IAEA
Atoms for Peace and Development

General Conference

GC(62)/RES/9
Date: September 2018

General Distribution
Original: English

Sixty-second regular session
Item 15 of the agenda
(GC(62)/17)

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

Resolution adopted on 20 September 2018 during the seventh 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) Stressing the importance of the Paris Agreement at the twenty-first Conference of the Parties (COP 21) of the United Nations Framework Convention on Climate Change,

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

(i) Taking note of the *Nuclear Technology Review 2018* (document GC(62)/INF/2),

(j) 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,

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

(l) 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,

(m) Acknowledging the need for increasing the capacity of Member States for using advanced nuclear techniques in disease management, including cancer, and aware of the need to develop performance indicators for measuring such capacity,

(n) 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, the IAEA/World Health Organization (WHO) Network of Secondary Standards Dosimetry Laboratories (SSDL Network) services and dosimetry audit networks,

(o) 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,

(p) 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,

(q) 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, including through the IAEA/WHO SSDL Network and dosimetry audit services,

(r) Aware that the events sponsored by the IAEA Nobel Peace Prize Cancer and Nutrition Fund have led to 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 looking forward to 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), to be held in Vienna from 10–13 December 2018,

(s) Aware of events sponsored by the Agency to increase the capacity of Member States in the field of medical radiation dosimetry and looking forward to the International Symposium on Standards, Applications and Quality Assurance in Medical Radiation Dosimetry (IDOS 2019), to be held in Vienna from 18–21 June 2019,

(t) 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,

(u) Recognizing the efforts of the Agency to promote the education and training of medical physicists and in particular, the success of the International Centre for Theoretical Physics (ICTP) Master of Advanced Studies programme in Medical Physics, based on Agency guidelines,

(v) Recognizing the continuing activities within the UN Joint Global Programme on Cervical Cancer Prevention and Control,

(w) Stressing the importance of continued assistance to Member States, in collaboration with external partners, in the fight against cancers affecting women,

(x) Noting that the Dosimetry Laboratory services have been expanded to enhance dosimetry in hospitals and the development of education and training activities,

(y) Acknowledging the long-term benefits of Coordinated Research Projects (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,

(z) 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 Framework for 2010–2019, and the FAO's five strategic objectives,

(aa) Welcoming the support of the Joint FAO/IAEA Division to control outbreaks of certain diseases in Africa, Latin America and the Caribbean, Asia and Europe,

(bb) Recognizing the need for preventive measures and the importance of addressing the challenges posed by climate change and the rise in animal disease outbreak,

(cc) Further recognizing the success of the sterile insect technique (SIT) in the suppression or eradication of populations of pests,

(dd) Aware of the activities of the Latin American and Caribbean Analytical Network (RALACA), composed of national food safety institutes in 21 countries in Latin America and the Caribbean, 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 44 African and 19 Asian national animal disease diagnostic laboratories in disseminating the use of nuclear techniques for the diagnosis and control of transboundary animal and zoonotic diseases,

(ee) 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,

(ff) 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.

(gg) 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,

(hh) 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,

(ii) 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,

(jj) 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 organising regular proficiency tests, inter-laboratory comparisons, and producing certified reference materials from a wide range of environmental matrices,

(kk) 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 176 laboratories from 89 Member States,

(ll) 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,

(mm) 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,

(nn) 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,

(oo) 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,

(pp) Noting the expanding use of positron emission tomography (PET), PET-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,

(qq) 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,

(rr) 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),

(ss) 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,

(tt) 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,

(uu) 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,

(vv) Aware that greater regional and international cooperation, including regional research reactors 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,

(ww) 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) experiments and biennial IAEA Fusion Energy Conferences, and taking note of the 27th biennial IAEA Fusion Energy Conference (FEC2018), to be held in India in October 2018,

(xx) 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, and

(yy) Noting with appreciation the on-going efforts of the Secretariat, together with Member States, under the programme and budget for 2018–2019, 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,

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 the 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 continue close consultations with Co-Chairs and Member States on the preparation of the 2018 Ministerial Conference on nuclear science, technologies and applications for peaceful uses, and their delivery to Member States through the Agency's Technical Cooperation programme, while highlighting their future contributions to sustainable development, and encourages Member States to participate at ministerial level;

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. the use of radioisotopes and radiation in human health,

ii. nuclear applications related to food and agriculture, such as climate-smart agriculture, land and water management, crop improvement and management in light of climate change,

iii. use of the SIT to establish tsetse-free zones and to combat mosquitoes transmitting diseases including dengue, malaria and zika, and the Mediterranean fruit fly,

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 radiopharmaceuticals, and

xi. use of radiation technology for development of novel materials, as well as the treatment of waste water, flue gases and other pollutants resulting from industrial activities;

9. 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;

10. Urges the Secretariat to further strengthen the IAEA-UN Environment partnership, in close consultation with Member States to 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;

11. 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;

12. Urges the Secretariat to further strengthen the IAEA-WHO partnership;

13. Requests the Secretariat to assist Member States upon request in their activities to mitigate the impact of female cancers with proper prevention, diagnosis and treatment mechanisms;

14. Encourages Member States to make use of the existing peer-review mechanisms in radiation medicine to strengthen quality diagnosis and patient treatment;

15. Calls for the support of the Agency in setting guidelines for the adoption of advanced techniques and equipment in radiation medicine in Member States;

16. Recognizes the success of the VETLAB Network of veterinary diagnostic laboratories in disseminating the use of nuclear techniques for the timely diagnosis, control and eradication of transboundary animal and zoonotic diseases such as Ebola virus disease, avian influenza and lumpy skin disease in Africa, Latin America and the Caribbean, Asia and Europe and urges the Secretariat to further increase these efforts as well as to expand and transfer these techniques to Member States;

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

18. 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;

19. 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 other international initiatives such as the High-level Group on the Security of Supply of Medical Radioisotopes established by the OECD Nuclear Energy Agency;

20. 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;

21. 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;

22. 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;

23. 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;

24. 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;

25. 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 and ICERRs, and further requests the Secretariat to facilitate safe, effective and sustainable operation of these facilities;

26. 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;

27. 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;

28. 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;

29. 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;

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

31. Recommends that the Secretariat report to the Board of Governors and to the General Conference at its sixty-third (2019) regular session on the progress made in the areas of nuclear science, technology and applications.

2.
Development of the sterile insect technique package for the management of disease-transmitting mosquitoes

The General Conference,

(a) Recalling its resolution GC(44)/RES/24 on "Servicing Immediate Human Needs" and its resolution GC(60)/RES/12 on "Development of the sterile insect technique for the control or eradication of malaria-, dengue-, Zika- and other disease-transmitting mosquitoes",

(b) Taking note of the decisions taken by the Summit of the African Union at its Fifteenth Ordinary Session, held in Kampala, Uganda, on 25–27 July 2010, on the five-year review of the Abuja Call for Accelerated Action Towards Universal Access to HIV/AIDS, Tuberculosis and Malaria Services in Africa, reaffirming the commitments undertaken at the Special Summit on HIV/AIDS, TB and Malaria, as well as under the Millennium Development Goals (MDGs) and the Decade for Roll Back Malaria, and deciding to extend the Abuja Call for Accelerated Action Towards Universal Access to HIV/AIDS, Tuberculosis and Malaria Services (the Abuja Call) to 2015 to coincide with attainment of the MDGs,

(c) Welcoming the adoption of the 2030 Agenda for Sustainable Development, especially the relevant targets under Sustainable Development Goal 3 to ensure healthy lives and promote well-being for all, at all ages,

(d) Appreciating the important role of nuclear applications in addressing human needs,

(e) Conscious that the work done by the Agency in the field of nuclear sciences and applications in the non power sector contributes to sustainable development, especially with

programmes aimed at enhancing the quality of life in various ways, including improving human health,

(f) Recognizing the success of the area-wide integrated pest management application of the sterile insect technique (SIT) in the eradication and/or suppression of tsetse flies, moths, fruit flies and other insects of economic importance,

(g) Noting with concern that about 3.2 billion people remain at risk of malaria, transmitted by mosquitos and that in 2016 alone, there were an estimated 216 million new cases of malaria and 445 000 deaths, mainly in Africa, thus constituting a major obstacle to poverty eradication in Africa,

(h) Noting that the malaria parasite has continued to develop resistance to drugs and that mosquitoes have continued to develop resistance to insecticides, and that it is envisaged that the SIT would be used under specific conditions as an adjunct to other technologies, conforming to the World Health Organization's (WHO's) roll-back strategy, including integrated vector management, and to not relying on any single approach to malaria management,

(i) Noting with serious concern that mosquito-transmitted dengue, now the world's most common mosquito-borne disease has become a major international public health concern with an incidence growing more than 30-fold during the last 50 years, that dengue is estimated to infect around 400 million people per year, and over half of the world's population is at risk of the disease, and that insecticide-treated bed nets are not effective in combating dengue as the mosquito vectors are active during the day and other control tactics are urgently required,

(j) Noting with concern the effective transmission of mosquito-transmitted chikungunya in the Latin American and the Caribbean regions, and that currently there is no treatment available for this mosquito-borne disease,

(k) Noting with concern the Zika virus outbreak in the Americas, which has been strongly linked to babies born with severe neurological disorders, such as congenital microcephaly, and which led to the declaration of a public health emergency of international concern by the WHO on 1 February 2016, and that so far there are no drugs nor effective global vaccines available to treat or prevent Zika,

(l) Noting that the Thematic Plan for the Development and Application of the Sterile Insect Technique (SIT) and Related Genetic and Biological Control Methods for Disease Transmitting Mosquitoes organized by the Agency and held in Vienna from 16 to 20 June 2014 recommended that the Agency invests in supporting the management of the mosquito vector species through continuous funding of the development of the SIT and other related genetic and environment-friendly methods,

(m) Noting that the suppression of disease-transmitting mosquitoes using the SIT will be suitable mostly in urban areas, where aerial spraying with insecticides is prohibited or not indicated, and that an area-wide approach is required, which represents a novel and potentially powerful supplement to existing community-based programmes,

(n) Welcoming the fact that laboratory R&D and field project driven research on malaria and other disease-transmitting mosquitoes continued in the last biennium,

(o) Taking note of the prioritization of the renovation of the Insect Pest Control Laboratory in Seibersdorf within the ReNuAL Strategy — *Strategy for the Renovation of the Nuclear Sciences and Applications Laboratories in Seibersdorf* (GOV/INF/2014/11),

(p) Noting with appreciation the interest shown by some donors in and their support for R&D on the SIT for combating malaria-, dengue-, Zika- and other disease-transmitting mosquitoes, and

(q) Acknowledging with appreciation the support given by the Agency to the development of the SIT for the management of mosquitoes that transmit arthropod borne diseases as outlined in the report by the Director General in document GC(62)/4, Annex 3,

1. Requests the Agency to continue and strengthen, through the activities mentioned above, the research, both in the laboratory and in the field, required to be able to refine and validate the use of the SIT for the integrated management of malaria-, dengue-, Zika- and other disease-transmitting mosquitoes;

2. Requests the Agency to increasingly involve developing Member States' scientific and research institutes in the research programme in order to ensure their participation, leading to ownership by the affected countries;

3. Requests the Agency to increase efforts to develop and transfer more efficient sex separation systems, including genetic sexing strains, that allow complete removal of the female mosquitoes in production facilities and to develop cost-effective methods to release and monitor sterile males in the field;

4. Further requests the Agency to allocate adequate resources and to attract extrabudgetary funds so as to continue the currently expanded mosquito research programme, laboratory/office space and staffing;

5. Requests the Agency to strengthen capacity building and networking in Latin America, Asia and the Pacific, and Africa through regional TC projects and to support field projects against *Aedes* and *Anopheles* mosquitoes through national TC projects for assessing the potential of the SIT as an efficient control tactic for disease-transmitting mosquitoes;

6. Invites the Agency to act upon the recommendation made by the experts of the Thematic Plan for the Development and Application of the Sterile Insect Technique (SIT) and Related Genetic and Biological Control Methods for Disease Transmitting Mosquitoes to invest in supporting the management of the mosquito vector species through continuous funding of the development of the SIT and related genetic and environment-friendly methods;

7. Invites the Agency to review and update the Thematic Plan for the Development and Application of the Sterile Insect Technique (SIT) and Related Genetic and Biological Control Methods for Disease Transmitting Mosquitoes;

8. Invites the Agency to strengthen its collaboration with the WHO, and to provide guidance to field projects to assess entomological and epidemiological impacts;

9. Appreciates Member States for the continued support for the renovation of the new Insect Pest Control Laboratory in Seibersdorf;

10. Requests the Secretariat to continue to solicit extrabudgetary resources, including through the IAEA Peaceful Uses Initiative, so as to enable increased efforts to be made in validating in the field the SIT package for disease-transmitting mosquitoes through operational projects in the field; and

11. Requests the Director General to report on the progress made in the implementation of this resolution to the General Conference at its sixty-fourth session (2020).

3.
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,

(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 2 000 per year and are currently at the lowest level for several decades, animal trypanosomosis still affects millions of livestock every year and is a constraint to rural development for tens of millions of people in rural communities in 39 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 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, and further welcoming the establishment of a tsetse mass-rearing facility in Burkina Faso,

(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) Welcoming the opening of the Insectary of Bobo-Dioulasso (IBD) under the Burkina Faso PATTEC project as a sub-regional centre for the production and distribution of tsetse flies for the SIT,

(p) 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,

(q) 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,

(r) 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, 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(62)/4, Annex 2,

1. Urges the Secretariat to further intensify the efforts in advocating at the national 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;

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 continue 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-third (2019) regular session.

4.
Plan for producing potable water economically using small and medium-sized nuclear reactors

The General Conference,

(a) Recalling resolution GC(60)/RES/12.A4, Plan for producing potable water economically using small and medium-sized nuclear reactors, and previous General Conference resolutions on strengthening the Agency's activities related to nuclear science, technology and applications,

(b) Recognizing that sufficient and clean potable water supplies for all humankind are of vital importance, as emphasized in Agenda 21 of the Rio Summit on Development and Environment, held in 1992, and the United Nations Conference on Sustainable Development (Rio +20), held in June 2012 in Rio de Janeiro, Brazil, and most recently, in Goal 6 of the 2030 Agenda for Sustainable Development, as well as through the discussion towards implementing the Paris

Agreement adopted at the COP 21 United Nations Climate Change Conference in December 2015, and the Rabat Call 'Water for Africa' outcome document of the International Conference on Water and Climate: "Water Security for Climate Justice", which sought to ensure stronger integration of water in the climate agenda ahead of the COP 22 United Nations Climate Change Conference which took place in Morocco in November 2016,

(c) Noting that potable water shortages are of growing concern in many regions of the world, due to population growth, increased urbanization and industrialization and the effects of climate change,

(d) Underlining the urgent need for regional and international cooperation in helping to solve the serious problem of potable water shortages, particularly through the desalination of seawater,

(e) Recognizing that a number of Member States have expressed their interest in participating in activities relating to seawater desalination using nuclear energy,

(f) Noting that seawater desalination using nuclear energy has been successfully demonstrated through various projects in some Member States both for drinking water and for plant operated service water and is generally cost-effective, while recognizing that the economics of implementation will depend on site-specific factors,

(g) Taking note with appreciation of the different activities carried out by the Secretariat in cooperation with interested Member States and international organizations, as outlined in the report of the Director General contained in document GC(62)/4,

(h) Taking note of the enhanced scope of the Technical Working Group on Nuclear Desalination (TWG-ND), to encompass integrated water resources management and more specifically the efficient use of water in nuclear facilities,

(i) Taking note of the technical meetings that were held in 2016, 2017 and 2018 to examine techno-economic aspects of cogeneration and socio-environmental effects towards mitigating climate change,

(j) Taking note of the Technical Meeting that was held in 2017 to address the responsibilities of users and vendors including to establish a common understanding of users' requirements and the terms under which vendors can supply suitable reactor designs and desalination technologies,

(k) Noting that the Secretariat has in 2017 issued two IAEA Nuclear Energy Series publications: NP-T-4.1 on "Opportunities for Cogeneration with Nuclear Energy" and NP-T-4.3 on "Industrial Applications of Nuclear Energy" to highlight nuclear cogeneration for various industrial applications, and noting the progress that has been made in developing guidance on nuclear energy cogeneration,

(l) Further noting the release of a new version of the Water Management Program in Nuclear Power Plants (WAMP) in January 2018,

(m) Noting that the Coordinated Research Project (CRP) on the Application of Advanced Low Temperature Desalination Systems to Support Nuclear Power Plants and Non-Electric Applications has progressed as planned with the final research coordinating meeting held in 2016,

(n) Recalling with appreciation that the Agency has established a programme to assist developing countries in addressing issues concerning economics, safety, reliability and technical measures for proliferation resistance in the application of small and medium-sized nuclear reactors (SMRs) for the production of potable water, and

(o) Taking note of the efforts of the Director General in soliciting additional funds for nuclear desalination,

1. Requests the Director General to continue consultations and strengthen interactions with interested Member States, the competent organizations of the United Nations system, regional development bodies and other relevant intergovernmental and non-governmental organizations in activities relating to seawater desalination using nuclear energy;

2. Encourages the TWG-ND to continue its functions as a forum for advice and review on nuclear desalination activities;

3. Stresses the need for continued strengthening of international cooperation in the planning and implementation of nuclear desalination demonstration programmes through national and regional projects open for the participation of any interested country;

4. Requests the Director General, subject to the availability of resources, to:

(a) Continue to hold regional training workshops and technical meetings and to use other available mechanisms for disseminating information on nuclear desalination and water management using SMRs and to undertake further activities aimed at better establishing how existing reactors may offer options for cogeneration;

(b) Issue a technical report addressing responsibilities of vendors and users involved in nuclear desalination projects, and assessing different scenarios for cogeneration; and

(c) Continue to increase the Secretariat's activities in capacity building (including training and education) on nuclear desalination projects to bridge the gap among users/vendors/operators/regulators;

5. Invites the Director General to raise funds from extrabudgetary sources in order to catalyse and contribute to the implementation of all Agency activities relating to nuclear desalination and cogeneration, and the development of innovative SMRs;

6. Requests the Director General to note the high priority given by a growing number of interested Member States to the nuclear desalination of seawater in the process of preparing the Agency's Programme and Budget; and

7. Further 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-fourth (2020) regular session under an appropriate agenda item.

5.
Strengthening the support to Member States in food and agriculture

The General Conference,

(a) Recalling its resolutions GC(60)/RES/12.A.5, GC(58)/RES/13.A.5, GC(56)/RES/12.A.4, GC(54)/RES/10.A.4 and GC(52)/RES/12.A.5 on "Strengthening the support to Member States in food and agriculture" and its resolution GC(51)/RES/14 on "Strengthening the Agency's activities related to nuclear science, technology and applications",

(b) Recognizing the central role of agricultural development in accelerating progress towards several Sustainable Development Goals (SDGs), in particular to end hunger, achieve food security and improved nutrition and promote sustainable agriculture for the socioeconomic benefits of all Member States,

(c) Recognizing that the major global trends that will frame agricultural development over the medium term include: rising food demand, lingering food insecurity, malnutrition, and the impact of climate change,

(d) Noting that the Paris Agreement on Climate Change recognizes the fundamental priority of safeguarding food security and ending hunger, and the particular vulnerabilities of food production systems to the adverse impacts of climate change,

(e) Noting that, according to the FAO publication "The State of Food Security and Nutrition in the World 2018", the number of chronically undernourished people in the world is estimated to have increased to 821 million, from 804 million in 2016, and that, while some regions continue to show overall progress, hunger remains an everyday challenge,

(f) Noting the benefits from the peaceful application of nuclear techniques in food and agriculture, and the importance of making appropriate technologies available, particularly to developing Member States to improve food security,

(g) Appreciating the efforts of the Secretariat to further strengthen its partnership with FAO and to adjust and adapt its technology development, capacity building and technology transfer services in response to Member States' demands in food and agriculture,

(h) Appreciating the work of the Joint Division of the FAO and the IAEA in its dedication to the development and application of nuclear and related techniques in food and agriculture, and welcoming the reaffirmation of the commitment of both organizations to the long-standing partnership between the two organizations through the signing by the Agency and FAO in 2013 of revised arrangements regarding the work of the Joint FAO/IAEA Division,

(i) Affirming the synergy and contribution of this unique partnership through the Joint FAO/IAEA Division to global food security and sustainable agriculture development,

(j) Recalling the Strategic Framework of the FAO, which focuses on five Strategic Objectives and which streamlines priorities, results and resource allocation to accelerate the eradication of hunger, malnutrition, poverty and the sustainable use of natural resources,

(k) Expressing appreciation for the work undertaken by the FAO/IAEA Agriculture and Biotechnology Laboratories in Seibersdorf, including the use of isotopes in climate smart agriculture and food traceability, authenticity and contaminant control; the investigation of irradiated animal vaccines; the development of radiation hybrid maps for animal breeding; the enhancement of animal disease diagnostic applications; and improving the efficiency of mutation induction techniques for crop improvement using modern biotechnologies,

(l) Acknowledging the crucial role of the FAO/IAEA Agriculture and Biotechnology Laboratories in meeting the needs and expectations of Member States relating to the successful deployment of nuclear science, technology and applications in food and agriculture, including to provide a very responsive in-house research and development resource,

(m) Recognizing the importance of the Agency's Biosafety Level 3 (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) on access to and use of its BSL3 facility, and welcoming the Agency's consideration to establish an IAEA owned extension to the existing facility,

(n) Noting the efforts made by the Secretariat to combat emerging and re-emerging animal and zoonotic diseases such as peste des petits ruminants, swine fever, foot-and-mouth disease,

Ebola virus disease, avian influenza, bluetongue and lumpy skin disease in Africa, Asia, Europe, Latin America and the Caribbean,

(o) Recognizing that emerging and re-emerging animal diseases are severely affecting livestock productivity and food security, and further recognizing the importance of the development of more efficient and healthy livestock production systems in rural communities in improving socio-economic development,

(p) Recognizing the success of the Veterinary Disease Diagnostic Laboratories Network (VETLAB Network), following the achievements of the African Rinderpest Laboratory Network developed by the Joint FAO/IAEA Division in the early 1990s covering 20 countries for the global rinderpest eradication campaign, in adapting its structure to accommodate most transboundary and zoonotic diseases and currently involving 44 African Member States plus 19 Asian Member States,

(q) Further recognizing the significant and expanding role the VETLAB Network fulfils in assisting these Member States in improving human and animal health as well as food safety and food security and in enhancing the quality of food production thus contributing towards Member States' efforts to achieve the SDGs,

(r) Noting recent successes resulting from the efforts made by the Secretariat in the development of new and improved crop varieties using nuclear techniques and biotechnologies, e.g. new rice and soybean mutant varieties in Indonesia adaptable to climate change, improved sesame and cotton varieties adapted to high temperatures in Pakistan, and new groundnut varieties in Sri Lanka being disease resistant, drought tolerant and high-yield lines,

(s) Noting recent successes resulting from the efforts made by the Secretariat in development of climate-smart crop varieties using nuclear techniques and biotechnologies, e.g. improved rice mutant lines in Japan adaptable to low nitrogen conditions, improved wheat mutant varieties with high water use efficiency in China, improved barley mutant lines in Australia adaptable to low phosphorous fields, and improved mungbean mutant lines with early maturity in Thailand,

(t) Commending the Secretariat on the further enhancement of laboratory networks to strengthen capacity building of Member States, in particular for food safety and quality, for crop improvement and molecular marker development, and to strengthen support for the timely diagnosis, control and eradication of transboundary animal and zoonotic diseases,

(u) Commending the Secretariat on its continued efforts in development and application of nuclear and related analytical techniques to detect food residues/contaminants, to combat food fraud and to improve food safety and control systems, so as to protect consumers and enhance competitiveness of foodstuffs on the international market,

(v) Noting the efforts made by the Secretariat to build national and regional capacity in animal genetic characterization targeting especially animal breeding for sustainable development in the context of disease resistance and tolerance to harsh environmental conditions due to climate change,

(w) Noting the efforts made by the Secretariat in identification and inclusion of lesser known, non-conventional feeds and forages, crop residues and industrial by-products for sustainably increasing animal-origin food production,

(x) Noting the efforts by the Secretariat to build a network of national agriculture research systems in Asia Pacific to improve the efficiency of crop mutation breeding by encouraging and facilitating the exchange of mutant germplasm for breeding purposes, accelerating mutant trait

discovery and marker development for agronomically important traits, and developing molecular markers for mutant traits,

(y) Noting the efforts made by the Secretariat to introduce coffee mutation breeding as a new approach for genetic improvement of coffee varieties for fighting important diseases such as coffee leaf rust,

(z) Commending the Secretariat on its effective assistance to Member States in quickly and effectively identifying and characterizing transboundary animal and zoonotic diseases, such as Ebola, highly pathogenic avian influenza, Crimean-Congo haemorrhagic fever and Rift Valley fever,

(aa) Commending the Secretariat on its work on eradication of fruit flies in Latin America and the Caribbean using the SIT, resulting in a very significant socio-economic impact in the region and, in particular, on its exemplary support towards the successful eradication of the Mediterranean fruit fly in the Dominican Republic,

(bb) Applauding the support provided by the Agency to the African Union's Pan African Tsetse and Trypanosomosis Eradication Campaign (AU-PATTEC), which is making excellent progress in eradicating tsetse flies from the Niayes region of Senegal and is fostering the suppression of tsetse flies and the disease they transmit in several affected Member States,

(cc) Commending the Secretariat on the support to the development, reorganization and harmonization of a suite of fruit fly international standards on the framework of the International Plant Protection Convention (IPPC), to help limit the spread of fruit fly pests, which in turn will help reduce poverty as farmers will have a higher yield, less loss and increased opportunity to trade, and appreciating the teamwork award from the FAO to the IPPC-Joint FAO/IAEA team,

(dd) Appreciating the major achievement of the Joint FAO/IAEA Division and the Agency's Technical Cooperation programme in developing mutant wheat varieties with resistance to Ug99, a black stem rust disease of wheat,

(ee) Commending the Agency and FAO on jointly providing Achievement Awards and Outstanding Achievement Awards to plant breeders and institutes in Member States for exceptional achievements in mutation breeding and their contributions to global food security,

(ff) Commending the Agency on its key role in the post-rinderpest era, including its contributions to the sequestration of the rinderpest virus from diagnostic and vaccine production and storage facilities and to the maintenance of global diagnostic capabilities and expertise, and on its support in building national and regional capacity, improving epidemiological studies and data management and setting up pertinent networks to combat and eliminate other livestock and zoonotic diseases,

(gg) Commending the Agency on its exemplary role in the enhancement of nuclear emergency response in the field of food and agriculture and on its adaptation of nuclear and related technologies in that connection,

(hh) Applauding the commencement of new demand-driven R&D work at the FAO/IAEA Agriculture and Biotechnology Laboratories in Seibersdorf on the development of the SIT for disease-transmitting mosquitoes, the use of isotopic techniques in soil erosion control, land and water management, climate-smart agriculture, greenhouse gas emission reduction, food forensics, traceability and contaminant control to improve food safety and quality, the investigation of irradiated animal vaccines, the application of stable isotopes as tracing technologies and in enhancing animal disease diagnostic applications, and the use of whole genome sequencing

techniques and bioinformatics in the development of robust molecular markers for mutation breeding,

(ii) Applauding the support of the Secretariat to 65 African, Asian, European and Latin American countries in the development of soil conservation strategies using fallout radionuclide (FRN) techniques to ensure sustainable agricultural production and to mitigate the impacts of climate change,

(jj) Welcoming the demand-driven research activities on the development of communication tools to improve decision-making in agricultural water management in Africa, and the new visualization platform for nuclear and radiological emergency preparedness and response for food and agriculture,

(kk) Recognizing that the demand from Member States for technical assistance in the area of nuclear applications in food and agriculture remains high, as evidenced by the scientific and technical support of the Joint FAO/IAEA Division to more than for 225 national, regional and interregional technical cooperation projects and 30 coordinated research projects, and

(ll) Appreciating the contributions made by Member States, the FAO and other stakeholders in support of the ReNuAL+ Project and, inter alia, the food and agriculture programme of the Agency, and commending the Secretariat on securing extra-budgetary funding of its crucial research including into the development of an SIT package against *Aedes* mosquitoes,

1. Urges the Secretariat to further expand, in an integrated and holistic manner, its efforts to address, inter alia, food insecurity in Member States and to further increase its contribution to raising agricultural productivity and sustainability, reducing poverty and hunger, and improving farmers' incomes, through the development and integrated application of nuclear science and technology;

2. Encourages the Secretariat, and in particular the Joint FAO/IAEA Division, to continue its unique role in strengthening the capacity of Member States in the use of nuclear and related techniques to improve food security and sustainable agriculture through international cooperation in research, training and outreach activities;

3. Urges the Secretariat to address the impacts of climate change on food and agriculture through the use of nuclear technologies, with priority on adaptation to and mitigation of the effects of climate change, including through the development of tools and technology packages, and invites the Secretariat to carry out activities for addressing climate change challenges under the thematic heading of 'climate-smart agriculture';

4. Urges the Joint FAO/IAEA Division to further increase its focus on the sustainable intensification of agricultural productivity through climate-smart agricultural practices that ensure water quality, strengthen food safety and quality, improve water use efficiency, minimize land degradation, maximize crop yield and quality, improve crop resilience, and optimize livestock feeds and other agricultural practices to reduce greenhouse gases, while promising better adaptation to and mitigation of climate change in agriculture;

5. Urges the Agency to further increase its focus on development of crops adapted to the negative effect of climate change by using mutation induction techniques, biotechnology and other modern technologies for marker development to assist and accelerate crop breeding;

6. Encourages the Joint FAO/IAEA Division to assist Member States, upon, request, to develop irradiation technologies such as X rays and high-energy electron beam machines to treat plant pathogens and insect pests for sanitary and phytosanitary purposes;

7. Invites the Secretariat, in view of the global trend in antimicrobial resistance (AMR) and its impact on animal and human health, to continue to follow international developments in efforts to establish possible applications where nuclear/isotopic methods/tools may provide comparative advantages;

8. Encourages the Joint FAO/IAEA Division to further strengthen its pivotal role in the establishment, coordination and support of new global and regional technical/scientific laboratory networks in order to further strengthen regional and global partnerships among institutions in Member State striving to achieve the UN SDGs, and urges the Joint FAO/IAEA Division to take the lead in establishing, sustaining and managing such networks;

9. Furthermore, encourages the Joint FAO/IAEA Division to persist in its ongoing endeavours to further strengthen and expand existing networks, including the VETLAB Network, the Latin American and Caribbean Analytical Network (RALACA), the Asia and Oceania Association of Plant Mutagenesis (AOAPM), the African Food Safety Network (AFoSaN), the Tephritid Workers Database (TWD) Network and the Coffee Mutation Network (CMN), with the participation of multiple stakeholders to strengthen national programmes;

10. Further encourages the Joint FAO/IAEA Division to expand its support to Member States, through the VETLAB Network, in establishing and developing capabilities in diagnosing and responding to veterinary and zoonotic diseases, and acknowledges the efficient processes, which lead to quick diagnosis, response and action to diseases that have the ability to threaten human and animal health as well as food safety, food security and the quality of food production ultimately affecting socio-economic development;

11. Also urges the Joint FAO/IAEA Division to continue to build on its achievements in this regard by identifying opportunities for expansion to other regions, as requested by Member States and relevant regional organizations;

12. Encourages the Secretariat to continue its work on coffee mutation breeding and to promote development of network of research institutes in coffee growing countries;

13. Requests the Secretariat to strengthen capacity building for Member States, including in addressing those transboundary animal and zoonotic diseases that potentially pose a bio-threat to people and their livelihoods, in case of accidental or deliberate release to the environment, and encourages the Agency, in consultation with Member States, to pursue its consideration of an IAEA owned extension of the existing BSL3 laboratory of the AGES in order to strengthen capacity building for Member States to address these global threats;

14. Encourages the Joint FAO/IAEA Division, including the FAO/IAEA Agriculture and Biotechnology Laboratories in Seibersdorf, to continue its valuable work in the provision of demand driven training and services and in applied R&D;

15. Requests the Secretariat to work towards the renewal of the FAO/IAEA Agriculture and Biotechnology Laboratories in Seibersdorf, in conjunction with the other programmatic entities of the laboratories of the Department of Nuclear Sciences and Applications, in order to ensure that fit-for purpose laboratories will also in future be optimally positioned to assist Member States' research and development activities;

16. Urges the Secretariat to continue strengthening its activities in the area of food and agriculture through interregional, regional and national capacity building initiatives and through better north-south and south-south collaboration and harmonization, and to further expedite the sustainable transfer of technology to developing Member States;

17. Encourages Member States to contribute, particularly through the Peaceful Uses Initiative, to food and agriculture activities, and to continue supporting these activities by funding projects that will further enhance agricultural productivity while protecting increasingly scarce natural resources and addressing greenhouse gas emission;

18. Urges the Secretariat to further strengthen its efforts to seek extrabudgetary funding for infrastructure and equipment improvement and modernization of the Seibersdorf Laboratories, especially the FAO/IAEA Agriculture and Biotechnology Laboratories, to enable these to meet the growing and continuously evolving needs of Member States, and specifically encourages Member State contributions in support of the ReNuAL+ initiative;

19. Urges the Secretariat, in its resource mobilization efforts for the ReNuAL project, to draw on the extensive experience of the FAO in mobilizing extrabudgetary resources, and encourages the Secretariat to have relevant FAO staff work closely with Agency staff in these efforts;

20. Encourages the Secretariat to further strengthen its partnership with the FAO and to continue adjusting and adapting its technology development, capacity building and technology transfer services in response to Member States' demands and needs in food and agriculture, especially considering the FAO Strategic Objectives;

21. Appreciates the continuing activities of the Secretariat in relation to nuclear and radiological emergency preparedness and response, especially in the areas of agricultural countermeasures and remediation strategies to mitigate immediate and longer-term effects arising from radionuclide contamination, and urges the Secretariat to develop technologies, manuals, protocols, decision support systems and guidance to strengthen the capacity of Member States to deal with radionuclide contamination in food and agriculture;

22. Encourages the Joint FAO/IAEA Division to continue responding to the major global trends framing agricultural development in order to ensure to the maximum extent possible an increased resilience of livelihoods to threats and crises in agriculture, including the adaptation to and mitigation of the effects of climate change;

23. Urges the Secretariat to further strengthen its effort to seek extrabudgetary funding for strengthening its research activities in the preparedness and response to nuclear and radiological emergencies affecting food and agriculture; and

24. 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-fourth (2020) regular session.

6.
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 malaria-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 NA Laboratories at Seibersdorf are in urgent 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/2018/29-GC(62)/4, Annex 5, to the Board of Governors on progress made in implementing the ReNuAL project since the 61st General Conference,

(m) Welcoming progress made in the construction of the new laboratory buildings and infrastructure under both ReNuAL and ReNuAL+ and noting that the Insect Pest Control Laboratory (IPCL) was inaugurated on 25 September 2017; and that the IPCL and Dosimetry Laboratory are expected to be operational by the end of 2018,

(n) Further welcoming the major construction of the Flexible Modular Laboratory (FML), which is expected to be completed by the end of 2018,

(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 approximately €32 million in extrabudgetary funds have been raised for ReNuAL and ReNuAL+ to date, including over €11 million for ReNuAL+,

(q) Further welcoming the financial and in-kind contributions and cost-free experts for the implementation of the ReNuAL project provided by the following 34 Member States: Australia, Austria, Belgium, Brazil, Canada, China, France, Germany, India, Indonesia, Israel, Japan, Jordan, Kazakhstan, the Republic of Korea, Kuwait, Oman, Malaysia, Mongolia, Morocco, New Zealand, Norway, Pakistan, the Philippines, Qatar, the Russian Federation, Saudi Arabia, South Africa, Spain, Switzerland, Thailand, Turkey, the United Kingdom and the United States of America, 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 five 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) Noting the requirement for €3.75 million by 30 November 2018 to complete the integrated energy centre and to equip and set up the new laboratory buildings, in order to ensure full functionality on schedule,

(t) Further noting the proposal in the 2019 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 within the overall funding target for the renovation project;

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 ReNuAL+;

5. Encourages the Secretariat to carry out further planning on how to meet the requirements of laboratories that will remain in the existing facilities, once the FML has been completed;

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 equipping and set up of the new laboratory buildings and integrated energy centre to ensure that they become fully operational and on schedule;

8. Further invites Member States, based on the information provided from the recent planning efforts of the Secretariat, to make the appropriate contributions to support the completion of the renovation of the NA Laboratories in Seibersdorf, as described in GOV/INF/2017/1, so that those elements within ReNuAL+ are implemented as soon as possible, in consultation with all Member States;

9. 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 with the aim to have the new facilities operational by the end of 2019;

10. Calls on the Secretariat to report on the implementation of ReNuAL and ReNuAL+, with the aim of highlighting achievements and identifying outstanding resource requirements, at upcoming events such as the IAEA Ministerial Conference on Nuclear Science and Technology, scheduled to take place in November 2018; and

11. Requests the Director General to report on progress made in the implementation of this resolution to the General Conference at its sixty-third (2019) session.

B.
Nuclear power applications

1.
General

1.1. Introduction

The General Conference,

(a) Recalling resolution GC(61)/RES/11 and previous General Conference resolutions on strengthening the Agency's activities related to nuclear science, technology and applications,

(b) Noting that the Agency's objectives as outlined in Article II of the Statue 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 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) Recalling the importance of involving the Member States in the drafting and publication process of important publications on nuclear energy,

(e) 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,

(f) Acknowledging that actions have been taken by the Secretariat and Member States with nuclear power, drawing upon the lessons learned from the Fukushima Daiichi accident, endeavouring to enhance the robustness of nuclear power plants and fuel cycle facilities, as well as human and organizational effectiveness, and emphasizing the need for ensuring competent technical support at every stage of the lifetime of nuclear power plants and fuel cycle facilities for safe and reliable operations,

(g) Recalling that launching new, as well as maintaining and expanding existing nuclear power programmes, require 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, as well as a strong and long-term commitment of national authorities to creating and maintaining this infrastructure,

(h) Recognizing the growing interest within a number of Member States in next generation reactor designs,

(i) Recalling that the development of innovative fast reactors, closed fuel cycles and alternative fuel cycles (e.g. thorium, recycled uranium and plutonium) may be regarded as steps toward future sustainable and safe nuclear power that can extend the lifetime of nuclear fuel resources and be an effective solution for the management of radioactive waste and spent fuel,

(j) Recognizing that the establishment of a robust safety, security and non-proliferation infrastructure in States considering introducing nuclear reactors is vital for any nuclear

programme, and 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,

(k) 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,

(l) 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 importance of active stakeholder involvement in the development or expansion of nuclear power programmes; noting the Agency's efforts to enhance its work in the stakeholder involvement and public information and welcoming the publication of a Safety Guide on Communication and Consultation with Interested Parties by the Regulatory Body,

(m) Recalling the importance of human resource development, education and training, knowledge management and promoting gender equality and diversity, encouraging the Agency to work with the OECD/NEA on these issues, and 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,

(n) Recognizing the importance and ongoing need to strengthen management competencies in the nuclear sector, especially in developing countries embarking on or expanding nuclear power programmes, and commending the Agency's successful facilitation of university implemented master's programmes in nuclear technology management (NTM) through the collaboration framework of the International Nuclear Management Academy (INMA),

(o) 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 needs to be addressed in a holistic manner in order to promote access to competitive, clean safe, secure and affordable energy, so as to support sustainable economic growth in all Member States,

(p) Taking note 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,

(q) Noting the launch of the Nuclear Innovation: Clean Energy Future initiative (NICE Future) under the Clean Energy Ministerial, which recognizes the value of involving nuclear in broader, high level clean energy and climate discussions, as well as exploration under the initiative of the role of new nuclear technologies in increasing grid flexibility and reliability while creating opportunities to use process heat and heat that is traditionally lost in power conversion in applications such as desalination, industrial and chemical processes and district heating,

(r) 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 to use diverse portfolios of energy sources in order to achieve its energy security, while also working to address climate change, including, as applicable, through actions under the Paris Agreement adopted on 12 December 2015,

(s) 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,

(t) 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,

(u) Acknowledging the potential advantages offered by small and medium-sized or modular reactors (SMRs), recognizing that SMRs could be well-suited to small electrical grids, including in developing Member States, and could play a significant role in district heating, supply of industrial heat, desalination and hydrogen production systems in the future, and their potential for use in innovative energy systems and highlighting the establishment of the Technical Working Group on SMRs (TWG-SMRs),

(v) Noting the important role that the Agency plays in assisting Member States in the establishment, preservation and enhancement of nuclear knowledge and in implementing effective knowledge management programmes at all levels and confirming the important role of nuclear knowledge management programmes in strengthening nuclear education, training and networking capabilities,

(w) Acknowledging the increasing regional demand for the Agency's Nuclear Energy Management School and its positive impact on enhancing awareness and understanding of nuclear sector issues and challenges among future nuclear professionals and managers,

(x) Calling attention to the long-term benefit of implementing effective and targeted capacity building to support national plans to implement new or expanding nuclear power programmes, especially in developing countries, and

(y) Taking note of the Nuclear Technology Review 2018 (GC(62)/INF/2), as well as of the report Strengthening the Agency's Activities related to Nuclear Science, Technology and Applications (GOV/2018/29-GC(62)/4) prepared by the Secretariat,

1. Affirms the importance of the role of the Agency in facilitating through international cooperation among interested Member States, the development and use of nuclear energy for peaceful purposes, including the specific application of the generation of electric power, in assisting these States in that regard, in fostering international cooperation and in disseminating to the public well-balanced information on nuclear energy;

2. 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;

3. Encourages Member States to develop programmes and initiatives in close coordination with the Agency, to improve and promote Member States' expertise;

4. Encourages the Secretariat to support regional technical cooperation projects for initiatives in the areas of knowledge management, including support for the implementation of national level Education Capability Assessment and Planning missions and initiatives, programmes to foster and strengthen university collaboration in nuclear research, the development of e-learning resources and support for e-learning platforms, and flexible student fellowships to support nuclear professionals from developing countries to participate in and to complete INMA-endorsed university master's programmes in NTM;

5. Urges the Secretariat to support participation in regional Nuclear Energy Management (NEM) Schools for qualified students, in particular those from developing countries through regional funding of technical cooperation fellowships;

6. Commends the Agency for the assistance and review services for Member States embarking on a nuclear power programmes or expanding such programmes and encourages Member States to voluntarily use this assistance and the Agency's review services when planning and assessing the economics/socio-economics of their energy programmes, developing their national infrastructures for nuclear power and defining their long-term strategies for sustainable nuclear energy;

7. Requests the Secretariat to initiate a programme to explore new ways to foster international partnerships, investment and collaboration that does not duplicate existing Agency efforts or those undertaken by other relevant multilateral fora, is inclusive of developing countries and is focused on innovation through joint international research and development in advanced nuclear power technologies and alternative non-electric nuclear energy systems and their applications that will significantly contribute to attaining the SDGs in a responsible, safe, secure and economically sound manner that enhances proliferation resistance;

8. Requests the Secretariat to provide an update, at the earliest opportunity, of the technical document (TECDOC) on managing suspect and counterfeit items in the nuclear industry and encourages Member States to consider making use of the document once it is published;

9. Welcomes the recent effort of the Secretariat to introduce mechanisms for Member States to participate in the preparation of NE Series publications and its intention to share information on drafts under preparation, calls on the Secretariat to make these mechanisms fully functional and further encourages the Secretariat to consider utilizing the Technical Working Groups (TWGs) as review committees in a more systematic way, and to report to the Member States on this matter;

10. Encourages the Secretariat to improve the timeliness of information available during the publication process, to pursue its efforts in reducing the number of finalized but unpublished documents, and to promote the systematic review of old publications and indicate when publications are superseded as appropriate;

11. Encourages the Secretariat to reorganize NE Series documents by topic and clearly mark which publications are most current and which have been superseded, in order to enhance accessibility and navigation among these documents;

12. Requests the Secretariat, in completing the new IAEA website, to ensure that information is preserved and made easily accessible to all stakeholders, including both policy makers and experts;

13. Takes note of the success of the 4th International Ministerial Conference on Nuclear Power in the 21st Century, organized by the Agency and hosted by the United Arab Emirates in Abu Dhabi in October/November 2017, where one of the key messages was that for many countries, nuclear power will have an important role to play in achieving the SDGs and meeting the targets in the Paris Agreement, and requests the Secretariat to initiate preparation of the next such ministerial conference;

14. Notes the preparation by the Secretariat of the International Conference on Climate Change and the Role of Nuclear Power, to be held in October 2019, in Vienna;

15. Encourages the Agency to continue to organize capacity building workshops for senior management to enhance their understanding and execution of their leadership role and responsibility for management systems to ensure the safety, security, effectiveness and sustainability of nuclear power programmes;

16. 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 in this regard;

17. 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;

18. Encourages the Secretariat to continue to enhance interested Member States' understanding of funding requirements for nuclear power infrastructure development 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;

19. Encourages the Secretariat to analyse the technical and economic cost drivers for economic sustainability of nuclear power operation, especially in the scope of life extension, to determine the value of nuclear power in the energy mix considering environmental conditions;

20. Encourages the Secretariat to reshape the annual publication Energy, Electricity and Nuclear Power Estimates for the Period up to 2050, Reference Data Series No. 1, in order to better describe the plausible development of new nuclear power plants in different world regions whatever the scenario taken into account, and invites willing Member States to support the Secretariat with the promotion of this publication;

21. Requests the Secretariat to continue to pursue, in consultation with interested Member States, the Agency's activities in the areas of nuclear science and technology for 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 via the utilization of existing research reactors;

22. Stresses the importance, when planning and deploying nuclear energy, including nuclear power and related fuel cycle activities, of ensuring the highest standards of safety and emergency preparedness and response, security, non-proliferation, and environmental protection, for example through the promotion of a platform for the international nuclear community to continuously exchange information on R&D addressing safety issues highlighted by the Fukushima Daiichi accident, as well as the strengthening of long-term research programmes to learn about severe accidents and related decommissioning activities;

23. 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;

24. 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;

25. Requests that the actions of the Secretariat called for in this resolution be undertaken as a priority subject to the availability of resources; and

26. Requests the Secretariat to report to the Board of Governors as appropriate and to the General Conference at its sixty-third (2019) session on developments relevant to this resolution;

1.2. Nuclear fuel cycle and waste management

(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, and underlining the necessity to support uranium mine remediation, as part of a sustainable nuclear programme,

(c) Recalling the organization by the Secretariat of the 4th International Symposium on Uranium Raw Material for the Nuclear Fuel Cycle: Exploration, Mining, Production, Supply and Demand, Economics and Environmental Issues (URAM 2018), which took place from 25-29 June 2018,

(d) Recalling the opening of the Low Enriched Uranium (LEU) Bank Storage Facility on 29 August 2017, in Oskemen, Kazakhstan, and the signing of a Transit Agreement between the Agency and the Russian Federation and the signing of a Transit Agreement between the Agency and China to support the implementation of the LEU Bank,

(e) Welcoming the Secretariat's effort to ensure a fair LEU acquisition process for the LEU Bank,

(f) Noting also the functioning of the LEU Guaranteed Reserve in Angarsk, Russian Federation, comprising 120 tons of LEU under the aegis of the Agency,

(g) 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,

(h) 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, as far as is compatible with the safe management of such material, 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,

(i) Stressing the importance of Agency safety standards related to the management of radioactive waste and spent fuel and the benefits of strong cooperation with international organizations, and commending the TECDOCs published by the Department of Nuclear Energy intended to support their implementation,

(j) 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,

(k) Recognizing the continuing efforts and good progress that have been made on the Fukushima Daiichi site, whilst noting the important and complex decommissioning, environmental remediation and radioactive waste management challenges that remain,

(l) Recognizing that the growing number of shutdown reactors increases the need for developing adequate methods and techniques for decommissioning, environmental remediation and managing large volumes of radioactive waste, including contaminated water, resulting from the decommissioning of facilities, legacy practices and radiological or nuclear accidents and sharing lessons learned in that regard,

(m) Acknowledging progress made in the field of deep geological disposal of both spent fuel and high level radioactive waste, and further acknowledging the vital importance of involving national authorities, including regulatory bodies, in order to enhance stakeholder engagement,

(n) 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,

(o) 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

(p) Welcoming the introduction of and the completion of the first Integrated Review Service for Radioactive Waste and Spent Fuel Management, Decommissioning and Radiation (ARTEMIS) peer reviews 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 and encourages the Agency to cooperate with the OECD/NEA for the publication of the 27th edition of the 'Red Book' on Uranium: Resources, Production and Demand;

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, for instance through Coordinated Research Projects;

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. Welcomes the Secretariat's effort to ensure a fair LEU acquisition process for the LEU Bank;

7. Encourages discussion among interested Member States on the development of multilateral approaches to the nuclear fuel cycle, including on the one hand possibilities of creating mechanisms for

assurance for nuclear fuel supply and on the other hand 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. Highlights the organization by the Secretariat of the International Conference on the Management of Spent Fuel from Nuclear Power Reactors: Learning from the Past, Enabling the Future, to be held in June 2019;

9. 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, including those embarking on nuclear power programmes, to develop and implement adequate disposal programmes, in accordance with relevant safety standards and security guidance;

10. 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;

11. Encourages the Secretariat to promote information sharing to better integrate approaches to the back end of the fuel cycle that impact irretrievability, transport, storage and recycling of spent fuel, for example through the coordination of research projects and to provide more information on designing, constructing, operating and closing a radioactive waste disposal facility, 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;

12. Encourages the Secretariat to continue its activities on 'Status and Trends of 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;

13. Requests the Agency, through its new Decommissioning and Environmental Remediation Section, to formulate guidance documents on decommissioning and action plans to support decommissioning, inter alia by establishing an international cooperation framework for implementation 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;

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 concept, explaining its benefits as a means of encouraging Member States to invite such peer reviews where appropriate, through cooperation between the Department of Nuclear Energy and the Department of Nuclear Safety and Security;

16. Encourages further strengthening of Agency safety standards as well as strong cooperation with international and regional organizations, such as through the Net-Enabled Waste Management Database and through the new joint reporting tool SWIFT (Spent Fuel and Radioactive Waste Information Tool); and

17. Encourages the Agency to further strengthen its activities in support of the effective management of disused sealed radioactive sources (DSRS) through support to field operations and capacity building for characterization, dismantling, packaging for storage or transport through the development of Qualified Technical Centres for DSRS management and through the fostering of cooperative efforts to

further strengthen the supporting information on the borehole disposal of DSRS, with a view to enhancing safety and security of DSRS in the long term;

1.3. Research reactors

(a) Recalling the conversion of the Miniature Neutron Source Reactor (MNSR) in Ghana from highly enriched uranium (HEU) fuel to LEU fuel and the removal of the HEU from Ghana to China, which has been completed by China, the United States of America, the IAEA and the host country Ghana, in 2017,

(b) 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

(c) Commending the Secretariat for the continued support provided for the implementation and promotion of the International Centres based on Research Reactors (ICERR) and acknowledging the establishment of the ICERR-Net cooperation network,

1. Encourages the Secretariat to continue to foster regional and international collaboration and networking that expands access to research reactors, such as international user communities;

2. 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, environmental protection, and waste management associated with such reactors, and, on request, to assist decision makers 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;

3. 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, and the 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;

4. Acknowledges the implementation of an Operations and Maintenance Assessment for Research Reactors (OMARR) mission in Uzbekistan, and encourages Member States to make further use of this IAEA service;

5. 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;

6. Encourages the Secretariat to further strengthen its efforts to support capacity building based on research reactors, including with the IAEA Internet Reactor Laboratory project;

7. Welcomes the start of the conversion of the miniature neutron source research reactor in the Republic of Nigeria from HEU fuel to LEU fuel, and the removal of the HEU from Nigeria to China, which is being implemented by the United States of America, China, the IAEA and the host country Nigeria, with technical, financial and/or in-kind assistance made by the United Kingdom, Norway and China and 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; and

8. Requests the Secretariat to report to the Board of Governors as appropriate and to the General Conference at its sixty-third (2019) session on developments relevant to this resolution.

2.
Communication and IAEA cooperation with other agencies

The General Conference,

(a) 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), and

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

1. 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;

2. Encourages 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, in advance of COP 24 to be held in Katowice, Poland, in December 2018, 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;

3. Encourages the Agency to consider senior level representation at COP 24 and other major international forums where climate change and the potential role of nuclear power may be discussed; and to continue its efforts in identifying how nuclear energy could assist interested Member States in achieving the SDGs;

4. 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/NEA and the World Association of Nuclear Operators (WANO); and

5. Takes note of the Secretariat's cooperation with the International Framework for Nuclear Energy Cooperation (IFNEC), in areas of nuclear infrastructure, the back end of the nuclear fuel cycle and sustainable delivery chains.

3.
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, inter alia through the Nuclear Operator Organization Cooperation Forum held during regular sessions of the General Conference, while

recognizing both the role of international organizations such as the OECD/NEA, and multinational networks among operators, such as WANO, and the need to further strengthen the cooperation between the Agency and these organizations,

(b) Noting the growing importance 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) Recognizing the 4th International Conference on Nuclear Power Plant Life Management (PLiM), which took place in France, in October 2017,

(d) 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 improvements, effective management of radioactive waste and spent fuel and decommissioning through focusing on the optimization of training programmes for operating organizations, and

(e) Recognizing the establishment of the TWG on Nuclear Power Plant Operations (TWG-NPPOPS),

1. Requests the Secretariat to promote collaboration among interested Member States for strengthening excellence in nuclear power plant operation and to establish effective collaboration mechanisms such as TWGs for safe, secure, efficient and sustainable operation of nuclear power plants and also for application of management systems in the nuclear industry to exchange information on relevant experiences and good practices in safe and effective nuclear power plant operation;

2. 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;

3. Encourages the Secretariat to disseminate best practices and experience through the publication of TECDOCs with respect to learning and development, leadership, safety culture and security culture, organizational culture, stakeholder involvement, decision-making and management, for the whole life cycle of facilities and activities, including the need to maintain an appropriate organizational structure while nuclear power plants are in permanent shutdown, or in transition to decommissioning;

4. 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;

5. 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;

6. Encourages the Secretariat to identify and promote best practices and lessons learned, through NE Series publications TECDOCs, with respect to procurement and supply chain issues, including bidding and contract evaluation processes, and also to support experience sharing related to quality control and quality surveillance activities related to nuclear construction, component manufacturing, and modifications, with respect to fitness for service issues and independent nuclear training accreditation;

7. 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

8. Requests the Secretariat to support Member States involved with nuclear power, which needs a knowledgeable workforce, and welcomes the Third International Conference on Human Resource Development for Nuclear Power Programmes: Meeting Challenges to Ensure Future Nuclear Workforce Capability, which was held in Gyeongju, Republic of Korea, from 28–31 May 2018.

4.
Agency activities in the development of innovative nuclear technology

The General Conference,

(a) Recalling its previous resolutions on the Agency's activities in the development of innovative nuclear technology,

(b) Conscious of the need for sustainable development and of the potential contribution of nuclear power to meet the growing energy needs in the 21st century and mitigating climate change,

(c) Highlighting the need for an effective and efficient transition from the R&D and innovation stage to proven technology stage,

(d) 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,

(e) Noting that the membership of the Agency's International Project on Innovative Nuclear Reactors and Fuel Cycles (INPRO), which was launched in 2000, is continuing to grow and now comprises 42 Member States and the European Commission,

(f) Noting also that the Agency fosters collaboration among interested Member States on selected innovative technologies and approaches to nuclear power through INPRO Collaborative Projects, TWGs working on facilitating innovations or advanced reactors and nuclear fuel cycle options, and Coordinated Research Projects, and acknowledging that the coordination of INPRO-related activities is achieved through the Agency's Programme and Budget and the INPRO Subprogramme Plan,

(g) Noting that the INPRO Subprogramme Plan identifies activities in areas of global and regional nuclear energy scenarios, innovations in nuclear technology and institutional arrangements including such key collaborative projects as Roadmaps for a Transition to Globally Sustainable Nuclear Energy Systems (ROADMAPS), the project on Comparative Evaluation of Nuclear Energy System Options (CENESO), the project on Cooperative Approaches to the Back End of the Nuclear Fuel Cycle: Drivers and Legal, Institutional and Financial Impediments and other collaborative projects on specific issues of interest related to innovative nuclear reactor and fuel cycle concepts and designs,

(h) 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, and the new INPRO service on Scenario Analysis and Decision Support for Development of Nuclear Energy Systems with Enhanced Sustainability,

(i) Noting with appreciation that INPRO has successfully completed the collaborative project on Key Indicators for Innovative Nuclear Energy Systems (KIND) and received content approval for the final report of the Secretariat,

(j) Noting that the INPRO Secretariat has drafted the final report of the collaborative project on ROADMAPS,

(k) Noting the publication of an IAEA TECDOC on Experience in Modelling Nuclear Energy Systems with MESSAGE: Country Case Studies, and that INPRO Section is using it as a reference document in learning and training activities,

(l) Noting that within the on-going collaborative ROADMAPS project, INPRO has developed a template comprising structural elements, linked by a common logic and allowing for the characterization of the current situation through the NESA and plans for its development from a short-, medium- and long-term perspective, indicating the opportunities for saving time, effort and resources for improving characteristics of a national NESA through international cooperation,

(m) Noting the progress of other national, bilateral and international activities and initiatives, and their contributions to joint research and development work on innovative approaches to nuclear energy deployment and operation,

(n) 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, and encouraging the Secretariat to foster this process 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,

(o) Noting the increased interest in technology developments in the area of molten salt and molten-salt cooled advanced reactors, and

(p) Noting with appreciation the Director General's report on Agency activities in the development of innovative nuclear technology contained in document GOV/2018/29-GC(62)/4,

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, coordinate and integrate the services it provides to Member States, including broad energy planning and long-term nuclear energy planning, economic analysis and technico-economic assessments, NESAs and comparative evaluations of nuclear energy system and scenario options for transition to sustainable nuclear energy systems using, inter alia, the analytical approaches and tools developed by INPRO;

4. Encourages the Secretariat to consider further implementation of on-line conferences for interested Member States, based on distance communication systems and national and regional training

workshops, so that they may support the application of the analytical framework for modelling and assessment of 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 and the Secretariat to apply the ROADMAPS template for national case studies on options for achieving a Transition to Globally Sustainable Nuclear Energy Systems, including case studies based on cooperation among technology holder and technology user countries; and encourages the Secretariat to promote further application of the template developed within the ROADMAPS collaborative to perform national and regional long-term energy planning (towards enhanced sustainability of nuclear energy systems);

6. 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;

7. 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 to support decision analysis and prioritization in national nuclear energy programmes;

8. 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;

9. 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;

10. 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;

11. 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;

12. Encourages the Secretariat and interested Member States to complete the revision of the INPRO methodology, taking into account the results of NESAs performed in Member States 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;

13. Recognizes ongoing efforts by the Secretariat and interested Member States to conduct comprehensive case studies for deployment of factory-fuelled small modular reactors as follow on to the already published preliminary study on transportable nuclear power plants (TNPPs);

14. Takes note that there are ongoing projects to construct and deploy TNPPs and SMRs and requests that the Secretariat holds a comprehensive briefing on all their work on TNPPs in the fourth quarter of 2018;

15. Recommends that the Secretariat continue to explore opportunities for synergy between the Agency's activities (including 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, appropriate TWGs, the Generation IV International Forum (GIF), the IFNEC, the European Sustainable Nuclear Industrial Initiative (ESNII) and the International Thermonuclear Experimental Reactor (ITER) with regard to innovative and advanced nuclear energy systems;

16. Invites interested Member States that have not done so to consider joining INPRO and to contribute to innovative nuclear technology activities by providing scientific and technical information, financial support, or technical and other relevant experts and by contributing to joint collaborative projects on innovative nuclear energy systems;

17. Encourages the Secretariat to continue, through the consolidation of available resources and additional assistance from interested Member States, regular training and workshops 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;

18. 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 constructed, for development of innovative nuclear technologies;

19. 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 those needed 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, inter alia, economic, safety and security factors;

20. Recommends that the Secretariat continue to explore, in consultation with interested Member States, activities in the areas of innovative nuclear technologies, such as alternative fuel cycles (e.g. thorium, recycled uranium and plutonium) and Generation IV nuclear energy systems including fast neutron systems, supercritical water-cooled, high-temperature gas cooled and molten salt nuclear reactors, with a view to strengthening infrastructure, safety and security, fostering science, technology, engineering and capacity building via the utilization of existing and planned experimental facilities and material test reactors, and with a view to strengthening the efforts aimed at creating an adequate and harmonized regulatory framework so as to facilitate the licensing, construction and operation of these innovative reactors;

21. 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; and

22. 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-third (2019) regular session under an appropriate agenda item.

5.
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, especially for countries that are considering and

planning for the introduction of nuclear power, as well as for countries expanding their nuclear power programme,

(b) Recalling its previous resolutions on approaches to supporting nuclear power infrastructure development,

(c) Stressing that primary responsibility for nuclear safety and security rests with States and their regulatory agencies, licensees and operating organizations in order to achieve the protection of the public and environment, and that a strong infrastructure is necessary to execute this responsibility,

(d) 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 with assessments of infrastructure needs, taking into account relevant economic, social and policy considerations, to support the safe, secure and efficient use of nuclear power, and noting the Agency's increasing activities in this area, in accordance with the requests of Member States,

(e) Noting the Secretariat's effort to provide support in the area of stakeholder involvement, which continues to be of utmost importance to Member States that are considering and planning for the introduction of nuclear power,

(f) 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, and welcoming the Agency's efforts to share lessons learned from these missions,

(g) Noting the 26 INIR and follow-up INIR missions performed since 2009 at the request of 16 Member States, and further noting that additional countries considering embarking on or expanding a nuclear power programme are considering requesting INIR missions,

(h) Recognizing the activities undertaken by the Secretariat, with input from all relevant Departments, to finalize the development of the evaluation methodology for Phase 3 (before commissioning) INIR missions, with interested embarking or expanding Member States close to commissioning,

(i) Noting the publication of Nuclear Energy Series reports and the organization of a wide range of conferences, technical meetings and workshops on topics related to infrastructure development,

(j) Recognizing as effective platforms for leadership development the NEM School and other training courses on management and leadership and on construction management, and mentoring programmes implemented under the Agency's auspices,

(k) Noting the importance of coordination of activities within the Agency for nuclear infrastructure development, through the Nuclear Power Support Group, the Infrastructure Coordination Group and the respective Core Teams established to support each specific Member State considering and planning the introduction of nuclear power, or the expansion of their existing nuclear power programme,

(l) 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,

(m) Noting the Agency's efforts in developing innovative infrastructure approaches for future nuclear energy systems,

(n) Commending the TWG on Nuclear Power Infrastructure that provides guidance to the Agency on approaches, strategy, policy and implementing actions for the establishment of a national nuclear power programme,

(o) Welcoming the Secretariat's efforts in the production of a series of e-learning modules, based on the 19 infrastructure issues defined by the Agency's Milestones approach, of which 17 have already been released on-line, supporting capacity building in both countries embarking on new nuclear programmes and countries expanding their nuclear programmes,

(p) Recognizing the importance of encouraging effective workforce planning for operating and expanding nuclear power programmes, worldwide, and the increasing need for trained personnel,

(q) Taking note of other international initiatives focusing on support for infrastructure development, and

(r) Recognizing the growing interest of Member States in Agency's training on the reactor technology assessment methodology for near term deployment to embarking or expanding countries within the Milestone approach, and noting the increasing number of requests from embarking Member States for training courses and workshops on the Agency's reactor technology assessment methodology for near term deployment,

1. Commends the Director General and the Secretariat for their efforts in implementing resolution GC(61)/RES/11.B.5 as reported in document GC(62)/4;

2. 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;

3. Encourages the Secretariat to facilitate broad international participation at all technical meetings, workshops, training courses and conferences on nuclear infrastructure development sponsored by in kind support from Member States;

4. Emphasises 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;

5. Encourages Member States embarking on nuclear power programmes 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 design safety reviews, prior to commissioning the first nuclear power plant, and to make public their INIR mission reports in order to promote transparency and to share best practices;

6. Requests the Secretariat to consolidate the application of the Milestones approach (IAEA Nuclear Energy Series No. NG-G-3.1 (Rev. 1), 2015) across the Agency 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;

7. Invites Member States to make use of INIR follow-up missions to assess progress and determine whether recommendations and suggestions were successfully implemented;

8. Requests the Secretariat to continue to learn lessons from INIR missions and to enhance the effectiveness of such INIR activities;

9. Urges Member States to develop and keep updated Action Plans to address the recommendations and suggestions provided by the INIR missions and encourages them to participate in the development and updating of their Member State-specific IWPs;

10. Welcomes the pilot INIR Phase 3 conducted by the Agency at the request of the United Arab Emirates, and encourages other embarking or expanding Member States in Phase 3 to request an INIR Phase 3 mission at the appropriate time;

11. 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 as a working language, while ensuring that the use of such experts does not constitute a conflict of interest or convey commercial advantage;

12. Encourages the activities undertaken by the Secretariat to promote cooperation between embarking countries and those with established nuclear power programmes;

13. 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;

14. Encourages the Secretariat to continue to strengthen training related to the development of a knowledgeable future owner/operator;

15. 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;

16. Encourages the Secretariat to facilitate, where possible, 'soft coordination' among Member States for the more efficient implementation of multilateral and bilateral assistance to countries considering or planning for the introduction or expansion of nuclear power, provided it avoids all conflict of interest and excludes areas which are commercially sensitive;

17. Welcomes the activities undertaken by Member States, both individually and collectively, to cooperate on a voluntary basis in nuclear infrastructure development and encourages further such cooperation;

18. 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;

19. Encourages the Secretariat to update the reactor technology assessment methodology to incorporate the lessons learned in five 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;

20. 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

21. 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-third (2019) session under an appropriate agenda item.

C.
Nuclear knowledge management

The General Conference,

(a) Recalling its previous resolutions on nuclear knowledge management,

(b) Noting the importance of establishing and strengthening governance processes to advance knowledge management within organizations and having systems in place to measure the success of knowledge management programmes,

(c) Emphasizing the increasing importance of the role of the Agency in providing information and good practices in the safe and efficient utilization of nuclear technology for peaceful purposes including information and knowledge for the general public,

(d) Recognizing that preserving and enhancing nuclear knowledge and ensuring the renewed availability of qualified human resources are vital to the continued safe, economic and secure utilization of all nuclear technologies for peaceful purposes,

(e) Recognizing that nuclear knowledge management involves both education and training for succession planning as well as the preservation or growth of existing knowledge in nuclear science and technology,

(f) Aware of the value of diversity and inclusion in fostering innovation and increased performance of the nuclear industry, and, in this regard, of the need to encourage more women to join the nuclear field,

(g) Noting the important role that the Agency plays in assisting Member States in the establishment, preservation and enhancement of nuclear knowledge and in implementing effective knowledge management programmes at national and organizational levels,

(h) Recognizing the importance of knowledge management in all areas of the Secretariat's activities and programmes, and the cross-cutting inter-disciplinary and inter-departmental nature of many knowledge management issues and initiatives,

(i) Acknowledging the importance of adequate nuclear knowledge in understanding and applying safety principles in the design, construction, licensing, operation, life extension, closure and decommissioning of nuclear facilities,

(j) Aware of continuing concerns about risks of knowledge loss for operating facilities,

(k) Aware of the benefits of utilizing nuclear knowledge management approaches to support long-term, safe and secure operation of nuclear facilities, disposal of radioactive waste, decommissioning projects, environmental remediation projects, and the need to improve learning from incidents and events,

(l) Noting the increased interest of Member States in the development and use of modern plant information models and guidelines to support nuclear knowledge management, including design knowledge, throughout the entire life cycle of facilities and projects,

(m) Acknowledging the utility of collaborations towards development and adoption of integrated national and regional strategic planning approaches to strengthen and make sustainable university nuclear education programmes,

(n) Recognizing the benefits of collaboration between the Agency, universities, industry, national laboratories and government institutes, and the role that international and national human resource and knowledge development (HRKD) networks play in facilitating this collaboration,

(o) Recognizing the useful role of international coordination and cooperation in facilitating exchanges of information and experience and in implementing actions to help address common problems, and also in benefitting from opportunities relating to education and training and to nuclear knowledge preservation and enhancement,

(p) Noting the Agency's Green Frontiers Initiative, which promotes and fosters university-driven research and development cooperation with national labs, research reactors and industry, as well as the Agency's Knowledge Incubation Centres for Science and Technology Adoption, Resourcing and Transfer, which disseminate best practice in creating and growing university technology incubation centres and promote nuclear research and development investment,

(q) Noting the efforts of the OECD/NEA in establishing the Nuclear Education, Skills and Technology (NEST) Joint Undertaking, to foster the next generation of nuclear science and technology practitioners, and to establish networks and information sharing among the future workforce in pursuit of concrete research objectives, and the value of the Agency's cooperation with the OECD/NEA in this regard,

(r) 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, and

(s) Further noting the sustainable outcomes of the regional NEM Schools held in the UAE in May 2017, in Japan in July 2017, in the Russian Federation in September 2017 and in May and September 2018, and in South Africa in November 2017, and welcoming the continued interest of other Member States in hosting regional NEM Schools,

1. Commends the Director General and the Secretariat for their significant, interdepartmental efforts in addressing issues of preservation and enhancement of nuclear knowledge, in response to relevant General Conference resolutions;

2. Commends the Secretariat for its support to Member States in applying a comprehensive methodology and guidance for managing nuclear knowledge, including through nuclear knowledge management assistance visits and seminars in Member States;

3. Further commends the Secretariat for fostering nuclear knowledge management as a vital component of an integrated management system;

4. Encourages the Director General and the Secretariat to continue to strengthen their current and planned efforts in this area, in a holistic, interdepartmental manner, while consulting and engaging Member States and other relevant international organizations, and to further increase the level of awareness of efforts in managing nuclear knowledge, and in particular:

i. Requests the Secretariat to assist Member States, at their request, in their efforts to ensure the sustainability of nuclear education and training in all areas of the peaceful use of nuclear energy, including its regulation, inter alia by taking advantage of the activities of the regional networks in Asia (ANENT), Latin America (LANENT) and Africa (AFRA-NEST), and Eastern Europe and Central Asia (STAR-NET);

ii. Notes in particular the needs of developing countries or those considering or launching a nuclear power programme and in this regard, encourages Member States in a position to do so to participate in and support networking, and underlines the importance of the Technical Cooperation Programme in that context;

iii. Requests the Secretariat, in consultation with Member States, to further develop and disseminate guidance and methodologies for planning, designing, implementing and evaluating nuclear power programmes, including programmes for sustaining nuclear knowledge;

iv. Requests the Secretariat to continue to make available to Member States training programmes of the NEM School and the NKM School at the ICTP in Trieste, and on a regional basis;

v. Requests the Secretariat to review the broad range of education and training programmes established by the Department of Nuclear Energy and other departments of the Secretariat, as appropriate, in order to develop the most cost-effective and sustainable combination of events to maximize effectiveness and minimize unnecessary duplication among Agency offerings;

vi. Requests the Secretariat to further develop and utilize e-learning material, relevant content and technologies to make nuclear education and knowledge more broadly available in a modern, effective and efficient manner, including the further development and effective use of the IAEA's CLP4NET and CONNECT platforms as e-learning repositories; and

vii. Encourages the Secretariat to promote the use of state of the art knowledge management technologies, including those related to the application of modern plant information models and guidelines to support knowledge management, including design knowledge, throughout the entire life cycle of facilities and projects, and support interested Member States in their further development;

5. Requests the Secretariat to continue to gather, and make available to Member States, nuclear data, information and knowledge resources on the peaceful use of nuclear energy, including the International Nuclear Information System (INIS) and other valuable databases as well as the IAEA Library and the International Nuclear Library Network (INLN);

6. Calls on the Secretariat, to continue to focus, in particular, on activities aimed at helping interested Member States assess their human resource needs and to identify ways to address those needs, inter alia by encouraging the development of new tools and opportunities to gain practical experience through fellowships;

7. Invites the Secretariat, in consultation with Member States, to further develop and disseminate guidance and methodologies for planning, designing, implementing, and evaluating nuclear knowledge management programmes and practices;

8. Acknowledges the achievements of the Third International Conference on Nuclear Knowledge Management — Challenges and Approaches, held in November 2016, in promoting the sharing of experience and solutions between operating and newcomer countries, looks forward to the Fourth International Conference on Nuclear Knowledge Management to be held in 2020, and requests that the Secretariat continue to develop tools and services in the area of human resources development with a particular focus on capacity building;

9. Requests the Secretariat to promote gender equality and diversity in the context of nuclear knowledge management activities and encourages Member States to establish an inclusive workforce within their nuclear industry, including ensuring equal access to education and training in nuclear knowledge management;

10. Encourages the Secretariat to continue to facilitate the establishment of effective human resource and knowledge management (HRKM) networks in developing countries, and where appropriate in collaboration with other United Nations organizations and with the support of existing such networks in developed countries;

11. Requests the Director General to take into account the continuing high level of interest of Member States in the range of issues associated with nuclear knowledge management when preparing and carrying out the Agency's programme; and

12. Requests the Director General to report on progress made in the implementation of this resolution to the Board of Governors and to the General Conference at its sixty-fourth (2020) session under an appropriate agenda item.