

2020 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons

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Actions taken by France to promote the responsible development of peaceful nuclear and radiation applications under the third pillar of the Treaty on the Non-Proliferation of Nuclear Weapons

Working paper submitted by France

1. As a supplement to the working paper submitted by France, the United Kingdom and the United States of America on the 22 actions carried out under the third pillar of the Treaty on the Non-Proliferation of Nuclear Weapons, France, through this document, would like to return to the national actions that it has taken in support of the development of the peaceful uses of nuclear energy.

The third pillar of the Non-Proliferation Treaty contains a commitment to cooperation on the peaceful uses of nuclear and radiation applications

2. Article IV of the Non-Proliferation Treaty is the foundation of the third pillar. It stipulates, inter alia, “the inalienable right of all the Parties to the Treaty to develop research, production and use of nuclear energy for peaceful purposes without discrimination and in conformity with Articles I and II of this Treaty”. Article IV also contains a commitment to cooperate on the peaceful uses of nuclear energy: “All the Parties to the Treaty undertake to facilitate [...] the fullest possible exchange of equipment, materials and scientific and technological information for the peaceful uses of nuclear energy.”

3. The development of peaceful nuclear and radiation applications is conducted in parallel with nuclear non-proliferation commitments (articles I and II of the Non-Proliferation Treaty).

The third pillar of the Non-Proliferation Treaty guarantees financial and technical support for the development of the various peaceful uses of nuclear and radiation technologies

4. The International Atomic Energy Agency (IAEA) plays a key role in the implementation of the third pillar of the Non-Proliferation Treaty by contributing to the development of peaceful nuclear and radiation applications while ensuring the safe and secure use of radioactive materials.



5. Support for the development of the peaceful uses of nuclear and radiation technologies under the third pillar of the Non-Proliferation Treaty is therefore provided mainly by:

- Contributing to the financing of projects to develop the peaceful uses of the atom, in particular those conducted by IAEA
- Cooperation and the sharing and dissemination of nuclear and radiation expertise among States Parties

The third pillar of the Non-Proliferation Treaty focuses on six areas: nuclear energy, non-power nuclear applications, nuclear safety, nuclear security, technical expertise and training

6. France remains particularly attached to the third pillar of the Non-Proliferation Treaty and to the development of nuclear energy, an available, cost-effective and environmentally friendly source of energy.

7. It is fully committed to the implementation of article IV of the Non-Proliferation Treaty, and to the safe and responsible development of nuclear energy.

8. France is convinced that nuclear and radiation technologies can make a major contribution to meeting basic human needs and achieving the Sustainable Development Goals. These technologies must be able to benefit all countries in such areas as health, agriculture, industry, access to water and energy, environmental protection and many others.

Nuclear energy

9. Nuclear power is a sustainable, low-carbon energy source that can contribute to the implementation of the Paris Agreement on climate change. For many States, particularly among the developing countries, nuclear power capacity is the appropriate way to meet their growing energy needs.

10. The third pillar provides for support to countries that embark on a nuclear power programme. At the same time, however, it is essential – both for the countries concerned and for the international community as a whole – for any civil nuclear programme to be carried out in a way that is capable of meeting the highest standards regarding safety, security, non-proliferation and protection of the environment for future generations.

11. Support for the development and continued use of nuclear power also includes work, inter alia: on future technologies; on waste and spent fuel management; on the continued and sustainable management of nuclear power plants (including issues of plant ageing); and on the place of nuclear power in the energy mix.

12. Cooperation in nuclear energy development, made possible by the Non-Proliferation Treaty, can take many forms.

Action No. 1: Develop the expertise of States parties through cooperation between experts and the dissemination of good practices

13. IAEA member States delegate national experts to the Agency's expert missions in many areas related to the development and maintenance of nuclear power programmes, including fuel cycle management (such as peer reviews, training, the development of guides and other technical documents of the Agency).

14. **Practical application.** France participated in the international peer review mission on the medium- and long-term decommissioning project for the Fukushima Nuclear Power Plant. It also participates in the drafting of the "Red Book", an

international reference on uranium mining in the world, coordinated by IAEA and the Nuclear Energy Agency of the Organisation for Economic Co-operation and Development (OECD).

Action No. 2: Structure the development of nuclear power programmes, particularly for the benefit of newcomers

15. IAEA member States hold technical meetings or workshops on topics related to the development and maintenance of nuclear power programmes.

16. **Practical application.** Since 2018, France has been hosting an international Agency training course on the financing of a nuclear power programme. French experts in all relevant fields are mobilized, and site visits are an integral part of the course. In total, in 2019, France trained about 20 trainees and hosted about 40 IAEA scientific visits and study tours.

Action No. 3: Support the development of a regulatory framework and infrastructure for a nuclear power programme

17. IAEA member States actively support the development of the infrastructure necessary for the introduction of nuclear power to countries that wish to have it through financial contributions and the provision of French experts free of charge.

18. **Practical application.** Since 2010, France has provided an expert to the Agency's Nuclear Infrastructure Development Section. This Section guides newcomers through a step-by-step approach to developing this essential infrastructure. In addition, in 2020, France provided the Agency with the first Junior Professional Officer on small modular reactors: new low-power reactors whose flexible use is of particular interest to developing countries taking their first steps in nuclear power.

Action No. 4: Facilitate access to nuclear fuel

19. Securing the nuclear fuel supply through multilateral assurances builds confidence that nuclear fuel can be obtained with certainty and predictability in the event of an inability to acquire low-enriched uranium on the commercial market or by any other means. This security of supply helps the development of a nuclear power programme.

20. **Practical application.** The establishment of the IAEA Low Enriched Uranium (LEU) Bank in Kazakhstan (inaugurated on 24 August 2017) is intended to provide States with guaranteed access to nuclear fuel in the event that they are unable to obtain supplies on the standard competitive market. The Bank went into operation on 17 October 2019, after receiving its first delivery of LEU. It received a second delivery on 10 December 2019, thereby reaching full storage capacity. From the outset, France, together with its European partners, has been committed to technical and financial participation by the European Union. The French company Orano has supplied part of the fuel stored in the LEU Bank.

Action No. 5: Respond to major energy and climate challenges with small modular reactors

21. Climate issues, environmental protection and the growing need for energy to ensure sustainable economic development are all factors that make nuclear energy a key element in tomorrow's energy mix, thanks to its low-carbon nature and its good complementarity with renewable energies. With their specific advantages, small modular reactors can be of interest to new markets and provide a particularly safe and relevant response to some of the global challenges related to energy and climate.

22. **Practical application.** As part of the “France 2030” investment plan, 1 billion euros will be mobilized for the development of small modular reactor technologies. A small modular reactor project based on pressurized water reactor technology, called “NUWARD”, is being developed by a French consortium comprising Électricité de France (EDF), the French Alternative Energies and Atomic Energy Commission, TechnicAtome and Naval Group.

23. France is funding a Junior Professional Officer and an expert on a pro bono basis to contribute to the work of the IAEA Department of Nuclear Energy on the technological aspects of small modular reactors. France also contributes to the activities of IAEA to verify the applicability and sufficiency of international safety and security standards for small modular reactors. The Institute for Radiological Protection and Nuclear Safety has participated in the Small Modular Reactor Regulators’ Forum since its creation in 2014.

24. In conclusion, all these collaborations and contributions are essential to support countries (whether or not they are newcomers) in the development of a sustainable nuclear power programme that respects international obligations and standards.

Non-power nuclear and radiation applications

25. The peaceful uses of nuclear and radiation applications, promoted by the third pillar, are not exclusively in the energy field. Owing to innovative techniques, nuclear science offers a wide range of applications in health (the diagnosis and treatment of diseases, including cancer and coronary heart disease, thanks to ongoing developments in nuclear medicine), agriculture, nutrition and food safety (the improvement of crop production using advanced irrigation techniques, such as isotope mapping), access to drinking water, and the protection of cultural heritage (such as dating, authenticating and preserving works of art).

26. Cooperation in non-power nuclear applications can take the forms described below.

Action No. 6: Addressing public health and combating epidemics

27. IAEA member States are funding projects to combat cancer (Programme of Action on Cancer Therapy), to prevent and treat coronary heart disease, to support the production of medical radioisotopes and to combat vector-borne diseases (such as Ebola or Zika) and the recent coronavirus disease (COVID-19) pandemic.

28. **Practical application.** An IAEA research project on Reunion island, in partnership with the Research Institute for Development, aims to control mosquitoes that carry malaria, dengue fever and chikungunya using the sterile insect technique. France is also funding a post of young associate expert in the IAEA Department of Nuclear Science and Applications on this technique.

Action No. 7: Addressing food security

29. Financing technical cooperation projects helps to improve crop production through the use of advanced irrigation techniques or to guarantee the traceability, and therefore the geographical origin, of produce.

30. **Practical application.** In 2017, a coordination meeting was held at Aérial in Strasbourg as part of a coordinated research project to increase and strengthen the capacity of participating countries to irradiate food with electrically generated (electron beam) ionizing radiation.

Action No. 8: Interpret, diagnose and preserve cultural heritage

31. Nuclear techniques make it possible to date works, verify their authenticity, identify their origin, study their creation and undertake restoration work.

32. **Practical application.** On the occasion of the 2019 Preparatory Committee for the Tenth Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons in 2022, France initiated a statement entitled “Nuclear techniques for cultural heritage”, reaffirming the undeniable role of nuclear applications in the preservation of cultural and natural heritage and encouraging States parties to the Non-Proliferation Treaty to develop nuclear techniques to promote it. It also co-organized a side event on this topic with Brazil, Egypt and the Netherlands at the IAEA Ministerial Conference on Nuclear Science and Technology held in November 2018. In keeping with these actions, the University of Paris-Saclay was designated as the first IAEA collaborating centre in the area of heritage sciences in September 2021. France has also made available a young associate expert to support the Agency in this area. Her responsibilities will include monitoring the coordinated research activities carried out by IAEA, for example in the field of combating illicit trafficking in works of art.

Action No. 9: Environmental protection

33. Non-power nuclear applications help to protect the environment, for example, by controlling the reproduction of insect pests (using the sterile insect technique) or studying ocean acidification (using nuclear and isotopic techniques to examine the impact on marine organisms of ocean acidification caused by carbon dioxide (CO₂) emissions).

34. **Practical application.** An international study, coordinated by the French Research Institute for Development and Paleosofia-APEMA (Italy), involved IAEA and a dozen scientific institutes. It showed that the reduction in size of some marine organisms during past mass extinction events could be a consequence of ocean acidification. This reduction has allowed them to survive in the presence of high CO₂ concentrations, a phenomenon that could occur again in the future due to global warming.

35. Under the third pillar, these applications must be available to all States, in particular developing States.

Nuclear safety

36. The accidents at Three Mile Island, Chernobyl and Fukushima Daiichi have demonstrated that the responsible use of nuclear energy must meet the highest safety standards. This is a sine qua non for sustainable nuclear power that can meet future energy needs.

37. The third pillar of the Non-Proliferation Treaty calls for increased international cooperation on security under the existing legal instruments.¹

38. Third pillar commitments on nuclear safety can be achieved, for example, through the following actions.

¹ The Convention on Nuclear Safety, the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management, the Convention on Early Notification of a Nuclear Accident and the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency.

Action No. 10: Systematize compliance reviews with the highest safety standards

39. The systematic use by States of IAEA peer review services is encouraged, in particular by the Action Plan on Nuclear Safety adopted by the Agency in 2011. To ensure that IAEA safety and security standards and recommendations are properly applied, States regularly request the Agency to organize such missions. They bring together international experts to review the compliance of national measures with these standards and recommendations. These missions make it possible to identify recommendations to be implemented by the country under review, as well as good practices.

40. **Practical applications.** In October 2019, an IAEA peer review mission commended the Civaux Nuclear Power Plant operator's commitment to safety. The experts encouraged the plant to continue to improve its operational safety. France provided an expert to the IAEA on a pro bono basis between 2015 and 2018. This expert published a technical paper on scientific and technical organizations and contributed to the identification of the nuclear safety and security needs of the Forum of Nuclear Regulatory Bodies in Africa. More generally, the French Nuclear Safety Authority and the Institute for Radiological Protection and Nuclear Safety are actively involved in the major international instruments for sharing experience under the aegis of IAEA (including the Convention on Nuclear Safety and the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management). The Nuclear Safety Authority and the Institute for Radiological Protection and Nuclear Safety continue to work with many IAEA member States to develop international safety and radiation protection standards. They do this through, for example, the permanent presence of France on standards review committees (the Radiation Safety Standards Committee, the Waste Safety Standards Committee, the Transport Safety Standards Committee and the Nuclear Safety Standards Committee), but they also contribute directly to the consideration of the best current standards through their regular participation in international reviews (such as the Integrated Regulatory Review Service and the Integrated Review Service for Radioactive Waste and Spent Fuel Management, Decommissioning and Remediation (ARTEMIS)).

Action No. 11: Implement and promote a global civil nuclear liability regime

41. A civil nuclear liability regime derogates from ordinary law and its purpose is to facilitate recourse for potential victims of nuclear or radiological accidents in order to ensure their compensation in the event of damage, including when it is transboundary. In return, international civil nuclear liability regimes provide a stable framework for operators to be held liable. Civil nuclear liability conventions apply to accidents occurring in a nuclear facility or during the transport of "nuclear substances" to or from such facilities.

42. **Practical application.** France shares the objective of the universal application of a civil nuclear liability regime based on internationally recognized principles, the purpose of which is, on the one hand, to ensure the protection of victims by guaranteeing rapid and easy compensation for damage resulting from a nuclear accident and, on the other hand, to enable the development of international cooperation in the field of nuclear energy. The founding documents of a global civil nuclear liability regime are the 1960 Paris Convention on Third Party Liability in the Field of Nuclear Energy, under the auspices of OECD, and the 1963 Vienna Convention on Civil Liability for Nuclear Damage, under the auspices of IAEA. A protocol known as the "Joint Protocol", adopted under the auspices of IAEA and OECD, and which entered into force on 27 April 1992, makes it possible to establish a bridge between the Paris and Vienna Conventions and to offer the advantages of both Conventions to States parties to one of these Conventions and to the Joint

Protocol. France is a State Party to the Paris Convention and approved the Joint Protocol in April 2014. In August 2013, the United States and France signed a joint statement affirming their commitment to contribute to the establishment of a global civil nuclear liability regime.

Action No. 12: Prevent accidents and mitigate their radiological consequences

43. The principles for the implementation of the objective of the Convention on Nuclear Safety – to prevent accidents and mitigate their radiological consequences – were strengthened by the adoption of the Vienna Declaration on Nuclear Safety in February 2015. The Vienna Declaration sets forth specific and ambitious nuclear safety objectives, including the principle of periodically reviewing the safety of existing facilities in order to prevent new nuclear and radiological accidents, and the principle of designing new plants in order to mitigate the radiological consequences in the event of a nuclear accident.

44. **Practical application.** Every 10 years, the Nuclear Safety Authority reviews all basic nuclear facilities in France, including those being dismantled, in order to thoroughly evaluate compliance with applicable standards, carefully assess the effects of ageing, address any deviations detected and improve safety in accordance with best practices. In addition, in 2018, the Institute for Radiological Protection and Nuclear Safety provided to IAEA, free of charge, an expert on the development of the Reactor Assessment Tool, an expert tool that is easy to use in emergencies. One of the expert's responsibilities was to prepare specifications and to oversee the development of the "prognostic" component, as a complement to the "diagnostic" component, for all types of reactors. This expert is now at the disposal of the Incident and Emergency Centre of IAEA.

Action No. 13: Use the most advanced technology to treat victims of radiation accidents

45. States are implementing unique, one-of-a-kind technologies for receiving and treating victims of radiation accidents.

46. **Practical application.** A Georgian soldier who had been the victim of a high-dose radiation accident was treated in France at Percy Army Teaching Hospital in 1997. In 2019, following a relapse, he once again underwent reconstructive surgery involving stem cell therapy at Percy Army Teaching Hospital, with technical support from the Institute for Radiological Protection and Nuclear Safety. In addition, following an interventional radiology procedure, a Peruvian patient developed a severe skin lesion. In 2019, experts from the Institute for Radiological Protection and Nuclear Safety and Percy Army Teaching Hospital participated in an IAEA assistance mission to Lima in order to treat this patient. Lastly, in 2019, experts from the Institute for Radiological Protection and Nuclear Safety contributed to seven training courses on preparedness and the medical response to nuclear and radiological emergencies.

47. Such steps make it possible to implement the third pillar with the assurance that every effort has been made to prevent accidents and mitigate their effects.

Nuclear security

48. In the current environment, the threat of nuclear or radiological terrorism must be taken into account more than ever. Addressing this threat is critical to ensuring the peaceful and responsible uses of nuclear energy. The first step of prevention is assessing the threat, which, when nuclear or radiological materials are involved, can take various forms, including:

- Use of terrorist devices that are either dispersive (dirty bombs) or release nuclear energy
- Use of a highly radioactive source
- Attack on a facility housing nuclear or radioactive materials or during the transport of such materials

49. Given the transboundary and potentially non-State nature of the threat, the third pillar of the Non-Proliferation Treaty emphasizes the need for international cooperation. Cooperation activities are undertaken to ensure the physical protection of sites and information, with particular attention to cybersecurity, as well as to prevent the risk of and detect malicious acts, such as trafficking and theft, and to respond to confirmed threats. The examination of nuclear or radiological crime scenes is also necessary.

50. Cooperation in the area of nuclear security can take the forms described below.

Action No. 14: Combat nuclear terrorism at the international level through the exchange of best practices

51. States can exchange best practices relating to nuclear security, including under the Global Initiative to Combat Nuclear Terrorism. The Initiative comprises 89 countries and six international organizations. Its purpose is to improve capacities for prevention, detection and response to malicious acts using nuclear or radiological materials. The holding of international seminars or exercises on regulatory and technical means of prevention, detection architecture and response strategies and organizations facilitates such exchanges.

52. **Practical application.** In 2021, France held the “Lutetia” workshop on information-sharing in the context of radiation detection and on the link with traditional national security architecture.

Action No. 15: Contribute to the security of radioactive sources and develop alternative technologies

53. States can contribute to programmes designed to ensure the security of radioactive sources (particularly orphan sources, difficult-to-handle sources, sealed sources, high-activity sources and sources at the end of their life cycle), in some cases in accordance with national frameworks. They can also contribute to the development of alternative technologies to replace high-activity sources, in order to reduce the risks associated with such sources. Moreover, they can endorse the Joint Statement on Strengthening the Security of High-Activity Sealed Radioactive Sources (information circular INFCIRC/910), which promotes such activities.

54. **Practical application.** France is promoting the Joint Statement and has organized a number of related events. At their request and within the framework of assistance programmes, France has provided support to countries such as Cameroon, Indonesia, the Sudan and Tunisia by sending teams from the Alternative Energies and Atomic Energy Commission to perform operations in order to secure, store or even repatriate sources outside regulatory control, and to pass on their knowledge to local operators. These operations are performed under the auspices of IAEA, through the Nuclear Security Fund. The Institute for Radiological Protection and Nuclear Safety regularly provides its expertise and field-measurement capacities to third countries (recently Haiti, under the auspices of IAEA), in order to help characterize sources with a view to ensuring that they are stored safely and securely and, if necessary, disposed of using dedicated management methods.

Action No. 16: Support the nuclear security activities of IAEA while respecting the sovereignty of States

55. States members can provide technical and financial assistance for the nuclear security activities of IAEA by making a financial contribution to the Nuclear Security Fund or by providing expertise or in-kind support for the Agency's various initiatives.

56. **Practical application.** France has provided significant financial and in-kind support for the nuclear security activities of IAEA, including by making Junior Professional Officers available to the Division of Nuclear Security, facilitating expert participation, hosting training sessions and funding a 1-million-euro project to strengthen the regulatory framework in Africa in 2020.

Action No. 17: Ensure the nuclear and radiological security of major events

57. Major public sporting, religious, cultural or political events, which are held in all countries and are generally highly publicized, may be subject to nuclear and radiological security measures, which help to prevent acts of nuclear or radiological terrorism. The strategies developed present a unique challenge for national authorities, involving measures such as:

- Establishment of a radiation map (reference radiation profile) using detection equipment
- Closure of the area by security forces
- Monitoring of area entry points by radiation detectors
- Deployment of response teams in the event that unauthorized nuclear or radiological materials are detected

58. All these measures, which are essential for ensuring the security of major public events, are part of the third pillar of the Non-Proliferation Treaty; the IAEA member States that are the most advanced in this area may provide related assistance and training.

59. **Practical application.** In order to strengthen international cooperation in this area, France made the security of major public events a priority of its presidency of the Global Partnership against the Spread of Weapons and Materials of Mass Destruction in 2019. In addition, in November 2018 and April 2019, France hosted two IAEA training sessions on ensuring the security of major events for authorities from French-speaking African countries, including several members of the Group of Five for the Sahel (G5 Sahel). The training sessions were very well received and helped to develop the capacities of these countries to ensure the radiological security of cultural, sporting and political events with detection equipment that is easy to use and inexpensive to purchase and maintain. Shortly thereafter, these capacities were built by the Niger at an African summit.

Action No. 18: Provide training in radiation detection and nuclear or radiological crime scene management

60. States can provide training in radiation detection and nuclear or radiological crime scene management.

61. **Practical application.** In October 2019, in the context of IAEA assistance programmes, training on radiation detection architecture was provided in Dakar for a number of French-speaking African countries. In July 2019, France provided a delegation from Burkina Faso with training on the management of contaminated crime scenes.

62. Such support for nuclear security helps to increase public acceptance of nuclear power and, because of the seriousness and technical nature of the methods used, also facilitates training and the transfer of knowledge and technology to States. Nuclear

security is not an obstacle to the development of nuclear and radiation energy; rather, it is a vector of progress for the bodies that ensure it.

Technical expertise

63. The implementation of the third pillar of the Non-Proliferation Treaty also requires the sharing and harnessing of nuclear technical expertise.

Action No. 19: Establish a network of research reactors

64. The purpose of the International Centres based on Research Reactors initiative is to help IAEA member States to gain timely access to existing research reactor infrastructure in order to advance research and development and strengthen their scientific capacities.

65. **Practical application.** The Alternative Energies and Atomic Energy Commission has signed several International Centres based on Research Reactors agreements with research bodies based in Morocco, Tunisia and Slovenia (September 2016), Indonesia (March 2017) and Algeria (April 2017). Under these agreements, signatory IAEA member States have access to research reactors certified by the International Centres. In addition, the CABRI facility (a pool-type research reactor), whose purpose is to study the behaviour of nuclear fuel pencils in the event of an accident and to assess the consequences of their potential rupture, is open to international collaboration, in particular under the CABRI international programme, established under the auspices of the Nuclear Energy Agency of OECD. The Institute for Radiological Protection and Nuclear Safety is also actively contributing to the initiative of the Nuclear Energy Agency to ensure the sustainability of experimental reactors still in operation.

Action No. 20: Develop virtual reactors

66. By developing virtual reactors, States can overcome physical and material limitations; these training tools, which are accessible to everyone, everywhere, prevent exposure to radiation.

67. **Practical application.** The “Enhanced Virtual Open Core” platform of the Alternative Energies and Atomic Energy Commission is a mixed-reality simulator based on an open-core pool-type reactor. This educational platform helps students to acquire a basic understanding of reactor physics and to develop essential operation-related knowledge, expertise and soft skills through a balance between theory and practice. The platform is also used to train future operators, providing them with the necessary basis for specialized training in facilities. Thanks to this platform, the use of research reactors and nuclear facilities for training can positively contribute to operational activities such as the conduct of scientific experiments and the production of radioelements. The mechanism can also host participants from international partner organizations. Starting in 2021, replicas of the platform could be set up in partner countries as part of a combined offering of equipment and services.

Action No. 21: Share crisis management tools

68. Sharing dispersion codes and nuclear and radiological measurement instruments in the event of a nuclear incident is one way to help States manage radiological crises.

69. **Practical application.** The detection capabilities of the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO), namely, 60 radionuclide detection and measurement stations and 16 noble gas measurement facilities, can be mobilized as a complement to and in support of those of IAEA, pursuant to a practical arrangement signed between the two organizations in 2016. More broadly, CTBTO contributes to the third pillar by providing members of the international scientific community with all

or part of the data collected by the International Monitoring System. In addition, the Institute for Radiological Protection and Nuclear Safety is participating in an IAEA-coordinated research project on the effective use of dose projection tools in the preparedness and response to nuclear and radiological emergencies, in order to promote the sharing of information on atmospheric dispersion and on the operational use of such tools to provide expert products that are helpful to decision makers.

Training

Action No. 22: Share training tools and build capacities

70. Under the third pillar of the Non-Proliferation Treaty, training plays an essential role in developing States' capacities to meet their commitments by helping them to build the necessary skills.

71. **Practical application.** In France, there is an extensive training system to support the operation of the entire nuclear sector. The available training courses can be general in nature or focused on specific subjects, such as science, economics, law or management. These courses, some of which lead to a diploma, address the various aspects of the third pillar in a cross-cutting manner. To support the development of nuclear energy at the international level, France now has more than 50 nuclear-related master's degree programmes, 9 of which are taught in English. France also hosts many foreign trainees and interns, and regularly contributes to the training courses offered by IAEA by providing experts in all areas of the third pillar.

72. More specifically, the National Institute for Nuclear Science and Technology provides highly specialized training in the science and technology used in the field of nuclear energy, industrial and medical applications of nuclear energy, and low-carbon energy systems. The courses offered by the Institute in France are open to all nationalities; for example, 66 per cent of students enrolled in the Institute's international master's degree programme in nuclear energy are foreign. The Institute also provides training for its international partners and clients, such as the Ministry of Higher Education of Senegal. In 2010, France and China jointly established the Franco-Chinese Nuclear Energy Institute, of which the National Institute for Nuclear Science and Technology is a founding member, and whose purpose is to train nuclear engineers, through joint instruction, to be able to work in France and China. Since 2016, the National Institute for Nuclear Science and Technology has been an IAEA collaborating centre for education and training in the field of nuclear technology and industrial and radiopharmaceutical applications of such technology. The Institute and the Agency are currently working to renew and expand the scope of that collaboration for the period 2020–2024. The Institute also provides training to many IAEA fellows within the framework of technical cooperation (particularly with Africa) and technical and scientific visits.

73. Since 2011, the International Institute of Nuclear Energy has been representing and coordinating French training programmes at the international level, in order to support industrial export contracts that contribute to the development of nuclear energy for peaceful purposes. By bringing together all nuclear industry actors under one umbrella, the International serves as an entry point for all countries wishing to develop nuclear training programmes and to benefit from French expertise in this area. The Institute helps States wishing to develop nuclear energy for peaceful purposes to implement the best training solutions to meet their needs for qualified personnel.

74. With respect to nuclear safety, security and safeguards, for the past 10 years the European Nuclear Safety Training and Tutoring Institute has been providing French and European expertise in the control and regulation of the use of ionizing radiation to professionals around the world. The Institute also implements the training programmes of IAEA and the European Commission.

Assessment and outlook

Preserving and strengthening the authority of the third pillar of the Non-Proliferation Treaty

The development of peaceful nuclear and radiation applications must be safe, sustainable and beneficial to all

75. Given the ever-increasing energy needs of countries worldwide, particularly developing countries, the peaceful uses of nuclear energy are of critical importance. Indeed, nuclear power is a sustainable, non-CO₂-emitting energy source. Furthermore, non-power nuclear and radiation applications can contribute to addressing major issues related to the environment, public health and world hunger, and can help us to better understand and preserve our cultural heritage.

76. The responsible and sustainable development of civil nuclear activities is a priority. The implementation of nuclear power programmes or non-power nuclear applications requires the maintenance of a strong nuclear safety and security culture and the acquisition of the fullest possible range of knowledge, expertise and skills at the highest level.

The attention of the international community is thus rightly focused on the practical implementation of article IV of the Non-Proliferation Treaty

77. States parties to the Non-Proliferation Treaty are strongly committed to developing and sharing the benefits of the civilian uses of the atom.

78. The 22 actions described in this document are proof of the international community's commitment, under the auspices of IAEA, to the development of peaceful nuclear and radiation applications under the best conditions of safety, security and non-proliferation, and with due respect for the environment. France shares in that commitment.

Intergovernmental agreements remain one of the best tools for implementing the third pillar

79. Intergovernmental agreements, whether bilateral or multilateral, thematic or cross-cutting, play an essential role in the implementation of article IV of the Non-Proliferation Treaty. They contribute to the establishment of an institutional, technical and legal framework that is essential for enhanced cooperation that meets the highest standards of safety, security, safeguards, non-proliferation and environmental protection. In 2017, France initiated a discussion on a framework for civil nuclear cooperation based on intergovernmental agreements, as reflected in a working paper containing an illustrative and non-exclusive list of best practices. The purpose of this discussion was to highlight the value of such agreements in facilitating cooperation with newcomers and, more broadly, with all States involved in promoting the responsible and sustainable development of peaceful nuclear and radiological programmes. This working paper was submitted for consideration at the second session of the Preparatory Committee for the Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, held in May 2018, and then at the third session of the Preparatory Committee, held in May 2019, with 11 endorsements (Belgium, Canada, Cyprus, Finland, France, Greece, Latvia, Mexico, the Niger, Portugal and Romania). It will be submitted once again at the next Conference of the Parties. If widely disseminated, it could serve as a useful frame of reference for the conclusion of new intergovernmental agreements.