



IAEA AT WORK

2018 Edition



IAEA

International Atomic Energy Agency

Atoms for Peace and Development

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Foreword

The IAEA promotes the peaceful uses of nuclear technology in many fields, including energy, human health, food production, water management and environmental protection — all of which are important areas under the United Nations Sustainable Development Goals (SDGs). Our mandate is Atoms for Peace and Development.

Since its establishment in 1957, the Agency has helped Member States to use nuclear technologies to improve the health and prosperity of their people. Another key IAEA function is to prevent the spread of nuclear weapons. We do this by implementing safeguards to verify that nuclear material in non-nuclear-weapon States is in exclusively peaceful uses.

The IAEA is the only organization within the United Nations system with expertise in the peaceful uses of nuclear technology. Through our extensive technical cooperation programme, we make this technology available to developing countries, helping them to achieve the SDGs. Our unique specialized laboratories help transfer knowledge to Member States. We improve countries' capacity to treat cancer patients, grow new varieties of food crops that can thrive in adverse conditions and manage scarce water resources — to name just a few areas.

We take pride in being able to respond quickly to crises. For example, after devastating earthquakes in Ecuador and Mexico, the Agency sent experts in non-destructive testing techniques — including radiography — to assess the safety of hospitals and schools in danger of collapse. We also reacted quickly to emergencies such as outbreaks of the Ebola and Zika viruses, supplying affected countries with simple nuclear-derived kits so they could detect the diseases quickly and accurately in the field.

Nuclear power is the best known peaceful application of nuclear energy. Use of nuclear power looks set to grow in the next 20 years, particularly in developing countries. The accident at the Fukushima Daiichi nuclear power plant in Japan in 2011 led to a renewed global focus on safety. Nuclear safety is the

responsibility of individual countries, but the IAEA brings its 170 Member States together to agree on international safety standards and share practical experience. In the coming years, the IAEA will work on strengthening nuclear, radiation, transport and waste safety in a more comprehensive manner, including the safety of radiation sources used in non-power applications.

The IAEA also helps countries to ensure that nuclear and other radioactive material does not fall into the hands of terrorists or other criminals and to secure nuclear facilities against malicious acts. As the global platform for cooperation in nuclear security, we help countries establish and maintain robust and sustainable national nuclear security regimes.

In the area of nuclear non-proliferation, the IAEA has the technical competence, independence and objectivity to provide credible assurances that States are honouring their international obligations to use nuclear material only for peaceful purposes. This is an important contribution to international peace and security.

Since 2016, the IAEA has been verifying and monitoring Iran's implementation of its nuclear-related commitments under the Joint Comprehensive Plan of Action.

I hope this brochure will provide a useful overview of the IAEA's work.

— *Yukiya Amano, IAEA Director General*





Overview

The International Atomic Energy Agency

is the world's foremost forum for scientific and technical cooperation in the peaceful uses of nuclear technology. Established in 1957 as an independent organization within the United Nations system, the IAEA serves 170 Member States with a regular budget of approximately €362.5 million.

The IAEA works for the safe, secure and peaceful application of nuclear science and technology, contributing to international peace and security and the United Nations Sustainable Development Goals (SDGs).

Its three thematic priorities are:

- Nuclear technology and applications
- Nuclear safety and security
- Safeguards and verification

Nuclear Technology and Applications

The IAEA supports collective efforts for the peaceful uses of nuclear science and technology. It provides services through its specialized laboratories in Seibersdorf (Austria) and Monaco, as well as through the IAEA's technical cooperation programme, networks and collaborations with partners. With IAEA assistance, nuclear techniques are put to use in various areas, as illustrated in this section. Close collaboration between the IAEA, United Nations organizations and other partners helps maximize the impact of the IAEA's contribution on the achievement of Member States' development priorities, including those listed under the SDGs.



How the IAEA contributes to the Sustainable Development Goals

Poverty, hunger, human health, clean water, affordable and clean energy, industry and innovation, and climate change are areas in which the IAEA has been working for over 60 years. Here's an overview of some of the ways the IAEA helps Member States in achieving the Sustainable Development Goals (SDGs).

The IAEA activities are relevant to many of the SDGs. Specifically, the Agency:



helps tackle hunger and malnutrition in least developed countries through nuclear and isotopic techniques;



helps establish and strengthen nuclear medicine, radiotherapy and radiopharmaceuticals production;



supports effective water management globally through nuclear and isotopic techniques;



fosters the efficient and safe use of nuclear power around the world;



improves industrial production and safety through the use of nuclear technologies;



contributes to both climate change mitigation and adaptation by, for example, assisting countries in reducing their greenhouse gas emissions and measuring the impact of climate change;



trains scientists in the use of nuclear techniques to monitor and manage marine environmental phenomena;



supports the use of isotopic techniques to reverse land degradation and restore soils;



facilitates technology transfer through partnerships with its Member States and other international organizations.

Indirectly, the IAEA's work also contributes to reducing poverty by controlling animal and plant diseases (SDG1), to improving education by giving support to schools and offering training courses, fellowships and expert visits (SDG4), to fostering gender equality by promoting women staff recruitment and science and technical education for girls and women (SDG5), and to furthering peace, justice and strong institutions (SDG16) by providing legal and regulatory advice, among others.

"I believe that nuclear technology has a great deal to contribute to sustainable development. I welcome the fact that the United Nations Sustainable Development Goals explicitly recognize the importance of science and technology for development."

— IAEA Director General Yukiya Amano



ENERGY

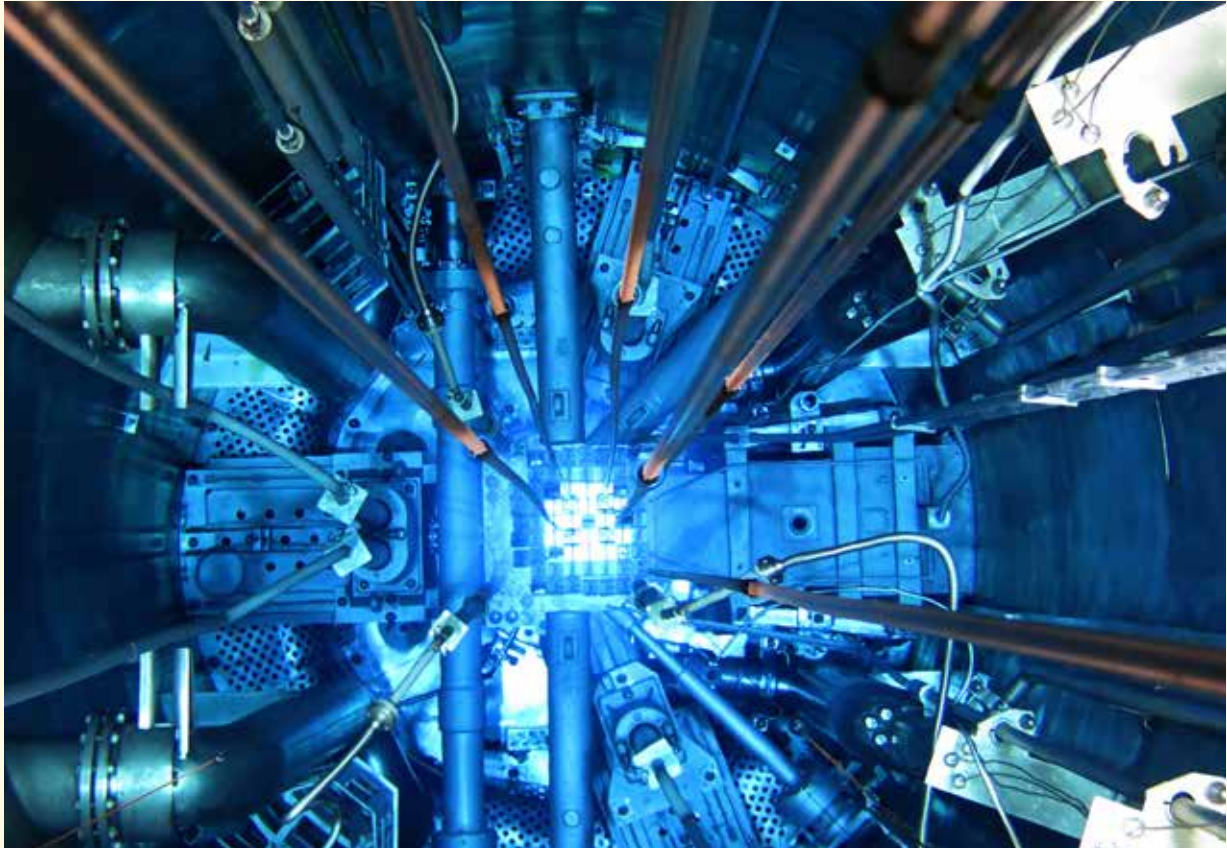
In August 2018, there were 453 reactors in operation in 30 countries. In the face of climate change and increasing demand for electricity, some countries are expanding their existing programmes, or are considering or planning to include nuclear power as part of their energy mixes. The IAEA assists these countries in introducing nuclear power in line with internationally recognized safety standards and security guidelines, best practices and relevant legal instruments, including the relevant nuclear safeguards obligations. The IAEA also provides technical support to countries with existing nuclear power plants, nuclear fuel cycle facilities and research reactors, and to develop capacity in energy analysis and planning.

The IAEA provides a variety of services and activities to address all relevant issues in the areas of nuclear infrastructure, nuclear power reactor technologies and the nuclear power plant life cycle and fuel cycle. It also supports and facilitates the development of new and emerging applications of nuclear power, including non-electric applications such as seawater desalination, hydrogen production or district heating — projects with full attention to nuclear safety and security, as well as international safeguards.

Fusion

Scientists in more than 50 IAEA Member States are carrying out research in controlled nuclear fusion and plasma physics to prove that fusion as an energy source is scientifically feasible. Since this will require large, complex and expensive devices, international collaboration on fusion research and development creates an opportunity to pool resources. The IAEA fosters this collaboration, knowledge exchange and coordination to help close the existing gaps in physics, technology and regulation and move forward in developing the peaceful use of fusion energy.

International Project on Innovative Nuclear Reactors and Fuel Cycles (INPRO)



INPRO was established in 2000 to help ensure that nuclear energy is able to contribute to meeting the energy needs of the 21st century in a sustainable manner.

INPRO provides a forum for experts and policy makers from industrialized and developing countries to discuss and cooperate on such issues as sustainable nuclear energy planning, development and deployment. It promotes a mutually beneficial dialogue between countries with nuclear technology and countries that consider using these technologies to develop new nuclear energy capacity. INPRO supports national strategic and long term planning and decision making and helps create awareness of the options available in technology innovation for the future.

INPRO also supports collaborative projects that review innovative reactor concepts to help prevent severe accidents and mitigate their consequences, undertake nuclear fuel and fuel cycle analysis for future nuclear energy systems, and study waste from innovative types of reactors and fuel cycles.



HEALTH

Radiation Medicine

To expand the benefits of radiation medicine for all, the IAEA and its specialized laboratories provide IAEA Member States — in particular low and middle income countries — support in the use of nuclear techniques for the diagnosis and treatment of cancer, as well as cardiovascular and other non-communicable diseases.

Cancer diagnosis frequently requires imaging studies, which in many cases use radiation. Procedures such as X-rays or magnetic resonance imaging are instrumental for an accurate diagnosis of patients and for clinical decision making concerning therapy and follow-up. The IAEA checks the quality of infrastructure, human resources and medical procedures to ensure adequate diagnostic information while minimizing radiation exposure to patients.

The IAEA also provides equipment and expert guidance in radiation treatment or radiotherapy. Its work includes ensuring the safe, effective and secure use and management of radioactive sources, such as those used in radiotherapy machines and for sterilizing medical tools. The Agency also ensures the safe and secure production, availability and use of radiopharmaceuticals — drugs that contain radioactive substances — used in nuclear medicine and radiation therapy, and it works to minimize side effects for patients while optimizing treatment delivery.

Nutrition

Good health also depends on proper nutrition and adequate access to food. The world is facing the double burden of malnutrition: undernutrition and obesity coexist, often contributing to non-communicable diseases. Nutrition specialists can apply nuclear and isotopic techniques to monitor and assess all forms of malnutrition — from severe undernourishment to obesity — and support the implementation of breastfeeding programmes that can improve nutrition and health from the first days of life. The IAEA helps many countries through training and research and by providing necessary equipment to implement nutrition-related projects.

Programme of Action for Cancer Therapy (PACT)

In response to the global cancer crisis, the IAEA established PACT in 2004. Its vision strives for global partnerships to support developing countries in addressing the growing cancer burden, notably with the World Health Organization (WHO), through the Joint Programme on Cancer Control established in 2009.

The IAEA, the WHO, the International Agency for Research on Cancer (IARC) and other cancer-related organizations, work together to implement a coordinated global response in supporting low and middle income IAEA Member States to develop and implement comprehensive national cancer control programmes. PACT assists low and middle income countries to assess their cancer burden, support the establishment of partnerships necessary for effective cancer control programmes and mobilize additional resources to ensure that investments in radiation medicine are maximized.

The IAEA assists Member States in optimizing the investments made in cancer control through imPACT Reviews. At governments' request, experts travel to a country to assess its cancer burden and readiness to implement cancer control programmes and to provide a series of technical recommendations. Since 2005, 92 imPACT Review missions have taken place.

PACT's goals are to:

- build global partnerships with key international organizations committed to addressing the many challenges posed by cancer in low and middle income Member States;
- mobilize resources from the public and private sectors to support Member States in developing and implementing an effective and well-targeted national cancer control programme;
- support Member States with comprehensive capacity and needs assessments, as well as targeted capacity-building activities to strengthen their national cancer control programmes;
- support effective and affordable access to quality cancer control services to all in need.



ADDRESSING ENVIRONMENTAL ISSUES

One of the biggest environmental challenges is climate change, triggered by carbon dioxide (CO₂) emissions. Nuclear energy is one of the lowest emitters of CO₂ among energy sources. The IAEA contributes to increasing awareness of the potential for nuclear power as a tool for climate change mitigation.

Small changes in the environment could have wide-ranging consequences. The IAEA uses nuclear and isotopic tools to understand the world we live in and to provide decision makers with the necessary information to address modern environmental issues and adapt to future scenarios.

IAEA experts use science-based tools to study both terrestrial and aquatic systems and to evaluate the potential effects of pollution and climate change on the environment and on human health. Stable isotopes and nuclear techniques are used to assess freshwater resources, biological systems, atmospheric processes and oceanic ecosystems, as well as to improve agricultural practices. These tools help evaluate ecological impacts on the environment, particularly by fingerprinting natural and human-made pollution. The techniques can also help assess negative health effects of living in unsanitary environments.

In the area of radioactive waste, the IAEA assists Member States in treating their waste appropriately and in remediating contaminated sites.



WATER

Access to safe water is essential for the support of growing populations, the acceleration of economic development and for meeting the demands of changing lifestyles, such as urbanization. The quality of ocean water not only impacts marine life, but it also affects people who rely on the sea for their livelihoods. The IAEA provides assistance in using nuclear and isotopic techniques to better understand water in order to sustainably manage and protect it for the future.

Water is naturally tagged with isotopic ‘fingerprints,’ which can help determine its origin, age, vulnerability to pollution, movement and interactions both above and below ground, including groundwater and river water. Isotopic fingerprinting helps countries in getting information about the availability of their water resources in the next half century and beyond, and it provides experts with a scientific basis for the sound management of these resources.

Isotopic techniques also provide data on pollutants in the water cycle or levels of ocean acidification. They can reveal vital details about the effects of climate change on rain by assessing precipitation patterns and providing valuable information for climate change adaptation.

IAEA Water Availability Enhancement (IWAVE) Project



IWAVE is an initiative aimed at strengthening national capacities for collecting, managing and interpreting water resource data, as well as using advanced techniques to improve resource management. The IAEA works with partners and national counterparts to identify existing gaps in national hydrological information, particularly regarding groundwater.

Fundamental hydrological data are essential to conduct a comprehensive national water resource assessment in a country. This is why the IWAVE Project focuses primarily on finding

out whether the necessary hydrological data are available and properly understood. Comprehensive water resource assessments consider such issues as water quality, quantity and use, as well as resource vulnerability and sustainability.

Once a comprehensive water resource assessment is in place, national decision makers can take action. Better access to information can result in better policies. Under the umbrella of the project, the IAEA helps build initiatives that provide decision makers with reliable tools to better manage their water resources.



FOOD AND AGRICULTURE

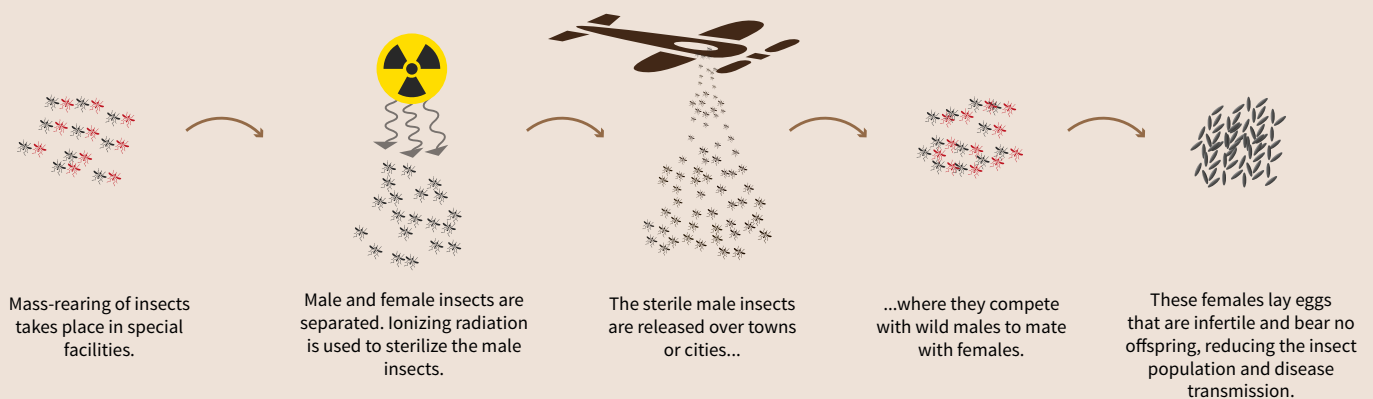
A number of countries, particularly those relying heavily on agriculture for food and livelihoods, are using nuclear techniques to enhance agricultural productivity, and food security and safety. The IAEA provides important equipment and expert guidance through its technical cooperation programme, as well as technology and training from the IAEA's specialized laboratories and partner organizations such as the Food and Agriculture Organization of the United Nations (FAO). With this support, countries are able to use nuclear techniques safely and properly in different areas.

Jointly with the FAO, the IAEA assists its Member States in developing and adopting nuclear-based technologies to enhance livestock reproduction and nutrition and help meet the growing demand for food in a sustainable way. The Joint FAO/IAEA Programme of Nuclear Techniques in Food and Agriculture also helps control pests and diseases that directly affect food security and, in some cases, can be transmitted to humans. In 2017, thanks to the Sterile Insect Technique (see p.13), experts in the Dominican Republic eradicated the Mediterranean fruit fly, an insect pest that hurt agricultural production.

The Sterile Insect Technique

The IAEA, in cooperation with the FAO, helps countries adopt nuclear-based technologies to control insect pests. The sterile insect technique, or SIT for short, is an environmentally friendly insect pest control method that uses ionizing radiation to sterilize pests that are mass-produced in special rearing facilities. The sterile insects are released systematically from the ground or air in pest-infested areas where they mate with wild populations, which subsequently do not produce offspring.

Integrated with other control methods, SIT has been successful in controlling a number of high-profile insect pests that affect food, crops and people in various countries, including fruit flies, tsetse flies, moths, screwworms and some disease-transmitting mosquitoes.



The IAEA also helps breed improved crops and plants, including vitamin- or mineral-enriched varieties with greater resilience to climate change and tolerance to environmental stresses. In the area of food safety, the IAEA's work supports the use of food irradiation according to international norms. This destroys disease-carrying bacteria and reduces the incidence of food-borne illnesses. The IAEA also aims at strengthening international standards for the use of nuclear and related methods to spot food fraud by verifying food authenticity and to measure agrochemical levels in food, such as pesticides and veterinary drug residues.

Healthy soil matters to all people because it is where food is grown and part of how our earth thrives. For farmers, it is how they earn a living. The IAEA's work helps strengthen soil management. By looking closely at unhealthy soil and studying the concentration of certain atoms, such as caesium-137, scientists can make informed decisions about conservation methods to reverse the effects of soil erosion and degradation and enhance soil fertility and crop production while minimizing environmental impact. Fallout radionuclides and stable isotopes are used to measure sources and rates of soil erosion, which helps in tracing hot spots of land degradation and measuring the efficiency of soil conservation practices.



INDUSTRY

A range of nuclear techniques can be used to identify and assess the properties of different materials, measure pollution levels, sterilize and disinfect components, monitor and optimize industrial processes and change chemical, physical and biological properties to produce novel materials. Radiation can be used for analysing and processing a range of substances. Worldwide commercial applications of nuclear techniques include testing wire and cable insulations, automobile tyres and natural rubber latex for gloves, and producing heat shrinkable tubing, food wraps and self-regulating heaters.

Industrial radiography, for example, is a method that uses short X-rays, gamma rays and neutrons to penetrate various materials and detect invisible hidden flaws without destroying the material. This non-destructive testing is particularly helpful in analysing samples in the field of forensics. Radiation can also be used to characterize, restore and preserve cultural artefacts, such as antique books or sculptures.

Nuclear Safety and Security

The IAEA provides a global nuclear safety and security framework to protect people, society and the environment from the harmful effects of ionizing radiation.

Nuclear safety is the achievement of proper operating conditions, prevention of accidents or mitigation of accident consequences, all with the objective of protecting people and the environment from undue radiation hazards.

Nuclear security is the prevention and detection of, and response to, theft, sabotage, unauthorized access, illegal transfer or other malicious acts involving nuclear material, other radioactive substances or their associated facilities.





SAFETY STANDARDS

The IAEA works closely with governments and organizations around the world, such as the United Nations Scientific Committee on the Effects of Atomic Radiation and the International Commission on Radiological Protection, to research and address ways to safely use ionizing radiation.

The IAEA develops safety standards and supporting technical documents that cover all areas relevant to safety related to a wide range of nuclear material and facilities. These standards provide a system that organizations and governments can use to protect people and the environment against harmful effects of ionizing radiation. The IAEA also supports countries in applying these standards by organizing technical meetings and training activities and providing advisory services.

The safety standards, although not legally binding, provide internationally agreed principles, requirements and recommendations for States to ensure that the conduct of peaceful nuclear activities and the application of radioactive sources and other sources of ionizing radiation are undertaken in a way that enables States to meet their obligations under international law. To establish these standards, the IAEA determines which sources of natural and artificial ionizing radiation exposure can be reasonably controlled and advises on the best ways to control them.

While safety regulation is a responsibility of Member States, IAEA safety standards and coordinated approaches to safety focus on:

- promoting harmonization of regulatory approaches;
- helping to ensure that nuclear and radiation related technologies are used safely; and
- facilitating international technical cooperation, commerce and trade.

Implementation of the IAEA's safety standards by Member States helps protect human health and the environment from the harmful effects of ionizing radiation and can also serve as evidence that States are fulfilling their international obligations.



NUCLEAR INSTALLATION SAFETY

The IAEA supports Member States in building their nuclear installations — be they nuclear reactors, research reactors or fuel cycle facilities — with technical guidelines and assessments of the national safety, regulatory and technical infrastructure, as well as by providing training and advisory services. The Agency conducts peer reviews and provides technical advice to Member States to ensure safety in their nuclear installations. The IAEA is present in every phase of an installation's lifetime: from planning to siting, designing and constructing, operating and, eventually, decommissioning.



TRANSPORT OF RADIOACTIVE MATERIAL

Safety: The movement of nuclear and other radioactive material from one facility to another can be a challenging and vulnerable activity. IAEA regulations, reviewed and updated frequently, are applicable to the national and international carriage of radioactive material by all modes of transport.

These form the basis of international regulations established by other United Nations bodies, such as the International Maritime Organization and the International Civil Aviation Organization. The IAEA requirements are, in turn, adopted by national regulatory authorities, creating a strong global regulatory framework.

The regulations address all categories of radioactive material ranging from very low activity, including such materials as ores and concentrates of ores, to very high activity, such as spent fuel and high level waste. Specific requirements are established for marking, labelling, placarding of conveyances, documentation, external radiation limits, operational controls, quality assurance and notification, as well as approval of certain shipments and package types.

Security: Threats to nuclear security during transport could involve deliberately breaking radioactive material packages and dispersing the material found inside. The IAEA also assists States, upon request, in strengthening transport security arrangements by incorporating the necessary recommendations into their national frameworks, as well as in their practical implementation.

The IAEA works to ensure that safety measures do not compromise security and that security measures do not compromise safety.



RADIOACTIVE WASTE SAFETY

Almost all countries use radioactive sources in medicine, industry and agriculture. But if these sources are not controlled properly, they pose a threat to human health and the environment. To help prevent waste from becoming a burden on future generations, the IAEA helps countries develop effective, safe and secure control systems for their radioactive sources — from the cradle to the grave. Good waste management begins before the waste is generated. The starting point for all activities that produce radioactive waste is to avoid or reduce waste generation at its source in order to minimize the quantity of waste requiring disposal.

The IAEA establishes safety standards for radioactive waste management that include guides for classifying the different types of waste according to physical, chemical and radiological properties. These standards help manage the waste and select the appropriate safe disposal facilities. Among these standards is a safety guide that classifies and determines the required containment and isolation for each type of waste. This classification system primarily focuses on long term safety and potential hazard.

The Agency also helps Member States use and apply these safety standards. It works with experts worldwide to identify better ways to dispose of radioactive waste. For example, borehole disposal, a promising technology for storing low level radioactive sealed sources usually used in health care or industry, could allow countries all over the world to safely and securely take charge of their own sealed sources. The method, which involves placing and covering small sealed sources in a narrow hole a few hundred metres deep, is being tested in various countries.



RADIATION PROTECTION

The safe use of ionizing radiation in medicine, energy production, industry and research brings enormous benefits. To keep potential radiation risks under control, the IAEA has developed a set of safety standards.

Workers: The growth of the nuclear industry and the widespread application of radiation and nuclear technologies have led to a steady increase in the number of workers who might be exposed to radiation in the course of their work. According to a 2008 report by the United Nations Scientific Committee on the Effects of Atomic Radiation, close to 23 million workers worldwide are exposed occupationally to ionizing radiation, some 75 per cent of them working in the medical field. While their exposure is mostly a consequence of the normal operation of the facilities where they work and is within regulatory limits, they may occasionally be subject to an overexposure as a result of an accident.

One of the IAEA's programmes focuses specifically on occupational radiation protection. The IAEA promotes an internationally harmonized approach to the issue and develops safety standards and guidelines to reduce radiation exposure in the workplace. It also helps Member States apply these standards and guidelines in practice.

Patients: Medical exposure for diagnosis and treatment constitutes the source of more than 95 per cent of the radiation dose received by the general population. In some cases, however, this exposure may be unnecessary as a result of unjustified procedures, such as applying medical radiation to individuals whose condition does not warrant such intervention or medical exposure that is not appropriately optimized for the given situation. Unintended exposure can be the result of an unsafe design or inappropriate use of medical radiation technology.

The IAEA works to prevent patients from being exposed to unnecessary and unintended radiation while ensuring that radiation doses to patients are commensurate with their medical purpose.

Public and the Environment: Natural sources of radiation are present in the environment, but these are not always harmful. They are difficult to control, and it is impossible for the public to completely avoid exposure to them. In some exceptional cases, people can take cost-effective measures to reduce exposure to certain types of radiation, such as using radon detectors at home. In addition to natural radiation, the testing of nuclear weapons, and nuclear accidents such as Chernobyl in 1986 and Fukushima in 2011 generated additional radiation in the environment.

The IAEA develops safety standards that establish radiation safety principles and describe the practices associated with the use of ionizing radiation. Applying these safety principles ensures that both people and the environment are adequately protected from radiation while enjoying its benefits.



EMERGENCY PREPAREDNESS AND RESPONSE

The IAEA is the global focal point for preparedness for and response to nuclear and radiological emergencies independent of whether they arise from an accident, natural disaster, negligence or criminal act. The IAEA's role in response include notification and official information exchange, assessment of potential emergency consequences and prognosis of possible emergency progression, provision of public information, provision of assistance on request and coordination of the inter-agency response. Through its Incident and Emergency Centre (IEC), the IAEA also assists Member States to enhance their own level of preparedness, primarily through the implementation of a capacity building programme, which contributes to sustainable national capacities in emergency preparedness and response. The IEC also coordinates and maintains the Joint Radiation Emergency Management Plan of the International Organizations, which describes the inter-agency framework for preparedness for and response to a nuclear or radiological emergency.

Event Reporting and Information Exchange

The Unified System for Information Exchange in Incidents and Emergencies, a single unified website, allows for reliable and secure communication of information on nuclear and radiological events. It was developed by the IAEA for national contact points 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 (Assistance Convention) and for national officers under the International Nuclear and Radiological Event Scale. The IAEA's Incident and Emergency System, a 24/7 warning point and on-call system for notifications, requests for assistance and response to emergencies, ensures an immediate assessment of the reported information and enables a prompt response by the IAEA.

International Assistance

As part of the IAEA's strategy for supporting the practical implementation of the Assistance Convention and in order to coordinate international assistance, the IEC manages the Response and Assistance Network. This is a network of States capable and willing to provide, upon request, specialized assistance in case of a nuclear or radiological incident or emergency in a timely and effective manner and, when possible, on a regional basis.



LEGAL AND REGULATORY ASPECTS

There is no single international instrument that addresses nuclear safety and security in a comprehensive manner. A broad range of instruments (many developed under IAEA auspices) provides a framework for using nuclear material and facilities safely and securely in ways that protect all States — both those with active nuclear programmes and those conducting only limited nuclear activities. The IAEA seeks to keep States informed and advise them on the relevant international legal instruments while encouraging adherence to and/or implementation of these instruments.

The legal foundation for nuclear security comprises international instruments and recognized principles designed to control nuclear material and other radioactive substances. While responsibility for nuclear security rests entirely with each State, a number of States have not adhered to relevant instruments or implemented them effectively through their national legal and regulatory frameworks. This situation leaves gaps in the global system that can be exploited by terrorist or criminal elements. The IAEA maintains that universal adherence to relevant instruments, harmonization of national legal and regulatory frameworks and effective application of relevant measures can contribute to combating nuclear terrorism and other criminal acts.

The safety standards developed by the IAEA, although not legally binding, are designed to provide internationally agreed principles, requirements and recommendations for States to ensure that the conduct of civil nuclear activities and the application of radioactive sources and other sources of ionizing radiation are undertaken in a way that enables States to meet their obligations under international law.



NUCLEAR SECURITY

The IAEA helps Member States ensure that measures are taken to control and protect nuclear and other radioactive material, as well as facilities, from falling into the wrong hands.

“The threat of nuclear terrorism is real. Much progress has been made in tackling this threat, nationally, regionally and globally, but more needs to be done. International cooperation is vital.”

— IAEA Director General Yukiya Amano

Countries have the primary responsibility to combat this global threat by, among others, securing vulnerable material, combating illicit trafficking and preventing malicious acts. The IAEA coordinates and implements a nuclear security programme to help its Member States protect against, detect and respond to threats or acts of nuclear terrorism.

The amount of nuclear material used globally for peaceful purposes has risen by 70 per cent since 1999, and it will continue to grow in the coming decades with the global increase in the use of nuclear power. Since 1995, States have reported to the IAEA’s Incident and Trafficking Database approximately 3400 incidents involving nuclear and other radioactive material out of regulatory control.

The IAEA helps its Member States:

1. Prevent people from gaining access to nuclear material and using it with malicious intent by:
 - regulating material and facilities to ensure they are controlled by authorized personnel;
 - putting barriers and fences in place to protect material in use and in storage;
 - protecting material while it is being transported and placed in temporary or long term storage;
 - creating in-depth protection in nuclear facilities;
 - improving accountancy and control of nuclear material;
 - creating a nuclear security culture;
 - minimizing the use of highly enriched uranium;
 - establishing effective registries of material and its location;
 - assessing possible threats to material or related facilities and enabling feedback in the security systems; and
 - ensuring staff are educated and trained.

2. Detect and interdict illicit trafficking and other illegal activities involving radioactive substances by:
 - detecting the illegal possession and movement of material and attempts to sell, purchase or use it;
 - establishing effective border controls with radiation detection equipment to monitor and detect the movement of material;
 - enhancing the security of major public events to detect movement of material and a potential radiological dispersal device, or 'dirty bomb'; and
 - helping States establish nuclear security support centres to ensure sustainability in the use of radiation detection equipment and access to training programmes and nuclear security expertise.
3. Respond to malicious acts or threats quickly and effectively by:
 - coordinating the work of different security forces to deal with a nuclear security event;
 - preparing contingency plans that focus on preventing further damage to the target and other parts of the facility, securing the nuclear facility and protecting emergency equipment and personnel;
 - minimizing possible radiological consequences;
 - developing national nuclear forensics capacities to identify the material used and to manage a radiological crime scene; and
 - recovering and returning lost or stolen material to its owner and ensuring its secure transport.

Convention on the Physical Protection of Nuclear Material (CPPNM)

On 8 May 2016, the Amendment to the CPPNM entered into force. The CPPNM, the only legally binding international undertaking in the area of physical protection of nuclear material, entered into force in 1987. It establishes measures related to the physical protection of nuclear material used for peaceful purposes during international transport, but does not cover the protection of nuclear facilities or nuclear material in domestic use, storage and transport.

In July 2005, the Parties to the CPPNM adopted the Amendment to broaden the scope of the original Convention in this regard. Currently, there are 157 Parties to the Convention and 118 Parties to the Amendment.

Safeguards and Verification

IAEA safeguards are a set of technical measures aimed at assuring the international community that nuclear material and technology are used only for peaceful purposes. IAEA safeguards are embedded in legally binding agreements. Pursuant to the IAEA's Statute, States accept IAEA safeguards through the conclusion of legal agreements with the IAEA.

The IAEA verifies States' legal commitments under their respective safeguards agreements with the IAEA. Safeguards implementation during an annual cycle comprises four fundamental processes: the collection and evaluation of safeguards-relevant information; the development of a safeguards approach for a State which includes practical safeguards measures; the planning, conduct of and evaluation of safeguards activities; and the drawing of safeguards conclusions.





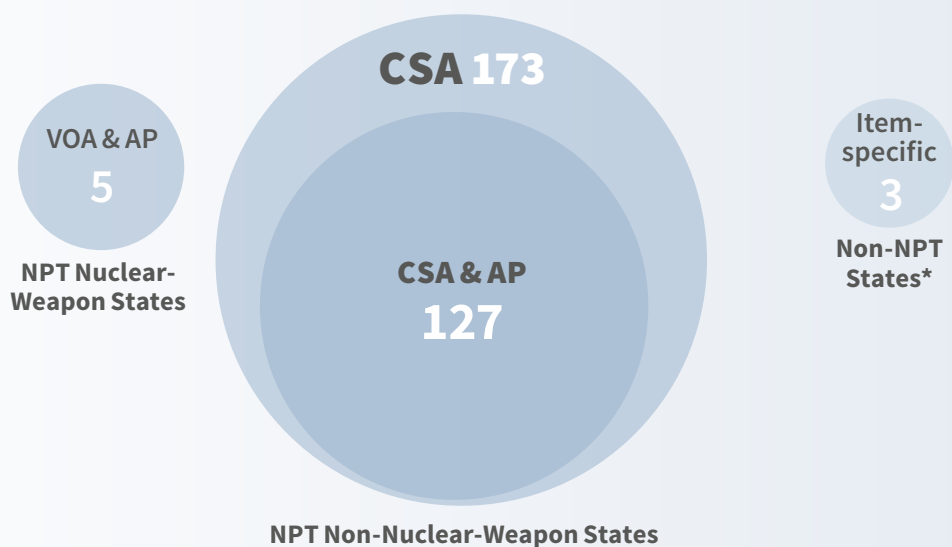
BASICS OF IAEA SAFEGUARDS

Safeguards are a set of technical measures applied by the IAEA on nuclear material and activities, through which the Agency seeks to independently verify that nuclear facilities are not misused and nuclear material is not diverted from peaceful uses. States accept these measures through the conclusion of safeguards agreements.

IAEA safeguards are an essential component of the international security system. The Treaty on the Non-Proliferation of Nuclear Weapons (NPT) — the centrepiece of global efforts to prevent the further spread of nuclear weapons — has given an essential verification role to the IAEA. Under its Article 3, each non-nuclear-weapon State is required to conclude a safeguards agreement with the IAEA. Similarly, under the five regional nuclear weapon free zone treaties, States are required to conclude comprehensive safeguards agreements (CSAs) with the IAEA.

Safeguards Agreements Implemented

(per State, as of December 2017)



CSA: Comprehensive Safeguards Agreement **AP:** Additional Protocol **VOA:** Voluntary Offer Agreement **NPT:** Treaty on the Non-Proliferation of Nuclear Weapons
*India has an AP in force

SAFEGUARDS LEGAL FRAMEWORK

The IAEA safeguards legal framework consists of a number of elements. These include the IAEA Statute, States' obligations under the NPT, safeguards instruments such as safeguards agreements, protocols and subsidiary arrangements, and the decisions of the IAEA Board of Governors.

IAEA safeguards are embedded in legally binding agreements between States and the Agency. Pursuant to the IAEA's Statute, States accept IAEA safeguards through the conclusion of agreements with the IAEA. These agreements provide the legal basis for the implementation of safeguards.

Pursuant to the IAEA Statute, the IAEA can conclude three types of legal agreements:

- CSAs with non-nuclear-weapon States party to the NPT;
- Voluntary offer safeguards agreements with nuclear-weapon States party to the NPT; and
- Item-specific safeguards agreements with non-NPT States.

These agreements can be complemented with an additional protocol, which includes provisions for broader information about, and broader access to, a State's nuclear fuel cycle.

A State with little or no nuclear material may be eligible to conclude a small quantities protocol to its CSA, which reduces the safeguards activities conducted in the State.



SAFEGUARDS IMPLEMENTATION

The purpose of safeguards implementation is to verify States' obligations under their respective safeguards agreements with the IAEA.

Safeguards implementation is based on an annual cycle. It comprises four fundamental processes, namely:

- Collecting and evaluating all safeguards-relevant information;
- Developing a safeguards approach for a State;
- Planning, conducting and evaluating safeguards activities;
- Drawing safeguards conclusions.

At the end of this cycle, the safeguards conclusions drawn by the IAEA provide assurance to the international community that States are abiding by their safeguards obligations under those agreements.



STRENGTHENING COOPERATION WITH STATES

The cooperation between States and the IAEA is a critical factor in determining the successful implementation of IAEA safeguards. Effective cooperation not only demonstrates a State's commitment to the peaceful use of nuclear energy, it is also essential for the efficient and effective implementation of IAEA safeguards.

The IAEA Department of Safeguards places great value on effective cooperation with States and devotes substantial resources to assist States in developing the relevant capabilities in response to their needs. It also provides guidance and assistance to States to enhance understanding of their safeguards obligations and to improve cooperation between States and the IAEA in safeguards implementation.

This assistance is provided through advisory service missions for State systems of accounting for and control of nuclear material, training courses, and the issuance of guidance documents and reference materials. Communications from State or regional authorities responsible for safeguards implementation are always encouraged.

Services

The IAEA works with its Member States and multiple partners worldwide to support the safe, secure and peaceful application of nuclear technologies, using mechanisms such as the IAEA's technical cooperation (TC) programme, coordinated research activities (CRAs) and review missions. Activities under these mechanisms foster collaboration between Member States and forge human and institutional capacity in countries so that they can safely utilize nuclear technologies to address key challenges.





TECHNICAL COOPERATION PROGRAMME

The technical cooperation (TC) programme is the IAEA's main mechanism for transferring nuclear technology to Member States. It assists them in establishing and strengthening capacities for the safe, peaceful and secure use of nuclear technology for sustainable socioeconomic development, working in partnership with national actors to increase impact.

The IAEA's TC programme is developed and managed jointly by the Member States and the IAEA Secretariat.

TC projects respond to Member States' development priorities and support the implementation of national development programmes. These projects provide expertise in fields where nuclear techniques offer advantages over other approaches, or where nuclear techniques can usefully supplement conventional means, adding value to services from other development partners. The programme offers support through building human resource capacity and equipment procurement, and emphasizes cooperation between Member States as well as the development of self-reliance, mutual responsibility and ownership.

The IAEA's TC programme supports the creation of networks and encourages cooperation at all levels. Its delivery mechanisms include fellowships and scientific visits, expert missions, meetings and training courses that enhance technology transfer and cooperation.







Fellowships and scientific visits prepare local personnel to use nuclear techniques. Fellows are sent abroad for comprehensive training in a suitable institution for periods ranging from a few months to several years. Scientific visits lasting up to two weeks are designed for senior personnel. They aim to broaden the scientific or managerial qualifications of specialists in developing countries.

Peaceful Uses Initiative

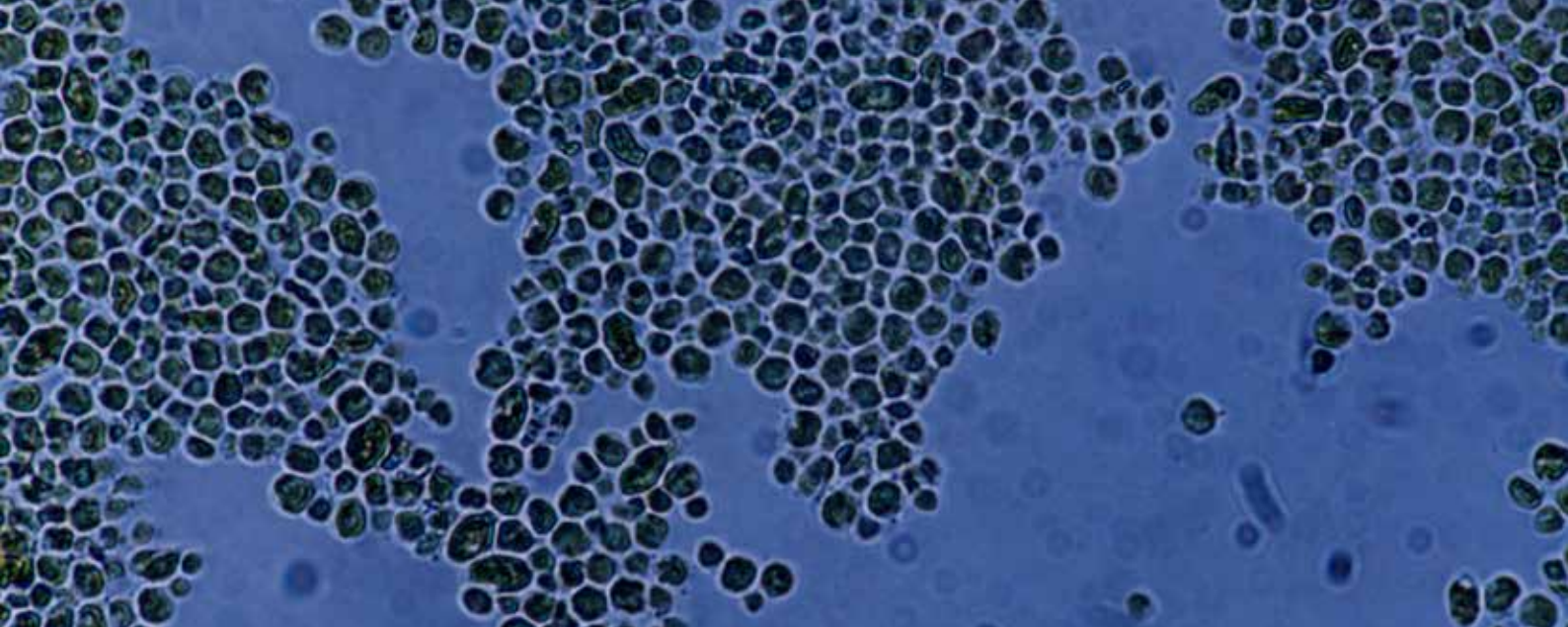
The IAEA Peaceful Uses Initiative (PUI) was launched in 2010 as an instrument to raise extrabudgetary contributions to help fund technical cooperation projects and other unfunded projects of the IAEA in the peaceful uses of nuclear technology.

Extrabudgetary contributions made through the PUI have been used to support a wide range of IAEA activities aimed at promoting broad development goals in Member States, in particular those that are part of the United Nations Sustainable Development Goals (SDGs).

Some of these projects include:

- Initiatives to combat zoonotic diseases; 
- Providing potable water to underserved communities; 
- Enhancing food security; 
- Strengthening and developing nuclear energy infrastructure;  
- Interventions focused on mitigation and adaptation efforts related to climate change. 





COORDINATED RESEARCH PROJECTS

The IAEA encourages research on the practical use of nuclear energy and its applications for peaceful purposes throughout the world. It brings together research institutions from developing and developed Member States to collaborate on research projects of common interest, known as coordinated research projects (CRPs).

These projects cover areas such as applications of isotopes and radiation in agriculture, human health, industry, hydrology and the terrestrial and marine environments, nuclear energy and economic studies, and nuclear safety and security.

The CRPs encourage Member States to acquire, disseminate and adapt new knowledge and technology generated through nuclear technologies and isotope techniques. Results are disseminated to Member States and the international scientific community through publications and through TC projects, that often also apply the findings practically.

Each CRP typically brings together 10–15 research institutions from a range of countries at different stages of socioeconomic development. Research is conducted in the participating institutions, with the IAEA coordinating the work and organizing periodic meetings. CRPs are designed to contribute to building professional relationships and networks, which usually thrive beyond the lifetime of the CRP.

CRPs at a Glance

- 135 active CRPs
- 1600 active research, technical and doctoral contracts and research agreements
- 74 research coordination meetings organized per year



COLLABORATING CENTRES

To promote the practical use of nuclear techniques worldwide and help the IAEA implement its own programmatic activities, the Agency works with Member State institutions designated as Collaborating Centres. Focusing on research, development and training, this Collaborating Centre scheme helps the IAEA reach important targets of the United Nations Sustainable Development Goals.

The IAEA Collaborating Centres are selected scientific institutions, such as laboratories, universities and research facilities, located all around the world that have been collaborating with the IAEA in a variety of fields, including food safety, environmental protection, water resource management and human health. Official selection of Collaborating Centres depends on a variety of criteria, including their adherence to nuclear safety and security guidelines and a proven record of collaboration with the IAEA. Collaborating Centres are dedicated to furthering research, development and training in peaceful applications of nuclear science and technology, recognizing the need to preserve and transfer nuclear knowledge. There are more than 31 Collaborating Centres worldwide in both developed and developing countries.



REVIEW MISSIONS

The IAEA offers a variety of services to help its Member States review and, if necessary, adapt and enhance their standards. The majority of such reviews focus on nuclear security, nuclear safety, safeguards or nuclear power. Others help maintain quality standards in medical applications of nuclear techniques.

One example is the Integrated Nuclear Infrastructure Review (INIR). Upon request from a Member State, the IAEA dispatches a team of international experts to the country to have in-depth discussions with international experts about experiences and best practices in nuclear power infrastructure development. Recommendations and suggestions are provided in a report to the Member State, enabling it to update its national action plan accordingly.

Before receiving an INIR mission, the country must complete a self-evaluation of the 19 nuclear power infrastructure issues included in the IAEA's Milestones approach — a comprehensive methodology that guides countries and organizations to work in a systematic way towards the introduction of nuclear power.

The Integrated Regulatory Review Service (IRRS) is another example that is designed to strengthen and enhance the effectiveness of States' national regulatory infrastructure for nuclear, radiation, radioactive waste and transport safety, as well as the security of radioactive sources. While each State has the ultimate responsibility to ensure safety and security in these areas, the IRRS helps countries bring regulatory, technical and policy issues in line with IAEA safety standards and international good practice.

The Emergency Preparedness Review (EPREV) is a service provided by the IAEA's Incident and Emergency Centre to assess the level of preparedness for nuclear or radiological emergencies in Member States. Any Member State can request such an international peer review mission, conducted by a team consisting of IAEA Secretariat and international experts, which will provide an assessment of the State's capability to respond to nuclear and radiological incidents and emergencies.

EPREV missions assist States in further enhancing their arrangements to promptly respond to a nuclear or radiological emergency, including those involving malicious or other unauthorized acts. EPREV missions can cover all aspects, from appraisal of emergency preparedness arrangements at a specific installation (for example, a nuclear power plant) to a full appraisal comparing the arrangements with current international safety standards and good practices.



LABORATORY SERVICES

The IAEA maintains several specialist laboratories that support its activities, develop innovative technologies and provide training. They also offer a number of important technical and analytical services to Member States and other laboratories, ranging from providing reference material to calibrating equipment and testing services.

The IAEA maintains 19 laboratories:

- Headquarters, Vienna, Austria: 1 nuclear applications laboratory + 3 safeguards laboratories + 1 nuclear safety and security laboratory
- Seibersdorf, near Vienna, Austria: 8 nuclear applications laboratories + 2 safeguards laboratories
- Monaco: 3 nuclear applications laboratories related to the environment
- Japan: 1 on site laboratory at the Rokkasho reprocessing plant

All of these laboratories deliver services to IAEA Member States. Recognizing the need to modernize some of the laboratories, the IAEA has established the Renovation of the Nuclear Applications Laboratories project (ReNuAL). Renovation of some of the nuclear applications laboratories in Seibersdorf began in 2016.



EDUCATION AND TRAINING

Human resource development, training and education are fundamental for a safe, secure and efficient nuclear industry. The IAEA offers a wide spectrum of activities in this field. It organizes, among others, international, regional and national workshops and training courses on:

- Nuclear safety and nuclear installation safety;
- Nuclear security;
- Radiation;
- Transport and waste safety;
- Human resource management in the nuclear field;
- Analytical tools for sustainable energy development.

The IAEA also offers the option to participate in its technical cooperation programme and various mentoring programmes. It maintains networks of managers and specialists for sharing good practices and gives younger generations the opportunity to join the IAEA's internship programme.

The IAEA also helps Member States maintain and preserve nuclear knowledge. Recognizing the importance of nuclear knowledge management, the IAEA develops methodologies and guidance documents for planning, designing and implementing nuclear knowledge management programmes and facilitates nuclear education by providing support, networking opportunities and experience exchange.

By generating interest in science among young generations, the IAEA also aims at contributing to the sustainability of the nuclear industry and related technologies in the future.

About Us



GOVERNANCE

IAEA programmes and budgets are set through the decisions of the policy-making organs: the 35-member Board of Governors and the General Conference of all Member States.

The General Conference of IAEA Member States meets annually, typically in September, in Vienna, to consider and approve the IAEA's programme and budget and to decide on other matters brought before it by the Board of Governors, the Director General and Member States.

The Board of Governors is composed of 35 Member States, as designated and elected by the General Conference. The Board meets at the IAEA Headquarters in Vienna five times per year: in March and June, twice in September (before and after the General Conference), and again in November.

Medium Term Strategy

The IAEA's Medium Term Strategy provides overarching guidance and serves as a roadmap to the Agency's activities during a five-year period. The current Medium Term Strategy covers the period 2018 to 2023.

It is developed through a process of interaction between the Secretariat and a working group established for this purpose by the IAEA's Board of Governors. Based on such considerations as recent technological trends, emerging needs and the political, economic and social background, it identifies priorities among and within the IAEA's programmes.

The Strategy also serves as a general framework and guide for the preparation of three programme and budget cycles using a results-based management approach. The programme and budget for each biennium is developed on the basis of the objectives defined by the Medium Term Strategy.

MANAGEMENT

The IAEA Secretariat is led by the Director General and a team of six Deputy Directors General who head the Agency's major Departments. The incumbent **IAEA Director General is Yukiya Amano** of Japan. He has held this post since 1 December 2009.

Before being appointed to the IAEA's top job, Director General Amano held a number of high-level policy positions, including Chairman of the IAEA Board of Governors from 2005 to 2006.

A diplomat and scholar, **Director General Amano** is closely familiar with the work of international organizations, particularly in the fields of disarmament and non-proliferation.

Deputy Directors General:

- Dazhu Yang, Head, Department of Technical Cooperation
- Aldo Malavasi, Head, Department of Nuclear Sciences and Applications
- Mikhail Chudakov, Head, Department of Nuclear Energy
- Juan Carlos Lentijo, Head, Department of Nuclear Safety and Security
- Massimo Aparo, Head, Department of Safeguards
- Mary Alice Hayward, Head, Department of Management

ORGANIZATIONAL STRUCTURE

The IAEA Secretariat — the international body of staff tasked with running the IAEA — is made up of a team of about 2500 multidisciplinary professional and support staff from more than 100 countries. They come from scientific, technical, managerial and professional disciplines.

Most of these men and women work at the IAEA's Headquarters in Vienna, Austria. Others work at the regional offices in Toronto and Tokyo, at liaison offices in New York and Geneva and at research laboratories in Seibersdorf (Austria) and Monaco.

The IAEA is structured into six Departments, which are further organized into Divisions. These, in turn, each comprise of a number of Sections in charge of specific work areas. Additionally, several Offices report directly to the Director General.

Six major IAEA Departments set the organizational framework:

- Department of Technical Cooperation
- Department of Nuclear Sciences and Applications
- Department of Nuclear Energy
- Department of Nuclear Safety and Security
- Department of Safeguards
- Department of Management

Offices reporting to the Director General

Director General's Office for Coordination

The Director General's Office for Coordination (DGOC) is responsible for a number of functions that are essential to supporting the Director General in performing his responsibilities. These include providing overall policy coordination, external relations with Member States and stakeholders, policy planning and strategy, as well as coordinating the activities of the New York and Geneva offices, which liaise with the United Nations and its agencies. An ethics function is also placed within DGOC.

Office of Internal Oversight Services

The Office of Internal Oversight Services (OIOS) was established to strengthen the IAEA's internal oversight services and its ability to ensure management efficiency and programme effectiveness and to enhance accountability. The Office assists the IAEA in accomplishing its objectives by providing independent internal oversight services through four of its functional areas: internal audit, programme evaluation, management services and investigations.

Office of Legal Affairs

The mission of the Office of Legal Affairs (OLA) is to provide the highest standard of legal services to the Director General, IAEA Secretariat, Policy-Making Organs and Member States in the implementation of the IAEA's activities. The Office provides advice on matters related to the IAEA's Statute and on the conduct of the meetings of the Board of Governors and the General Conference. Furthermore, it provides legal advice and support to all Departments of the IAEA to ensure that the IAEA's activities are conducted in accordance with applicable

agreements, rules, governing policies and relevant practice. It also coordinates the IAEA's legislative assistance programme, which assists IAEA Member States in the development of their national nuclear legislation, and performs the depositary functions for the multilateral treaties that have been adopted under the auspices of the IAEA and/or in respect of which the Director General serves as depositary.

Office of Public Information and Communication

The Office of Public Information and Communication (OPIC) has the responsibility to develop digital and print communication products, manage relations with the media and the public, and produce audio and video materials, all to promote support for the IAEA's mission and activities.

Secretariat of Policy-Making Organs

The objectives of the Secretariat of the Policy-Making Organs (SEC-PMO) are to enable the Policy-Making Organs (the General Conference and Board of Governors) to effectively perform their statutory responsibilities and other functions and to ensure that all meetings of the Policy-Making Organs are conducted efficiently.

List of Member States

Eighteen ratifications were required to bring the IAEA's Statute into force on 29 July 1957. Names of States are not necessarily their historical designations. As of July 2018, there were 170 Member States of the IAEA.

Afghanistan	Cuba	Japan
Albania	Cyprus	Jordan
Algeria	Czech Republic	Kazakhstan
Angola	Democratic Republic of the Congo	Kenya
Antigua and Barbuda	Denmark	Korea, Republic of
Argentina	Djibouti	Kuwait
Armenia	Dominica	Kyrgyzstan
Australia	Dominican Republic	Lao People's Democratic Republic
Austria	Ecuador	Latvia
Azerbaijan	Egypt	Lebanon
Bahamas	El Salvador	Lesotho
Bahrain	Eritrea	Liberia
Bangladesh	Estonia	Libya
Barbados	Ethiopia	Liechtenstein
Belarus	Fiji	Lithuania
Belgium	Finland	Luxembourg
Belize	France	Madagascar
Benin	Gabon	Malawi
Bolivia, Plurinational State of	Georgia	Malaysia
Bosnia and Herzegovina	Germany	Mali
Botswana	Ghana	Malta
Brazil	Greece	Marshall Islands
Brunei Darussalam	Grenada	Mauritania
Bulgaria	Guatemala	Mauritius
Burkina Faso	Guyana	Mexico
Burundi	Haiti	Monaco
Cambodia	Holy See	Mongolia
Cameroon	Honduras	Montenegro
Canada	Hungary	Morocco
Central African Republic	Iceland	Mozambique
Chad	India	Myanmar
Chile	Indonesia	Namibia
China	Iran, Islamic Republic of	Nepal
Colombia	Iraq	Netherlands
Congo	Ireland	New Zealand
Costa Rica	Israel	Nicaragua
Côte d'Ivoire	Italy	Niger
Croatia	Jamaica	Nigeria

Norway	Senegal	Trinidad and Tobago
Oman	Serbia	Tunisia
Pakistan	Seychelles	Turkey
Palau	Sierra Leone	Turkmenistan
Panama	Singapore	Uganda
Papua New Guinea	Slovakia	Ukraine
Paraguay	Slovenia	United Arab Emirates
Peru	South Africa	United Kingdom of Great Britain and Northern Ireland
Philippines	Spain	United Republic of Tanzania
Poland	Sri Lanka	United States of America
Portugal	Sudan	Uruguay
Qatar	Swaziland	Uzbekistan
Republic of Moldova	Sweden	Vanuatu
Romania	Switzerland	Venezuela, Bolivarian Republic of
Russian Federation	Syrian Arab Republic	Viet Nam
Rwanda	Tajikistan	Yemen
Saint Vincent and the Grenadines	Thailand	Zambia
San Marino	The former Yugoslav Republic of Macedonia	Zimbabwe
Saudi Arabia	Togo	

IAEA AT WORK, 2018 Edition
 is produced by the
IAEA Office of Public Information and Communication
info@iaea.org
 Editor: Laura Gil Martínez
 Design and layout: Ritu Kenn



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August 2018



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International Atomic Energy Agency

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