



**GOVERNMENT  
OF THE REPUBLIC OF CUBA**



**INTERNATIONAL ATOMIC  
ENERGY AGENCY**

## **COUNTRY PROGRAMME FRAMEWORK**

**2018–2023**

**On behalf of the Government:**

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## **Glossary**

<b>AENTA</b>	Agency for Nuclear Energy and Advanced Technologies
<b>ALMERA</b>	Network of Analytical Laboratories for the Measurement of Environmental Radioactivity
<b>ARCAL</b>	Co-operation Agreement for the Promotion of Nuclear Science and Technology in Latin America and the Caribbean
<b>CITMA</b>	Ministry of Science, Technology and Environment of Cuba
<b>CLAF</b>	Latin American Centre for Physics
<b>CYTED</b>	Ibero-American Programme of Science and Technology for Development
<b>ECLAC</b>	Economic Commission for Latin America and the Caribbean
<b>FAO</b>	Food and Agriculture Organization of the United Nations
<b>GEF</b>	Global Environment Facility
<b>IAEA</b>	International Atomic Energy Agency
<b>ICTP</b>	International Centre for Theoretical Physics
<b>IRPA</b>	International Radiation Protection Association
<b>LAS-ANS</b>	Latin American Section of the American Nuclear Society
<b>SDGs</b>	Sustainable Development Goals
<b>OACE</b>	State Central Administration Body
<b>OLADE</b>	Latin American Energy Organization
<b>PAHO</b>	Pan American Health Organization
<b>UNDAF</b>	United Nations Development Assistance Framework
<b>UNDESA</b>	United Nations Department of Economic and Social Affairs
<b>UNEP</b>	United Nations Environment Programme
<b>UNFCCC</b>	United Nations Framework Convention on Climate Change
<b>UNIDO</b>	United Nations Industrial Development Organization
<b>WHO</b>	World Health Organization

## Executive Summary

The purpose of Cuba's new Country Programme Framework (CPF) is to contribute to the country's sustainable development through the safe and effective application of nuclear technologies. The document contains strategic guidelines for use in planning technical cooperation between the IAEA and Cuba in 2018–2023. It is based on sector-specific analysis of five thematic areas — nuclear safety, food and agriculture, human health and nutrition, water and the environment, energy and industry — in which the application of nuclear technologies can contribute significantly to achieving the goals set in Cuba's National Socioeconomic Development Plan for 2030.

As a starting point in drafting this CPF, consideration was given to the outcomes achieved during the 2013–2017 technical cooperation cycles, which had contributed substantially to human resource training in support of the national programme on the introduction of advanced nuclear medicine and radiotherapy technologies, the rehabilitation of national irradiation capacities and the strengthening of national infrastructure for integrated coastal management studies using nuclear and related techniques.

This CPF will focus primarily on building national radiation safety capacities in accordance with new standards by strengthening the regulation and control of new nuclear technologies brought into the country during the period under consideration, developing national capacities to roll out irradiation technology to industry for a variety of purposes, building capacity for clinical and preclinical studies in accordance with best practices and international standards to enhance the development of new pharmaceuticals, introducing the sterile insect technique to control the *Aedes Aegypti* mosquito and livestock pests, and expanding the use of nuclear technologies to support integrated and sustainable soil and water resource management, thus consolidating regional integrated coastal management capacities.

The programme of technical cooperation between the Agency and Cuba will be managed by AENTA. The main counterparts involved are listed in Annex 2.

The new CPF is expected to contribute to improvements in the design and management of larger scale projects and to disseminate achievements in order to bolster the role of nuclear technology in the new sustainable development agenda.

## **1. Situation Analysis**

Cuba has a programme in place to extend nuclear applications to various branches of the economy as part of its science, technology and innovation system; it reaches into the socioeconomic life of the country through various applications in areas such as medicine, agriculture, industry and the environment.

The programme has contributed to social, economic and environmental achievements. Most of the projects terminated had been implemented by specific nuclear sector institutions, thus minimizing risks in achieving the expected outcomes. The Agency has contributed through technical cooperation to the achievement of results by playing a complementary role in the assimilation of new technologies and in training staff in key areas such as human health, agriculture, radiation safety and isotope hydrology.

The experience gained and the capacity built owing to the Agency's support for technical cooperation projects during more than 40 years of successful collaboration have been instrumental in raising the quality of life in Cuba, in particular in health and the environment.

Moreover, research institutions in Cuba are actively participating in the IAEA Coordinated Research Activities (CRA). Currently, Cuban Institutions have research contracts with the IAEA in the fields of Food and Agriculture, Human Health, Nuclear Science, Industrial Applications, Isotope Hydrology and Environment. While not all Coordinated Research Projects (CRPs) lead to technical cooperation projects, the two are complementary. CRPs offer Member States the ability to develop cutting edge technologies and to undertake research in nuclear techniques through collaboration between their respective research institutions and IAEA experts. By advancing national knowledge and expertise in a particular field, Member States are better equipped to carry out technical cooperation projects.

The main risks that must be overcome are due to harsh international economic conditions, in particular the economic, commercial and financial blockade imposed by the United States of America since 1962, which has hampered access to and assimilation of the advanced and cutting-edge technologies required to resolve the country's most pressing problems and to make its technological services and products more competitive for trading with or within other countries.

The five sectors identified as priorities for 2018–2023 are analysed below.

### **1.1 Radiation safety**

To ensure that nuclear technology is introduced safely and efficiently, it must be rolled out in accordance with the policy adopted to protect the health of workers, the general public and the environment. Highly specialized scientific and technical regulations and services are therefore required in support of radiation safety to ensure compliance with applicable national and international standards and contribute to the achievement of the 2030 Agenda for Sustainable Development, in particular Goal 3 on good health and well-being.

Cuba has a national regulatory and service infrastructure in place to support the application of nuclear techniques in all spheres of the economy and society. All of the progress achieved in the peaceful uses

of nuclear energy in Cuba has been supported by the national and regional projects implemented under the Agency's Technical Cooperation Programme.

As Cuba is modernizing and introducing advanced technologies that employ ionizing radiation, in particular in public health and industry, regulations must be updated in step with these advances to maximize the effectiveness of radiation safety and control mechanisms in complying with the relevant national and international standards.

Action that must be taken to attain the following goals in the next cycle comprises:

- strengthening the regulation and control of new technologies and medical radiology;
- building national radiation protection capacities by introducing new standards and technologies;
- strengthening the radiation emergency response system, including early warning;
- enhancing the safe management of disused radioactive sources and radioactive waste;
- strengthening radiation protection programmes for end-users, including leadership, management systems, ICT, assessment and safety culture;
- implementing a national radiation protection education and training strategy for radiation protection.

National regulatory authorities, institutions that provide scientific and technological services and bodies that use ionizing radiation must be involved if these goals are to be achieved.

## **1.2 Food and agriculture**

One of the strategic objectives set in the National Socioeconomic Development Plan for 2030 is to boost the output, productivity, competitiveness and environmental and financial sustainability of food production chains in order to improve food security. This can only be achieved with the support of science and innovation. Nuclear and isotope techniques can play a major role as a necessary complement or, in some cases, as the only possible solution.

Cuba has cooperated with the Agency in implementing more than 18 national and regional projects on soil degradation, pollution and radioactivity monitoring, livestock parasitosis control, pesticide assessment, agricultural variety improvement through mutation breeding and efficient use of water and fertilizers to raise agricultural output.

Cuba invests millions in sustainable land management programmes supported by GEF, which funds projects such as the Country Association Programme, known as OP-15 and designed to raise productivity in areas affected by various problems (compaction, salinity and erosion) and reduce the negative impact on biodiversity, and the Environmental Bases for Local Food Sustainability (BASAL) project. FAO, too, implements projects designed to raise output and food availability and has been identified as a strategic partner for the country's development plans.

The main challenges faced in food and agriculture in 2018–2023, for which nuclear and related technologies could be used, consist in:

- restoring the country's capacity to provide irradiation services to the health and agriculture and food sectors;
- enhancing national capacity to use nuclear techniques for comprehensive soil management;

- promoting the programme on the development of new varieties that are resistant to the growing effects of climate change;
- building capacity to support the introduction of the sterile insect technique (SIT) for livestock and agricultural pest control;
- rehabilitating national capacity for regulatory impact assessments of livestock reproduction and milk production.

To achieve these goals, Cuba has in place the human resources and a network of institutions specialized in the application of nuclear techniques in the agricultural sector, together with the basic infrastructure, complemented by national and regional IAEA technical cooperation projects, with FAO and GEF as strategic partners.

### **1.3 Human health and nutrition**

The National Socioeconomic Development Plan for 2030 highlights human health as one of its priorities requiring action to improve the people's quality of life, strengthen preventive and promotional drives to improve lifestyles and thus raise the population's health standards. Substantial investments have therefore been made in recent years in cutting-edge technology, which have been most rewarding to the national cancer control programme and to prevention and treatment programmes for non-communicable diseases generally, which have been the leading causes of death in Cuba for several years.

This national policy is informed by SDG 3, set to ensure healthy lives and promote well-being for all at all ages, and contributes indirectly with other SDGs to ending poverty and hunger and to ensuring quality education, clean water and sanitation. The policy has underpinned technical cooperation with the Agency, which has always included human health which, for the past four biennia, has been given the highest priority and has accounted for more than half of investments under the technical cooperation budget. These priorities have been enshrined in the UNDAF signed by Cuba, which reflects the importance that it ascribes to the subject.

Nationally, investment in cutting-edge technology has been made primarily in the specialist areas of nuclear medicine and radiotherapy to permit early diagnosis and timely treatment of oncological, cardiovascular and neurological diseases, among others. This effort has been complemented in its entirety by the Agency's support under its technical cooperation programme, through which professionals have been trained to use such technologies and the additional supporting equipment required has been procured.

Human health again features significantly in the new CPF, with the following priority goals:

- enhance national radiotherapy and nuclear medicine capacities to manage patients with non-communicable diseases;
- consolidate national capacities for clinical and non-clinical evaluation studies of radiopharmaceuticals in accordance with best practices;
- introduce SIT in order to prevent and control arbovirus disease transmission by sustainably managing *Aedes Aegypti* mosquitoes;
- enhance and integrate diagnostic imaging capacities;
- enhance national capacities for nutritional studies in support of policies on non-communicable disease prevention and healthy lifestyle promotion.



Owing to its achievements in this field, Cuba will stay the course in this endeavour with the support of other international bodies such as PAHO/WHO, UNICEF, FAO and GEF, which are considering the possibility of co-financing some of its planned outputs.

#### **1.4 Water and the environment**

The Republic of Cuba is firmly committed to ensuring environmental sustainability and has accordingly formulated the National Environmental Strategy (EAN) for 2016–2020, setting out the main environmental challenges, in particular:

- soil degradation;
- deforestation;
- pollution;
- loss of biological diversity and ecosystem deterioration;
- water scarcity and difficulties in water resource management, availability and quality;
- impacts of climate change;
- worsening sanitation in human settlements.

Nuclear techniques constitute highly competitive tools and are the only solution to existing problems in many cases. In previous cycles, Cuba implemented several national projects and participated actively in regional projects that have helped to build analytical capacity, develop human resources and transfer cutting-edge technology in order to solve many of the problems identified. Noteworthy progress has been achieved in integrated coastal management studies, and the experience gained has been shared with various Latin American and Caribbean countries.

In view of the results obtained to date and projects currently under way, the following goals, on which nuclear technology can have a great impact, have been identified:

- build national capacity for isotope hydrology studies;
- strengthen a regional reference centre to use nuclear and related technologies for integrated coastal management;
- enhance national air-quality monitoring and evaluation capacity;
- strengthen the network of analytical laboratories that provide environmental services by building their capacity to assess drinking and waste water treatment systems;
- conduct risk and environmental impact assessments, by means of nuclear and related technologies, for the safe management of the National Chemical Products and Hazardous Waste Disposal Facility.

Various environmental projects, funded by the Government, the United Nations Development Programme (UNDP), GEF and the European Union, are being implemented in order to combat erosion and drought, optimize the rational use of water in agriculture and introduce adaptation measures in the farming sector to complement identified priorities and maximize outputs.

#### **1.5 Energy and industry**

The goals highlighted under Cuba's industrial development strategy include cost reduction, mitigation of the environmental impact of industrial development, development of biotechnology results, production of medical pharmaceuticals, studies and use of renewable sources of energy, transfer of industrial technology, production of high-tech equipment, scientific and technological services with high added value and development lines in which cooperation with the Agency is crucial to the

achievement of these goals. Emphasis is placed, moreover, on national capacity building for research, development and innovation (R&D&I), specialized human capital formation and establishment of information and technological monitoring networks in order to revitalize the learning and assimilation of new technologies, on the basis of competitiveness and sustainability.

The country's socioeconomic development requires an adequate level of energy security, which is currently compromised by high fuel imports and merely incipient use of renewable energy sources to generate electricity. Under the approved energy policy, however, national fuel output is to be raised, the electricity-generating energy mix is to be diversified so that the share of renewable sources will rise to 24% by 2030, and energy-saving techniques, energy efficiency and the rational use of energy are to be intensified, thus contributing to climate change mitigation.

Cuba's development policies include environment-friendly achievement of industrial and energy development, in accordance with the SDG set to ensure environmental protection and sustainability.

Capacity building under technical cooperation and coordinated research projects with the Agency has consisted in training, equipment and technology for the conduct of comprehensive energy and electricity supply and demand assessments, environmental impact appraisals, measurement of air pollution, dispersion of pollutants, environmental externalities and the impact of rising air and water temperatures due to electricity generation. Capacity has been built, moreover, to use sustainable energy development indicators. The technological climate change mitigation requirements of various sectors have been assessed, nationally appropriate mitigation action (NAMA) for pig biogas has been taken, a programme on renewable energy and efficient transport in the capital has been drawn up, the first and second rounds of national UNFCCC communications have been submitted and Cuba's intended nationally determined contribution to UNFCCC for projects and services involving UNEP, UNDP and OLADE has been calculated. Cuba has participated in several ARCAL projects (RLA0029, RLA0040 and, currently, RLA2015).

Similarly, other regional and ARCAL technical cooperation projects on the energy industry have been designed to develop and enhance gamma radiation (radiosterilization and food irradiation) and biomaterial services in support of development programmes for the food and pharmaceutical industries, the introduction of radiotracer techniques and nationally produced nucleonic equipment in order to raise the efficiency and reduce the environmental impact of the nickel and sugar industries, assessment of the remaining useful lifetime of industrial equipment components and the training of specialists in the use of non-destructive testing to assess equipment and materials in order to improve industrial safety. These projects, which have built up the country's albeit yet insufficient capacities, have set a precedent and have increased demand.

The main project beneficiary counterparts will be CITMA, the Ministry of Energy and Mines (MINEM), the Ministry of Industries (MINDUS), the Ministry of the Food Industry (MINAL), the National Sugar Industry Group (AZCUBA), the Environment Agency (AMA) and the Agency for Nuclear Energy and Advanced Technologies (AENTA).

Owing to technical cooperation with the Agency, support could be provided for various important industrial and energy development programmes in achieving the following goals:

- introduce and validate in the country new integrated nuclear techniques in industrial processes in order to improve the efficiency and environmental performance of the country's key industries;

- implement in the country a national system for the certification of specialists in non-destructive testing in accordance with ISO 9712;
- build capacity for the establishment of new industrial facilities for nuclear applications (e.g. accelerators for the use of irradiation techniques, research reactors and reactors for the production of radiopharmaceuticals);
- formulate a low-carbon energy development strategy that will help to combat climate change (e.g. technology to combat climate change, comprehensive mitigation studies and a system for monitoring, reporting and verifying the impact of mitigation)

## 2. Programme Plan

The results obtained, the need to generate new products and services with a high added value and the need to contribute to the development of institutions that use nuclear techniques in support of the country's strategic lines are indicative of the importance of implementing this CPF as a complement to the national programme on nuclear technology applications, for it will enhance the impact of these techniques in contributing to the country's economic, social, scientific and environmental development.

The programme plan will identify indicative outputs that will contribute to the achievement of results in the sector by indicating, for each thematic area, the way in which support under the Agency's technical cooperation programme can be deployed sequentially between 2018 and 2023.

The main risks will arise from the country's economic difficulties, which have prevented timely technological renewal of existing capacities and the introduction of new capacities, and from the ageing of trained personnel.

### 2.1 Radiation safety

The following outputs must be achieved if radiation safety goals are to be met<sup>1</sup>:

- action plan to improve emergency preparedness and response (EPR) arrangements, based on Emergency Prepared and Review Service (EPREV) recommendations and suggestions, implemented (2018);
- new radiation monitoring measurement capacities for existing and/or improved practices introduced (2019);
- new tools to improve statistical processing for the national occupational doses register introduced and historical dosimetry data retrieved (2019).
- calibration capacity for new technologies built and existing capacities enhanced (2020);
- quality control services and protocols in hospitals further improved (2021);
- radiation protection programmes for end-users improved by implementing new regulations, management systems and information and communication technology (ICT) (2023);
- regulatory procedures and radiation protection programmes for positron emission tomography–computed tomography (PET-CT) technology, digital radiology, cyclotron production of radiopharmaceuticals, and industrial irradiation technology implemented (2020);
- legal regulatory framework for radiodiagnosis updated and implemented (2021);

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<sup>1</sup> Note: These radiation safety aspects will be considered in synergy with nuclear security requirements. Cuba's Integrated Nuclear Security Support Plan (INSSP) provides a customized framework for coordinating and implementing nuclear security activities and covers all aspects related to nuclear security: legislative and regulatory framework, threat and risk assessment, prevention, detection, response and sustainability. A new review, envisioned in 2018, will account for the achievements made to date and identify and prioritize nuclear security needs for the period 2019-2021/2022.

- radiation protection programmes in diagnostic radiology improved (2021); national radiation safety education and training strategy, covering all practices and the regulatory body, implemented (2020);
- disused radioactive sources and radioactive waste managed (2023).

As a complement to these efforts, Cuba will ensure that information on its national radiation safety infrastructure is kept up-to-date in IAEA's Radiation Safety Information Management System (RASIMS). Periodic update of information in RASIMS will provide a means of recording the achievements, as well as assessing the effectiveness of actions and progress made. The information in RASIMS needs to be updated by the relevant national counterparts and endorsed by the national RASIMS coordinator.

## **2.2 Food and agriculture**

Cuba has built, and continues to build, capacities in support of the introduction of nuclear techniques in agriculture, under national programmes implemented by the Ministry of Agriculture and national nuclear science and technology programme.

Technical cooperation with the Agency and strategic alliances with other partners in the United Nations system constitute invaluable support that complements national food security development strategies.

The following outputs must be achieved if the goals proposed for this strategic sector are to be met:

- operation of the Food Irradiation Plant (PIA) and of the irradiators at the Centre for Nuclear Development and Technological Applications (CEADEN) and the National Centre for Animal and Plant Health (CENSA) stable (2018);
- human resources trained in the sampling and analysis of metals, pesticides and long-lived organic pollutants (2019);
- manual on soil sampling and analysis, covering metals, pesticides and long-lived organic pollutants, compiled (2021);
- food contaminant monitoring capacities installed (2023).
- water and soil management practices improved through the proper use of agrochemicals, fertilizers and microorganisms for biological nitrogen fixation (2023);
- two new genotypes best adapted to the effects of climate change and obtained through radiomutagenesis recorded (2021);
- SIT pilot project on livestock pest control launched (2023);
- national reference capacity for veterinary surveillance involving nuclear techniques built (2021);

## 2.3 Human health and nutrition

Pursuant to the national policy strategy, the highest priority has been given to human health in the Agency's technical cooperation programme for five cycles, during which more than 400 specialists have been trained through courses, fellowships and scientific visits and 300 specialists have engaged in scientific exchange by participating in meetings, workshops, conferences and expert missions. These activities are embedded within the following results:

- cyclotron technology for production of PET radioisotopes introduced into the country (2018);
- human resources trained in nuclear medicine and other PET/CT technology-supporting specialisms (2018);
- national capacities built for the sustainability of human resource training, drawing on available infrastructure and trainers (2020);
- radio-guided surgery introduced as a feature of nuclear medicine that keeps the country abreast of the state of the art in the subject (2021);
- quality standards in radiotherapy and nuclear medicine services in the main institutions in the country raised (2023);
- radiodiagnostic imaging integrated for more accurate and efficient diagnosis, drawing on the country's installed capacity (2023);
- strengthening national capacities for work with Ga-68 radiopharmaceuticals (2020)
- preclinical and clinical assessment capacity built for conventional radiopharmaceuticals that are not available in Cuba and for radiolabelled biomolecules developed by the national biotechnology and pharmaceutical industry for use in diagnosis and treatment; positron-emitting radiopharmaceuticals developed (2021);
- new pharmaceuticals such as <sup>18</sup>F-Forbetapir, <sup>18</sup>F-Forbetaben, <sup>18</sup>F-Fluoride and <sup>18</sup>F-FMISO introduced in clinical practice for early diagnosis of Alzheimer's disease (2023).
- national vector control capacity built to prevent and eradicate diseases such as dengue, Zika and other diseases (2021);
- national capacity for conducting nutritional studies using nuclear techniques in support of policies control and management of non-communicable diseases and maintenance of healthy lifestyles built (2021).

## 2.4 Water and the environment

The following outputs must be achieved if the goals proposed for this sector are to be met:

- isotope hydrology map of Cuba drawn (2019);
- programme for monitoring environmental indicators by means of nuclear and related technologies launched (2019);
- Cienfuegos Centre for Environmental Studies (CEAC) recognized by the IAEA as a regional reference centre for integrated coastal management using nuclear and related techniques (2020);

- drinking water treatment systems in Havana and Cienfuegos assessed by means of nuclear techniques and complementary analytics (2020);
- human resources trained to monitor environmental pollution by means of nuclear and related technologies for the management of chemical products and hazardous waste (2020);
- wastewater treatment systems of the main industries in the country assessed by means of nuclear techniques and complementary analytics (2021);
- national air-quality monitoring and assessment programme approved; primary development hubs established in the country (2023);
- national capacities for desalinization and potable water studies built (2023);
- nuclear-based methods to assess seafood safety programmes developed (biotoxins plus contaminants)(2023);
- nuclear-based methods to assess coastal ecosystems / resources developed (including ocean acidification)(2023).

## **2.5 Energy and industry**

The goals highlighted under Cuba's industrial development strategy include cost reduction, mitigation of the environmental impact of industrial development.

The following outputs must be achieved if the goals proposed for this sector are to be met:

- comprehensive medium- and long-term energy planning studies, including an assessment of advanced energy technologies, conducted (2021);
- national non-destructive testing capacities built (2021);
- monitoring, reporting and verification methodology (MRV) for mitigation activities introduced in Cuba and implemented in at least two of the selected mitigation activities (2023);
- capacity built for the introduction of new nuclear facilities (e.g. accelerators for the use of irradiation techniques and reactors for the production of radiopharmaceuticals) (2023);
- services involving nuclear techniques in priority national industrial sectors increased (2023);
- national nuclear knowledge management and conservation capacities built (2023).

### 3. Results framework and plan of action

#### Results framework

	Outcome	Indicator	Means of verification
RADIATION SAFETY <sup>2</sup>	Regulation and control of new technologies and medical radiology strengthened.	New regulations implemented by 2021.	Legal framework and national regulator. Database of authorization and inspection processes.
	<b>Indicative outputs</b> <ul style="list-style-type: none"> <li>Legal regulatory base for radiodiagnosis updated and implemented.</li> <li>Regulatory procedures and radiation protection programmes for PET-CT technology, digital radiology, cyclotron production of radiopharmaceuticals and industrial irradiation technology implemented.</li> </ul>		
	National radiation protection capacities built by introducing new standards and technologies.	Services introduced or improved by 2021.	Portfolio of technological and scientific services provided by Cuban institutions.
	<b>Indicative outputs</b> <ul style="list-style-type: none"> <li>Radiation protection services and protocols for patients undergoing diagnostic radiology improved.</li> <li>Calibration capacity for new technologies built and existing capacities enhanced.</li> <li>New radiation monitoring measurement capacities for existing and/or improved practices introduced.</li> <li>Quality control services and protocols in hospitals further improved.</li> <li>New tools to improve statistical processing for the national occupational doses register introduced and historical dosimetry data retrieved.</li> </ul>		
	Radiation emergency response system, including early warning, strengthened.	Services and procedures introduced or improved by 2019.	National radiation emergency plan. Report by the National Network for Environmental Radiation Monitoring.
	<b>Indicative outputs</b> <ul style="list-style-type: none"> <li>Assessment regarding GSR Part 7 requirements implementation in the national nuclear and radiation emergency preparedness and response system completed.</li> <li>Action plan to strengthen EPR arrangements developed and implemented.</li> <li>National emergency response capacities, including measurement and assessment, enhanced.</li> <li>Early warning system strengthened.</li> </ul>		

<sup>2</sup> Radiation safety activities will be implemented in a coordinated manner with nuclear security aspects.



	Outcome	Indicator	Means of verification
	Safe and secure management of disused radioactive sources and radioactive waste enhanced.	50% of disused radioactive sources conditioned by 2023. Radioactive waste classified by 2023.	Registers of conditioned sources. Radioactive waste inventories.
	<b>Indicative output</b> <ul style="list-style-type: none"> <li>Disused radioactive sources and radioactive waste managed.</li> </ul>		
	Radiation protection programmes for end-users, including leadership, management systems, ICT, assessment and safety culture, strengthened.	Radiation protection programmes for end-users implemented by 2021.	Implemented programmes. Regulatory inspections.
	<b>Indicative output</b> <ul style="list-style-type: none"> <li>Radiation protection programmes for end-users improved.</li> </ul>		
	National radiation protection education and training strategy implemented.	Activities under the national radiation protection education and training strategy carried out by 2020.	Record of action taken.
	<b>Indicative output</b> <ul style="list-style-type: none"> <li>National radiation safety education and training strategy, covering all practices and the regulatory body, implemented (2021).</li> </ul>		
	Nuclear security of the main nuclear facilities in Cuba enhanced.	Projects introducing advanced technology to ensure compliance with international nuclear security standards implemented. 2023	Report by the Ministry of the Interior (MININ)
	<b>Indicative output</b> <ul style="list-style-type: none"> <li>Nuclear security standards at the main nuclear facilities in Cuba (CENTIS, PIA, CENSA and the national radioactive waste and spent fuel store) improved.</li> </ul>		

	Outcome	Indicator	Means of verification
FOOD AND AGRICULTURE	National capacities to provide irradiation services to the health and agriculture sectors rebuilt.	PIA, the two irradiators at CEADEN and the one at CENSA in operation. 2018	Irradiator output and service reports.
	<b>Indicative output</b> <ul style="list-style-type: none"> <li>Operation of PIA and of the CEADEN and CENSA irradiators stable.</li> </ul>		
	National capacities for comprehensive soil management by means of nuclear techniques built.	Metal, pesticide and long-lived organic pollutant content of soil at four State farms determined. 2023	Ministry of Agriculture (MINAGRI) reports. National research-development programme reports.
	<b>Indicative outputs</b> <ul style="list-style-type: none"> <li>Manual on soil sampling and analysis, covering metals, pesticides and long-lived organic pollutants, compiled.</li> <li>Human resources trained in the sampling and analysis of metals, pesticides and long-lived organic pollutants.</li> </ul>		
	New climate-change-resistant varieties obtained.	Two new varieties obtained. 2021	Register of new varieties.
	<b>Indicative output</b> <ul style="list-style-type: none"> <li>Two new genotypes best adapted to the effects of climate change and obtained through radiomutagenesis recorded.</li> </ul>		
	Capacity to introduce SIT to control livestock pests built.	Human resources qualified to use SIT to control livestock pests. 2023	MINAGRI animal health laboratory report.
	<b>Indicative output</b> <ul style="list-style-type: none"> <li>SIT pilot project on livestock pest control launched.</li> </ul>		
	National capacities for regulatory impact assessments of livestock reproduction and milk production rehabilitated.	Regulatory impact assessments introduced under MINAGRI priority livestock reproduction and milk production programmes. 2021	MINAGRI reports.
	<b>Indicative output</b> <ul style="list-style-type: none"> <li>National reference capacity for veterinary surveillance involving nuclear techniques built.</li> </ul>		

	Outcome	Indicator	Means of verification
HUMAN HEALTH AND NUTRITION	National radiotherapy and nuclear medicine capacities to manage patients with non-communicable diseases built.	Cyclotron technology introduced by 2018. Advanced radiotherapy techniques fully understood. Intraoperative radiotherapy (IORT), image-guided radiotherapy (IGRT), intensity modulated radiotherapy (IMRT) and volumetric modulated arc radiotherapy (VMAT) introduced at the leading institution by 2019. Radio-guided surgery introduced at leading institutions by 2021.	Established performance protocols. Established performance protocols. Harmonized institutional protocols.
	<b><u>Indicative outputs</u></b> <ul style="list-style-type: none"> <li>Human resources trained to use advanced radiotherapy and nuclear medicine techniques.</li> <li>Quality control and assurance programmes in nuclear medicine and radiotherapy strengthened.</li> <li>National strategy for the introduction of radio-guided surgery formulated and related national capacities built.</li> </ul>		
	National capacities for clinical and non-clinical evaluation studies of radiopharmaceuticals in accordance with best practices enhanced.	Phase I clinical and non-clinical trial performed on at least one locally produced radiopharmaceutical by 2021.	Final report on phase I clinical trial.
	<b><u>Indicative outputs</u></b> <ul style="list-style-type: none"> <li>Human resources trained in accordance with best practices</li> <li>Best-practice-enabling technological capacities available.</li> <li>Methods and procedures for clinical and non-clinical studies of new radiopharmaceuticals in accordance with best practices in Cuba standardized and optimized.</li> </ul>		
	Arbovirus transmission prevented and controlled through sustainable management of <i>Aedes Aegypti</i> mosquitoes.	SIT for <i>Aedes Aegypti</i> eradication validated through a pilot project. 2021	Diminution in <i>Aedes Aegypti</i> population indicators in the pilot area.
	<b><u>Indicative outputs</u></b> <ul style="list-style-type: none"> <li>Protocols on the collection of local eggs and adults drawn up.</li> <li>Protocols on mass rearing, sexing and storage of mosquitoes drawn up.</li> <li>SIT programme implemented locally.</li> </ul>		

	Diagnostic imaging capacities built and integrated.	Diagnostic imaging introduced at a leading institution. 2023	Performance protocols.
	<b><u>Indicative outputs</u></b> <ul style="list-style-type: none"> <li>• Human resources trained in the integrated management and administration of diagnostic imaging capacities.</li> <li>• Human resources trained in new diagnostic imaging technologies.</li> <li>• Performance protocols validated at the leading institution.</li> </ul>		
	National capacity built for conducting nutritional studies using nuclear techniques, in support of policies on control and management of non-communicable diseases and maintenance of healthy lifestyles.	Capacity building on body composition and doubly labelled water introduced to establish protocols for management and control of NCDs in leading institutions. 2023	Protocols used by leading on body composition and energy expenditure on NCDs of concern in Cuba
	<b><u>Indicative outputs</u></b> <ul style="list-style-type: none"> <li>• Methodology for body composition studies standardized.</li> <li>• Body composition standards (curves) for children and young people set.</li> <li>• National capacity to implement the standards built.</li> </ul>		

	Outcome	Indicator	Means of verification
WATER AND THE ENVIRONMENT	Service packages for assessing water treatment systems by means of nuclear techniques and complementary analytics introduced.	Two drinking water treatment systems and two wastewater treatment systems assessed. 2021	Technical report on water treatment systems assessed by means of nuclear techniques and complementary analytics.
	<b>Indicative outputs</b> <ul style="list-style-type: none"> <li>Wastewater treatment systems assessed by means of nuclear techniques and complementary analytics.</li> <li>Drinking water treatment systems assessed by means of nuclear techniques and complementary analytics.</li> <li>Human resources trained to use nuclear techniques and complementary analytics to assess wastewater and water treatment systems.</li> </ul>		
	Risks and environmental impact assessed, by means of nuclear and related technologies, for the safe management of the National Chemical Products and Hazardous Waste Disposal Facility.	Matrix of risks and environmental factors developed for the various waste streams stored at the national waste disposal facility. 2021	Technical assessment report on risks and environmental impact.
	<b>Indicative outputs</b> <ul style="list-style-type: none"> <li>Measures to minimize environmental risks and impact planned.</li> <li>Programme for monitoring environmental indicators by means of nuclear and related technologies launched.</li> <li>Human resources trained to monitor environmental pollution by means of nuclear and related technologies for the management of chemical products and hazardous waste.</li> </ul>		
	National capacities for isotope hydrology studies built.	Data collection stations installed. Human resources trained. 2019	National research-development programme reports.
	<b>Indicative outputs</b> <ul style="list-style-type: none"> <li>Isotope hydrology map of Cuba drawn.</li> </ul>		
	Regional reference centre for integrated coastal management, using nuclear and related techniques, strengthened.	Technological infrastructure and human resource training completed. 2021	Agency approval.
	<b>Indicative output</b> <ul style="list-style-type: none"> <li>CEAC recognized by the IAEA as a regional reference centre for integrated coastal management using nuclear and related techniques.</li> </ul>		
	National air-quality monitoring and evaluation capacities built.	Air quality in three nationally strategic areas of interest evaluated. 2023	Technical reports.
	<b>Indicative output</b> <ul style="list-style-type: none"> <li>National air-quality monitoring and assessment programme approved.</li> </ul>		

	Outcome	Indicator	Means of verification
ENERGY AND INDUSTRY	National capacities for comprehensive energy planning studies built.	New methodologies for comprehensive energy planning studies assimilated. Human resources trained. 2021	Technical reports.
	<b><u>Indicative outputs</u></b> <ul style="list-style-type: none"> <li>Comprehensive medium- and long-term energy planning studies, including an assessment of advanced energy technologies, conducted.</li> <li>Monitoring, reporting and verification methodology 2023 (MRV) for mitigation activities introduced in Cuba and implemented in at least two of the selected mitigation activities.</li> </ul>		
	Human resource capacity built for the introduction of accelerators for the use of radiation techniques and reactors for the production of radioisotopes.	Human resources trained. 2023	AENTA approval
	<b><u>Indicative output</u></b> <ul style="list-style-type: none"> <li>Capacity for the introduction of new nuclear facilities (e.g. accelerators for the use of irradiation techniques and reactors for the production of radiopharmaceuticals) built.</li> </ul>		
	National capacity to provide non-destructive testing services to the industrial sector improved.	Human resources trained. Basic equipment completed. 2021	AENTA approval.
	<b><u>Indicative output</u></b> <ul style="list-style-type: none"> <li>Use of nuclear techniques in the industrial sector increased.</li> </ul>		

### Plan of Action<sup>3</sup>

	Indicative output	Approximate cost in €	Currently available resources in €	Difference (€A-€B)	Counterpart/relevant national institution	Expected timeframe
RADIATION SAFETY	Regulation and control of new technologies and medical radiology strengthened.	889 600	611 600	278 000	Bureau of Environmental Health (DNSA) National Nuclear Safety Centre (CNSN) Centre for Radiation Protection and Hygiene (CPHR) Centre for State Control of Medicines, Equipment and Medical Devices (CECMED)	2018-2020
	National radiation protection capacities built by introducing new standards and technologies.	579 000	386 200	192 800	DNSA CNSN Centre for Radiation Protection and Hygiene (CPHR) CECMED Users Service providers	2018-2020
	Radiation emergency response system, including early warning, strengthened.	457 180	300 680	156 500	Civil defence services CNSN DNSA CPHR Users	2018-2019
	Safe management of disused radioactive sources and radioactive waste enhanced.	100 000	945 750	54 250	CNSN CPHR Users	2018-2023

<sup>3</sup> The above stated figures are indicative. Signing of the CPF by the Agency does not commit to funding of the CPF implementation.

	Indicative output	Approximate cost in €	Currently available resources in €	Difference (€A-€B)	Counterpart/relevant national institution	Expected timeframe
	Radiation protection programmes for end-users, including leadership, management systems, ICT, assessment and safety culture, strengthened.	150 000	10 000	Extrabudgetary funds	DNSA CNSN CPHR CECMED Users Higher Institute of Technologies and Applied Science (InSTEC)	2019-2023
	National radiation protection education and training strategy implemented.	450 000	350 000	10 000	DNSA CNSN CPHR Users InSTEC AENTA	2018-2020
	Nuclear security of the main nuclear facilities in Cuba enhanced.	350 000	300 000	Extrabudgetary funds	MININ CNSN AENTA PIA CENSA CPHR	2018-2023



	Indicative output	Approximate cost in €	Currently available resources in €	Difference (€A-€B)	Counterpart/relevant national institution	Expected timeframe
FOOD AND AGRICULTURE	National capacities to provide irradiation services to the health and agriculture sectors rebuilt.	5 840 267	5 820 267	20 000	AENTA Institute for Food Industry Research-Food Irradiation Plant (IIIA-PIA) CEADEN CENSA	2018-2019
	National capacities for comprehensive soil management by means of nuclear techniques built.	4 460 560	4 310 560	394 600	Soil Institute (IS) CEADEN CPHR CIAC CEAC MINAG	2018-2021
	New climate-change-resistant varieties obtained.	747 000	447 000	300 000	National Institute of Agricultural Sciences (INCA) CEADEN	2018-2021
	Capacity to introduce SIT to control livestock pests built.	730 000	700 000	30 000	MINAG CEADEN AENTA	2018-2023
	National capacities for regulatory impact assessments of livestock reproduction and milk production rehabilitated.	959 828	919 828	40 000	Medico-Surgical Research Centre (CIMEQ) CEADEN CENTIS CIAC MINAG	2018-2021

	Indicative output	Approximate cost in €	Currently available resources in €	Difference (€A-€B)	Counterpart/relevant national institution	Expected timeframe
HUMAN HEALTH	National radiotherapy and nuclear medicine capacities to manage patients with non-communicable diseases built.	2 244 683	1 743 923	500 760	National Institute for Oncology and Radiobiology (INOR) Hermanos Ameijeiras Clinical Surgical Hospital (HHA) CIMEQ	2018-2021
	National capacities for clinical and non-clinical evaluation studies of radiopharmaceuticals in accordance with best practices enhanced.	862 718	237 348	625 370	CENTIS Centre for Molecular Immunology (CIM)	2018-2023
	Arbovirus transmission prevented and controlled through sustainable management of <i>Aedes Aegypti</i> mosquitoes.	1 800 610	1 209 740	590 870	Pedro Kourí Tropical Medicine Institute (IPK) CEADEN	2018-2021
	Diagnostic imaging capacities built and integrated.	100 246	702 460	300 000	CIMEQ Institute for Cardiology and Cardiovascular Surgery (ICCV) HHA CECMED Public health units (UPS) of the Ministry of Public Health (MINSAP)	2010-2023

	<b>Indicative output</b>	<b>Approximate cost in €</b>	<b>Currently available resources in €</b>	<b>Difference (€A-€B)</b>	<b>Counterpart/relevant national institution</b>	<b>Expected timeframe</b>
	National capacities for nutritional studies in support of policies on non-communicable disease prevention and healthy lifestyle promotion built.	700 500	400 500	300 000	National Institute of Hygiene, Epidemiology and Microbiology (INHEM)	2018-2021

	Indicative output	Approximate cost in €	Currently available resources in €	Difference (€A-€B)	Counterpart/relevant national institution	Expected timeframe
WATER AND ENVIRONMENT	Service packages for assessing water treatment systems by means of nuclear techniques and complementary analytics introduced.	516 740	300 000	216 740	CEAC CIAC CPHR CEADEN	2019-2021
	Risks and environmental impact assessed, by means of nuclear and related technologies, for the safe management of the National Chemical Products and Hazardous Waste Disposal Facility.	150 000	120 000	Extrabudgetary funds	CPHR CIAC CEAC	2018-2021
	National capacities for isotope hydrology studies built.	1 007 874	962 874	45 000	CEAC CPHR CEADEN CIAC INRH	2018-2019
	Regional reference centre for integrated coastal management, using nuclear and related techniques, strengthened.	3 669 307	3 619 307	50 000	CEAC	2018-2021
	National air-quality monitoring and evaluation capacities built.	332 423	282 423	150 000	CUBAENERGIA CEADEN CPHR CIAC CEAC	2019-2021

	Indicative output	Approximate cost in €	Currently available resources in €	Difference (€A-€B)	Counterpart/relevant national institution	Expected timeframe
ENERGY AND INDUSTRY	National capacities for comprehensive energy planning studies built.	140 000	62 000	42 000	CUBAENERGIA MINEM	2019-2021
	Human resource capacity built for the introduction of accelerators for the use of radiation techniques and reactors for the production of radioisotopes.	2 500 000	2 350 000	150 000	AENTA CEADEN CENTIS CUBAENERGIA INTEC	2021-2023
	National capacity to provide non-destructive testing services to the industrial sector improved.	72 000	600 000	120 000	AENTA CEADEN MINDUS	2019-2021

<i>Total estimated CPF costs</i>	<i>Total estimated CPF resources available</i>	<i>Total difference in CPF resources (€C)</i>
<b>29 810 536</b>	<b>27 692 460</b>	<b>4 566 890</b>

<i>Government's estimated expenses, if more than (€ B)</i>	<b>€27 349 260</b>
<i>Government's estimated cash contribution, if more than (€ B)</i>	<b>€27 349 260</b>

<b>Total additional resources required - this amounts to €C ... less any additional contributions by the government.</b>	<b>€4 566 890</b>
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## **4. Programme implementation and support**

### **4.1 CPF coordination and review**

The 2018–2023 CPF is a working document that contains strategic guidelines for planning, monitoring and evaluating the technical cooperation cycles scheduled for the period under consideration. It will be updated regularly (biannually) to ascertain progress in achieving the stated goals.

The head of AENTA, as the national CPF coordinator, will select a team of experts to implement the monitoring and evaluation programme in collaboration with the programme management officer (PMO), who will be the Agency's contact point for CPF activities, and the relevant technical officers.

Review must cover all significant changes (both positive and negative) that have affected the programme and their impact on implementation in order to make the process more efficient through continuous improvement so that projects would have a greater, more beneficial impact.

### **4.2 Partner coordination**

Cuba maintains relations with other international organizations, such as ARCAL, WHO, UNDP, GEF, UNIDO, PAHO, FAO, UNDESA, CLAF, CEPAL, OLADE, LAS-ANS, ICTP, CYTED, FORO and UNEP, which are involved in projects in their sphere of competence. It collaborates bilaterally with European, Latin American and Asian institutions, and continues to seek other alliances through bilateral agreements with other organizations.

Eight direct effects, on which the United Nations system has focused jointly in Cuba, were identified in the 2014–2018 UNDAF, to which the Agency is a signatory. It has been determined that Agency's technical cooperation programme could contribute to three of those direct effects, namely Effect 1: Development and sustainability of social services; Effect 6: Food and nutritional security; and Effect 7: Environmental sustainability and disaster risk management.

The 17 SDGs will, moreover, be reviewed as part of the new sustainable development agenda drawn up to eradicate poverty, protect the planet and ensure prosperity for all. Against that backdrop, it is to be noted that the priorities identified in the CPF will contribute directly to the following SDGs: 2: Zero hunger; 3: Good health and well-being; 6: Clean water and sanitation; 7: Affordable and clean energy; 12: Responsible consumption and production; 13: Climate action; 14: Life below water; and 15: Life on land.

Action taken after the design phase of projects for the 2018–2019 cycle on projects on the introduction into the country of SIT for pest and disease control, child obesity control and integrated coastal management issues has been coordinated with FAO, WHO, UNICEF and GEF.

## Annex 1: Partnership Matrix

Thematic area	National plan or sectoral strategy outcome	CPF outcomes	Links to SDGs	Link to UNDAF results	Relevant partners
Food and agriculture	Ensure national food sustainability	<ul style="list-style-type: none"> <li>National capacities to provide irradiation services to agriculture sectors rebuilt.</li> <li>National capacities for comprehensive water and soil management by means of nuclear techniques built</li> <li>New climate change resistant varieties obtained.</li> <li>Capacities to introduce SIT to control livestock pests built.</li> <li>National capacities for regulatory impact assessments of livestock reproduction and milk production rehabilitated.</li> </ul>	<p><u>SDG 2</u></p> <p>End hunger, achieve food security and improved nutrition and promote sustainable agriculture</p> <p><u>SDG 6</u></p> <p>Ensure availability and sustainable management of water and sanitation for all</p>	06. Food and nutritional security	<p><u>National</u></p> <p>AENTA CEADEN IIIA-PIA MINAG INCA CENSA</p> <p><u>International</u></p> <p>CGIAR GEF FAO IFAD UNDP UNCCD</p>
Human health and nutrition	Improve the Cuban people's health and well-being	<ul style="list-style-type: none"> <li>National radiotherapy and nuclear medicine capacities to manage patients with non-communicative diseases built.</li> <li>National capacities for clinical and non-clinical evaluation studies of radiopharmaceuticals in accordance with best practices enhanced.</li> <li>Arbovirus transmission prevented and controlled through sustainable</li> </ul>	<p><u>SDG 3</u></p> <p>Ensure healthy lives and promote well-being for all at all ages</p>	01 Development and sustainability of social services	<p><u>National</u></p> <p>AENTA CENTIS INEM MINSAP</p> <p><u>International</u></p> <p>PAHO/WHO FAO UNICEF IAEA-PACT</p>



Thematic area	National plan or sectoral strategy outcome	CPF outcomes	Links to SDGs	Link to UNDAF results	Relevant partners
		<p>management of <i>Aedes Aegypti</i> mosquitoes.</p> <ul style="list-style-type: none"> <li>National capacity built for conducting nutritional studies in support of policies on control and management of non-communicable diseases and healthy lifestyle promotion. Diagnostic imaging capacities enhanced and integrated</li> </ul>			
Water and the environment	Ensure environmental sustainability in Cuba	<ul style="list-style-type: none"> <li>Regional reference centre for integrated coastal management, using nuclear and related techniques, strengthened.</li> <li>Service packages for assessing water treatment systems by means of nuclear techniques and complementary analytics introduced. Risks and environmental impact assessed, by means of nuclear and related technologies, for the safe management of the National Chemical Products and Hazardous Waste Disposal Facility. National capacities for isotope hydrology studies built. National air quality monitoring and evaluation capacities built</li> </ul>	<p><u>SDG 3</u></p> <p>Ensure healthy lives and promote well-being for all at all ages</p> <p><u>SDG 6</u></p> <p>Ensure availability and sustainable management of water and sanitation for all</p> <p><u>SDG 14</u></p> <p>Conserve and sustainably use the oceans, seas and marine resources</p>	Objective 07: environment and climate change.	<p><u>National</u></p> <p>AENTA CEAC CEADEN CPHR</p> <p><u>International</u></p> <p>FAO GEF UNDP</p>

Thematic area	National plan or sectoral strategy outcome	CPF outcomes	Links to SDGs	Link to UNDAF results	Relevant partners
			<p>for sustainable development</p> <p><u>SDG 15</u></p> <p>Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss</p>		

Thematic area	National plan or sectoral strategy outcome	CPF outcomes	Links to SDGs	Link to UNDAF results	Relevant partners
Energy and Industry		<ul style="list-style-type: none"> <li>• National capacities for comprehensive energy planning studies built</li> <li>• Human resource capacity built for the introduction of accelerators for the use of radiation techniques and reactors for the production of isotopes</li> <li>• National capacity to provide non-destructive testing services to the industrial sector</li> </ul>	<p><u>SDG 7</u></p> <p>Ensure access to affordable, reliable, sustainable and modern energy for all</p> <p><u>SDG 9</u></p> <p>Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation</p>		UNIDO

## Annex 2: List of participating institutions

### MAIN IAEA PARTNERS IN THE COUNTRY

The **Ministry of Science, Technology and Environment of Cuba (CITMA)** is the central State administration body (OACE) that acts as the IAEA's main counterpart in Cuba, both as a representative to policy bodies, in close coordination with the Ministry for Foreign Affairs (MINREX), and for technical cooperation, safeguards and security and compliance with the main conventions, treaties and agreements deposited with the Agency.

The **Ministry of the Interior (MININT)** acts as the IAEA's counterpart for nuclear safety and related conventions (such as the Convention on the Physical Protection of Nuclear Material and its Amendment). Accordingly, it manages and coordinates Cuba's Integrated Nuclear Security Support Plan (INSSP).

The **Agency for Nuclear Energy and Advanced Technologies (AENTA)** is the coordinating institution that promotes and manages nuclear-related programmes and projects in the country and acts on behalf of CITMA as the National Liaison Office for technical cooperation with the Agency. It comprises several centres, namely the:

- **Centre for Technology Applications and Nuclear Development (CEADEN)**, established to provide the necessary support for the introduction of nuclear and related techniques into various areas of national socioeconomic life. It conducts research–development activities, provides scientific and technical services and engages in small-scale production on demand;
- **Isotope Centre (CENTIS)**, dedicated to the production and research–development of radiopharmaceuticals, other radiolabelled compounds and sets of reagents used for *in vitro* diagnosis, participates in the development of pharmaceuticals by labelling molecules and conducting pharmacokinetic studies, and engages in radionuclide metrology (magnitude of radioactive charge), in particular for medical applications;
- **Centre for Energy Information and Development Management (CUBAENERGIA)**, which provides highly competitive scientific and technological services by managing information and research projects that contribute to national sustainable energy development, and gives specialists access to scientific and technological information on nuclear energy and other forms of energy;
- **Centre for Radiation Protection and Hygiene (CPHR)**, established in order to build the necessary foundations for radiation protection and safety in Cuba. It provides occupational monitoring and environmental radiation monitoring services throughout the country, it conducts ionizing radiation metrology and biological dosimetry in radiation emergencies, it responds in radiation emergency situations and provides advisory services on radiation safety, courses and events;
- **Camagüey Environmental Engineering Centre (CIAC)**, established to conduct research and provide specialized scientific and technical services for environmental management using nuclear and related techniques;
- **Cienfuegos Environmental Studies Centre (CEAC)**, which conducts environmental studies on the preservation and integrated management of coastal areas and on the inherent risks of environmental factors.

**Partners involved in regulatory activities comprise the:**

- **National Nuclear Safety Centre (CNSN)**, attached to CITMA's Office of Environmental Regulation and Nuclear Safety (ORASEN). It is the regulatory body for the country's nuclear material, it keeps the register of the State's nuclear material accounting and control system (SNCC) and it is the technical body responsible for the application of IAEA safeguards in Cuba;
- **Centre for State Control of Medicines, Equipment and Medical Devices (CECMED)**;
- **National Environmental Health Directorate (DNSA)**, which is the regulatory authority for diagnostic radiography;
- **Higher Institute of Technologies and Applied Science (InSTEC)**, a Cuban university institution that provides undergraduate and postgraduate education in nuclear physics, radiochemistry, nuclear and energy technology engineering and meteorology. It offers Master's degree and PhD programmes on nuclear and related subjects, knowledge management and the environment. It conducts research—development activities, provides scientific and technical services and develops software, among other things. It maintains close links with universities and research centres in Latin America and Europe.

**Main partners involved in medical applications**

- National Institute for Oncology and Radiobiology (INOR)
- Institute for Cardiology and Cardiovascular Surgery (ICCV)
- National Institute of Food Hygiene (INHA)
- Institute for Nephrology
- Centre for Molecular Immunology (CIM)
- International Center for Neurological Restoration (CIREN)
- Pedro Kourí Tropical Medicine Institute (IPK)
- Frank País Orthopaedic Hospital
- Medico-Surgical Research Centre (CIMEQ)
- Hermanos Ameijeiras Clinical Surgical Hospital (HHA)
- National Institute of Hygiene, Epidemiology and Microbiology (INHEM)

**Main partners involved in agricultural applications**

- National Institute of Agricultural Sciences (INCA)
- National Centre for Hydrology and Water Quality (CENHICA)
- Institute for Sugar Cane Research (INICA)
- National Centre for Animal and Plant Health (CENSA)
- Rice Research Institute (IIA)
- Animal Improvement Research Centre (CIMA)
- Institute of Agricultural Sciences (ICA)
- Plant Health Research Institute (INISAV)
- National Water Resources Institute (INRH)
- Soil Institute (IS)

**Main partners involved in industrial applications**

- Cuban Sugar Research Institute (ICINAZ)
- National Petroleum Geophysics Company (ENG del Petróleo)

- Centre for Lateritic Research (CIL)
- Power Plant Maintenance Company (EMCE)
- Centre for Metallurgical Research (CIME)
- Central University of Las Villas (UCLV)
- José Antonio Echevarría Higher Polytechnical Institute (ISPJAE)
- Industrial Works Company (ECOI)
- Institute for Food Industry Research (IIIA)

### Annex 3: Compilation of treaties under the auspices of the IAEA

Cuba has been an IAEA Member State since 1957, and is party to the following Multilateral Agreements:

	Title	In Force	Status
P&I	Agreement on the Privileges and Immunities of the IAEA	1982-08-24	acceptance: 1982-08-24
VC	Vienna Convention on Civil Liability for Nuclear Damage	1977-11-12	Signature: 1964-12-10 ratification: 1965-10-25
CPPNM	Convention on the Physical Protection of Nuclear Material	1997-10-26	accession: 1997-09-26
NOT	Convention on Early Notification of a Nuclear Accident	1991-02-08	Signature: 1986-09-26 ratification: 1991-01-08
ASSIST	Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency	1991-02-08	Signature: 1986-09-26 ratification: 1991-01-08
NS	Convention on Nuclear Safety		Signature: 1994-09-20
RSA	Revised Supplementary Agreement Concerning the Provision of Technical Assistance by the IAEA (RSA)	1993-07-13	Signature: 1993-07-13
ARCAL	Co-operation Agreement for the Promotion of Nuclear Science and Technology in Latin America and the Caribbean (ARCAL)	2005-09-05	Signature: 1998-09-25 ratification: 2002-09-04

Last updated on 2011-04-11 by OLA

And the following Safeguards Agreements:

Reg.No	Title	In Force	Status
1394	Application of Safeguards in connection with the Supply of a Nuclear Power Plant from the Union of Soviet Socialist Republics	1980-05-05	Signature: 1980-05-05
1504	Application of Safeguards in connection with the Supply of a Zero-Power Nuclear Reactor from the Hungarian People's Republic	1983-10-07	Signature: 1983-10-07
1771	Agreement between the Republic of Cuba and the International Atomic Energy Agency for the Application of Safeguards in connection with the Treaty for the Prohibition of Nuclear Weapons in Latin America and the Caribbean and the Treaty on the Non Proliferation of Nuclear Weapons	2004-06-03	Signature: 2003-09-18
1772	Protocol Additional to the Agreement between the Republic of Cuba and the International Atomic Energy Agency for the Application of Safeguards in connection with the Treaty for the Prohibition of Nuclear Weapons in Latin America and the Caribbean and the Treaty on the Non-Proliferation of Nuclear Weapons	2004-06-03	Signature: 2003-09-18

- Cuba ratified the Treaty for the Prohibition of Nuclear Weapons in Latin America and the Caribbean on 26 October 2002 and acceded to the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) on 4 November 2002.
- Cuba has a comprehensive safeguards agreement with the Agency and an additional protocol, both of which entered into force on 3 June 2004.
- Convention on Civil Liability for Nuclear Damage. *State Party*, 1965.
- Convention on Nuclear Safety. *Signatory*.
- Convention on Early Notification of a Nuclear Accident. *State Party*, 1991.
- Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency. *State Party*, 1991.
- Convention on the Physical Protection of Nuclear Material. *State Party*, 1997.
- Committed to upholding the Code of Conduct (2004) and the Guidance (2012). *Contact point* (2008).



#### Annex 4: Contacts of Partners in Cuba

Thematic area	CPF outcomes	Relevant Partners & Programmatic Links	Partner Contact
Food and agriculture	<ul style="list-style-type: none"> <li>National capacities to provide irradiation services to the health and agriculture sectors rebuilt.</li> <li>National capacities for comprehensive soil management by means of nuclear techniques built</li> <li>New climate change resistant varieties obtained.</li> <li>Capacities to introduce SIT to control livestock pests built.</li> <li>National capacities for regulatory impact assessments of livestock reproduction and milk production rehabilitated.</li> </ul>	<p><u>FAO</u></p> <p><u>Country Programme Framework 2013-2018</u></p> <p>Area A. Sustainable production of food, seeds and animal feed.</p> <ul style="list-style-type: none"> <li>Increase in agricultural production, reduction of food imports.</li> </ul> <p>Area D. South-South Cooperation</p> <ul style="list-style-type: none"> <li>Supported the development of South-South cooperation, issued and received.</li> </ul>	<p>FAO Representative:</p> <p>Mr. THEODOR FRIEDRICH</p> <p>Email: <a href="mailto:FAO-CU@fao.org">FAO-CU@fao.org</a></p>
		<p><u>UNDP</u></p> <p><u>Country Programme 2014-2018</u></p> <ul style="list-style-type: none"> <li>Food and nutritional security.</li> </ul>	<p><b>Ms Barbara Pesce-Monteiro</b></p> <p>Coordinadora Residente Sistema De Las Naciones Unidas en Cuba y Representante Residente PNUD</p> <p>Oficina del PNUD en Cuba Calle 18 No. 110 e/ 1ra y 3ra, Miramar, Playa, La Habana, Cuba Tel: (537) 2041513, Fax: (537) 204 1516 Email: <a href="mailto:registry.cu@undp.org">registry.cu@undp.org</a> Sitio Web: <a href="http://www.undp.org.cu">www.undp.org.cu</a></p>
		<p><u>CGIAR</u></p> <p>Research priorities – Climate-smart agriculture focusing on urgently needed adaptation and mitigation options for farmers and other resource users.</p>	

Thematic area	CPF outcomes	Relevant Partners & Programmatic Links	Partner Contact
		<u>IFAD</u> Country Strategy Note TC related priorities: Increasing the productivity, efficiency and competitiveness of selected locally produced foodstuff; target group: smallholders IFAD's value added is considered to be supporting the Government in: (i) identifying projects in which local production by smallholders in cooperatives can be competitive; (ii) selecting the geographical areas and beneficiaries of the interventions, based on IFAD's targeting experience; (iii) proposing the development of business plans that are defined in a participatory manner, including not only equipment but also capacity building; and (iv) supporting the development of private forms of production and agricultural services.	IFAD Country Programme Manager Via Paolo di Dono, 44 Rome, Italy Work: +39 0654592308 Fax: +39 0654593308
		<u>GEF</u> Current related projects in Cuba : Land degradation Biodiversity	Mr. Enrique Moret Hernandez Ministry of Science Technology and Environment (CITMA) Calle 18A # 4118 e / 41 y 47 La Habana, - 11300 Cuba Tel: + 537 2144 256 Email: emoret@citma.cu; dcicitma@ceniai.inf.cu; yadira.gonzalez@citma.cu; yadira.gonzalez73@gmail.com
		<u>IAEA/UNCCD Partnership Agreement (2013-2017)</u> 1) Sustainable land management 2) Training and capacity building 3) Technical support and research activities	<b>IAEA/UNCCD Partnership Focal Point:</b> <b>Ms Ana Raffo-Caiado</b> <b>Director</b> Division of Programme Coordination and Support Department of Technical Cooperation International Atomic Energy Agency Tel: +43 1 2600 22500

Thematic area	CPF outcomes	Relevant Partners & Programmatic Links	Partner Contact
Human health and nutrition	<ul style="list-style-type: none"> <li>National radiotherapy and nuclear medicine capacities to manage patients with non-communicative diseases built.</li> <li>National capacities for clinical and non-clinical evaluation studies of radiopharmaceuticals in accordance with best practices enhanced.</li> <li>Arbovirus transmission prevented and controlled through sustainable management of <i>Aedes Aegypti</i> mosquitoes.</li> <li>National capacity built for conducting nutritional studies in support of policies on control and management of non-communicable diseases and healthy lifestyle promotion. Diagnostic imaging capacities enhanced and integrated</li> </ul>	<u>PAHO/WHO</u>  1: Contribute to the strengthening of the national health system  4: Strengthen the integrated public health surveillance system.  6: Support the initiatives for the prevention and mitigation of disaster effects on the health of the population.	Email: <a href="mailto:A.Raffo-Caiado@iaea.org">A.Raffo-Caiado@iaea.org</a>  PAHO WHO Representative Tel: +53 7 8375808 Fax: +53 7 8332075 E-mail: <a href="mailto:moralesc@paho.org">moralesc@paho.org</a>
		<u>FAO</u>  Country Programme Framework 2013-2018  Areas C: Health, quality and food safety (safety, safety and quality) <ul style="list-style-type: none"> <li>Strengthen food and nutrition education and guidance in food for families, teachers and health personnel</li> </ul>	<b>Mr Theodor FRIEDRICH</b> FAO Representative: Email: <a href="mailto:FAO-CU@fao.org">FAO-CU@fao.org</a>
		<u>IAEA-PACT</u> <ul style="list-style-type: none"> <li>Build partnerships with cancer-related organizations committed to addressing cancer in all its aspects</li> <li>Mobilize resources to assist with the development/implementation of radiation medicine capacities for the national cancer control programme.</li> <li>Ensure effective and sustainable transfer of radiation medicine technologies or knowledge where unmet needs exist.</li> </ul>	<b>Ms Nelly/Enwerem-Bromsom</b> Director Division of PACT, TC, IAEA Tel: +43 2600 21360 Email: <a href="mailto:N.Enwerem-Bromson@iaea.org">N.Enwerem-Bromson@iaea.org</a>

Thematic area	CPF outcomes	Relevant Partners & Programmatic Links	Partner Contact
		<p><u>UNICEF</u></p> <p>Cuba Country Programme 2014-2018</p> <p><b>Programme component: Health and nutrition.</b></p> <ul style="list-style-type: none"> <li>• maternal, child and adolescent health.</li> <li>• the promotion and protection of breastfeeding.</li> <li>• better feeding practices and a healthy food and nutrition culture</li> </ul>	<p>UNICEF</p> <p>Calle 1ra. B No. 15802</p> <p>Esquina a 158</p> <p>Reperto Náutico, Playa</p> <p>Ciudad de la Habana, Cuba</p> <p>Tel: + 53 7 208 6307</p> <p>Email: <a href="mailto:Havana@unicef.org">Havana@unicef.org</a></p>
Water and the environment	<ul style="list-style-type: none"> <li>• Regional reference centre for integrated coastal management, using nuclear and related techniques, strengthened.</li> <li>• Service packages for assessing water treatment systems by means of nuclear techniques and complementary analytics introduced. Risks and environmental impact assessed, by means of nuclear and related technologies, for the safe management of the National Chemical Products and Hazardous Waste Disposal Facility. National capacities for isotope hydrology studies built. National air quality monitoring and evaluation capacities built</li> </ul>	<p><u>FAO</u></p> <p>Country Programme Framework 2013-2018</p> <ul style="list-style-type: none"> <li>• Area B Adaptation to climate change and sustainable management of natural resources.</li> <li>• The selected institutions effectively implement the National Environmental Strategy, the National Strategy for Biodiversity and other programs, such as the National Program of Action to Combat Desertification and Drought and Sustainable Land Management.</li> <li>• Addressing environmental problems of the past, correcting those of the present and avoiding, as far as possible, new impacts on the environment. See Guidelines 133 and 136 for more details.</li> </ul> <p>Area D. South-South Cooperation</p> <ul style="list-style-type: none"> <li>• Supported the development of South-South cooperation, issued and received.</li> </ul>	<p>Mr Theodor FRIEDRICH</p> <p>FAO Representative:</p> <p>Email: <a href="mailto:FAO-CU@fao.org">FAO-CU@fao.org</a></p>
		<p><u>UNDP</u></p> <p>Country Programme 2014-2018</p> <ul style="list-style-type: none"> <li>• Environmental sustainability and disaster risk management.</li> </ul>	<p>Ms Myrta Kaulard</p> <p>Coordinadora Residente Sistema De Las Naciones Unidas en Cuba y Representante Residente PNUD</p>

Thematic area	CPF outcomes	Relevant Partners & Programmatic Links	Partner Contact
			<p>Oficina del PNUD en Cuba  Calle 18 No. 110 e/ 1ra y 3ra, Miramar,  Playa, La Habana, Cuba  Tel: (537) 2041513, Fax: (537) 204  1516 Email:  myrta.kaulard@one.un.org  Sitio Web: <a href="http://www.undp.org.cu">www.undp.org.cu</a></p>
		<p><u>GEF</u></p> <p><u>Related focal areas:</u></p> <p>Climate change</p>	<p>Mr. Enrique Moret Hernandez</p> <p>Ministry of Science Technology and  Environment (CITMA)  Calle 18A # 4118 e / 41 y 47  La Habana, - 11300  Cuba  Tel: + 537 2144 256  Email: emoret@citma.cu;</p>
Energy and Industry	<ul style="list-style-type: none"> <li>National capacities for comprehensive energy planning studies built</li> <li>Human resource capacity built for the introduction of accelerators for the use of radiation techniques and reactors for the production of isotopes</li> </ul> <p>National capacity to provide non-destructive testing services to the industrial sector</p>	<p><u>UNIDO</u></p> <p><b>Area II: Increasing the industrial competitiveness</b></p> <p>2.1 Developed Industrial Modernization and Upgrade</p> <p>2.4 Enhanced Human Resources Capacities</p>	<p>Mr. Fidel Domenech Lopez</p> <p>Country Programme Coordinator</p> <p>Calle 18 Mro. 110, entre lera y  Miramar, Playa, Havana</p> <p>Telephone: +53 72041513</p>