honduras enabled discussions on the importance of becoming party to relevant international legal instruments and developing comprehensive nuclear legislation. Draft laws from the Bahamas, Barbados, Colombia, El Salvador, and Honduras were reviewed and feedback was provided. In Colombia, significant progress was made following the provision of two years of support, and a nuclear bill was submitted to Congress for formal consideration in December 2024. If enacted, the bill can be expected to positively impact key sectors in the country for the peaceful use of nuclear applications in sectors including health, the environment and agriculture.

In May 2024, the University of Buenos Aires, Argentina, launched a postgraduate programme of study entitled 'Specialization in Nuclear Law', with assistance from the Agency. This advanced programme aims to promote a deeper understanding of legal, regulatory and policy issues associated with the peaceful use of nuclear technology, nuclear safety and security, safeguards and non-proliferation. Twenty students have enrolled in the 10-module, 12-month programme.

A.4.1. Tailoring support to Member State needs

South–South and Triangular Cooperation

The Agency continued to leverage South–South cooperation by prioritizing engagement with international cancer control experts from the regions of Member States requesting assistance. This approach ensured that technical support was tailored to regional economic, political, social and cultural contexts. To build capacities in LMICs and establish collaborative networks, qualified counterparts in countries that received imPACT Review missions were later deployed as experts in other missions. Additionally, imPACT Review experts provided recipient Member States with fellowship opportunities at their institutions, strengthening connections with ongoing and future national projects under the TC programme.

Triangular cooperation between Kenya, South Africa and the Agency has led to the development and deployment of a terrestrial system to measure radionuclides in beach sediment and a delta underwater gamma system to assess radioactive quantities in aquatic sediment. The cooperation supports the use of an environmentally friendly method of tracing ocean sediments, helping to keep East Africa's largest international seaport open for trade.

In 2024, Jordan reinforced its role as a regional hub for nuclear capacity building through Agency-supported South–South collaboration. The Jordan Atomic Energy Commission (JAEC) trained over 100 professionals from countries and territories in the region, including Iraq, Saudi Arabia, Tunisia, Yemen and the State of Palestine in areas such as radiation protection, emergency preparedness and radioactive waste management. Highlights included the provision of advanced nuclear medicine training at the King Hussein Cancer Center for 59 professionals from the region.

The Agency formalized its cooperation with the UNOSSC through a Statement of Intent signed in 2024, which identifies joint activities in areas of mutual interest.

The IAEA, Kenya and South Africa worked together to trace sediments in the Kenyan port of Mombasa. (Photo: K. Kiprotich/University of Nairobi, Kenya)

Addressing the needs of least developed countries and small island developing States

An Agency side event on the margins of the Fourth International Conference on Small Island Developing States in May 2024, entitled 'Leveraging Environmental Data for Development through South–South Cooperation' highlighted the importance of evidence based data for decision making and development in SIDS, with a particular focus on the role of science and technology in tackling ocean and terrestrial environmental challenges. The discussions emphasized the value of sustainable capacity building and of mechanisms such as South–South and triangular cooperation.

During the imPACT Review mission to The Gambia, the mission team met with UN partners. (Photo: I. Veljkovikj/ IAEA)

Two LDCs received imPACT Reviews in 2024: The Gambia and Mozambique. The Gambia requested an imPACT Review to inform the development of the country's first national cancer control strategy and to plan for the introduction of its first radiotherapy centre under Rays of Hope. An imPACT Review was conducted in Mozambique, a participating country under Rays of Hope, to advance cancer control, inform the implementation of and strengthen the national cancer control plan (NCCP) for 2019–2029, and assess changes in national cancer control capacities since the previous imPACT Review in 2014.

Cambodia received support under Rays of Hope in 2024 to help assess and review the design plans for the construction of a cyclotron facility in Calmette Hospital in Phnom Penh. Infrastructure development is being supported with the procurement of necessary supplies, and short and long term training in radiation oncology, diagnostic imaging and nuclear medicine is ongoing. A new cancer center at Luang Me Hospital, Phnom Penh, is further strengthening the country's capacity to provide critical cancer care. Support for training and for the design of a new linear accelerator bunker was provided under Rays of Hope. Cambodia also improved the mapping of soil properties to increase arable land productivity using innovative approaches such as artificial intelligence (AI) and satellite imaging. In 2024, a cashew-growing area map was released, a major achievement that provides stakeholders with critical data on the precise locations of cashew plantations, soil quality analyses and climate data, thus supporting national efforts to enhance the quality and quantity of cashew output.

Progress was made in Lao People's Democratic Republic in 2024 in four key areas: health, food and agriculture, non-destructive testing (NDT), and radiation safety. In health, support focused on the provision of a mammography unit for Mittaphab Hospital, the first to be installed in a public hospital in the country. A medical physicist is currently undergoing Agency-supported long term training, and capacity building is being provided on dosimetry and medical physics. Climate-smart agriculture practices were developed, increasing rice, cassava

and maize productivity and introducing new rice varieties, improving soil fertility and building soil resilience to climate change. Lao People's Democratic Republic significantly strengthened Thematic Safety Area 1 with the enactment of new regulations for enhanced radiation control.

In Myanmar, infrastructure for veterinary drug residue testing was upgraded, laboratory testing materials were supplied and support was provided for capacity building, contributing to enhanced food safety. An upgrade to the national veterinary laboratory improved the diagnosis, prevention and control of transboundary animal diseases, enabling the country to better respond to outbreaks. Ongoing support for capacity building to strengthen Myanmar's ability to respond to its growing cancer burden was provided through the initiation of a long term fellowship to train a medical physicist, and infrastructure for radiopharmaceutical production was strengthened at Yangon General Hospital.

In Nepal, a high dose rate (HDR) brachytherapy unit was procured for the National Academy of Medical Sciences at Bir Hospital in Kathmandu. This advanced equipment allows for precise, targeted radiation therapy for cancers including cervical and breast, significantly improving patient outcomes and quality of life. In addition, a single photon emission computed tomography–computed tomography (SPECT–CT) system for Bir Hospital was procured, which will improve health care for patients with cardiovascular diseases and cancers by offering advanced diagnostic and treatment capabilities previously unavailable in the country. Quality management audits and national training courses were implemented to enhance nuclear medicine services overall. Agency support advanced animal health and productivity: equipment was procured to support animal nutrition and breeding. Capabilities for the diagnosis of brucellosis were enhanced with the provision of enzyme immunoassay kits, as well as training programmes, with the goal of

Medical professionals attend a national training course on stereotactic body radiation therapy, Bir Hospital, Nepal. (Photo: Bir Hospital)

reducing disease incidence in livestock. In food safety, national laboratories were upgraded, improving pesticide residue analysis capabilities and ensuring safer food production. Equipment was procured for the National Biotechnology Research Centre and the National Rice Research Programme, facilitating climate-resilient crop production and advancing food security. Training programmes were conducted to build capacity in molecular breeding and genetic analysis, contributing to sustainable agricultural practices in Nepal.

Yemen is implementing projects to enhance national food security through climate-smart crop development and increased livestock productivity, to rehabilitate national capabilities in radiotherapy and nuclear medicine, and to advance national skills in radiation detection and EPR. A scientific visit focusing on mutation induction was conducted in Cairo in August 2024. Group fellowships at Pakistan's Nuclear Medicine, Oncology and Radiotherapy Institute were awarded to radiographers, medical physicists and radiation therapy technicians. A group scientific visit to Amman in July focused on radiation detection equipment, radioactive contamination measurement and radiation monitoring.

The Agency continues to support SIDS in the Caribbean through regional and national TC projects tailored to their specific social, economic and environmental vulnerabilities. In 2024, Haiti — the only LDC in the region — received support through an online training course on sustainable energy system planning and the Agency's capacity building support. The course aimed to provide participants with the knowledge and skills required for effective energy planning at the national level. The Dominican Republic is extending its nuclear medicine and radiotherapy infrastructure to improve response time and improve access to oncological diagnosis and treatment through the establishment of a new oncological centre

In February 2024, ANSTO hosted a meeting for strategic discussions on the TC programme as part of SAPI. (Photo: ANSTO)

in the city of Barahona, in the south-west of the country. The Agency is providing equipment and related training. It is also providing support for the establishment of the Dominican Republic's first secondary standards dosimetry laboratory (SSDL), which will improve national infrastructure to assess the calibration of dosimetry equipment.

Sub-Regional Approach to the Pacific Islands

The Agency's Sub-Regional Approach to the Pacific Islands (SAPI) prioritizes five areas: nutrition, agriculture, non-communicable diseases, water resources management and marine and coastal environments, and radiation safety. The approach was initially developed to address the needs of existing Member States such as Fiji, the Marshall Islands, Palau, Papua New Guinea and Vanuatu, but some activities have been extended to non-Member States, serving as a blueprint for future cooperation.

In the field of health, two regional training courses on diagnostic imaging were conducted in Australia in 2024: one in February at the University of South Australia, attended by 13 participants from six Pacific Islands Member States, and another at Monash University, focused on quality assurance and control and radiation protection. The latter training was aligned with the concept of the 'Toolbox for Radiographers', which aims to provide the Pacific Islands with the means to respond quickly, efficiently and safely to daily radiological challenges.

A workshop on the use of isotopic techniques for nutrition assessment was conducted in April in Fiji in partnership with Fiji National University, attended by 13 participants from Fiji, Papua New Guinea, Samoa and Tonga. The workshop introduced the work of Agency in the field of nutrition and raised awareness on the use of stable isotopes for assessing body composition and of SOPs in nutrition studies. The workshop also provided an opportunity to discuss and plan for collaborative data collection in the participating countries.

Progress in mutation breeding activities was reviewed at a joint coordination meeting in Viet Nam in March 2024, attended by participants from 13 countries. A regional training course on mutation breeding and molecular techniques for crop improvement, held in Thailand at the end of April, built capacity in mutation breeding methods and other technologies to accelerate the selection process for participants attending from five Pacific SIDS. Collaboration with the Secretariat of the Pacific Community through the Centre for Pacific Crops and Trees continued with the co-organization of a regional training course on tissue culture and phytosanitary methods in Fiji. Eleven participants from six SIDS were trained in tissue culture techniques for conservation and micropropagation, with practical demonstrations. Fellowships for Papua New Guinea and Samoa on mutation induction and breeding in banana and taro were conducted at the Seibersdorf laboratories from August to November. A regional training course on mutation breeding for abiotic stress tolerance, hosted by the Malaysian Nuclear Agency for 14 participants from six Pacific SIDS in October, offered training on mutation breeding for varieties with abiotic stress tolerance. To support outreach for the project, a Technical Officer attended the Pacific Heads of Veterinary and Animal Production Services Meeting in October to present the Agency's work in animal production and health, including the national project in Papua New Guinea, as part of a panel discussion.

A six-week group fellowship on isotope hydrology was held at the Geotop Research Centre at the University of Québec in Montreal, Canada, from October to November, attended by five participants from the Pacific SIDS. The fellowship built capacity in isotope hydrology and strengthened the application of isotope hydrology techniques in groundwater assessment and management. A fellowship on radiation monitoring for the Marshall Islands was conducted at

At a group fellowship in Canada, participants focused on activities related to the integrated management of water resources. (Photo: M. Kato/IAEA)

Participants from the Pacific Islands visited ANSTO's facilities, gaining a better understanding of the multiple applications of nuclear science, February 2024. (Photo: ANSTO)

the Australian Radiation Protection and Nuclear Safety Agency from August to September, providing training on laboratory work, radiation safety and regulatory infrastructure. The training supported a scientist from the Marshall Islands Marine Resources Authority to implement the fish market monitoring programme. The fellow gave an oral/poster presentation at the 2024 Conference of the South Pacific Environmental Radioactivity Association.

At a meeting in February organized in partnership with the Australian Nuclear Science and Technology Organisation (ANSTO), participants from six Pacific Islands Member States held strategic discussions on the TC programme as part of SAPI and on common challenges related to radiation safety infrastructure. As a follow-up, learning materials were developed for a training school programme on nuclear regulations, tailored to the specific needs of participating Member States. An expert mission in September provided Fiji with assistance to prepare disused radium-226 sources for international transportation for recycling. Expert support was also provided to Papua New Guinea's regulatory body in September 2024 for the review and assessment of documentation for a cobalt-60 radiotherapy machine, including licensing, to ensure compliance with local and international regulatory standards.

Responding to emergencies

In June 2024, emergency assistance was provided to the Syrian Arab Republic to build capacity in using NDT to identify damage to civil engineering structures, buildings and cultural heritage following the 2023 earthquake. Syrian experts received training at a national NDT workshop at the Atomic Energy Commission of Syria, using equipment provided by the Agency.

In response to a request by the Prime Minister of Grenada, the Agency initiated procurement of an X-ray unit for the Princess Royal Hospital on the island of Carriacou, Grenada, to replace one that was damaged by Hurricane Beryl in July 2024 and quickly reinstate services for the communities that the hospital serves.

An expert demonstrates equipment during the Agency workshop on NDT in the Syrian Arab Republic. (Photo: I. Othman/AECS)

Following a request for support from the Government of Honduras in the aftermath of Tropical Storm Sara, which made landfall in Honduras in November 2024, the Agency initiated procurement of equipment and supplies to reinstate X-ray and laboratory services at public health centres in four regions of the country.

Following an oil spill in February, Trinidad and Tobago requested support for clean-up efforts. The Agency provided training in preparing samples for analysis of the presence of petroleum hydrocarbons in the marine environment. The Agency also provided laboratory equipment and analytical supplies for the Institute of Marine Affairs and expert advice on conducting oil fingerprinting and quantifying hydrocarbon pollution in the marine environment.

A.4.2. Building awareness of the technical cooperation programme

Technical cooperation outreach in 2024

New outreach material on the TC programme issued in 2024 included the non-serial publication *Prospects and Achievements of the IAEA Technical Cooperation Programme in the 21st Century* and a brochure entitled *Atoms4Food — Growing Food Security*.

Exhibitions and side events were organized at international conferences, including the United Nations High-level Political Forum, the Fourth International Conference on Small Island Developing States, and COP 29.

The visibility of the TC programme on LinkedIn increased, with 85 posts on the IAEATC LinkedIn channel. LinkedIn impressions rose to 275 641, an increase of 78.3% compared to 2023. These activities increased the awareness of key audiences of the work conducted under the TC programme.

At the 68th regular session of the IAEA General Conference, the Department of Technical Cooperation organized side events on human resource development in Africa and on managing legacy radioactive waste.

OUTREACH IN 2024

107 Agency web articles on technical cooperation

5975 LinkedIn followers and **85** posts

8988 @IAEATC X followers

2752 @iaeapact X followers

QR code to Prospects and Achievements of the IAEA Technical Cooperation Programme in the 21st Century

A.5. Building a more efficient, more effective technical cooperation programme

A.5.1. Revised Supplementary Agreements and Country Programme Frameworks

Country Programme Frameworks (CPFs) are strategic medium-term planning documents drawn up by a Member State in collaboration with the Agency's Secretariat. They define mutually agreed priority development needs and interests to be supported through TC activities. Twenty-six countries signed CPFs in 2024: Albania, Angola, Armenia, Azerbaijan, Bulgaria, Chad, Cuba, El Salvador, Eritrea, Eswatini, Ethiopia, Gambia, Grenada, Iraq, Morocco, Oman, Peru, Poland, Saudi Arabia, Senegal, Sierra Leone, South Africa, Uganda, Uruguay, Vanuatu, Yemen. In 2024, CPFs were extended for the first time: in Belize, Israel and North Macedonia.

A.5.2. Maximizing programme impact through strategic partnerships

The Agency continued to strengthen its cooperation with key international financing institutions and explored new cooperation where priorities align. For example, the Agency engaged with the Asian Infrastructure Investment Bank, the Asian Development Bank (ADB), the African Development Bank, the European Investment Bank, the World Bank and the OPEC Fund for International Development to align programmes to better support common Member States.

IAEA Director General Rafael Mariano Grossi and President of the OPEC Fund Abdulhamid Alkhalifa signed Practical Arrangements to strengthen collaboration on health, agriculture, energy and climate adaptation. (Photo: D. Calma/IAEA)

In 2024, Practical Arrangements were signed with the OPEC Fund for International Development to strengthen joint efforts to tackle the world's growing health, food, energy and climate development challenges with nuclear science and technology. The agreement focuses on the key IAEA initiatives to improve cancer care through Rays of Hope, use nuclear science to boost agriculture through Atoms4Food, and to cooperate in areas related to water scarcity, environmental monitoring and energy planning. Collaborative efforts between the Agency and the Fund are continuing, with intentions to broaden the spectrum of cooperation to encompass various sectors outlined in the IAEA flagship initiatives.

The Agency signed Practical Arrangements to support the Rays of Hope initiative with three leading companies in the field of dosimetry and quality assurance. (Photo: E. Swabey-Van de Borne/IAEA)

In 2024, the Agency concluded Practical Arrangements with three leading companies in the field of dosimetry and quality assurance, to support Rays of Hope: IBA Dosimetry, PTW Freiburg and Standard Imaging. Practical Arrangements were formalized under Rays of Hope with the Sovereign Military Order of Malta to support Agency awareness-raising and resource mobilization efforts for cancer care. The Agency also formalized Practical Arrangements with the Radiological Society of North America to build capacity in radiology professionals in LMICs, and with RAD-AID International to address global health disparities in access to medical imaging and radiation oncology. A Letter of Intent was signed by the Agency, the Government of Honduras and the Government of Japan with the aim of expanding access to nuclear medicine and radiotherapy facilities across regions in Honduras. In addition, the IAEA signed a contributions agreement with Elekta and a Letter of Intent with GE Healthcare for the donation of equipment to the IAEA's Seibersdorf Laboratory for training to advance Rays of Hope.

The Agency signed Practical Arrangements with the Hainan Nuclear Power Company, focused on capacity building for the deployment of SMRs. (Photo: IAEA)

The Agency signed agreements with the Ministry of Science, Technology and Innovation of Brazil and with Chile in support of NUTEC Plastics. The Agency also signed an MOU with Peru to advance collaboration under Atoms4Food, and renewed its Memorandum of Understanding with the International Renewable Energy Agency (IRENA) to build capacity in energy planning. A Grant Arrangement with the Department of Foreign Affairs and Trade of Australia was signed in support of NUTEC Plastics and support for the Pacific Islands. The Agency signed Practical Arrangements with the China National Nuclear Corporation to cooperate in nuclear sciences and applications in support of Atoms4NetZero, NUTEC Plastics and Rays of Hope. Practical Arrangements concluded with the Hainan Nuclear Power Company focus on capacity building for the deployment of SMRs.

A Contribution Agreement was signed for the receipt of extrabudgetary funds from the European Commission's Directorate-General for Health and Food Safety to support project activities in Cyprus aimed at preventing the spread of the *Aedes albopictus* and *Aedes aegypti* mosquitoes.

Further agreements concluded in 2024 include Practical Arrangements with the Chilean Nuclear Energy Commission and a Joint Declaration of Intent with Peru's Ministry of Energy and Mines, both aimed at fostering collaboration in sustainable mining and lithium applications. Further Practical Arrangements were concluded with the Italian Society for Non-Destructive Testing Monitoring Diagnostics to advance NDT applications, and with the Spanish Radiation Protection Society (SEPR) to strengthen radiological protection efforts. Practical Arrangements with the National Company for Radioactive Waste (Enresa) were renewed for a second term until 2027, ensuring the continued availability of qualified experts for IAEA activities in radioactive waste management, decommissioning of nuclear installations, spent nuclear fuel management and environmental remediation. Enresa will also facilitate capacity-building activities, including training courses,

scientific visits, and fellowships. An agreement with the Pakistan Atomic Energy Commission was extended to ensure continued collaboration on the peaceful applications of atomic energy.

A tripartite agreement between Ghana, the Agency and EDIBON was signed for the installation and commissioning of a thermal hydraulic loop to support education and training at the School of Nuclear and Allied Sciences at the University of Ghana.

An agreement between the Agency and Uzbekistan was signed in 2024 to implement the capacity building component of Uzbekistan's project entitled 'Support to the Development of Oncology Services Project in the Republic of Uzbekistan, Phase II', which is financed by the Islamic Development Bank (IsDB). Capacity building delivered through an Agency TC project will be focused on expanding and strengthening radiation medicine for cancer care.

IAEA Director General Rafael Mariano Grossi and Uzbekistan's Minister of Health Asilbek Khudayarov sign an agreement to support the development of oncology services in the country. (Photo: D. Candano /IAEA)

Actions under ongoing partnerships

Under its partnership with the IsDB, the Agency hosted a knowledge sharing event for relevant IsDB staff on the contribution of nuclear technology to food security and human health. The United States of America continues to provide support and training for IAEA capacity building in the peaceful application of nuclear science and technology at Argonne National Laboratory. The Korea Institute of Radiological and Medical Sciences (KIRAMS), and the United States' M.D. Anderson Cancer Center, St. Jude Children's Research Hospital and National Cancer Institute, provided experts for imPACT Reviews at no cost to the Agency.

Several capacity-building activities were carried out in 2024 in the Asia and the Pacific region as a result of the partnership with the World Council on Isotopes (WCI) and the Korea Atomic Energy Research Institute (KAERI). An IAEA–WCI–KAERI e-learning course on diagnostic and therapeutic radioisotopes and radiopharmaceutical applications was held in July–August, with a further course at foundation level held in September. In-person laboratory based training was conducted in July.

Practical Arrangements were signed between the Agency and Qatar's Ministry of Public Health in November 2023 to enhance collaboration in radiation medicine and food safety. Under these agreements, Qatar hosted a number of capacity building activities and training courses on both topics. These included an advanced regional training course on isotopic confirmatory techniques for residues/contaminants in food products at Qatar's National Food Safety Laboratory in Doha in October 2024, attended by 34 participants from the Asia and the Pacific region. A regional training course on image guided adaptive brachytherapy for gynaecological cancer was hosted at Hamad Medical Corporation, Doha, in November 2024 to provide advanced training to 19 professionals from eight States Parties to the Co-operative Agreement for Arab States in Asia for Research, Development and Training related to Nuclear Science and Technology (ARASIA). The Practical Arrangements also facilitated the assessment and eventual designation of the National Food Safety Laboratory as a Collaborating Centre in May 2024.

Since 2012, the Russian Federation's State Atomic Energy Corporation 'Rosatom' has contributed extrabudgetary and in-kind support for medical physics and cancer control activities to countries that require training to be provided in the

Qatar hosted the ARASIA–IAEA regional training course on brachytherapy in Doha. November 2024. (Photo: L. Eid/IAEA)

Russian language. In June 2024, a fifth agreement was concluded between the Agency, Rosatom and the Federal Medical and Biological Agency in support of the implementation of the Agency's initiatives to enhance cancer management in the period 2024–2027. Rosatom and the Agency also signed an agreement for the implementation of an interregional TC project on nuclear infrastructure development.

A.5.3. Continual improvement in project design quality and monitoring

Guidelines for the planning and design of the TC programme 2026–2027, outlining the criteria for ensuring consistently high quality projects, were disseminated to Member States. Training on results based management, together with country programme review missions and project design meetings, ensure that Member States' needs and priorities are accurately reflected in proposed projects.

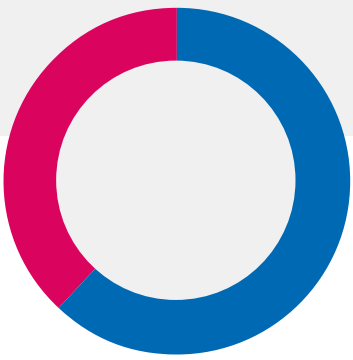
All recommendations made by the Office of Internal Oversight Services and due for completion by the end of 2024 were adequately addressed.

In April and September 2024, two new cohorts of National Liaison Assistants (NLAs) successfully completed group fellowships designed to promote stronger collaboration between Member States and the Agency and to contribute to more effective implementation of the TC programme. The April cohort consisted of eight NLAs from Argentina, Cambodia, Honduras, Libya, Sierra Leone, Tunisia, Turkmenistan and Yemen, while the September cohort consisted of eight NLAs from Chad, Egypt, the Marshall Islands, Slovakia, the Syrian Arab Republic, Togo, Türkiye and Venezuela.

A.5.4. Female participation in the technical cooperation programme

The Agency strongly encourages the expansion of female participation in the TC programme, and gender is carefully considered during the development of TC project designs. Member States are encouraged to nominate female National Liaison Officers (NLOs), meeting and training course participants, fellows and scientific visitors, and counterparts.

8064 Female participation in the TC programme



13 336 Male participation in the TC programme

IAEA Director General Rafael Mariano Grossi at the International Women's Day event "For More Women in Nuclear" held at the Agency headquarters in Vienna, Austria. (Photo: D. Calma/ IAEA)

In 2024, a total of 8064 women participated in the TC programme as fellows, scientific visitors, meeting and training course participants, project counterparts and international experts.

The Regional Workshop on Leadership in the Nuclear Field for Young Professionals for Latin America and the Caribbean was conducted once again in 2024 with the aim of training professional women from the region to develop and strengthen their leadership skills in the nuclear sector. The event was conducted under a regional project focused on strengthening gender equality in national nuclear insitutions generously supported by the USA. The second part of the workshop was held within the framework of the IAEA Ministerial Conference on Nuclear Science, Technology and Applications and the Technical Cooperation Programme, where participants shared their experiences and heard from female leaders in the field.

The pool of international experts for imPACT Review missions was expanded, fostering South–South cooperation and gender balance through the increased participation of women: 24 new experts (14 women and 10 men) from Africa, the Americas and Asia, including experts from the University of Pennsylvania; and cost-free experts from the M.D. Anderson Cancer Center (USA), KIRAMS, St. Jude Children's Research Hospital (USA) and the US National Cancer Institute. The number of female international experts participating in imPACT Reviews was increased to achieve gender balance. Notably, 39 female experts from different regions were engaged in imPACT Reviews and advisory support for NCCPs.

A young professional takes the floor at the ARCAL side event, 'Women Leaders in the Nuclear Sector', on the margins of the IAEA Ministerial Conference on Nuclear Science, Technology and Applications and the Technical Cooperation Programme, November 2024. (Photo: J. O'Brien/ IAEA)

Female participation in the technical cooperation programme

Percentage of female NLOs by region.

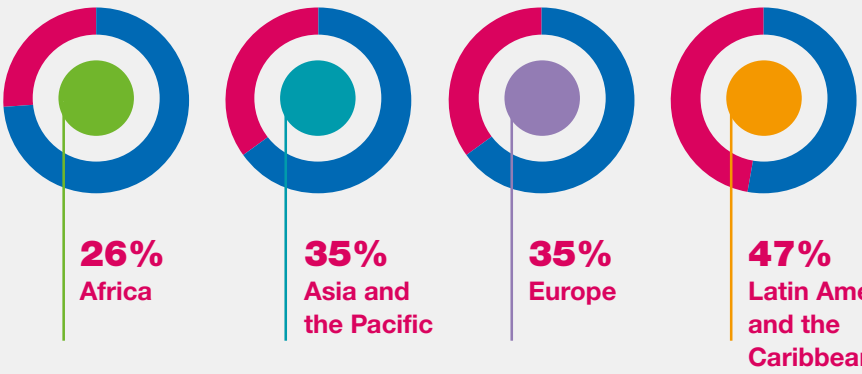
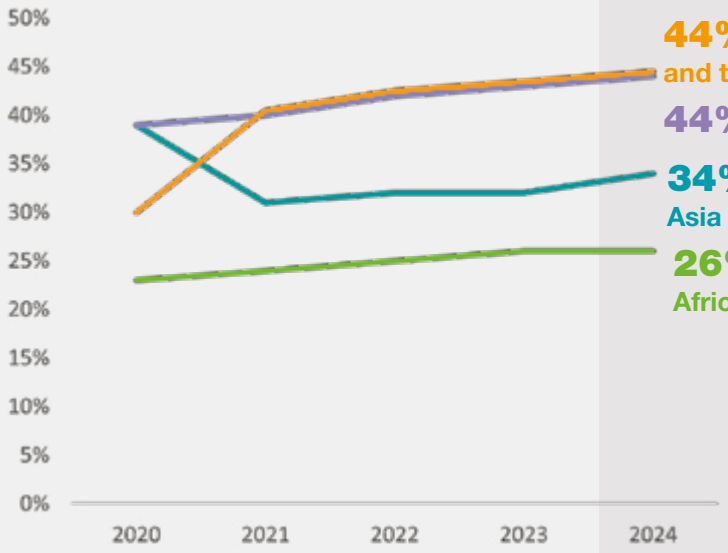


Figure 1: Female project counterparts by region, 2020–2024



in 2024

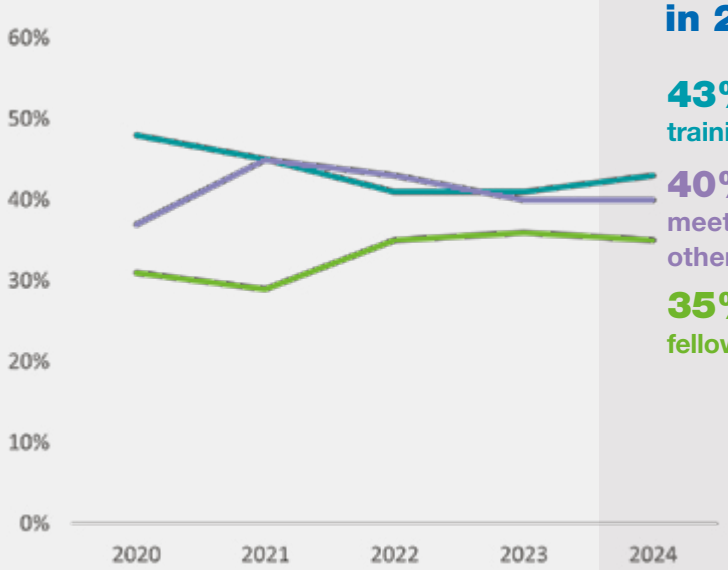
44% Latin America and the Caribbean

44% Europe

34% Asia and the Pacific

26% Africa

Figure 2: Female participation in training 2020–2024



in 2024

43% training course participants

40% meeting participants/ other project personnel

35% fellows/scientific visitors

B.

Technical Cooperation Programme Resources and Delivery

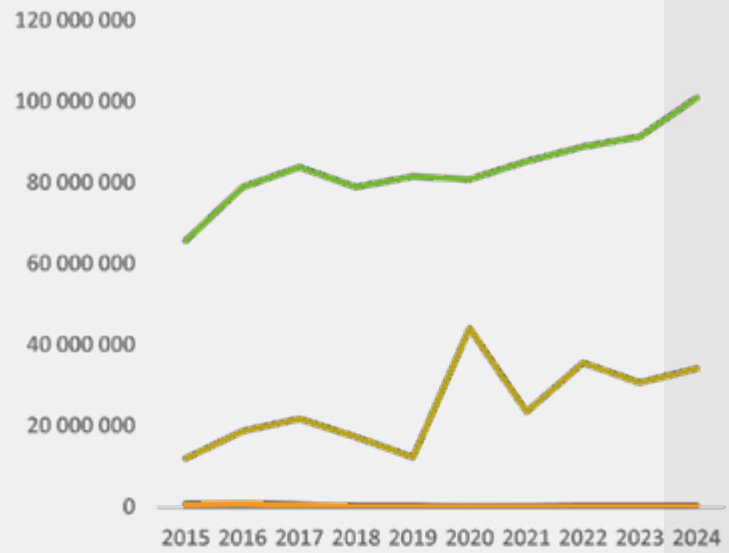
B.1. Financial overview

B.1.1. Resources for the technical cooperation programme

€96.0 million
2024 target for voluntary contributions to the TCF

€135.4 million
Total new resources in 2024 for the TC programme

Figure 3: Trends in TC programme resources, 2015–2024



in 2024

€101.0 million
Technical Cooperation Fund, NPCs, APCs, miscellaneous income

€34.1 million
Extrabudgetary resources

€0.3 million
In-kind contributions

At the end of 2024, €92.2 million of the €96.0 million target for the 2024 Technical Cooperation Fund (TCF) had been pledged and €91.2 million in payments had been received. Total TCF resources (Fig.3) including National Participation Costs (NPCs), assessed programme costs (APCs) arrears, and miscellaneous income amounted to €101.0 million (€91.2 million TCF, €3.9 million NPCs, and €5.9 million miscellaneous income). New extrabudgetary resources for 2024 came to €34.1 million and in-kind contributions amounted to €0.3 million.

At 31 December 2024, the rate of attainment on pledges was 96.1% and the rate of attainment on payments was 95.0% (Fig.4). 127 Member States, including 16 LDCs, paid their TCF target fully or partially. Total payments received in 2024 include €0.2 million of deferred or additional payments by 11 Member States. Excluding these payments, the 2024 rate of attainment on payments would have been 94.8%.

Payment of National Participation Costs (NPCs) and assessed programme cost (APC) arrears

RECEIVED IN 2024	**€3.9 million** National Participation Costs	**€0.01 million** assessed programme cost
OUTSTANDING PAYMENTS AT END 2024	**€0.7 million** National Participation Costs	**€0.8 million** assessed programme cost

Figure 4: Trends in the rate of attainment, 2015–2024

€ 91.2 million
received in TCF payments in 2024

in 2024

96.1%
Percent of target pledged

95.0%
Rate of Attainment on payments

B.1.2. Extrabudgetary and in-kind contributions

Extrabudgetary contributions from all sources in 2024 (donor countries, international and other organizations, government cost sharing) accounted for €34.1 million. The breakdown of the €34.1 million is as follows: €1.9 million funding for activities where the donor is the recipient (commonly referred to as government cost sharing); €32.2 million from donors, of which €14.7 million was received through the Peaceful Uses Initiative mechanism; and €2.2 million from international and bilateral organizations. Twenty African Member States provided extrabudgetary contributions amounting to €0.7 million for regional TC projects through the AFRA Fund. More detail is contained in Table 1 (extrabudgetary contributions by donor), Table 2 (government cost sharing) and Table 3 (contributions to PACT). In-kind contributions accounted for €0.3 million.

Table 1[11]: Extrabudgetary contributions (where the donor is not the recipient) allotted to TC projects in 2024, by donor

Country name	euro
Australia	1 361 227
Belgium	250 000
Bulgaria	95 000
Chile	9 330
Czechia	98 928
France	250 000
Germany	100 000
Japan	9 345 392
Korea, Republic of	127 000
Latvia	20 000
Malaysia	10 000
Philippines	9 240
Russian Federation	683 000
Saudi Arabia	2 252 500
United Arab Emirates	9 130
United States of America	15 357 976
AFRA Fund	659 643
Korea Nuclear Association for International Cooperation (KNA)	96 060
Onchikai General Incorporated Foundation, Japan	100 000
The Cooperation Council for the Arab States of the Gulf (COOP)	68 320
European Commission	1 249 624
Total	**32 152 370**

Table 2[12]: Funding where the donor is the recipient (government cost sharing) allotted to TC projects in 2024

Country name	in euro
Albania	300 000
Ghana	100 428
Jordan	100 000
Mali	315 000
Malta	30 000
Pakistan	187 434
Serbia	323 000
Türkiye	109 844
United Republic of Tanzania	453 367
Total	**1 919 073**

Table 3[13]: Extrabudgetary contributions resulting from PACT resource mobilization efforts, 2024

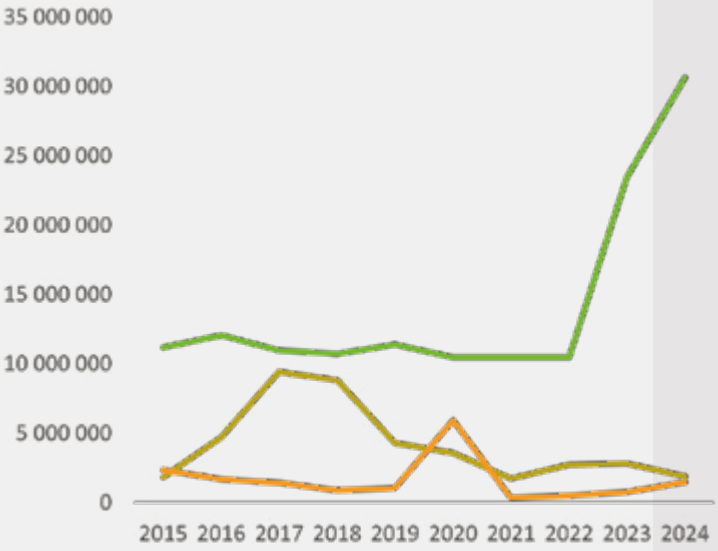
Country name	in euro
Albania	300 000
Australia	1 206 555
Belgium	250 000
France	200 000
Germany	100 000
Korea, Republic of	18 040
Latvia	20 000
Philippines	9 240
Russian Federation	123 000
Saudi Arabia	2 252 500
United States of America	7 080 815
Onchikai General Incorporated Foundation, Japan	100 000
Total	**11 660 149**

[11] Due to rounding, amounts in tables may not add up exactly to the totals shown.

[12] Due to rounding, amounts in tables may not add up exactly to the totals shown.

[13] Funds presented under Table 3 are already reported in Table 1 above under the respective donors. Some contributions are made directly to PACT activities, while others are made in support of TC programme activities.

Figure 5: Trends in extrabudgetary contributions by donor type, excluding contributions to PACT, 2015–2024



€34.1 million
Extrabudgetary contributions from all sources in 2024[14]

in 2024

€30.0 million
Donor countries

€1.9 million
Government cost sharing

€2.2 million
International and bilateral organizations

As part of the TC programme, the Agency provides support to Member States upon request for the development of Member State-owned strategic funding documents (also known as bankable documents) that are intended to enable the mobilization of resources from international financial institutions (IFIs), development agencies and other partners, including at the national level. The Agency ensures that bankable documents are technically sound, financially viable and facilitate the flow of financial resources to Member States. Funds leveraged by Member States from IFIs and other sources with Agency support are referred to as 'parallel financing' or 'indirect resource mobilization'[15].

In 2024, the Agency provided expert advisory support to Burundi, the Central African Republic, the Comoros, the Congo, Democratic Republic of the Congo, Eswatini, The Gambia, Liberia, Rwanda, Senegal and Uganda for the preparation of bankable documents for the establishment or expansion of radiotherapy services.

The top host countries covering local costs for TC activities in 2024 are Argentina, Brazil, Chile, China, Colombia, Egypt, Indonesia, Japan, Kenya, Malaysia, Mexico, Thailand, Peru, the Russian Federation, South Africa, Türkiye and the United States of America. Such costs have not traditionally been tracked by the Agency but are essential to the successful implementation of the TC programme, and extensive behind-the-scenes efforts are required to mobilize them.

[14] Shown amounts may not add up exactly to €34.1 million due to rounding.

[15] The Agency has been informed that €80 million in parallel funding has been mobilized for cancer care in Uzbekistan.

B.2. Delivering the technical cooperation programme

B.2.1. Financial implementation

TC programme delivery is expressed in both financial and non-financial terms. Financial delivery is articulated in terms of actuals[16] and encumbrances. Non-financial delivery (i.e. outputs) can be expressed numerically in terms of, for example, experts deployed, training activities, and purchase orders obligated. Financial implementation for the TCF, measured against the budget for 2024 at 31 December 2024, reached 86.0% (Table 4).

Table 4: TCF financial indicators for 2022, 2023 and 2024

Indicator	2022	2023	2024
Budget allotment at year end[17]	123 565 216	132 441 535	134 238 016
Encumbrances + actuals	104 347 914	113 296 804	115 474 429
Implementation rate	84.4%	85.5%	86.0%

B.2.2. Unallocated balance

At the end of 2024, the unallocated balance[18] amounted to €0.9 million. €15.5 million were received as advance payments for the 2025 TCF in 2024. Some €0.1 million of cash is held in non-convertible currencies that cannot be used in the implementation of the TC programme.

Table 5: Comparison of the unallocated balance of the TCF

Indicator	2023	2024
Unallocated balance	4 261 209	934 240
Advance payment in 2023 and 2024 for the TCF for the following year	17 818 700	15 549 978
Non-convertible currencies that cannot be utilized	21 194	66 448
Currencies that are difficult to convert and can only be used slowly	75 541	200 014
Adjusted unallocated balance	22 176 645	16 750 680

[16] Actuals are the equivalent of disbursements in line with the terminology in use since the implementation of the Agency-wide Information System for Programme Support (AIPS/Oracle).

[17] 2024 budget allotment at year end includes carry-over from previous years of €7.9 million, already allotted to projects.

[18] Total funds not allocated in 2023 were allocated to TC projects in 2024.

B.2.3. Human resources and procurement

Human resource and procurement indicators show the non-financial delivery of the TC programme. With regard to procurement, a total of 1444 purchase orders were issued in 2024.

Delivery of outputs: non-financial indicators for 2024

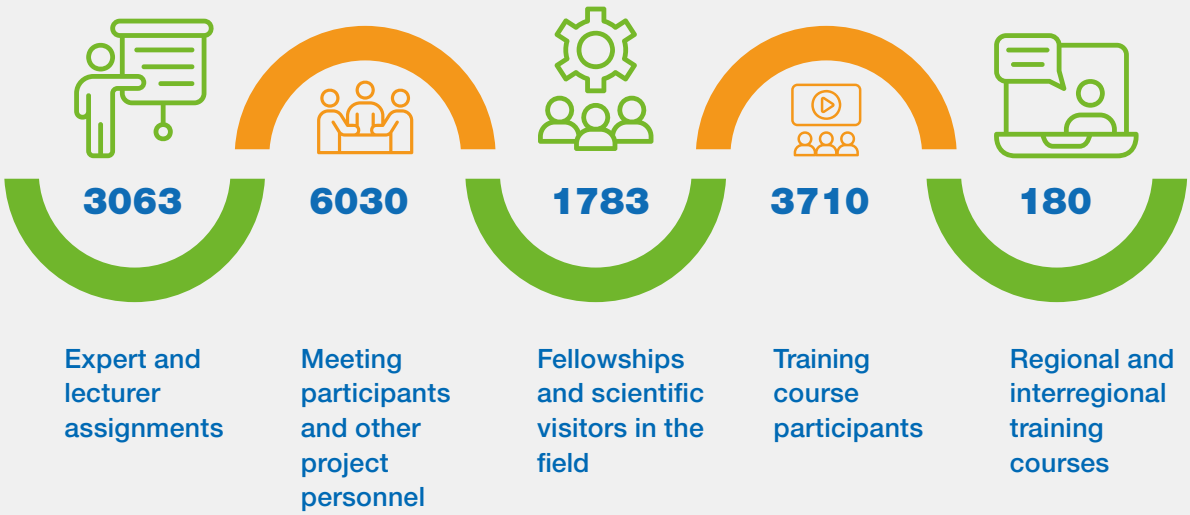


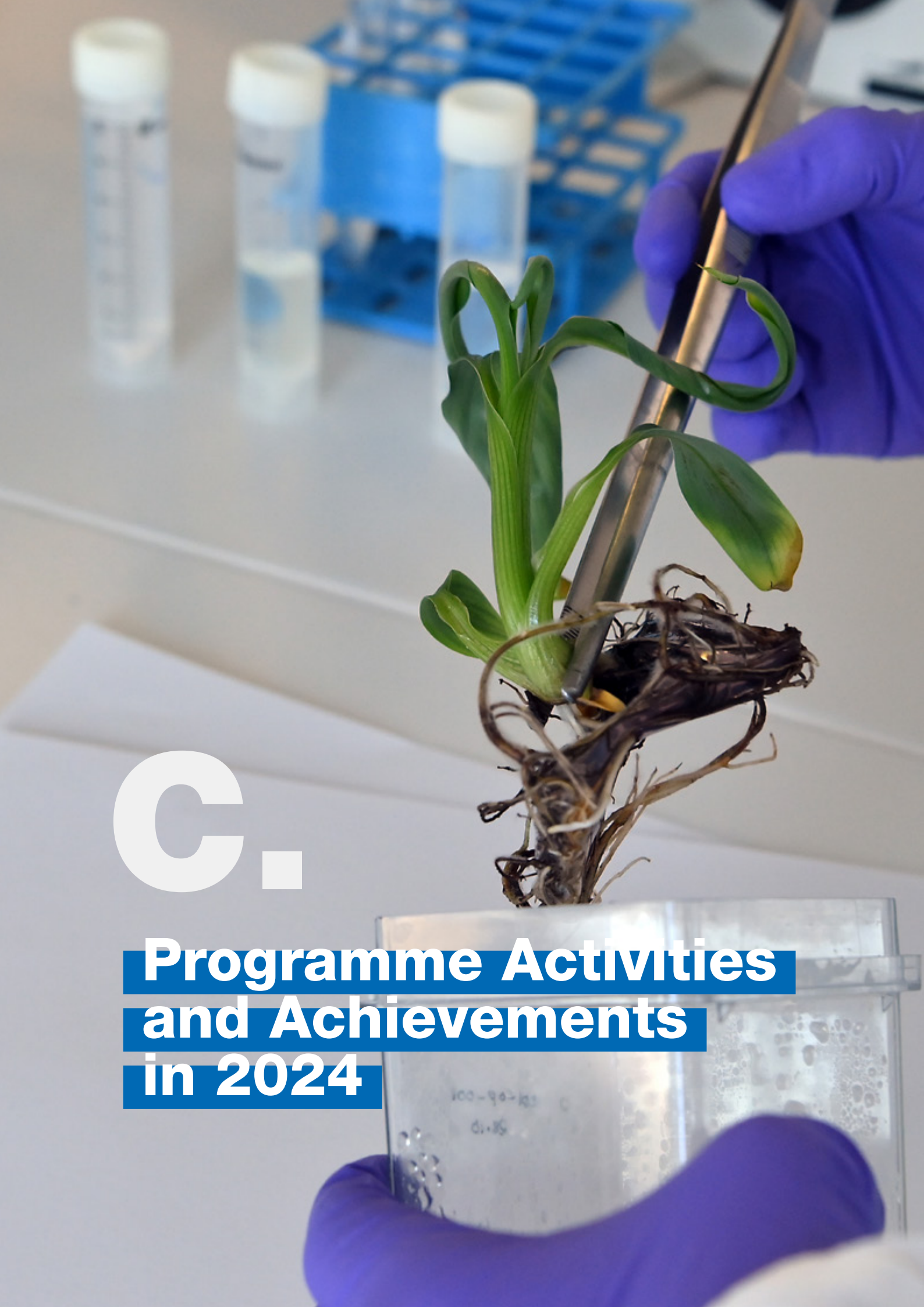
Table 6: TC procurement in 2024

Division	Requisitions	Purchase orders issued	Value of purchase orders issued
TCAF	388	485	17 894 340
TCAP	300	330	15 870 536
TCEU	249	239	11 559 399
TCLAC	315	387	20 999 099
PACT	3	3	29 545
Total	**1 255**	**1 444**	**66 352 919**

At the end of 2024, 810 projects were active, and an additional 1 142 projects were in the process of being closed. During 2024, 193 projects were closed.

B.2.4. Programme Reserve projects

There were no Programme Reserve projects in 2024.



C.

Programme Activities and Achievements in 2024

C.1.

2024 Africa

- In 2024, 47 Member States in Africa, including 28 LDCs, participated in the TC programme. By the end of the year, there were 165 national and 23 regional projects active. The programme achieved an implementation rate of 90.7% in the region.
- Eleven Member States signed CPFs in 2024: Angola, Chad, Eritrea, Eswatini, Ethiopia, Gambia, Morocco, Senegal, Sierra Leone, South Africa and Uganda. Somalia became the most recent African Member State.

AFRICA

47
Countries receiving technical support

90.7%
Technical Cooperation Fund implementation rate

€33 667 184
Budget allotment at year end

€30 551 983
Encumbrances and actuals

Cooperation and training

699 Fellows and scientific visits

487 Expert and lecturer assignments in the region

29 Regional training courses

1036 Participants in training courses

59 Regional meetings and workshops

1380 Meeting participants and other project personnel

This graph shows the distribution of assistance through TCF and extrabudgetary disbursements in the Africa region according to technical field in 2024

Food and Agriculture 26.4%

Health and Nutrition 46.6%

Industrial Applications/Radiation Technology 4.4%

Nuclear Knowledge Development and Management 5.8%

Safety and Security 8.2%

Water and the Environment 4.9%

Energy 3.7%

Projects in 2024

40 closed
437 in closure
7 cancelled

11 Member States signed CPFs in 2024:

Angola
Chad
Eritrea
Eswatini
Ethiopia
Gambia
Morocco
Senegal
Sierra Leone
South Africa
Uganda

C.1.1. Overview of regional thematic priorities

In **health**, the TC programme in Africa supports Member State efforts to establish and enhance access to quality cancer diagnosis and treatment through radiotherapy, nuclear medicine, medical physics and diagnostic radiology. South Africa's Nuclear Medicine Research Infrastructure became one of three African Rays of Hope Anchor Centres in June. The programme supported human resource development, in particular through the provision of short and long term fellowship trainings in radiation oncology, medical physics, nuclear medicine and radiopharmacy, resulting in qualifications for key personnel assigned to work in these centres.

In 2024, **food and agriculture** continued to be the second highest priority area for the TC programme in Africa. Under Atoms4Food, a regional project to promote the use of nuclear techniques to enhance food security and climate change adaptation was launched in May 2024. Similarly, a regional project on food safety was launched in May 2024. Under ZODIAC, assistance was also provided to African Member States through the provision of training and equipment to enhance pandemic preparedness.

With regard to **water and the environment**, the TC programme in Africa in 2024 built Member State capacities in the use of isotopic techniques for assessing water resources and managing surface water and groundwater at local, national and transboundary levels. A special focus was placed on human resource development, in particular long term training to support doctorates in isotope hydrology for young Africans.

IAEA Director General Rafael Mariano Grossi visited Nigeria in May 2024, where he met with high level government officials and visited Abuja's national hospital. (Photo: IAEA)

In the area of **industrial applications**, the TC programme in Africa focused on building Member State capacities for radiation based techniques that support cleaner and safer industrial processes, including for the management of industrial and agricultural waste and the decontamination of biological agents. The programme also helped countries embarking on the development of a research reactor programme in line with the Milestones approach.

In **energy**, the TC programme in Africa helped Member States to chart their national energy strategies, taking into consideration all possible energy supply and demand options. The Agency also supported Member States embarking on nuclear power programmes to plan and build national nuclear infrastructure. Several subregional meetings were held with African Member States and regional partners, including the African Union, the Economic Community of West African States, the Economic Commission for Africa, the Southern African Development Community and the Economic Community of Central African States.

The TC programme helped to bolster Member State capacities to strengthen national infrastructures across all thematic **safety** areas.

Regarding **human resource development and knowledge management**, assistance was provided to build capacities through short and long term training, including by fostering the next generation of nuclear scientists at master's and doctoral levels. Assistance was provided to Ethiopia to develop a master's degree programme in nuclear engineering at the Addis Ababa University of Science and Technology.

At a side event on the margins of the 68th regular session of the IAEA General Conference entitled "High Level Dialogue: Addressing Human Resource Development Needs in Nuclear Science and Technology", participants highlighted the importance of enhancing education and training in nuclear science and technology at the graduate and postgraduate level in African universities. (Photo: R. Fraga Pazos/IAEA)

C.1.2. Project highlights according to thematic area

HEALTH AND NUTRITION

Radiation oncology in cancer management

REGIONAL

RAF6060: Enhancing Member States' Capacities for Improved Cancer Diagnosis and Treatment (AFRA)

Under the AFRA umbrella, four radiopharmacists from Ethiopia, Kenya, Nigeria and South Africa completed master's degree programmes in radiopharmacy, while eight radiopharmacists from Benin, Mauritania, Niger, Senegal, Tunisia, and Mauritius also completed their degrees. An in-kind contribution from China supported three months of clinical and classroom training for 16 radiotherapy medical physicists from 15 African countries. The project also enhanced the capacities of almost 150 medical professionals from Africa in cancer diagnosis, and in the diagnosis and treatment of prostate cancer. Ten radiopharmacists participated in the School of Radiopharmacy, organized by the Agency in collaboration with France's National Institute for Nuclear Science and Technology.

Participants in the AFRA Regional Training Course on SPECT/CT in Cancer Management. (Photo: Egypt Atomic Energy Authority)

BENIN

BEN6010: Supporting the Establishment of a Radiotherapy and Nuclear Medicine Department at the University Hospital Centre of Abomey–Calavi

In Benin, the focus of activities was on developing human resource capacity and strengthening quality assurance for nuclear medicine and radiotherapy at the University Hospital Centre of Abomey–Calavi, near the capital. Over 10 medical staff have received training. The procurement of a cyclotron is ongoing alongside technical and equipment maintenance training for medical and engineering staff to enhance the hospital's operational capabilities. The project has benefited from contributions from the United States of America totalling Euro 1.8 million since 2018, including a contribution of Euro 0.2 million in 2024.

LESOTHO

LES6005: Building Capacity for the Establishment of a National Radiotherapy Facility

The Agency is supporting the Government of Lesotho as construction of the country's first radiotherapy facility in Maseru commences, by training a radiation oncologist in Zambia, two radiation oncologists and two medical physicists in Ghana.

LIBERIA

LIR6004: Preparing to Establish a Radiotherapy Facility

A bankable document to establish the first radiotherapy facility in Liberia is being finalized. Support is being provided to build a critical mass of radiation medicine human resource capacity for the facility, through participation in a master's degree programme in medical physics at the University of Ghana, and a long term fellowship in radiation oncology, hosted at Muhimbili University of Health and Allied Sciences, Tanzania.

MALAWI

MLW6009: Enhancing Access to Cancer Treatment

MLW6010: Enhancing Access to Radiotherapy Services

Malawi is one of the first wave of countries to benefit from Rays of Hope, with extrabudgetary support from the United States of America, including Euro 0.3 million in 2024. The construction of four radiotherapy and two brachytherapy bunkers has been finalized, and equipment including two linear accelerator, a CT scanner, ultrasound equipment, a mammography system and a brachytherapy machine has been procured and delivered. Training and installation are ongoing and services are due to start this year.

SIERRA LEONE

SIL6009: Establishing a Radiotherapy Centre – Phase II

In response to a growing number of cancer cases, the Agency provided assistance to Sierra Leone in 2024 for preparatory work to establish the country's first radiotherapy centre. This included a review of architectural drawings and advice on measures for safety compliance and radiation shielding calculations.

Nuclear medicine and diagnostic imaging

MAURITIUS

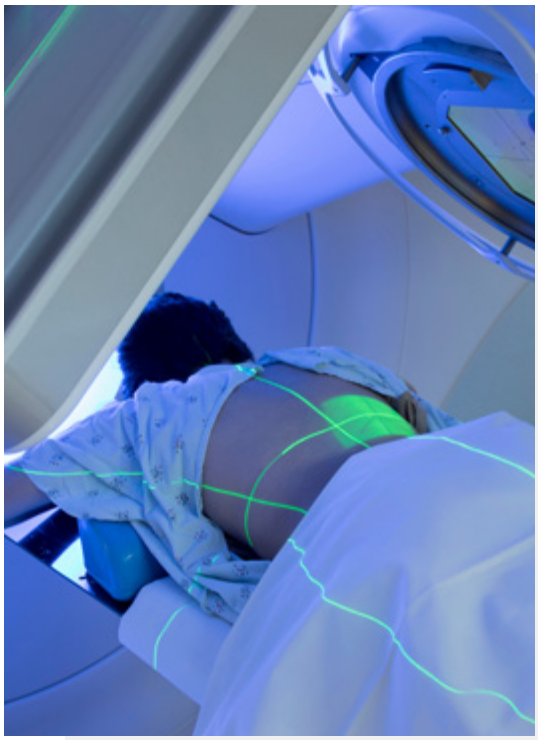
MAR6016: Assessing Body Composition for the Early Diagnosis of Osteoporosis and Sarcopenia in the Elderly

A dual energy X-ray absorptiometry system for measuring bone density and body composition at the spine, hip and whole body was delivered to Mauritius, along with training for professionals to enable them to analyse and interpret results related to sarcopenia, muscle mass, muscle strength and physical performance.

NIGER

NER6015: Building Capacity for Nuclear Medicine in the Diagnosis, Treatment and Monitoring of Cancer, including Positron Emission Tomography/Computed Tomography, and Improving Human Health — Phase I

Following the establishment of Niger's first radiotherapy centre in 2021, a linear accelerator and brachytherapy equipment were delivered to the country under Rays of Hope to support the expansion of cancer services.



SENEGAL

SEN6025: Strengthening the Quality of Radiotherapy and Nuclear Medicine Services for Cancer

SEN6026: Strengthening Quality Management of Radiation Medicine for Cancer Control

A SPECT–CT system is being procured for Senegal, and four radiopharmacists and two radiotherapists are undergoing training in France.

UNITED REPUBLIC OF TANZANIA

URT6033: Expanding and Improving Nuclear Medicine and Radiotherapy Services

In the United Republic of Tanzania, the TC programme has complemented the Government's efforts to enhance diagnostic radiology capacity. A training at the Bugando Medical Centre in June 2024 addressed the urgent need to upgrade the skills of more than 20 radiologists, radiographers and biomedical engineers from 13 zonal hospitals in the appropriate use of newly acquired CT scanners. The training provided hands-on practical sessions, focusing on optimizing scan parameters and ensuring patient safety.

FOOD AND AGRICULTURE

Crop production

BURKINA FASO

BKF5024: Improving Food Crops through Mutation Breeding and Best Soil and Nutrient Management to Ensure Food Security

In Burkina Faso, the Ministry of Agriculture began to disseminate new, improved rice varieties developed using nuclear techniques under a national TC project. Through this effort, small-scale farmers will be able to boost agricultural productivity and resilience, and increase food security.

Insect pest control

REGIONAL

RAF5087: Enhancing Regional Capacity for the Implementation of the Sterile Insect Technique as a Component for Area-Wide Tsetse and Trypanosomosis Management (AFRA)

Under a regional project to support control of the tsetse fly, three regional training courses were held in 2024 at the Agency's Insect Pest Control Laboratory in Seibersdorf, Austria, and in Cameroon and South Africa. These covered aspects such as dosimetry, irradiation and insect handling; molecular techniques — including deoxyribonucleic acid (DNA) extraction, polymerase chain reaction (PCR) and sample preparation for insect population genetic analysis — and tsetse identification and dissection techniques. Entomological equipment was delivered to Cameroon, Djibouti, Ethiopia, Kenya, Nigeria, South Africa, the United Republic of Tanzania and Zimbabwe.

Food safety

SENEGAL

SEN5043: Developing Capacity to Conduct an Assessment of Exposure to Chemical Hazards in Food, and to Evaluate the Nutritional Composition of Local Dishes

The Agency has procured an automatic alpha/beta counting system and a high resolution gas chromatography mass spectrometer to enhance Senegal's capacity to assess chemical hazards in food and to evaluate the nutritional composition of local dishes.

TOGO

TOG5007: Developing Laboratory Capacities for the Quality Control of Food and Pharmaceutical Products

In Togo, food safety analytical capacities were strengthened at the University of Kara and at the laboratories of the National Institute of Hygiene through government cost-shared acquisition of mass spectrometry equipment. Five national technicians underwent training in techniques for extracting pesticide residues, veterinary drugs and mycotoxins from food for analysis.

Ministers, representatives, senior policymakers and officials from African Member States came together in 2024 under a regional project to gain a better understanding of the contribution of electron beam and X-ray technologies to improving food security, ensuring food safety, broadening export opportunities and mitigating losses of perishable commodities. (Photo: J. O'Brien/IAEA)

Livestock production

REGIONAL

RAF5089: Strengthening the Capacities of National Veterinary Laboratories for the Early Warning, Control and Prevention of Outbreaks of Animal and Zoonotic Diseases (AFRA)

A regional project supported seven fellows from five Member States (Central African Republic, Eritrea, Eswatini, Libya and Sierra Leone) to undergo postgraduate degrees in veterinary sciences. Under the project, serology and molecular diagnostic equipment was procured for ZNLs in Benin, Central African Republic, Eritrea, Eswatini, Ethiopia, Guinea, Lesotho, Libya, Mauritania, Mauritius and Seychelles.

WATER AND THE ENVIRONMENT

Water resources management

RWANDA

RWA7001: Developing Capacities to Assess, Characterize and Monitor Aquifers in the Northwest of the Country Using Isotope Hydrology Techniques

The Rwanda Water Resources Board's capacity to monitor freshwater resources has been strengthened through the provision of a state-of-the-art laser analyser for conducting isotopic measurements at the national laboratory.

Marine, terrestrial and coastal environments

CONGO

PRC7002: Strengthening National Capacity to Monitor Marine Pollution by Heavy Metals and Hydrocarbons — Phase I

PRC7001: Establishing National Capacities for Monitoring Marine Pollution and Assessing Related Risks on the Environment and Society

The TC programme supported the Nuclear Physics and Applications Laboratory of the National Institute for Research in Exact and Natural Sciences through the provision of equipment and expertise for two sampling campaigns to assess radiological quality and heavy metal contamination in coastal sediments in the Congo. These served to identify possible environmental and human health risks, and results were published in peer reviewed international scientific journals. A third sampling campaign was conducted in several polymetallic mining sites.

INDUSTRIAL APPLICATIONS/ RADIATION TECHNOLOGY

Research reactors

REGIONAL

RAF1009: Supporting Embarking Countries in Establishing National Infrastructure for Research Reactors (AFRA)

An Agency Site and External Events Design (SEED) review mission in January 2024 advised Kenya's Nuclear Power and Energy Agency with regard to site selection and evaluation for the country's first research reactor, including consideration of volcanic and hydrological hazards, in line with the Agency's safety standards. Rwanda, which is also embarking on a research reactor programme, is actively participating in this project. An expert mission in March 2024 provided technical assistance to the Rwanda Atomic Energy Board on safety analysis, operational organization, project management, regulatory supervision and design safety features.

REGIONAL

RAF1011: Strengthening Research Reactor Safety, Operation, and Utilization (AFRA)

African Member States with operational research reactors continued to receive support in 2024. A regional training course held in Rabat in June provided hands-on training and theoretical instruction on radioisotope production for young professionals. A regional training course on neutron imaging for research and diverse practical applications was conducted in Algiers in July.

A regional workshop held in Kinshasa, Democratic Republic of the Congo, in September 2024 provided practical information based on IAEA safety standards on operational radiation protection and radioactive waste management programmes for research reactors.

A cobalt-60 source for the calibration system in the Kenya Bureau of Standards was commissioned, enhancing national capacity for the quality assurance of radiotherapy equipment. (Photo: KBS)

EGYPT

EGY1029: Updating a Strategic Plan for the First Egyptian Research Reactor (ETRR-1)

An expert mission to assess the status of key structures, systems and components of Egypt's ETRR-1 research reactor provided the Egyptian Atomic Energy Authority with engineering inputs to support informed decision making on the future of the facility.

Radioisotopes and radiation technology for industrial, health care and environmental applications

ANGOLA

ANG1005: Using Radiation Technologies as Diagnostic Tools for Industrial Plant Process Performance Optimization and Troubleshooting

Angola's only radiotracer laboratory, hosted by the National Centre for Scientific Research, has been equipped with a gamma column scanning set, an industrial CT system and a multichannel data acquisition system for radiotracer applications. An expert mission also supported gamma scanning of several crude oil distillation columns by Angolan counterparts at the Luanda Refinery. The project played a key role in establishing the necessary infrastructure for the industrial application of radiation technologies, while strengthening human capabilities to ensure long term sustainability.

ENERGY PLANNING AND NUCLEAR POWER

Energy planning

REGIONAL

RAF2013: Developing, Expanding, and Reinforcing Energy Planning Capabilities — Phase II (AFRA)

The Agency contributed as a modelling partner to the development to the African Continental Master Plan adopted at the 37th ordinary session of African Union Summit as an Agenda 2063 flagship programme.

Nuclear fuel cycle

REGIONAL

RAF2014: Enhancing Regional Capabilities for Sustainable Uranium Exploration and Mining (AFRA)

In June 2024, a regional training course held in Arusha, United Republic of Tanzania, introduced 26 participants to common standards and best practices related to the sustainable uranium production cycle and the uranium fuel cycle, encompassing topics ranging from exploration, mining and processing to final site remediation. In October 2024, 24 participants attended a regional training course on field uranium exploration techniques in Swakopmund, Namibia, where they practised field techniques typically used in the exploration of uranium deposits. In December 2024, participants from 18 African countries attended a meeting in Vienna, where they familiarized themselves with the Milestones approach for the development of national infrastructure for the uranium production cycle.

NUCLEAR KNOWLEDGE DEVELOPMENT AND MANAGEMENT

Capacity building

REGIONAL

RAF0062: Supporting Human Resource Development in Nuclear Science and Technology — Phase II (AFRA)

Nineteen candidates entered the second year of master's degree programmes in nuclear science and technology at Alexandria University, Egypt, and the University of Ghana, both of which are AFRA regional designated centres for higher and professional education. In addition, nine candidates completed their doctoral programmes while 12 others continued their doctoral fellowship sandwich programme and started research work in foreign universities. The first regional meeting of Faculties' Deans on Education Training Needs in African Accredited Universities was held in Nairobi in May, where participants agreed on actions to establish collaboration between accredited universities in Africa and international and regional bodies. The aim is to train a critical mass of graduate and postgraduate students in order to maximize the contribution of nuclear science and technology to the socioeconomic development of African Member States.

In November 2024, secondary school teachers from 13 African countries participated in a train the trainers course at Argonne National Laboratory.

RAYS OF HOPE

Health and Nutrition

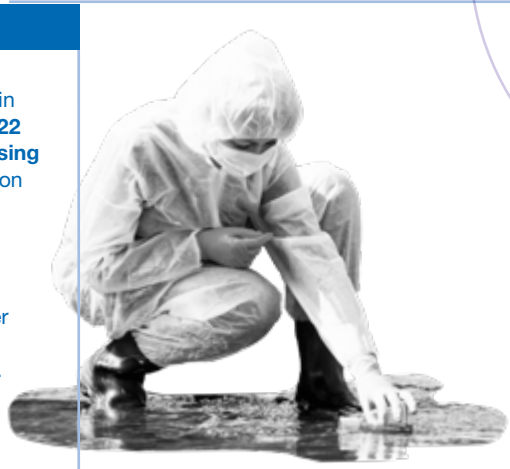
- The first wave of countries to benefit under Rays of Hope in Africa have received support in the form of training, equipment procurement and expert missions to enhance access to cancer diagnosis and treatment.
- Achievements in 2024 include the procurement of a linear accelerator and CT simulator for **Niger**, two linear accelerators for **Kenya** and **Malawi** that are currently being installed with training provided, and SPECT–CT systems for **Benin** and **Senegal**.
- Nuclear medicine professionals received training, and long term academic training is ongoing in the fields of radiation oncology, medical physics, oncology nursing, nuclear medical physics and radiation therapy technology.
- Support for the development of strategic funding documents was provided to the **Comoros**, **the Congo**, **Djibouti** and **The Gambia** in 2024.

The impact of Technical Cooperation in Africa

NUTEC PLASTICS

Water and the Environment

- A two-week regional training course held in Tunisia in July 2024 **enhanced the knowledge and skills of 22 participants from 18 African Member States in using nuclear techniques** to sample, analyse and report on microplastics measuring 0.3-5 millimetres in size in beach sand and surface water.
- **The training focused on sample collection and preparation**, microscopic identification and polymer characterization using attenuated total reflectance–Fourier transform infrared (ATR–FTIR) spectroscopy. Marine laboratories in the participating countries received sampling and microplastic analysis kits, enhancing their analytical capacities.



SENEGAL
Following the successful eradication of the tsetse fly in the Niayes region of Senegal, support continues through training and provision of equipment to control the disease vector in the Sine-Saloum region using the SIT.

AFRA

In February 2024, the Annual Meeting of National Liaison Officers and AFRA National Coordinators brought together **51 participants from 37 African Member States** in Rabat to discuss key regional issues, including lessons learned in delivering the programme during the pandemic, promoting women in nuclear science and technology, and engaging in partnerships to support programme delivery and advance the 2030 Agenda. (Photo: M. Edwerd/IAEA)

ZODIAC

Food and Agriculture

Under project RAF5089, Strengthening the Capacities of National Veterinary Laboratories for the Early Warning, Control and Prevention of Outbreaks of Animal and Zoonotic Diseases (AFRA), **serology and molecular diagnostic equipment was procured for ZNLs** in Benin, Central African Republic, Eritrea, Eswatini, Ethiopia, Guinea, Lesotho, Libya, Mauritania, Mauritius and Seychelles.

EGYPT
A linear accelerator and accessories were delivered to replace an obsolete teletherapy unit at the Egyptian Atomic Energy Authority.

RAYS OF HOPE

UGANDA
In May, the Agency conducted an Integrated Uranium Production Cycle Review mission to Uganda, supporting efforts by the Ministry of Energy and Mineral Development to develop national infrastructure for uranium production.

C.2.

2024

Asia and the Pacific

- In 2024, 39 Member States and territories in the Asia and the Pacific region, including seven LDCs, participated in the TC programme. By the end of the year, there were 223 national and 52 regional projects active. The programme achieved an implementation rate of 89.4% in the region.
- Five countries in the region signed CPFs in 2024: Iraq, Oman, Saudi Arabia, Vanuatu and Yemen. Israel's CPF was extended.

ASIA and the PACIFIC

39 Countries and territories receiving technical support

89.4% Technical Cooperation Fund implementation rate

€32 497 987
Budget allotment at year end

€29 048 996
Encumbrances and actuals

Cooperation and training

528 Fellows and scientific visits

834 Expert and lecturer assignments in the region

48 Regional training courses

1186 Participants in training courses

88 Regional meetings and workshops

1780 Meeting participants and other project personnel

This graph shows the distribution of assistance through TCF and extrabudgetary disbursements in the Asia and the Pacific region according to technical field in 2024

Food and Agriculture 24.2%

Health and Nutrition 27.4%

Industrial Applications/Radiation Technology 11.1%

Nuclear Knowledge Development and Management 8.5%

Safety and Security 18.4%

Water and the Environment 6.2%

Energy 4.2%

Projects in 2024

72 closed
320 in closure
3 cancelled

5 Member States signed CPFs in 2024:

Iraq
Oman
Saudi Arabia
Vanuatu
Yemen

The CPF for Israel was extended

C.2.1. Overview of regional thematic priorities

Regional cooperation in **health** was a key priority in the Asia and the Pacific region in 2024. Efforts focused on enhancing capacities in nuclear and radiation medicine to support health systems facing a growing incidence of non-communicable diseases, in particular cancer. Special emphasis was placed on advanced technologies such as theranostics, which are garnering greater interest in the region.

In the field of **food and agriculture**, advances were made across the Asia and the Pacific region in 2024 in enhancing food safety monitoring and surveillance for chemical contaminants and residues in plant and animal products. Key regional training initiatives underscored multi-stakeholder cooperation and a growing capacity to apply nuclear and isotopic techniques for food safety.

Regional collaboration through cooperative agreements and strategies contributed to enhance regional capacity in **water resources management and environmental protection**. Activities centred on supporting the application of isotopic techniques to determine the extent of microplastic pollution and the presence of contaminants, and to date and assess the quality of freshwater resources.

Support continued to advance the use of nuclear and radiation techniques to improve **industrial processes** in the region. Activities focused on enhancing the quality of services though international certification processes, the use of advanced technology and methods, and the promotion of collaboration to foster research and development (R&D).

IAEA Director General Rafael Mariano Grossi speaks at a Regional Co-operative Agreement for Research, Development and Training Related to Nuclear Science and Technology (RCA) event during the IAEA General Conference in September 2024. (Photo: IAEA)

Several national projects in the region continued to focus on energy planning and on supporting countries considering nuclear power as a part of their energy mix, including through the deployment of advanced technologies such as SMRs. Support was also provided through capacity building, review missions and scientific visits.

In 2024, significant progress was made in the region in enhancing nuclear, radiation and radioactive waste safety and nuclear security, in particular emergency preparedness and response (EPR) and regulatory infrastructure.

Nuclear knowledge development and management remained a key focus area across the Asia and the Pacific region in 2024.

Yemen signed its first CPF, for the period 2024–2029, in June. (Photo: R. Fraga Pazos/IAEA)

C.2.2. Project highlights according to thematic area

HEALTH AND NUTRITION

Radiation oncology in cancer management

REGIONAL

RAS6107: Ensuring Radiotherapy Patient Safety in Enabling Improved Health Outcomes through a Collaborative Multilayered Quality Assurance System

A regional training course on comprehensive radiotherapy audits using the Agency's Quality Assurance Team in Radiation Oncology (QUATRO) methodology was held in Indonesia from 29 September to 5 October 2024. The event provided critical training to 50 participants from 16 countries in implementing the methodology to enhance the accuracy and reliability of clinical audits in radiotherapy facilities. This training will harmonize practices across the region and support optimal radiotherapy services, helping to reduce premature mortality from non-communicable diseases in the region.

SINGAPORE

SIN6005: Building up Expertise and Capability in the Application of Proton Therapy

SIN6006: Building Expertise and Capabilities in the Application of Proton Therapy — Phase II

Singapore has made proton therapy — advanced radiation treatment that can destroy cancer cells while minimizing damage to surrounding healthy tissues — available to patients since 2023, and in 2024 a proton beam therapy centre was established at the National Cancer Centre Singapore. The Agency supported capacity building for the application of this advanced nuclear and radiation medicine technique, contributing to the improvement of health care services in Singapore, which has an ageing population and rising cancer incidence and mortality rates.

YEMEN

YEM6016: Rehabilitating National Capabilities in Radiotherapy and Nuclear Medicine — Phase II

The Agency continued to support the establishment and expansion of radiotherapy and nuclear medicine services in Yemen. Group fellowships for medical physicists, radiation oncologists and radiation therapists were organized in Pakistan's Nuclear Medicine, Oncology and Radiotherapy Institute, a Rays of Hope Anchor Centre. The health professionals received training in various radiotherapy techniques such as conformal and intensity modulated radiation therapy (IMRT), volumetric modulated arc therapy (VMAT) and stereotactic radiosurgery technology, as well as in the operation of advanced radiation devices such as linear accelerators and CyberKnife. The training also enhanced understanding of related radiation safety protocols, including preventive measures and emergency response, to reduce potential risks for patients and health care workers.

Nuclear medicine and diagnostic imaging

REGIONAL

RAS6106: Strengthening the Application of Hybrid Imaging and Theranostics Techniques for the Effective Management of Patients with Communicable and Non-Communicable Diseases

In September, the Government of Indonesia hosted a regional training course on the clinical applications of hybrid imaging at Dr Soetomo General Hospital in Denpasar, Bali. The course focused on the role of computed tomography (CT), magnetic resonance and molecular imaging techniques in managing communicable and non-communicable diseases, and on the harmonization of best practices in theranostics and hybrid imaging.

PAKISTAN

PAK6027: Enhancing and Strengthening Nuclear Medicine and Oncology Institutions in Cancer Diagnostics and Treatment and Ensuring Human Safety by Adopting Best Practices in Cancer Management

In 2024, the Agency supported the establishment of a theranostic laboratory in the Karachi Institute of Radiotherapy and Nuclear Medicine, the largest public cancer hospital in southern Pakistan. The Agency provided a theranostic module, and the laboratory was inaugurated in May 2024. Agency support for advanced nuclear and radiation medicine techniques helps to increase access to early diagnosis and treatment for cancer patients in Pakistan.

STATE OF PALESTINE

PAL6004: Building Capacity for Nuclear Medicine, Radiation Oncology, and Radiation Therapy

The Agency is supporting the State of Palestine in its efforts to enhance capacity in nuclear medicine and radiation oncology, and is strengthening health care infrastructure by providing specialized training to medical professionals. Two fellows are currently undergoing long term advanced training in radiation oncology in Amman. In addition, the Agency has been supporting long term training in nuclear medicine for two fellows since 2023 in Jordan, to build the capacity needed to address the growing demand for such services.

Radioisotopes and radiopharmaceuticals production for medical applications

REGIONAL

RAS6111: Enhancing the Management of Cancer through Capacity Building in Theranostics

Countries in the region participated in an extensive survey to evaluate the status of nuclear medicine and theranostics, providing data on current capabilities including the capacity to develop radiopharmaceuticals. The findings revealed significant variability in the availability of theranostic services and a need for improved infrastructure and training, and will inform future activities and collaboration strategies for the wider application of advanced nuclear medicine techniques in the region. A network among national project coordinators was also developed to help harmonize nuclear medicine protocols across Member States.

Dosimetry and medical physics

THAILAND

THA6045: Advancing National Capacity in Diagnostic Radiology, Nuclear Medicine, and Radiotherapy

Thailand expanded its web-based radiation dose management system in 2024, acquiring eight additional CT units to enhance national radiation dose data collection. Key advances were made in proton therapy and neuroimaging, supported by extensive training programmes, scientific visits and expert missions. Progress was also made through QUATRO and Quality Management Audits in Nuclear Medicine Practices (QUANUM) audits, including auditing Maha Vajiralongkorn Thanyaburi Hospital and Lampang Cancer Hospital under T-QUANUM. Additionally, Thai professionals received training in QUANUM at certified centers in Malaysia.

FOOD AND AGRICULTURE

Crop production

PHILIPPINES

PHI5036: Providing an Innovative Platform for Germplasm Utilization for Rainfed and Irrigated Lowland Rice Ecosystems — Phase I

In the Philippines, Agency support focused on strengthening national capacity for new breeding techniques to enhance the value and sustainable utilization of improved traditional rice varieties and to boost food security, nutrition and income. With TC programme support, the Philippines began to apply field rapid generation advance (fRGA) — a breeding technique to accelerate the development of new varieties. This has increased the number of cropping seasons from two to three per year. With ongoing capacity building and infrastructure development, the country continues to expand the availability of enhanced, climate-adaptive mutant rice varieties, contributing to sustained food security in challenging conditions.

Agricultural water and soil management

PAKISTAN

PAK5053: Strengthening and Enhancing National Capabilities for the Development of Climate Smart Crops, Improvement in Animal Productivity and Management of Soil, Water, and Nutrient Resources Using Nuclear and Related Techniques

The Agency provided equipment to boost Pakistan's animal production capabilities in 2024, supporting precise immunological assays, vaccine efficacy monitoring and molecular analyses. The National Institute for Biotechnology and Genetic Engineering developed a vaccine for foot-and-mouth disease that is currently undergoing field trials. Furthermore, the Agency supplied Pakistan with instruments for analysing soil and water samples from polluted sites with a view to facilitating the reuse of water for irrigation purposes. Pakistan also received an ultra-high performance liquid chromatography system which is being used to test food consignments and implement control measures to mitigate mycotoxin contamination in food and feed materials.

Livestock production

MONGOLIA

MON5026: Improving the Diagnosis and Treatment of Transboundary Animal Diseases with Potential Pandemic Patterns

MON0014: Strengthening the Capacity of the National Centre for Zoonotic Diseases

Mongolia made strides in improving animal health and in facilitating the export of livestock products to high demand markets in 2024, receiving next generation sequencing kits and scanning transmission electron microscopes to enhance the early and rapid diagnosis and control of transboundary animal diseases. In addition, several capacity building activities for professionals at the National Centre for Zoonotic Diseases and the Institute of Veterinary Medicine are being conducted to strengthen Mongolia's animal health management.

Following an IAEA/WHO feasibility study for the application of the SIT to control dengue in Bangladesh, the country is now mass rearing mosquitoes. In 2024, a site was selected for the conduct of pilot releases of sterile Aedes aegypti male insects. (Photo: IAEA)

Insect pest control

FIJI

FIJ5007: Implementing Pesticide Free Suppression and Management of Fruit Flies for Sustainable Fruit Production — Phase II

In Fiji, the sustainability of fruit production was boosted with activities to support the integration of the SIT into an area-wide pest management approach to control fruit flies. Support was provided for mass trapping techniques (especially for the main target pest *Bactrocera kirki*) and fly surveillance, and to increase awareness of fruit fly management in villages and schools. Young people have been encouraged to participate in community activities such as handling traps, infusing fly lures and deploying traps at the correct distance and in specific hosts.

Food safety

REGIONAL

RAS5096: Strengthening Multi-Stakeholder Food Safety Monitoring Programmes for Chemical Contaminants and Residues in Plant and Animal Products Using Nuclear/Isotopic Techniques

Activities under a regional project continue to improve control systems to protect consumers from harmful contaminants and residues in food and to enhance the competitiveness of agricultural exports. A regional training course on multiclass food hazard monitoring and surveillance was conducted in Xiamen, China, in August. An advanced regional training course on isotopic confirmatory techniques, facilitated by Qatar's Ministry of Public Health, was held in April, bolstering analytical skills to detect antimicrobial residues, mycotoxins, pesticide residues and toxic metals.

Participants at a regional Agency training course on multiclass food hazard monitoring and surveillance held in Xiamen, China. (Photo: CAAS)

WATER AND THE ENVIRONMENT

Water resources management

REGIONAL

RAS7040: Improving Water Resources Management Practices by Enhancing the Regional Collaboration in Environmental Isotope Analysis and Applications (RCA)

In 2024, Agency support enhanced the capabilities of States Parties to the Regional Co-operative Agreement for Research, Development and Training Related to Nuclear Science and Technology (RCA) in surface water and groundwater monitoring to support resource management strategies. Capacity building centred on isotope-enabled groundwater dating, including carbon-14 and noble gases, and in applying flow modelling techniques. In India, where data was generated at 35 sites, isotopic studies evaluated the impact of urbanization on groundwater and proposed remedial actions to control contamination and depletion.

Director General Rafael Mariano Grossi views the progress of ongoing plant breeding projects at the Pacific Community's Centre for Pacific Crops and Trees in Fiji. (Photo: D. Candano/ IAEA)

REGIONAL

RAS7041: Developing an Effective and Sustainable Implementation of Integrated Management of Water Resources and Related Ecosystems (SAPI)

Pacific Island Member States received assistance to strengthen national and subregional capacities for the systematic assessment of water resources and to support coastal zone management. Pacific Islands face unique environmental challenges such as rising sea levels, salt water intrusion and limited freshwater resources. Through group fellowships and training, expertise in isotope hydrology techniques for water resources assessment and ocean acidification monitoring was addressed in 2024 in Fiji, the Marshall Islands, Palau, Papua New Guinea, Samoa and Vanuatu.

KUWAIT

KUW7011: Understanding the Sources and Transport of Carbon in Rainwater and Groundwater Using Isotopic Techniques

In Kuwait, the Agency supported activities to investigate the geochemical responses of rainwater and groundwater to carbon dioxide perturbations. Through a fellowship training at the King Abdulaziz City for Science and Technology in Saudi Arabia, a Kuwaiti expert gained advanced skills in geographic information systems, remote sensing, isotopic analysis, and hydrological modelling and other statistical techniques. An expert mission to the Water Research Center at the Kuwait Institute for Scientific Research supported the identification of sampling locations, types and frequency, as well as future equipment needs. An initial set of rainwater and groundwater samples was collected and sent to the Agency's Seibersdorf laboratories in Vienna for analysis.

Marine, terrestrial and coastal environments

REGIONAL

RAS7039: Enhancing the Protection of Marine, Terrestrial, and Coastal Environments through Holistic Environmental Monitoring Programmes (ARASIA)

This regional project advances informed decision making for the protection of marine, terrestrial and coastal environments in States Parties to ARASIA. In 2024, training courses and sponsored participation in environmental monitoring activities enhanced skills in isotopic analysis, radionuclide sampling and pollution assessment. The acquisition of these enhanced technical capacities in Member States including Bahrain, Jordan and Kuwait, facilitates the adoption of standardized, data-driven approaches for protective policies.

PALAU

PLW7003: Enhancing National Capacities to Monitor and Assess the Impacts of Ocean Acidification — Phase II

The Palau International Coral Reef Center has been collecting nearshore and offshore water samples to test for pH and total alkalinity since 2021. In 2024, with Agency procurement of control reference material for analysis, the Centre was able to clear a backlog of samples. Training for new staff also contributed to the sustainability of the effort.

THAILAND

THA7006: Developing National Technical Capability for Impact Assessment of Plastic Pollution on Marine and Coastal Ecosystems and Human Health through the Application of Nuclear and Isotopic Techniques

Thailand improved its capabilities to monitor and assess marine and coastal ecosystems, in particular the potential impacts of plastic pollution on these environments and on seafood in 2024. The procurement of an upright microscope enabled more detailed analysis of phytoplankton and microplastics, enhancing environmental monitoring capabilities. Fellowships and scientific visits also supported the effort to build expertise in nuclear and isotopic techniques for such assessments.

INDUSTRIAL APPLICATIONS/ RADIATION TECHNOLOGY

Radioisotopes and radiation technology for industrial, health care and environmental applications

REGIONAL

RAS1030: Using Radioisotope Techniques and Computational Fluid Dynamics Simulation for Troubleshooting and Optimizing of Industrial Processes

To advance the integration of radiotracer technology measurement with computational fluid dynamics, national counterparts worked together in 2024 to develop a 'tech pack' of resources and training related to industrial equipment. The tool was presented to all stakeholders at a regional training on the use of radiotracer technology to assess the performance of industrial processes, held in Jakarta in August, and will be essential for harmonizing standards across the region, fostering technical training and facilitating knowledge transfer.

PHILIPPINES

PHI1022: Strengthening National Capacity in Radiation Processing for Product Development and Scale-Up — Phase II

In the Philippines, local industrial production capabilities are being enhanced with the use of radiation processing technology. In 2024, the country scaled up the use of the Philippine Nuclear Research Institute (PNRI) irradiation facility, providing services to private companies and promoting the commercial use of the technology. The successful release of irradiated plant growth promoters in 2024 is driving semi-commercial use of the PNRI irradiator, paving the way for increased public acceptance of irradiated products in the country.

VIET NAM

VIE1012: Establishing a Non-Destructive Testing Personnel Certification Scheme according to International Organization for Standardization Standard ISO 9712

In Viet Nam, Agency support contributed to enhancing human resource capabilities for establishing and maintaining a central NDT certification scheme. In 2024, the Viet Nam Atomic Energy Institute (Vinatom) gained a comprehensive understanding of the globally recognized ISO 9712 certification system for NDT and identified the specific steps required to establish such a system. The national team developed key documents to apply the certification process and established collaboration with the International Committee for Non-Destructive Testing to advance the process.

Research reactors

THAILAND

THA1017: Strengthening National Capacities for the Safe Operation of the New Miniature Neutron Source Reactor

National capacities for quality assurance during construction were boosted by a training course on welding inspection and concrete testing, delivered at the Suranaree University of Technology in Nakhon Ratchasima, Thailand, in September 2024. The course supported human resource development for the construction of a new miniature neutron source reactor planned to be used for cancer therapy.

VIET NAM

VIE1011: Enhancing National Capacity for Design and Safety Analysis for a New High Power and Multipurpose Research Reactor

Support was provided for the establishment of the Research Centre for Nuclear Energy Science and Technology in Viet Nam, with a focus on building Vinatom's capabilities for the implementation of this new research reactor project. In September, experts from the Korea Atomic Energy Research Institute (KAERI) visited the Dalat Nuclear Research Insitute to share their experience in the design, safety analysis and utilization of research reactors. The Agency strengthened Vinatom's safety research team by providing equipment to establish a thermal hydraulic safety experimental research system. Specialized training in the form of a 6-week fellowship programme was provided for four researchers at the Tokyo Institute of Technology, Japan, where the researchers enhanced their skills in flow measurement and computational simulation for hydraulic safety research. Viet Nam also received Agency support to develop national documents relating to the possible inclusion of nuclear energy in the national energy plan. A training workshop was held in Hanoi in November on the application of International Project on Innovative Nuclear Reactors and Fuel Cycles (INPRO) modelling and analysis tools. After the workshop, participants were able to apply Agency tools to model various energy sources, including coal, oil, gas, liquefied national gas, wind, solar, hydropower and nuclear, and to consider key aspects such as environmental regulations, and constraints and variations in demand and supply.

Nuclear instrumentation

REGIONAL

RAS1026: Strengthening Nuclear Instrumentation Capacity in the Areas of Nuclear Sciences and Applications

A regional project to improve instrumentation infrastructure and cooperation in the research and use of nuclear applications concluded in 2024 with the establishment of a network and database to foster the continued exchange of information, experiences and technological solutions in the region.

ENERGY PLANNING AND NUCLEAR POWER

Introduction of nuclear power

INDONESIA

INS2019: Accelerating Capability Building to Support the Development and Implementation of a Nuclear Power Plant

An expert mission to Indonesia, organized in response to the findings of an Agency peer review in October 2022, focused on capacity building for the decommissioning of research reactors. The mission aimed to address identified gaps and strengthen national capabilities to manage research reactor decommissioning safely and efficiently, and provided technical guidance and support to enhance local expertise and preparedness for decommissioning activities.

JORDAN

JOR2018: Developing National Nuclear Energy Programme

The Jordan Atomic Energy Commission (JAEC) is conducting an SMR technology assessment to select the most optimal and viable technology for electricity generation and water desalination. With TC support, a national workshop on a business model for the nuclear power project was conducted in June 2024.

The JAEC conducted a national workshop on SMR business models in June 2024 as part of ongoing technology assessments for SMRs in Jordan. (Photo: JAEC)

MONGOLIA

MON2010: Assessing the Feasibility of the Nuclear Power Option and Strengthening Nuclear and Radiation Safety and Security

In 2024, Mongolia conducted a series of workshops and training sessions, supported by the Agency, to evaluate the feasibility of a nuclear power programme. Topics addressed included the Milestones approach and energy planning, site selection, electrical grid requirements for a nuclear power programme, and general aspects of SMR deployment. The Agency also supported the acquisition of an optically stimulated luminescence dosimeter system to strengthen radiation monitoring capabilities and radiation safety across the country.

SAUDI ARABIA

SAU2012: Continuing the Development of National Nuclear Infrastructure for Phase Three

The Agency is supporting Saudi Arabia's continuing development of national infrastructure for the country's nuclear power programme. In 2024, the annual meeting to review Saudi Arabia's Integrated Work Plan (IWP) was held in Vienna. A Knowledge Management Assist Visit was also organized.

Nuclear power reactors

PAKISTAN

PAK2008: Strengthening National Capabilities to Support the Safe Operation, Environmental Assessment, Radioactive Waste Management and Decommissioning of Nuclear Power Plants – Phase II

In 2024, Pakistan continued to receive support to strengthen the safe and reliable operation of its nuclear power reactors, and a group fellowship on electricity supply system planning was conducted at the Agency's Headquarters in Vienna. National counterparts received training on data acquisition and analysis using remote visual inspection of power plant equipment.

Nuclear fuel cycle

CHINA

CPR2018: Developing Enhanced Exploration Techniques for Hard Rock Type Uranium Resources and Promoting Green and Efficient Uranium Recovery Technology by External Field Reinforcement

In 2024, an Agency project contributed to improved exploration and evaluation of mainstream uranium ore types by helping to assess critical technology for enhancing uranium recovery and to promote R&D to foster its application on an industrial scale to meet long term demands for uranium exploration, mining and environmental protection. Over 60 trainees participated in courses covering theoretical aspects and practical applications. Training on uranium mineral system mapping, geological structure and biogenic uranium mineralization was delivered through a scientific visit to the Russian Federation to gain insights into the interpretation of ore formation in different uranium deposit types.

RADIATION PROTECTION AND NUCLEAR SAFETY

Safety of nuclear installations, including siting and hazard characterization

BANGLADESH

BGD9020: Strengthening the Nuclear Regulatory Supervision Process to Ensure Effective Oversight during the Nuclear Power Plant Operational Phase

Bangladesh has made significant progress in nuclear infrastructure in the past decade as it builds its first NPP at Rooppur. In 2024, with TC support, Bangladesh held a national workshop to review and assess safety documents before issuing the operating license for the NPP, thereby helping to ensure regulatory readiness prior to operation.

UNITED ARAB EMIRATES

UAE9018: Building and Sustaining Capacity for the Safe Operation of the Nuclear Energy Programme — Phase II

The United Arab Emirates (UAE) continues to engage closely with the Agency to maintain the safe and sustainable operation of its nuclear power plant at Barakah. In December, the UAE hosted an IAEA School of Nuclear and Radiological Leadership for Safety in Abu Dhabi. The school brought together experts and participants from the national nuclear power sector to develop skills in leadership and management through interactive sessions, discussions, case studies and exercises.

Since Bangladesh expressed interest in embarking on a nuclear power programme, the IAEA has been assisting the country in developing and reviewing regulations, assessing sites, and developing a radioactive waste management system. (Photo: L. Gil/IAEA)

Emergency preparedness and response

REGIONAL

RAS9094: Enhancing Nuclear Emergency Preparedness and Response in the Member States of the Association of Southeast Asian Nations

In 2024, project activities to strengthen EPR in the Member States of the Association of Southeast Asian Nations (ASEAN) focused on transboundary emergency assessments, protective action decision making and information sharing. A coordination meeting held in April in Vienna and a regional workshop held in Bangkok in July emphasized the importance of coordinated communication during nuclear or radiological emergencies. These activities helped to raise awareness of the ASEAN Protocol for Preparedness and Response to a Nuclear or Radiological Emergency, and outlined the updated work plan for 2024–2025 to ensure its implementation across all ASEAN Member States (Brunei Darussalam, Cambodia, Indonesia, Lao People's Democratic Republic, Malaysia, Myanmar, Philippines, Singapore, Thailand and Viet Nam).

REGIONAL

RAS9088: Strengthening Capabilities for Radiological and Nuclear Emergency Preparedness and Response in the Member States of the Cooperation Council for the Arab States of the Gulf - Phase II

In November, a high level meeting in Kuwait jointly organized by the Emergency Management Centre of the Cooperation Council for the Arab States of the Gulf and the Agency identified gaps, developed actionable recommendations, and reinforced regional collaboration to strengthen capabilities in emergency preparedness planning and response in the Gulf region.

In September 2024, an IAEA expert mission was deployed to Suva, Fiji, through an ongoing IAEA technical cooperation programme to support the recovery and transport of approximately 205mg of radium-226. (Photo: IAEA)

Radioactive waste management, decommissioning and remediation of contaminated sites

REGIONAL

RAS9097: Establishing and Enhancing National Infrastructure for the Management of Disused Sealed Radioactive Sources, Radioactive Wastes, and Naturally Occurring Radioactive Material

In 2024, a training course in Oman focused on developing policies and strategies for the effective management of naturally occurring radioactive material (NORM). The training strengthened national infrastructure and enhanced local capacities to address the challenges associated with NORM, supporting safe and sustainable management practices.

CHINA

CPR9063: Implementing the Safe Decommissioning of the Heavy Water Research Reactor and Improving the Optimization of Occupational Radiation Protection during Decommissioning

The Agency continues to support China in the decommissioning of its heavy water research reactor. In 2024, experts shared practical experiences of decommissioning light water, heavy water and other types of reactors, providing national counterparts with valuable insights and good practices on decommissioning activities, including waste minimization methods. The exchange of experience will help to improve the technical abilities of the team.

THAILAND

THA9019: Enhancing National Capacities in Managing Radioactive Waste and Naturally Occurring Radioactive Material

With Agency support, Thailand has made considerable progress in enhancing radioactive waste and NORM management. In 2024, essential radiation measurement tools were procured and several expert missions, fellowships and scientific visits strengthened national capabilities in radioactive waste management. Additionally, advancements were made in updating the country's radiation profile in the Radiation Safety Information Management System (RASIMS) system, supporting the procurement of health care equipment and further enhancing the regulatory framework to support safe radiation practices in the country.

Governmental and regulatory infrastructure for nuclear installations safety

BAHRAIN

BAH9008: Improving the Regulatory Infrastructure for Radiation and Nuclear Safety

In Bahrain, five gamma dose rate measuring probes were upgraded to meet the latest telecommunication and data security standards, and 14 new stations with diverse measurement capabilities were procured to address the country's radiation monitoring needs over the next decade. A high volume air sampler capable of sampling both particulates and gaseous iodine was also acquired. The expanded network enhances Bahrain's radiological environmental monitoring and early warning capabilities, strengthening both routine and emergency response efforts. It will also improve the country's mobile radiological land and sea survey capacity.

INDONESIA

INS9031: Strengthening Nuclear and Radiation Safety Infrastructure and Enhancing the Capabilities of the Regulatory Body in the Oversight of a Nuclear Power Plant

A number of activities took place in 2024 under a project to support Indonesia's regulatory body in strengthening its capabilities, including for the management of NORM risks, decommissioning issues and the development of a comprehensive human resources strategy for regulatory bodies. A national training workshop focused on the development of a comprehensive national strategy and action plan for the management of NORM, and facilitated the exchange of expertise and best practices to ensure the safe and sustainable handling of NORM across various industries.

NUCLEAR KNOWLEDGE DEVELOPMENT AND MANAGEMENT

REGIONAL

IAEA–INSTA–ANENT E-Learning Programme for Educators — Phase 1A

The first cohort of Phase 1 of the International Nuclear Science and Technology Academy (INSTA) Executive Programme for Educators successfully equipped 85 participants with essential knowledge and skills. Conducted from 22 April to 30 November 2024, the virtual programme provided training in the nuclear legal regime and policy, principles and applications of nuclear science and technology, and effective educational strategies.

Over 520 virtual participants attended nine webinars hosted by the Asian Network for Education in Nuclear Technology (ANENT) between March and December 2024, where they learned about nuclear applications in various fields, including nuclear and radiation medicine; nuclear engineering; food safety, security, quality and authenticity; and nuclear waste management. Experts from Australia, China, Indonesia, the Islamic Republic of Iran, Japan, Malaysia, Oman, the Philippines and Thailand presented topics.

ARASIA

The newly established ARASIA Committee on Outreach and Communication (ACOC) held its first meeting in Vienna in July. The committee developed an action plan to increase awareness of ARASIA using digital communication channels and outreach to support knowledge management and promote contributions and engagement by States Parties.

KUWAIT

The Agency supported the installation of atomic force microscopy (AFM) equipment at the Petroleum Research Centre and provided related training to support Kuwait in research and development related to polymer and oil refining.

Through the successful transfer of mutation breeding technology and through capacity building over the years, Pakistan has developed its first high yield soybean, NIBGE Soya-2, which was released for general cultivation in 2024. This variety has demonstrated a yield 16% higher than other varieties.

ATOMS FOR FOOD

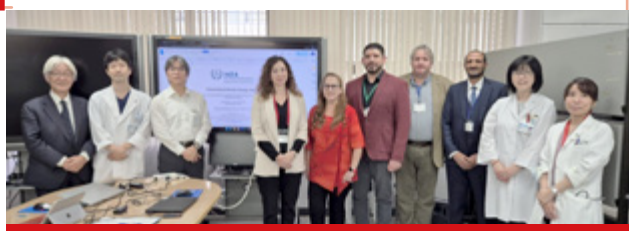
The impact of Technical Cooperation in Asia and Pacific

NUTEC PLASTICS

Water and the Environment

- The second phase of upcycling activities using irradiation under NUTEC Plastics was launched in 2024 in pilot countries in the Asia and the Pacific region. In August 2024, Indonesia and the Philippines validated the relevant technology in a laboratory setting.
- The Philippines achieved a 50% increase in the structural strength of recycled materials using irradiation techniques, and Malaysia completed the first phase of the construction of a pilot plant.

RAYS OF HOPE



Health and Nutrition

Twelve countries in the Asia and the Pacific region were supported through Rays of Hope in 2024: Cambodia, Fiji, Indonesia, Iraq, Lao People's Democratic Republic, Lebanon, Marshall Islands, Mongolia, Papua New Guinea, Syrian Arab Republic, Viet Nam and Yemen, along with the State of Palestine.

In August, Shonan Kamakura General Hospital in Kanagawa, Japan — a member of the Consortium of Universities and Institutions in Japan and a Rays of Hope Anchor Centre — hosted a regional training course on theranostics for 19 participants from 15 countries in the region.

Japan also hosted a week-long workshop on best practices for nuclear medicine professionals from Iraq, Jordan, Lebanon, Qatar, the UAE and Yemen.

PAPUA NEW GUINEA

After nearly a decade of inactivity, Papua New Guinea's only radiotherapy machine, located in the Angau Memorial Hospital in Lae, restarted operations in August 2024 and has since provided critical care for around 50 patients per month. Services received a boost with the installation of new HDR brachytherapy equipment in December, which supports care for patients with cervical cancer.

RAYS OF HOPE

SRI LANKA

A SEED mission assessed Sri Lanka's process to identify potential sites for its first NPP. The team reviewed the site survey report, held interviews and discussions with representatives from the technical agencies involved, and visited a candidate site in Pulmoddai.

C.3.

2024 Europe

- In 2024, the TC programme supported 33 Member States in Europe and Central Asia through national, regional and interregional projects. By the end of the year, there were 122 national and 26 regional projects active. The programme achieved an implementation rate of 86.4%.
- CPFs were signed in 2024 with Albania, Armenia, Azerbaijan, Bulgaria and Poland, and the CPF for North Macedonia was extended.

EUROPE

33 Countries receiving technical support

86.4% Technical Cooperation Fund implementation rate

€23 655 141
Budget allotment at year end

€20 439 761
Encumbrances and actuals

Cooperation and training

345 Fellows and scientific visits

559 Expert and lecturer assignments in the region

20 Regional training courses

574 Participants in training courses

84 Regional meetings and workshops

1691 Meeting participants and other project personnel

This graph shows the distribution of assistance through TCF and extrabudgetary disbursements in the Europe region according to technical field in 2024

Food and Agriculture 17.2%

Health and Nutrition 35.8%

Industrial Applications/Radiation Technology 3.3%

Nuclear Knowledge Development and Management 4.5%

Safety and Security 27.0%

Water and the Environment 8.3%

Energy 3.9%

Projects in 2024

39 closed
145 in closure
4 cancelled

5 Member States signed CPFs in 2024:

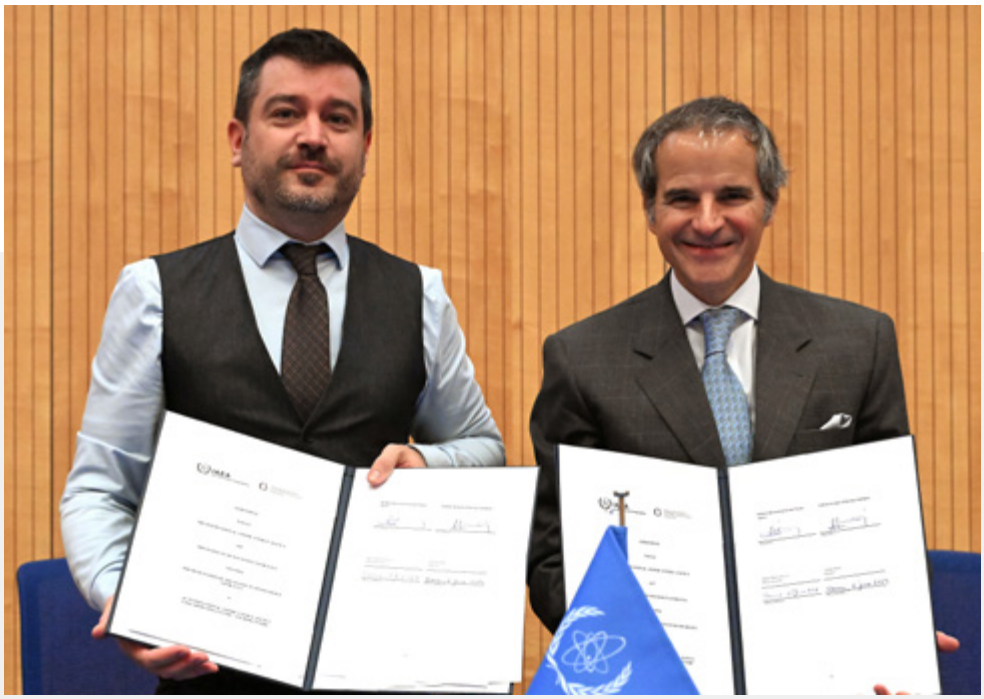
Albania
Armenia
Azerbaijan
Bulgaria
Poland
The CPF for North Macedonia was extended

C.3.1. Overview of regional thematic priorities

In the area of health, support to keep up with advances in radiation medicine and its effective and safe use remained a high priority for the Europe region. Various training opportunities, from basic to specialized, were offered throughout the year. Radiation medicine infrastructure upgrades were completed in several Member States under national TC programmes.

Support for food and agriculture projects focused on nuclear techniques for better land and water management and for enhancing major food crops. Regional events on advanced agricultural techniques covered topics such as soil moisture assessment, climate-smart agricultural practices and plant mutation breeding for climate resilience. Equipment procurement helped Member States to improve irrigation planning and agricultural management, and several countries received infrastructure upgrades and capacity building to enable them to strengthen the application of the SIT.

In the field of water and the environment, monitoring and assessment activities to improve public and environmental protection continued throughout the year. Member States produced a unified protocol for future microplastic monitoring using innovative nuclear techniques. Regional representatives worked together to improve the characterization of shared aquifers, address data gaps and facilitate the use of isotope hydrology for the formulation of water-related policies. Specialists who received training at the Seibersdorf laboratories in advanced radioanalytical techniques are now equipped to conduct reliable and accurate independent analyses of natural radionuclides in water. The State Regulatory Agency for Radiation and Nuclear Safety in Bosnia and Herzegovina facilitated the provision of training on dose assessment and the practical application



IAEA Director General Rafael Mariano Grossi and Mr. Anreas Jakelj, Director General, IO Ljubljana signing an Anchor Centre Agreement with Slovenia under RoH in June 2024 (Photo:D. Calma/IAEA)

Albania signed a CPF in November 2024. (Photo: J. O'Brien/IAEA)

of monitoring data to safeguard public health and the environment in various exposure scenarios. Through these efforts, radiation protection and safety for the public and the environment in various exposure situations in Europe and Central Asian countries was strengthened.

In Europe and Central Asia, efforts continued in 2024 to address climate and environmental challenges while fostering innovation using **radiation technology** solutions. Regional activities strengthened expertise in radiation processing dosimetry and modern measurement techniques, enhanced quality management systems in line with updated standards, and provided training on the use of radiation technologies for recycling polymer waste into higher value products.

Countries in Europe and Central Asia operate the largest fleet of **nuclear power** plants (NPPs) and are enhancing their capacity for long term operation (LTO). They are developing infrastructure for new NPP phases to provide clean, reliable electricity, and are running R&D programmes for improvements, including through the deployment of SMRs. In 2024, the Agency supported Member States in ensuring safe NPP operations and developing infrastructure including through activities focused on human resource development, strengthening regulatory capacity, and using advanced nuclear technology for low carbon electricity generation. Member States continue to collaborate on energy planning, economic evaluation of large projects and SMR deployment to achieve the targets of the Paris Agreement through low carbon energy and climate strategies.

Efforts to strengthen regulatory infrastructure across all thematic **safety** areas continued, with the aim of supporting the robust and sustainable use of nuclear technology. In 2024, three studies were launched in Europe and Central Asia to improve radiation protection for patients and assess imaging practices in the region.

In the field of **nuclear knowledge development and management**, educational institutions were supported to promote the sustainable, safe and secure use of nuclear technology. Agency activities fostered regional cooperation and helped to address educational disparities, strengthening partnerships between universities and industry. Workshops were provided on outreach to secondary schools, on

nuclear education, and on the use of the integral pressurized water reactor SMR simulator. Two Nuclear Energy Management Schools organized jointly with the ICTP were held in Trieste, Italy.

C.3.2. Project highlights according to thematic area

HEALTH AND NUTRITION

Radiation oncology in cancer management

ALBANIA

ALB6019: Enhancing Nuclear Medicine and Radiotherapy and Improving Patient and Staff Safety in the Mother Teresa University Hospital Centre

With Agency support, the Mother Teresa University Hospital Centre in Albania launched the first brachytherapy treatment for gynaecological cancer patients, marking a transformative milestone in cancer care. The Agency provided expert missions and training to support the commissioning of, and quality assurance for, the advanced radiotherapy equipment, and the new orthovoltage machine has expanded treatment options for patients with skin cancers, further advancing cancer care in the country.

REPUBLIC OF MOLDOVA

MOL6011: Improving Radiotherapy Services in the Oncology Institute

MOL6012: Increasing Accessibility to High Quality Cancer Management Services

In 2024, the Republic of Moldova strengthened cancer management at the Institute of Oncology, with Agency support. An upgraded brachytherapy service was opened with a three-dimensional (3D) brachytherapy system procured by the Agency. The TC programme also supported radiation medicine with an iridium-192 afterloader system, along with dosimetry and quality control equipment for diagnostic radiology and upgraded VMAT equipment. One radiation oncologist received training in gynaecological 3D image guided brachytherapy, and one medical physicist was trained in advanced external beam radiotherapy and brachytherapy. Furthermore, the Agency provided expert support to assess readiness for iodine therapy activities, develop protocols, design layouts for therapy room remodels and review designs for PET/CT and SPECT–CT facilities. On-site training was conducted for medical staff on the use of IMRT/VMAT in radiation oncology for breast and head and neck cancers.

Cancer management was strengthened with Agency support at Moldova's National Institute of Oncology in 2024. (Photo: C. Jiménez/IAEA)

UKRAINE

UKR6014: Strengthening Radiation Therapy and Medical Imaging in Ukraine

Significant progress has been achieved under this project to strengthen nuclear and radiation medicine capacities in Ukraine. Equipment and training were provided to the Bukovinian Clinical Oncology Centre. In July, a group of external experts and Ukrainian stakeholders — including hospitals, the Ministry of Health, civil society and the State Nuclear Regulatory Inspectorate of Ukraine — conducted a comprehensive gap analysis that laid the groundwork for a virtual training programme and the establishment of three training centres in Ukraine. The Grigoriev Institute for Medical Radiology in Kharkiv received dosimetry and quality control equipment, including a thermoluminescence dosimetry (TLD) reader. As the only entity outside Kyiv responsible for the dosimetry monitoring of approximately 6500 medical personnel, the institute plays a crucial role in Ukraine's quality assurance framework for medical facilities using ionizing radiation.

Nuclear medicine and diagnostic imaging

SLOVENIA

SLO6007: Enhancing Theranostic Capabilities in the Management of Oncological Diseases

In Slovenia, the Agency has been supporting the University Medical Centre Ljubljana to introduce prostate-specific membrane antigen targeted radioligand therapy into clinical practice. Under the project, the validation process for therapeutic radiopharmaceuticals produced in-house for the treatment of advanced prostate cancer was completed. The first batch of radiopharmaceuticals was successfully used to treat two patients in March, and the service is now regularly performed at the centre, putting an end to the need to send patients abroad for treatment.

Dosimetry and medical physics

CROATIA

CRO6024: Introducing Remote Photon and Electron Radiotherapy Beam Dosimetry Audits in Reference Conditions and Implementing the Small Static Photon Fields Dosimetry Protocol

In Croatia, support was provided to enhance the quality and consistency of radiotherapy dosimetry practices through expert missions and training. Agency assistance focused on the establishment of a Dosimetry Audit Committee (DAC) under the Croatian Medical Physics Association, and on a survey of the implementation of the dosimetry code of practice in Croatian radiotherapy centres. Croatian medical staff participated in fellowships and scientific visits to the Agency's Dosimetry Laboratory in Seibersdorf.

LATVIA

LAT6006: Enhancing the Calibration Capabilities of the Secondary Standard Dosimetry Laboratory for X ray Measurements

Calibration services at the secondary standards dosimetry laboratory (SSDL) in Latvia were enhanced with Agency support, improving radiation protection and diagnostic radiology. An X-ray unit that was procured and installed is generating relevant radiation qualities for general diagnostic radiology, mammography and radiation protection purposes. Better calibration services will improve the accuracy of dosimetry and will strengthen radiation protection and the quality and safety of diagnostic radiology in Latvia.

TURKMENISTAN

TKM6001: Establishing Dosimetry and Calibration Services to Improve Radiation Safety

A national TC project has been assisting the Civil Defense and Rescue Operations Directorate of the Ministry of Defence of Turkmenistan to establish calibration services in the field of radiation protection. In 2024, an automatic TL dosimetry reader was procured and installed at the Ministry of Defence, and qualified national dosimetry experts received training to operate and maintain the system. This support will help to establish the country's first individual monitoring services for occupationally exposed workers.

FOOD AND AGRICULTURE

Crop production

BULGARIA

BUL5020: Increasing the Yield and Quality of Main Vegetable Crops through Nuclear Technology to Withstand the Impacts of Climate Change

In 2024, the Agency supported agricultural innovation and crop improvement in Bulgaria by providing training in molecular techniques and genome selection for identifying beneficial mutations in crops such as tomato, pepper and the common bean. Additionally, the provision of equipment and consumables enabled the implementation of molecular selection to accelerate the development of crops with improved traits, such as higher carotene and flavonoid concentrations, higher disease resistance, and tolerance to abiotic stress. These efforts have strengthened national capabilities in agricultural research, contributing to more resilient and productive crop systems.

Bulgarian experts received training on the applications of Oxford Nanopore sequencing in mutation breeding, supporting more productive crops. (Photo: Maritsa Vegetable Crops Research Institute)

Agricultural water and soil management

AZERBAIJAN

AZB5004: Strengthening Best Soil, Nutrient, and Water Agricultural Practices for Cotton Production

A project to support the application of advanced climate-smart agricultural practices continues to enhance cotton production in Azerbaijan. Isotopic techniques were introduced, supporting innovative soil, nutrient and water management strategies. Activities in 2024 built on a previous Agency project to develop an improved cotton variety with higher tolerance to disease, drought and salinity.

Insect pest control

SERBIA

SRB5006: Strengthening National Capacity to Integrate the Sterile Insect Technique in the Control of Aedes Invasive Mosquitoes by Establishing a Mass Rearing Facility

In 2024, Serbia laid the foundations for the use of the SIT to control invasive Aedes mosquitoes, with Agency support for the development of a mass rearing facility. Key activities included conducting meetings with policymakers and stakeholders, designing the facility, and selecting a village for a sterile male mosquitoe mass release pilot trial. Collaboration with the Vinča Institute of Nuclear Sciences was established to support dosimetry research and mosquito irradiation, and essential equipment was provided along with training for new staff on mass rearing, sex separation and sterilization techniques.

TÜRKIYE

TUR5027: Implementation of SIT for Suppression and Eradication of Medfly in Turkey

In 2024, the Agency provided support to Türkiye for the mass production of sterile Mediterranean fruit flies at laboratory scale and their release in a pilot area. This effort included capacity building activities and support for participation in an international symposium to exchange experiences and good practices. Key staff members received on-the-job fellowship training in key SIT processes, such as the packing, shipping, holding and release of sterile fruit flies. The Agency also supported the procurement of necessary items for the mass rearing centre and the fly release area.

WATER AND THE ENVIRONMENT

Marine, terrestrial and coastal environments

REGIONAL

RER7014: Improving Environmental Monitoring and Assessment for Radiation Protection in the Region

In 2024, under a project to increase regional capacity for environmental monitoring, 12 radiochemistry specialists were trained at the Seibersdorf laboratories in advanced radioanalytical techniques, including alpha particle spectrometry and liquid scintillation counting. These techniques are crucial for accurately detecting natural radionuclides in water samples, and the specialists are now fully equipped to conduct independent analyses, ensuring the reliability and accuracy of their findings. Additionally, in collaboration with the State Regulatory Agency for Radiation and Nuclear Safety in Bosnia and Herzegovina, 30 specialists received training on dose assessment and the practical application of monitoring data for the purpose of safeguarding public health and the environment across various exposure scenarios. Participants learned about key recommendations and requirements for conducting radiological and environmental assessments in accordance with IAEA safety standards and European Union regulations. They also engaged in practical exercises involving the use of monitoring data to assess radiation doses affecting the public and flora and fauna.

ARMENIA

ARM7001: Improving Mercury Monitoring Capacities to Meet the Requirements of the Minamata Convention

In 2024, Armenia significantly advanced its capacity to monitor mercury and mercury compounds in the environment, aligning with the Minamata Convention on Mercury. The project enhanced the capacities of both the Hydrometeorology and Monitoring Center and the Ministry of Environment's Hazardous Substances and Wastes Policy Department. Two specialists gained expertise in soil, water, biota and air sampling and data interpretation and risk assessment related to mercury, while another improved skills in conducting quality assurance on monitoring data. Additionally, one specialist undertook a fellowship at the IAEA Marine Environment Laboratories in Monaco, focusing on the analysis of mercury and its variations in different media. Advanced equipment for mercury determination and for detecting trace amounts of mercury and other volatile heavy metals was also provided.

Capacities to monitor mercury in the environment have been strengthened in Armenia through training and the provision of equipment. (Photo: Hydrometeorology and Monitoring Centre, Republic of Armenia)

INDUSTRIAL APPLICATIONS/ RADIATION TECHNOLOGY

Reference products for science and trade

UZBEKISTAN

UZB1004: Enhancing the Capabilities of the Environmental Radiation Monitoring Network and Improving the Laboratories of the National Hydrometeorological Service

Environmental monitoring in Uzbekistan is performed by the Centre of Hydrometeorological Service of the Republic of Uzbekistan (Uzhydromet). With Agency support, an isotope hydrology laboratory is being established at Uzhydromet to ensure water quality control and sustainable management. In 2024, an expert supported the preparation of monitoring programmes alongside a sampling campaign for water analysis. A stable isotope analyser was procured to enhance the technical infrastructure of Uzhydromet, and two fellows were trained in stable isotope analysis at the Walker Institute for Climate System Research at the University of Reading, United Kingdom.

IAEA Director General Rafael Mariano Grossi visited Uzbekistan in December 2024, as part of ongoing support to the country's plans to harness nuclear science for development, including through SMRs and a new cancer hospital. (Photo: IAEA)

Research reactors

REGIONAL

RER1022: Enhancing Utilization and Safety of Research Reactors

The Agency delivered a regional training course on ageing management for research reactors in Tashkent in 2024 to enhance Member States' capacities by providing guidance on establishing, implementing and improving ageing management, refurbishment and modernization programmes.

Radioisotopes and radiation technology for industrial, health care and environmental applications

REGIONAL

RER1024: Enhancing the Use of Radiation Technologies for Improved Resource Efficiency

In 2024, regional workshops focused on critical areas such as radiation processing dosimetry, uncertainty measurement, and the implementation of new quality standards for irradiation facilities. A dedicated training course showcased the potential of radiation technologies for polymer waste recycling and how they could be integrated into recycling and production chains to create value added products. Regional experts also participated in the 15th Tihany Symposium on Radiation Chemistry, gaining knowledge and exposure to advancements in the field. A national seminar was held to raise awareness of the uses of radiation technology, with a particular focus on polymer modification.

Participants at a regional training course learned about the use of radiation technologies in polymer waste recycling. (Photo: Dresden University of Applied Sciences)

ENERGY PLANNING AND NUCLEAR POWER

Introduction of nuclear power

POLAND

POL2021: Strengthening National Infrastructure for Nuclear Safety, Radiation Protection, and Nuclear Power

In 2024, the Agency continued to support Poland in developing its national nuclear power programme through a series of expert missions, national workshops, scientific visits and fellowships. These activities covered various aspects of nuclear power, including safety requirements for NPP design, site characterization for waste disposal facilities, and public outreach strategies for nuclear regulatory bodies. Additional support was provided in areas such as leadership and safety culture, nuclear safety inspections, and human resources development for the nuclear power sector. A key component was the implementation of the Integrated Nuclear Infrastructure Review (INIR) Phase 2 mission, which assisted Poland in assessing the status of its national infrastructure for the introduction of nuclear power.

An Integrated Nuclear Infrastructure Review (INIR) Phase 2 mission was conducted in Poland in April. (Photo: Ministry of Climate and Environment, Poland)

Nuclear power reactors

ARMENIA

ARM2005: Enhancing Nuclear Safety for the Extended Design Operation Lifetime of the Armenian Nuclear Power Plant

In 2024, Armenian cooperation with the Agency significantly enhanced nuclear safety at the Armenian Nuclear Power Plant (ANPP). A TC project facilitated a seismic safety review mission, which comprehensively reviewed safety documentation and led to the development of a seismic margins assessment plan addressing upgraded hazards. The project also resulted in the successful review and update of the safe shutdown equipment list and the generation of floor response spectra, both of which are crucial for the seismic margin assessment. Additionally, the project supported the evaluation of low cycle fatigue and flow accelerated corrosion ageing management programmes, and provided training and recommendations for developing an integrated leadership management system. Risk monitoring was enhanced, and necessary modifications were identified for implementing online risk monitoring with the latest software. Capacity building was another key focus during the year, with four specialists from the ANPP gaining valuable insights into knowledge management during a scientific visit to the Kozloduy NPP in Bulgaria. Furthermore, specialists from the ANPP participated in the First International Generic Ageing Lessons Learned (IGALL) Phase 7 working groups on mechanical components and civil structures, thereby contributing to international knowledge exchange. The project also supported the upgrading of the ageing management system and the acquisition of a high purity germanium gamma spectrometry system.

RADIATION PROTECTION AND NUCLEAR SAFETY

Governmental and regulatory infrastructure for radiation safety

ESTONIA

EST9008: Building Capacity of Legal and Regulatory Frameworks on Radiation Protection and Nuclear Safety

Estonia, which is seeking to bolster its energy security while achieving net zero emissions by 2050, is considering nuclear power as an option to diversify its energy mix by 2035. The country's plans for nuclear energy are focused on SMRs and key stakeholders worked with the Agency in 2024 to identify areas that would receive support under an Integrated Work Plan (IWP). This is a strategic planning framework to support Estonia in its endeavor, including through the development of legal and regulatory frameworks in the fields of nuclear power and radioactive waste management.

GEORGIA

GEO9019: Improving the Regulatory Infrastructure for Radiation Safety

In 2024, Georgia made progress in developing regulatory infrastructure for radiation safety and enhancing emergency response capabilities at the Agency of Nuclear and Radiation Safety. Specialists received training in the authorization and inspection of new technology in medicine and industry, including proton therapy and cyclotron installations. Two scientific visits were conducted: one to the Radiation Protection Centre of the Ministry of Health in Vilnius focused on EPR, and another to the Nuclear Regulatory Agency in Sofia focused on gaining experience and knowledge to authorize the operation of new technology in medical and industrial installations. Fellowships for Georgian regulators and operators hosted by the Radiation Protection Department of the State Office for Nuclear Safety in Prague focused on planning and developing a robust regulatory package for new medical applications, as well as on authorization and inspection at these installations. Fellows had the opportunity to visit the Proton Therapy Centre in Prague and its cyclotron facility, a radiopharmaceutical manufacturer, PET centres and hospitals.

Georgian regulators and operators were supported through three fellowships hosted by the Radiation Protection Department of the State Office for Nuclear Safety in Prague. (Photo: J. Slovák/SONS)

Radioactive waste management, decommissioning and remediation of contaminated sites

KAZAKHSTAN

KAZ9019: Enhancing the Decommissioning, Remediation, and Handling of Radioactive Waste in the Mining and Processing of Natural Uranium

A preliminary fact-finding mission was conducted at the BN-350 fast reactor facility in Aktau, Kazakhstan, as part of the decommissioning efforts under this project. The mission assessed the current status of decommissioning and identified key challenges related to the process. Additionally, discussions were held to define the priority tasks for TC projects for 2024–2025.

SERBIA

SRB9007: Strengthening Radiation Safety Capabilities in Public Company Nuclear Facilities

Support provided to the Public Company Nuclear Facilities of Serbia (PCNFS), bolstered the protection of workers, the public and the environment from the harmful effects of ionizing radiation in Serbia, in line with national priorities. With Agency assistance, PCNFS upgraded its radiation safety system and improved its internal occupational exposure assessment by acquiring advanced detectors and equipment for the whole body counting facility. PCNFS has enhanced its capacity to plan and implement radiation protection measures for decommissioning and radioactive waste management.

UKRAINE

UKR9042: Supporting the Decommissioning, Radioactive Waste Management and Other Complex Long Term Problems within the Chornobyl Exclusion Zone

Through a national project supporting the decommissioning, radioactive waste management and other complex long term problems within the Chornobyl exclusion zone, assistance was provided to strengthen Ukraine's nuclear waste management sector with a focus on human resource development and enhancing capacity and resilience in radioactive waste management. The initiative facilitated safer decommissioning practices and marked a significant step toward sustainable nuclear waste management in the country.

Radiation protection in medical uses of ionizing radiation

BOSNIA AND HERZEGOVINA

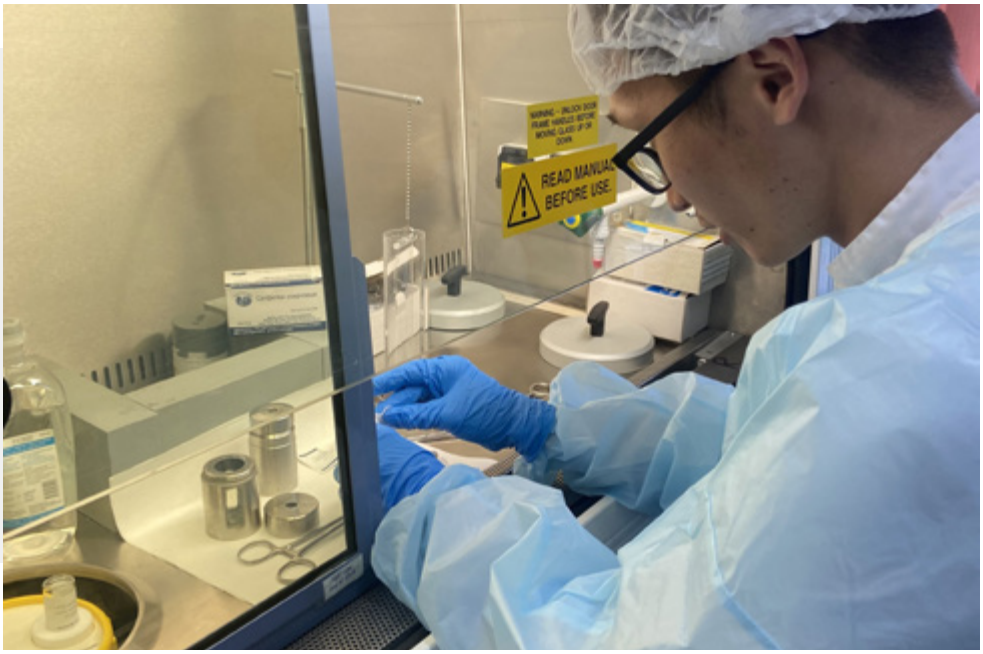
BOH9014: Strengthening Radiation Protection of Paediatric Patients in Diagnostic and Interventional Radiology

Two national training courses on patient dosimetry and optimization in paediatric diagnostic and interventional radiology boosted the treatment of childhood cancers in Bosnia and Herzegovina. Twenty-one physicians, radiographers and physicists were trained in patient dosimetry, with special emphasis on paediatric patients, and are now applying the acquired knowledge in the workflows of their facilities. Equipment was also provided to enable eight public institutions to perform necessary measurements to strengthen safety for paediatric patients and staff.

KYRGYZSTAN

KIG9008: Improving Radiation Protection of Patients and Staff in Diagnostic and Interventional Radiology Services

Kyrgyzstan is strengthening the capacity of the National Centre of Oncology and Haematology in Bishkek in order to provide quality diagnostic and treatment for cancer patients. The Agency facilitated support for the servicing, repair and calibration of the centre's SPECT unit, as well as on-site training for medical staff on nuclear medicine techniques, covering topics such as labelling of technetium-99m kits, eluting generators, dose calibration, radiation safety, patient preparation, radiopharmaceutical administration, quality audits, and handling of radioactive waste. The Agency also supported a national training course for radiation therapy technologists, providing expert advice on workflows and work plans for immediate improvement of clinical skills in order to increase the quality of radiotherapy at the hospital.



The IAEA conducted a workshop to introduce basic nuclear medicine techniques to medical staff from the National Centre of Oncology and Haematology of Kyrgyzstan. (Photo: IAEA experts)

Radioactive waste management, decommissioning and remediation of contaminated sites

REGIONAL

RER9164: Building Capacity for Radioactive Waste Management

Events organized in 2024 under this regional project emphasized the importance of international cooperation and innovation in radioactive waste management. A regional workshop was held in Germany on design principles for radioactive waste repositories, and a further workshop in the Kingdom of the Netherlands focused on long term storage technologies. These efforts foster collaboration, facilitate the sharing of best practices and support the development of innovative solutions, ultimately contributing to safer and more efficient radioactive waste management and environmental protection.

LITHUANIA

LIT9020: Enhancing National Capabilities for Decommissioning and Radioactive Waste Management, Safety Assessment, Oversight, Licensing and Emergency Prepardness

In 2024, an expert mission supported the preparation of a feasibility study on the demolition of contaminated buildings and the management of contaminated concrete in Lithuania, assessing the technical, safety and regulatory challenges involved in dismantling structures affected by radioactive contamination. The mission supported Lithuania's efforts to develop practical strategies for safely managing contaminated materials, including concrete, in compliance with national and international safety standards. A separate expert mission in early 2024 helped the country gain experience in preparing for site release from regulatory control, further strengthening national decommissioning and regulatory capabilities.

SLOVAKIA

SLR9020: Enhancing Competence for the Safe and Effective Completion of Decommissioning Projects

In October 2024, an expert mission to Slovakia reviewed state-of-the-art methods, techniques and procedures for the dismantling, handling and storage of highly contaminated or activated components from the primary circuit of NPPs. The mission focused on advancing decommissioning competencies by evaluating the latest advancements in safety protocols, and best practices.

NUCLEAR KNOWLEDGE DEVELOPMENT AND MANAGEMENT

CZECH REPUBLIC

CZR0012: Enhancing Nuclear Knowledge, Skills Preservation and Expertise for the Peaceful Use of Nuclear Energy

In 2024, Czech specialists strengthened their knowledge of Transient Reactor Test Facility (TREAT) experiments and measurements, and of fuel behavior in reactivity initiated accidents, through a fellowship at Idaho National Laboratory, USA. Human resource capacities related to the uranium geology cycle were strengthened through a fellowship hosted by Argentina's National Atomic Energy Commission (CNEA) and through a scientific visit to the Geological Survey of Finland, Espoo.

Strengthening regulatory infrastructure for radiation safety In 2024, the Agency brought together 20 senior managers from regulatory bodies in Europe and Central Asia to deepen their understanding of the practical benefits of an integrated management system and to enhance leadership and management skills to support the effective implementation of such systems.

RADIATION SAFETY

The impact of Technical Cooperation in Europe

UKRAINE
In 2024, the Agency continued to support health systems in Ukraine. Six professionals from the Bukovinian Clinical Oncology Centre undertook six-month fellowships abroad to enable them to operate a second linear accelerator acquired by the Ministry of Health. Vital equipment was also provided to the centre, including a C-arm X-ray unit, a brachytherapy system and a mammography system.

RAYS OF HOPE

RAYS OF HOPE

Health and Nutrition

A regional workshop on paediatric radiotherapy was organized at the Faculty of Medicine at Ege University in Türkiye, a Rays of Hope Anchor Centre in the region. The workshop brought together 100 radiotherapy professionals to develop a roadmap for expanding access to paediatric radiotherapy services.

The Institute of Oncology Ljubljana in Slovenia was designated the second regional Anchor Centre in the region in 2024, in a bid to boost capacity for the delivery of cancer care by providing training.

KAZAKHSTAN

The Agency continues to support nuclear power programme developments in Kazakhstan.
A national workshop on stakeholder engagement was held in May 2024, ahead of a referendum on the introduction of nuclear power held in October 2024. Capacity building activities focusing on management systems and the organizational culture necessary for a successful nuclear energy project were also organized in the country, in support of preparatory work for a nuclear power programme.

MALTA

A liquid water isotope laser analyser system and expertise were provided to the Energy and Water Agency (EWA) to enhance Malta's capacity in isotope analysis. This led to an improved understanding of the management of the country's water resources and strengthened the EWA's field capacity. Officers from the EWA's water unit are now engaged in active chemistry and isotope sampling for groundwater.

C.4.

2024

Latin America and the Caribbean

- In 2024, 32 Member States, including one LDC, were supported through the TC programme. By the end of the year, there were 145 national and 35 regional projects active. The programme achieved an implementation rate of 88.5% in the region.
- Five countries in the region signed CPFs in 2024: Cuba, El Salvador, Grenada, Peru and Uruguay. CPFs were also extended for the first time in 2024, in Belize.

LATIN AMERICA AND THE CARIBBEAN

32 Countries receiving technical support

88.5% Technical Cooperation Fund implementation rate

€23 456 638
Budget allotment at year end

€20 762 129
Encumbrances and actuals

Cooperation and training

211 Fellows and scientific visits

609 Expert and lecturer assignments in the region

46 Regional training courses

914 Participants in training courses

74 Regional meetings and workshops

1179 Meeting participants and other project personnel

The distribution of assistance through TCF and extrabudgetary disbursements in the Latin America and the Caribbean region according to technical field in 2024.

- Food and Agriculture 18.3%
- Health and Nutrition 22.3%
- Industrial Applications/Radiation Technology 6.5%
- Nuclear Knowledge Development and Management 18.2%
- Safety and Security 18.9%
- Water and the Environment 13.6%
- Energy 2.2%

Projects in 2024

38 closed
222 in closure
0 cancelled

Five Member States signed CPFs in 2024:

Cuba
El Salvador
Grenada
Peru
Uruguay
The CPF for Belize was extended

C.4.1. Overview of regional thematic priorities

In the field of **health**, 21 countries in Latin America and the Caribbean participated actively in Rays of Hope in 2024, which aims to scale up much needed imaging, nuclear medicine and radiotherapy access for cancer patients. Support in this area includes the procurement of linear accelerators for the Dominican Republic, Mexico, Uruguay and Venezuela. Efforts continue to build capacity, train a new generation of qualified professionals and expand the use of more advanced techniques in the region. With regard to nutrition, the Latin America and the Caribbean region continues to face significant challenges, with undernutrition and overnutrition affecting maternal and child health. A regional study examining maternal body composition during pregnancy and its link to infant body composition helped to establish nutrition guidelines for optimal maternal and child outcomes.

IAEA Director General Rafael Mariano Grossi visited Paraguay in December 2024 as part of ongoing support for the country's use of nuclear science to increase food security and cancer care, among others. (Photo: IAEA)

In **food and agriculture**, the TC programme made significant progress in 2024 in addressing food safety and security challenges in Latin America and the Caribbean through nuclear science and technology, with the support of Atoms4Food. Activities focused on capacity building, technical support and technology transfer, and contributed to agricultural productivity, food quality, and food sustainability in the region.

In **water and the environment** in 2024, the TC programme strengthened capacities in Latin America and Caribbean Member States to use isotope techniques to assess and manage surface water and groundwater resources, building on existing capacities and promoting regional collaboration under the IAEA Global Water Analysis Laboratory (GloWAL) Network.

The focus of TC support for **industrial applications** in 2024 was on the development of business plans for irradiation facilities for plastic recycling and phytosanitary applications. Emphasis was placed on strengthening stakeholder engagement to better understand variables when assessing project feasibility.

In the field of **energy**, the focus in the region was on strengthening long term operation infrastructure and providing support to existing nuclear power plants that are expected to go through a lifetime extension process. Emphasis was placed on building on existing regional energy planning capacities by applying the climate, land, energy and water approach to national energy planning programmes. Tailored assistance was provided to Member States in SMR technology development, given the growing interest worldwide in the role of SMRs in the energy matrix.

Radiation safety continued to be an important focus for Latin America and the Caribbean in 2024 as the region continues to expand the use of nuclear technology in medicine, agriculture and industry. Efforts focused on supporting Member States in strengthening radiation protection, hazard assessments, and response to radiological emergencies through training courses and the provision of key equipment.

CARICOM Member States continued to receive support to strengthen their radiation safety frameworks, including through the procurement of radiation and personal protective equipment for first responder institutions. This was complemented with training of personnel in the development of national radiation emergency plans, including hazard assessments and radiation protection programmes for industrial applications, in particular industrial radiography.

A meeting of the Regional Steering Committee of the Regional Strategic Framework for Technical Cooperation with IAEA–CARICOM Member States 2020–2026 was held in November. Participants reviewed the progress made under the RSF and proposed actions to improve its implementation. (Photo: J. O'Brien/IAEA)

C.4.2. Project highlights according to thematic area

HEALTH AND NUTRITION

Radiation oncology in cancer management

REGIONAL

RLA6092: Strengthening the Use of Advanced Techniques and Hypofractionation Schemes of Radiotherapy in the Countries of the Region (ARCAL CLXXXVIII)

Countries in the Latin America and the Caribbean region are tending towards the adoption of advanced radiotherapy techniques such as VMAT and image guided radiation therapy (IGRT), which require new theoretical knowledge and practical skills. The M.D. Anderson Cancer Center, a leading US cancer treatment centre, is working with the Agency to support professional development to improve access to radiotherapy. In August, a regional training course on VMAT and IGRT at the M.D. Anderson Cancer Center brought together 26 participants, including physicians and medical physicists, from oncology teams across the region. Another training course boosted skills in critical areas such as radiation physics, biology, treatment planning, equipment needs, quality assurance and radiation safety, as well as in administrative areas such as staffing, budgeting and research funding.

COLOMBIA

COL6019: Implementing Stereotactic Body Radiation Therapy in the Treatment of Lung Cancer

Caldas University Hospital in Manizales, Colombia, has received an electron density phantom, which is needed for the precise planning of radiotherapy treatment. The machine provides medical physicists with an accurate tool to evaluate CT scan data, and will be used in the implementation of advanced radiotherapy techniques such as stereotactic body radiation therapy, which can provide high radiotherapy doses to tumours in a short timeframe, thereby decreasing the risk of postoperative complications.

During his visit to Chile in May 2024, IAEA Director General Rafael Mariano Grossi toured the Centre for Nuclear Studies (CEN) in La Reina. (Photo: IAEA)

GUYANA

GUY6001: Strengthening Cancer Diagnosis and Treatment Services in the Public Health Sector in Guyana

GUY6002: Strengthening Diagnostic Radiology Services

National diagnostic radiology services in Guyana have been strengthened through the provision of mammography units to four hospitals: Linden Hospital Complex, New Amsterdam Public Hospital, Public Hospital Suddie and Lethem Regional Hospital. Quality control equipment was provided for the Georgetown Public Hospital Corporation. In parallel, the Agency provided technical guidance to help centres plan, design and operate high quality and safe breast cancer screening services.

HONDURAS

HON6006: Improving the Capacities of the National Cancer Center of Honduras

In Honduras, the Agency contributed to the acquisition of the first linear accelerator to be installed in the public health sector, which will significantly enhance treatment capacity at the main cancer centre in the country. IAEA assistance to address cancer in Honduras has received significant extrabudgetary support from the United States of America. Delivery and installation is expected in 2025.

Honduran President Xiomara Castro during a visit to San Felipe Hospital, where the linear accelerator donated by the Agency will be installed. (Photo: Ministry of Health of Honduras)

Nutrition for improved health

REGIONAL

RLA6089: Using Stable Isotopes to Reduce Nutritional Risks in Pregnant Women and Their Impact on Infants (ARCAL CLXXXIV)

The Agency continued to provide experts with assistance in collecting nutrition data during pregnancy and infancy using isotopic techniques. Specialists from 13 countries in Latin America and the Caribbean participated in a workshop in Chile to enhance their skills in analysing and interpreting such data in order to inform policies promoting the nutritional health of mothers and infants. The workshop, along with other capacity building initiatives, is part of a regional effort to reduce maternal and early childhood malnutrition by using stable isotopes to evaluate breast milk intake and assess infant body composition.

Radioisotopes and radiopharmaceuticals production for medical applications

REGIONAL

RLA6085: Strengthening the Capacities of Cyclotron/Positron Emission Tomography Centres in the Region (ARCAL CLXXXIII)

A regional workshop on regulatory requirements for radiopharmaceuticals brought together producers and regulators from Latin America and the Caribbean to review challenges and share experiences of regulatory processes. As a result, a collaboration network was created, promoting the exchange of information as well as the development of strategies to enhance regulatory efficiency.

FOOD AND AGRICULTURE

Crop production

REGIONAL

RLA7027: Applying Nuclear Technology in Agriculture, Water Resource Management and the Environment in Caribbean Member States (CARICOM)

The Agency provided assistance to strengthen the capacity of CARICOM Member States in plant mutation breeding. A training course, held in Dominica in September, brought together 17 participants from 10 Member States to learn about radiation induced mutations and associated biotechnology and their role in developing new varieties of local crops with enhanced resilience to plant diseases, higher yields and improved nutritional value.

Insect pest control

REGIONAL

RLA5083: Enhancing Capacity for the Use of the Sterile Insect Technique as a Component of Mosquito Control Programs

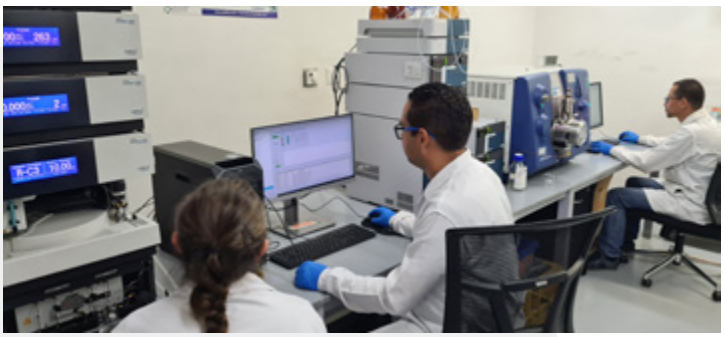
In August 2024, a high dose X-ray irradiator was delivered to the Vector Laboratory at the Institute of Hygiene of the University of the Republic of Uruguay, to support the application of vector control methods such as the SIT to contain disease transmitting insects, including mosquitoes. The United States of America has provided important extrabudgetary support to this project in support of IAEA efforts to promote the application of the sterile insect technique in the region.

Food safety

REGIONAL

RLA5091: Strengthening the Monitoring Programmes of Pesticide Residues and Mycotoxins in Food Through the Establishment of a Proficiency Test Programme in Official Laboratories (ARCAL CXCV)

The Food Safety Laboratory of the Colombian Agricultural Institute (ICA) received an ion chromatography system, which will be used to analyzse pesticide residues and other chemical contaminants as part of the public food safety monitoring programme. The ICA is leading a regional effort involving 19 countries to produce local items required for interlaboratory comparison tests. Through the Latin American and Caribbean Analytical Network and with Agency assistance, Argentina, Brazil and Colombia are developing capacities to produce proficiency test items using isotopic dilution, a highly accurate and precise technique for measuring element concentrations in a wide array of samples. These items will be available for interlaboratory comparison tests, benefiting all countries in the region. In June, a regional meeting was held in Bogotá, in collaboration with UNIDO, to develop a roadmap for the implementation of a regional interlaboratory comparison programme for analytical food safety laboratories. Furthermore, training courses were held on ISO 17025 quality standards and on basic statistics.



With equipment provided by the IAEA, staff at the Food Safety Laboratory of the Agricultural Institute of Colombia will be able to analyze pesticide residues and other chemical contaminants as part of a public food safety monitoring programme. (Photo: N. Schloegl/IAEA)

BARBADOS

BAR5001: Enhancing Capability for Food Safety and Surveillance through the Development of Nuclear, Isotopic and Complimentary Analytical Methods

The food safety analysis capabilities of the national laboratory at Government Analytical Services in Barbados are being improved with the provision of ultra-high performance liquid chromatography for quantitative and confirmatory analysis of mycotoxins and pesticide residues in plant and animal food products. Laboratory staff have been trained in analytical method development and validation techniques for pesticide and other chemical residues in food using isotope-based liquid chromatography–mass spectrometry and gas chromatography–mass spectrometry.

WATER AND THE ENVIRONMENT

Water resources management

REGIONAL

RLA7029: Enhancing Regional Capacities to Assess Freshwater Availability and Quality Using Isotope Hydrology Techniques (ARCAL CXCIV)

Through this project, the capacities of Member States in Latin America and the Caribbean to assess and better manage underground water resources using isotope hydrology, were strengthened. A comprehensive review of the regional situation and infrastructure was conducted with the support of the Agency and international experts, and tailored training was subsequently provided by means of an underground hydrology course in Uruguay and a regional training course on laser spectrometry methods for isotope hydrology in Mexico. Regional technical counterparts and decision makers were introduced to the work of the project and to relevant Agency methodologies and tools at a regional meeting in Vienna in December.

REGIONAL

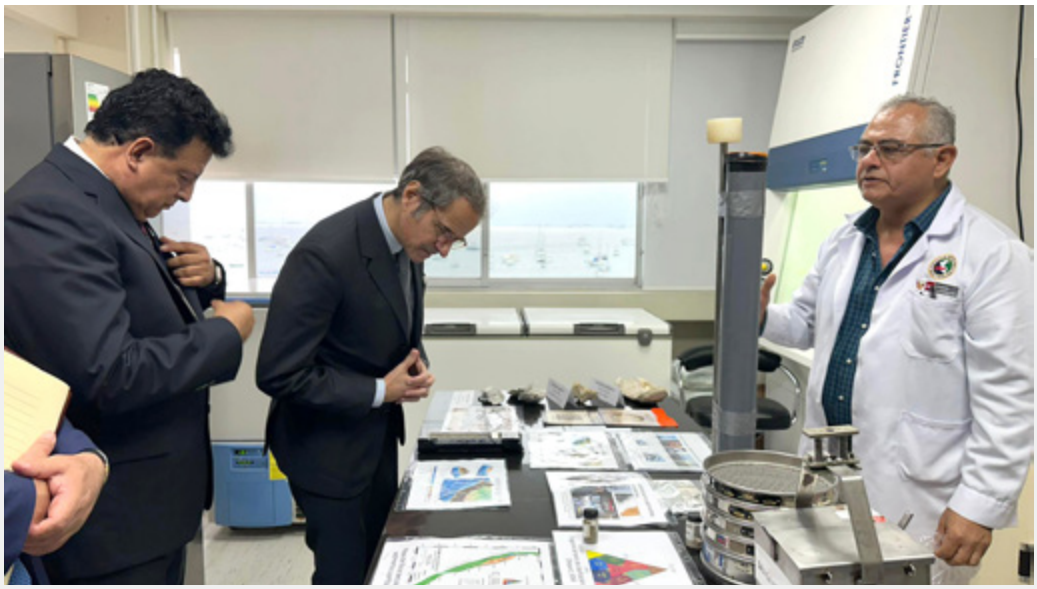
RLA7027: Applying Nuclear Technology in Agriculture, Water Resource Management and the Environment in Caribbean Member States (CARICOM)”

CARICOM Member States received support to strengthen their water resources management capacities through the training of personnel in conceptual hydrogeology models and isotope hydrology methodologies. In addition, laboratory personnel at the Caribbean Institute for Meteorology and Hydrology in Barbados were trained in the use of laser spectrometry, including troubleshooting, data acquisition and data processing.

COLOMBIA

COL7005: Strengthening National Capacities to Improve Groundwater Quality in Key Priority Areas using Isotope Techniques

The Agency assisted several institutions in Colombia to apply isotopic techniques to improve groundwater quality, including the Regional Autonomous Corporations of Quindío and Caldas, the University of Antioquia in Medellín, and the Colombian Geological Service in Bogotá. An ion chromatography system was installed at the Regional Autonomous Corporation of Quindío, alongside a national training course on ion chromatography in July 2024. The delivery of hydrology and radon equipment and accessories was finalized in June 2024, and a national training course on the use of radon-222 to evaluate interactions between surface water and groundwater was held in November 2024.



In June 2024, IAEA Director General Rafael Mariano Grossi visited Peru's Instituto del Mar del Perú (IMARPE), which has been supported by the IAEA in efforts to tackle marine pollution. (Photo: IAEA)

INDUSTRIAL APPLICATIONS/ RADIATION TECHNOLOGY

ARGENTINA

ARG2017: Strengthening Capacities for the Characterization of Polymer Matrix Composite Materials to Support Nuclear Facility Design, Operation and Maintenance

In Argentina, the Agency supported the characterization of polymer matrix composite materials for nuclear facility design, operation and maintenance by providing specialized equipment to perform NDT and the characterization of composite materials, together with training. National capacities have now been established to support advanced industrial technology development projects in the country's nuclear sector.

Research reactors

BRAZIL

BRA0025: Developing Human Resources in Nuclear Technology

An Agency-led team of experts has concluded an Operation and Maintenance Assessment for Research Reactors (OMARR) mission to the IEA-R1 research reactor site in Brazil, and has provided recommendations and suggestions to improve operation and maintenance practices.

CHILE

CHI9026: Strengthening National Infrastructure for Radiation and Nuclear Safety

A follow-up OMARR mission to Chile assessed progress in the implementation of the recommendations made two years previously. The expert mission also reviewed the operating conditions of key components and structures of the research reactor facility, which marked 50 years of operation in 2024.

ENERGY PLANNING AND NUCLEAR POWER

Energy planning

REGIONAL

RLA2018: Supporting the Development of Comprehensive Energy Plans Considering the Climate, Land, Energy and Water in Latin America and the Caribbean (ARCAL CXC)

In 2024, Agency efforts to strengthen regional capabilities in energy planning continued with a training course on using Agency and related tools for integrated analysis of climate, land, energy and water systems (CLEW). Meetings focused on the application of this methodology were held in Uruguay and Nicaragua, where models applying this approach were developed. Complementing these efforts, online events encouraged interaction between public institutions involved in energy planning and water and land use. Member States considering the introduction of nuclear energy in their energy planning strategies received tailored assistance upon request.

REGIONAL

RLA0063: Using Nuclear Techniques for Climate Change Adaptation and Mitigation

Fourteen participants from five CARICOM Member States have been introduced to the suite of Agency assessment tools, including for energy data, statistics and balances, energy demand analysis and energy supply optimization, to support national efforts in effective energy planning.

Nuclear power reactors

ARGENTINA

ARG2018: Consolidating Capabilities in Ageing Management and Equipment Qualifications at Nuclear Power Plants and Research Reactors

As the lifetime of some NPPs is being extended, capacities for the management of ageing equipment to ensure the safe operation of nuclear facilities must be continuously maintained. Agency support to Argentina contributed to enhancing national capacities in this area by facilitating scientific visits to relevant facilities, strengthening laboratory capacity with new equipment, and providing expert advice on addressing new challenges and providing effective and innovative solutions.

RADIATION PROTECTION AND NUCLEAR SAFETY

Governmental and regulatory infrastructure for radiation safety

LATIN AMERICA AND THE CARIBBEAN

RLA9095: Strengthening the Regulatory Infrastructure to Enhance Radiation Safety in Latin America and the Caribbean

Several capacity building events were held in 2024 under a regional project to enhance radiation safety infrastructure. Coordination meetings with relevant stakeholders from the different thematic safety areas supported the exchange of experiences and lessons learned, and facilitated enhanced regional coordination among regulatory bodies.

The Agency organized a meeting in collaboration with the Pan American Health Organization (PAHO) in its capacity as the WHO Regional Office for the Americas to strengthen collaboration between health and nuclear regulatory authorities in 13 countries in the region. The meeting agreed on the San José Action Plan, which sets out 32 concrete actions to improve the effectiveness of regulatory control around four areas: improve cooperation between nuclear and health regulatory authorities; provide training for both regulatory personnel and users; strengthen regulatory infrastructures by updating national regulations and inspection capabilities; and update national inventories.

Radiation protection of workers and the public

REGIONAL

RLA9093: Strengthening Regional Capabilities on Radiation Protection for End Users and Technical Support Organizations

In 2024, the Agency held a regional meeting with focal points for occupational radiation protection and radiation protection in medical exposure to review training needs with a view to establishing regional schools in these areas. Throughout the year, webinars and regional training courses were provided in radiation protection in radiotherapy, nuclear medicine, interventional radiology in trauma medicine, urology and gastroenterology; the implementation of dosimetry codes of practice for absorbed dose determination in external beams and brachytherapy; calibration using X-ray beams; and the implementation of ISO 4037 in SSDLs. Member States were also consulted to map the regional NORM situation and needs. This information is being used to define actions to support regional capacity building activities in this area.

The Agency sponsored the participation of national representatives in the International Conference on Enhancing Nuclear Safety and Security Through Technical and Scientific Support Organizations (TSOs), and in the 2024 Symposium of the Network for the Optimization of Occupational Radiation Protection in Latin America . The latter provided an opportunity to share scientific results and strengthen this important area of safety in Latin America. The participants had the opportunity to attend two of the four courses offered by the symposium: in computational dosimetry techniques, veterinary radiation protection, radiation protection in the event of incidents and accidents, and radiation protection in interventional radiology.

ARCAL

ARCAL celebrated its 40th anniversary in 2024. Since its establishment, the agreement has contributed to the implementation of nearly 200 regional TC projects, training over 35 000 professionals from across the region in various aspects of nuclear science and technology through some 1500 courses, meetings and workshops.

The impact of Technical Cooperation in Latin America

NUTEC PLASTICS

Water and the Environment

- Regional counterparts and international experts met in Lima to develop training on approaching stakeholders and developing a business strategy to link irradiation technology with the objectives of the plastics industry.
- In Montevideo in November, project counterparts met local stakeholders from the plastic recycling industry to raise awareness of how irradiation technology can strengthen a circular plastic economy in the region. Assistance was provided to develop business plans in the pilot countries.

JAMAICA
With Agency assistance, the International Centre for Environmental and Nuclear Sciences established a self-contained gamma irradiation facility to support the use of the SIT, mutation induction for the development of new crop varieties, and the irradiation of agricultural crops as a post-harvest phytosanitary measure on a pilot scale.

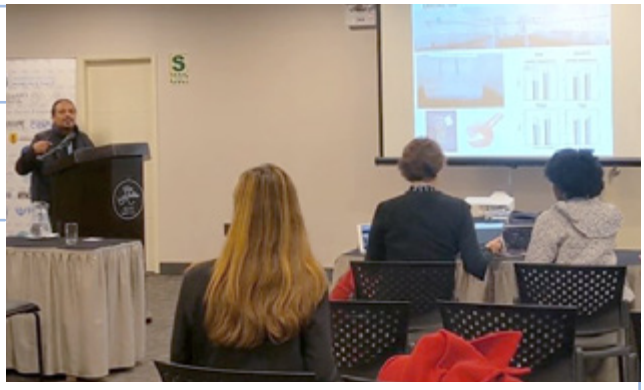
RAYS OF HOPE

Health and Nutrition

- Thirty-two mammography units are under procurement through Rays of Hope for **19 countries in Latin America and the Caribbean in 2024** to support breast cancer screening and diagnosis.
- The delivery and installation of the machines are ongoing; once in place these units will **provide services for up to 250 000 women per year.**

and the Caribbean

REMARCO



In August 2024, INVEMAR, Colombia, received equipment to support soil, fertilizer and seawater analysis, boosting throughput in its analytical laboratory. **INVEMAR conducts key marine research** and serves as a national and regional reference and training centre within the Research Network of Marine-Coastal Stressors in Latin America and the Caribbean.

ARGENTINA/BRAZIL
To support nuclear safety for the long term operation of NPPs, two SALTO missions were carried out in 2024 at Atucha I NPP in Argentina, and at Angra NPP in Brazil, and specific missions applying the PROSPER methodology were implemented in the two countries.

C.5.

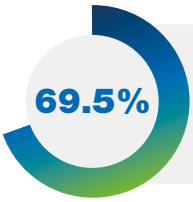
2024 Interregional projects

→ Interregional projects deliver technical cooperation support across national and regional boundaries and address the needs of several Member States in different regions. By the end of 2024, there were 19 interregional projects active.

INTERREGIONAL

€9 593 256
Budget allotment at year end

€6 665 358
Encumbrances and actuals



Technical Cooperation Fund implementation rate

Cooperation and trainings

131 Fellows and scientific visits

364 Expert and lecturer assignments in the region

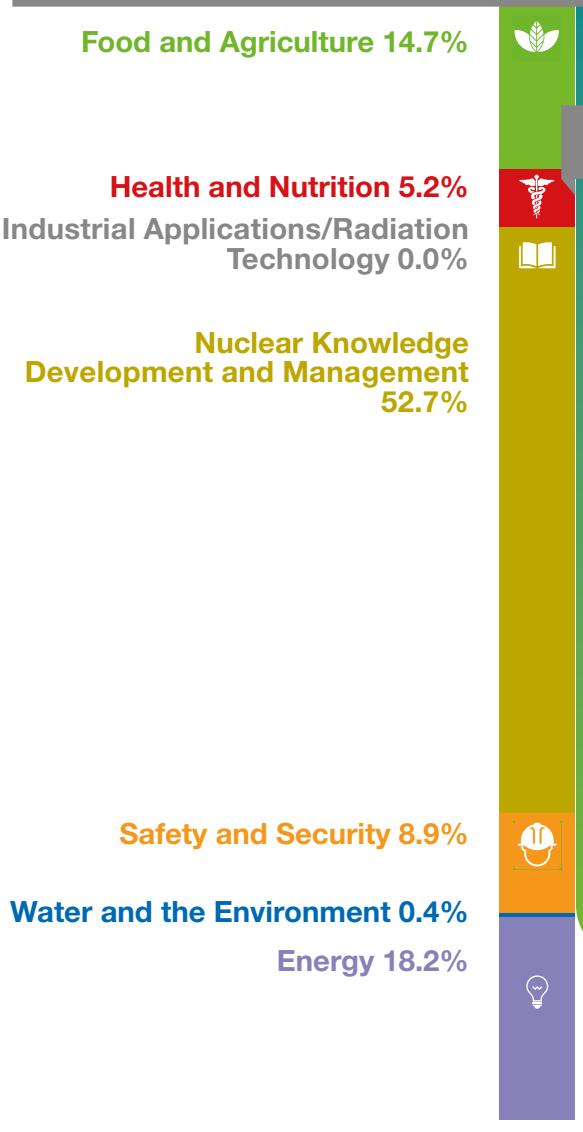
31 Interregional training courses

680 Participants in training courses

50 Regional meetings and workshops

898 Meeting participants and other project personnel

This graph shows the distribution of assistance through TCF and extrabudgetary disbursements in interregional projects according to technical field in 2024



Interregional Projects in 2024

4 closed
18 in closure
0 cancelled

C.5.1. Project highlights according to thematic area

FOOD AND AGRICULTURE

Livestock production

INT5157: Supporting National and Regional Capacity in Integrated Action for Control of Zoonotic Diseases

The Agency continued to support capacity building activities in Member States to strengthen One Health and pandemic preparedness under ZODIAC. In 2024, the Livestock Research Institute for Development in Chad was established as a world-class research and diagnostic laboratory for zoonoses. This was achieved thanks to the equipment provided by the Agency under ZODIAC, in partnership with the World Bank, the Swiss Tropical and Public Health Institute and Yale School of Public Health.

WATER AND THE ENVIRONMENT

Marine, terrestrial and coastal environments

INT7020: Developing Capacity towards the Wider Use of Stable Isotopic Techniques for Source Attribution of Greenhouse Gases in the Atmosphere

Efforts continued under an interregional project to increase Member State capacities to generate high quality stable isotope data on greenhouse gas emissions. In August 2024, the IAEA Technical Document *Measurement of the Stable Carbon Isotope Ratio in Atmospheric CH4 Using Laser Spectroscopy for CH4 Source Characterization* (IAEA-TECDOC-2066) was released — the first publication outlining good practice in isotopic analyses and methane footprinting. This publication will underpin the development of training materials for the regional expert centres for analysis and training being established under the project. In addition to the centre being established in Argentina, two further centres have been identified under the project, in Singapore and South Africa.

RADIATION PROTECTION AND NUCLEAR SAFETY

Radioactive waste management, decommissioning and remediation of contaminated sites

INT9186: Sustaining Cradle-to-Grave Control of Radioactive Sources - Phase II

Source removal operations for the Republic of Moldova were completed in March 2024. Source capsules and shielded containers were delivered to Bulgaria, Cameroon, Cuba, Egypt, Ghana, Jordan, Lebanon, Nigeria and Thailand. In addition, an interregional meeting on the safety and security of disused sealed radioactive sources (DSRSs) during predisposal management was held in Türkiye in March 2024.

INT9187: Sustaining Cradle-to-Grave Control of Radioactive Sources – Phase III

The procurement processes for the removal of Category 1 and 2 DSRSs were initiated for Bangladesh, Morocco, Uganda and the United Republic of Tanzania. An interregional training course on the use of the Agency mobile toolkit for handling Category 3 to 5 DSRSs was held in Kuala Lumpur in November 2024. In addition, an interregional meeting on the selection of disposal options for DSRSs was held in Santiago in September 2024.

Emergency preparedness and response

INT9188: Strengthening and Harmonizing Regional Arab Cooperation and Coordination in Emergency Preparedness and Response (EPR)

In 2024, the Arab Roadmap on Emergency Preparedness and Response was adopted. The roadmap aims to strengthen the capabilities of Arab countries in preparing for and responding to nuclear and radiological emergencies.

ENERGY PLANNING AND NUCLEAR POWER

Introduction of nuclear power

INT2024: Supporting Member States Introducing or Expanding Nuclear Power Programmes to Develop a National Infrastructure for a Safe, Secure and Peaceful Nuclear Power Programme

In 2024, a four-year interregional project to support Member States in developing national infrastructure for safe, secure and sustainable nuclear power programmes was initiated. It builds on three previous projects and involves 59 beneficiary countries, and extrabudgetary contributions from five donor countries (France, Japan, Republic of Korea, Russian Federation, United States of America) and an in-kind contribution from one country (China). In 2024, technical training events covered topics ranging from regulation and infrastructure development to reactor technology assessment and leadership for safety, with a special focus on project financing, environmental protection and emergency preparedness.

Nuclear power reactors

INT2023: Supporting Member States' Capacity Building on Small Modular Reactors and Micro-reactors and their Technology and Applications as a Contribution of Nuclear Power to the Mitigation of Climate Change

Agency support for countries interested in the deployment of SMRs continued in 2024. During the course of the year, 14 events including 8 workshops, 2 training courses, 2 expert missions, 1 scientific visit and 1 TC-sponsored conference participation were conducted, involving 969 participants from more than 60 Member States. An event in Beijing for example, provided stakeholders with the opportunity to learn about the development of a taxonomy for SMRs and microreactors, and facilitated the transfer and interoperability of knowledge organization systems for these technologies. The project is supported by extrabudgetary contributions from two main donor countries (Russian Federation and United States of America), and one in-kind contribution country (China).


CAUTION

C.6.

2024

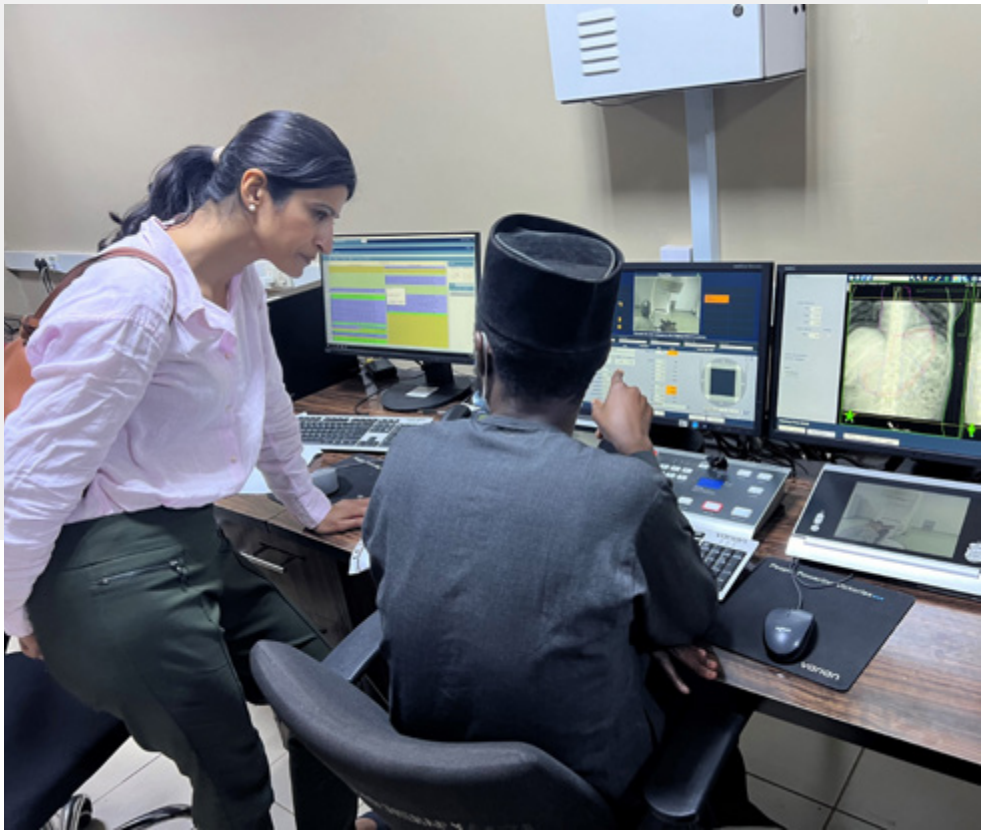
Programme of Action for Cancer Therapy

- In 2024, the Agency, through the Programme of Action for Cancer Therapy (PACT) continued to support the efforts of low- and middle-income Countries (LMICs) to integrate radiation medicine into national comprehensive cancer control programmes. PACT activities focused on assessing cancer control capacities, providing expert advice for national cancer control planning, assisting with the development of strategic funding documents, and mobilizing resources for cancer-related projects.
- In February 2024, PACT coordinated the Rays of Hope Forum which provided an impetus for partnership building and resource mobilization throughout the year. Several first-time traditional donors from 2023 renewed their contributions and additional partners joined in 2024.

C.6.1. ImPACT Reviews

In 2024, activities from PACT supported Ministries of Health in developing evidence based strategies for comprehensive cancer control and provided essential information to advance the implementation of global initiatives, including Rays of Hope, the WHO Global Initiatives on cervical, breast and childhood cancer, and the broader agenda for the SDGs and universal health coverage. In particular, through the delivery of integrated missions of PACT (imPACT Reviews), key areas of cancer control were assessed, such as geographical and financial access to cancer services, the inclusion of cancer radiation medicine in essential health benefits packages, and the integration of cancer control within non-communicable disease service delivery platforms. Recommendations from imPACT Reviews identified areas where the Agency and its partners can provide programmatic support to enhance national cancer control systems and promote safe, high quality radiation medicine practices. In 2024, nine imPACT Reviews were conducted in Bolivia, Eswatini, The Gambia, Guatemala, Indonesia, Mongolia, Mozambique, Nigeria and Peru, as well as follow-up missions in Indonesia and Nepal.

An international expert in radiotherapy engages with a medical physicist at the Usman Danfodiyo Teaching Hospital in Sokoto, Nigeria. (Photo: L. Haskins/IAEA)



Bolivia

An imPACT Review mission was conducted in Bolivia to evaluate the country's cancer control system. The assessment identified key gaps and areas for development in Bolivia's cancer care infrastructure, with a particular focus on the high incidence of cervical cancer. The review emphasized the need to expand human papillomavirus (HPV) vaccination coverage and enhance screening programmes to address cervical cancer. While efforts to decentralize services have been initiated, infrastructure and resources remain concentrated in major cities, limiting access to care in rural and underserved areas. Key recommendations included optimizing diagnostic tools, investing in radiotherapy and nuclear medicine, and strengthening the regulatory framework for cancer care.

Additionally, the review highlighted the importance of improving health information systems and establishing comprehensive cancer registries to inform policy and planning. National stakeholders validated the findings and recommendations of the imPACT Review during a workshop and discussed next steps to develop Bolivia's national cancer control plan (NCCP).

NEXT STEPS: Based on the imPACT Review report and the outcomes of the prioritization workshop held in La Paz during the imPACT Review mission in August 2024, the Ministry of Health is developing a new NCCP with support from the Agency, WHO and the IARC. Both the imPACT Review and the NCCP are embedded in Rays of Hope, which Bolivia joined in February 2022.

Eswatini

The imPACT Review mission to Eswatini provided an opportunity to take stock of the progress made in cancer control since the previous review in 2017, and to assess the implementation of the national cancer control strategy (NCCS) for 2019–2023. The mission was tailored to assess the capacity of the health system and the need for a comprehensive approach to the high burden of preventable cancers and the planned introduction of radiotherapy services.

Additionally, it provided support to finalize the bankable document to mobilize resources for the country's first radiotherapy centre. Notable progress includes the establishment of a National Cancer Control Unit at the Ministry of Health, the establishment of the Manzini Oncology Hospital and the introduction of HPV vaccination into the national immunization programme. Opportunities to strengthen cancer control include the integration of cancer services within primary health care, developing a human resource capacity plan, and finalizing the legal framework for the proposed radiotherapy centre.

NEXT STEPS: The country leveraged the imPACT Review process to finalize a bankable document for the planned establishment of the first radiotherapy centre, and plans to use the recommendations of the imPACT Review to inform the development of the next National Cancer Control Strategy.

The Gambia

The imPACT Review mission to The Gambia was a timely boost to ongoing efforts by the Government to strengthen cancer control, including the development of the country's first National Cancer Control Programme (NCCP) and planned introduction of the first radiotherapy centre under the Rays of Hope initiative. Noting that The Gambia is a new IAEA Member State (since January 2023), the review provided baseline information to guide current and future TC programmes. During the in-country mission, the experts facilitated a two-day prioritization workshop for development of the NCCP, informed by the findings and preliminary recommendations from the imPACT Review. The mission helped trigger national-level conversations within and beyond the Ministry of Health, including involvement of development partners with the potential for better integration of cancer control into the broader health agenda and additional allocation of resources through expanded partnerships.

NEXT STEPS: The imPACT report has also informed the development of a BD that the country plans to use for the establishment of its first radiotherapy centre.

Guatemala

Guatemala is setting new cancer control priorities following the imPACT Review conducted in June 2024. The mission evaluated progress since 2010 and provided updated recommendations in cancer control. The Ministry of Health emphasized the importance of building capacity in human resources for health, strengthening the cancer registry, and financing palliative care. Of the nearly 18 000 new cancer cases annually, breast and cervical cancers are a major focus. The review highlighted the need for improved prevention, early detection and treatment, in particular for cervical and childhood cancers. The team visited 23 health facilities and met with stakeholders to discuss cancer control planning, radiotherapy, education, and regulatory infrastructure. Considering the lack of radiotherapy units in the public sector, the mission underscored the importance of expanding access to radiotherapy services nationwide and optimizing telemedicine in remote regions.

During the imPACT Review mission to Guatemala, the international team of experts visited the premises of the National Cancer Institute in Guatemala. (Photo: M. Nobile/IAEA)

NEXT STEPS: The country plans to use the imPACT report to develop national TC projects aimed at closing the gaps identified during the imPACT Review.

The imPACT Review team with the Minister of Health, Jakarta, Indonesia (Photo: M. Nobile/IAEA)

Indonesia

The imPACT Review mission conducted in July 2024 assessed Indonesia's cancer control capacity and highlighted the importance of HPV vaccination and screening for cervical cancer. Childhood cancer was also a priority, with efforts being made to meet the target survival rate of at least 60% under the WHO Global Initiative for Childhood Cancer. Partners such as St. Jude Children's Research Hospital (USA) and the M.D. Anderson Cancer Center (USA), which are already involved in strengthening cancer care in the country, formed part of the international team of experts. The mission included discussions on establishing a national cancer hospital network, enhancing cooperation with regional centres of excellence, and expanding nuclear medicine and radiotherapy. Indonesia used the insights from the imPACT Review to develop its new NCCP for 2024–2034. A follow-up mission was conducted in October to present the findings and recommendations of the imPACT report at the 2024 Indonesia International Cancer Conference, where the country launched its new National Cancer Control Plan.

NEXT STEPS: Through Agency support, Indonesia continued to receive technical assistance to enhance its national cancer treatment capacities and to inform the country's resource mobilization efforts. Indonesia aims to use the recommendations from the imPACT report, which built on the findings of the 2023 IAEA mission to the country, to expand radiotherapy and nuclear medicine services across 34 provinces.

During the May 2024 imPACT Review mission to Mongolia, experts from the Agency and KIRAMS visited national and regional hospitals and various health care facilities to gain a thorough understanding of Mongolia's cancer control capacity and needs. (Photo: I. Veljkovik/IAEA)

Mongolia

An expert mission conducted by the Agency, WHO and the IARC in May 2024 assessed Mongolia's cancer control capacities, informing the development of a new NCCP. Mongolia is committed to strengthening its cancer detection and treatment workforce, supported by international collaborations. Conducted under the framework of the 2023 agreement with KIRAMS and the Agency, the review documented the gradual expansion of radiation medicine infrastructure in the country. With nearly 7000 new cancer cases per year, Mongolia will need to further enhance its ongoing primary prevention and early detection programmes, and scale up diagnosis and treatment capacity outside the capital city.

NEXT STEPS: Based on the imPACT Review, the Ministry of Health aims to develop a new National Cancer Control Plan and a bankable document to support the decentralization of cancer services across the country.

Visit to the radiotherapy department at the National Cancer Centre in Mongolia (Photo: I. Veljkovikj/IAEA)

A visit by the imPACT Review team to Maputo Central Hospital, which has the only radiotherapy centre in Mozambique (Photo: A. Karagu/IAEA)

Mozambique

The imPACT Review provided an opportunity to build on ongoing efforts by the Government of Mozambique — a Rays of Hope participating country — to advance cancer control, inform the implementation of the NCCP for 2019–2029, and assess national cancer control capacities against the previous imPACT Review in 2014. The mission was tailored to assess the health system's capacities, the need for a comprehensive approach to tackle the high burden of infection-related cancers including cervical cancer and Kaposi sarcoma, the planned expansion of radiotherapy services, and the need to strengthen governance structures for cancer control across Mozambique. It involved visits to Maputo and Nampula, including central hospitals, Government authorities, civil society, development partners and other health care providers.

NEXT STEPS: The imPACT Review assessed the implementation of the National Cancer Control Plan for 2019–2029, and made recommendations on expanding access to radiotherapy services with support from the Agency and other partners under Rays of Hope.

Nepal

The Nepal imPACT Review follow-up meeting was organized by the Ministry of Health in collaboration with the WHO Country Office. It provided an opportunity to report on the progress made in implementing the 2022 imPACT Review recommendations and to discuss plans for finalizing the NCCP, which was largely guided by the 2022 imPACT report. Representatives from the country's main cancer hospitals participated in discussions to review the current scope of Agency technical cooperation support to Nepal and to explore opportunities for future collaboration.

NEXT STEPS: The imPACT Review follow-up meeting will help Nepal to prioritize cancer control interventions as part of the new NCCP.

Nigeria

The imPACT Review mission to Nigeria built on progress made since the 2011 imPACT Review. The mission was tailored to the national priority of the regional expansion of cancer centres, including the expansion of radiotherapy services through Rays of Hope. It provided a baseline needs assessment to inform the development of strategic funding documents in support of this expansion. Regional stakeholder meetings were conducted during the mission to capture diverse perspectives across the country. The mission also evaluated the National Strategic Cancer Control Plan (NCCP) and made recommendations to strengthen its implementation. Finally, the expert team developed a roadmap to further strengthen cancer control services across the country, with a focus on breast, cervical and childhood cancers.

NEXT STEPS: Based on the imPACT Review recommendations, the Ministry of Health aims to develop a bankable document to support decentralization of cancer services across the country.

Peru

An imPACT Review mission was conducted in Peru at the request of the Ministry of Health (the first having been conducted in 2014) to assess progress in cancer control and identify priorities for inclusion in the National Cancer Control Plan (NCCP) currently under development. The review highlighted significant advancements in decentralizing nuclear medicine and radiotherapy services beyond the capital, as well as progress in planning, screening, training, and cancer management. The imPACT Review was conducted in the broader context of international cooperation with the M.D. Anderson Cancer Center and City Cancer Challenge to improve access to cancer care. Peru is taking steps towards universal health care for cancer patients. Experts emphasized the need for further investment in nuclear medicine and radiotherapy to address resource constraints and enhance service quality. Recommendations included standardizing academic curricula and clinical protocols to ensure consistent care. During a workshop, over 80 national stakeholders validated the findings and discussed next steps, with a view to shaping the priorities of the new NCCP.

NEXT STEPS: Based on the imPACT report and the outcomes of the prioritization workshop held in Lima during the imPACT Review mission in April 2024, the Ministry of Health is developing a new cancer control program with support from the Agency, WHO, the IARC and City Cancer Challenge. Both the imPACT Review and the national cancer control program are embedded in Rays of Hope, which Peru joined in May 2023.

C.6.2. Development of strategic documents

As part of the TC programme, the Agency provides support in developing Member State-owned strategic funding documents, or bankable documents, intended to enable the mobilization of national resources as well as from IFIs, development agencies and other partners.

To date, more than 30 countries have benefited from the Agency's support in developing bankable documents. This has enabled Member States to mobilize funds over the last 20 years to address priority needs, such as the establishment of new radiotherapy facilities, expansion of existing facilities, procurement of critical equipment, and training of health care professionals.

In 2024, the Agency supported 11 Member States with the development of bankable documents, namely Burundi, Central African Republic, Comoros, Congo, Democratic Republic of the Congo, Eswatini, The Gambia, Liberia, Rwanda, Senegal and Uganda.

C.6.3. Advocacy, partnership building and resource mobilization for cancer activities

Building and leveraging on the fruitful collaboration with traditional donor Member States, the Agency engaged new partners in support of Rays of Hope through multiple outreach activities such as online briefings and webinars organized with the Canadian Nuclear Isotope Council, the German Health Alliance, and the United States Government. These events helped to increase the visibility of the Agency's work in sustainable development and showcased different ways to support Rays of Hope to potential new donors and partners, including the private sector. Two webinars on Rays of Hope were organized for pharmaceutical companies, which allowed for targeted engagement with this group of potential partners.

On the margins of the IAEA General Conference, three new private sector companies—IBA Dosimetry, PTW Dosimetry, and Standard Imaging—became official partners with the Agency under the Rays of Hope initiative. Furthermore, at the IAEA Ministerial Conference, IAEA Director General Rafael Grossi signed agreements with established strategic partners, Elekta and GE Healthcare, to provide vital equipment to the Seibersdorf laboratories. Elekta committed to supplying brachytherapy applicators, while GE Healthcare agreed to donate a mammography machine, further enhancing the Agency's support for cancer care and radiology services worldwide.

List of frequently used abbreviations

AfDB	African Development Bank
AFRA	African Regional Co-operative Agreement for Research, Development and Training Related to Nuclear Science and Technology
Agency	International Atomic Energy Agency
APCs	assessed programme costs
ARASIA	Co-operative Agreement for Arab States in Asia for Research, Development and Training related to Nuclear Science and Technology
ARCAL	Regional Co-operation Agreement for the Promotion of Nuclear Science and Technology in Latin America and the Caribbean
ASEAN	Association of Southeast Asian Nations
COP28	28th meeting of the Conference of the Parties
CPF	Country Programme Framework
ESCAP	Economic and Social Commission for Asia and the Pacific
FAO	Food and Agriculture Organization of the United Nations
G20	Group of 20
GLOWAL Network	Global Water Analysis Laboratory Network
GPAP	Global Plastic Action Partnership
IAEA	International Atomic Energy Agency
IARC	International Agency for Research on Cancer
IMF	International Monetary Fund
imPACT	integrated mission of PACT
IOC/UNESCO	Intergovernmental Oceanographic Commission of UNESCO
IsDB	Islamic Development Bank
LDC	least developed country
LDC5	Fifth United Nations Conference on the Least Developed Countries
NCCP	National cancer control plan/programme
NLA	National Liaison Assistant
NLO	National Liaison Officer
NPCs	National Participation Costs
NPP	Nuclear power plant/programme
NPP	nuclear power plant

OECD	Organisation for Economic Co-operation and Development
OPEC	Organization of the Petroleum Exporting Countries
PACT	Programme of Action for Cancer Therapy
RCA	Regional Co-operative Agreement for Research, Development and Training Related to Nuclear Science and Technology
SDG	Sustainable Development Goal
SDPU	Sustained Dialogue on Peaceful Uses
SIDS	small island developing States
SIT	Sterile insect technique
TC	technical cooperation
TCF	Technical Cooperation Fund
UICC	Union for International Cancer Control
UICC	Union for International Cancer Control
UNCSTD	UN Commission on Science and Technology for Development
UNDESA	United Nations Department of Economic and Social Affairs
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNIDO	United Nations Industrial Development Organization
UN-OHRLLS	UN Office of the High Representative on Least Developed Countries, Landlocked Developing Countries and Small Islands Developing States
UNOSSC	United Nations Office for South-South Cooperation
WHO	World Health Organization
WHO	World Health Organization
WHO AFRO	WHO Regional Office for Africa
WHO EMRO	WHO Regional Office for the Eastern Mediterranean
WHO PAHO	WHO Pan-American Health Organization
WHO WPRO	WHO Regional Office for the Western Pacific

Annex 1: Technical Cooperation Programme Fields of Activity[19]

Nuclear Knowledge Development and Management

- Capacity establishment, programme knowledge management and facilitation of cooperation among Member States (01)
- Building national nuclear legal infrastructures (03)

Industrial Applications/Radiation Technology

- Reference products for science and trade (02)
- Research reactors (08)
- Radioisotopes and radiation technology for industrial, health care and environmental applications (18)
- Accelerator technology (32)
- Nuclear instrumentation (33)

Energy

- Energy planning (04)
- Introduction of nuclear power (05)
- Nuclear power reactors (06)
- Nuclear fuel cycle (07)

Food and Agriculture

- Crop production (20)
- Agricultural water and soil management (21)
- Livestock production (22)
- Insect pest control (23)
- Food safety (24)

[19] Updated in 2020 for the Agency's TC programme 2022–2023. The field of activity number is shown in parentheses.

Health and Nutrition

- → Comprehensive cancer control (25)
- → Radiation oncology in cancer management (26)
- → Nuclear medicine and diagnostic imaging (27)
- → Radioisotopes and radiopharmaceuticals production for medical applications (28)
- → Dosimetry and medical physics (29)
- → Nutrition for improved health (30)

Water and the Environment

- → Water resources management (15)
- → Marine, terrestrial and coastal environments (17)

Safety and Security

- → Governmental and regulatory infrastructure for radiation safety (09)
- → Safety of nuclear installations, including siting and hazard characterization (10)
- → Governmental and regulatory infrastructure for nuclear installations safety (11)
- → Radiation protection of workers and the public (12)
- → Transport safety (13)
- → Nuclear security (14)
- → Emergency preparedness and response (16)
- → Radioactive waste management, decommissioning and remediation of contaminated sites (19)
- → Radiation protection in medical uses of ionizing radiation (31)

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