Overview

For almost six decades, the International Atomic Energy Agency has pursued the goal of making nuclear science and technology available to its Member States in a safe, secure and peaceful manner. Throughout this time, it has adapted its programme of work, within the framework of its Statute, to address the evolving needs and developmental goals of Member States.

The Agency's activities in 2015 were balanced across its main areas of work: technology transfer, safety and security, and verification. Throughout the year, the Agency supported its Member States in the use of nuclear science and technology to achieve their development goals and address a range of global challenges — from meeting growing energy needs and protecting the environment to improving food security and human health in a sustainable manner. At the same time, it worked to promote and strengthen global nuclear safety and nuclear security, and to contribute to non-proliferation by preventing the use of nuclear material and facilities for non-peaceful purposes. In this way, the Agency contributed to global peace, security and development, and made real improvements in the lives of people around the world.

The following is a report of the Agency's activities in 2015.

NUCLEAR TECHNOLOGY

Nuclear Power

Status and trends

The global generating capacity of nuclear energy grew in 2015, reaching 382.9 gigawatts (electrical) (GW(e)) at the end of the year. The number of operational nuclear power reactors increased to 441, with 10 new reactors connected to the grid in 2015, the highest number since 1993. During the year, construction started on 7 reactors — bringing to 67 the total number of reactors under construction around the world — and 7 reactors were permanently shut down.

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The Agency's projections for 2030 showed an increase in global nuclear power capacity of 2% in the low case scenario and 68% in the high case scenario. These projections were lower than those of 2014 owing to uncertainties concerning energy policy, licence renewals, reactor shutdowns and future construction. The figures take into account plant retirements; the actual new capacity added in the next 15 years will be about 150 GW(e) in the low and 300 GW(e) in the high case scenario. Near and long term growth prospects remained centred in Asia, with growth also expected in Africa, Eastern Europe and Latin America.

Major conferences

In June, the International Conference on the Management of Spent Fuel from Nuclear Power Reactors — An Integrated Approach to the Back End of the Fuel Cycle, held at the Agency's Headquarters in Vienna, attracted 207 participants from 39 Member States and 5 international organizations. Participants discussed key issues, including the safety of spent fuel management and spent fuel management strategies. The conference highlighted the need for an integrated approach to the back end of the fuel cycle, especially in the areas of processing, storage, transport and disposal, as well as the need to adopt a holistic view of spent fuel management.

In November, the Agency organized the International Conference on Research Reactors: Safe Management and Effective Utilization, its largest research reactor conference to date. Held in Vienna, the conference drew over 300 participants from 56 Member States. Among the conclusions were that operators should ensure the sustainability of research reactors through proper strategic planning, that they should integrate Agency safety standards and nuclear security guidance into their operations, and that they should make increased use of networking to learn from their peers.

Climate change and sustainable development

A new binding agreement on climate change was adopted at the 21st session of the Conference of the Parties to the United Nations Framework Convention on Climate Change (COP21), held from 30 November to 11 December in Paris, France. The Paris Agreement recognizes that reductions in global greenhouse emissions are needed as soon as possible. At the same time, the need for energy worldwide is expected to grow. The Agency publication *Climate Change and Nuclear Power 2015*, launched in the run-up to COP21, describes how nuclear energy, as one of the low carbon energy sources available today, can help meet this 'climate–energy challenge'.

Energy assessment services

The Agency continued to provide energy assessment services to Member States, including assisting them, upon request, in conducting energy planning studies. Such studies help countries to evaluate how different technologies, including nuclear power, can potentially help them meet their energy needs. In 2015, the Agency continued to build Member State capacity for conducting Nuclear Energy System Assessments (NESAs) according to the methodology developed by the Agency's International Project on Innovative Nuclear Reactors and Fuel Cycles (INPRO). In 2015, a NESA was initiated in Malaysia and NESAs were under way in Indonesia, Romania and Ukraine.

Support to operating nuclear power plants

Many operators have made investments to enhance the safety and security and improve the reliability of their nuclear power plants, while at the same time facing increased operational costs and low electricity prices. This has an impact on the cost of nuclear power generation and may affect the economic sustainability of long term operation of plants. A Technical Meeting with 35 participants from 16 Member States, held in May in Helsinki, Finland, assessed such economic impacts and defined the technical, management and external cost drivers affecting long term operation.

Launching nuclear power programmes

To improve support to 'newcomer' countries — some thirty Member States that are currently considering or planning a nuclear power programme — the lessons learned from the first six years of Integrated Nuclear Infrastructure Review (INIR) missions were reviewed and published. The Agency also updated Country Nuclear Infrastructure Profiles and integrated work plans for several countries, which were then used in planning its 2016–2017 activities. In 2015, INIR missions were conducted to Kenya, Morocco and Nigeria.

Capacity building, knowledge management and nuclear information

The Agency provided a variety of support to newcomer countries and to Member States with established nuclear power programmes throughout the year. It held Technical Meetings, provided training, conducted Nuclear Knowledge Management Schools and Nuclear Energy Management Schools, and carried out missions and activities to support networks, focusing in particular on capacity building, human resource development, training, knowledge management, stakeholder involvement, learning management systems and e-learning. The Agency's largest database, the International Nuclear Information System (INIS), grew to almost 3.9 million records, with 1.9 million document downloads in 2015. Membership in the International Nuclear Library Network, coordinated by the IAEA Library, increased to 55 partners, up from 52 in 2014.

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Assurance of supply

Major milestones were reached in the IAEA Low Enriched Uranium (LEU) Bank project in 2015. In June, the Board of Governors approved an agreement with Kazakhstan to establish in Kazakhstan the IAEA LEU Bank, and authorized the Director General to implement it; the Board also approved a draft agreement with the Russian Federation regarding the transit of the Agency's LEU through its territory to and from the IAEA LEU Bank, and authorized the Director General to conclude and implement it. The transit agreement was signed with the Russian Federation in June, and the Host State Agreement and two subsidiary technical agreements were signed with Kazakhstan in August. Significant technical work continued in the areas of safety — specifically seismic safety — and security. A feasibility study was completed on storage facility options and a new building came into consideration.

An LEU reserve in Angarsk, established following the February 2011 agreement between the Government of the Russian Federation and the Agency, remained operational.

Support to fuel cycle activities

To assist Member States in identifying and extracting uranium resources, the Agency organized ten Technical Meetings and training workshops on uranium exploration, resources and production, and social and environmental responsibility aspects of mining activities. It also held 11 Technical Meetings and consultancy meetings focusing on various topics related to fuel engineering and spent fuel management; the meetings reaffirmed the findings of the International Conference on the Management of Spent Fuel from Nuclear Power Reactors held in June.

Technology development and innovation

The Agency continued to focus on activities aimed at addressing the potential challenges for deployment of advanced reactors in the near term. Throughout 2015, it provided a variety of support to Member States and various stakeholders involved in developing and designing innovative nuclear systems. For advanced water cooled reactor technologies,

efforts were focused on research and innovation activities in the light of the accident at the Fukushima Daiichi nuclear power plant, and on supporting Member States in addressing design, deployment, safety and regulatory issues of small and medium sized or modular reactors. For innovative systems such as fast and gas cooled reactors, the focus was on the development of specific safety systems and adequate safety design criteria and guidelines, and on knowledge management and education and training. Guided by Member State requests and recent General Conference resolutions, the Agency also increased its efforts to support research and development and the exchange of information on various non-electrical applications such as seawater desalination, hydrogen production, cogeneration and industrial applications. The development and maintenance of dedicated toolkits for such applications were another focus of Agency activities. Two INPRO Dialogue Forums, held at the Agency's Headquarters in May and October, addressed cooperative approaches to the back end of the nuclear fuel cycle and road maps for transition to globally sustainable nuclear energy systems.

Research reactors

The Agency assisted Member States in various aspects of planning, construction, operation, maintenance and utilization of research reactors through training and outreach activities, new publications, and support to networks and coalitions. It continued to assist Member States, upon request, in minimizing the civilian use of high enriched uranium (HEU) by supporting conversion of research and test reactors from the use of HEU fuel to LEU fuel and the repatriation of HEU to its country of origin. During the 59th regular session of the Agency's General Conference, the Director General designated the Research Centres of Saclay and Cadarache of the French Alternative Energies and Atomic Energy Commission as the first 'IAEA-designated International Centre based on Research Reactor' (ICERR).

Nuclear fusion

Nuclear fusion is being pursued as a potential energy source of the future by several countries, both individually and collectively through ITER. With ITER construction fully under way, the Agency continued its activities to support the consolidation of some of ITER's design choices through Technical Meetings and coordinated research projects. The Agency's series of DEMO (Demonstration Fusion Power Plant) Programme Workshops provided a framework for coordinating Member State programmes aimed at demonstrating industrial scale electricity production from fusion.

Nuclear data

The Agency's databases of nuclear, atomic and molecular data received more than two million hits per month in 2015. In addition, almost 260 000 datasets and documents were downloaded in that time period.

Accelerator applications

The Agency continued to build capacity in Member States by providing training and facilitating research using large accelerators such as synchrotrons. In 2015, the Agency established the Accelerator Knowledge Portal, a community driven web site for the benefit of accelerator scientists, accelerator users and service providers worldwide. Together with the American Nuclear Society, the Agency organized the 12th International Topical Meeting on Nuclear Applications of Accelerators, held in November in Washington, DC, United States of America.

Nuclear instrumentation

Through its Nuclear Science and Instrumentation Laboratory, the Agency continued to provide high quality training and to develop instruments to meet the specific needs of Member States. During the year, fellows from several Member States received hands-on training in effective utilization of nuclear instrumentation for environmental and other applications. Also in 2015, a rapid environmental radioactivity mapping system using unmanned aerial vehicles on a customized hexacopter was developed for use in Japan's Fukushima Prefecture, where testing is under way. Such detection systems can help Member States to monitor radiation after mining or remediation activities.

NUCLEAR SCIENCES AND APPLICATIONS

Nuclear sciences and applications continued to play a vital role across a range of important socioeconomic sectors in 2015. In a number of areas — from food and agriculture, human health and the environment to water resources and industry — Agency scientists worked with experts in Member States to help meet development needs through nuclear science, technology and innovation.

Renovation of the Nuclear Applications Laboratories (ReNuAL)

The Renovation of the Nuclear Applications Laboratories (ReNuAL) project made substantial progress in 2015. An expert review in February endorsed the conceptual designs of the new laboratory buildings. The functional designs of the new laboratory buildings, yielding more refined details and cost estimates, were completed in August, and in September the site was prepared for construction. During the year, the Agency procured equipment to improve the capabilities of four of the Agency laboratories in Seibersdorf using approximately €1.5 million provided for this purpose. Over €10.3 million in extrabudgetary funds was raised in 2015[1] to support the project, creating a sound basis for construction of the new buildings and infrastructure starting in 2016.

Nuclear Olympiad

In 2015, as part of its outreach activities, the Agency organized a Nuclear Olympiad in cooperation with the World Nuclear University. The event challenged university students in nuclear science related fields from around the world to create 60-second videos illustrating how nuclear techniques can be used for global development.

Food and Agriculture

Emerging and re-emerging zoonotic diseases

Recent outbreaks of diseases such as Ebola virus disease (EVD) and H5N1 influenza in human populations, and Rift Valley fever, African swine fever, peste des petits ruminants and foot-and-mouth disease in animal populations point to the need for wider use of tools for early and rapid disease diagnosis and control. In 2015, the Agency delivered an extensive technological animal health package to Member States in Africa affected by EVD to detect and respond to outbreaks of the disease at the animal–human interface. During

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[1] In 2015, financial contributions were received from Australia, China, Germany, India, Israel, Japan, the Republic of Korea, Kuwait, Mongolia, Norway, Pakistan, the Philippines, South Africa, Spain, Switzerland, the United Kingdom and the United States of America.

the year, the Agency's Board of Governors approved an off-cycle technical cooperation project targeting emerging zoonotic diseases (including EVD). Seventeen participants from nine Member States attended two training courses — held in Cameroon in August and Uganda in December — aimed at enhancing biosecurity during sample collection, packing and shipment.

Soil and water management and crop nutrition

To commemorate the International Year of Soils, the Agency held a side event during the 59th regular session of its General Conference in September entitled 'Managing Soils for Climate-Smart Agriculture', highlighting ongoing work on soil management and its important contribution to global food security. In December, the Agency and the International Union of Soil Sciences held a one day conference commemorating World Soil Day. Participants adopted the Vienna Soil Declaration, which sets out a framework for future research in soil science and links achievements to the Sustainable Development Goals (SDGs) and to global efforts to combat climate change. An article on the Agency's work on the use of fallout radionuclides and compound specific stable isotopes to measure soil erosion and to determine sources of land degradation was published in *National Geographic* in December. The piece highlights how these nuclear techniques can help to curtail the threat of soil erosion to ensure sustainable agricultural management.

Human Health

IPET-2015

The Agency hosted the International Conference on Clinical PET–CT and Molecular Imaging: PET–CT in the Era of Multimodality Imaging and Image Guided Therapy (IPET-2015) in Vienna in October. This unique, multidisciplinary conference supported the development of comprehensive approaches to patient care by bringing together over 500 professionals from 95 Member States, working in different fields and regions of the world, to discuss the current status of and trends in nuclear medicine, radiology and radiopharmaceutical sciences. Participants explored important clinical aspects of specific diseases and conditions, and the role of positron emission tomography–computed tomography (PET–CT) and other imaging modalities in providing appropriate diagnostics and treatment.

Use of electronic and digital tools in radiation medicine

The Agency assists Member States in using communication technology to improve radiation medicine services. Technology such as on-line platforms can be used for peer review to allow medical experts to discuss and review plans or treatments and to learn from other experts. During the 59th regular session of the General Conference, the Agency released a cancer staging app for iPhone and Android devices. This TNM (tumour, lymph node, metastasis) app, developed by the Agency in collaboration with the Tata Memorial Centre under the Government of India's Department of Atomic Energy, is easy to use and is available free of charge. The app enables physicians around the world to carry out cancer staging both on- and off-line.

Water Resources Management

In May, the Agency hosted the 14th International Symposium on Isotope Hydrology: Revisiting Foundations and Exploring Frontiers, which was attended by over 400 professionals from 84 Member States. The participants reviewed the current state of

the science of isotope applications and helped to identify research, analytical and training requirements to support the wider use of isotope hydrology for sustainable development. As groundwater is the largest reservoir of fresh water on earth, global groundwater depletion poses a significant threat to water security. In this context, in 2015 the Agency focused on research, training, protocol development and analytical services aimed at expanding the use of groundwater age dating with isotopes to map water resources.

Environment

Ocean acidification is a growing global concern and a specific target under the SDG on oceans and seas. In 2015, the Agency, through its Ocean Acidification International Coordination Centre (OA-ICC), increased capacity building and communication and outreach activities in this area, and helped to advance ocean acidification science. In January, the OA-ICC, in cooperation with the Scientific Centre of Monaco, brought together leading experts from around the world to discuss the science and socioeconomic impacts of ocean acidification, the effects it has on communities and the actions that policy makers can take to address it. The results of the meeting were presented on World Oceans Day, in June, and during a side event at COP21, in December. The Agency continued to strengthen its work in areas where ocean acidification data are scarce and where the problem is most severe. Regional training courses on ocean acidification were organized in China and South Africa, providing training to 54 participants from 27 Member States. The courses also provided a forum for preliminary discussions on the creation of regional ocean acidification networks in Asia and Africa.

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Radioisotope Production and Radiation Technology

Radioisotope production

The possible shortage of molybdenum-99 (^{99}Mo) — the parent of technetium-99m (^{99m}Tc), the most widely employed radioisotope in nuclear medicine — continues to be a major concern around the world. This issue was addressed in a coordinated research project entitled 'Accelerator-based Alternatives to Non-HEU Production of ^{99}Mo/^{99m}Tc'. The project, which concluded in 2015, resulted in the demonstration of an alternative technology for producing ^{99m}Tc using medical cyclotrons. If widely implemented, the new technology can enhance security of the global medical radioisotope supply.

SCIENTIFIC FORUM 2015

Radiation technologies are increasingly being applied to improve the quality of products used in daily life, from car tires to medical devices to building materials. At the 2015 Scientific Forum on 'Atoms in Industry: Radiation Technology for Development', held at the Agency's Headquarters during the 59th regular session of the General Conference, leading experts, academics and industrial representatives outlined the many benefits these techniques offer, in particular boosting productivity in environmentally friendly ways.

The forum highlighted how radiation can be used to kill germs to sterilize medical equipment used in lifesaving procedures, produce more effective vaccines and make tissue grafts safe for transplants. The use of radiation technologies in the treatment of pollution, such as industrial pollutants and flue gas, was also showcased.

NUCLEAR SAFETY AND SECURITY

Nuclear Safety

The global nuclear community made further progress in strengthening and improving safety in 2015. The challenges faced by Member States during the year highlighted the importance of ongoing international collaboration, cooperation and capacity building. The Agency continued to assist Member States in building capabilities and worked to strengthen the nuclear safety and security framework globally through national and international programmes and activities.

Progress on the IAEA Action Plan on Nuclear Safety

The Agency continued to analyse the relevant technical aspects of the Fukushima Daiichi accident and to share lessons learned with the wider nuclear community. In February, the Agency, in cooperation with the Nuclear Energy Agency of the Organisation for Economic Co-operation and Development (OECD/NEA), organized the International Experts Meeting on Strengthening Research and Development Effectiveness in the Light of the Accident at the Fukushima Daiichi Nuclear Power Plant, which was attended by 150 experts, representing 38 Member States and 5 international organizations. It also organized, in April, the International Experts Meeting on Assessment and Prognosis in Response to a Nuclear or Radiological Emergency, which drew 200 experts from 70 countries and 5 international organizations.

During the year, the Agency published four reports in connection with the IAEA Action Plan on Nuclear Safety: the *IAEA Report on Severe Accident Management in the Light of the Accident at the Fukushima Daiichi Nuclear Power Plant*[2]; the *IAEA Report on Strengthening Research and Development Effectiveness in the Light of the Accident at the Fukushima Daiichi Nuclear Power Plant*[3]; the *IAEA Report on Assessment and Prognosis in Response to a Nuclear or Radiological Emergency*[4]; and the *IAEA Report on Capacity Building for Nuclear Safety*[5].

"In September, the Director General's report on the Fukushima Daiichi accident was released, along with five technical volumes."

In September, the Director General's report on the Fukushima Daiichi accident was released, along with five technical volumes. The report and the technical volumes were the result of an extensive international collaborative effort involving 5 working groups of some 180 experts from 42 Member States with and without nuclear power programmes, and several international organizations. They provide a description of the accident and its causes, evolution and consequences, based on the evaluation of data and information from many sources, including the results of the work carried out in implementing the Action Plan. The Government of Japan and various Japanese organizations provided a significant amount of data.

The Director General's fourth and final annual report on the Action Plan, *Progress in the Implementation of the IAEA Action Plan on Nuclear Safety*,[6] and its supplement[7] were submitted to Member States in September 2015. The Agency will continue to implement dedicated projects related to elements of the Action Plan in the context of the regular programme of work.

2 Available at: *https://www.iaea.org/sites/default/files/iem7-severe-accident-management.pdf.*

3 Available at: *https://www.iaea.org/sites/default/files/iem8-report-on-research-and-development.pdf.*

4 Available at: *https://www.iaea.org/sites/default/files/iem9-assessment-and-prognosis.pdf.pdf.*

5 Available at: *https://www.iaea.org/sites/default/files/report-on-capacity-building.pdf.*

6 Available at: *https://www.iaea.org/About/Policy/GC/GC59/GC59InfDocuments/English/gc59inf-5_en.pdf.*

7 Available at: *https://www.iaea.org/About/Policy/GC/GC59/GC59InfDocuments/English/gc59inf-5-att1_en.pdf.*

Improving regulatory effectiveness

The Agency's Integrated Regulatory Review Service (IRRS) enables Member States with and without nuclear power plants to evaluate the effectiveness of their national safety regulatory bodies using self-assessment and peer review. As part of the evaluation, regulatory, technical and policy practices are compared against Agency safety standards and, where appropriate, good practices elsewhere. In 2015, the Agency conducted eight IRRS missions, to Armenia, Croatia, Hungary, India, Indonesia, Ireland, Malta and the United Republic of Tanzania, and four IRRS follow-up missions, to Finland, Slovakia, Switzerland and the United Arab Emirates. In addition, four IRRS preparatory missions were conducted to Member States with nuclear power plants (Bulgaria, Finland, Japan and Sweden), and five IRRS preparatory missions were conducted to Member States without operating nuclear power plants (Belarus, Guatemala, Ireland, Lithuania and the United Republic of Tanzania).

Operation of nuclear power plants and research reactors

Managing the long term operation of both power reactors and research reactors continued to be a major focus of Member States in 2015. By the end of the year, around 40% of the 441 nuclear power reactors operating in the world had been in operation for 30 to 40 years and another 16% had been in operation for more than 40 years. During the year, the Agency conducted four Safety Aspects of Long Term Operation (SALTO) peer review service missions, to Belgium, China, Mexico and South Africa.

In 2015, the Agency also carried out six Operational Safety Review Team (OSART) missions, to Canada, France, Japan, Pakistan, the Russian Federation and the United Kingdom; two OSART follow-up missions, to France and the United States of America; and one Corporate OSART follow-up mission, to the Czech Republic. The Agency also revised the 2005 edition of the *OSART Guidelines* and piloted the updated guidelines during the OSART missions conducted in 2015.

New and expanding nuclear power programmes

In 2015, feedback from Agency peer reviews, expert missions, workshops and other assistance activities indicated that Member States embarking on a nuclear power programme continued to experience challenges in establishing an adequate and effective regulatory body with a sufficient number of competent staff. In particular, the Agency's review services continued to identify delays in the development of the regulatory framework, especially the establishment of the licensing process and regulatory inspection programmes.

Throughout the year, the Agency provided Member States embarking on a nuclear programme with a range of services offered as part of the Agency's Safety Assessment Advisory Programme (SAAP) as well as training programmes aimed at improving safety infrastructure. In 2015, the Agency conducted a SAAP mission to Malaysia and provided training in the use of thermohydraulic analysis codes to 30 participants in a course held in Jordan.

Major outcomes of key nuclear safety conferences in 2015

In June, the Agency hosted the International Conference on Operational Safety to seek further opportunities to improve operational safety worldwide. The conference, held in Vienna, was attended by 180 participants from 44 Member States, who highlighted the important role of OSART missions in promoting the application of the Agency's safety standards. Conference participants also identified challenges in the following areas:

corporate management of safety; leadership and safety culture; operational experience; and long term operation of nuclear power plants.

In October, over 420 participants from 82 Member States and 18 international organizations attended the International Conference on Global Emergency Preparedness and Response, held at the Agency's Headquarters in Vienna. The conference covered topics such as international cooperation, communication, past emergencies, and education and training, in order to share knowledge and strengthen national systems. Experts in emergency preparedness and response (EPR) discussed challenges and identified key priorities for further improving readiness to respond to nuclear and radiological emergencies.

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Occupational radiation protection

As the use of ionizing radiation in occupational settings expands around the world, the number of occupationally exposed workers continues to increase. Two important measures that Member States can take to reduce occupational exposures are to build capacity for individual monitoring and to support the implementation of the Agency's safety standards by end users. In 2015, the Agency carried out a number of activities to assist Member States in this regard. In May, an international symposium on radiation protection in nuclear power plants, co-sponsored by the Agency and the OECD/NEA, was held in Brazil. The event attracted some 70 participants from 15 countries, who shared experience of source term management. The symposium considered in detail information on occupational exposure in Brazil and the Republic of Korea and the impact of alpha emitting radionuclides on radiation protection at nuclear power plants. In October, the Agency organized the Second International Workshop on Developing Guidance Material to Support Safety Standards Applicable to the Uranium Mining and Processing Industry. The workshop, held in Australia, addressed radiation protection issues concerning radon and future uranium supply needs and was attended by 30 participants from 7 Member States. The participants discussed the challenges faced by regulators, operators and workers in implementing the new occupational radiation protection requirements established in *Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards* (IAEA Safety Standards Series No. GSR Part 3). During the year, the Agency published a Safety Report entitled *Radiation Protection of Itinerant Workers* (Safety Reports Series No. 84) and *Naturally Occurring Radiation Material (NORM VII)*, the proceedings of an international symposium.

Incident and emergency preparedness and response

In line with its specific functions under the Convention on Early Notification of a Nuclear Accident and the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency, the Agency continued to assist Member States in strengthening EPR arrangements in 2015. During the year, it developed technical and practical guidance for Member States, and provided training and expert and Emergency Preparedness Review (EPREV) services. In November, it published the revised requirements for preparedness and response for a nuclear or radiological emergency in the new General Safety Requirements publication *Preparedness and Response for a Nuclear or Radiological Emergency* (IAEA Safety Standards Series No. GSR Part 7). It also conducted five EPREV missions in 2015, to Ghana, Jamaica, Kenya, Nigeria and the United Arab Emirates, and two preparatory EPREV missions, to Ghana and Hungary.

The Agency launched the Emergency Preparedness and Response Information Management System (EPRIMS) during the 59th regular session of the General Conference in September. Use of this system will enhance the effectiveness and usefulness of EPR self-assessment and of EPREV peer reviews. EPRIMS is a web based tool that allows Member States to record information about their EPR arrangements, perform self-assessments of their status with reference to the recommendations outlined in the Agency safety standards

on EPR and, at their discretion, share information and knowledge with the Agency and other Member States. EPRIMS features a database of nuclear power plants in Member States and associated technical data. The database is linked to the Agency's Power Reactor Information System, making the tool instrumental in the assessment and prognosis process in response to a nuclear or radiological emergency.

In 2015, the Emergency Preparedness and Response Standards Committee (EPReSC) was established under the Agency's Commission on Safety Standards and held its first meeting from 30 November to 2 December. EPReSC focuses on EPR aspects of the Agency's programme for the development, review and revision of safety standards, and advises on the activities supporting the use and application of these standards.

Strengthening global, regional and national networks

Knowledge networks continued to grow and played an integral part in the Agency's support of capacity building in Member States during the year. In 2015, the SMR Regulators' Forum was created and joined the Agency's Global Nuclear Safety and Security Network (GNSSN). This new forum is the first to specifically address regulatory issues in the safety and licensing of small modular reactors (SMRs). The GNSSN platform now links 20 international and regional networks. Moreover, the Agency began discussions with various international groups in Europe and Central Asia on establishing a new regional safety network under the GNSSN with a view to involving those countries that currently are not members of any safety network. In 2015, further development of regional networks for transport safety was a primary focus for the Agency. Efforts continued aimed at strengthening existing networks in Africa, Asia, the Caribbean, the Mediterranean and the Pacific Islands.

Code of Conduct on the Safety and Security of Radioactive Sources

The Agency organized an International Meeting on Facilitation of States' Political Commitment to and Implementation of the Code of Conduct on the Safety and Security of Radioactive Sources. Held in Vienna in November, the meeting was attended by 21 experts from 17 Member States. The event provided an opportunity for those States that have not yet expressed political commitment to the Code to gain a better understanding of the Code and to learn from other Member States about the benefits and the challenges associated with implementing its provisions.

Conventions

On 9 February 2015, a diplomatic conference was convened to consider a proposal by Switzerland to amend Article 18 of the Convention on Nuclear Safety (CNS) addressing the design and construction of both existing and new nuclear power plants. The conference thoroughly considered the Swiss proposal and concluded that it would not be possible to reach consensus on the proposed amendment. Instead, in order to achieve the same objective as the proposed amendment, the Contracting Parties unanimously adopted the Vienna Declaration on Nuclear Safety, which includes "principles to guide them, as appropriate, in the implementation of the objective of the CNS to prevent accidents with radiological consequences and mitigate such consequences should they occur".

The Fifth Review Meeting of the Contracting Parties to the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management was held in May 2015. The Contracting Parties discussed, in particular, the progress made since the Fourth Review Meeting with regard to the management of disused sealed sources; the safety implications of very long storage periods and delayed disposal of spent fuel and radioactive waste; and international cooperation in finding solutions for the long

term management and disposal of different types of radioactive waste and spent fuel. The Contracting Parties highlighted the contribution of the Joint Convention towards enhancing the level of safety worldwide for the management of spent fuel and radioactive waste.

The Convention on Supplementary Compensation for Nuclear Damage (CSC), which was adopted on 12 September 1997 at the same time as the Protocol to Amend the Vienna Convention on Civil Liability for Nuclear Damage, entered into force on 15 April 2015.

Civil liability for nuclear damage

The International Expert Group on Nuclear Liability (INLEX) continues to serve as the Agency's main forum for questions related to nuclear liability. The 15th Meeting of INLEX took place in Vienna, from 28 to 30 April 2015.

The Group discussed, inter alia, the issue of liability and insurance provisions covering radioactive sources; the implications of the entry into force of the CSC; a proposal to revise a paper issued by INLEX in 2013 on the benefits of joining the international nuclear liability regime and corresponding key messages; the revision of the model provisions on nuclear liability in the *Handbook on Nuclear Law: Implementing Legislation*; and outreach activities. Regarding liability and insurance provisions covering radioactive sources, the Group recommended that licences for at least Category 1 and 2 sources include a requirement that the licensee take out insurance coverage or other financial security. However, in view of questions raised regarding the availability of such insurance in developing countries, the Group decided, at the same time, to keep the matter under review.

The Fourth Workshop on Civil Liability for Nuclear Damage was held in Vienna on 27 April 2015 and was attended by 65 participants from 38 Member States. The purpose of the workshop was to provide diplomats and experts from Member States with an introduction to the international legal regime of civil liability for nuclear damage.

Other outreach activities in 2015 included two joint IAEA–INLEX missions, to Jordan and Mexico, to raise awareness of the international legal instruments relevant for achieving a global nuclear liability regime. In addition, a Subregional Workshop for Caribbean Countries on Civil Liability for Nuclear Damage was held in Panama City, Panama, in June to provide participants with information on the existing international nuclear liability regime and to advise on the development of national implementing legislation. The event was attended by 31 participants from 14 Member States.

Nuclear Security

The Agency continued to contribute to global efforts to secure nuclear facilities and to ensure the security of radioactive material in use, storage or transport. Throughout the year, the Agency supported States, upon request, in their efforts to meet their national responsibilities and international obligations through its implementation of the *Nuclear Security Plan 2014–2017*. The Agency also encouraged and assisted States to adhere to relevant international instruments; continued efforts aimed at completing international guidance in the IAEA Nuclear Security Series; and built on the progress made during previous years to help States sustain and further improve their national nuclear security regimes. The need for these continued efforts to improve nuclear security worldwide was clearly demonstrated by General Conference resolutions and requests for assistance. The support of activities to improve physical protection measures in States remained a high priority. In response to Member State requests, the Agency published four Implementing Guides during the year, including one on nuclear forensics. Member States continued to request security advisory services, in particular the International Physical Protection Advisory Service (IPPAS), which assists States in strengthening their national security infrastructure relating to physical protection; the Agency conducted four IPPAS missions in 2015, to Canada, Japan, New Zealand and Norway.

Conventions

In 2015, the Agency continued to give priority to promoting the entry into force of the 2005 Amendment to the Convention on the Physical Protection of Nuclear Material (CPPNM). During the year, seven States adhered to the Amendment (Botswana, Iceland, Italy, Morocco, San Marino, Turkey and the United States of America). At the end of 2015, a total of 90 States (and one international organization) had joined the Amendment and a further 12 CPPNM States Parties were needed for it to enter into force. In December, the Agency held the first meeting for Points of Contact and Central Authorities of States Parties to the CPPNM.

Capacity building in nuclear security

Human resource development continues to be regarded as essential for the sustainability of nuclear security regimes. In the course of the year, the Agency conducted 108 training courses and workshops (23 regional or international, and 85 national), at which 2315 participants were trained in all aspects of nuclear security. In addition, one Member State established a master's course in nuclear security using the Agency's syllabus. To enhance national capacities to detect material out of regulatory control, the Agency donates detection instruments to States. In the course of 2015, the Agency donated some 780 detection instruments, including four portal monitors.

"In the course of the year, the Agency conducted 108 training courses and workshops ... at which 2315 participants were trained in all aspects of nuclear security."

International Conference on Computer Security in a Nuclear World

In June, the Agency hosted its first conference on computer security. Around 700 experts from 92 Member States and 17 regional and international organizations attended the International Conference on Computer Security in a Nuclear World: Expert Discussion and Exchange, held at the Agency's Headquarters in Vienna. Organized in cooperation with the International Criminal Police Organization – INTERPOL, the International Telecommunication Union, the United Nations Interregional Crime and Justice Research Institute, and the International Electrotechnical Commission, the conference included representatives of nuclear regulators and plant operators, law enforcement agencies, and system and security vendors. Experts concluded that computer security is an essential element in nuclear security to guard against increasingly sophisticated on-line threats in a digitally dependent and interconnected environment.

NUCLEAR VERIFICATION[8,9]

Implementation of safeguards in 2015

At the end of every year, the Agency draws a safeguards conclusion for each State for which safeguards are applied. This conclusion is based on an evaluation of all safeguards relevant information available to the Agency in exercising its rights and fulfilling its safeguards obligations for that year.

[8] The designations employed and the presentation of material in this section, including the numbers cited, do not imply the expression of any opinion whatsoever on the part of the Agency or its Member States concerning the legal status of any country or territory or of its authorities, or concerning the delimitation of its frontiers.

[9] The referenced number of States Parties to the Treaty on the Non-Proliferation of Nuclear Weapons is based on the number of instruments of ratification, accession or succession that have been deposited.

In 2015, safeguards were applied for 181 States[10,11] with safeguards agreements in force with the Agency[12]. Of the 121 States that had both a comprehensive safeguards agreement (CSA) and an additional protocol (AP) in force, the Agency concluded that *all* nuclear material remained in peaceful activities in 67 States[13]; for 54 States, as the necessary evaluation regarding the absence of undeclared nuclear material and activities for each of these States remained ongoing, the Agency was unable to draw the same conclusion. For these 54 States, and for the 52 States with a CSA but with no AP in force, the Agency concluded only that *declared* nuclear material remained in peaceful activities. For those States for which the broader conclusion that *all* nuclear material has remained in peaceful activities has been drawn, the Agency implements integrated safeguards: an optimized combination of measures available under CSAs and APs to maximize effectiveness and efficiency in fulfilling the Agency's safeguards obligations. By the end of 2015, integrated safeguards were implemented for 54 States.

Safeguards were also implemented with regard to nuclear material in selected facilities in the five nuclear-weapon States party to the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) under their respective voluntary offer agreements. For these five States, the Agency concluded that nuclear material in selected facilities to which safeguards had been applied remained in peaceful activities or had been withdrawn from safeguards as provided for in the agreements.

For the three States for which the Agency implemented safeguards pursuant to item-specific safeguards agreements based on INFCIRC/66/Rev.2, the Agency concluded that nuclear material, facilities or other items to which safeguards had been applied remained in peaceful activities.

As of 31 December 2015, 12 States Parties to the NPT had yet to bring CSAs into force pursuant to Article III of the Treaty. For these States Parties, the Agency could not draw any safeguards conclusions.

Conclusion of safeguards agreements and additional protocols, and amendment and rescission of small quantities protocols

In 2015, the Agency continued to implement the *Plan of Action to Promote the Conclusion of Safeguards Agreements and Additional Protocols*[14], which was updated in September 2015. During 2015, three APs entered into force,[15] one comprehensive safeguards agreement with a small quantities protocol (SQP) based on the revised SQP text entered into force,[16] one State[17] signed a comprehensive safeguards agreement with an SQP, one operational SQP was amended,[18] and three SQPs were rescinded.[19] By the end of the year, safeguards agreements were in force with 182 States and APs were in force with 127 States. Moreover, 60 States of some 100 States had accepted the revised SQP text (which was in force for 54 of these States) and 7 States had rescinded their SQPs.

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10 These States do not include the Democratic People's Republic of Korea, where the Agency did not implement safeguards and, therefore, could not draw any conclusion..

11 And Taiwan, China.

12 The status with regard to the conclusion of safeguards agreements, additional protocols and small quantities protocols is given in the Annex to this report.

13 And Taiwan, China.

14 Available at: *https://www.iaea.org/sites/default/files/final_action_plan_1_july_2014_to_30_june_2015.doc.pdf.*

15 Cambodia, Djibouti and Liechtenstein.

16 Djibouti.

17 Federated States of Micronesia.

18 Togo.

19 Azerbaijan, Jordan and Tajikistan.

Islamic Republic of Iran (Iran)

During 2015, the Director General submitted four reports to the Board of Governors entitled *Implementation of the NPT Safeguards Agreement and relevant provisions of Security Council resolutions in the Islamic Republic of Iran* (GOV/2015/15, GOV/2015/34, GOV/2015/50 and GOV/2015/65).

In 2015, Iran continued to conduct enrichment related activities, although it did not produce uranium hexafluoride enriched above 5% uranium-235. Iran also continued work on heavy water related projects. However, it neither installed any major components at the IR-40 Reactor nor produced nuclear fuel assemblies for the IR-40 Reactor at the Fuel Manufacturing Plant[20].

On 14 July 2015, the Director General and the Vice-President of Iran and President of the Atomic Energy Organization of Iran, HE Ali Akbar Salehi, signed in Vienna a Road-map for the clarification of past and present outstanding issues regarding Iran's nuclear programme (GOV/INF/2015/14). The Road-map identified the necessary activities to be undertaken under the Framework for Cooperation in order to accelerate and strengthen cooperation and dialogue between the Agency and Iran aimed at the resolution, by the end of 2015, of all past and present outstanding issues — as set out in the annex to the Director General's report of November 2011 (GOV/2011/65) — that had not already been resolved by the Agency and Iran.

The activities set out in the Road-map, including technical-expert meetings and the conduct of safeguards activities by the Agency at particular locations in Iran, were completed on schedule. The implementation of the Road-map facilitated a more substantive engagement between the Agency and Iran.

On 2 December 2015, the Director General provided a report to the Board of Governors on the *Final Assessment on Past and Present Outstanding Issues regarding Iran's Nuclear Programme* (GOV/2015/68). The Agency assessed that a range of activities relevant to the development of a nuclear explosive device had been conducted in Iran prior to the end of 2003 as a coordinated effort, and some activities took place after 2003. The Agency also assessed that these activities had not advanced beyond feasibility and scientific studies, and the acquisition of certain relevant technical competences and capabilities. The Agency had no credible indications of activities in Iran relevant to the development of a nuclear explosive device after 2009 and found no credible indications of the diversion of nuclear material in connection with the possible military dimensions to Iran's nuclear programme.

On 15 December 2015, the Board of Governors adopted resolution GOV/2015/72, in which, inter alia, it noted that all activities in the Road-map had been completed in accordance with the agreed schedule and that this closed its consideration of this item.

Throughout 2015, the Agency continued to undertake monitoring and verification in relation to the nuclear-related measures set out in the Joint Plan of Action agreed between China, France, Germany, the Russian Federation, the United Kingdom, the United States of America (E3+3) and Iran, the aim of which was to reach a "mutually-agreed, long-term comprehensive solution that would ensure Iran's nuclear programme will be exclusively peaceful". The Joint Plan of Action was extended three times, most recently on 30 June 2015, when the E3+3 and Iran requested the Agency, on behalf of the E3/EU+3 and Iran, to continue to undertake the necessary nuclear-related monitoring and verification activities in Iran under the Joint Plan of Action until further notice.

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[20] In 2015, Iran was required by relevant binding resolutions of the Board of Governors and the United Nations Security Council to implement the modified Code 3.1 of the Subsidiary Arrangements General Part to its Safeguards Agreement; suspend all enrichment-related and reprocessing activities; and suspend all heavy water related activities. Security Council resolution 2231 (2015), adopted in July 2015, included terms providing for the termination of the provisions of six Security Council resolutions adopted between 2006 and 2010.

On 14 July 2015, the E3/EU+3 and Iran agreed on a Joint Comprehensive Plan of Action (JCPOA), stating that "the full implementation of this JCPOA will ensure the exclusively peaceful nature of Iran's nuclear programme". In August 2015, the Board of Governors, inter alia, authorized the Director General to implement the necessary verification and monitoring of Iran's nuclear-related commitments as set out in the JCPOA, and report accordingly, for the full duration of those commitments in light of United Nations Security Council resolution 2231 (2015), subject to the availability of funds and consistent with the Agency's standard safeguards practices; and authorized the Agency to consult and exchange information with the Joint Commission, as set out in the Director General's report on *Verification and Monitoring in the Islamic Republic of Iran in light of United Nations Security Council Resolution 2231 (2015)* (GOV/2015/53 and Corr.1 thereto). After Adoption Day, the Agency began conducting preparatory activities related to the verification and monitoring of Iran's nuclear-related commitments under the JCPOA.

In October 2015, Iran informed the Agency pursuant to paragraph 8 of Annex V of the JCPOA that, effective on JCPOA Implementation Day, Iran would provisionally apply the Additional Protocol to its Safeguards Agreement pending its entry into force, and would fully implement the modified Code 3.1 of the Subsidiary Arrangements to its Safeguards Agreement.

While the Agency continued throughout 2015 to verify the non-diversion of declared nuclear material at the nuclear facilities and locations outside facilities declared by Iran under its Safeguards Agreement, the Agency was not in a position to provide credible assurance about the absence of undeclared nuclear material and activities in Iran and, therefore, was unable to conclude that all nuclear material in Iran was in peaceful activities.

Syrian Arab Republic (Syria)

In September 2015, the Director General submitted a report to the Board of Governors entitled *Implementation of the NPT Safeguards Agreement in the Syrian Arab Republic* (GOV/2015/51) covering relevant developments since the previous report in September 2014 (GOV/2014/44). The Director General informed the Board of Governors that no new information had come to the knowledge of the Agency that would have an impact on the Agency's assessment that it was very likely that a building destroyed at the Dair Alzour site was a nuclear reactor that should have been declared to the Agency by Syria.[21] In 2015, the Director General renewed his call on Syria to cooperate fully with the Agency in connection with unresolved issues related to the Dair Alzour site and other locations. Syria has yet to respond to these calls.

In 2015, Syria indicated its readiness to receive Agency inspectors, and to provide support for the purpose of performing a physical inventory verification (PIV) at the Miniature Neutron Source Reactor in Damascus. On 29 September 2015, the Agency — after considering the United Nations Department of Safety and Security's assessment of the prevailing security level in Syria and making additional arrangements to ensure the safe transit of the inspectors — successfully carried out the PIV at the reactor.

On the basis of the evaluation of information provided by Syria, the results of the safeguards verification activities and all relevant information available to it, the Agency found no indication of the diversion of declared nuclear material from peaceful activities.

[21] The Board of Governors, in its resolution GOV/2011/41 of June 2011 (adopted by a vote) had, inter alia, called on Syria to urgently remedy its non-compliance with its NPT safeguards agreement and, in particular, to provide the Agency with updated reporting under its safeguards agreement and access to all information, sites, material and persons necessary for the Agency to verify such reporting and resolve all outstanding questions so that the Agency could provide the necessary assurance as to the exclusively peaceful nature of Syria's nuclear programme.

For 2015, the Agency concluded for Syria that declared nuclear material remained in peaceful activities.

Democratic People's Republic of Korea (DPRK)

In August 2015, the Director General submitted a report to the Board of Governors and General Conference entitled *Application of Safeguards in the Democratic People's Republic of Korea* (GOV/2015/49–GC(59)/22), which provided an update of developments since the Director General's report of September 2014.

Since 1994, the Agency has not been able to conduct all necessary safeguards activities provided for in the DPRK's NPT Safeguards Agreement. From the end of 2002 until July 2007, the Agency was not able — and, since April 2009, has not been able — to implement any verification measures in the DPRK and, therefore, could not draw any safeguards conclusion regarding the DPRK.

Since April 2009, the Agency has not implemented any measures under the ad hoc monitoring and verification arrangement agreed between the Agency and the DPRK and foreseen in the Initial Actions agreed at the Six-Party Talks. No verification activities were implemented in the field in 2015, but the Agency continued to monitor the DPRK's nuclear activities by using open source information, including satellite imagery and trade information. Using satellite imagery, the Agency continued to observe signatures during 2015 which were consistent with the operation of the 5 MW(e) reactor at Yongbyon. Renovation or expansion of other buildings was also seen within the Yongbyon site. However, without access to the site, the Agency cannot confirm the operational status of the reactor or the purpose of the other observed activities. The Agency also continued to further consolidate its knowledge of the DPRK's nuclear programme with the objective of maintaining operational readiness to resume safeguards implementation in the DPRK.

The nuclear programme of the DPRK and its ongoing efforts to further develop its nuclear capabilities remain a matter of serious concern. The DPRK's operation of the 5 MW(e) reactor, the ongoing construction at the Yongbyon site, the extension and use of the building housing the reported enrichment facility, and statements about bolstering its nuclear deterrent capability are deeply regrettable. Such actions are clear violations of relevant United Nations Security Council resolutions.

Evolving safeguards implementation

During 2015, the Agency implemented State-level safeguards approaches for 54 States[22] under integrated safeguards. Six of these approaches were updated during the year and the Secretariat is currently in the process of updating the remainder. The Secretariat is planning to develop such approaches for other States in the future. As described in several documents submitted to the Board of Governors, in developing and implementing a State-level safeguards approach, consultations are held with the relevant State and/or regional authority, particularly on the implementation of in-field safeguards measures. Three technical meetings on safeguards implementation were held with Member States in 2015 as part of the Agency's ongoing dialogue with States on safeguards matters.

Enhancing safeguards

In 2015, the Agency continued to ensure consistency and non-discrimination in the implementation of safeguards for States with the same type of safeguards agreements. To generate further efficiencies, it continued to improve associated internal procedures,

[22] And Taiwan, China.

prepared guidance documentation and improved review mechanisms for safeguards implementation. A process based quality management system was implemented, providing tools to document, measure and improve process performance.

Cooperation with State and regional authorities

"the Agency conducted six international, regional and national training courses ... for personnel responsible for overseeing and implementing the State systems of accounting for and control of nuclear material."

In February, the Agency published *Safeguards Implementation Practices Guide on Establishing and Maintaining State Safeguards Infrastructure*. This is the second of four planned Safeguards Implementation Practices Guides being produced to assist States in building capacity for implementing their safeguards obligations. During the year, the Agency conducted six international, regional and national training courses — in Belarus, Canada, the Republic of Korea, the Republic of Moldova, Turkey and the United States of America — for personnel responsible for overseeing and implementing the State systems of accounting for and control of nuclear material. These training courses involved over 160 participants from more than 50 countries. The Agency also participated in several other training activities organized by Member States on a bilateral basis.

Safeguards equipment and tools

The Agency's instrumentation and monitoring equipment is vital to the implementation of effective safeguards around the world. Throughout 2015, the Agency ensured that this equipment continued to function as required. It also replaced large numbers of old and obsolete pieces of surveillance equipment as part of the ongoing next generation surveillance system replacement campaign.

Among its instrumentation technology foresight activities, which are aimed at identifying and evaluating emerging technologies that could benefit the organization, the Agency held two workshops in 2015, in Vienna, Austria, and Karlsruhe, Germany, which were supported by numerous Member State Support Programmes (MSSPs).

Enhancing Capabilities of the Safeguards Analytical Services (ECAS)

All remaining transition activities needed to move into the new Nuclear Material Laboratory (NML) were finished during 2015. Additional training and administrative space in the NML office was constructed and the planned security upgrades to the main gate facility, the access road and the site perimeter were completed. Procurement, receipt and installation of remaining equipment for the chemical and instrumentation laboratories was completed during the first two quarters. Active testing in the new facility was completed during the period from May to November, and provisional operation commenced in December, following approval by the Agency's internal regulator and acknowledgement by the Austrian Government. With the completion of the ECAS project in December, the Agency is able to conduct safeguards sample analysis in safe, secure and modern facilities for decades to come.

Information technology: MOSAIC

The Agency's safeguards information technology modernization needs are being addressed through the Modernization of Safeguards Information Technology (MOSAIC) project. In 2015, the Agency completed the first phase of the MOSAIC project by transferring data from the mainframe computer to a new platform, re-engineering the associated software applications and decommissioning the mainframe computer. The new safeguards IT working environment provides the Agency with improved information security, enhanced applications and quicker access to data.

Preparing for the future

Research and development is essential to meeting the safeguards needs of the future. During 2015, the Agency continued to implement the *Department of Safeguards Long-Term Research and Development Plan, 2012–2023* with the assistance of MSSPs. To address near term development objectives and to support the implementation of its verification activities, the Agency continued to rely on MSSPs in implementing its *Development and Implementation Support Programme for Nuclear Verification 2014–2015*. At the end of 2015, 20 States[23] and the European Commission had formal support programmes with the Agency.

MANAGEMENT OF TECHNICAL COOPERATION FOR DEVELOPMENT

The Agency's technical cooperation programme supports capacity building and the provision of equipment, and promotes cooperation among Member States through networking, knowledge sharing and partnership facilitation. The programme is delivered through projects in the areas of health and nutrition, food and agriculture, water and the environment, industrial applications and radiation technology, energy planning and nuclear power, nuclear knowledge development and management, and safety and security. Through its Programme of Action for Cancer Therapy (PACT), the Agency enables Member States to introduce, expand and improve their cancer care capacity by integrating radiotherapy into a comprehensive cancer control programme.

Technical cooperation and the global development context

In September 2015, the United Nations General Assembly adopted the 2030 Agenda for Sustainable Development (A/RES/70/1) and its 17 SDGs. The Agency's technical cooperation programme is well positioned to contribute actively to Member State efforts to achieve the SDGs in areas such as agriculture, human health and nutrition, clean air and water, affordable and clean energy, industry and innovation, and climate change.

Science and technology are recognized as important enablers of the SDGs. Nuclear science and technology, in particular, have a contribution to make, and the Agency plays an important role in making them available to improve the lives of people. SDG 17 ('Strengthen the means of implementation and revitalize the global partnership for sustainable development'), and specifically its focus on science and technology, is an explicit recognition of this importance. The new SDG framework also emphasizes the importance of data and evidence; here, too, the Agency has an important part to play, for example, helping countries to monitor and manage soil degradation or the impact of nutritional interventions. In addition, Target 3.4 looks to intensify efforts against chronic diseases, including cancer, and aims to save millions of lives by reducing early deaths from non-communicable diseases by one third in the next 15 years. This target is of specific relevance to the various Agency programmes supporting health, including the human health programme, the technical cooperation programme and PACT.

During the 59th regular session of the General Conference, the Agency organized a side event, entitled 'Atoms for Peace and Development: The IAEA and the Post-2015 Development Goals', to discuss the new SDG framework and its relevance to the technical cooperation programme. Participants emphasized the need to ensure a 'people centred' approach to development, stressing the importance of improved education and employment

[23] Argentina, Australia, Belgium, Brazil, Canada, China, Czech Republic, Finland, France, Germany, Hungary, Japan, Republic of Korea, Netherlands, Russian Federation, South Africa, Spain, Sweden, United Kingdom and United States of America.

opportunities for youth in scientific and technical fields, especially in developing countries. Panellists also highlighted the importance of good quality data and systems for data collection and monitoring as a basis for improved development policies and programmes.

The technical cooperation programme in 2015

"the [technical cooperation] programme supported, inter alia, 3477 expert and lecture assignments, 175 regional and interregional training courses, and 1852 fellowships and scientific visits."

In 2015, safety and security accounted for the highest proportion of actuals — that is, disbursements — through the technical cooperation programme, at 24.8%. This was followed by health and nutrition at 21.7%, and by food and agriculture at 17.2%. By the end of the year, financial implementation of the Technical Cooperation Fund (TCF) stood at 84.8%. Regarding non-financial implementation, the programme supported, inter alia, 3477 expert and lecture assignments, 175 regional and interregional training courses, and 1852 fellowships and scientific visits.

Throughout 2015, the Agency supported Member States in strengthening human capacity for sustainable development, focusing on effectively meeting basic human needs and achieving a tangible socioeconomic impact. Particular attention was paid to improving programme and project quality, building partnerships, supporting strengthened regional cooperation, and enhancing radiation safety and security for the peaceful application of nuclear energy. Considerable efforts were also made to prepare for the 2016–2017 technical cooperation programme cycle, which is guided by the priorities expressed in individual Country Programme Frameworks and national development plans, as well as by regional programme frameworks and priorities.

In Africa, the technical cooperation programme supported 45 Member States (including 26 least developed countries) in the peaceful use of nuclear and isotopic techniques for sustainable development. The support focused on capacity building and training, technology transfer, and expert advice and services, and resulted in improvements in human health through increased access to radiation medicine services, increased capabilities to assess nutrition programmes, and the establishment of capacities to detect emerging zoonotic diseases. Food security was enhanced through increased and more reliable crop production, improved animal health and livestock production, and improved capabilities for livestock disease diagnosis and treatment. Environmental sustainability was enhanced through better investigation, understanding and management of water resources in the continent, and the use of nuclear applications in industry and research was expanded. The technical cooperation programme in Africa also supported the enhancement of legal and regulatory frameworks, strengthened radiation protection, built competence in radiation safety, and strengthened the management of radioactive waste, with particular attention given to used radioactive sources and naturally occurring radioactive material. An increase in interest in nuclear power was also observed in some Member States in the region.

In the Asia and the Pacific region, Agency membership grew with the accession of a number of small island developing States (SIDS) from the Pacific region, which increased demand for technical cooperation support. The Agency provided substantive support to the SIDS in the formulation of their first Country Programme Frameworks, which identify national development priorities where nuclear applications can play a role and potentially contribute to the achievement of the SDGs. In preparation for the 2016–2017 technical cooperation programme cycle, the Agency assisted these new Member States in formulating projects for their first national programmes. The SIDS also received subregional assistance to support the establishment of radiation safety infrastructure and necessary legal frameworks.

Nuclear safety and security continued to be the priority thematic area in the region. Regional projects in radiation protection supported Member States in the development of national radiation safety infrastructure, and two drafting schools on regulations provided a crucial contribution to creating effective national regulatory frameworks for the development of a robust safety culture.

Health and nutrition — in particular addressing malnutrition and non-communicable diseases, including cancer — and food and agriculture were also important areas for Member States in the Asia and the Pacific region. National technical cooperation programmes provided support in the use of isotopic techniques to assess body composition and in the fields of diagnostic medicine, radiotherapy and nuclear medicine. In the area of food and agriculture, projects focused on enhancing food safety and food security. Assistance provided by the Agency helped Member States to enhance crop resilience and productivity, and to establish quality assessment and control mechanisms for enhanced food security.

In Europe, the technical cooperation programme continued to focus on human health; radioactive waste management and environment restoration; nuclear power; and nuclear and radiation safety. Maintaining appropriate levels of safety in all aspects of the peaceful use of nuclear technologies was heavily emphasized, particularly in the regional programme, where projects related to radiation and nuclear safety received around 50% of the total budget for regional cooperation.

Substantial assistance was provided to Member States in the region to strengthen their regulatory infrastructure for safety, including training in the preparation of national regulations in line with the Agency's safety standards, a seminar for drafting regulations for radiation safety and nuclear safety, a postgraduate course on radiation protection and the safety of radiation sources, and a train the trainers course for radiation protection officers.

In the Latin America and the Caribbean region, priority thematic areas for the 2014–2015 technical cooperation cycle were health and nutrition, followed by nuclear safety, water and the environment, and food and agriculture. More than 70% of core funding was allocated to these areas, which will remain priorities for the 2016–2017 cycle.

The *ARCAL Regional Strategic Profile for Latin America and the Caribbean (RSP) 2016–2021* (IAEA-TECDOC-1763) was issued in 2015. This key reference establishes the priority areas for the regional technical cooperation programme.

In addition to traditional capacity building support in various thematic areas in the region, particular attention was paid in 2015 to enhancing governmental and regulatory safety infrastructure and to strengthening regional capacities for radiation emergency preparedness and response. Emphasis was also placed on using nuclear techniques for the early diagnosis and treatment of illnesses such as sarcopenia and cancer, and on applying the sterile insect technique to control important transboundary pests such as the New World screw worm and the Mediterranean fruit fly. Several projects were carried out to promote regional cooperation and to further strengthen existing regional capacities.

Programme of Action for Cancer Therapy (PACT)

In 2015, the Agency expanded its engagement with partners and donors in cancer control to enhance the effectiveness of radiation medicine services in low and middle income countries by further integrating such services into a comprehensive cancer control approach. PACT reinforced the Agency's key role in tackling cancer, representing the organization at high level events and organizing regional meetings and workshops.

Through PACT, the Agency conducted eight impact (integrated missions of PACT) assessments in 2015, and provided expert assistance to the development of several national cancer control plans. The Agency established, strengthened and operationalized partnerships to mobilize financial and human resources for cancer control activities in Member States. Direct assistance was provided to Member States in the development of bankable documents and capacity building in resource mobilization. In addition, plans for the expansion of the Virtual University for Cancer Control and Regional Training Network (VUCCnet) to other sub-Saharan countries were advanced.

Technical cooperation programme management

The technical cooperation programme is delivered in close cooperation with Member States and partners. In 2015, effective and efficient programme management and monitoring resulted in an increased implementation of the TCF. Management, implementation and monitoring processes were further aligned to improve programme delivery based on the principles of results based management, shared responsibility, ownership, relevance and sustainability.

The Agency continued to focus on improving programme quality through quality reviews of project documents for the 2016–2017 technical cooperation programme. These were conducted to support project teams in enhancing the quality of their project designs, and to identify lessons learned and areas for improvement in future technical cooperation cycles. A framework for outcome monitoring of technical cooperation projects was developed and is being piloted with selected projects in the 2016–2017 programme cycle. Training in results based management using the logical framework approach, and in monitoring and evaluation, was conducted for Programme Management Officers, Technical Officers, National Liaison Officers and project counterparts. The overall aim of these initiatives was to prepare and implement projects that would be of high quality, with measurable, attainable and timely objectives, and would better respond to Member State needs and priorities.

Financial resources

The technical cooperation programme is funded by contributions to the TCF, as well as through extrabudgetary contributions, government cost sharing and contributions in kind. Overall, new resources reached a total of some €78.7 million in 2015, with approximately €66.1 million for the TCF (including assessed programme costs, National Participation Costs[24] (NPCs) and miscellaneous income), €11.9 million in extrabudgetary resources, and about €0.7 million representing in kind contributions.

The rate of attainment for the TCF stood at 94.1% on pledges and at 93.8% on payments at the end of 2015, while payment of NPCs totalled €0.4 million.

Actuals

In 2015, approximately €77.2 million was disbursed to 135 countries or territories, of which 35 were least developed countries, reflecting the Agency's ongoing effort to address the development needs of those States.

MANAGEMENT ISSUES

Partnership for Continuous Improvement (PCI)

"Identification of priorities and efficiency gains was incorporated into the process for preparing the 2016–2017 Programme and Budget"

In 2015, the Agency continued to streamline business processes and eliminate unnecessary bureaucracy through the Partnership for Continuous Improvement (PCI) initiative. Identification of priorities and efficiency gains was incorporated into the process for preparing the 2016–2017 Programme and Budget to provide greater transparency about the changes being made to use resources more effectively.

[24] National Participation Costs: Member States receiving technical assistance are assessed a charge of 5% of their national programme, including national projects and fellows and scientific visitors funded under regional or interregional activities. At least half the assessed amount for the programme must be paid before contractual arrangements for the projects may be made.

During the year, model contracts for standard procurements were established, substantially reducing the time needed to prepare and finalize them. The process for low value purchasing — covering more than 5000 transactions a year — became fully electronic, reducing the overall effort devoted to such transactions.

Agency-wide Information System for Programme Support (AIPS)

The AIPS Plateau 3 systems for Human Resources and Payroll were introduced, enabling the retirement of two legacy systems. The initial roll-out of the new system caused some disruption early in the year. By the end of 2015, the system had largely been stabilized. The high level design proceeded for the last phase of the AIPS project, covering staff performance management, travel and meetings.

Resource mobilization

In June, the Board of Governors approved the Strategic Guidelines on Partnerships and Resource Mobilization. The guidelines are aimed at assisting the Agency in developing partnerships with traditional and non-traditional donors — including the private sector — to support specific Agency objectives. They outline a comprehensive approach to engaging with these new partners that involves defining the modalities of engagement, monitoring project outcomes and establishing responsibilities.