

African Regional Cooperative Agreement for Research, Development and Training related to Nuclear Science and Technology

**Fostering Nuclear Science and Technology
for African Development**



AFRA



IAEA



AFRA

**AFRICAN REGIONAL COOPERATIVE
AGREEMENT FOR RESEARCH, DEVELOPMENT
AND TRAINING RELATED TO NUCLEAR SCIENCE
AND TECHNOLOGY**

**FOSTERING NUCLEAR SCIENCE AND TECHNOLOGY
FOR AFRICAN DEVELOPMENT**

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African Regional Cooperative Agreement for Research, Development and Training Related to Nuclear Science and Technology (AFRA) – Fifth Extension

Pursuant to Article XIV.2 of the original Agreement, the Fifth extension entered into force on 4 April 2015, upon expiration of the fourth extension, and will remain in force for an additional five years, i.e. through 3 April 2020.

State Parties to the Agreement: 30 (as of April 2017)

1. Algeria	16. Mauritius
2. Angola	17. Morocco
3. Botswana	18. Namibia
4. Burundi	19. Niger
5. Chad	20. Nigeria
6. Cote D'Ivoire	21. Senegal
7. Democratic Republic of Congo	22. Seychelles
8. Egypt	23. Sierra Leone
9. Ethiopia	24. South Africa
10. Ghana	25. Sudan
11. Kenya	26. Swaziland
12. Lesotho	27. Tunisia
13. Madagascar	28. Uganda
14. Mali	29. Zambia
15. Mauritania	30. Zimbabwe

Introduction

The African Regional Cooperative Agreement for Research, Development and Training related to Nuclear Science and Technology (AFRA) is an intergovernmental Agreement established by African Member States to further strengthen and enlarge the contribution of nuclear science and technology to socio-economic development on the African continent. The scope of AFRA activities covers a wide range of peaceful applications of nuclear techniques that contribute towards the achievement of national and regional development goals.

The AFRA Agreement is renewed by its Member States every five years for a term of five years. This renewal is achieved by notifying the Director General of the IAEA of the AFRA Member States' acceptance of the extension of the Agreement, and of their desire to continue participating in the Agreement.

The Fifth Extension of AFRA entered into force on 4 April 2015 through 3 April 2020. The Member States who accepted the Fifth Extension as of April 2017 are listed on the opposite table.

The International Atomic Energy Agency (IAEA) is not party to AFRA, but provides technical and scientific backstopping as well as financial and administrative support, in accordance with the IAEA's principles, rules and procedures applicable to the Agency's technical cooperation programme.

I. AFRA MANDATE

The AFRA Mandate is guided by the interests of AFRA Member States in terms of regional cooperation and based on their priority needs as described in the AFRA Agreement.

AFRA MANDATE

Through a regional approach to sustainable development, AFRA seeks to:

- Maximize the utilization of available infrastructure and expertise in Africa in the field of nuclear science and technology;
- Accelerate moves toward regional self-sufficiency in peaceful applications of nuclear techniques by establishing and strengthening necessary infrastructure, coordinating intellectual and physical resources and disseminating innovative methods and practices cost-efficiently; and
- Deepen the commitment of Member States to the application of nuclear science and technology for their socio-economic development through sustained funding.

II. AFRA VISION AND MISSION

The AFRA mission derives from the AFRA Agreement, which states that “...*the Governments Parties to this Agreement [...] recognize that, within their national atomic energy programmes, there exist areas of common interest wherein mutual cooperation can promote the more efficient utilization of available resources. [...] The Government Parties undertake [...] to promote and coordinate cooperative research, development and training projects in nuclear science and technology through their appropriate national institutions*”.

AFRA VISION

To be the leading regional organization in Africa and vehicle of the Member States for the effective promotion and coordination of peaceful applications of nuclear science and technology for socio-economic development on the African continent.

AFRA MISSION

“Based on the social context and the economic goals of its Member States, AFRA is to develop capacity, establish and facilitate, through regional cooperation, the use of infrastructure to exploit nuclear science and technology applications safely and cost effectively in order to meet the challenges of sustained communal socio-economic development on the African continent”

III. STRATEGIC GOALS

The AFRA goals are:

Goal 1: To enhance the sustainable contribution of nuclear science and technology to meet the developmental needs and interests of Member States;

Goal 2: To entrench the culture of mutual assistance and regional cooperation in the effective utilization of available nuclear expertise and infrastructure;

Goal 3: To deepen the culture of nuclear safety and security at regional and national levels in the gainful exploitation of nuclear science and technology;

Goal 4: To continuously interact with and create awareness amongst decision makers, civil society, users and the general public on the benefits of peaceful application of nuclear science and technology;

Goal 5: To institute good governance and excellence in management of the activities in the region.

IV. AFRA STRATEGY

The underlying strategic principles of AFRA enunciate the ways and means of achieving the set objectives of AFRA in the formulation, design, implementation, monitoring and evaluation of AFRA cooperative activities, with the emphasis on ownership:

- Underlining the central role of AFRA countries in the planning and management of regional cooperation undertakings;
- Use of thematic programmes rather than a project-by-project approach and improved planning in the context of coordinated support for regional priorities, objectives and policies;
- Emphasis on the use of available regional expertise and existing facilities for the planning, implementation and auditing of cooperative programmes;
- Gradual shifting of the managerial activities from the IAEA to the AFRA Programme Management Committee;
- Closer collaboration with partners in development from inside and/or outside the region;
- Consolidation of AFRA countries' institutional capacity to enable them to assume full ownership of activities and pursue them upon the programme's completion, as a key element of sustainability;
- Development and implementation of sound fund raising strategies in collaboration with major donors and continuous lobbying for AFRA activities that require extra-budgetary funding, including assistance to design and formulate sound project proposals;

- Priority attention to the Least Developed Countries (LDCs), including practical strategies to address their specific needs and overcome their difficulties;
- Promotion of the participation of women and youth in nuclear science and technology, through the design and implementation of specific activities and initiatives in collaboration with women and youth associations, and networking and sensitization of decision makers in Member States;
- Particular attention to the efficient management and preservation of nuclear knowledge, skill acquisition and retention and networking;
- Sustainable implementation of AFRA can only be achieved through ownership of the programme by Member States;
- Enhancement of success of AFRA project implementation by building appropriate linkages with development plans of Member States with statutory funding;
- Evolve an appropriate mechanism of adequate Member State participation in funding the activities of the AFRA programme;
- Assumption of greater management responsibilities by AFRA Member States;
- Particular attention to strengthen coordination and cooperation aimed at filling the relative gap in the nuclear science and technology infrastructure and knowledge between Member States.

V. AFRA CORE FUNCTIONS

AFRA will:

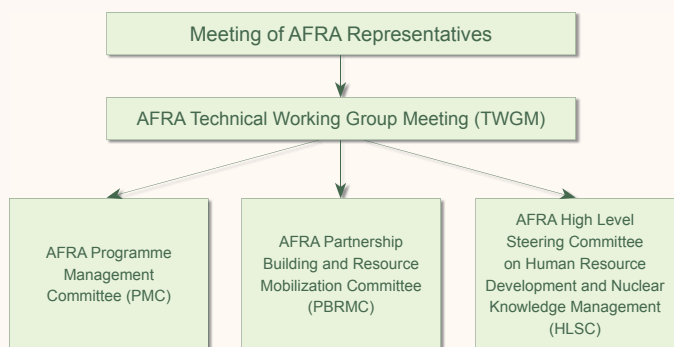
- Establish relevant institutional linkages and essential mechanisms for cooperation and coordination in the areas of training, nuclear science and technology, information and communication technologies (ICTs) and institutional sustainability, with a particular attention to the challenges facing the least developed countries (LDCs);
- Develop and implement appropriate systems for human resource development, nuclear knowledge management and preservation, and skills acquisition and retention;
- Harmonize regulations, practice and operational procedures, mechanisms for information management and exchange, and experience and best practice dissemination;
- Promote networking for the benefit of the African nuclear community and the involvement of youth and women in nuclear science and technology;
- Promote South-South cooperation among AFRA Member States, and between them and regional and international partners in fields of common interests and, where appropriate, to execute activities for regional partners such as the New Partnership for Africa's Development (NEPAD);
- Coordinate and streamline cooperation and assistance within the region for strengthening nuclear technology infrastructure in Member States with particular attention to the challenges facing the LDCs.

VI. AFRA MANAGEMENT

The decision making organ of AFRA is the Meeting of AFRA Representatives, composed of government officials who are authorized to commit their governments with respect to matters pertaining to the AFRA Agreement. The Meeting of AFRA Representatives convenes annually at the time of the General Conference of the IAEA.

The Technical Working Group, composed of AFRA National Coordinators meets at least once every year, normally in late July preceding the meeting of AFRA Representatives.

Following the decision made in November 2007 by the High Level Policy Review Seminar (HLPRS) to support the improvement of the managerial procedures of AFRA, to increase its effectiveness and efficiency and to promote full ownership of its programmes by AFRA Member States, the new management structure of AFRA includes three committees as described in the following organizational chart:



VII. AFRA REGIONAL STRATEGIC COOPERATIVE FRAMEWORK (2014–2018)

The AFRA Regional Strategic Cooperative Framework (RCF) is the principal planning tool for setting regional cooperation priorities and developing AFRA regional cooperative programmes. The present document, adopted by AFRA Member States in September 2012, covers the period 2014–2018. The RCF represents the frame of reference for the formulation of the AFRA regional programmes and is used as the main modality to strengthen the planning and programming of AFRA regional projects in the following thematic areas:

VII.1. Human health

AFRA interventions focus on areas where the application of nuclear technology is considered to make a unique contribution, such as cancer, nuclear medicine, communicable diseases and human nutrition.

In the area of cancer, AFRA's involvement will focus on enhancing human capacities in cancer therapy by establishing and harmonizing education and training programmes throughout the region. It will also aim to promote the establishment of new radiotherapy facilities in countries where there are none, and to consolidate and expand existing infrastructure through the introduction of improved clinical, safety and managerial practices and the provision of specialized training for radiotherapy managers, medical physicists and radiographers.

In nuclear medicine, AFRA activities will aim to expand clinical nuclear medicine as well as to identify medical physics as a profession in all Member States. Isotopic techniques to monitor the efficacy of nutrition intervention schemes in support of breastfeeding mothers are being used in a network of laboratories. AFRA will facilitate continued network operations to gain a regional perspective on the status of interventions in areas related to food contaminants, nutrition and infection. In the field of communicable diseases (malaria, TB and HIV/AIDS), AFRA promotes the development of innovative and effective strategies to strengthen regional capacity in new diagnostic tools for national disease control and surveillance programmes by facilitating networking between laboratories collaborating in tracking disease drug resistance.

VII.2. Food and Agriculture

AFRA fosters regional cooperation in the use of nuclear techniques in the fields of animal production, crop improvement, soil fertility and water management, insect and pest control, and food safety.



In animal production, AFRA promotes capacity building in the utilisation of nuclear techniques in programmes supporting artificial insemination. Cost-effective approaches to the selection of breeding stock and the development of feeding strategies are necessary for the conservation and sustainable utilisation of African animal genetic resources.

AFRA continues to promote the use of serological and molecular techniques to diagnose and control transboundary animal diseases (TADs), such as peste des petits ruminants (PPR), by strengthening laboratory capacities. A strategy promoting a collaborative framework between AFRA and the African Union (AU) is suggested for the control of livestock diseases in Africa.

In crop improvement, AFRA aims to enhance and strengthen the Member State capacities needed to transform and optimize land crops through breeding drought-tolerant crop varieties, using mutation techniques for underutilized crops, undertaking studies on consumer-focused approaches, and improving crops by mutation induction and biotechnology through a farmer-participatory approach.

In the area of soil fertility and water, AFRA projects are geared towards protecting soil sustainability and combating desertification, as well as formulating strategies for changing agricultural patterns, using nuclear techniques to monitor water uptake by plants and losses through evaporation and/or drainage, and quantifying the efficiency of nitrogen applied under different irrigation and crop systems. AFRA facilitates regional cooperation in the utilization and improvement of these techniques as well as in up-scaling it to other regions.

In the field of insect and pest control, the AFRA strategy is to facilitate the establishment of regional programmes on education and training in order to ensure the

successful use of nuclear technology for control of insects and pests, including false codling moth, Mediterranean fruit fly, mosquitoes and tsetse fly.

In food safety, AFRA activities aim to improve levels of food safety by promoting the importance of crop sustainability, food production and processing, and enhancing knowledge and skills in this field.



VII.3. Water resources

AFRA focuses its interventions in projects that aim to maximize the regional technical capabilities in the water sector, including strengthening regional designated centres (RDCs) in isotope hydrology and enhancing the adoption of isotope hydrology techniques in integrated water resources management, focusing on transboundary surface water, ground water resources and dam safety. This will be attained by establishing cross-sectoral linkages and new initiatives, and by creating strong partnerships with other institutions and development partners in the field of water resources.

VII.4. Sustainable energy development

AFRA promotes the dissemination and wider use of the IAEA's analytical tools for energy planning. Regional cooperation will be enhanced through the establishment of additional RDCs for energy planning, and by building partnerships with other institutions and organizations active in the field of energy development.

The regional effort provides strong linkages across the region with respect to planning and strategizing energy options, including assessing and preparing countries embarking on nuclear electricity generation programmes.





VII.5. Industrial applications

AFRA cooperative activities focus on further development of non-destructive testing techniques for industrial quality control, as well as on enhancing the application of radiation processing technologies, optimizing the usage of radioisotopes for troubleshooting, and promoting the effective utilization of research reactors and accelerators.

VII.6. Radiation safety and nuclear security

The AFRA strategy in the field of radiation safety promotes the use of self-assessment methodologies for the establishment and improvement of radiation protection infrastructures. In nuclear security, AFRA activities aim to strengthen human capabilities using new models such as the triangular initiative, hands on training, RDCs, and the involvement of regional experts and project scientific consultants (PSCs). AFRA will continue to contribute to improving regional capabilities to deal with radioactive waste, using RDCs to retrieve, condition and safely store orphan sources.

VII.7. Human Resource Development

The AFRA strategy for human resource development focuses on the provision of education and training in various fields that address needs and bridge gaps in nuclear science and technology in Africa. Regional efforts will be complemented by recognizing RDCs in new fields, integrating information and communication technology, promoting research and development accommodated within the framework of the regional programme, and establishing the TCDC mechanism through bilateral agreements or Memoranda.

VIII. PROMOTING REGIONAL SELF-RELIANCE AND SUSTAINABILITY

AFRA Member States are committed to achieve regional self-reliance and sustainability in the peaceful, safe and secure application of nuclear science and technology through the principle of technical cooperation among developing countries (TCDCs). The following modalities are used:

VIII.1. AFRA strategy on Human Resource Development and Nuclear Knowledge Management (HRD and NKM)

AFRA Member States implement a regional strategy in human resource development (HRD) and nuclear knowledge management (NKM) through the AFRA Network for Education in Nuclear Science and Technology (AFRA-NEST). A High Level Steering Committee on HRD and NKM, which oversees these important initiatives in the region, has been formed. A harmonized curriculum for the AFRA Masters Degree in Nuclear Science and Technology has been adopted as a minimum standard for awarding such a degree in the region. A process to recognize Regional Designated Centres (RDCs) in Professional and Higher Education has been initiated to cater for the needs of Member States that do not yet have the capacity to present the curriculum. A follow-up to a high priority project has been approved for the period 2014-2016 to enable students to attend RDCs through fellowship programmes.

The AFRA programme is also supporting the establishment of International Nuclear Information System (INIS) centres for new AFRA Member States, as well as enhancing existing national facilities to assist AFRA Member States to access reliable, trustworthy nuclear information resources to support national and regional nuclear activities and programmes, to preserve national nuclear literature and to exchange expertise and share resources in the field of nuclear information processing.

VIII.2. Regional Designated Centres (RDCs)

In the context of AFRA, the RDC is defined as an established African institution able to provide multinational services on the basis of the AFRA Agreement. AFRA Member States apply a rigorous process to recognize RDCs.

As of March 2017, the institutions listed in the following table have been recognized by the AFRA Member States as Regional Designated Centres.

FIELD OF EXPERTISE	NAME OF INSTITUTION
RADIOACTIVE WASTE MANAGEMENT	South African Nuclear Energy Corporation (Necsa) Pretoria, South Africa
CLINICAL RADIOTHERAPY AND MEDICAL PHYSICS (ANGLOPHONE)	Tygerberg Hospital, Cape Town, South Africa
CLINICAL RADIOTHERAPY AND MEDICAL PHYSICS (FRANCOPHONE)	Institut National d'Oncologie Sidi Mohamed Ben Abdellah Rabat, Morocco
CLINICAL RADIOTHERAPY AND MEDICAL PHYSICS	National Cancer Institute (NCI) Cairo University, Cairo, Egypt
NON-DESTRUCTIVE TESTING TECHNIQUES (ANGLOPHONE)	Southern African Institute of Welding Johannesburg, South Africa
NON-DESTRUCTIVE TESTING TECHNIQUES (FRANCOPHONE)	Centre Technique des Industries Mécaniques et Electriques (CETIME) Tunis, Tunisia
	Centre National de l'Energie, des Sciences et des Techniques Nucléaires (CNESTEN) Rabat, Morocco
MUTATION BREEDING AND RELATED BIOTECHNOLOGY (ANGLOPHONE)	Agricultural Research Council (ARC) Pretoria, South Africa
REPAIR, PREVENTIVE MAINTENANCE AND QUALITY CONTROL OF MEDICAL AND SCIENTIFIC INSTRUMENTS (ANGLOPHONE)	Nuclear Research Centre, Egyptian Atomic Energy Authority Cairo, Egypt
IRRADIATION TECHNOLOGY	National Centre for Radiation Research and Technology (NCRRT), Egyptian Atomic Energy Authority Cairo, Egypt
SECONDARY STANDARDS DOSIMETRY LABORATORY (ANGLOPHONE)	National Metrology Institute of South Africa (NMISA) Pretoria, South Africa
SECONDARY STANDARDS DOSIMETRY LABORATORY (FRANCOPHONE)	Centre de Recherche Nucléaire d'Alger (CRN) Commissariat à l'Energie Atomique (COMENA), Algiers, Algeria
ENERGY PLANNING	Energy Research Centre, University of Cape Town Cape Town, South Africa
	General Directorate for Policies and Energy Planning (GDPEP), Ministry of Petroleum- Sudanese Petroleum Corporations Khartoum, Sudan
HIGHER AND PROFESSIONAL EDUCATION	Department of Nuclear and Radiation Engineering Faculty of Engineering University of Alexandria Alexandria, Egypt
	Graduate School of Nuclear and Allied Sciences (SNAS), University of Ghana Ghana Atomic Energy Commission (GAEC) Accra, Ghana

FIELD OF EXPERTISE	NAME OF INSTITUTION
ENVIRONMENTAL ISOTOPE HYDROLOGY	National Centre for Nuclear Safety and Radiation Control (Central Lab. For Environmental Isotope Hydrology) Egyptian Atomic Energy Agency Cairo, Egypt
	Centre national de l'énergie, des sciences et des techniques nucléaires (CNESTEN) Rabat, Morocco
	Laboratory of Radio-Analyses and Environment of the National School of Engineers of Sfax (LRAE) University of Sfax Tunisia
NUCLEAR MEDICINE AND RELATED MEDICAL PHYSICS	Service de medecine nucleaire CHU Bab El Oued Alger, Algeria
TRAINING AND EDUCATION IN RADIATION PROTECTION	Centre de Recherche Nucléaire d'Alger (CRNA) Commissariat à l'énergie atomique (COMENA) Algeria
	Radiation Protection Institute (RPI) Ghana Atomic Energy Commission (GAEC) Accra, Ghana
	Centre national de l'énergie, des sciences et des techniques nucléaires (CNESTEN) Rabat, Morocco
STABLE ISOTOPE IN HUMAN NUTRITION	National Food Technology Research Centre (NFTRC) Kanye, Botswana
	Unité Mixte de Recherche en Nutrition et Alimentation Universite Ibn Tofail de Kenitra Centre national de l'énergie, des sciences et des techniques nucléaires (CNESTEN) Kénitra, Morocco
COMMUNICABLE DISEASES	Centre de biotechnologie (Malaria) Universite of Yaoundé I Yaoundé, Cameroon
	Centre for Biotechnology and Research Development (Malaria) Kenya Medical Research Institute (KEMRI) Nairobi, Kenya
	Division of Molecular Biology and Human Genetics (Tuberculosis) Faculty of Health Sciences Stellenbosch University South Africa
FOOD SAFETY	Central Veterinary Laboratory Algiers, Algeria
	National Agency for Food and Drug Administration and Control (NAFDAC) Lagos, Nigeria
ACADEMIC AND CLINICAL TRAINING IN MEDICAL PHYSICS	Medical Physics Department School of Nuclear and Allied Sciences University of Ghana - Atomic Campus Accra, Ghana
ANIMAL HEALTH AND REPRODUCTION	National Medicine Veterinary School Sidi Thabet, Tunisia

VIII.3. Specialized Teams

AFRA uses Specialized Teams composed of regional experts to perform a range of services, including conditioning and storage of sealed radioactive sources, auditing of radiotherapy and nuclear medicine facilities, and advising on steps to achieve self-reliance and sustainability of national nuclear institutions.

VIII.4. Project Scientific Consultants

When appropriate, AFRA Member States appoint Project Scientific Consultants (PSCs) to provide upon request technical backstopping to AFRA Member States and to the AFRA Committees. PSCs are African scientists recognized as experts and regional leaders in their respective fields. PSCs participate in AFRA activities in their individual capacity.

VIII.5. Promoting the Sustainability of National Nuclear Institutions and Other Facilities Using Nuclear Techniques

AFRA provides advice on the formulation and implementation of appropriate Strategic Action Plans (SAPs) to guide the efforts of national nuclear institutions to enhance their sustainability in order to enable them to remain relevant, to develop capabilities to adapt to changes in the external environment.

IX. REGIONAL CONFERENCES

AFRA serves as a forum for exchange of information and a mechanism for promoting networking in Africa through regular project coordination meetings, often tied to regional conferences. During 2015, AFRA supported the following conference:

PROJECT	CONFERENCE TITLE	VENUE	DATES
RAF/2/010	3rd African Nuclear Power and Energy Conference and Coordination meeting	Kenya	April 2015

X. AFRA SUCCESSES

Notable examples of AFRA successes in thematic areas are presented below:

Human Health

Under AFRA, 40 radiotherapy centres in 18 African countries have been upgraded and more than 250 radiotherapists, medical physicists, nurses and radiographers have been trained on improved radiotherapy protocols, medical physics and management of radiotherapy departments.



AFRA projects in the field of radiotherapy and associated medical physics have been designed to tackle national and regional deficiencies in training/education by developing harmonized curricula to facilitate training in Africa and to promote recognition of the profession of medical physicists. AFRA RDCs have played a leading role in this effort. The curricula developed under AFRA have been utilized by at least six African countries with education programmes in the field. Emphasis has been placed on strengthening the response of Member States to the ever increasing incidence of cancer, particularly HIV related cancers, through the provision of dedicated training of key personnel. The AFRA programme has also focused on promoting more efficient management of the most common cancers in the region.

AFRA supported the organization of biennial Congresses of the African Radiation Oncology Group (AFROG), enabling African radiation oncologists and medical physicists to meet to debate issues of vital importance to

their profession and to the region's strategy and plans to combat cancers holistically.

AFRA also supports efforts to strengthen regional capabilities in clinical nuclear medicine. The programme has enhanced Member State capabilities in the diagnosis and treatment of coronary artery disease, refractory arthritis, thyroid diseases, liver cancer, metastasis bone pain and lymphoma. Sound medical physics practices with regard to nuclear medicine have been promoted.

AFRA Specialized Teams have been used to audit nuclear medicine facilities in several Member States and are helping to identify major constraints. The recommendations made by the audits have proved to be an important tool in integrating nuclear medicine into the national health care systems.

Food and Agriculture

In the area of animal production, the AFRA programme is providing significant assistance to Member States to develop and facilitate the application of appropriate selection criteria for genetically improved livestock. An important contribution has been to focus on the interaction between nutrition and reproduction for improved productivity and to use modern reproductive techniques such as artificial insemination to improve the productivity and reproductive efficiency of livestock in the region.

Crop improvement is another area of focus for AFRA. A total of 17 AFRA Member States are working on the improvement of 'neglected crops', i.e. traditional crops which have not yet benefited from conventional breeding techniques. The development of drought tolerant lines has also been of great importance to the AFRA Member States. As a result, six new crop varieties have been released in Egypt (sesame), Ghana (cassava), Kenya (wheat), Sudan (banana) and Zambia (finger millet and cotton). In addition, several countries have promising mutant materials and are at advanced stages of development: Tunisia (barley and lucerne), Egypt (safflower, lupin and wheat), United Republic of Tanzania (rice and barley) and Zambia (beans).

Other achievements are the development of fully established tissue culture laboratories in almost all the participating countries as well as molecular laboratories in three countries. In addition, new initiatives have been started in selected countries such as United Republic of Tanzania where the counterpart institute is

working closely with the agriculture and food industry for the development of a new variety of barley. This has prompted other AFRA Member States to develop and disseminate staple and market oriented crops using mutation induction and biotechnology, supported by farmer participatory approaches.



Industrial Applications and Quality Management

AFRA focuses on the development of non-destructive techniques for industrial quality control. African Member States have opted for a regional approach to maximize the utilization of resources. Currently, most AFRA Member States rely on the training and certification of NDT personnel at RDCs: the Southern African Institute of Welding (SAIW) in South Africa and the Centre Technique des Industries Mécaniques et Electriques (CETIME) in Tunisia.

Until recently, no AFRA Member States had acquired the necessary capability to certify NDT personnel at level III. This level represents the expertise required to establish a sustainable NDT capacity for training and promoting NDT techniques at the national level. Since 2003, several regional training courses leading to certification at level III have been supported. NDT practitioners from 14 Member States have benefited from this initiative. In all, over 100 new level III certifications, in conformity with ISO 9712, have been achieved. The pass rate achieved is within the range of internationally observed limits, and it can therefore be concluded that the capability to train and certify NDT practitioners to level III has been firmly established within the region.

The AFRA programme on quality management has focused on strengthening the capacity and competence of nuclear and related institutions in participating

Member States through the promotion of good managerial practices, especially quality management. The programme has provided training to managers and decision makers, facilitated regional networking and promoted the certification of nuclear laboratories in several countries. This network has already held its second regional conference on quality management in AFRA countries, aimed at improving recognition and implementation of ISO standards and their benefits for international trade and communication in Africa.

Information and Communication Technologies (ICTs)

AFRA Member States have established sustainable national and regional capabilities in the use of ICTs for training and education in the fields of nuclear science and technology relating to agriculture, human health, environmental monitoring, water resource management, nuclear instrumentation and other nuclear related fields. Emphasis was placed on training nuclear engineers, computer scientists and technicians with the aim of building regional capabilities to train personnel using ICT based training materials and of further strengthening the use of ICT based training materials for national needs. ICT telecentres have been established in several countries.



Radioactive Waste Safety

Sealed radioactive sources have brought great benefits to human kind in almost all socio-economic sectors. When these sources come to the end of their useful life, they are still radioactive enough to be hazardous to people and the environment and, therefore, should be carefully managed. AFRA developed, in collaboration with the South Africa Atomic Energy Corporation (Necsa), the Borehole Disposal for Sealed Radioactive Sources (BOSS) system, which was designed to provide safe and secure, disposal of disused sealed radioactive sources.

The AFRA Member States have also developed a mobile hot cell facility to manage Spent Highly Active Radioactive Sources (SHARS).



Nuclear Security

Nuclear security was identified by AFRA Member States as a global issue of regional significance and a priority for regional cooperation. Since 2002, the IAEA Nuclear Security Programme has conducted activities to assist AFRA Member States in improving their systems for protecting nuclear and other radioactive material while in use, in storage, and while being transported, and in combating the illicit trafficking of such material.

Cooperation in the area of nuclear security between AFRA Member States and the IAEA has increased consistently since the beginning of the programme. Based on an assessment of needs carried out in conjunction with AFRA Member States, regional nuclear security projects to strengthen national nuclear security programmes were successfully implemented. The AFRA programme provides a wide range of assistance to AFRA Member States in the area of human resource development, including assistance in establishing Nuclear Security Support Centres. To date, the AFRA programme has provided nuclear security training for more than 850 participants, including law enforcement, customs, civil defence and regulatory personnel. Regional workshops on illicit trafficking information management and coordination have fostered communication, good practices and working relationships among stakeholders in AFRA Member States.

AFRA Member States' commitment to improving nuclear security is reflected in the growing support for relevant international conventions and agreements.

XI. OPERATIONAL AFRA PROJECTS

The current AFRA Programme consists of the projects listed in the table below.

FIELD OF ACTIVITY	PROJECT CODE	PROJECT TITLE	PLANNED DURATION
Food and Agriculture	RAF/5/068	Strengthening Capacities for the Diagnosis and Control of Transboundary Animal Diseases in Africa (AFRA)	2014–2018
	RAF/5/071	Enhancing Crop Nutrition and Soil and Water Management and Technology Transfer in Irrigated Systems for Increased Food Production and Income Generation (AFRA)	2014–2017
	RAF/5/076	Improving Crops by Using Mutation Induction and Biotechnology through a Farmer Participatory Approach	2016–2019
	RAF/5/078	Establishing a Food Safety Network through the Application of Nuclear and Related Technologies, Phase II	2016–2019
Human Health	RAF/6/048	Strengthening Medical Physicists' Capacities to Ensure Safety in Medical Imaging, with an Emphasis on Paediatric Imaging Safety (AFRA)	2014–2017
	RAF/6/047	Using Stable Isotope Techniques to Monitor and Assess the Vitamin A Status of Children Susceptible to Infection (AFRA)	2014–2018
	RAF/6/044	Strengthening Medical Physics in Support of Cancer Management - Phase II (AFRA)	2012–2016
	RAF/6/049	Strengthening and Improving Radiopharmacy Services (AFRA)	2014–2017
	RAF/6/050	Improving Access to Quality Cancer Management through Sustainable Capacity Building	2017–2019
	RAF/6/051	Strengthening Education and Human Resources Development for Expansion and Sustainability of Nuclear Medicine Services in Africa	2016–2019
	RAF/6/045	Strengthening Regional Human Resource Building and Treatment Capacity in Radiotherapy (AFRA)	2012–2016
Sustainable Energy Development	RAF/2/010	Planning for Sustainable Energy Development	2014–2018
Water Resources Management	RAF/7/013	Enhancing the Use of Isotope Hydrology in Planning, Management and Development of Water Resources (AFRA)	2014–2018
Radiation Safety and Nuclear Security	RAF/9/049	Enhancing and Sustaining the National Regulatory Bodies for Safety (AFRA)	2014–2017
	RAF/9/050	Supporting Human Resource Development in Nuclear Security (AFRA)	2014–2017
	RAF/9/054	Strengthening Radioactive Waste Management (AFRA)	2014–2017
	RAF/9/056	Strengthening Education and Training in Radiation Safety and Sustaining Human Resources Development and Nuclear Knowledge Management	2016–2019

FIELD OF ACTIVITY	PROJECT CODE	PROJECT TITLE	PLANNED DURATION
Industrial Applications	RAF/0/041	Sharing Best Practices in Preventive Maintenance of Nuclear Equipment (AFRA)	2012–2016
	RAF/1/005	Strengthening the Capacity for Research Reactor Safety and Applications in Africa (AFRA)	2014–2017
	RAF/1/004	Supporting Radioisotope Technology as a Diagnostic Tool for Plant Process Performance, Optimization and Troubleshooting (AFRA)	2012–2015
AFRA Management and TCDC	RAF/0/038	Promoting Technical Cooperation Among Developing Countries (TCDC) in Africa through Triangular Partnerships (AFRA)	2012–2014
	RAF/0/046	Promoting Technical Cooperation among Developing Countries through Triangular Partnerships and Sustaining Regional Ownership of the AFRA Programme	2016–2019



27th AFRA Technical Working Group Meeting and National Liaison Officers Meeting, July 2016, Sharm El Sheikh, Egypt



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