

# ENERGY FROM ATOM: PATHWAY TO ECONOMIC AND TECHNOLOGICAL DEVELOPMENT OF NIGERIA

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BY

**PROF. YUSUF AMINU AHMED** *FNIP, FNATE*  
**CHAIRMAN/CEO, NIGERIA ATOMIC ENERGY COMMISSION**  
IAEA NATIONAL LIAISON OFFICER FOR NIGERIA  
AFRA AND CTBTO NATIONAL COORDINATOR FOR NIGERIA

## INTRODUCTION

There are diverse applications of Atomic Energy in Nigeria in the fields of industry, medicine, agriculture, environment, water resources and research. The petroleum industry is the largest importer and user of radioactive sources in the country. These practices include nuclear well-logging, industrial radiography, nuclear gauging, radio-tracing, etc.

The Nigeria Atomic Energy Commission (NAEC) which was established by Act No. 46 of 1976 and activated in 2006 is the national focal agency for the development and promotion of peaceful uses of atomic energy and Nigeria's National Liaison Office for the International Atomic Energy Agency (IAEA). In this regard, the Commission coordinates Nigeria's participation in IAEA's National, Regional, and International Projects. The Commission has been saddled with the mandate of constructing critical national infrastructure in all the six geopolitical zones of the country to satisfy the dire need for nuclear energy research and development.

**The Nigeria's Country Programme Framework (CPF) developed by the Nigeria Atomic Energy Commission in collaboration with key stakeholders serves as the frame of reference for use of atomic energy for economic and technological development of Nigeria through technical cooperation with IAEA during the period 2024-2029 cycle.** The CPF reflects an agreement on areas where the deployment of nuclear science and technology applications would contribute directly and cost-effectively to national development through technical cooperation activities. These activities are expected to reflect the national development plan, country specific analyses and lessons learned from previous cooperation and also take into consideration the United Nations Sustainable Development Cooperation Framework (UNSDCF) as well as alignment with specific development targets of government that are tailored towards the attainment of Sustainable Development Goals (SDGs) of the country.

This CPF is an outcome of series of engagements and active involvement of appropriate national authorities and relevant stakeholders at both policy and operational levels including UN organizations and other bilateral donors. The proposed technical cooperation programme under the CPF aims to strengthen and increase the national infrastructure and capabilities for

- Improving nuclear and radiation safety and nuclear security in Nigeria, including radioactive waste management
- Improving and expanding radiation technology for industrial, environmental, and medical applications
- Preventing and controlling plant and animal diseases
- Improving crop and livestock production as well as best practices in food handling chain
- Producing crops that are resistant to abiotic stress and adapt to different climatic conditions.

- Providing quality radiotherapy for better oncology care in public health sector
- Monitoring, assessing and managing groundwater pollution and environmental pollution.
- Management of water resources through nuclear technology
- Embarking on a Nuclear Power Plant (NPP) and Multi-Purpose Nuclear Research Reactor (MPRR) development.

The CPF is aligned with and contributes to relevant sectoral, national, and international development strategies including

- i. National Development Plan (2021-2025),
- ii. National Agricultural Technology and Innovation Policy (NATIP, 2022-2027),
- iii. National Health Policy (2016),
- iv. Economic Recovery and Growth Plan (ERGP),
- v. National Economic Empowerment Development Strategy (NEEDS),
- vi. National Energy Policy (reviewed 2021),
- vii. UNSDCF, etc.

The focus of the 2024-2029 cooperation programme cycle is on six proposed thematic areas which are:

- Nuclear and Radiation Safety and Nuclear Security,
- Food and Agriculture,
- Health and Nutrition,
- Water Resources and Environment,
- Manufacturing and Industry and
- Energy Planning and Development.

These selected thematic areas are within the scope of the nine Sustainable Development Goals (SDGs 2,3,6,7,9,13,14,15 and 17) where the application of nuclear science and technology could be used to facilitate national development agenda with the assistance of the international partners like the IAEA.

The structure of Nigeria's economy remains highly import dependent, consumption driven and undiversified. Oil accounts for more than 95 percent of exports and foreign exchange earnings while the manufacturing sector accounts for less than one percent of total exports. Key sectors such as agriculture have continued to remain largely subsistence and have failed to keep up with rapid population growth. Crude oil, natural gas and their products thus continue to provide up to 20% of gross domestic product (GDP).

Although, the country has rich vegetation and abundant water resources capable of supporting a large population of livestock; about 79 million hectares of arable land, 214 billion m<sup>3</sup> of surface water and 87 billion m<sup>3</sup> groundwater both of which can partly be used for irrigation (AQUASTAT-FAO). Despite this endowment of large natural resource, total cultivable area is estimated at 61 million hectares, which is 66 percent of the total area of the country. The cultivated area was 33 million hectares, of which arable land covered 30.2 million hectares and permanent crops 2.8 million hectares. Irrigation potential estimates in Nigeria vary from 1.5 to 3.2 million hectares. The latest irrigation estimate gives a total of about 2.1 million hectares of land, of which about 1.6 million hectares is from surface water and 0.5 million hectares from groundwater. Thus, the country must do more to make effective and efficient use of water resources and environment.

Being aware of the country's numerous challenges amid a wealth of human and material resources, successive administrations have come up with several economic intervention strategies and development plans to address these daunting challenges facing the country. These development plans include: The National Economic Empowerment Development Strategy (NEEDS), State Economic Empowerment Development Strategy (SEEDS), New Economic Partnership for African Development (NEPAD), Nigeria Vision 20-2020 (NV: 20-2020), Nigeria Industrial Revolution Plan (NIRP), Economic Recovery and Growth Plan (ERGP), SDGs among others. The SDGs are global developmental objectives designed to further consolidate on the gains of the Millennium Development Goals (MDGs).

## **GENERAL SITUATION ANALYSIS**

### **Nuclear and Radiation Safety and Nuclear Security**

- The national regulatory infrastructure and capacities for nuclear and radiation safety and nuclear security have been improved including the safe and secure management of radioactive waste.

### **Food and Agriculture**

- The deployment of Sterile Insect Technique (SIT) in the eradication of tsetse fly leading to improved livestock production and reduction in the use of insecticides.
- Use of nuclear technique for irradiation of agricultural products.
- Improvement of food and livestock production.

### **Health and Nutrition**

- Establishment of several programmes and activities in the area of cancer prevention, diagnosis and treatment in several tertiary health institutions across the country.
- Enhancing capacity for nuclear medicine, radiotherapy and radio diagnostics.

### **Water Resources and Environment**

- Developed national capacity for assessment and management of water resources through nuclear technology and successfully integrated isotope hydrology techniques in the water resources management plan of Nigeria
- Nuclear Technology for Controlling Plastic Pollution (NUTEC Plastics) control

### **Energy and Industry**

- Non-Destructive Testing applications
- Improving the infrastructure and capacity for nuclear power for clean energy

The CPF has been drafted based on a thorough review of relevant sectoral, national, and international strategies and policies. The implementation of the programme would be co-funded by the Federal Government of Nigeria and the IAEA. Adequate support is assured through national counterpart funding by the Federal Government of Nigeria. In addition, it will be implemented through the cooperation of several national stakeholder institutions to ensure continuity and sustainability.

## **CONTRIBUTIONS TO ECONOMIC AND TECHNOLOGICAL DEVELOPEMENT**

### **Nuclear Energy**

In this regard, further areas of support in the broader scope of the national nuclear energy programmes which currently focus on NPP and research reactor projects include:

- i. Strengthening national capabilities for response to nuclear and radiological emergencies.
- ii. Strengthening national capacity for nuclear security, including physical protection of nuclear installations and nuclear materials, prevention of illicit trafficking in radioactive materials.
- iii. Improving National Radioactive Waste Management infrastructure.
- iv. Increasing capacity for radiation monitoring of individual and the environment
- v. Enhancing capacity for the regulation of NPP siting, design, commissioning, operations, and decommissioning activities.
- vi. Building capacity for the regulation of MPRR siting, design, commissioning, operations, and decommissioning activities.
- vii. Building capacity for the regulation of Small Modular Reactor (SMR) siting, design, commissioning, operations, and decommissioning activities
- viii. Building capacity for the regulation of E-beam/X-ray technology siting, design, commissioning, operations, and decommissioning activities.
- ix. Enhancing radiation dosimetry methods, radiation protection and radiation safety in medical and environmental applications.
- x. Upgrading the accelerator facility at the Centre for Energy Research and Development.

## **Food and Agriculture**

In this regard, further areas of support and comparative advantage to support national efforts in achieving agriculture and food security include:

- i. Developing capacity for climate-smart agriculture in line with the Nigeria Agriculture Resilience Framework (NARF).
- ii. Enhancing capacity for mobile laboratory testing in primary agricultural production; safety monitoring along the supply chain and enhancing dietary exposure assessment of chemicals in food using Total Diet Study (TDS) approach to risk assessment.
- iii. Enhancing capacity for the integrated management of vector carrying insects in Nigeria using different control approaches (including SIT).
- iv. Enhancing capacity for post-harvest treatment of agricultural produce for export trade (which includes, among others, cold & hot water treatments and ionizing irradiation depending on the produce and expected port of import).
- v. Enhancing capacity for veterinary laboratory diagnosis and testing, vaccine research and development, biosafety/biosecurity.
- vi. Capacity building in biotechnology, bioinformatics and assisted livestock reproduction.
- vii. Procurement of laboratory equipment in food safety analysis.
- viii. Area Wide Integrated Control of fruit flies using SIT
- ix. Genetic improvement programme for fruits and vegetables using nuclear science and technology

## **Health and Nutrition**

In this regard, further areas of assistance and comparative advantage to support national efforts in health and nutrition include:

- i. Enhancing national capacity to train more medical professionals for the sustainability of the nuclear medicine and radiotherapy projects
- ii. Enhancement of national capacity for Applied Radiation Biology and Radiotherapy facilities
- iii. Establishment of a standard radio-pharmacy facility for radiopharmaceutical cold kits production
- iv. Upgrading of the Oncology Nursing and Palliative Care.
- v. Diagnosis of Epidemic Prone Diseases and Management of Communicable Diseases
- vi. Production of Radiation Sterilized Tissue Grafts
- vii. Establishment of Nutritional Intervention Programme
- viii. Development of cancer screening programme across the country
- ix. Addressing the challenges of poor breastfeeding practices for better nutrition and health through the use of stable isotopes
- x. Development of Micronutrients Database of Vegetable-based foods
- xi. Improving the infrastructure and human resources capabilities for nuclear medicine-based diagnoses and treatment of cancer patients
- xii. Upgrading of facilities for External Beam Radiotherapy, brachytherapy and nuclear medicine equipment.

The National Radiotherapy and Nuclear Medicine programmes which are aimed at early detection and management of cancer, among other range of healthcare challenges are to be mostly domiciled in the tertiary healthcare centres established by the Federal Government of Nigeria. A network of laboratories which support the National Reference Laboratory of the Nigeria Centre for Disease Control (NCDC) are also located in these centres. Furthermore, other national stakeholder organizations involved in specific areas of health and nutrition include: FMH, NCDC, NAFDAC, NAEC and its NNIs, NNRA and FMARD.

## **Water Resources and Environment**

In this regard, further areas of assistance and comparative advantage to support national efforts in water resources and environment include:

- i. Capacity building in the acquisition and interpretation of water resources data for sustainable development and management.

- ii. Capacity building for operational, managerial and safety of water resources and infrastructure development
- iii. Development of a Pilot Repository for proper storage of radioactive materials. This can be upscaled or replicated through private sector involvement.
- iv. Piloting nuclear techniques for hazardous waste contaminated site vectorization and characterisation and mitigation strategy.
- v. Climatological investigation related to climate change and global warming.
- vi. Operationalization of Isotope Ratio Mass Spectrometer (IRMS) and Laser Spectroscopic Isotope Water Analyzer (LSIWA) to sustain the momentum of isotope application in Nigeria
- vii. Enhanced capacity in the operation and management of IRMS and LSIWA)
- viii. Capacity building in groundwater salinization in coastal and inland basins as well as dams, reservoir safety, risks assessment and management in Nigeria

## **Energy Planning and Development**

In this regard, further areas of assistance and comparative advantage to support national efforts in achieving the objectives of this thematic area include:

- i. NPP project coordination and implementation
- ii. MPRR project coordination and implementation
- iii. Capacity development for project management of nuclear facilities
- iv. Synergize with the academia for skilled technologists/technicians/craftsmen for project management of nuclear facilities
- v. Competency enhancement in documentation of licensing procedures for nuclear facilities
- vi. Nuclear knowledge management for NPP and MPRR operations
- vii. Capacity development for NPP and MPRR procurement activities
- viii. Developing competencies for legal personnel
- ix. Developing skills for effective public awareness/acceptance strategy implementation
- x. Provision of technical support on best practises and relevant legal instruments in policy planning and formulation.
- xi. Establishment of National Energy Databank (NED)
- xii. Capacity development in SMR deployment.

## Annex 1: Partnership Matrix

Thematic Area	Outcome in National Plan or Sector Strategy	CPF Outcomes	Links with SDGs	Links with UNSDPF Outcomes	Relevant Partners
<b>Nuclear and Radiation safety and Nuclear Security</b>	i. Finalize Requisite regulations for the design, commissioning, operation, maintenance and decommissioning of NPP	i. Strengthened national infrastructure for radiation protection, nuclear safety, nuclear security and safeguards by 2029 ii. Strengthened national infrastructure for Emergency planning by 2028 iii. Strengthened national infrastructure for Radioactive waste management by 2029	SDG 3	UNSDPF Result Area 2 & 3	NAEC, NNRA and their NNIs, MPR, NEMA, FMH, FMEnv-NESREA, ONSA, FMJ, NCDC and NGSA.
<b>Food and Agriculture</b>	<b>ERGP Outcome:</b> i. <i>Achieving Agriculture Transformation and Food Security.</i> Thus, by 2020, Nigeria is projected to become a net exporter of key agricultural products, such as rice, cashew nuts, groundnuts, cassava and vegetable oil. ii. <i>National Development Plan (2021-2025)</i> - significant increase in Nigeria's agricultural productivity through massive public and private investments in technology, innovation, and adoption of climate-smart practices. iii. <i>National Agricultural Technology and Innovation Policy (NATIP, 2022-2027)</i> - unlock the country's untapped potentials through the massive deployment of 21st - century knowledge, technology, and innovation in the agricultural sector to make Nigeria food and nutrition secure.	i. Enhanced capacity for advanced crop & livestock production, disease and pest control and post-harvest storage and treatment to meet domestic and international food safety and nutrition requirements. ii. Enhanced capacity for assessment of chemicals in food through laboratory testing and safety monitoring along the supply chain.	SDG 2, SDG 3	UNSDCF (2023-2027) Outcome 1.1 and 2.1	FMARD, FMWR, FMEnv, FMTI, ARCN, NAPRI, NAFDAC, NVRI, IAR, NRCRI, NIHORT, FMST, NNRA, NEMA and NAEC.
<b>Health and Nutrition</b>	<b>Health policy:</b> <i>Improve the availability, accessibility, affordability and quality of health services</i> <b>ERGP objective:</b> <i>increasing access to primary health care services, expanding health coverage and improving the quality of the services provided</i> <b>National Policy on Food and Nutrition (NPFN):</b>	i. Enhanced national capacity for the sustainability of nuclear medicine and radiotherapy practices and for diagnosing epidemic-prone and other communicable diseases	SDG 2, SDG 3	UNSDCF (2023-2027) Outcome 2.1 and 3.1	FMH, NCDC, NAFDAC, NAEC and its NNIs, NNRA and FMARD.

Thematic Area	Outcome in National Plan or Sector Strategy	CPF Outcomes	Links with SDGs	Links with UNSDPF Outcomes	Relevant Partners
	Attain holistic improvement in the nutrition situation of Nigeria	ii. Improve the existing Nutritional Intervention Programme			
<b>Water and the Environment</b>	i. Improve access to quality water supply and sanitation ii. Safeguard human and environmental well-being, in line with global best practices. iii. <i>National Water Resources Policy 2016</i> - facilitate and enhance sustainable access to safe and sufficient water to meet the cultural and socioeconomic needs of all Nigerians in a way that will enhance public health, food security and poverty reduction, while maintaining the integrity of freshwater ecosystems of the nation	i. Improve capacity in hydrological and hydrogeological characterization of major aquifer systems/basins by 2026 ii. Development of capacity for National Environmental Radiological Assessment by 2029	SDG 6 SDG 13 SDG 14 SDG 15	UNSDCF (2023-2027) Outcome 2.2 and 3.3	NIHSA, FMWR, NIWRMC, NWRI, NAEC, NESREA, NNRA, FMEnv
<b>Energy Planning and Development</b>	<b>ERGP Outcome:</b> i. <i>Restoration of Growth</i> Achieving structural economic change and having a more diversified and inclusive economy	i. Building national capacity for optimal and synergized management of NPP construction ii. Building national capacity for MPRR infrastructure iii. Strengthened capacity for research, nuclear instrumentation, Repairs and Maintenances of Equipment and Devices in Nuclear Application in NNIs/other national technical support organizations.	SDG 2, SDG 3 SDG 7, SDG 9	UNSDCF (2023-2027) Outcome 1.1	NAEC and its NNIs, ECN, NNRA, FMWR, FMST, FMARD, FMEnv, TCN, FMPW&H, FMT and NESREA.

## Annex 2: List of Participating Institutions

<b>S/N</b>	<b>INSTITUTIONS</b>	<b>ROLES</b>
1	Nigeria Atomic Energy Commission (NAEC)	Nuclear Science and Technology Promotion, Application and National Coordination
2	Nigerian Nuclear Regulatory Authority (NNRA)	Nuclear and Radiation Regulation
3	Ministry of Petroleum Resources (MPR)	Use of Radioactive sources
4	Federal Ministry of Environment (FMEnv)	Environmental Regulations
5	Federal Ministry of Health (FMH)	Nuclear Medicine and Radiotherapy
6	Federal Ministry of Justice (FMJ)	Legal
7	National Assembly	Legislative Framework
8	National Emergency Management Agency (NEMA)	Radiological Emergency
9	National Environmental Standards and Regulation Enforcement Agency (NESREA)	Environmental Regulations
10	National Centre for Disease Control (NCDC)	Diseases Surveillance and Control
11	Nigerian Geological Survey Agency (NGSA)	Exploration, Mining & Radioactive Waste Management
12	Office of the National Security Adviser (ONSA)	Nuclear security
13	Federal Ministry of Agriculture and Rural Development (FMARD)	Sectorial Nuclear Applications Coordination
14	Federal Ministry of Water Resources (FMWR)	Sectorial Nuclear Applications Coordination
15	Agricultural Research Council of Nigeria (ARCN)	Nuclear Applications
16	National Animal Production Research Institute NAPRI -	Nuclear Applications
17	National Agency for Food and Drug Administration and Control (NAFDAC)	Nuclear Applications
18	National Veterinary Research Institute (NVRI)	Nuclear Applications
19	National Horticulture Research Institute (NIHORT)	Nuclear Applications
20	Institute for Agricultural Research (IAR)	Nuclear Applications
21	National Root Crops Research Institute (NRCRI)	Nuclear Applications
22	Federal Ministry of Science and Technology (FMST)	Sectorial Nuclear Applications Coordination
23	Nigeria Hydrological Services Agency (NIHSA)	Nuclear Applications
24	National Water Resources Institute (NWRI)	Nuclear Applications
25	Nigeria Integrated Water Resources Management Commission (NIWRMC)	Nuclear Applications
26	Federal Ministry of Power, Works and Housing (FMPW&H)	Stakeholder in Nuclear Power Programme
27	Federal Ministry of Transport (FMT)	Stakeholder in Nuclear Power Programme
28	Energy Commission of Nigeria (ECN)	Energy Planning
29	Transmission Company of Nigeria (TCN)	Stakeholder in Nuclear Power Programme



## Annex 3: Treaties Adopted

### Multilateral Agreements

	Title	In Force	Status
<u>P&amp;I</u>	Agreement on the Privileges and Immunities of the IAEA	2007-04-04	acceptance: 2007-04-04
<u>CPPNM</u>	Convention on the Physical Protection of Nuclear Material	2007-05-04	accession: 2007-04-04
<u>VC</u>	Vienna Convention on Civil Liability for Nuclear Damage	2007-07-04	accession: 2007-04-04
<u>NOT</u>	Convention on Early Notification of a Nuclear Accident	1990-09-10	Signature: 1987-01-21 ratification: 1990-08-10
<u>ASSIST</u>	Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency	1990-09-10	Signature: 1987-01-21 ratification: 1990-08-10
<u>NS</u>	Convention on Nuclear Safety	2007-07-03	Signature: 1994-09-21 ratification: 2007-04-04
<u>VC/OP</u>	Optional Protocol Concerning the Compulsory Settlement of Disputes		Non-Party
<u>JP</u>	Joint Protocol Relating to the Application of the Vienna Convention and the Paris Convention		Non-Party
<u>RADW</u>	Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management	2007-07-03	accession: 2007-04-04
<u>PVC</u>	Protocol to Amend the Vienna Convention on Civil Liability for Nuclear Damage		Non-Party
<u>SUPP</u>	Convention on Supplementary Compensation for Nuclear Damage		Non-Party
<u>CPPNME</u>	Amendment to the Convention on the Physical Protection of Nuclear Material		ratification: 2007-05-04
<u>AFRA</u>	African Regional Co-operative Agreement for Research, Development and Training Related to Nuclear Science and Technology (AFRA) - Fourth Extension	2024	Revised Agreement Ratification 2024-05-25

### Safeguards Agreements

Reg.No	Title	In Force	Status
1541	Application of safeguards in connection with the Treaty on Non-Proliferation of Nuclear Weapons (with Protocol)	1988-02-29	Signature: 1988-02-29
1818-0	Protocol Additional to the Agreement between the Federal Republic of Nigeria and the International Atomic Energy Agency for the Application of Safeguards in connection with the Treaty on the Non-Proliferation of Nuclear Weapons	2007-04-04	Signature: 2001-09-20

## Annex 4: TC Projects

- Nigeria joined the IAEA TC programme in 1964.
- 99 national TC projects have been concluded under the auspices of the TC programme.

<b>Thematic area</b>	<b>Results of past technical cooperation</b>	<b>Key counterpart institutes and partners</b>
Nuclear and radiation safety and nuclear security	<ul style="list-style-type: none"> <li>• The national regulatory infrastructure and capacities for nuclear and radiation safety and nuclear security have been improved including the safe and secure management of radioactive waste.</li> </ul>	NAEC, NNRA and their NNIs, MPR, NEMA, FMH, FMEnv-NESREA, ONSA, FMJ, NCDC and NGSA
Food and agriculture	<ul style="list-style-type: none"> <li>• The deployment of SIT in the eradication of tsetse fly leading to improved livestock production and reduction in the use of insecticides.</li> <li>• Use of nuclear technique for irradiation of agricultural products.</li> <li>• Improvement of food and livestock production.</li> </ul>	NAEC, FMARD, FMWR, FMEnv, FMTI, ARCN, NAPRI, NAFDAC, NVRI, IAR, NRCRI, NIHORT, FMST, NEMA
Health and nutrition	<ul style="list-style-type: none"> <li>• Establishment of several programmes and activities in the area of cancer prevention, diagnosis and treatment in several tertiary health institutions across the country.</li> <li>• Enhancing capacity for nuclear medicine, radiotherapy and radio diagnostics.</li> </ul>	NAEC, FMOH, NCDC, NAFDAC, NNRA and FMARD
Water resources and environment	<ul style="list-style-type: none"> <li>• Developed national capacity for assessment and management of water resources through nuclear technology and successfully integrated isotope hydrology techniques in the water resources management plan of Nigeria</li> <li>• NUTEC Plastics control</li> </ul>	NAEC, NIHSA, FMWR, NIWRMC, NWRI, RBDAs, LCBC, OSS
Energy planning and development	<ul style="list-style-type: none"> <li>• Non-Destructive Testing applications</li> <li>• Improving the infrastructure and capacity for nuclear power for clean energy</li> </ul>	NNRA, NAEC and its NNIs, ECN, NNRA, FMWR, FMST, FMARD, FMEnv, TCN, FMP, FMT and NESREA.

## ACTIVE NATIONAL PROJECTS (TOTAL OF 17)

<b>Project Number</b>	<b>Project Title</b>	<b>1<sup>st</sup> Year of Approval</b>	<b>Field of activity</b>	<b>Status</b>
NIR0010	Strengthening National Capacity for Nuclear Instrumentation, Repairs and Maintenance	2018	01	Active
NIR1013	Building National Nuclear Infrastructure and Regulatory Capacity for Multipurpose Research Reactor Siting, Design and Construction, Commissioning, Operations and Decommissioning	2020	08	Active
NIR1014	Enhancing National Capacity for Multipurpose Research Reactor Infrastructure, Development and Regulation	2022	08	Active
NIR2009	Building National Capacities for Optimal and Synergized Management of the Nuclear Power Plant Construction Stage	2020	05	Active
NIR2010	Enhancing National Capacity for Optimal and Synergized Participation and Management in Nuclear Power Plant Construction Stage	2022	05	Active
NIR5039	Enhancing Dietary Exposure Assessment of Chemicals in Food	2016	24	Active
NIR5040	Controlling Parasitic and Transboundary Animal Diseases to Improve Animal Productivity in Smallholder Farms Using Nuclear and Molecular Techniques	2016	22	Active
NIR5041	Improving Livestock Productivity through Enhanced Nutrition and Reproduction Using Nuclear and Molecular Techniques	2020	22	Active
NIR6022	Expanding Nuclear Medicine Services	2009	6B	Active
NIR6026	Planning and Establishing a National Post-Graduate Programme in Nuclear Medicine	2016	27	Active
NIR6027	Strengthening the National Framework for Post-Graduate and Clinical Training in Radiotherapy	2018	26	Active
NIR6028	Strengthening National Capacity for Effective and Sustainable Cancer Management	2020	26	Active
NIR6029	Consolidating Three-Dimensional Conformal Radiation Therapy Cancer Screening and Treatment and Advancing New Treatment Techniques in Radiotherapy Centres	2022	26	Active
NIR7004	Designing and Developing a National Ambient Air Quality Monitoring Network for Potential Mega Cities	2016	17	Active
NIR9013	Developing Safety Infrastructure for Regulating Non-Power Nuclear and Radiation Applications	2020	09	Active
NIR9014	Strengthening and Sustaining National Capabilities for Environmental Radiological Monitoring	2022	12	Active

## ACTIVE REGIONAL AND INTERREGIONAL PROJECTS (Total of 65)

### a) Regional

Project Number	Project Title	1st Year of Approval	Field of activity Status	
RAF0042	Promoting the Sustainability and Networking of National Nuclear Institutions for Development	2014	01	Active
RAF0052	Supporting Human Resource Development in Nuclear Science and Technology (AFRA)	2018	01	Active
RAF0054	Supporting Programme Development and Review Including Pre-Project Assistance	2020	01	Active
RAF0058	Enhancing the Management and Ownership of the Programme (AFRA)	2020	01	Active
RAF0059	Supporting the Establishment of the Nuclear Education Science and Technology Network (AFRA)	2020	01	Active
RAF0061	Establishing and Enhancing National Legal Frameworks (AFRA)	2022	03	Active
RAF1007	Strengthening the Capacities of Research Reactors for Safety and Utilization (AFRA)	2018	08	Active
RAF1008	Supporting Radiation Technologies in Industrial Applications and Preventive Maintenance of Nuclear and Medical Equipment (AFRA)	2018	18	Active
RAF1010	Reutilizing and Recycling Polymeric Waste Through Radiation Modification for the Production of Industrial Goods (AFRA)	2022	18	Active
RAF1011	Strengthening Research Reactor Safety, Operation, and Utilization (AFRA)	2022	08	Active
RAF2012	Enhancing Regional Capabilities for a Sustainable Uranium Mining Industry	2018	07	Active
RAF2013	Developing, Expanding, and Reinforcing Energy Planning Capabilities — Phase II (AFRA)	2022	04	Active
RAF2014	Enhancing Regional Capabilities for Sustainable Uranium Exploration and Mining (AFRA)	2022	07	Active
RAF5061	Supporting Capacity Building and a Feasibility Study on Control of Fruit Flies of Economic Significance in West Africa	2012	23	Closure In Progress
RAF5066	Improving Crops Using Mutation Induction and Biotechnology through a Farmer Participation Approach (AFRA)	2012	20	Active
RAF5073	Strengthening Africa's Regional Capacity for Diagnosis of Emerging or Re-emerging Zoonotic Diseases, including Ebola Virus Disease (EVD), and Establishing Early Warning Systems.	2015	22	Active
RAF5074	Enhancing Capacity for Detection, Surveillance and Suppression of Exotic and Established Fruit Fly Species through Integration of Sterile Insect Technique with Other Suppression Methods	2016	23	Active
RAF5077	Supporting Area-Wide Tsetse and Trypanosomosis Management to improve Livestock Productivity, Phase III	2016	23	Closure In Progress

<b>Project Number</b>	<b>Project Title</b>	<b>1st Year of Approval</b>	<b>Field of activity Status</b>	
RAF5078	Establishing a Food Safety Network through the Application of Nuclear and Related Technologies, Phase II (AFRA)	2016	24	Active
RAF5079	Enhancing Crop Nutrition and Soil and Water Management and Technology Transfer in Irrigated Systems for increased Food Production and Income Generation (AFRA)	2018	21	Active
RAF5080	Supporting Area-Wide Tsetse and Trypanosomosis Management to Improve Livestock Productivity - Phase IV	2018	23	Active
RAF5081	Enhancing Productivity and Climate Resilience in Cassava-Based Systems through Improved Nutrient, Water and Soil Management (AFRA)	2020	21	Active
RAF5084	Strengthening Food Contaminant Monitoring and Control Systems and Enhancing Competitiveness of Agricultural Exports using Nuclear and Isotopic Techniques (AFRA)	2020	24	Active
RAF5086	Promoting Sustainable Agriculture under Changing Climatic Conditions Using Nuclear Technology (AFRA)	2022	21	Active
RAF5087	Enhancing Regional Capacity for the Implementation of the Sterile Insect Technique as a Component for Area-Wide Tsetse and Trypanosomosis Management (AFRA)	2022	23	Active
RAF5088	Building Capacity for Food Irradiation by Facilitating the Commercial Application of Irradiation Technologies — Phase II (AFRA)	2022	24	Active
RAF5090	Supporting Climate Change Adaptation for Communities Through Integrated Soil–Cropping–Livestock Production Systems (AFRA)	2022	22	Active
RAF6049	Strengthening and Improving Radiopharmacy Services (AFRA)	2014	28	Active
RAF6051	Strengthening Education and Human Resources Development for Expansion and Sustainability of Nuclear Medicine Services in Africa (AFRA)	2016	27	Active
RAF6053	Enhancing Capacity Building of Medical Physicists to Improve Safety and Effectiveness of Medical Imaging (AFRA)	2018	29	Active
RAF6054	Strengthening and Improving Radiopharmacy Services (AFRA)	2018	28	Active
RAF6055	Improving the Quality of Radiotherapy in the Treatment of Frequently Occurring Cancers (AFRA)	2020	26	Active
RAF6056	Supporting Human Resources Development in Radiation Medicine (AFRA)	2020	26	Active
RAF6057	Strengthening the Quality of Nuclear Medicine Services (AFRA)	2020	27	Active
RAF6058	Strengthening the Capacities for Radiopharmacy and Medical Physics and Radiology for Expansion and Sustainability of Medical Imaging Services — Phase II (AFRA)	2022	29	Active

<b>Project Number</b>	<b>Project Title</b>	<b>1st Year of Approval</b>	<b>Field of activity Status</b>	
RAF6059	Building Capacity to Use Stable Isotope Techniques to Improve Micronutrient Status Among Children (AFRA)	2022	30	Active
RAF7014	Applying Nuclear Analytical Techniques to Support Harmful Algal Bloom Management in the Context of Climate and Environmental Change, Phase II	2016	17	Active
RAF7015	Strengthening Regional Capacities for Marine Risk Assessment Using Nuclear and Related Techniques	2016	17	Active
RAF7016	Establishing and Improving Air Pollution Monitoring	2016	17	Active
RAF7017	Promoting Technical Cooperation among Radio-Analytical Laboratories for the Measurement of Environmental Radioactivity	2016	17	Active
RAF7018	Applying Radiation technologies to Assess Sediment Transport for the Management of Coastal Infrastructures	2016	17	Active
RAF7019	Adding the Groundwater Dimension to the Understanding and Management of Shared Water Resources in the Sahel Region	2018	15	Active
RAF7021	Enhancing, Planning, Management and Sustainable Utilization of Water Resources (AFRA)	2022	15	Active
RAF9049	Enhancing and Sustaining the National Regulatory Bodies for Safety (AFRA)	2014	09	Active
RAF9056	Strengthening Education and Training in Radiation Safety and Sustaining Human Resources Development and Nuclear Knowledge Management (AFRA)	2016	09	Active
RAF9058	Improving the Regulatory Framework for the Control of Radiation Sources in Member States	2016	09	Active
RAF9061	Enhancing the Capacities of National Regulatory Bodies for Safety in AFRA Member States (AFRA)	2018	09	Active
RAF9062	Strengthening Radioactive Waste Management (AFRA)	2018	19	Active
RAF9063	Strengthening Competent Authorities for the Safe Transport of Radioactive Material (AFRA)	2020	13	Active
RAF9064	Improving the Capabilities of States in Radiation Protection of Patients (AFRA)	2020	12	Active
RAF9065	Establishing Regulatory Infrastructure for Control of Radiation Sources (AFRA)	2020	09	Active
RAF9066	Strengthening Regional Infrastructures for Effective Preparedness and Response to Radiological Emergencies (AFRA)	2020	16	Active
RAF9067	Sustaining the Establishment of Education and Training in Radiation Safety and Human Resource Development — Phase II (AFRA)	2020	09	Active
RAF9068	Enhancing Regional Capabilities on Occupational Radiation Protection (AFRA)	2020	12	Active
RAF9069	Strengthening the Implementation of Basic Safety Standards and Radioactive Waste Management — Phase II (AFRA)	2022	19	Active



## b) Inter-regional Projects

<b>Project Number</b>	<b>Project Title</b>	<b>1st Year of Approval</b>	<b>Field</b>	<b>Status</b>
INT0096	Establishing and Enhancing National Legal Frameworks for the Safe, Secure and Peaceful Use of Nuclear Energy and Ionizing Radiation	2018	03	Active
INT2018	Supporting Knowledgeable Decision-making and Building Capacities to Start and Implement Nuclear Power Programmes	2016	05	Active
INT2021	Supporting Member States Considering or Planning to Introduce or Expand Nuclear Power Programmes in Developing the Sustainable National Infrastructure Required for a Safe, Secure and Peaceful Nuclear Power Programme	2020	05	Active
INT2022	Supporting Capacity Building in Member States for Uranium Production and Safety of Naturally Occurring Radioactive Material Residue Management	2020	07	Active
INT2023	Supporting Member States' Capacity Building on SMRs and Micro-reactors and their Technology and Applications as a Contribution of Nuclear Power to the Mitigation of Climate Change	2022	06	Active
INT5155	Sharing Knowledge on the Sterile Insect and Related Techniques for the Integrated Area-Wide Management of Insect Pests and Human Disease Vectors	2016	23	Active
INT6062	Strengthening Capacity for Cervical Cancer Control through Improvement of Diagnosis and Treatment	2018	26	Active
INT6064	Supporting Member States to Increase Access to Affordable, Equitable, Effective and Sustainable Radiation Medicine Services within a Comprehensive Cancer Control System	2020	25	Active
INT7019	Supporting a Global Ocean Acidification Observing Network towards Increased Involvement of Developing States	2016	17	Active
INT9174	Connecting Networks for Enhanced Communication and Training	2012	19	Active
INT9182	Sustaining Cradle-to-Grave Control of Radioactive Sources	2016	19	Active
INT9186	Sustaining Cradle-to-Grave Control of Radioactive Sources - Phase II	2020	19	Active