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Strengthening the Agency's activities related to nuclear science, technology and applications

Resolution adopted on 25 September 2020 during the twelfth plenary meeting

A.

Non-power nuclear applications

1.

General

The General Conference,

- (a) Noting that the Agency's objectives as outlined in Article II of the Statute include "*to accelerate and enlarge the contribution of atomic energy to peace, health and prosperity throughout the world*",
- (b) Noting also that the statutory functions of the Agency as outlined in Article III of the Statute, paragraphs A.1 to A.4, include encouraging research and development and fostering the exchange of scientific and technical information and the training of scientists and experts in the field of peaceful uses of atomic energy, with due consideration for the needs of developing countries,
- (c) Noting that the United Nations General Assembly, in resolution 64/292, called upon States and international organizations to provide financial resources, capacity building and technology transfer, through international assistance and cooperation, in particular to developing countries, in order to scale up efforts to provide safe, clean, accessible and affordable drinking water and sanitation for all,
- (d) Noting that the United Nations General Assembly, in resolution 66/288, endorsed the outcome document of the United Nations Conference on Sustainable Development, entitled "The future we want", which recognized the importance of strengthened national, scientific and

technological capacities for sustainable development, and to this end, supported building science and technology capacity, with both women and men as contributors and beneficiaries, including through collaboration among research institutions, universities, the private sector, governments, non-governmental organizations and scientists,

(e) Appreciating the adoption of the 2030 Agenda for Sustainable Development by the United Nations General Assembly of 2015 (A/RES/70/1), and welcoming the Secretariat activities that contribute to fostering sustainable development and protecting the environment,

(f) Noting that the United Nations General Assembly Resolution 71/312 endorsed the declaration entitled “Our ocean, our future: call for action” which calls upon all stakeholders to conserve and sustainably use the oceans, seas and marine resources for sustainable development,

(g) Noting that for the ten-year period from 2021–2030, the United Nations General Assembly has proclaimed a Decade of Ocean Science for Sustainable Development (Resolution 72/73), and a Decade on Ecosystem Restoration (Resolution 73/284),

(h) Stressing the importance of the Paris Agreement adopted under the United Nations Framework Convention on Climate Change,

(i) Noting the Medium Term Strategy as noted by the Board of Governors,

(j) Taking note of the *Nuclear Technology Review 2020* (document GC(64)/INF/2)),

(k) Stressing that nuclear science, technology and applications address and contribute to a wide variety of basic socio-economic human development needs of Member States, in such areas as health, nutrition, food and agriculture, water resources, environment, industry, materials, and energy, and noting that many Member States, both developing and developed, benefit from the application of nuclear techniques in all the above areas,

(l) Recognizing the success of science and technology studies in enhancing scientific communication and their contribution to training the trainer,

(m) Acknowledging that the IAEA Collaborating Centres scheme supports the Agency in its mandate to encourage research and development and foster the exchange of scientific and technical information and the training of scientists and experts in the field of peaceful uses of atomic energy, with due consideration for the needs of developing countries,

(n) Acknowledging the need for increasing the capacity of Member States for using advanced nuclear techniques at all stages of management of communicable and non-communicable diseases, including cancer, and aware of the need to develop performance indicators for measuring such capacity, including access, quality and outcomes,

(o) Recognizing the Agency’s maintenance and development work in databases that provide Member States with information on the international distribution of radiotherapy and nuclear medicine technologies, such as the Directory of Radiotherapy Centres (DIRAC) and the Nuclear Medicine Database (NUMDAB), the IAEA/World Health Organization (WHO) Network of Secondary Standards Dosimetry Laboratories (SSDL Network) services, dosimetry audit networks, and the Doubly Labelled Water database,

(p) Recognizing that independent external peer reviews, forming part of a comprehensive quality assurance programme, are an effective tool for quality improvement of the radiation medicine practice, and appreciating the Secretariat’s efforts in developing the peer-review mechanisms in nuclear medicine, diagnostic radiology and radiotherapy,

- (q) Aware of the innovative use of IT tools in capacity building and educational tools in human health through the well-developed IAEA Human Health Campus, and welcoming the new e-learning tools in the area of strategic planning, forensic science and site remediation, as well as the convening of the first International Virtual Conference on Theranostics (iViCT 2019) held on 4–5 September 2019,
- (r) Noting the increasing demand from Member States in nuclear applications for human health and recognizing the importance of the continued Agency-wide collaboration with the WHO,
- (s) Noting the events sponsored by the IAEA Nobel Peace Prize Cancer and Nutrition Fund and aware of an increase in requests from Member States for cooperation and capacity building in the field of infant and young child nutrition, micronutrient nutrition and prevention of obesity related non-communicable diseases, and welcoming the publication of the proceedings of the International Symposium on Understanding the Double Burden of Malnutrition for Effective Interventions organized in cooperation with the WHO and the United Nations Children’s Fund (UNICEF),
- (t) Aware of the need of the Agency to increase the capacity of Member States in the field of medical radiation dosimetry and welcoming the International Symposium on Standards, Applications and Quality Assurance in Medical Radiation Dosimetry (IDOS 2019), held in Vienna from 18–21 June 2019,
- (u) Recognizing the Agency’s successes at establishing traditional and non-traditional partnerships and expecting further efforts from the Agency to improve partnerships with relevant partners and donors, including regional and multilateral organizations, as well as development agencies and other entities and successful significant funding with non-conventional partners, notably in human health,
- (v) Recognizing the efforts of the Agency to promote the education and training of radiation medicine specialists, including medical physicists and the success of the International Centre for Theoretical Physics (ICTP) Master of Advanced Studies programme in Medical Physics, based on Agency guidelines,
- (w) Recognizing the role of the Agency in supporting Member States to tackle the burden of non-communicable diseases, especially cardiovascular diseases and neurodegenerative conditions,
- (x) Stressing the importance of continued assistance to Member States, in collaboration with external partners, in the fight against cancer, particularly cancers affecting women and children,
- (y) Recognizing the close collaboration with WHO and the United Nations Interagency Task Force on the Prevention and Control of Non-Communicable Diseases (UNIATF) and noting the continuing activities within the UN Joint Global Programme on Cervical Cancer Prevention and Control as well as participation in the WHO-led initiative for cervical cancer prevention and control and the Global Initiative for Childhood Cancer,
- (z) Recognizing the contribution of public–private partnerships and resource mobilization in providing support for educational activities and Coordinated Research Projects (CRPs),
- (aa) Noting that the Dosimetry Laboratory services have been expanded to enhance dosimetry in hospitals and the development of education and training activities, and welcoming the opening of the new linear accelerator (LINAC) facility in Seibersdorf that will increase the Agency’s capacity to provide dosimetry services,

- (bb) Acknowledging the long-term benefits of CRPs and their resulting publications in the development and practical application of nuclear technologies for peaceful uses and their possible positive impact on the Technical Cooperation programme, while recognizing their differences, and urging the Secretariat to further ensure benefits from possible synergies and avoid duplication in this regard,
- (cc) Further recognizing the successful cooperation and significant results being achieved by the Food and Agriculture Organization of the United Nations (FAO) and the Agency through the Joint FAO/IAEA Programme, the Revised Arrangements regarding the work of the Joint FAO/IAEA Division for Nuclear Techniques in Food and Agriculture, signed in 2013, the FAO's strategic objectives, including with regard to Climate Smart Agriculture and its associated FAO/IAEA Agriculture and Biotechnology Laboratories in Seibersdorf, for a better and sustainable adaptation to climate change in food and agriculture in developing countries,
- (dd) Welcoming the support of the Joint FAO/IAEA Division to control certain disease and pest outbreaks in Africa, Latin America and the Caribbean, Asia and Europe,
- (ee) Recognizing the need for preventive measures and the importance of addressing the challenges posed by climate change and the rise in disease and pest outbreaks that harm human, animal and plant health,
- (ff) Further recognizing the success of the sterile insect technique (SIT) in the suppression or eradication of populations of insect pests, that can harm human, animal and plant health,
- (gg) Aware of the activities of the Latin American and Caribbean Analytical Network (RALACA), composed of 56 national food safety laboratories/institutes in 21 countries in Latin America and the Caribbean, and the African Food Safety Network (AFoSaN) of 108 national food safety laboratories/institutes in 43 African countries, to address food contamination issues and improve environmental and food safety with health, trade and economic benefits; and the Veterinary Disease Diagnostic Laboratories Network (VETLAB Network) of 45 African and 19 Asian national animal disease diagnostic laboratories to disseminate the use of nuclear techniques for the diagnosis and control of transboundary animal and zoonotic diseases, as well as the Plant Mutation Breeding Network (MBN) of 13 countries in the Asia Pacific Region to promote R&D activities and foster regional cooperation in the field of plant mutation breeding, related biotechnology and mutant germplasm exchange in the region,
- (hh) Recognizing the work conducted at the Agency's Nuclear Applications (NA) Laboratories in performing applied and adaptive R&D, developing standards, protocols and guidelines, as well as providing training and specialized services to benefit Member States, and looking forward to the establishment of a Neutron Science Facility (NSF) to assist Member States in developing neutron based techniques, related applications and capacity building,
- (ii) Welcoming the ongoing the modernization of the NA Laboratories in Seibersdorf and the ongoing implementation of the ReNuAL and the ReNuAL+ projects contributing to R&D activities and supporting access to nuclear applications to Member States and the Agency's effort in building traditional and non-traditional partnerships to mobilize resources for these projects,
- (jj) Noting that the Agency has compiled and disseminated isotope data on aquifers and rivers worldwide and is addressing links between climate change, rising food and energy costs and the global economic crisis, with the aim of assisting decision-makers in adopting better management practices for integrated water resources management and planning, especially for surface water related to agricultural use,

(kk) Noting ongoing cooperation and partnership between the United Nations Environment Programme (UN Environment) and the Agency, particularly in the context of marine pollution and the Regional Seas Programme, and the increasing demand from Member States in nuclear applications for environmental management,

(ll) Recognizing the Agency's unique capabilities in contributing to global efforts to protect the environment, including terrestrial, riverine, coastal and marine ecosystems, and aware of the significant contribution nuclear science can make to addressing environmental challenges such as climate change, coastal and ocean pollution, microplastics, threatened habitats, and endangered species,

(mm) Noting with appreciation the work of the Agency over many decades to assist analytical laboratories and research facilities in Member States to improve their analytical performance by organizing regular proficiency tests, inter-laboratory comparisons, and producing certified reference materials from a wide range of environmental matrices,

(nn) Aware of the ALMERA network of Analytical Laboratories for the Measurement of Environmental Radioactivity providing accurate measurement for monitoring radioactivity in the environment, represented with 188 laboratories from 89 Member States,

(oo) Acknowledging the important contribution of the Ocean Acidification International Coordination Centre at the IAEA Environment Laboratories to the coordination of activities supporting a better understanding of the global effects of ocean acidification, and welcoming the significant support for the Centre provided by a number of Member States,

(pp) Recognizing the increasing use of radioisotopes and radiation technology in healthcare practices, sanitation and sterilization, industrial process management, environment remediation, food preservation, crop improvement, new materials development and analytical sciences, and in assessing the impacts of climate change,

(qq) Noting the importance of molybdenum-99 availability for medical diagnosis and treatment, and acknowledging with appreciation the efforts made by the Agency, in coordination with other international organizations, Member States and relevant stakeholders, to facilitate a reliable supply of molybdenum-99 by supporting the development of Member States' abilities to generate, for their indigenous needs and for export, the non-HEU-based production of molybdenum-99 and technetium-99m, where technically and economically feasible, including research into the accelerator-based alternative production of technetium-99/molybdenum-99,

(rr) Aware of the new cooperative initiatives that have emerged to provide reactor irradiation services, of the significant advances reported in the development of new molybdenum-99 production facilities and the expansion of existing facilities, and of the continued interest of many countries in establishing non-HEU-based molybdenum-99 production facilities to meet domestic needs, for export and/or to serve as a partial reserve capacity,

(ss) Noting the expanding use of positron emission tomography/computed tomography (PET-CT) and therapeutic radiopharmaceuticals and acknowledging the efforts taken by the Secretariat in planning appropriate activities to address the needs for production of hospital prepared therapeutic radiopharmaceuticals and their use following the applicable national regulatory requirements,

(tt) Noting the role of the Agency in assisting Member States in establishing and strengthening the personalized medicine approach using nuclear techniques including in nuclear medicine and radiotherapy,

(uu) Recognizing the role of ion beam accelerators and synchrotron radiation sources in research and development in material science, environmental science, bio- and life sciences and cultural heritage,

(vv) Aware of the problems of pollutants arising from urban and industrial activities and the potential of radiation treatment to address some of them, including industrial wastewaters, and noting the initiative taken by the Agency to explore the use of radiation technology for waste water treatment and the remediation of pollutants in Member States through coordinated research activities (CRAs),

(ww) Taking note of the high potential of electron beams as a source of radiation for the treatment of materials and pollutants, and the attenuation of bio-hazard materials and of pathogens for the development of vaccines and acknowledging the encouraging results produced through the related CRPs,

(xx) Recognizing the importance of nuclear instrumentation in the monitoring of nuclear radiation and nuclear materials in the environment and noting with appreciation the development of instruments for monitoring surface radioactivity and the provision of services to requesting Member States for the mapping of their land,

(yy) Acknowledging the multiple uses of research reactors, also within national research nuclear centres and universities, as valuable tools for, inter alia, education and training, research, radioisotope production and materials testing and also as a learning tool for Member States that are considering the introduction of nuclear power,

(zz) Aware that greater regional and international cooperation, including regional research reactor coalitions and International Centres based on Research Reactors (ICERRs), will be needed to ensure broad access to research reactors, owing to the fact that older research reactors are being replaced by fewer multi-purpose reactors, resulting in a drop in the number of operational reactors and noting with appreciation the Secretariat's integrated and systematic support to countries embarking on their first research reactor project and the recent efforts to promote support for optimizing utilization of research reactors through the Integrated Research Reactor Utilization Review (IRRUR) mission,

(aaa) Acknowledging that the peaceful use of fusion energy can be advanced through increased international efforts and with the active collaboration of interested Member States and international organizations, such as the International Thermonuclear Experiment Reactor (ITER) project group, in fusion-related projects, appreciating the efforts taken in leading the demonstration fusion power plant (DEMO) and noting the first meeting of the Nuclear Fusion Coordination Committee to manage cross-cutting activities related to fusion,

(bbb) Confirming the important role of science, technology and engineering in enhancing nuclear and radiation safety and security, and the need to resolve the issues of managing radioactive waste in a sustainable manner,

(ccc) Noting with appreciation the on-going efforts of the Secretariat, together with Member States, under the programme and budget for 2020–2021, to allocate sufficient resources to renovate the Agency's NA Laboratories at Seibersdorf with facilities and equipment that are fully fit-for-purpose and to ensure that maximum benefits in terms of capacity building and technology enhancement are made available to Member States, particularly developing countries, and

(ddd) Welcoming the launch of the IAEA Marie Skłodowska-Curie Fellowship Programme (MSCFP) with the objective to encourage women to pursue a professional career in the field of

nuclear sciences, technology and non-proliferation, as well as the support offered by various Member States to the MSCFP,

1. Requests the Director General, in conformity with the Statute, to continue to pursue, in consultation with Member States, the Agency's activities in the areas of nuclear science, technology and applications, with special emphasis on supporting the development of nuclear applications in Member States with a view to strengthening infrastructures and fostering science, technology and engineering for meeting sustainable growth and development needs of Member States in a safe manner;
2. Requests the Secretariat to fully utilize the capacities of Member State institutions through appropriate mechanisms in order to expand the extent to which nuclear sciences and applications are utilized to achieve socio-economic benefits and looks forward to the Agency's contribution to Member States' implementation of the 2030 Agenda for Sustainable Development (A/RES/70/1), as well as the Paris Agreement on Climate Change;
3. Underlines the importance of facilitating effective programmes in the areas of nuclear science, technology and applications aimed at pooling and further improving the scientific and technological capabilities of Member States through CRPs within the Agency and between the Agency and Member States and through direct assistance, and urges the Secretariat to further strengthen capacity building for Member States, particularly through interregional, regional and national training courses and fellowship training in the areas of nuclear science, technology and applications, and expanding the scope and outreach of CRAs and relying on the IAEA Collaborating Centres scheme;
4. Urges the Secretariat to communicate the benefits of various applications of nuclear technologies for development that could benefit Member States and to address the needs for human resource training in these applications;
5. Requests the Secretariat to commence consultations with Member States towards convening a follow up to the 2018 Ministerial Conference on nuclear science, technology and applications and the Technical Cooperation Programme in 2023 with a view to convening every four years thereafter;
6. Urges the Secretariat to continue implementing efforts that contribute to greater understanding and a well-balanced perspective of the role of nuclear science and technology in sustainable global development, including the relevant commitments, and future efforts on climate change mitigation, monitoring and adaptation;
7. Welcomes all contributions announced by Member States, institutions and the private sector, including through the IAEA Peaceful Uses Initiative, as extra budgetary and in-kind contributions to the Agency;
8. Calls upon the Secretariat to continue to address identified priority needs and requirements of Member States in the areas of nuclear science, technology and applications, such as:
 - i. use of radioisotopes and radiation in human health, including through enhancing access and quality,
 - ii. nuclear applications related to food and agriculture, such as climate-smart agriculture, land and water management, food safety and security, and crop improvement and management in light of climate change,
 - iii. use of the SIT to establish tsetse-free zones and fruit fly free and low prevalence areas, and to combat mosquitoes transmitting diseases including dengue, malaria, chikungunya and zika,

- iv. application of nuclear-derived techniques for early, rapid diagnosis and control of transboundary animal and zoonotic diseases,
 - v. measurement of environmental radioactivity and radiation,
 - vi. unique applications of isotopes to track the global uptake of carbon dioxide by the oceans and the resulting acidification effects on marine ecosystems,
 - vii. use of radioisotopes and stable isotopes to assess risks to seafood safety, including heavy metals, persistent organic pollutants, microplastics and biotoxins,
 - viii. use of isotopes in the protection of threatened habitats and endangered species,
 - ix. use of isotopes in groundwater management,
 - x. use of cyclotrons, research reactors and accelerators for the production of affordable radiopharmaceuticals, and
 - xi. use of radiation technology for development of novel materials, in the treatment of waste water, flue gases and other pollutants resulting from industrial activities, as well as for the preservation of cultural heritage;
9. Requests the Secretariat to continue to support Member States through CRPs and to encourage appropriate resource mobilization to support these efforts;
10. Encourages strengthening mutual cooperation between Member States to exchange information on relevant experiences and good practices on water resources management in synergy with the UN system organizations dealing with water resources management;
11. Urges the Secretariat to continue strengthening the IAEA–UN Environment partnership, in close consultation with Member States to further explore the possibility for a formalized cooperation, such as a joint programme between the IAEA and UN Environment to increase access to beneficial projects and information bearing in mind the need to avoid duplication;
12. Takes note with appreciation of the continued efforts of the Secretariat with Member States party to the Regional Cooperative Agreement (RCA) for Research, Development and Training Related to Nuclear Science and Technology and encourages the Secretariat to develop and disseminate IT tools in various areas of nuclear applications;
13. Urges the Secretariat to continue to strengthen the IAEA–WHO partnership;
14. Requests the Secretariat to assist Member States upon request in their activities to mitigate the impact of cancer, particularly female and childhood cancers, with proper prevention, diagnosis, treatment and symptom management mechanisms;
15. Encourages Member States to make use of the existing peer-review mechanisms in radiation medicine to strengthen quality diagnosis and patient treatment;
16. Calls for the support of the Agency in setting guidelines for the adoption of advanced techniques and equipment in radiation medicine in Member States;
17. Recognizes the success of the Agency’s laboratory Networks, such as VETLAB, RALACA, AFoSaN and MBN, in prompting R&D activities on nuclear science and applications, disseminating the use of nuclear techniques for food and agriculture and facilitating the international cooperation in nuclear applications, including through south–south and triangular partnerships, and therefore requests the Secretariat to further increase the support to strengthen and expand these Networks enabling them

to fully and effectively undertake technology transfer, capacity building in R&D activities and emergency response for the benefit of Member States;

18. Requests the Secretariat to continue to provide to interested Member States, upon request, technical assistance regarding production and transport of medical isotopes and radiopharmaceuticals;

19. Requests the Secretariat to continue providing assistance to Member States with capacity building for the development, production and quality control of new generations of therapeutic radiopharmaceuticals (such as alpha emitters);

20. Requests the Secretariat to continue providing assistance with capacity building for quality assurance in radiopharmaceutical development and the use of radiation technology in industries and disseminating radiation technology guidelines based on international quality assurance standards;

21. Urges the Secretariat to continue to implement activities that will contribute to securing and supplementing the molybdenum-99/technetium-99m production capacity, including in developing countries, in an effort to ensure the security of supplies of molybdenum-99 to users worldwide and further urges the Secretariat to continue its cooperative work towards this goal with related initiatives undertaken by other international organizations such as the OECD Nuclear Energy Agency;

22. Requests the Secretariat, upon request from interested Member States, when technically and economically feasible, to provide technical assistance to emerging national and regional efforts to establish non-HEU based molybdenum-99 production capabilities, and to provide technical assistance to transition existing production capabilities to utilize non-HEU-based methods and facilitate training activities such as workshops to support Member States in their efforts to achieve self-sufficiency in local production of medical radioisotopes and radiopharmaceuticals;

23. Urges the Secretariat to continue exploring the use of accelerators for various radiation technology applications and to facilitate demonstrations and training for interested Member States;

24. Requests the Secretariat to make efforts together with Member States in developing industrial irradiation facilities such as electron accelerators and their accessories for use in, inter alia, healthcare practices, crop improvement, food preservation, industrial applications, sanitization and sterilization, and further requests the provision of technical support for the use of research reactors in the production of radiopharmaceuticals and industrial radioisotopes;

25. Requests the Secretariat, in collaboration with interested Member States, to continue with the development of appropriate instruments and to make available, to requesting Member States, services for the rapid and economic mapping of radioactivity on the Earth's surface;

26. Requests the Secretariat to strengthen the Agency's activities in the area of fusion science and technology in view of the advances in nuclear fusion research at ITER and worldwide and to continue the DEMO activities, expanding the scope and participation to the extent possible, taking into further consideration, the need to coordinate the involvement of various stake holders to address the different aspects of fusion facilities;

27. Requests the Secretariat to foster regional and international efforts in ensuring wide access to existing multi-purpose research reactors to increase research reactor operations and utilization, through regional research reactors coalitions, ICERRs and formalization of IRRUR missions as an IAEA review service, and further requests the Secretariat to facilitate safe, effective and sustainable operation of these facilities;

28. Urges the Secretariat to continue to assist Member States considering their first research reactor with systematic, comprehensive and appropriately graded infrastructure development and to provide

guidelines on the applications of research reactors to help Member State organizations make informed decisions that ensure the strategic viability and enduring sustainability of these projects;

29. Recognizing the underpinning nature of reliable nuclear data for all activities related to nuclear sciences and engineering, expresses its appreciation to the Secretariat for the provision of reliable nuclear data to the Member States for over 50 years as well as the development of an application for accessing nuclear data through mobile phones, and encourages the expansion of such applications to other types of nuclear data to continue the service in future;

30. Requests the Secretariat to assist interested Member States in developing safety infrastructure and in establishing regional training and education centres in their regions, where they do not exist, for the specialized training of nuclear and radiological experts, and requests the Secretariat to take advantage of qualified instructors from developing countries in this regard;

31. Encourages the Secretariat to continue cooperating with the World Nuclear University (WNU) in the biennial School on Radiation Technologies and to enhance its support for the participation of applicants from developing countries;

32. Requests also that the actions of the Secretariat called for in this resolution be undertaken subject to the availability of resources; and

33. Recommends that the Secretariat report to the Board of Governors and to the General Conference at its sixty-fifth (2021) regular session on the progress made in the areas of nuclear science, technology and applications.

2.

Support to the African Union's Pan African Tsetse and Trypanosomosis Eradication Campaign (AU-PATTEC)

The General Conference,

(a) Recalling its previous resolutions on support to the African Union's Pan African Tsetse and Trypanosomosis Eradication Campaign (AU-PATTEC),

(b) Recognizing that the main objective of AU-PATTEC is to eradicate tsetse flies and trypanosomosis by creating sustainable tsetse- and trypanosomosis-free areas, using various suppression and eradication techniques, while ensuring that the reclaimed land areas are sustainably and economically exploited and hence contributing to poverty alleviation and food security and thus supporting Member States' efforts to achieve the Sustainable Development Goals,

(c) Recognizing that tsetse fly and trypanosomosis (T&T) control programmes are complex and logistically demanding activities that require flexible, innovative and adaptable approaches in the provision of technical support,

(d) Recognizing that tsetse flies and the trypanosomosis problem which they cause constitute one of the greatest constraints on the African continent's socio-economic development, affecting the health of humans and livestock, limiting sustainable rural development and thus causing increased poverty and food insecurity,

(e) Recognizing that although the new reported cases of human African trypanosomosis (HAT) are now below 1000 per year and are currently at the lowest level for several decades, animal trypanosomosis still affects millions of livestock every year and remains a constraint to rural

development for tens of millions of people in rural communities in 37 African countries, most of which are Agency Member States,

(f) Recognizing the importance of the development of more efficient livestock production systems in rural communities affected by tsetse flies and trypanosomosis in order to reduce poverty and hunger and to form the basis for food security and socio-economic development,

(g) Recalling decisions AHG/Dec.156 (XXXVI) and AHG/Dec.169 (XXXVII) of the Heads of State and Government of the then Organization of African Unity (now African Union) to free Africa of tsetse flies and on a plan of action for implementing AU-PATTEC,

(h) Recognizing the upstream work of the Agency under its Joint FAO/IAEA Programme of Nuclear Techniques in Food and Agriculture in developing the sterile insect technique (SIT) against tsetse flies and providing assistance through field projects, supported from the Agency's Technical Cooperation Fund, on integrating tsetse SIT into Member States' efforts to address the T&T problem in a sustainable manner,

(i) Cognizant that the SIT is a proven technique for the creation of tsetse-free zones when integrated with other control techniques and when applied within an area-wide integrated pest management (AW-IPM) approach,

(j) Welcoming the continuing close collaboration of the Secretariat with AU-PATTEC, in consultation with other mandated specialized United Nations organizations, in raising awareness regarding the T&T problem, organizing regional training courses and providing, through the Agency's Technical Cooperation programme and Regular Budget programme, operational assistance to field project activities, as well as advice regarding project management and policy and strategy development in support of national and sub-regional AU-PATTEC projects,

(k) Welcoming the progress made by AU-PATTEC in increasingly involving — besides international organizations such as the Agency, the Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization (WHO) — also non-governmental organizations and the private sector in addressing the T&T problem and to foster sustainable agriculture and rural development (SARD),

(l) Welcoming the establishment and operationalization of a tsetse mass-rearing facility, the Insectary of Bobo-Dioulasso (IBD), in Burkina Faso, and further welcoming the progress made in the Agency-supported tsetse eradication project in the Niayes Region of Senegal, which has improved food security and increased farmers' incomes in a highly cost-effective way,

(m) Appreciative of the contributions made by various Members States and United Nations specialized agencies in support of addressing the T&T problem in West Africa, especially the contributions made by the United States of America through the Peaceful Uses Initiative (PUI) in support of projects for T&T control in Senegal and Burkina Faso,

(n) Acknowledging the continued close collaboration of the Secretariat and the International Centre of Research and Development for Livestock in Subhumid Zones (CIRDES) in Bobo-Dioulasso, Burkina Faso, the first IAEA Collaborating Centre in Africa for the 'Use of the Sterile Insect Technique for Area-Wide Integrated Management of Tsetse Fly Populations',

(o) Acknowledging the good technical management at the IBD under the Burkina Faso PATTEC project, which has resulted in the expansion of the colony of one tsetse species above one million producing females,

- (p) Welcoming the efforts made by the Agency's Department of Technical Cooperation and the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture in support of AU-PATTEC,
- (q) Welcoming the efforts made by the Secretariat to address and eliminate obstacles to applying the SIT against tsetse flies in African Member States through applied research and methods development, both in-house and through the Agency's coordinated research project mechanism,
- (r) Acknowledging the need for increasing capacity building on all levels for affected Member States in using advanced nuclear techniques in eradicating the aforementioned diseases, and
- (s) Acknowledging the continued support given to AU-PATTEC by the Agency as outlined in the report submitted by the Director General in document GC(64)/5, Annex 2,
1. Urges the Secretariat to further intensify the efforts in advocating at the national, regional and international levels in order to sensitize on the burden imposed by the T&T, and to continue assigning high priority to agricultural development in Member States and to redouble its efforts to build capacity and further develop the techniques for integrating the SIT with other control techniques in creating tsetse-free zones in sub-Saharan Africa;
 2. Calls upon Member States to strengthen the provision of technical, financial and material support to African States in their efforts to create tsetse-free zones, while stressing the importance of a needs-driven approach to applied research and methods development and validation to support operational field projects;
 3. Requests the Secretariat, in cooperation with Member States and other partners, to maintain funding through the Regular Budget and the Technical Cooperation Fund for consistent assistance to selected operational SIT field projects and to strengthen its support for R&D and technology transfer to African Member States in order to complement their efforts to create and subsequently expand tsetse-free zones;
 4. Requests the Secretariat to support Member States through technical cooperation projects on baseline data collection, development of project proposals and implementation of operational tsetse eradication projects underpinned by on-site based experts, with priority given to genetically isolated tsetse populations;
 5. Encourages the Agency's Department of Technical Cooperation and the Joint FAO/IAEA Division to continue supporting and working closely with AU-PATTEC in the agreed areas of collaboration as specified in the Memorandum of Understanding between the African Union Commission and the Agency signed in November 2009 and expanded through the Practical Arrangements (AUC/IAEA) signed in February 2018;
 6. Stresses the need for continued harmonized, synergetic efforts by the Agency and other international partners, particularly FAO and WHO, with the aim of supporting the African Union Commission and Member States through the provision of guidance and quality assurance in planning and implementing sound and viable national and sub-regional AU-PATTEC projects;
 7. Requests the Agency and other partners to strengthen capacity-building in Member States for informed decision-making regarding the choice of T&T strategies and the cost-effective integration of SIT operations in AW-IPM campaigns;
 8. Urges the Secretariat and other partners to increase their efforts in providing capacity building and to explore the possibilities of private-public partnership for the establishment and operation of tsetse

mass rearing centres for providing cost-effectively large numbers of sterile male flies to different field programmes;

9. Encourages the countries that have selected a T&T strategy with an SIT component to focus initially on the field activities, including releases of sterile males imported from mass production centres as in the case of the eradication project in Senegal;

10. Encourages the Agency's Department of Technical Cooperation and the Joint FAO/IAEA Division to continue to support sub-regional mass production and distribution of tsetse flies through strengthened support to the Insectary of Bobo-Dioulasso; and

11. Requests the Director General to report on the progress made in the implementation of this resolution to the Board of Governors and to the General Conference at its sixty-fifth (2021) regular session.

3.

Renovation of the Agency's Nuclear Applications Laboratories at Seibersdorf

The General Conference,

(a) Recalling paragraph 9 of resolution GC(55)/RES/12.A.1, in which the General Conference called upon the Secretariat to make efforts, together with Member States, to modernize the Agency's Nuclear Applications (NA) Laboratories at Seibersdorf, thus ensuring maximum benefits to Member States, particularly developing ones,

(b) Further recalling additional resolutions requiring that the NA Laboratories at Seibersdorf be fully fit-for-purpose (such as resolution GC(56)/RES/12.A.2, concerning the development of the sterile insect technique for the eradication and/or suppression of disease-transmitting mosquitoes; resolution GC(57)/RES/12.A.3, concerning support to the African Union's Pan African Tsetse and Trypanosomosis Eradication Campaign (AU-PATTEC); resolution GC(56)/RES/12.A.4, on strengthening the support to Member States in food and agriculture; resolution GC(57)/RES/9.13, regarding nuclear and radiological incident and emergency preparedness and response; and resolution GC(57)/RES/11, relating to the strengthening of the Agency's technical cooperation activities),

(c) Recognizing the growing applications, with economic and environmental benefits, of nuclear and radiation technologies in a wide variety of areas, the vital role that the NA Laboratories at Seibersdorf play in the demonstration and development of new technologies and in their deployment in Member States, and the dramatic increase in associated training courses and provision of technical services during recent years,

(d) Acknowledging with appreciation the worldwide leading role of the NA Laboratories at Seibersdorf in the establishment of global laboratory networks in several areas, such as the animal disease control networks supported through the Peaceful Uses Initiative (PUI), the African Renaissance and International Co-operation Fund (ARF) initiative and numerous other initiatives,

(e) Further recognizing that the four remaining NA Laboratories at Seibersdorf are in need of modernization in order to respond to the evolving range and complexity of the requests submitted to them and the growing demands of Member States and keep pace with increasingly rapid technological developments,

(f) Emphasizing the importance of fit-for-purpose laboratories that comply with health and safety standards and that have the appropriate infrastructure,

- (g) Supporting the Director General's initiative regarding the modernization of the NA Laboratories at Seibersdorf, announced in his statement at the 56th regular session of the General Conference,
- (h) Recalling resolution GC(56)/RES/12.A.5, and specifically paragraph 4, in which the General Conference requested the Secretariat "to develop a strategic overarching plan of action for the modernization of the NA Laboratories at Seibersdorf, provide a concept and methodology for the short-, medium- and long-term modernization programme and outline the vision and future role for each of the eight NA laboratories",
- (i) Further recalling the report of the Director General to the Board of Governors (GC(57)/INF/11), mapping out activities and services of the NA Laboratories at Seibersdorf aimed at benefiting Member States and other stakeholders, quantifying projected future needs of and demands by Member States and identifying current and anticipated future gaps,
- (j) Welcoming the Director General's report to the Board of Governors on the Strategy for the Renovation of the Nuclear Sciences and Applications Laboratories in Seibersdorf as contained in GOV/INF/2014/11, which outlines the necessary elements and resource requirements for assuring fit-for-purpose laboratories, known as the ReNuAL project, to be implemented from 2014–2017 within a €31 million target budget, and the Addendum to the Strategy as contained in GOV/INF/2014/11/Add.1, which provides an update to the Strategy defining the additional elements as contained in paragraph 15 of the Strategy, known as ReNuAL Plus (ReNuAL+), and the Agency's consideration to establish its own Biosafety Level 3 (BSL3) laboratory capabilities,
- (k) Noting GOV/INF/2017/1, "The Renovation of the Nuclear Applications Laboratories Project (ReNuAL)", which provided an update to Member States on progress, resource requirements and the scope of ReNuAL+,
- (l) Further welcoming the Director General's report in GOV/2020/28-GC(64)/5, Annex 3, to the Board of Governors on progress made in implementing the ReNuAL project since the 63rd General Conference,
- (m) Welcoming the achievements and progress made under ReNuAL and ReNuAL+, including the beginning of operations in June 2019 of the Dosimetry Laboratory's new linear accelerator facility and in August 2019 of the new Insect Pest Control Laboratory (IPCL), and further development of site infrastructure,
- (n) Further welcoming the opening for operations in June 2020 of the Yukiya Amano Laboratories, housing the Animal Production and Health Laboratory, the Food and Environmental Protection Laboratory, and the Soil and Water Management and Crop Nutrition Laboratory,
- (o) Recognizing the importance of the Agency's BSL3 capabilities to support Member States' efforts to control transboundary animal and zoonotic diseases, and appreciating the good cooperation with Austrian authorities, in particular the Austrian Agency for Health and Food Safety (AGES), which began providing full access and use of its new BSL3 facility at Mödling, thereby enhancing the Agency's ability to provide increased assistance to Member States in controlling transboundary animal and zoonotic diseases, and further noting the Austrian Government's offer of a package of land, infrastructure and technical services that it values at €2 million towards the Agency establishing its own BSL3 capabilities at the same facility in Mödling,
- (p) Welcoming that over €39 million in extrabudgetary funds have been raised for ReNuAL and ReNuAL+ to date, including over €18.5 million for ReNuAL+, and that 4 first-time donors

and 6 repeat donors are among 10 Member States that have contributed approximately €2.6 million since the 63rd General Conference,

(q) Further welcoming the financial and in-kind contributions and cost-free experts for the implementation of the ReNuAL project provided by the following 43 Member States: Argentina, Australia, Austria, Belgium, Brazil, Canada, China, France, Germany, India, Indonesia, Israel, Iran, Japan, Jordan, Kazakhstan, Kenya, the Republic of Korea, Kuwait, Oman, Malaysia, Mongolia, Montenegro, Morocco, the Netherlands, New Zealand, Nigeria, Norway, Pakistan, Paraguay, the Philippines, Portugal, Qatar, the Russian Federation, Saudi Arabia, South Africa, Spain, Switzerland, Thailand, Turkey, the United Kingdom, the United States of America and Viet Nam and the contributions received from the Food and Agriculture Organization of the United Nations (FAO) and the African Regional Co-operative Agreement for Research, Development and Training Related to Nuclear Science and Technology (AFRA), one of the Agency's Collaborating Centres, as well as from six private contributors,

(r) Recognizing the efforts of the informal group of Member States known as the 'Friends of ReNuAL' which are actively facilitating the mobilization of resources for the project and encouraging all Member States that are in a position to do so, to make resources available to support the renovation of the NA Laboratories at Seibersdorf,

(s) Welcoming €2.6 million received in extrabudgetary contributions to implement the final major element of the project, the enhancement of the core infrastructure of laboratories that will remain in the existing facilities after the other laboratories relocate to new facilities,

(t) Further noting the proposal in the 2021 Budget Update to allocate €2.1 million to ReNuAL+ from the Major Capital Investment Fund, and

(u) Acknowledging the efforts and progress made in seeking partnerships and contributions from non-traditional donors, particularly with regard to equipment needs, and further acknowledging with appreciation the establishment of agreements with non-traditional partners for the provision of equipment to the laboratories,

1. Stresses the need, in conformity with its Statute, for the Agency to continue pursuing adaptive research and development activities in the areas of nuclear science, technology and applications where the Agency has a comparative advantage, and to retain its focus on capacity-building initiatives and the provision of technical services so as to meet the basic sustainable development needs of Member States;
2. Requests the Secretariat to strive to ensure that, commensurate with the prominence of the NA Laboratories at Seibersdorf within the Agency, the urgent needs and projected future demands of Member States as regards the services of those laboratories are met in the most cost-effective and sustainable way;
3. Calls on the Secretariat to continue to pursue a project specific resource mobilization strategy seeking resources from Member States, institutions, foundations and the private sector and encourages partnerships including through utilization of the UN Global Marketplace and further encourages the Secretariat to consider devoting financial resources from savings or efficiency gains to the project, in consultation with Member States;
4. Further calls on the Secretariat to continue to develop targeted resource mobilization packages that will match the interest of the potential donors with the needs of ReNuAL+, prioritizing the remaining elements of ReNuAL+;
5. Encourages the Secretariat to keep Member States apprised of planning for the remaining requirements of the NA laboratories;

6. Requests the Secretariat to provide information on the financial resources required for upcoming implementation and to indicate where resources are needed to match implementation schedules;
7. Invites Member States to make financial commitments and contributions, as well as in-kind contributions in a timely manner, as well as to facilitate cooperation with other partners, as relevant, including institutions, foundations and the private sector, to provide for the enhancement of the core infrastructure of the NA laboratories;
8. Encourages the ‘Friends of ReNuAL’ under the co-chairmanship of South Africa and Germany, and all Member States to continue to support the implementation of the project with a focus on mobilizing resources in a timely manner to allow for implementation of the remaining elements of the project; and
9. Requests the Director General to report on progress made in the implementation of this resolution to the General Conference at its sixty-fifth (2021) session.

4.

Zoonotic Disease Integrated Action (ZODIAC) Project

The General Conference,

- (a) Welcoming the Director General’s proposal to establish the Zoonotic Disease Integrated Action (ZODIAC) project at the Board of Governors meeting on 15 June 2020,
- (b) Noting the Director General’s information paper “Zoonotic Disease Integrated Action Project, Early Detection and Global Response”, as contained in GOV/INF/2020/13 submitted to the Board of Governors for information, as well as the technical briefings provided to Member States,
- (c) Recognizing the role that the Agency continues to play in assisting Member States to achieve the UN’s Sustainable Development Goals (SDGs), including Good Health and Well-Being (Goal 3), Life on Land (Goal 15) and Partnerships (Goal 17),
- (d) Appreciating the longstanding role of the IAEA, in line with its mandate, in assisting Member States to access nuclear science, technology and applications with the aim of addressing a wide variety of socio-economic human development needs, including in human health, food and agriculture, animal health and zoonotic diseases,
- (e) Recognizing that the IAEA has a longstanding practice of cooperation with other relevant international organizations and specialized agencies; and further recognizing the importance of complementing the respective mandates of such organizations, as well as longstanding protocols that guide cooperation such as Taking a Multisectoral, One Health Approach: A Tripartite Guide to Addressing Zoonotic Diseases in Countries (the Tripartite Zoonoses Guide), which addresses collaborative efforts to address health risks at the human-animal-environment interface,
- (f) Noting that zoonotic diseases such as COVID-19, including vector-borne diseases such as malaria, yellow fever, chikungunya virus, and dengue fever, have a significant and long-term implications on human health and the socio-economic development of Member States,
- (g) Recognizing the importance of nuclear science, technology and applications to detect, trace and control emerging pathogens that could develop into diseases and pandemics and further recognizing the importance of making these technologies available to all Member States,
- (h) Noting that ZODIAC could support Member States and enhance their preparedness to address emerging and re-emerging zoonotic diseases, through the use of molecular biology nuclear

and nuclear-derived methods, by enhancing capacity in Member States to detect, trace and respond to emerging pathogens that could develop into zoonotic diseases and pandemics,

(i) Recognizing the establishment in cooperation with the Food and Agriculture Organization of the United Nations (FAO) in 2013 of the Veterinary Disease Diagnostic Laboratories (VETLAB) Network as an example of the support the IAEA provides to Member States, and further recognizing that this network continues to fulfill a crucial role in enabling Member States to fight zoonotic diseases, through building capacity and enabling cross-boundary collaborations, which have significantly improved responses to transboundary animal and zoonotic diseases, as well as the role of the network in enabling the IAEA to rapidly respond to the COVID-19 pandemic,

(j) Welcoming that ZODIAC would build upon existing, relevant IAEA nuclear science and technology applications and structures, such as the VETLAB Network, and other delivery mechanisms of the Technical Cooperation Programme,

(k) Welcoming the reaffirmation by the Directors General of the IAEA and FAO of their commitment to the longstanding partnership between the two organizations, including in strengthening global capacity to detect, trace and respond to zoonotic diseases, through the use of nuclear and nuclear derived techniques at all phases of disease development,

(l) Acknowledging that ZODIAC aims to build on the existing partnership between the IAEA and the FAO, to include coordination with the United Nations Environment Programme (UNEP), the World Health Organization (WHO) and the World Organization for Animal Health (OIE),

(m) Recognizing that ZODIAC is also intended, through the use of nuclear and nuclear-derived techniques, to form part of the IAEA's support to Member States in combatting zoonotic diseases and preventing future pandemics, in collaboration and coordination with existing networks of laboratories, such as VETLAB, and

(n) Recognizing the importance of the Agency's use of the Biosafety Level 3 (BSL3) capabilities provided by the Austrian Government to support Member States' efforts to control transboundary animal and zoonotic diseases, and appreciating the good cooperation with Austrian authorities, in particular the Austrian Agency for Health and Food Safety (AGES) on access to and use of its BSL3 facility,

1. Stresses the need for the IAEA, in accordance with its Statute, to respond to the needs and priorities of States and to continue the implementation of all its programmatic activities in a balanced manner and in consultation with Member States;

2. Further stresses the need for the IAEA to continue pursuing adaptive research and development activities in the areas of nuclear science, technology and applications, where the Agency has a comparative advantage, so to support Member States, in particular developing Member States, upon their request, and in conformity with its Statute in building their capabilities to identify, characterize and accurately detect, diagnose, control and manage zoonotic diseases through the use of nuclear and nuclear-derived techniques;

3. Requests the Secretariat to present Member States and the Board of Governors with more information on the ZODIAC proposal, including a comprehensive needs-gap analysis, a prioritization of tasks in the context of the amount of extrabudgetary resources mobilized, a detailed project plan for the implementation of ZODIAC, the proposed timeframe, as well as the financial, organizational and human resource implications of the project, as well as on the proposed associated Technical Cooperation Project;

4. Requests the Secretariat to concentrate its efforts on utilizing nuclear and nuclear-derived technologies in relation to ZODIAC, and to ensure equal access to ZODIAC planning and implementation, as well as to relevant information, for all the interested Member States;
5. Further requests the Secretariat to ensure efficiencies and effectiveness, to avoid duplication and to build and expand upon existing IAEA delivery mechanisms and networks in its implementation of ZODIAC;
6. Urges the Secretariat to examine lessons learned from its COVID-19 response and to reflect these in ZODIAC's programme design;
7. Takes note of the longstanding collaboration of the IAEA with the FAO, OIE and WHO, and stresses that collaboration with these international organizations with complementary expertise and mandates, would be instrumental to avoiding duplication and to the successful development and implementation of ZODIAC;
8. Calls on the Secretariat to assist Member States to develop sustainable capacity of national laboratories to enable Member States to obtain the necessary nuclear and nuclear-derived tools and capabilities to more effectively respond to emerging zoonotic diseases;
9. Further calls on the Secretariat to expand coordination with relevant international and regional organizations as required without duplicating existing mandates, and to also utilize existing delivery mechanisms, such as the VETLAB Network, collaborating centres and CRPs in strengthening the capacity of Member States in combating zoonotic diseases and preventing pandemics through the use of nuclear and nuclear-derived techniques;
10. Recommends the Secretariat to strengthen its resource mobilization efforts, including by seeking project-specific extrabudgetary funding for the implementation of ZODIAC, in particular building on its previous experience in mobilizing non-traditional and private sector donors;
11. Requests the Secretariat to consult with Member States and relevant international organizations, including through technical meetings, on the principles, procedures and modalities of planning and implementation of ZODIAC, and provide periodic reports to Member States and the Board of Governors on developments; and
12. Requests the Director General to report on the progress made in the implementation of this resolution to the Board of Governors and the General Conference at its sixty-fifth (2021) regular session.

5.

Development of the sterile insect technique for the control or eradication of malaria-, dengue- and other disease-transmitting mosquitoes

1. Requests the Director General to report on progress made in the implementation of resolution GC(62)/RES/9 to the Board of Governors and to the General Conference at its sixty-fifth (2021) session under an appropriate agenda.

6.

Plan for producing potable water economically using small and medium-sized nuclear reactors

1. Requests the Director General to report on progress made in the implementation of resolution GC(62)/RES/9 to the Board of Governors and to the General Conference at its sixty-fifth (2021) session under an appropriate agenda.

7.

Strengthening the support to Member States in food and agriculture

1. Requests the Director General to report on progress made in the implementation of resolution GC(62)/RES/9 to the Board of Governors and to the General Conference at its sixty-fifth (2021) session under an appropriate agenda.

B.

Nuclear power applications

1.

Introduction

The General Conference,

- (a) Recalling resolution GC(63)/RES/10 and previous General Conference resolutions on strengthening the Agency's activities related to nuclear science, technology and applications,
- (b) Noting the Agency's objectives as outlined in Article II of the Statute include "to accelerate and enlarge the contribution of atomic energy to peace, health and prosperity throughout the world",
- (c) Noting also that the Agency's statutory functions include "to encourage and assist research on, and development and practical application of, atomic energy for peaceful uses", "to foster the exchange of scientific and technical information" and "to encourage the exchange and training of scientists and experts in the field of peaceful uses of atomic energy", including the production of electric power, with due consideration for the needs of developing countries,
- (d) Stressing that the use of nuclear power must be accompanied at all stages by commitments to and ongoing implementation of the highest standards of safety and security throughout the life of the power plants, and effective safeguards, consistent with Member States' national legislation and respective international obligations, and welcoming the Agency's assistance in these areas,
- (e) Recognizing that the establishment of a robust safety, security and non-proliferation infrastructure in States considering introducing nuclear power programmes, as well as maintaining and expanding such programmes, is vital for any nuclear programme, and welcoming the Agency's assistance in these areas,
- (f) Stressing that primary responsibility for nuclear safety and security rests with States, in particular licensees and operating organizations, supervised by regulatory agencies, in order to achieve the protection of the public and environment, and that a strong infrastructure is necessary to execute this responsibility,
- (g) Recalling that launching new, as well as maintaining and expanding existing nuclear power programmes, requires the development, implementation and continuous improvement of appropriate infrastructure to ensure the safe, secure, efficient and sustainable use of nuclear power, and implementation of the highest standards of nuclear safety, taking into account relevant Agency standards and guidance and relevant international instruments, lessons learned from the Fukushima Daiichi accident, as well as a strong and long-term commitment of national authorities to creating and maintaining this infrastructure,
- (h) Welcoming the launch of the IAEA Marie Skłodowska-Curie Fellowship Programme (MSCFP) with the objective to encourage women to pursue a professional career in the field of

nuclear sciences, technology and non-proliferation as well as the support offered by various Member States to the MSCFP,

(i) Recalling, in its previous resolutions, the content addressing nuclear knowledge management, and noting the success of the Nuclear Energy Management (NEM) School and the Nuclear Knowledge Management (NKM) School, both held annually at the International Centre for Theoretical Physics (ICTP) in Trieste and the highly-valued continuous cooperation between the IAEA and the ICTP,

(j) Recalling the importance of human resource development, education and training, knowledge management and promoting gender equality and diversity, stressing the Agency's unique expertise and capacity to assist Member States in building their national capacities to support the safe, secure and efficient use of nuclear power and its application, inter alia through its technical cooperation programme, and acknowledging the important role the Agency plays in assisting Member States in the establishment, preservation and enhancement of nuclear knowledge and in implementing effective knowledge management programmes,

(k) Noting the continued value of Integrated Work Plans (IWPs), which provide an operational framework for the delivery of optimized Agency assistance to support Member States with new and expanding nuclear programmes,

(l) Noting that significant concerns related to energy resource availability, the environment, energy security, climate change and its impacts, which have been reflected in the Sustainable Development Goals (SDGs) by the Member States of the United Nations in September 2015, suggest that a wide variety of energy options need to be addressed in a holistic manner to promote access to competitive, clean, safe, secure and affordable energy and support sustainable economic growth, and welcoming the proactive approach of the Secretariat to identify relevant areas of activities among the 17 SDGs,

(m) Conscious of the potential contribution of nuclear power to meet the growing energy needs in the 21st century and mitigating climate change and noting that nuclear power does not produce either air pollution or greenhouse gas emissions during normal operation, which makes it one of the low carbon technologies available to generate electricity, and therefore acknowledging the participation of some Member States in the Nuclear Innovation: Clean Energy Future initiative (NICE Future) under the Clean Energy Ministerial, which calls attention to the interest, on the part of some Member States, in including nuclear power in national and international clean energy and climate discussions and engages nuclear expertise to explore how innovative uses of nuclear technologies, including systems that integrate nuclear power and renewable sources together in reliable clean energy systems, can accelerate progress toward clean air and climate objectives,

(n) Noting the work of the IAEA on projections on the future use of nuclear power worldwide, in particular with the annual publication Energy, Electricity and Nuclear Power Estimates for the Period up to 2050,

(o) Acknowledging that each State has the right to decide its priorities and establish its national energy policy in accordance with its national requirements, taking into account relevant international obligations, and highlighting the support provided by the IAEA to Member States that are considering developing nuclear power, in the field of energy planning and energy systems assessment taking into account environmental and economic aspects,

(p) Recognizing the challenges in obtaining a large amount of financing to construct nuclear power plants as a viable and sustained option in meeting energy needs, and taking into account

appropriate financing schemes, which could involve investors from not only the public sector but also the private sector where it is available, and

(q) Taking note of the Nuclear Technology Review 2020 (GC(64)/INF/2), as well as of the report Strengthening the Agency's Activities related to Nuclear Science, Technology and Applications (GOV/2020/28-GC(64)/5) prepared by the Secretariat,

1. Commends the Director General and the Secretariat for their work in response to previous relevant General Conference resolutions as reported in document GC(64)/5;
2. Affirms the importance of the role of the Agency in facilitating the development and use of nuclear energy for peaceful purposes, in fostering international cooperation among interested Member States, and in disseminating well-balanced information on nuclear energy to the public;
3. Requests the Director General to keep Member States informed on the progress of the implementation of the MSCFP and encourages Member States in a position to do so, to provide support for the Programme;
4. Encourages the Agency to continue its support to interested Member States in building their national capacities in the operation of nuclear power plants and their nuclear power infrastructure when embarking on new nuclear power programmes;
5. Encourages the Secretariat to support initiatives in the areas of knowledge management, including capacity building activities for senior management and the development of e-learning materials, and to facilitate participation in regional NEM Schools for qualified students, in particular those from developing countries through regional funding or cooperation mechanisms;
6. Encourages the Agency to maintain and strengthen the assistance and peer review and advisory services provided to Member States embarking on a nuclear power programme or expanding such programmes, including the coordination and integration of such services, and calls on those Member States to voluntarily use these services when planning the possible introduction or expansion of a nuclear energy capacity in their national infrastructures and energy mix;
7. Encourages Member States that are considering developing nuclear power to voluntarily use the support provided by the Agency to Member States on energy planning and assessment of energy systems in relation to environment, climate and economic factors and requests the Agency to continue its services to help interested Member States in this regard;
8. Welcomes the revision of the Nuclear Energy Series publication on Managing Counterfeit and Fraudulent Items in the Nuclear Industry, requests the Secretariat to continue working to address this issue and encourages Member States to make use of the publication;
9. Notes the outcomes of the International Conference on Climate Change and the Role of Nuclear Power, held in October 2019, in Vienna, commends the Secretariat's efforts in providing comprehensive information on nuclear energy's potential as a low carbon energy source and its potential to contribute to mitigating climate change, during COP25 in Madrid, Spain, in December 2019, and in advance of COP26 to be held in Glasgow, UK, in November 2021, and encourages the Secretariat to work directly with Member States upon request and to continue to extend its activities in these areas, including the Paris Agreement;
10. Takes note of the preparation by the Secretariat for the 5th International Ministerial Conference on Nuclear Power in the 21st Century, to be held in October 2021, in Washington DC, the United States of America;

11. Acknowledges the importance of the Agency's technical cooperation projects for assisting Member States in energy analysis and planning, and in establishing the infrastructure required for the safe, secure and efficient introduction and use of nuclear power, and encourages interested Member States to consider how they can further contribute in this field by enhancing the Agency's technical assistance to developing countries, and notes the importance of active stakeholder involvement in the development or expansion of nuclear power programmes;

12. Encourages the Secretariat to continue to enhance interested Member States' understanding of funding requirements for nuclear power infrastructure and potential approaches to financing nuclear power programmes, including management of radioactive waste and spent fuel in a changing international financial landscape, and encourages interested Member States to work with the relevant financial institutions towards addressing financial issues related to the introduction of enhanced safety design and technologies for nuclear power;

13. Encourages the Secretariat to analyse the technical and economic cost drivers for economic sustainability of nuclear power operation, especially with regard to decisions of Member States concerning the long-term operation of nuclear power plants, to determine the value of nuclear power in the energy mix considering environmental conditions;

14. Stresses the importance, when planning, deploying, or decommissioning nuclear energy facilities, including nuclear power plants and related fuel cycle activities, of ensuring the highest standards of safety and emergency preparedness and response, security, non-proliferation, and environmental protection, of being informed of the best available technologies and practices, of continuously exchanging information on R&D addressing safety issues, of strengthening long-term research programmes to learn about severe accidents and related decommissioning activities, and of enabling continuous improvement in this regard, and values the role of the IAEA in fostering exchange of expertise and discussions within the international nuclear community on such issues;

15. Welcomes the continuation of the IAEA Peaceful Uses Initiative and all contributions announced by Member States or regional groups of States, and encourages Member States and groups of States, in a position to do so, to contribute, including with 'in-kind' contributions; and

16. Encourages the Secretariat to streamline and rationalize the set of 16 Technical Working Groups (TWG) created to advise it on its nuclear energy activities while considering the interest in establishing a TWG on the topic of nuclear power in energy systems, also including issues such as climate, environment and economics.

2.

IAEA communication, cooperation with other agencies and stakeholder involvement

The General Conference,

(a) Recalling the importance of involving the Member States in the drafting and publication process of important publications on nuclear energy,

(b) Welcoming the Secretariat's contributions to international discussions addressing global climate change, such as at the Conferences of the Parties to the United Nations Framework Convention on Climate Change (COP), and taking note of the participation of the Agency in the Intergovernmental Panel on Climate Change (IPCC),

(c) Commending the proactive approach of the Secretariat to identify relevant areas of activities among the 17 SDGs adopted by the United Nations in 2015,

- (d) Stressing the importance of appropriate and applicable engineering and industrial national and international codes and standards for the safe, timely and cost-effective deployment of nuclear technology, and
- (e) Acknowledging that it is important for Member States that opt to use nuclear power to engage the public in a science based and transparent dialogue, recognizing the utmost importance of active stakeholder involvement to Member States that are considering and planning for the introduction or expansion of nuclear power, and noting the Agency's efforts to enhance its work on stakeholder involvement and public information,
1. Welcomes efforts of the Secretariat to introduce mechanisms for Member States to participate in the preparation of Nuclear Energy Series publications and the sharing of information on drafts under preparation, and further encourages the Secretariat to continue consolidating the drafting and review of Nuclear Energy Series publications to establish a single, systematic, and transparent process and to report to the Member States on this matter;
 2. Encourages the Secretariat to improve the timeliness of information available during the publication process, welcomes the revision of the Nuclear Energy Series structure, and encourages the Secretariat to continue to develop Nuclear Energy Series documents as a more integrated, comprehensive and clearly organized set of publications to be maintained up-to-date by clearly marking which publications are most current and which have been superseded, in order to enhance accessibility and navigation among these documents;
 3. Welcomes the development of the IAEA website in all official languages of the IAEA and encourages the Secretariat to include more content relevant to policy makers and experts involved in IAEA activities, such as organizational charts and activities of expert groups, and to make access to Agency guidance documents and TECDOCs easier;
 4. Encourages the Agency to seek efficiencies in the development and management of digital information systems, to ensure and improve long-term accessibility and public access to these tools and databases, as relevant, and to anticipate the needs to update and maintain these tools on the long term;
 5. Requests the Secretariat to continue cooperation with international initiatives such as UN-Energy, and to explore the possibility of cooperation with Sustainable Energy for All (SE4All), stressing the importance of ongoing, transparent communications about the risks and benefits of nuclear power in operating and embarking countries;
 6. Requests the Secretariat to continue cooperation with international initiatives such as UN-Energy to ensure that the IAEA's capacity building in energy planning can be widely recognized within UN system as an important contributor to SDGs, in particular SDG 7;
 7. Encourages strengthening mutual cooperation between Member States by exchanging information on relevant experiences and good practices with respect to nuclear power programmes, through international organizations such as the IAEA, OECD Nuclear Energy Agency (NEA), the International Framework for Nuclear Energy Cooperation (IFNEC), the World Nuclear Association (WNA) and the World Association of Nuclear Operators (WANO);
 8. Encourages the Secretariat to work further with the OECD/NEA, in particular, on capacity building issues and in the preparation of key IAEA publications such as the "Status and Trends in Spent Fuel and Radioactive Waste Management" and the next edition of the 'Red book' on Uranium: Resources, Production and Demand;
 9. Encourages the Secretariat to cooperate with national and international industrial organizations for standardization, such as the International Organization for Standardization (ISO) and the

International Electrotechnical Commission (IEC), with regard to their development of appropriate engineering and industry codes and standards in order to better respond to the needs of the Member States;

10. Recommends that the Secretariat continue to explore opportunities for synergy between the Agency's activities (including the International Project on Innovative Nuclear Reactors and Fuel Cycles (INPRO)) and those pursued under other international initiatives in areas relating to international cooperation in peaceful uses of nuclear energy, safety, proliferation resistance and security issues and, in particular, supports collaboration among INPRO, the Generation IV International Forum (GIF), IFNEC, the European Sustainable Nuclear Industrial Initiative (ESNII) and the International Thermonuclear Experimental Reactor (ITER) with regard to innovative and advanced nuclear energy systems;

11. Takes note of the Secretariat's cooperation with IFNEC, in areas of nuclear infrastructure, the back end of the nuclear fuel cycle, and sustainable delivery chains, as well as small and medium or modular reactors (SMRs); and

12. Encourages the Secretariat to continuously assist Member States in enhancing public awareness and understanding of peaceful uses of nuclear energy, including by publishing reports on stakeholder involvement and public information as well as organizing conferences, technical meetings and workshops, among other mechanisms.

3.

Nuclear fuel cycle and waste management

The General Conference,

(a) Noting the increasing number of requests from Member States for advice on the exploration of uranium resources and on mining and milling for safe, secure and effective uranium production while minimizing the environmental impact and acknowledging the importance of the Agency's assistance in this field,

(b) Noting the importance of identifying undiscovered uranium or secondary uranium resources, while underlining the necessity to support uranium mine remediation, as part of a sustainable nuclear programme,

(c) Welcoming the start of operation of the Low Enriched Uranium (LEU) Bank project, in Oskemen, Kazakhstan, with the completion of LEU supply to the bank by France and Kazakhstan,

(d) Noting also the functioning of the LEU Guaranteed Reserve in Angarsk, Russian Federation, comprising 120 tons of LEU under the aegis of the Agency, and aware of the availability of the American Assured Fuel Supply, a bank of approximately 230 tons of LEU, for responding to supply disruptions in countries pursuing peaceful civilian nuclear programmes,

(e) Recognizing the role that the effective management of spent fuel and radioactive waste should play in avoiding imposing undue burdens on future generations, and recognizing that, while each Member State should dispose of the radioactive waste it generates, in certain circumstances the safe and efficient management of spent fuel and radioactive waste might be fostered through agreements among Member States to use facilities in one of them for their mutual benefit, and stressing the importance of Agency safety standards on this issue related to the management of radioactive waste and spent fuel and the benefits of strong cooperation with relevant international organizations,

- (f) Emphasizing the need to ensure effective management of spent fuel which, for some Member States, includes reprocessing and recycling, as well as of radioactive waste, including its transport, decommissioning and remediation, in a safe, secure and sustainable manner, and confirming the important role of science and technology in continuously addressing these challenges, particularly through innovations,
- (g) Welcoming progress made in the field of deep geological disposal of spent fuel and high-level radioactive waste, and further recognizing the need for Member States to evaluate and manage the financial commitments that are necessary for planning and implementing radioactive waste and spent fuel management programmes, including disposal,
- (h) Recognizing the continuing efforts and good progress that have been made on the Fukushima Daiichi site, and noting the important and complex decommissioning, environmental remediation and radioactive waste management challenges that remain,
- (i) Recognizing that the growing number of shutdown reactors and an anticipated growing number of shutdown fuel cycle and research facilities increase the need for developing adequate methods and techniques for decommissioning, environmental remediation and managing of all forms of radioactive waste resulting from the decommissioning of facilities, legacy practices and radiological or nuclear accidents and sharing lessons learned in that regard,
- (j) Welcoming ongoing activities of the Agency's project entitled "Global Status of Decommissioning",
- (k) Commending the continuous efforts of the Secretariat to help support the safe, secure and effective borehole disposal of disused sealed radioactive sources, based on expertise from interested Member States, and acknowledging Canadian funding to enable borehole pilot projects being implemented in Ghana, the Philippines and Malaysia, and
- (l) Welcoming the increased use of the Integrated Review Service for Radioactive Waste and Spent Fuel Management, Decommissioning and Radiation (ARTEMIS) peer review missions and encouraging Member States to make further use of these IAEA services,
1. Recognizes the importance of assisting Member States interested in uranium production to develop and maintain sustainable activities through appropriate technology, infrastructure and stakeholder involvement and the development of skilled human resources;
 2. Encourages the Agency to develop a guidance document with a step by step approach for countries considering or initiating a uranium production programme, based on the analysis and promotion of practical know-how and innovative knowledge regarding environmental aspects of uranium exploration, mining and site remediation, and encourages interested Member States to use the uranium production site appraisal team (UPSAT) missions which support Member States in this field;
 3. Welcomes the Secretariat's efforts in pursuing activities for enhancing Member State capabilities in modelling, predicting and improving the understanding of the behaviour of current and advanced nuclear fuel under accident conditions;
 4. Encourages the Secretariat to assist interested Member States in analysing the technical challenges that may hinder the sustainable operation of nuclear fuel cycle facilities, such as ageing management issues;
 5. Encourages the Secretariat to analyse the potential technical challenges that may affect the transportability of spent fuel after long storage;

6. Encourages the Secretariat to keep Member States informed of its actions regarding the operation of the LEU Bank, including the implementation of the criteria, set in 2010, to determine the eligibility of an LEU request;
7. Encourages discussion among interested Member States on the development of multilateral approaches to the nuclear fuel cycle, including possible mechanisms for nuclear fuel supply assurance and possible schemes for the back end of the fuel cycle, recognizing that any discussion on these matters should take place in a non-discriminatory, inclusive and transparent manner and be respectful of the rights of each Member State to develop national capabilities;
8. Requests the Secretariat to continue and strengthen its efforts relating to the fuel cycle, spent fuel, and radioactive waste management, and to assist Member States to develop and implement adequate programmes, in accordance with relevant safety standards and security guidance;
9. Encourages the Secretariat to promote information sharing to better integrate approaches to the back end of the fuel cycle that impact processing, transport, storage, and recycling of spent fuel and waste management, for example through the coordination of research projects and to provide more information on all stages of waste management, including waste pre-disposal management and disposal, and thereby assisting Member States, including those embarking on nuclear power programmes, to develop and implement adequate disposal programmes, in accordance with relevant safety standards and security guidance;
10. Encourages the Secretariat to continue its activities on ‘Status and Trends in Spent Fuel and Radioactive Waste Management’ by publishing a series of reports on global inventories on radioactive waste and spent fuel and on advanced planning for their management in cooperation with the OECD/NEA and the European Commission;
11. Encourages further strengthening of Agency safety standards as well as strong cooperation with international and regional organizations, such as through the SRIS (Spent Fuel and Radioactive Waste Information System) and the joint reporting tool SWIFT (Spent Fuel and Radioactive Waste Information Tool);
12. Requests the Agency to formulate guidance documents on decommissioning and action plans to support decommissioning, with a view to promoting the safe, secure, efficient, and sustainable execution of these activities, and to facilitate the systematic review of these guidance documents based on recent developments, as appropriate;
13. Encourages the Secretariat to formulate recommendations on practical enablers of end-state definition, controls and long-term stewardship for decommissioning and contaminated sites, including compliance demonstration and stakeholder engagement aspects;
14. Encourages the Agency to further strengthen its activities in the area of environmental remediation, in close collaboration with the Department of Nuclear Safety and Security;
15. Encourages the Secretariat to further promote the ARTEMIS peer review service, explaining its benefits as a means of encouraging Member States to invite such peer reviews where appropriate, and requests the Secretariat to enhance the effectiveness and efficiency of this service, including combined Integrated Regulatory Review Service (IRRS)-ARTEMIS missions, through cooperation and coordination, between the Department of Nuclear Energy and the Department of Nuclear Safety and Security;
16. Supports Member States in the adoption of best practices for managing NORM residue/wastes (including inventory determination, reuse, recycle, storage, and disposal options) and to remediate NORM contaminated sites and welcomes the organization by the IAEA of the International Conference

on Management of Naturally Occurring Radioactive Materials (NORM) in Industry, planned in October 2020 in Vienna, Austria; and

17. Encourages the Agency to further strengthen its activities in support of the effective management of disused sealed radioactive sources (DSRS) through, inter alia, the development of Qualified Technical Centres for DSRS management and cooperative efforts to strengthen supporting information on the borehole disposal of DSRS, with a view to enhancing safety and security of DSRS in the long term.

4. Research reactors

The General Conference,

- (a) Recognizing the role that safe, secure, reliably operated, and well utilized research reactors can play in national, regional, and international nuclear science and technology programmes, including support of R&D in the fields on neutron science, fuel and material testing, and education and training, and
 - (b) Commending the Secretariat for the continued support provided for the implementation and promotion of the International Centres based on Research Reactors (ICERR) and acknowledging with appreciation the designation as ICERR of the Korea Atomic Energy Research Institute (KAERI) and of the Institute for Nuclear Research in Pitesti, Romania,
1. Requests the Secretariat to continue its efforts, in consultation with interested Member States, to utilize existing research reactors to pursue the Agency's activities in the area of nuclear science and technology, including nuclear power applications, in Member States, with a view to strengthening infrastructures, including safety and security, and fostering science, technology, and engineering, including capacity building;
 2. Encourages the Secretariat to continue to foster regional and international collaboration and networking that expands access to research reactors, such as international user communities;
 3. Encourages the Secretariat to inform Member States considering the development or installation of their first research reactor of the issues related to utilization, cost-effectiveness, environmental protection, safety and security, nuclear liability, proliferation resistance, including the application of comprehensive safeguards, and waste management associated with such reactors, and, on request, to assist Member States in pursuing new reactor projects following the Agency-developed Specific Considerations and Milestones for a Research Reactor Project systematically and on the basis of a robust, utilization-based strategic plan;
 4. Urges the Secretariat to continue to provide guidance on all aspects of the research reactor life cycle, including the development of ageing management programmes at both new and older research reactors, to ensure continuous improvements in safety and reliability, sustainable long-term operation, the sustainability of fuel supply, exploration of efficient and effective disposition options for spent fuel and waste management, and the development of a knowledgeable customer capability in Member States decommissioning research reactors;
 5. Acknowledges the recently launched Agency peer review service Integrated Nuclear Infrastructure Review for Research Reactors (INIR-RR), implemented in Nigeria and Viet Nam, and encourages the Agency to continue to provide this service to interested Member States;
 6. Acknowledges the implementation of an Operations and Maintenance Assessment for Research Reactors (OMARR) mission in Bangladesh, and encourages Member States to make further use of this IAEA service;

7. Acknowledges with appreciation the engagement of the Secretariat in the promotion of ICERR, calls on willing Member States to apply for designation, and encourages already designated facilities and expected unique facilities to cooperate through ICERR-Net or other international networks and research programmes on relevant activities of interest to Member States;
8. Encourages the Secretariat to further strengthen its efforts to support capacity building based on research reactors, including with the IAEA Internet Reactor Laboratory project which could be expanded in the Asia-Pacific, Europe and Africa regions; and
9. Calls on the Secretariat to continue to support international programmes working to minimize the civilian use of HEU, for example through the development and qualification of LEU high density fuel for research reactors, where such minimization is technically and economically feasible.

5. Operating nuclear power plants

The General Conference,

- (a) Stressing the essential role the Agency plays as an international forum for the exchange of information and experience on nuclear power plant operation and for continuous improvement of this exchange among interested Member States,
 - (b) Noting the growing importance, for some Member States, of long-term operation of existing nuclear power plants and underlining the need to share relevant lessons learned from long-term operations including safety aspects, for the benefit of new programmes that may have nuclear power plants capable of operating beyond 60 years,
 - (c) Stressing the importance of adequate human resources for ensuring, inter alia, the safe and secure operation and the effective regulation of a nuclear power programme, and noting the increasing need, worldwide, for trained and qualified personnel to implement nuclear energy related activities during construction, commissioning and operation including long-term operation, performance improvement, effective management of radioactive waste and spent fuel and decommissioning through focusing on the optimization of training programmes for operating organizations, and
 - (d) Recognizing the organization of the meetings of the TWG on Nuclear Power Plant Operations (TWG-NPPOPS),
1. Requests the Secretariat to promote collaboration among interested Member States for strengthening excellence for the safe, secure, efficient, and sustainable operation of nuclear power plants;
 2. Acknowledges the work of the Secretariat on nuclear leadership, management systems, and quality assurance and control for the nuclear industry and the whole life cycle of facilities and activities, including while nuclear power plants are in permanent shutdown, or in transition to decommissioning;
 3. Requests the Secretariat to continue this work through experience sharing and identification and promotion of best practices, and taking into account quality control activities related to nuclear construction, component manufacturing, and modifications, with respect to fitness for service issues and independent nuclear training accreditation;
 4. Requests the Secretariat to continue its support to interested Member States, in particular through strengthening their knowledge, experience, and capacity in management of ageing and plant life management;

5. Encourages the Agency to support interested Member States in their activities to improve the safe, secure and economical operation of existing nuclear power plants throughout their operational lifetime;
6. Acknowledges the growing interest in the application of advanced instrumentation and control (I&C) systems and encourages the Agency to provide further support to interested Member States, by means of sharing best practices and strategies used in the justification of commercial industrial I&C equipment for nuclear power plant applications and I&C aspects of human factors engineering as well as for discussing the challenges and issues that need to be resolved in this area;
7. Recognizes the need to enhance further the support for grid and nuclear power plant interfaces, grid reliability, and cooling water usage, and recommends that the Secretariat collaborate on these matters with Member States that have operating nuclear power plants;
8. Encourages the Secretariat to identify best practices and lessons learned with respect to procurement, supply chain, engineering, and related issues in the delivery of large, capital-intensive nuclear engineering projects and to promote and disseminate them through publications and web-based tools with respect to supply chain management;
9. Encourages the nuclear owner/operating organizations of Member States to share their experience and knowledge related to methods and strategies for the implementation of post-Fukushima actions at nuclear power plants; and
10. Encourages the Secretariat to analyse the status and future challenges of human resources in the nuclear power industry and welcomes the International Conference on Nuclear Knowledge Management and Human Resources Development: Challenges and Opportunities, planned in Moscow in 2022.

6.

Agency activities in the development of innovative nuclear power technology

The General Conference,

- (a) Recalling its previous resolutions on the Agency's activities in the development of innovative nuclear technology,
- (b) Noting the progress achieved in a number of Member States in the development of innovative nuclear energy system technologies and the high technical and economic potential of international collaboration in the development of such technologies and highlighting the need for transition from the R&D and innovation stage to proven technology stage,
- (c) Acknowledging the importance of fostering increased international collaboration in research on advanced nuclear power technologies and alternative non-electric nuclear energy systems and their applications,
- (d) Noting that the membership of INPRO, which has reached a total of 42 members comprising 41 IAEA Member States plus the European Commission, and acknowledging that the coordination of INPRO-related activities is achieved through the Agency's Programme and Budget and the INPRO Subprogramme Plan,
- (e) Noting also that the Agency fosters collaboration among interested Member States on selected innovative technologies and approaches to nuclear power through Coordinated Research Projects and INPRO Collaborative Projects,
- (f) Noting that the INPRO Subprogramme Plan identifies activities in areas of global and regional nuclear energy scenarios, innovations in nuclear technology and institutional arrangements and in this area including: the final report of the INPRO Methodology for

Sustainable Assessment of Nuclear Energy Systems for Waste Management and Safety Aspects; collaborative efforts in safeguards by design resulting in new INPRO publications, the final report on the Key Indicators for Innovative Nuclear Energy Systems (KIND) project and a new version of the Nuclear Energy System Economics Support Tool (NEST) which compares the economics of different technologies for electricity generation,

(g) Noting that the scope of INPRO includes activities to support interested Member States in developing national long-range sustainable nuclear energy strategies and related nuclear energy deployment decision making, including nuclear energy system assessments (NESAs) using INPRO methodology, the INPRO Dialogue Forum, and regional training on nuclear energy system modelling, including collaborative scenarios,

(h) Noting that the INPRO collaborative project on Comparative Evaluation of Nuclear Energy System Options (CENESO) is currently ongoing and the ASENES service on “Analysis Support for Enhanced Nuclear Energy Sustainability” can now be used to evaluate fast reactors and SMRs, and

(i) Recognizing that a number of Member States are planning to license, construct, and operate prototypes or demonstrations of fast neutron systems, high temperature reactors, thermonuclear experimental reactors, and other innovative reactors and integrated systems within the next decades, noting the latest technology developments in the area of molten salt and molten-salt cooled reactors and encouraging the Secretariat to foster these developments through the provision of international fora for the exchange of information, thus supporting interested Member States to develop innovative technology with enhanced safety, proliferation resistance, and economic performance,

1. Commends the Director General and the Secretariat for their work in response to the relevant General Conference resolutions, in particular the results achieved to date within INPRO;
2. Emphasizes the important role that the Agency can play in assisting interested Member States in building long-term national nuclear energy strategies and in long-term sustainable nuclear energy deployment decision-making through NESAs, based on the INPRO methodology, and nuclear energy scenario analyses and comparative evaluations of nuclear energy system and scenario options based on the approaches and tools developed by INPRO;
3. Encourages the Secretariat to consider further opportunities to develop and coordinate the services it provides on these subjects focusing on transition to sustainable nuclear energy systems using, inter alia, the analytical approaches and tools developed by INPRO;
4. Encourages the Secretariat to consider further use of web based tools for implementing the INPRO Collaborative Project: Analytical Framework for Analysis and Assessment of Transition Scenarios to Sustainable Nuclear Energy Systems, an approach for comparative evaluation of nuclear energy system options based on key indicators and multi-criteria decision analysis methods;
5. Encourages interested Member States to use methods and tools developed by the Agency for nuclear energy evolution scenario modelling, nuclear energy system economic assessments, comparative evaluation of nuclear energy system or scenario options, and road mapping, including the new service being developed by INPRO on ASENES;
6. Encourages interested Member States and the Secretariat to apply the ROADMAPS templates for national case studies, including case studies based on cooperation among technology holder and technology user countries, and for national and regional long-term energy planning to enhance sustainability of nuclear energy systems;

7. Requests the Secretariat to promote collaboration among interested Member States in developing innovative, globally sustainable nuclear energy systems and to support the establishment of effective collaboration mechanisms to exchange information on relevant experiences and good practices;
8. Requests the Secretariat to promote further application of multi-criteria decision analysis methods for comparative evaluation of plausible nuclear energy system options by interested INPRO Members states to support decision analysis and prioritization in national nuclear energy programmes;
9. Encourages the Secretariat to study cooperative approaches to the back end of the nuclear fuel cycle with a focus on the drivers and institutional, economic, and legal impediments to ensure effective cooperation among countries towards the long-term sustainable use of nuclear energy and requests the Secretariat to facilitate discussion among developers of advanced reactors (e.g. SMRs, Generation IV reactors) on the challenges and technologies related to decommissioning and radioactive waste management at the earliest stage of their design thinking;
10. Notes the Agency's efforts in developing innovative infrastructure approaches for future nuclear energy systems and invites Member States and the Secretariat to examine the role that technological and institutional innovations can play in improving nuclear power infrastructure and enhancing nuclear safety, security, and non-proliferation and to exchange information, including through the INPRO Dialogue Forum;
11. Invites all interested Member States to join, under the aegis of the Agency, in the activities of INPRO in considering issues of innovative nuclear energy systems and institutional and infrastructure innovations, particularly by continuing assessment studies of such energy systems and their role in national, regional, and global scenarios for the further use of nuclear energy, and also by identifying common topics of interest for possible collaborative projects;
12. Encourages the Secretariat to further its efforts on distance learning/training on development and evaluation of innovative nuclear technology for students and staff of universities and research centres, and to further develop tools supporting this activity that supports efficient delivery of services to Member States;
13. Encourages the Secretariat and interested Member States to complete the revision of the INPRO methodology, taking into account the results of completed NESAs and lessons learned from the Fukushima Daiichi accident, while noting updates to the INPRO manuals dealing with infrastructure, economics, depletion of resources, and environmental stressors;
14. Encourages the Secretariat to continue, through activities on innovative nuclear technologies and their underlying science and technology, to exchange knowledge and experience in the area of innovative, globally sustainable nuclear energy systems;
15. Notes the role of research reactors in supporting the development of innovative nuclear energy systems and invites interested Member States to share access to unique research reactors and facilities, currently operated and being constructed, for development of innovative nuclear technologies;
16. Calls upon the Secretariat and Member States in a position to do so to investigate new reactor and fuel cycle technologies with improved utilization of natural resources and enhanced proliferation resistance, including technologies for the recycling of spent fuel and its use in advanced reactors under appropriate controls and for the long-term disposition of remaining waste materials, taking into account economic, safety, and security factors;
17. Recommends that the Secretariat continue to explore, in consultation with interested Member States, innovative nuclear technologies, such as alternative fuel cycles (e.g. thorium, recycled uranium and plutonium), associated back-end management capabilities, and innovative nuclear energy systems

including fast neutron systems, supercritical water-cooled, high-temperature gas cooled, molten salt nuclear reactors, as well as thermonuclear fusion experimental reactors, with a view to strengthening and fostering infrastructure, safety, security, science, technology, engineering, and capacity building via the use of experimental facilities and material testing reactors, to facilitate licensing, construction, and operation of these technologies; and

18. Welcomes the extra budgetary funds provided to the Secretariat's activities for the development of innovative nuclear technology and encourages Member States in a position to do so to consider how they can further contribute to the Secretariat's work in this area.

7.

Approaches to supporting nuclear power infrastructure development

The General Conference,

- (a) Recognizing that the development, implementation, and maintenance of an appropriate infrastructure to support the successful introduction of nuclear power and its safe, secure, and efficient use is an issue of great importance,
- (b) Commending the Secretariat's effort to provide support in the areas of human resource development, which continues to be a high priority to Member States that are considering and planning for the introduction of nuclear power in a safe, secure, and efficient manner,
- (c) Recognizing the continued value of the Agency's Integrated Nuclear Infrastructure Review (INIR) missions, which provide expert and peer-based evaluations, in helping requesting Member States to determine their nuclear infrastructure development status and needs, welcoming the Agency's efforts to share lessons learned from these missions and noting the 30 INIR and follow-up INIR missions performed since 2009 at the request of 21 Member States, including the second INIR Phase 3 pilot mission in Belarus, and that additional countries considering embarking on or expanding a nuclear power programme are considering requesting INIR missions,
- (d) Recognizing the finalization of the evaluation methodology for Phase 3 INIR missions, with input from all relevant Departments and taking into account feedback from the first Phase 3 INIR missions, and welcoming that, for each phase of nuclear power programme development, evaluation methodologies and guidelines are now available to support Member States' self-evaluation and to conduct INIR missions,
- (e) Noting the importance of coordination of activities, including the integrated Agency support to Member States for nuclear infrastructure development, through the Nuclear Power Support Group and the Infrastructure Coordination Group,
- (f) Noting the increasing number of Technical Cooperation projects, including the provision of assistance to Member States planning to introduce or expand nuclear power generation in conducting energy studies to evaluate future energy options, especially in the scope of their Nationally Determined Contributions (NDCs), taking into account the highest standards of safety and planning for appropriate nuclear security frameworks,
- (g) Commending the work of the TWG on Nuclear Power Infrastructure, which provides guidance to the Agency on approaches, strategy, policy, and implementing actions for the establishment of a national nuclear power programme,
- (h) Recognizing the importance of encouraging effective workforce planning for operating and expanding nuclear power programmes, worldwide, and the increasing need for trained personnel,

- (i) Taking note of other international initiatives focusing on support for infrastructure development,
 - (j) Recognizing the importance of effective management systems for new nuclear power programmes and the need to strengthen senior management understanding and execution of their leadership role and responsibilities in this regard, and
 - (k) Recognizing the growing interest of Member States in the Agency's reactor technology assessment methodology for near term deployment in embarking or expanding countries within the Milestones approach, and noting the increasing number of requests from embarking Member States to receive training to use this tool,
1. Encourages the Nuclear Infrastructure Development Section to pursue its activities integrating the Agency's assistance provided to Member States embarking on or expanding nuclear power programmes;
 2. Emphasizes the necessity for Member States to ensure the development of the appropriate legal and regulatory frameworks, which are necessary for the safe introduction of nuclear power;
 3. Encourages Member States interested in or embarking on new or expanded nuclear power programmes to make use of Agency services related to nuclear infrastructure development and to conduct a self-evaluation based on IAEA Nuclear Energy Series No. NG-T-3.2 (Rev. 1) to identify gaps in their national nuclear infrastructure and to invite an INIR mission and relevant peer review missions, including site and design safety reviews, prior to commissioning the first nuclear power plant, and to make public their INIR and follow-up INIR mission reports in order to promote transparency and to share best practices;
 4. Supports the Milestones approach (IAEA Nuclear Energy Series No. NG-G-3.1 (Rev. 1)) as the leading document for the use of Member States in the development of new nuclear power programmes and in the establishment of corresponding IWPs;
 5. Requests the Secretariat to continue to incorporate lessons learned from INIR missions and to enhance the effectiveness of such INIR activities, including through the ongoing development of the TECDOC on 10 years of INIR missions;
 6. Urges Member States to develop and keep updated action plans to address the recommendations and suggestions provided by the INIR missions, encourages them to participate in the development of their Member State-specific IWPs, to implement these IWPs to plan and integrate the IAEA support, to use the Country Nuclear Infrastructure Profiles (CNIPs) as a tool for monitoring and reporting progress, and to make use of INIR follow-up missions for each phase of the programme to assess progress and determine whether recommendations and suggestions were successfully implemented;
 7. Encourages the Secretariat to be prepared to perform INIR missions in all UN official languages, to allow the highest level of information exchange during the missions, and to expand the panel of related experts, especially in countries using one of these languages other than English as a working language, while ensuring that the use of such experts does not constitute a conflict of interest or convey commercial advantage;
 8. Encourages Member States to use the competency framework and requests the Secretariat to continue to update the nuclear infrastructure bibliography, as a useful tool to help Member States plan technical cooperation and other assistance such as training needs for capacity building;
 9. Invites all Member States that are considering or planning for the introduction or expansion of nuclear power to provide, as appropriate, information and/or resources to enable the Agency to apply its

full spectrum of tools in support of nuclear infrastructure development, encourages the Secretariat to facilitate, where possible, international coordination to improve efficiency of multilateral and bilateral assistance to these Member States, provided it avoids all conflict of interest and excludes areas which are commercially sensitive, and encourages the strengthening of activities undertaken by Member States, both individually and collectively, to cooperate on a voluntary basis in nuclear infrastructure development;

10. Encourages the Agency to review and adapt the application of the evaluation methodologies and guidelines for SMRs, taking into account the work done under the SMR Regulatory Forum and the Agency's activities on SMRs;

11. Welcomes the extra budgetary funds provided to the Secretariat's activities for the infrastructure development support to Member States and encourages Member States, in a position to do so, to consider how they can further contribute to the Secretariat's work in this area;

12. Encourages the Agency to continue to organize workshops on management systems and the leadership role and responsibility of senior management in the context of a new nuclear power programme;

13. Encourages the Secretariat to update the reactor technology assessment methodology to incorporate the lessons learned in six years of its application with embarking countries, and to expand the methodology to be relevant to advanced reactor technology, including SMRs, and non-electric applications;

14. Encourages the Secretariat to work with Member States that are providing financial support for training courses on nuclear infrastructure development in order to streamline and reduce overlap and duplication in such courses; and

15. Welcomes the development of a gradual comprehensive capacity building programme for embarking countries using introductory e-learning modules, interregional TC training programmes and tailor-made national training events delivered through IAEA matrix structure and covering all aspects of nuclear power programme development.

8.

Small and medium-sized reactors or small modular reactors — Development and deployment

The General Conference,

(a) Noting that the Agency has a dedicated project to support SMRs, highlighting their potential as an option for enhancing energy availability and supply security both in expanding and embarking countries and to address economics, environmental protection, safety and security, reliability, enhanced proliferation resistance, regulation, technology development and waste management issues,

(b) Recognizing that smaller reactors could be better suited to the small electrical grids of many developing countries with less developed infrastructure, and that for some developed countries they could be one way to replace, in line with goals to reduce greenhouse gas emissions, obsolete, ageing, or high-carbon-emitting power sources, but acknowledging that the size of nuclear reactors is a national decision that each Member State takes on the basis of its own needs and the size of its electrical grid,

- (c) Noting that SMRs could play an important role in the future in appropriate markets with cogeneration such as district heating, desalination, and hydrogen production systems, and their potential for innovative energy systems,
 - (d) Acknowledging that the Secretariat has published various Nuclear Energy Series reports on SMRs and the TECDOC on Considerations for Environmental Impact Assessment for Small Modular Reactors, and looking forward to the forthcoming Nuclear Energy Series report on Technology Roadmap for Small Modular Reactor Deployments and the TECDOC on Options to Enhance Energy Supply Security using Hybrid Energy Systems using SMRs – Synergizing Nuclear and Renewable Energies,
 - (e) Noting the outcomes of the 17th INPRO Dialogue Forum on Opportunities and Challenges in small modular reactors,
 - (f) Welcoming the establishment of an internal coordination group on SMRs on nuclear energy and nuclear safety and security aspects, tasked to coordinate the relevant IAEA activities, and
 - (g) Recognizing the role that innovative technologies can play in developing SMRs, and noting the ongoing initiative from INPRO of a collaborative project The INPRO Case Study for the Deployment of a Factory Fuelled Small Modular Nuclear Reactor (SMR) as a follow-on to the already published preliminary study on transportable nuclear power plants (TNPPs),
1. Takes note that there are ongoing projects to construct and deploy TNPPs and SMRs;
 2. Encourages the Secretariat to continue taking appropriate measures to assist Member States, particularly embarking countries, engaged in the process of preparatory actions with regard to demonstration projects, and encouraging the development of safe, secure, economically viable SMRs with enhanced proliferation resistance;
 3. Calls upon the Secretariat to continue to promote effective international exchange of information on options as regards SMRs available internationally by organizing technical meetings and workshops, as appropriate, and to produce relevant status and technical reports;
 4. Invites the Secretariat and Member States that are in a position to offer SMRs to foster international cooperation in undertaking studies of the social and economic impacts of SMR deployment in developing countries, their potential integration with renewables, and their non-electric applications;
 5. Encourages the Secretariat to continue consultations and interactions with interested Member States, the competent organizations of the United Nations system, financial institutions, regional development bodies, and other relevant organizations regarding advice on the development and deployment of SMRs;
 6. Encourages the Secretariat to continue working on defining indicators of safety performance, operability, maintainability, and constructability so as to assist countries in assessing advanced SMR technologies, and developing guidance for SMR technology implementation;
 7. Encourages the Secretariat to continue providing guidance for safety, security, economics, licensing, and regulatory reviews of SMRs of various designs and to foster collaboration among interested Member States working to license and deploy SMRs;
 8. Looks forward to additional reports from the Small Modular Reactors Regulators' Forum and encourages the Secretariat to finalize the publication of the Nuclear Energy Series report entitled Technology Roadmap for Small Modular Reactor Deployments and the TECDOC entitled Options to Enhance Energy Supply Security using Hybrid Energy Systems using SMRs – Synergizing Nuclear and Renewable Energies;

9. Encourages the Secretariat to develop generic user requirements for SMRs;
10. Invites the Director General to raise appropriate funding from extra budgetary sources in order to contribute to the implementation of Agency activities relating to the sharing of experience and lessons learned from the development and deployment of SMRs; and
11. Requests the Director General to continue to report on:
 - i. the status of the programme initiated to assist developing countries interested in SMRs, and
 - ii. progress made in the research, development, demonstration and deployment of SMRs in interested Member States intending to introduce them.

9. Implementation and reporting

The General Conference,

1. Requests that the actions of the Secretariat called for in this resolution be undertaken as a priority subject to the availability of resources; and
2. Requests the Director General to report on progress made in the implementation of this resolution to the Board of Governors as appropriate and to the General Conference at its sixty-fifth (2021) session.

C. Nuclear knowledge management

1. Requests the Director General to report on progress made in the implementation of resolution GC(62)/RES/9 to the Board of Governors and to the General Conference at its sixty-fifth (2021) session under an appropriate agenda item.