



GOVERNMENT OF THE LAO PEOPLE'S
DEMOCRATIC REPUBLIC



INTERNATIONAL ATOMIC
ENERGY AGENCY

COUNTRY PROGRAMME FRAMEWORK 2013-2017

On behalf of the Government:

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LIST OF ACRONYMS

ADB	Asian Development Bank
AIDS	Acquired Immune Deficiency Syndrome
BSS	Basic Safety Standards
CCA	Common Country Assessment
CCS	Country Cooperation Strategy
CLV	Lao-Vietnam-Cambodia
CPF	Country Programme Framework
DPs	Development Partners
FAO	Food and Agriculture Organization of the United Nations
FY	Fiscal year
GDP	Gross Domestic Product
GMS	Greater Mekong Sub-region
HIV	Human Immunodeficiency Virus
HRD	Human Resource Development
IAEA	International Atomic Energy Agency
ICC	Immunization Coordination Committee
ICT	Information and Communication Technology
IMR	Infant mortality rate
LDC	Least developing country
MDGs	Millennium Development Goals
MMR	Maternal mortality ratio
MOH	Ministry of Health
MoST	Ministry of Science and Technology
MoNRE	Ministry of Natural Resources and Environment
MEM	Ministry of Energy and Mining
MAF	Ministry of Agriculture and Forestry
NA	National Assembly
NCLE N	National Centre for Laboratory and Epidemiology
NDC	Non Communicable Disease
NEIDCO	National Emerging Infectious Disease Coordination Office
NGO	Nongovernmental organisation
NHSDP	National Health Sector Development Plan
NSEDP	National Socio-Economic Development Plan
NSRC	Nuclear Safety and Radiation Control
NST	Nuclear Science and Technology
QA/QC/QM	Quality Assurance/Quality Control/ Quality Management
R&D	Research and Development
RCA	Regional Cooperation Agreement
SASS	State Authority Social Security
SIM-RW	System Information Management for Radioactive Waste
SIT	Sterile Insect Techniques
TB	Tuberculosis
TCDC	Technical Cooperation Developing Country
TCP	Technical Cooperation Programme
TSOs	Technical Support Organizations
TWG	Technical working group
UN	United Nations
UNAIDS	Joint United Nations Program on HIV/AIDS
UNCT	United Nations Country Team
UNDAF	United Nations Development Assistance Framework
UNDP	United Nations Development Programme
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund
UNODC	United Nations Office for Drugs and Crimes
USAID	United States Agency for International Development
UXO	Unexploded Ordnance
WB	World Bank

WFP
WHO

United Nations World Food Programme
World Health Organization

EXECUTIVE SUMMARY

The Country Programme Framework (CPF) described in this document constitutes the frame of reference for the near-term and medium-term planning of technical cooperation between the Lao PDR and the International Atomic Energy Agency (IAEA) for the period 2013–2017.

The objective of this CPF is to categorize priorities and activities required to support the sustainable delivery of the IAEA technical cooperation projects in the country, incorporating characteristics relating to legal and institutional frameworks, regional, multilateral and bilateral cooperation, relevant international conventions and information activities, with the purpose of supporting the transparency, sustainability, efficiency and implement ability of the programme for the benefit of sustainable development of the country and the region. For that reason, the Government is concerned in further endorsing and strengthening its technical cooperation programme with the IAEA in order to support better utilization of nuclear techniques by means of enlarging its participation in cooperation projects in important development areas, and commitment to ensuring distribution of the financial, technical and human resources required for their implementation, progress and sustainability.

This CPF has been developed following a wide-ranging consultation process between the IAEA and the competent national authorities involving all the ministries and institutions concerned in the following sectors: academic, radiation safety, health, agriculture, environment, energy, amongst others. The programme covered in this CPF document will be concentrated on areas of particular importance that have been identified in the fields of: Human Health, Food and Agriculture (Sustainable Development), Environment Protection, Water Resources Management, Sustainable Energy Development, Industry, Radiation and Nuclear Safety and Nuclear Security. This will be supported by a new human resource strategy approach to support the Government's National Development Plan. In this connection, subsequent programmes of assistance from the Agency will emphasise the need for capacity development in more innovative ways.

Consistent with relevant recommendations of the Agency's Board of Governors, the Strategy for Technical Cooperation and the objectives of Country Programme Frameworks, the future programmes are organised into three categories, namely, (a) the near-term programme, (b) the medium-term programme, and (c) general support activities.

The **near-term programme** to be supported by this CPF will concentrate on a few high priority needs defined in each socio-economic activity as outlined above. In **human health** area the objective is to provide nuclear medicine technique packages for diagnostic, therapeutic and palliative uses with a view to overcoming the cancer and infectious diseases. The focus will continue on efforts to build an adequate core of professionals for cancer management by strengthening radio diagnostic and therapy facilities/centres and establishing a national capability for education in medical physics, nuclear medicine and radiation oncology. In **food and agriculture** the objective is to increase the quality of food and agricultural production and to enhance the adaptation capabilities of food crops to climatic stress conditions with a view to ensuring national food security and protection of the environment. The priority would be the preparation of readiness of introduction of nuclear

technology for agriculture development to ensure the food security and safety. Moreover, to mitigate some effects of climate change, land and water management practices including soil and water conservation. In the field of **environmental protection**, the objective is to study dispersion of pollutants in the environment using appropriate nuclear and related analytical techniques in support of the national development programmes. The application of relevant nuclear techniques is to support the management of natural resources in particular the **water resources management**. In this area much effort will studying groundwater resources development and management and key matters generated by climate change around Mekong River. To study energy resources to design a Sustainable Energy Development is a focus in this area to able to satisfy the future energy demand, with low energy related environmental impacts. In **industrial application** of radioisotopes the focus is to introduce the use of new technologies and safety and security aspects. In the area of **nuclear and radiation safety** the top priority for IAEA support, will be the need to help the national authorities accelerate the process for enhancing the national radiation safety infrastructure in compliance with the Radiation Protection and Safety of Radiation Sources. In the area of **nuclear security** the focus will be on establishing an appropriate legal framework. The risk that nuclear or other radioactive material could be used in malicious acts remains high and is regarded as a serious threat to international peace and security.

The medium term programme implemented under this CPF will place greater emphasis on human resources building, skills retention, quality management as well as enhancement of economic competitiveness. Enhanced IAEA assistance is expected to make a significant contribution to national planned programme aimed at maximizing crop productivity through crop improvement, food quality and water utilization initiatives. The nuclear science and technology programme will focus on disseminating the results obtained through the different projects, with the aim to promote widely nuclear services and products to public and potential end-users in order to gain stakeholders recognition and public acceptance.

In human health, it is envisaged that additional support will be also needed in addressing skill shortages in both the nuclear medicine and radiotherapy fields. The improvement of existing cancer treatment centres in different local hospitals. Upgrading and modernizing various medical facilities related to diagnostic and therapy should be sought. In the area of food and agriculture, the focus will continue on improvement of crop and livestock productions, post harvesting, food quality and safety, mitigation and adaptation to climate change, and safety use of nuclear techniques and technologies. There is a need to improve laws and regulations on environment conservation and pollution control in environmental protection area. Using nuclear application to monitor, inspect and evaluating the environment management in industrial projects. The programmes for water resource, weather forecast, hydrology will carry out: water resource management strategy and plan to ensure the utilized efficiently, thus impacting the ecosystem and to protect watersheds. The contribution of energy and mining sectors will continue the development of the increasing amount of energy supply, energy consumption, energy resource management, and sustainable energy plan frameworks. The contribution of industry sector will continue for enhancing the application of research reactor, application of radiation technology and accelerators and digital Non Destructive Evaluation technology for the industrial activities. In line with radiation and nuclear safety, the Agency's support will continue in assisting the Government in establishing the minimum elements of

the national infrastructure. Occupational and public radiation protection aspects will be fully addressed.

Further to the core programme and notwithstanding the fact that the Agency's support is not meant to substitute Government's efforts and responsibility for sustaining nuclear technology related projects in the country, the assistance of the Agency is at times essential for the continuation of on-going activities. Human resource development will continue to be given greater priority in the context of the cooperation between the Government and the Agency. The bulk of the required support activities could be undertaken within the framework of RCA programme and other regional technical cooperation projects. The IAEA's assistance will support national efforts designed to further develop human resources while at the same time promote the use of new learning/training tools and methodology such as Information and Communication Technology (ICT) and e-learning to which the Lao PDR. Specific assistance will be provided to some institutions in the form of mentorship to help them introduce successfully potential nuclear techniques to address developmental problems. It is envisaged that IAEA support will assist the Government in playing a more active role in the participation of relevant regional projects.

This CPF will promote the fullest possible utilization of available nuclear facilities and expertise in Lao PDR to accompany optimally the socio-economic development of the country and the integration of nuclear techniques into the national development plan. Such integration will enhance the credibility and relevance of nuclear techniques and nuclear activities and consolidate partnerships with various stakeholders by increasing their contribution towards achieving national development goals, including the Millennium Development Goals (MDGs). This CPF will also assist Lao PDR in establishing an Atomic Energy Commission or equivalent as well national nuclear institutions to promote socio-economic development in the above-mentioned priorities using potential nuclear techniques.

1. INTRODUCTION

The Country Programme Framework (CPF), which has been formulated to provide a linkage between national priority areas and the Technical Cooperation (TC) of the IAEA, provides inputs based on identified needs, interests and priorities that can contribute to the socio-economic development of the country. This document is developed on the basis of national development plans of Lao PDR, 7th Five Year National Socio Economic Development Plans (7th NSEDP) (2011-2015), the 7th Five Year of National Health Sector Development Plan (7th NHSDP) (2011-2015), the United Nations Development Assistance Framework (UNDAF) for (2012-2015), WHO Country Cooperation Strategy (CCS) action plan for the same period, Millennium Development Goals (MDG) by 2015, country specific needs, assessment of the existing programmes, lessons learned from past technical cooperation, expertise, resources and achievements all other relevant national stakeholders (see Figure 1.1 and 1.2).

The objective of the CPF is to establish a mutual understanding between the Government and the IAEA on future programming, focusing on safety and security and developmental issues that will contribute towards achieving the objectives identified in the National Developmental Plans as well as the Millennium Development Goals, with aim of graduation from the Least Developed Country (LDC) status by 2020. This is first CPF of Lao PDR which will cover 2013-2017 periods, with specific focus on, food and agriculture, human health, energy, natural resources and environment, industry, radiation safety, nuclear safety and security.

The CPF assist in planning and implementing potential nuclear programmes that are linked to the national development objectives and priorities in collaboration with the IAEA, as well as facilitating the assessment and evaluation of the impact and sustainability of the IAEA assistance to the country. The overall aim is to create awareness and enhance the contribution of peaceful applications of nuclear techniques in Lao PDR while at the same time creating and sustaining an environment for the safe application of these technologies.

The CPF is intended to be a concise working document that should be revised if and when critical circumstances change rather than a rigid document locking either party into a plan which may no longer serve mutual needs. The primary audiences for the CPF are those institutions and partners who are directly involved in the TC Programme and may also serves as a useful source of information for higher levels of management.

The endorsement of the CPF Document by the relevant Government bodies and the Agency, while not being legally binding, demonstrates common commitment and shared responsibility to implement a programme of cooperation.

The CPF serves two closely related purposes regarding future TC programming between Laos DPR and the International Atomic Energy Agency (IAEA) on the peaceful application of nuclear science and technology. First, the development of the CPF stimulates clear communication between the national decision makers involved in the definition of the country's development priorities on the one hand, and those who are responsible for the management of the IAEA TC programme and resources limitations of the IAEA on the other.

The objective is to reach an agreement on future programming, which focuses on the limited resources available through the IAEA's Technical Cooperation Programme on selected areas of development that are of high priority to the Government, and where technology available through assistance provided by the IAEA can make a significant contribution. Identification of these selected areas provides opportunities for establishing high quality projects.

The second function served by a CPF is to record the agreement that is reached as a reference for use in preparing project requests by the Member States, and in appraising those requests. The mutual endorsement of the CPF by the Government and the IAEA allows for the document to be revisited if and when the circumstances change. The CPF is not regarded as a rigid document locking either party into a plan, which may no longer serve mutual needs.

The CPF document guides those who are directly involved with the TC Programme in Laos DPR and in the IAEA in prioritizing areas for cooperation. At the same time, the CPF document also serves as a useful source of information for national authorities and the IAEA Secretariat.

The document outlines a strategy for the IAEA technical cooperation efforts in supporting the current socio-economic development goals of the Government. The Technical Cooperation activities planned under the CPF are an integral part of and support to the national development plan expressed in the priorities established by the Government. The CPF is a dynamic process; therefore, the present document will be reviewed when deemed necessary, but not later than the year 2017.

The programming plans outlined here emanate from numerous consultations between the relevant national authorities and staff members of the IAEA. They are consistent with the Government's priorities with regard to the utilization of nuclear techniques for socio-economic development and take account of accomplishments of and progress made under previous and present IAEA-supported projects.

The programme covered in this CPF document will be concentrated on areas of particular importance that have been identified in the fields of (see Figure 2.1):

- 1) Human Health
- 2) Food and Agriculture (Sustainable Development)
- 3) Environment Protection
- 4) Water Resources Management
- 5) Sustainable Energy Development
- 6) Industry
- 7) Radiation and Nuclear Safety
- 8) Nuclear Security

2. NATIONAL DEVELOPMENT PRIORITIES AND ACTIVITIES RELEVANT TO THE AGENCY'S TECHNICAL COOPERATION PROGRAMME

2.1 Country profile

Geography

The Lao People's Democratic Republic (Lao PDR) is located in South-eastern Asia, northeast of Thailand, west of Vietnam with Geographic coordinates 17:58 north, 102:36 east. The country is a landlocked country with total area of 236,800 km² (land: 230,800 km² and water: 6,000 km²) is bordered with Burma 235 km and China 423 km (to the northwest), Cambodia 541 km (to the south), Thailand 1,754 km (to the west), Vietnam 2,130 km (to the east). It has a waterways of 4,600 km (primarily on the Mekong River and its tributaries; 2,900 additional km are intermittently navigable by craft drawing less than 0.5 m) (2012). Lao PDR enjoys tropical monsoon of rainy season (May to November); dry season (December to April) and Terrain of mostly rugged mountains; some plains and plateaus. The country has natural resources of timber, hydropower, gypsum, tin, gold, and gemstones.

Demographic Structure

Lao PDR has the population of 6,385,057 (Lao Statistic Bureau, 2011). It is estimate that the population of Lao PDR will be 6.9 million by 2015. The majority of population of Lao PDR is young, with 50% of the total population under the age of 20. When classified by age group, it is estimated that in 2011, those aged 0-14 years old numbered approximately 2.38 million(of whom 1.17 million are female); those age 15-64 years number approximately 3.76 million(of whom 1.89 million); and those aged over 65 years old number approximately 237 thousand(of whom 127 thousand are female).

The official language is Lao. Lao PDR is a multi-ethnic country with the politically and culturally dominant Lao people making up approximately 60% of the population, mostly in the lowlands. Various Mon-Khmer groups, the Hmong, and other indigenous hill tribes, accounting for forty 40% of the population, live in the foothills and mountains.

There are 16 provinces (khoueng): Attapu, Bokeo, Bolikhamxai, Champasak, Houaphan, Khammouan, Louangnamtha, Louangphabang, Oudomxai, Phongsali, Salavan, Savannakhét, Viangchan, Vientiane, Xaignabouli, Xekong, and Xiangkhouang, and the Vientiane prefecture (kampheng nakhon) that includes the capital city Vientiane (Nakhon Luang Viangchan). Other large cities include Luang Prabang, Savannakhet and Pakse.

Economy

Since the late 1980s, the government's economic policy has been shifted from a centralized, planned economy toward an open, liberalized, market-oriented economic system. Lao PDR is a single-party socialist republic. Laos remains a country with an underdeveloped

infrastructure, particularly in rural areas. It has a rudimentary, but improving, road system, and limited external and internal land-line telecommunications.

Economic growth has reduced official poverty rates from 46% in 1992 to 26% in 2010. The growth exceeded 7% per year during 2008-11. The GDP in composition by sectors divided to three sections of agriculture: 27.8%, industry: 34.8% and services: 37.4% (2011 estimate). The GDP real growth rate was increased over past years (8.3% (2011 estimate); (7.9% (2010 estimate); 7.6% (2009 estimate)) The GDP per capita (PPP): \$2,700 (2011 estimate); (\$2,500 (2010 estimate); \$2,400 (2009 estimate)

The economy has benefited from high foreign investment in hydropower, mining, and construction. Electricity is available in urban areas and in many rural districts. It is a rising power in providing electricity to neighbouring countries such as Thailand, China and Vietnam and the economy is accelerating rapidly with the demands for its metals. Lao PDR is also producer and exporter of coal, however importing other energy sources such as petroleum and natural gas. Lao PDR has wide range of agriculture products such as sweet potatoes, vegetables, corn, coffee, sugarcane, tobacco, cotton, tea, peanuts, rice, cassava (manioc), water buffalo, pigs, cattle, and poultry. The country has industrial production growth rate of 17.7% (2010 est.) for mining (copper, tin, gold, and gypsum); timber, electric power, agricultural processing, rubber, construction, garments, cement, tourism.

The socio-economic infrastructure has developed to a certain extent, economic structure has changed according to the plans for industrialization and modernization, and laws and regulations have been drawn-up and enforced widely. Each of these has now become the basis for the next step of development. In addition, Lao PDR being located in the centre of the Sub-Mekong Region, it links ASEAN and China, ASEAN and Korea, and ASEAN and Japan. This geographical positioning is suitable to construct a cross-border service centre and connect it with other regions and the larger world.

2.2 National Vision and Development Strategy

The Lao PDR has the country's priority national development goals addressing in the strategic areas of the 7th Five Year National Socio-Economic Development Plan (7th NSEDP) 2011-2015, including the achievement of the Millennium Development Goals (MDGs) by 2015. The 7th NSEDP provides the significant outlines for poverty reduction, as well as building primary foundations for the future industrialisation and modernisation of the country, promoting equitable growth and helping the country graduate from Least Developed Country (LDC) status by 2020. The indicators of MDGs have moved towards the 2015 targets with the greatest achievements thus far are the reduction of income poverty; increase in primary net enrolment; reduction in child mortality; action against tuberculosis and malaria; and access to safe drinking water and basic sanitation in urban areas.

The 7th NSEDP is continued the 6th Five-Year Plan and it has an important role to realise the 9th Party Congress Resolution of the dynamic plan "Bouthalu – breakthrough strategy" which consists of the following four dynamic objectives: (1) achievement in imagination; (2) achievement in human resource development; (3) achievement in mechanism, regime, and administrative system; (4) achievement in poverty reduction by attracting more sources of funds and promoting special policy, and constructing basic infrastructure in focal areas. It is

regarded as a measure for achieving socio-economic development, industrialization and modernization towards the year 2020, and widens and deepens regional and international integration.

Overall targets of 7th Five Year Socio-Economic Development Plan (7th NSEDP)

1. Maintain economic growth in a stable and progressive manner at more than 8% per year, GDP per capita estimation for 2015 is approximately USD 1,700 per person per year at current prices.
2. Achieve the MDGs (including poverty reduction) and fill integration with the ASEAN Community by 2015, acquire modern technologies and infrastructures, and establish a diverse economic foundation to help the country graduate from Least Developed Country status in 2020.
3. Ensure sustainable development by integrating economic development with socio-cultural development and environment protection to the nation's advantage.
4. Ensure political stability, fairness, and order in the society; maintain public security; and support regional and international integration.

Some directions of 7th NSEDP are: developing a strong and stable macroeconomic foundation to ensure strongly growth; boosting the economic and labour structural change through industrialisation and modernisation; applying modern scientific and technological methods reducing poverty; protecting and sustaining the environment; conserving forest cover and water; regenerating natural resources to utilise them more effectively and sustainably; planning for mitigating climate change; raising the efficiency of the production process; working on comparative advantages of different economic sectors; reducing the risk of unexploded ordnance (UXO); promoting better health and hygiene-consciousness; strengthening public administration from the central to grass roots level; promoting democracy through the state's legal mechanisms; promoting industrialisation and modernisation, and encouraging SMEs, cooperative enterprises and household enterprises to utilised newer technologies for improving their productivity and increasing their effectiveness.

Targets of 7th Five Year Socio-Economic Development Plan 2011- 2015:

Target on international integration:

- Increase international trade to GDP ratio from 83% in 2010 to 100% or more in 2015;
- Achieve the target of full integration into the ASEAN Community by 2015, which is constituted of the three Community pillars: Security, Economic and Socio-Cultural; as well as to be drug free by 2015;
- Become a member of the World Trade Organisation;
- Achieve the Greater Mekong Sub-region (GMS) Cooperation Plan and triangle development Lao-Vietnam-Cambodia (CLV) Cooperation Plan;
- Contribute to the establishment of a drug-free ASEAN by 2015;
- Participate in GMS cooperation, through participating in ASEAN international commission and cooperation with Mekong sub-region countries: GMS, CLV, and CLMV.

Economic Targets:

- It is estimated that by 2015, the GDP per capita will be about USD 1,700 at current prices (exchange rate at 8,500kip/1USD).
- The agriculture and forestry sector is slated to grow at 3.5% annually, to form 23% of GDP by 2015; the industrial sector to grow at 15% annually, to form 39% of the GDP; and the services sector to grow at 6.5% annually, to form 38% of the GDP.
- Increase average export value by 18% and increase imports by 5% per annum; manufacturing industry and handicraft sector to have growth rates of maximum 13% per annum and to account for 15% GDP;
- The investment (state and private, combined) 32%, import 50% and export 35% by 2015;
- The growth process aims to be environmentally sustainable and adhere to set standards, and where possible create jobs;
- Rice production to reach 4.2 million tonnes, on a total area of 1.04 million hectares with an average productivity of 450-500 kilogram of rice per person per year in order to ensure energy of 2,400-2,500 kilocalorie per person per day;
- Expand livestock to reach 4-6% per year, of which cattle 2-3% pigs 4% and poultry 6%;
- Turn the irrigation into agri-irrigation development by applying machinery and electricity, covering 60-70% of the flat and mountainous cultivation areas or 50% of the rice, commercial grains and fruit trees cultivation area;
- Attempt to build 8 electricity power plants with capacity of 2,862 megawatts; attempt to expand 22 kv medium power grid and off grid to rural areas that still lack electricity in order to ensure 80% of total household have access to electricity by 2015;
- Attempt to complete the link between North-Middle and South power grid with 115 kv in order to balance the supply of electricity needs;
- Attempt to complete the link of power grid with neighbouring countries, especially Thailand and Vietnam 500 kv;
- Attempt to complete 75% of production of geographical-mining maps with a ratio of 1/200,000 and attempt to explore and process important minerals, such as copper plate 86,200 tons per year, copper powder 298,000 tons per year, gold bar 6 tons per year, coal 728,000 tons per year, gypsum 6000,000 tons per year.
- Construct and expand roads to link regionally to achieve 100% in 2015;
- supply clean water to 67% of total population in cities;
- Expand networks and telecommunication services in rural area to cover 90% of total national households;

- Expand data bases and national statistic indices to be in line with the national development situation.

Social Targets:

- By 2015, it is expected that Lao population will reach 6.9 million people with expansion rate of 2% per year.
- Attempt to reduce the poverty rate to below 19% of the total population and household poverty rate to below 10% of the total households in 2015.
- Increase net enrolment ratio in primary education to 98% by the year 2015;
- Increase the rate of students who continuously study from year 1 to year 5 to 95% and increase literacy rate of people in 15-24 age group to 99%;
- Reduce child mortality rate (< 5 years) to 70 per 1,000 live births;
- Reduce infant mortality rate (< 1 year) to 45 per 1,000 live births;
- Reduce underweight rate of children under 5 years to less than 22%;
- Reduce maternal mortality to 260 per 100,000 live births;
- Increase clean water usage rate to 80% and toilet usage rate to 60% of the total populations;
- Control malaria, tuberculosis and HIV/AIDS according to the MDGs targets.
- By 2015, life expectancy to be 68 years(male: 66; female: 70);
- Maintain unemployment rate under 2%;
- Attempt to increase number of women who are high ranking officials to more than 15%, increase the number of women who are members of the National Assembly (NA) to more than 30% and increase the rate of female workers to 40%;
- Effectively implement the 2nd national strategy on the pathway to security by reducing the number of injuries and deaths caused by UXO;
- Attempt to improve the quality of life to Lao people as well as attempting to achieve the MDGs.

Target in natural resources and environment:

- Develop and protect forestry to cover 65% of the total land area; and build Lao PDR as one of the greener countries in the world;
- Complete land allocation; identify development zones and land use areas, especially areas with forest cover, i.e. conservation areas, production forests, protected forests, and watersheds;
- Participate in the campaign against global warming, climate change and pollution;

- Participate in preserving mineral resources (preserve mine areas of more than 65% of the total area of mines), preserve land, water and air;
- Ensure high alert in preventing natural disaster, particularly, forest fires, droughts, floods and river bank and mountain erosion;
- Ensure water resource management at the Mekong River basin and other important Mekong River branch basins;
- Ensure environment protection in cities, communities (villages), and national highways, public places based on the principle of “green, clean and beautiful”.

Due to the facts that the science and technology is an important element that needs to be integrated in all developmental sectors, the government has given priority to R&D activities in various areas; particularly the use of science and technology in various sectors and promote the peaceful uses of nuclear activities. In order to meet the development goals, the Ministry of Science and Technology (MoST) has the roles to identify the medium term strategic objectives and key activities of science and technology development towards 2020, in accordance with the rights and duties under the Decree No. 309 of Prime Minister of Lao PDR. These includes the promotion of peaceful uses of nuclear technology activities, for example the plans of establishment regulatory authority, radiation safety and security management, the expansion of nuclear medical treatment facilities, and the expansion of the use of nuclear technology for the preservation of food, promotion of the agricultural products, protection of environment, management of water resources, nuclear application safety in industry.

2.3 National Development Priorities

The national activities relevant to the IAEA’s technical cooperation programme touch upon various development areas/sectors and are formulated according to and in support of 7th Five Year National Socio Economic Development Plans (7th **NSEDP**) (2011-2015) and the 7th Five Year of National Health Sector Development Plan (7th **NHSDP**) (2011-2015), which is specified in the 5 yearly NSEDP and NHSDP as mentioned before. The current CPF document is using the time range of 2013-2017 thereby 7th NSEDP and 7th NHSDP document are used as the basis for the development of nuclear science and technology priority programmes.

National development programmes for medium-term plan 7th NSEDP and 7th NHSDP 2011-2015 consists, as mentioned before, of nine priorities which are:

1. Education
2. Health
3. Poverty Eradication
4. Food Security
5. Infrastructure
6. Investment and Trade Climate
7. Energy
8. Environment and Disaster Management

9. Reduce the impact of UXO

Referring to the major programmes of action under the above priority, nuclear science and technology is able to contribute to five priority programmes: nuclear safety and security, food security, health, energy, environment and disaster management. Each of these priority programmes will be described below.

The implementation of the national development priorities requires the consolidation of efforts and strong international support; therefore, the Government of Lao PDR is considering essential technical cooperation with the IAEA in several areas where nuclear techniques and technology may contribute to fill the scientific gap.

Human Health

The programme is emphasizing the development of health with preventive approaches (not only curative), through improvement of public health and environment (including the expansion of water supply and slum reduction) and the overall achievement of the Millennium Development Goals (MDGs) by 2015.

The government action plan from this area which Nuclear Science and Technology can support, are mentioned below:

1. Create basic material and technological health infrastructure in order to bring the country out of the LDC status by 2020;
2. Expand and strengthen the health system in order to meet the needs of the people, especially the poor and vulnerable and in synergy with the rapid industrialization and modernization of the country;
3. Contribute to eradicating poverty to improve the Lao people's quality of life, aiming to achieve the five health-related MDGs.

In addition to the government action plan as a key Health achievements, opportunities and challenges Achievements/ opportunities which has been mentioned above, the Ministry of Health in its strategic plan has also a priority programme to control Non Communicable Diseases (NCD) such as cancer, diabetes mellitus, and cardiovascular diseases due to the increasing trend regarding the number of cases in recent years.

Food and Agriculture

The programme is emphasizing the improvement of food security and the continuity of agriculture revitalization to achieve food self-sufficiency, increase the competitiveness of agriculture, increasing farmers' income, also environment and natural resources sustainability. The programme is also highlighting on the increase of the GDP growth in the agricultural and forestry sector by 3.5% per year in 2015.

The government action plan from this area which Nuclear Science and Technology can support, are mentioned below:

- Land, area development and spatial planning of agriculture: development of new agricultural land areas, including the utilization of marginal and abandoned land area.

Environmental Protection

The programme in environment and disaster management is emphasizing conservation and utilization of the environment to support economic growth and sustainable welfare, accompanied by the acquisition and management of disaster risks in anticipation of climate change.

The government action plans from environment and water resources studying dispersion of pollutants by using nuclear techniques and utilizing natural resources are mentioned below:

1. Detoxification and disinfection of different kinds of industrial effluents applying nuclear techniques (e.g. by ionizing and non-ionizing radiation);
2. Transboundary air quality monitoring and relation to climate change parameters;
3. Pesticide, chemical fertilizers residue analysis in the environment;
4. Treatment of industrial effluents by nuclear and related techniques;
5. Biodegradation of chemical pollutants using potential microbial strains along with nuclear approaches;
6. Establishment of stationary national air monitoring network and an early notification air pollution network;
7. Determination of trace metals in the environment.

Water Resource Management

The programme is emphasizing the application of relevant nuclear techniques to support the natural resources management in particular the water conservation, the studying groundwater resources development and management and the matters of climate change around Mekong River.

To meet MDG target by 2015 of reaching or affording safe drinking water, achieving food security goals and the sustainable water use, therefore, Lao PDR plans to supply of safe and pollution free drinking water, the integration of soil-water-plant nutrient techniques, to avoid water borne disease, to protect the environment and sustain crop production and water irrigation technologies and water use efficiency.

Sustainable Energy Development

The programme is emphasizing the achievement of national energy security that ensures the continuity of national growth through institutional restructuring and broad optimization of alternative energy utilization.

In the focus area of energy, Lao PDR is an independent state in the generation of energy, it will be necessary to keep this status as one of the large producer and even supply energy to neighbour country, such as Thailand, China and Vietnam. However, growing economy had demanded an increasing amount of energy supply. Energy consumption has a close and strong relationship with the economic development and living standard of the people of Lao PDR. Energy supply and management system is quite fragmented and therefore need integration for efficient utilization of the energy resources. The country needs sustainable energy plan frameworks that provide guiding principles, direction and priorities while optimizing the utilization of resources. From the national perspective, it is timely to strengthen the capacity of concerned institutions while developing the national sustainable energy plan framework, including training of human resources in energy planning and energy modelling as well as provision for dedicated IT equipment.

Industry

The programme is emphasizing the achievement of the five-year national social-economic development plan by enhancing the capacity of industry and commerce to compete in domestic and export market, as well as promoting industrialization and modernization in resulting economic growth.

As the targets for 2015, Lao PDR ensures the benefits of integrating the economy in the region and at international levels as WTO by applying new technologies and strengthening human resources. The country is focused of achieving processing industry and handicraft development by expanding at average rate of 13% and a GDP share about 24% of industries in wood processing, garments, food and beverage processing, construction materials, and other daily use products. As well as, the supporting projects modernization factories such as, factories of garment, sugar, steel, rubber processing, paper, crop processing (electric line), coffee processing and etc.

Nuclear and Radiation Safety

The development of an effective legal and governmental framework for radiation protection and nuclear safety, including the establishment of legislation for radiation safety of radioactive sources and an independent regulatory body, is a key infrastructure issue for introduction use of nuclear technology. Recently, the country has committed to establishing an independent regulatory body with appropriate resources, which will be empowered to regulate the safety, security and peaceful uses of nuclear applications. The regulatory infrastructure for radiation safety of radioactive sources has not yet been established. It is broadly based on the Basic Safety Standards (BSS), but it is not compatible with international standards and should be replaced by comprehensive regulations to implement the new legislation. The Ministry of Health, established a temporary regulatory body for the control of medical radiation sources until a permanent regulatory body becomes functional.

Nuclear Security

It is even considered more important after accident of Fukushima Daiichi Nuclear power station. The lessons learnt from the accident of Fukushima Daiichi should be considered in that improvement, including the capability to communicate to the public in case of emergency situation and strengthening the coordination between local and national responsible institution. Considering the increase of the use of radioactive sources for various applications, the capacity building in preparedness and response in case of nuclear and radiological emergency is one of priority in the field of security. The focus of the capacity building should be in terms of capacity of emergency planning, medical response, radiological assessment and others, in local services and national official level. Along with the increase of the use of radioactive materials, including sealed sources, the upgrade of processing technology and development of the radioactive waste disposal facilities and their safety should be considered. Although Laos has no nuclear power reactors or nuclear fuel cycle facilities, nuclear techniques have been used in the medical field, as indicated in the previous section.

2.4 Technology Requirements

The technology required to support the national nuclear science and technology programme are: (1) nuclear safety and radiation protection technology, (2) irradiation technology for food preservation, medical product sterilization, genetic mutation, latex processing, area-wide blowfly pest management, (3) radioisotopes and radiopharmaceuticals productions technology, (4) isotope hydrology technology for management of water resources, (5) nuclear and related techniques for natural hazards and environmental monitoring, etc.

Thus, all of the aforementioned techniques have been used in Lao PDR with vary intensity. Therefore, it is expected that, with the technical assistance of the IAEA, it will be possible to implement the national programmes more successfully. Implementation of these programmes will increase the opportunity for rendering the services of nuclear science and technology to the public, and also increase the national capability in these fields. Generally, it is expected that there would be no risk during the programme implementation, and there will not be any cost constraints.

2.5 Technical Cooperation Approach

Being the national organization and having official mandate to perform R&D on science and technology, the MoST has the main facilities to support the program. However, in several sectors, such as food/agriculture, health, and energy, cooperation with other ministries, universities, hospitals, and R&D institutes is established. In some cases, the national capabilities in terms of capable human resources and availability of required equipment are limited. In order to cope with these problems, links and cooperation with the IAEA, especially through the Technical Cooperation Program, are needed.

2.6 Legislative Framework

IAEA Legal Framework:

Lao PDR is party to the Convention on the Physical Protection of Nuclear Material, however, Lao PDR is encouraged to further enhance its status vis-à-vis the Agency's legal framework by concluding a Revised Supplementary Agreement concerning the Provision of Technical Assistance by the IAEA, accepting the Agreement on the Privileges and Immunities of the International Atomic Energy Agency, as well by becoming party to the Convention on Early Notification of a Nuclear Accident, the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency, the Convention on Nuclear Safety and the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management and adhering to the adhering to the Amendment to the Convention on the Physical Protection of Nuclear Material. Lao PDR is also encouraged to give a political commitment to the Code of Conduct on the Safety and Security of Radioactive Sources.

Legislative Assistance:

Lao PDR is encouraged to participate in the Agency's legislative assistance activities which aim to promote adherence to and implementation of international agreements, guidelines and recommendations and to support Lao PDR in its efforts to establish, develop, or review its national nuclear laws and in adopting implementing legislation for the international instruments to which Lao PDR has or intends to adhere.

2.7 Status of Millennium Development Goals in Lao PDR

Goal 1: Eradicate extreme poverty and hunger

Target 1a: Reduce by half the proportion of people living on less than a dollar a day

1.1 Proportion of population below \$1 (PPP) per day

1.2 Poverty gap ratio

1.3 Share of poorest quintile in national consumption

Target 1b: Achieve full and productive employment and decent work for all, including women and young people

1.4 Growth rate of GDP per person employed

1.5 Employment-to-population ratio

1.6 Proportion of employed people living below \$1 (PPP) per day

1.7 Proportion of own-account and contributing family workers in total employment

Target 1c: Reduce by half the proportion of people who suffer from hunger

1.8 Prevalence of underweight children under-five years of age

1.9 Proportion of population below minimum level of dietary energy consumption

Goal 2: Achieve universal primary education

Target 2a: Ensure that all boys and girls complete a full course of primary schooling

- 2.1 Net enrolment ratio in primary education
- 2.2 Proportion of pupils starting grade 1 who reach last grade of primary
- 2.3 Literacy rate of 15-24 year-olds, women and men

Goal 3: Promote gender equality and empower women

Target 3a: Eliminate gender disparity in primary and secondary education preferably by 2005, and at all levels by 2015

- 3.1 Ratios of girls to boys in primary, secondary and tertiary education
- 3.2 Share of women in wage employment in the non-agricultural sector
- 3.3 Proportion of seats held by women in national parliament

Goal 4: Reduce child mortality

Target 4a: Reduce by two thirds the mortality rate among children under five

- 4.1 Under-five mortality rate
- 4.2 Infant mortality rate
- 4.3 Proportion of 1 year-old children immunized against measles

Goal 5: Improve maternal health

Target 5a: Reduce by three quarters the maternal mortality ratio

- 5.1 Maternal mortality ratio
- 5.2 Proportion of births attended by skilled health personnel

Target 5b: Achieve, by 2015, universal access to reproductive health

- 5.3 Contraceptive prevalence rate
- 5.4 Adolescent birth rate
- 5.5 Antenatal care coverage (at least one visit and at least four visits)
- 5.6 Unmet need for family planning

Goal 6: Combat HIV-AIDS, malaria and other diseases

Target 6a: Halt and begin to reverse the spread of HIV/AIDS

- 6.1 HIV prevalence among population aged 15-24 years
- 6.2 Condom use at last high-risk sex
- 6.3 Proportion of population aged 15-24 years with comprehensive correct knowledge of HIV/AIDS
- 6.4 Ratio of school attendance of orphans to school attendance of non-orphans aged 10-14 years

Target 6b: Achieve, by 2010, universal access to treatment for HIV/AIDS for all those who need it

6.5 Proportion of population with advanced HIV infection with access to antiretroviral drugs

Target 6c: Halt and begin to reverse the incidence of malaria and other major diseases

6.6 Incidence and death rates associated with malaria

6.7 Proportion of children under 5 sleeping under insecticide-treated bed nets

6.8 Proportion of children under 5 with fever who are treated with appropriate anti-malarial drugs

6.9 Incidence, prevalence and death rates associated with tuberculosis

6.10 Proportion of tuberculosis cases detected and cured under directly observed treatment short course

Goal 7: Ensure environmental sustainability

Target 7a: Integrate the principles of sustainable development into country policies and programs; reverse loss of environmental resources

Target 7b: Reduce biodiversity loss, achieving, by 2010, a significant reduction in the rate of loss

7.1 Proportion of land area covered by forest

7.2 CO₂ emissions, total, per capita and per \$1 GDP (PPP)

7.3 Consumption of ozone-depleting substances

7.4 Proportion of fish stocks within safe biological limits

7.5 Proportion of total water resources used

7.6 Proportion of terrestrial and marine areas protected

7.7 Proportion of species threatened with extinction

Target 7c: Reduce by half the proportion of people without sustainable access to safe drinking water and basic sanitation

7.8 Proportion of population using an improved drinking water source

7.9 Proportion of population using an improved sanitation facility

Target 7d: Achieve significant improvement in lives of at least 100 million slum dwellers, by 2020

7.10 Proportion of urban population living in slums

Goal 8: Develop a global partnership for development

Target 8a: Develop further an open, rule-based, predictable, non-discriminatory trading and financial system

Target 8b: Address the special needs of the least developed countries

Target 8c: Address the special needs of landlocked developing countries and small island developing States (through the Programme of Action for the Sustainable Development of Small Island Developing States and the outcome of the twenty-second special session of the General Assembly)

Target 8d: Deal comprehensively with the debt problems of developing countries through national and international measures in order to make debt sustainable in the long term

Goal 9: Reduce the impact of UXO

Target 9a: Ensure the complete clearance of UXO from priority / high value agricultural land by 2020

9.1 Number of hectares released from UXO contamination

Target 9b: Reduce substantially the number of casualties as a result of UXO incidents

9.2 Number of casualties reported as a result of UXO incidents

Target 9c: Ensure that the medical and rehabilitation needs of all UXO survivors are met in line with treaty obligations under the Convention on Cluster Munitions

9.3 Provision of proper assistance to UXO survivors

It is stated in the Perspective Plan and in the 7th Five Year Plan that the achievements of MDGs should become an indicator of the national development plan. These goals are expected to be achieved during the period of coverage of Perspective Plan 2010-2021. Nuclear science and technology is expected to contribute to the achievement of the MDGs, especially by its application in area of energy, food and agriculture, human health, environment and water resources.

3. RELEVANT INTERNATIONAL DEVELOPMENT ASSISTANCE

The overall goal of the UN System in Lao PDR is to support the efforts of the Government of Lao PDR to apply the principles of the Millennium Declaration and to achieve the Millennium Development Goals (MDGs) with equity. This will be realized by ensuring alignment between the MDGs, national development priorities, and the UN System's strategic areas of cooperation as determined by its comparative advantage. The United Nations Development Assistance Framework (UNDAF), which is the UN System's coherent and collective response for addressing inequalities in Lao PDR, elaborates what and how results will be achieved over the next five years for the people of Lao PDR particularly for the most vulnerable, deprived, and marginalized groups.

In agricultural cooperation projects, NAFRI works closely with a number of international donors, research organizations and universities. There are two regional centres under NAFRI such as Northern Agriculture and Forestry Research Centre (NAFReC) and Southern Agriculture and Forestry Research Centre (SAFReC).

The lists of centre's activities are:

Commodity based Research Centres:

1. Rice and Commercial Crops Research Centre (RPCRC)
2. Horticulture Research Centre (HRC)
3. Forestry Research Centre (FRC)
4. Livestock Research Centre (LRC)
5. Living Aquatic Resources Research Centre (LARReC)
6. National Conservation Agriculture Centre (NCAC)

Non-commodity based Research Centres (NCAC):

1. Agriculture Land Research Centre (ALRC)
2. Agriculture and Forestry Policy Research Centre (AFPRC)
3. Centre for Agriculture and Forestry Research Information (CAFRI)

In 2006, there were 87 projects, which were included 13 funding projects and 74 international grant funds. Under the bilateral projects with Vietnam, France, Japan, Sweden, Australia, and Switzerland, there were 21 projects with 96 million dollars sharing for National Agricultural and Forestry Extension Service (NAFES) and National Agriculture and Forestry Research Institute (NAFRI) activities. There were 23 projects under the multilateral agreement with FAO and ASEAN + 3 (Japan, Korea and China) countries, which the assistance projects of FAO, covered the most. The areas of assistance of FAO were for the technical assistance and human resource development. UNDP also assisted for human resource development and the development strategy for ecological management. There were 10 projects under the cooperation with ADB, World Bank, IFAD for the projects on irrigation construction, forestry, and commodity promoting and animal production. The projects with WB and IFAD were on rural comprehensive development.

In 2012, the World Health Organization (WHO) will mark its 50 years of presence in Lao PDR. The Government has been working together with WHO to improve the health of its people throughout the country all the while. This WHO Country Cooperation Strategy (CCS) for the Lao PDR for 2012–2015 is fully aligned with the national health sector development five-year planning cycle and the United Nations Development Assistance Framework (UNDAF) action plan for the same period.

The United Nations Development Program (UNDP) is the UN's global development network, advocating for change and connecting countries to knowledge, experience and resources to help people build better lives. We are on the ground in 177 countries and territories, working with governments and people on their own solutions to development challenges. On the Ground in Lao PDR UNDP works to ensure that all people in Lao PDR benefit from national development. We support growth which creates more and better economic and social opportunities, and which results in benefits for all, without harming the environment. We also promote peace and security as a critical element of this pattern of development. The aim is to increase human development, achieve the Millennium Development Goals (MDGs) and lift the country out of the ranks of Least Developed Countries (LDCs) by 2020. The UNDP Human Development Report 2011 ranked Lao PDR at 138 out of 187 countries covered in the Report.

The United Nations 4-year development plan 2012 to 2015 was signed today by Dr Thongloun Sisoulith, Deputy Prime Minister and Minister for Foreign Affairs, and Minh Pham, UN Resident Coordinator and UNDP Resident Representative.

The plan is the framework for coordinated United Nations support to Lao PDR over the coming 4 years in aid of national development priorities and was also signed by UN resident and non-resident heads of agencies.

The United Nations Development Assistance Framework (UNDAF) Action Plan 2012 to 2015 supports the Government's 7th National Socio-Economic Development Plan (7th NSEDP),

including the achievement of the Millennium Development Goals by 2015. The plan also supports the Government in its ambition to successfully graduate from Least Developed Country (LDC) status by 2020.

The UNDAF Action Plan marks the strong commitment of the United Nations to the Lao people and the Lao Government, and to a prosperous Lao PDR in which all segments of the population are able to equally enjoy development gains. The plan focuses on 10 targeted outcomes under the six key priority areas of Governance, Inclusive and Equitable Growth, Human Development, Natural Resource Management, Unexploded Ordnance and Gender.

The Action Plan has been produced with a results based focus to strengthen the impact of development work supported by the United Nations. Preparations to develop the new framework began in early 2010 and have included a number of strategic consultations between the UN and Government since then. Speaking at the signing ceremony, Minh Pham, said, “The collective aspiration under this UNDAF Action Plan will be to move toward greater collaboration, focus, transparency, efficiency and coherence, and to enhance the impact of UN support as we seek to improve the quality of life for all people in Lao PDR.”

4. OVERVIEW OF PAST AND PRESENT TECHNICAL COOPERATION ACTIVITIES IN THE COUNTRY

4.1 Overview of the Past TC Activities

Lao PDR has joined as a Member State of the IAEA science November 2011. There has been no TC project in the past.

4.2 Current TC Program

Lao PDR is a new Member State of the IAEA and there is no current programme.

5. ENVISIONED COUNTRY PROGRAMME OUTLINE

Lao PDR with the aim of accelerating growth and reducing poverty. In this context, a strategy has been established and priority areas have been identified to facilitate the development and utilization of nuclear science and technology with a view to bringing various benefits to the public.

During the planning period, all relevant stakeholders are invited to share their views with regard to the programmes activities to be undertaken. This is required because each stakeholder has its own strategic plan, and as such, adjustments in the present planning are needed so as to align it with the stakeholder’s prioritized activities. The implementation strategy is designed to have the highest achievement in the most cost effective manner. The strategy includes the following elements:

- The programmes and activities are designed to provide cost-effective S&T solutions to various national development problems. These activities are largely demand/market driven; end-user oriented and has significant socio-economic impacts. Some activities

relating to capacity building and scientific research and development in new technologies are pursued in parallel.

- Development of national networks comprising the relevant Government agencies/institutions, national R&D institutions, universities and end-user/beneficiary groups.
- Development of links and cooperation with the technologically advanced countries and international organizations, such as the IAEA.

Consistent with the recommendations from the IAEA's Board of Governors, the Strategy for the Technical Cooperation, and the objectives of Country Programme Frameworks, future programme planning discussed in this section are organized into three categories.

The first category referred to as the near-term programme includes the highest priority activities for the 2014-2015 TC cycle with potential for significant impact and for which the bulk of the country's TC Programme budget will be devoted.

The second category under the medium-term programme includes those activities, which are projected to become the next set of core projects. Support for these activities will be concentrated primarily on building those components of infrastructure and technical capabilities, including human resources development that are expected to be required for the subsequent programmes. Support for appropriate feasibility studies are also to be included in this category.

The third category, the General Support Activities, identifies the support that is essential for the continuation of on-going activities, including those initiated through previous TC projects.

Based on the country's identified needs and defined priorities in this CPF, specific Technical Cooperation projects will be formulated and considered for the IAEA's support. The usual IAEA procedures and quality criteria for the approval of technical cooperation projects will be followed.

Lao DPR considers nuclear techniques to be an important component in the national policy of science and technology development, which contributes to the country's development goals. It is the country's policy to revitalize applications of nuclear science and technology, ensure radiation protection and safety, fully establish the legal and regulatory infrastructure in line with international standards and its own obligations and to harmonize the national nuclear legislation with relevant international legal instruments and requirements, and make optimum use of the assistance of the IAEA TC programme to address national needs and priorities.

The programme of Technical Cooperation between Lao DPR and the IAEA envisioned under this CPF will support the main relevant directions of the current national policy in nuclear science and technology. Projects to be included in the next TC Programme are based on identified sectorial priorities for application of nuclear science and technology. The areas for

cooperation have been categorized into near-term and medium-term programmes and explained as follows:

5.1. The Near-term Programme

The activities during the period of 2011-2015 are focused on the priority development areas according to 7th Five Year NSEDP of the Government of Lao PDR, particularly the application of the nuclear technology and its peaceful use, such as in the promotion of agriculture and forestry, industry, environment protection, energy, radiation and nuclear Safety and nuclear and security, in assisting the achievement of development goals and the benefit of the public.

The infrastructure for nuclear science and applied technology with further developing national capabilities in many areas of nuclear applications is crucial. General support should be given to human resource development in the fields given below, in addition to the specific areas mentioned under the near-term programme.

Lao PDR considers nuclear applications as an important complementary component to provide a positive impact in specific fields and to achieve overall sustainable development. In order to maximize the benefits of cooperation with the IAEA, the Government has the following policies and principles in formulating and implementing the technical cooperation programme:

- Upgrade non-nuclear technology applications;
- Establish a fully functional statutory framework and regulatory infrastructure in accordance with international standards;
- Obtain first-hand information on nuclear technology application;
- Maximize benefits from technical cooperation according to national needs and priorities.

The near-term programme to be supported by this CPF will concentrate on a few high priority needs defined in each socio-economic development activity as outlined above.

1. Programme Focus: Human Health

Objective: To provide nuclear medicine technique packages for diagnostic, therapeutic and palliative uses with a view to overcoming the cancer and infectious diseases.

In human health, the focus will continue on efforts to build an adequate core of professionals for cancer management will be supported together with mentorship to expand accessibility to cancer care through strengthening radio diagnostic and therapy facilities/centres including, upgrading the existing and creating new and implement QA and QC programme and establish a national capability for education in medical physics, nuclear medicine and radiation oncology. The recommendations made by fact-finding mission conducted by the IAEA in April 2012 have served as a basis for drawing up future projects and, in particular, for

expanding and consolidating medical infrastructure to combat cancer in the public hospitals of Lao PDR. In the longer term, the resources for managing cancer will also have to be better distributed geographically so that local needs can be met more easily by bringing care close to the patients. With regards to nuclear medicine diagnosis, the emphasis will be on the establishment of a new nuclear medicine facility in the centre area of Lao PDR, where about more than one million people reside. To support the improvement and expansion of cancer diagnosis, an upgrading of both the skills and existing equipment in radiation therapy will be needed. Again, there will be a need for government cost-sharing with regards to long-term training and the purchase of new equipment. Near future support will therefore include advisory assistance to optimize the utilization of the existing radiotherapy infrastructure, training of professional and assistance to improve QA/QC and safety at the workplace, and to sensitize decision makers about the usefulness of isotope techniques in support of studies in human nutrition.

Priority Activities

- Enhancing prevention, treatment and control of diseases
- Protecting patients and workers by applying Quality Assurance in Radiation Medicine
- Management of thyroid related disorders;
- Management of coronary artery and other cardiac diseases;
- Development of Positron Emission Tomography (PET) for nuclear oncology and cardiology;
- Development of Molecular and Allied (e.g. Ultrasound, MRI) Imaging;
- Development of radiotherapy programmes for detection and management of cancer;
- Development of Therapeutic Nuclear Medicine;
- Development of radioimmunosciintigraphy and therapy;
- Early detection and management of infectious and communicable diseases using isotopic techniques e.g. TB, Hepatitis, Malaria, Dengue, AIDS etc.;
- Use of nuclear and non-nuclear techniques for screening of congenital diseases of newborn;
- Detection of malnutrition and bio-availability of essential nutrients through isotopic method;
- Management of infectious diseases;
- Strengthening of Tissue Banking and Biomaterials research and applications;
- Education and training of nuclear medicine physicians and medical physicists working in nuclear medicine;
- Education and training of medical physicists working in radiation oncology / radiation oncologists in both public and private sectors;
- Enhancement of tissue banking activities, and to work on cell culture & stem cell for clinical applications;
- Technical support for PET CT setup projects;
- Promoting evidence based radiation oncology practices;
- Upgrading of existing nuclear medicine facilities.

2. Programme Focus: Food and Agriculture

Objective: To increase the quality of food and agricultural production and to enhance the adaptation capabilities of food crops to climatic stress conditions with a view to ensuring national food security and protection of the environment.

In food and agriculture priority in the immediate and medium term need would be the preparation of readiness of introduction of nuclear technology for agriculture development. The immediate need for this sector would be capacity building include human resource development, laboratory and research facilities in order to conduct research and apply appropriate nuclear technologies for improved crop and livestock production aiming to increase crop and livestock production in Laos, and to ensure the food security and safety that meet the MDG by 2015 as the Government goal setting in the 7th Five Year National Socio-Economic Development Plan (7th NSEDP). In the near-term programme the CPF will continue supporting the on-going programmes aimed at improving crop/plant production, controlling/preventing insects and infectious animal diseases, increasing agricultural yields and animal production and food safety. In the field of crop improvement the utilization of nuclear techniques to: i) elucidate soil/water relationships, ii) enhance efficiency of crops irrigation, and iii) assess soil erosion rates and improve conservation measures.

Also attention will be focused on mutation breeding of rice and other field crops and vegetables, controlling crop pests and diseases and human capacity building using isotope techniques in combination with other conventional methods. Moreover, to mitigate some effects of climate change, land and water management practices and soil and water conservation measures that enhance soil resilience and crop adaptability to climate change and variability will be considered. In animal health and reproduction, this CPF will support the programmes of the Ministry of Agriculture, Forestry and Fishery, with the aim to improve livestock production through better nutrition, reproduction and health approaches, disease control, and capacity building and expand the application of nuclear and nuclear related technologies to control animal diseases. Veterinary drug and pesticide residues in foods of animal and crop origin, respectively, will also be included for ensuring food safety to the public.

Priority Activities

- Increased production of crops through conventional breeding and application of nuclear and biotechnology;
- Increasing and diversification of crop productivity in problem soil and water;
- Improve milk and meat production through nuclear technologies for improving animal breeding, nutrition and infectious disease control;
- Improved food safety through pre- and post-harvest treatment methods of insect pests and microbial decontamination using irradiation and other eco-friendly approaches;
- Improved food quality and safety through better food preservation and processing for cereals, meat, fish, and dairy products by irradiation and other techniques;

- Microbial quality improvement for fresh and processed fruits and vegetables and other food products for immune-compromised patients and other potential target groups;
- Development of Bio-fertilizers and soil and water conservation measures to improve land productivity for crop/animal production and enhance soil resilience against climate change impacts;
- Development of soil and water management practices including improved irrigation scheduling through tracer techniques to improve natural resource use sustainability in agricultural sector and minimize greenhouse gas emissions from farmlands;
- Development of climate resilient crop varieties, through irradiation and biotechnological approaches.

3. Programme Focus: Environmental Protection

Objective: To study dispersion of pollutants in the environment using appropriate nuclear and related analytical techniques in support of the national development programmes, as well as to identify, develop and utilize natural resources, in particular the water resources.

In the field of environment, much effort will continue studying groundwater resources development and management and key matters generated by climate change around Mekong river. Regarding environment protection and monitoring, deforestation, urbanization and rapid industrialization during the last 10 years had led to environmental degradation and pollution. Proper water resources management including supply of clean and safe drinking water is also one of the challenges to avoid water borne diseases and to meet MDG target of halving the production of people unable to reach or afford safe drinking water by 2015. It is also essential that Lao PDR employ integrated soil-water-plant nutrient techniques to protect the environment and sustain crop production to achieve food security goals for those citizens living in marginalised areas in the different part of the country. **Priority Activities**

- Monitoring of air quality and assessment of policies adopted for reduction of short-lived climate forcers;
- Characterization and source identification of particulate air pollution in the Asian region;
- Monitoring of food quality in terms of health and environmental factors;
- Baseline data and monitoring of pesticide residues in the environmental samples;
- Detoxification and disinfection of different kinds of industrial effluents applying nuclear techniques (e.g., by ionizing and non-ionizing radiation);
- Control of microbiological hazards by radiation.

The IAEA assistance at this level will include human capacity building, mentorship, and specific facilities to introduce new nuclear techniques as well as support the regulatory authority to further strengthen its safety infrastructure.

Besides the above-mentioned main programme activities, additional supporting activities for enhancing the human resource capacity building as well as nuclear and radiation safety infrastructure development in the country have also been planned.

4. Programme Focus: Water Resource Management

Objective: To identify natural resources, in particular water resources, to protect these resources against pollution.

The application of relevant nuclear techniques to support the management of natural resources in particular the **water resources** could increase significantly in near-term. In this area much effort will continue studying groundwater resources development and management and key matters generated by climate change around Mekong River. Water conservation, water irrigation technologies and water use efficiency will need to be assessed to provide higher quality water as well as quantity for the population to help address the increasing concern on sustainable water use in agriculture. Proper water resources management including supply of safe and pollution free drinking water is also one of the challenges to avoid water borne diseases and to meet MDG target of halving the production of people unable to reach or afford safe drinking water by 2015.

Priority Activities

1. Strengthening of a national isotope hydrology based capability for planning and management of groundwater resources in coastal area;
2. Assessment of trends in freshwater quality using environmental isotopes and chemical techniques for improved resource management;
3. Applying isotope techniques to investigate groundwater dynamics and recharge rate for sustainable groundwater resource management;
4. Establishing monitoring network and model study to assess saline water intrusion in groundwater around Mekong river of Lao PDR due to climate change;
5. Providing water supply and sanitation facilities in arsenic affected and saline prone areas.

5. Programme Focus: Sustainable Energy Development

Objective: To study energy resources to design a Sustainable Energy Development able to satisfy the future energy demand, with low energy related environmental impacts.

In the focus area of energy, Lao PDR is an independent state in the generation of energy, it will be necessary to keep this status as one of the large producer and even supply energy to neighbour country, such as Thailand, China and Vietnam. However, growing economy had demanded an increasing amount of energy supply. Energy consumption has a close and

strong relationship with the economic development and living standard of the people of Lao PDR. Energy supply and management system is quite fragmented and therefore need integration for efficient utilization of the energy resources. The country needs sustainable energy plan frameworks that provide guiding principles, direction and priorities while optimizing the utilization of resources. From the national perspective, it is timely to strengthen the capacity of concerned institutions while developing the national sustainable energy plan framework, including training of human resources in energy planning and energy modelling as well as provision for dedicated IT equipment.

Priority Activities

- Optimizing the use of energy resources and energy technology to ensure the development of a Sustainable Energy Development, minimizing its environmental impacts;
- Enhancing the using water and other natural resources effectively and economically, to ensure sustainability of the environment;
- Enhancing the human resource capacity (in both quality and quantity) especially in
- the field of energy and mining sectors;
- Applying the use of new technology in conducting surveys, exploration and processing mines;
- Supporting the improvements of policies, laws, regulations, coordination mechanisms and procedures.

6. Programme Focus: Industry

Objective: To introduce the use of new technologies and safety and security aspects in supporting the socio-economic development.

In industrial application of radioisotopes, the focus will be to strengthen the existing momentum, and to introduce new technologies which proved to have high and visible impact on socio-economic development and which could also attract public and private investments through partnerships through enhancement of application of research reactor, application of radiation technology and accelerators, and digital Non Destructive Evaluation technology.

Priority Activities

- Establishing modern management system for operational, regulatory and project management organization;
- Developing essential legislative and regulatory infrastructures for establishing the regulatory body;

- Developing an integrated national HRD programme for the operational, regulatory and TSO personnel;
- Developing national stakeholder management programme and formulating strategic plan for public information and stakeholder involvement;
- Preparing a comprehensive radioactive waste management policy documents as well as corresponding strategy documents;
- Human resource development for the introduction of nuclear application in Lao PDR, with particular emphasis on the areas related to nuclear safety and safety analysis, radiological protection, regulatory infrastructures, NPP technology management, and radioactive waste management from both regulatory and operational perspectives;
- Development of Radioactive Waste Management policies and strategies;
- Establishment of appropriate organization and management system for managing the pre-project and project activities;
- Establishment and implementation an integrated Management System including QA/QM in the existing organization;
- Improving public information and education to get better public acceptance on utilization of nuclear energy for energy system.

7. Programme Focus: Radiation and Nuclear Safety

Objective: To strengthen all the infrastructures needed for introduction of safe nuclear technology.

In the area of radiation safety, it is expected that during the course of the CPF, two new bodies, the Atomic Energy Board and the National Radiation Protection Authority will be formed. The top priority for IAEA support, will be the need to help the national authorities accelerate the process for enhancing the national radiation safety infrastructure in compliance with the Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards (BSS, GSR Part 3), the Governmental, Legal and Regulatory Framework for Safety (GSR Part 1), the Code of Conduct on the Safety and Security of Radioactive Sources (CoC), and the Guidance on Import and Export of Radioactive Sources (GIERS), with special emphasis in the short-term on occupational exposure control and medical exposure control. Strengthening of the national radiation safety and nuclear safety infrastructure and gaining effective control of the application of radiation sources in all socio-economic sectors through the development of integrated regulatory frameworks and ensuring the protection of workers, patients, the public and the environment and promoting a safety culture will be continued as priority activities in the field of radiation and nuclear safety.

Priority Activities

Establishment of a functional, effectively independent regulatory infrastructure in line with international requirements of IAEA, including:

- Legal framework providing laws, regulations and guidance, setting out provisions for authorization, review and assessment, inspection and enforcement
- Regulatory body, with emphasis on authorization, review and assessment and inspection and enforcement competences
- Technical capability with appropriate equipment and sufficiently qualified staff
- Monitoring of radioactive waste management;
- Adherence to relevant international conventions and code of conducts in the field of radiation safety, including radioactive waste management

8. Programme Focus: Nuclear Security

Objective: To ensure the safety and security of the use of radioactive sources and materials, radiation and nuclear equipment and facilities in order to gain public confidence for the application of nuclear science and technology in different fields.

The risk that nuclear or other radioactive material could be used in malicious acts remains high and is regarded as a serious threat to international peace and security. It is well recognized that the responsibility for nuclear security rests entirely with each State and that appropriate and effective national systems for nuclear security are vital in facilitating the peaceful use of nuclear energy and enhancing global efforts to combat nuclear terrorism. Lao PDR is committed to enforce the nuclear security regulations to prevent malicious uses of nuclear or radioactive materials. In the near term, as a first step, the development of human resources in the field of nuclear security becomes a priority, followed by the introduction and fostering of nuclear security culture into all role-player programmes.

The IAEA assists States in carrying out their responsibilities for nuclear security through the implementation of the Agency's Nuclear Security Plan 2010 to 2013, approved by the Board of Governors and managed and implemented by the IAEA Office of Nuclear Security. This plan aims to achieve improved security worldwide for nuclear and other radioactive materials in use, storage and transport and of their associated facilities, as well as the implementation of relevant international legal instruments related to nuclear security. The objective is to support development of sustainable security infrastructures and to help improve aspects of nuclear security such as physical protection capabilities at facilities housing nuclear and other radioactive material, and the detection and response capabilities throughout a country.

The Nuclear Security Fund (NSF) is the established funding resource for the implementation of the Agency's Nuclear Security Plan. Assistance for establishing and enhancing the nuclear security infrastructure in a country should be requested directly through the Office of Nuclear Security.

Priority Activities

- Combating of illicit trafficking in radioactive and nuclear material and nuclear terrorism;
- Promotion of peaceful applications of nuclear science and technology.

5.2. The Medium-term Programmes

In many cases, the activities mentioned under the near-term programme cycle will be continued in the medium-term programme cycle. However, more efforts will be given for the promotion of R&D on nuclear science and technology. The application of nuclear science and technology in food and agriculture sector will be continuously improved and sought for entering the market. In the human health sector, the development of national capacity for medical uses would be one of the major activities. The following sections present the priority areas of activities for the identified focus areas during the mid-term CPF programme cycle.

The medium term programme implemented under this CPF will place greater emphasis on human resources building, skills retention, quality management, as well as enhancement of economic competitiveness.

Enhanced IAEA assistance is expected to make a significant contribution to the on-going national programme aimed at maximizing crop productivity through crop improvement, food quality and water utilization initiatives.

The nuclear science and technology programme will focus on further disseminating the results obtained through the different projects, with the aim to promote widely nuclear services and products to public and potential end-users in order to gain stakeholders recognition and public acceptance.

1. Human Health

In human health, it is envisaged that additional support will be also needed in addressing skill shortages in both the nuclear medicine and radiotherapy fields. The improvement of existing cancer treatment centres in different local hospitals as well as the establishment of new centres for bring cancer care to patients in eastern regions of Indonesia should also be continued. Accordingly, the national capability to upgrade and modernize various medical facilities related to diagnostic and therapy should be sought. Human resource development will continue to be given greater priority in the context of the cooperation between the Government and the Agency throughout the medium-term programme. The joint efforts would essentially be for supporting institutions that have been subject to a considerable loss of personnel but where the application of nuclear technology is essential for social and

economic development. The nuclear science community at Government, academic and technical and educational institutions would be the primary beneficiaries with the introduction of a nuclear knowledge management programme employing the use of the Agency's own International Nuclear Information System (INIS) as well as the launch of new curricula.

Priority Activities

- Improvement of medical applications, both diagnostic and therapeutic;
- Upgrading of the knowledge and skills of medical staff through long-term, intensive training, thus improving the quality of services necessary to meet massive physical investments in radiotherapy and increasing demand for new technologies;
- Upgrading of nuclear medicine services;
- Ensuring of the safe and secure use of radiation sources, with focus on:
 - Regulatory oversight of radiation safety and the security of radioactive sources;
 - Education and training;
 - Radiation protection of the public, professionals, patients and the environment
- Strengthening and expansion of National Nuclear Cardiology Management;
- Body composition assessment and Impact on Foetal Development;
- Human resource development in application of nuclear technology in healthcare;
- Assistance in establishment of 3D Radiotherapy for Cancer Treatment in Lao PDR;
- Nutritional interventions to improve childhood nutrition and reduce under-five mortality in Lao PDR;
- Establishing a sustainable mechanism to conduct training on radiation oncology;
- Management of insect pests of medical importance;
- Education and training of nuclear medicine physicians and medical physicists working in nuclear medicine;
- Education and training of medical physicists working in radiation oncology/radiation oncologists in both public and private sectors;
- Development of Nuclear Magnetic Imaging;
- Expansion and application of radiation sterilization of medical products;
- Further expansion of radio- immunoassay and other in-vitro facilities;
- Continuous collaboration with more advanced nuclear medicine centres for interchange of scientific information and technology transfer;

- Enhancement of tissue banking activities, and to work on cell culture and stem cell for clinical applications.

2. Food and Agriculture

In food and agriculture, the focus will continue on crop improvement using mutation induction, together with soil/water/fertilizer as well as increased meat and milk production through better nutrition, reproduction and health approaches and capacity building, and ultimately the participation in the national programme for food self-sufficiency. In the medium term, the focus will be placed on the development of rice and other staple crops with higher yield and resistance or tolerance to biotic and abiotic stresses, quality control and assurance in utilization of pesticides, production and application of bio-fertilizers, efficient management of irrigation water to enhance crop productivity under water limited conditions, using nuclear techniques, application of the sterile insect technique as part of an area-wide integrated pest management, good preservation using irradiation technology and improvement of crop genotypes with high water and nutrient use efficiency for water scarce environments. For long term need would be concentrate on the application of advanced nuclear technology in food and agriculture production and as well as in the post harvesting process such as improved food quality and safety (value added). Further need nuclear technology in food agriculture would be in mitigation and adaptation to climate change, sustainable agriculture production (economical feasible, social acceptance and environmental sound) and safety use of nuclear techniques and technologies. The CPF will also support Lao PDR in addressing the effect of climate change on water, energy, agriculture, health and environment sectors as well as natural disasters.

Priority Activities

- Increase crop, meat and dairy production;
- Increase and diversification of crop production in farm lands with soil (e.g., low fertile and degraded soils) and water (alternating drought-flooding events) problems;
- Strengthening the capacity of sanitary and phyto-sanitary treatment using irradiation of fresh and processed products for commercial application;
- Area-wide management of insect pests of economic importance, initially on the use of the sterile insect technique for fruit flies in combination with other suppression techniques;
- Management of soil and water fertility using nuclear analytical techniques;
- Microbial quality improvement for fresh and processed fruits and vegetables and other food products for immune-compromised patients and other potential target groups;
- Development of climate resilient crop varieties, through mutation induction and biotechnological approaches;
- Strengthening the capacity of bio-fertilizer production;

- Monitoring of pesticide and veterinary drug residues in food and environment;
- Field trials of promising mutant lines of crop;
- Development of microbial mutants using nuclear and biotechnology;
- Process development to monitor, to prevent or, to eliminate biohazards in food and food products and in animal feeds;
- Strengthening the capacity of food preservation and processing using irradiation and nuclear-related techniques;
- Diagnosis of animal diseases using nuclear and nuclear related techniques;
- Instrumentation, repair and maintenance of equipment;
- Training programmes for the scientific and technical staffs in the field of food and agriculture.

3. Environmental Protection

Based on country's conditions, there should be reasonable and efficient use of natural resources to ensure the balance maintained between socio-economic developments and environment protection. Lao PDR is paid on to make people be able to adjust and prevent themselves from the impacts of climate change and to ensure environment protection through protecting forest, land, mineral resources, water resource, and rich species of the nation.

There is a need to develop infrastructure and human to strengthen national environment management as well as to improve laws and regulations on environment conservation and pollution control. There is the need for monitoring, inspecting and evaluating the environment management in industrial projects; finding the solutions to dispose garbage and toxic material in urban areas; and promoting scientific research, construct library networks and raise awareness about environment in the society.

Priority Activities

- Application of analytical techniques in sustainable management of human health and environment;
- Transboundary air quality monitoring and relation to climate change parameters;
- Evaluation and formulation of air quality assessment policies;
- Pesticides, chemical fertilizers residue analysis in the environment;
- Environmental radioactivity monitoring;
- Application of nuclear techniques for controlling microbial hazards in water environment;

- Treatment of industrial effluents by nuclear and related techniques;
- Biodegradation of chemical pollutants using potential microbial strains along with nuclear approaches.

Development of non-nuclear power applications, in particular:

- Promotion of nuclear analytical techniques in environmental monitoring, food and quality control, in preparation for major nuclear power facilities planned in the region;
- Participation in international environmental monitoring networks in accordance with international conventions and protocols;
- Collection of information on nuclear technology for energy production and seawater desalination;
- Establishment of a stationary national air monitoring network and an early notification air pollution network;
- Determination of traces of heavy metals in the environment.

4. **Water Resources Management**

The contributions of the water sector will continue to be examined through the users: irrigation, hydro-power, navigation, fisheries, urban water supply and rural water supply. Irrigation contributes to the achievement of self-sufficiency in food, to increase the production of agricultural commodities and to reduce shifting cultivation. Hydropower contributes to economic goals, increase availability of electricity; improve the quality of life in rural areas. Navigation contributes to economic and social goals through improved transport particularly between the neighbouring countries of Thailand, Myanmar and China. Urban water supply meets the needs of industry as well as urban populations. Rural water supply and sanitation improvements are essential to the goals of increasing health and living standards of rural communities and to the promotion of tourism. Drainage, solid waste and sewage disposal are needed, principally in urban areas, to provide for industry and development.

The programmes for water resource, weather forecast, hydrology will carry out: water resource management strategy and plan to ensure the utilized efficiently, thus impacting the ecosystem and to protect watersheds. Setting up and upgrading legal and regulatory standard of the integrated water resource management in a sustainable manner. Establish meteorological stations to forecast natural occurrences that could result in disasters, setting up equipment to monitor the weather and providing quality information to policymakers in a timely manner. Use early-warning systems to forecast weather conditions/flood, drought, and other disasters. Improve and upgrade weather forecast and hydrology network and earthquake alert stations across country. Rehabilitate and improve hydrologic station across country which is a key of utilizing for commercial agriculture production, the adaptation to climate change, food security programme by basing on the direction of industrialization and modernization

Priority Activities

- Development of analytical methodologies for assessment of radionuclides in groundwater resources in Lao PDR;
- Investigation, monitoring and management of climate change impact on groundwater resources of Lao PDR through isotopic techniques;
- Water quality monitoring and mitigation of Arsenic and other trace element contaminations in groundwater;
- Isotope monitoring in precipitation network-develop isotope fingerprints for water and climate studies;
- Monitoring of isotopic composition of large rivers from headwaters to deltas;
- Action research on groundwater buffering in Lao PDR;
- Development of non-nuclear power applications, in particular:
 - Exploration of the possibility of using radiation technology for flue gas and wastewater treatment;
 - Development of research methods to monitor radioisotopes in the rain or snow in order to protect groundwater;
 - Monitoring of contaminants and residues in food, water and soil.

5. Sustainable Energy Development

The contribution of energy and mining sectors will continue the development of the increasing amount of energy supply, energy consumption, energy resource management, sustainable energy plan frameworks and the training of human resources in energy and mining sectors.

Priority Activities

- Continuing the using water sources, minerals and other natural resources effectively and economically;
- Ensure sustainability of the environment;
- Enhancing the human resource capacity (in both quality and quantity) especially in the field of energy and mining sectors;

- Continuing the application of new technology in conducting surveys, exploration and processing mines and concerning activities;
- Studying the need of developments laws and regulations on mechanisms and procedures in energy and mining activities.

6. Industry

The contribution of industry sector will continue for introducing of radioisotopes and new technologies in strengthening on socio-economic development and attract public and private investments. Enhance the application of research reactor, application of radiation technology and accelerators and digital Non Destructive Evaluation technology for the industrial activities.

Priority Activities

- Following up the activities on the establishment of modern management system for operational, regulatory and project management organization;
- Continuing activities on developing legislative and regulatory infrastructures for establishing the regulatory body;
- Continuing activities on developing an integrated national HRD programme for the operational, regulatory and TSO personnel;
- Planning activities for a comprehensive radioactive waste management;
- Continuing for human resource development for the introduction of nuclear application in Lao PDR, with particular emphasis on the areas related to nuclear safety and safety analysis, radiological protection, regulatory infrastructures, and radioactive waste management from both regulatory and operational perspectives;
- Following up the activities of establishment of appropriate organization and management system for managing the pre-project and project activities;
- Following up the activities of establishment and implementation an integrated Management System including QA/QM in the existing organization.

7. Radiation and Nuclear Safety

The establishment of a viable national radiation safety infrastructure is a key factor for the sustainable promotion of peaceful applications of nuclear science and technology in Lao PDR. The Agency's support will continue in assisting the Government in establishing the minimum elements of the national infrastructure as well as providing, where appropriate, post-graduate qualification in radiation protection. Occupational and public radiation protection aspects will be fully addressed. TCDC as well as cooperation with other national and regional partners will be sought for mutual benefits.

Priority Activities

- Human resource development for regulatory review, inspection and approval of nuclear application and related safety documentations, QA/QC and emergency planning and response preparedness;
- Development of necessary legislative and regulatory infrastructures in connection with nuclear application.

8. Nuclear Security

Human resource development with particular emphasis on construction management will be a focus in nuclear security area as well as to enforce the nuclear security regulations and nuclear security culture.

Priority Activities

- Human resource development with particular emphasis on construction management as well as on testing, commissioning, operation and maintenance of nuclear application and related systems/facilities;
- Development of national strategy for radioactive waste management methodology including treatments, conditioning, disposal and development of System Information Management for Radioactive waste (SIM-RW) and for associated R&D programme;
- Development of necessary legislative and regulatory infrastructures in connection with nuclear application.
- Establishment of national strategy for Civil Liabilities for Nuclear Damage.

The assistance of the IAEA in the medium term to support the above-mentioned national priorities will be provided in the form of human capacity building, mentorship, guidance as well as provision of specific instruments to upgrade/modernize existing facilities.

Further to the core programme and notwithstanding the fact that the Agency's support is not meant to substitute Government's efforts and responsibility for sustaining nuclear technology related projects in the country, the assistance of the Agency is at times essential for the continuation of on-going activities, including those initiated through previous TC projects, which might otherwise lapse or fail. The bulk of the required support activities could be undertaken within the framework of the RCA programme and other regional technical cooperation projects. The IAEA's assistance will support national efforts designed to further develop human resources while at the same time promote the use of new learning/training tools and methodology such as Information Communication Technology (ICT) and e-learning to which the Lao PDR attaches particular importance. Specific assistance will be provided to some institutions in the form of mentorship to help them introduce successfully potential nuclear techniques to address developmental problems. It is envisaged that IAEA support will assist the Government in playing a more active role in the participation of relevant regional projects.

This CPF will promote the fullest possible utilization of available nuclear facilities and expertise in Lao PDR to accompany optimally the socio-economic development of the country and the integration of nuclear techniques into the national development plan. Such integration will enhance the credibility and relevance of nuclear techniques and nuclear activities and consolidate partnerships with various stakeholders by increasing their contribution towards achieving national development goals, including the Millennium Development Goals (MDGs). This CPF will also assist Lao PDR in establishing an Atomic Energy Commission or equivalent as well national nuclear institutions to promote socio-economic development in the above-mentioned priorities using potential nuclear techniques.

5.3. General Support Activities

The focus of general support activities is to strengthen the national capability in the area of nuclear science and technology with particular attention to the activities related to that of the TSOs (Technical Support Organizations). The general support activities are expected to include the followings:

- Full exploitation of the possibilities offered by the IAEA's technical cooperation programme to meet national needs and priorities;
- Sustained support for nuclear and related R&D activities;
- Radioactive waste management, ratification of IAEA conventions and other relevant international treaties;
- Development and/or upgrading of the country's relationships with the most prominent international organizations in the relevant fields;
- Securing of financial resources for the health sector;
- Creation of national development plans in which the place and role of nuclear energy is clearly defined and for which a strong national commitment and resources exist, in order to select and prioritize programmes under the IAEA technical cooperation programme;
- Human resources development (HRD) in the area of:
 - Physical protection of nuclear installations and radiation sources;
 - Use of electron beam for the treatment of industrial effluents;
 - Use of accelerator facilities (e.g., Tandem Accelerator) for environmental sample analysis;
 - Radiation processing technology;
 - Application of the sterile insect technique as part of an integrated approach;

- Repair and maintenance of sophisticated equipment being used in nuclear science and technology institutions;
- Development of nuclear instrumentation etc.

The above programmes for near-term, medium-term and general support are a summary of the country's major needs and priorities. They provide a comprehensive background for the IAEA technical cooperation programme over the next five years. They will be formulated as priority programmes for the next two cycles, assigned potential national counterparts, and given resources by the IAEA and other partners.

List of Figures;

Figure 1.1. Organizations participating in development of the national planning system of Lao PDR.

Figure 1.2. National Planning System and Related Documents for Lao PDR.

Figure 2.1. Action priorities resulting from development of the national planning system of Lao PDR.

Figure 2.2. Action priorities resulting in development of the national planning system of Lao PDR.

Figure 3.1. A comparison of WHO CCS 2012, the UNDAF action plan 2012-2015, 7th NHSDP 2011-2015 and CPF for Lao PDR.

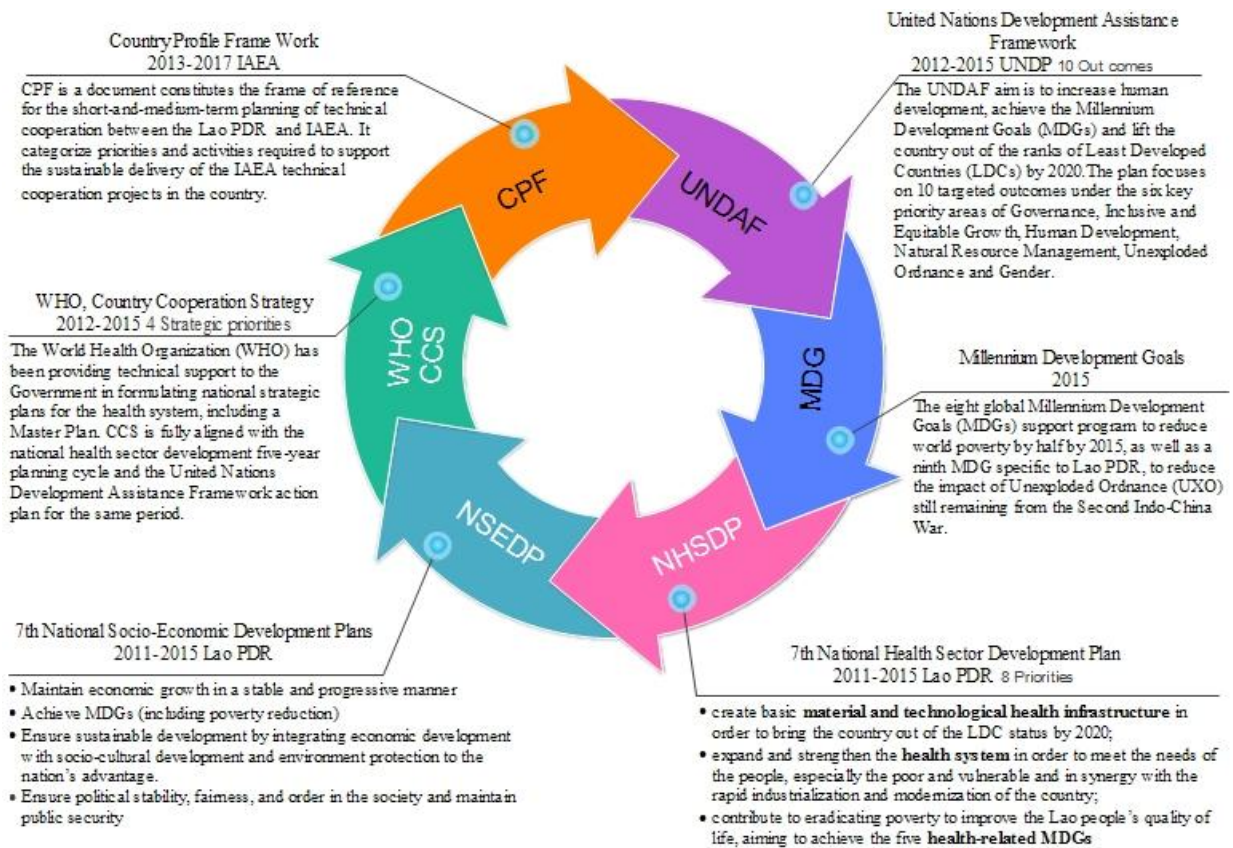


Figure 1.1. Organizations participating in development of the national planning system of Lao PDR.

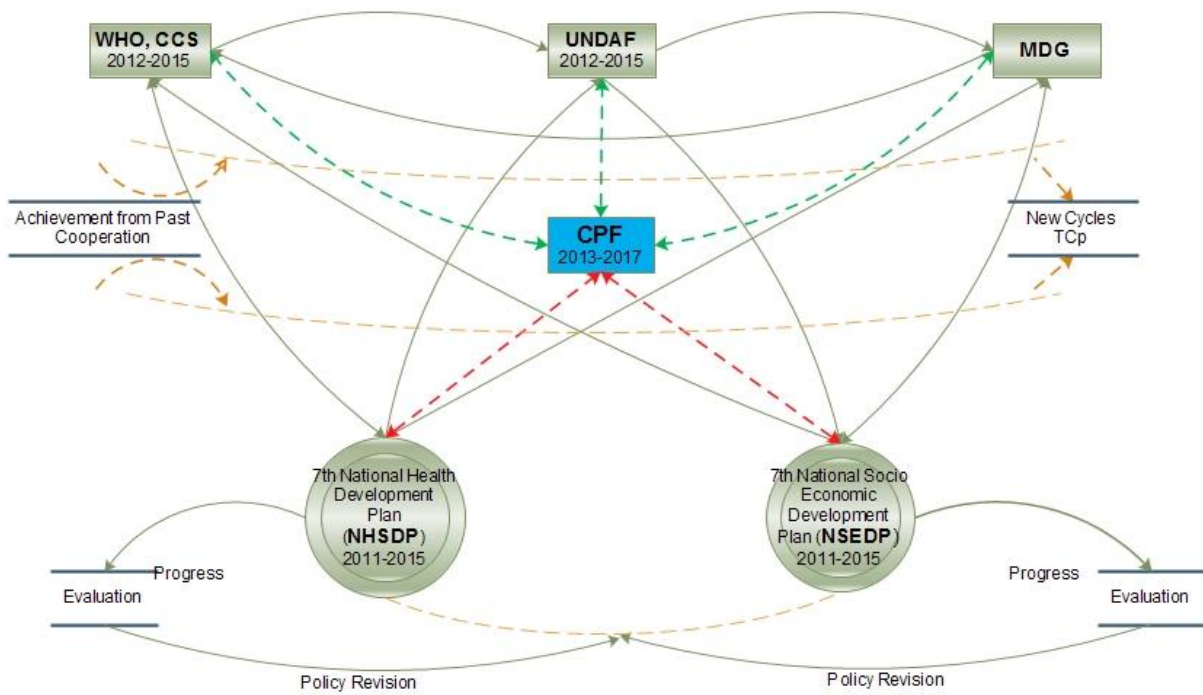


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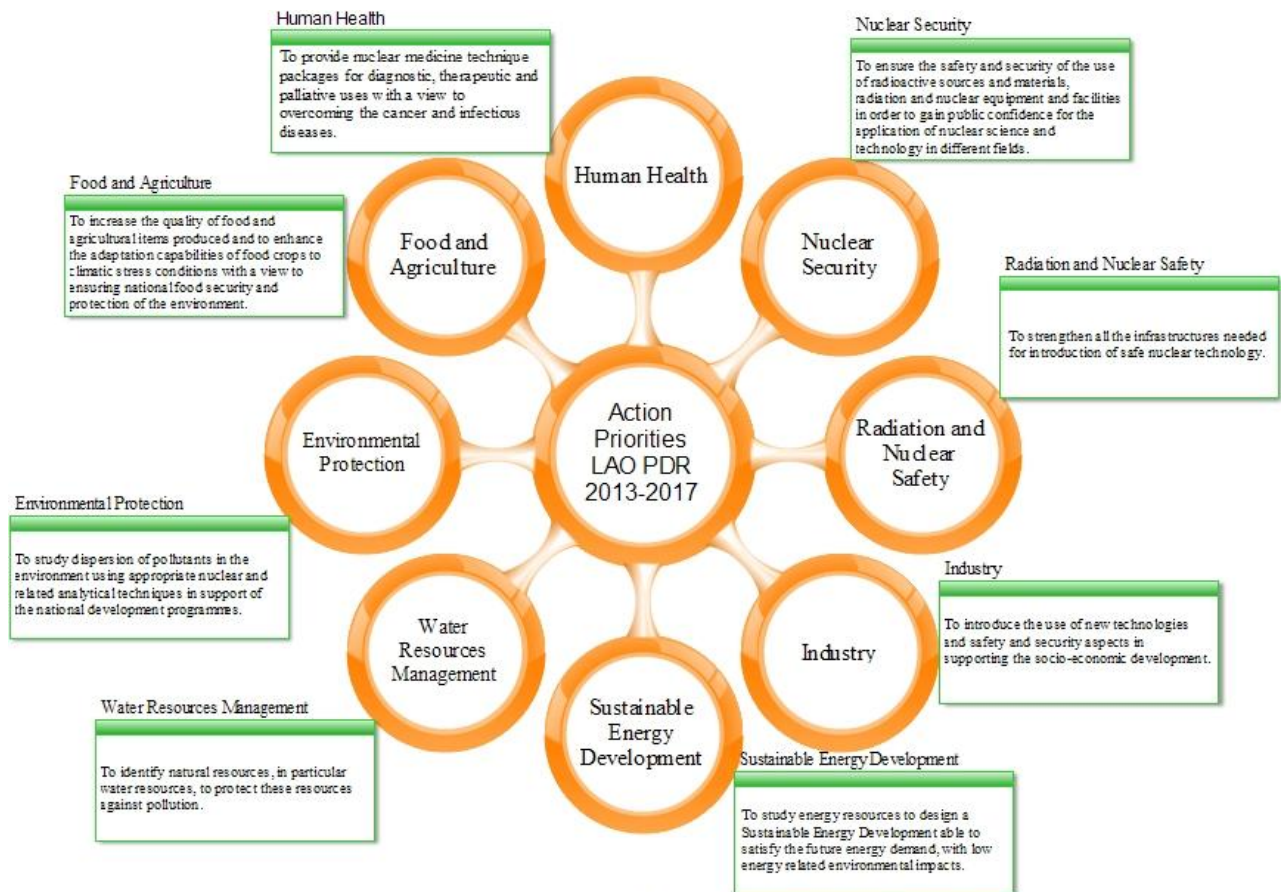


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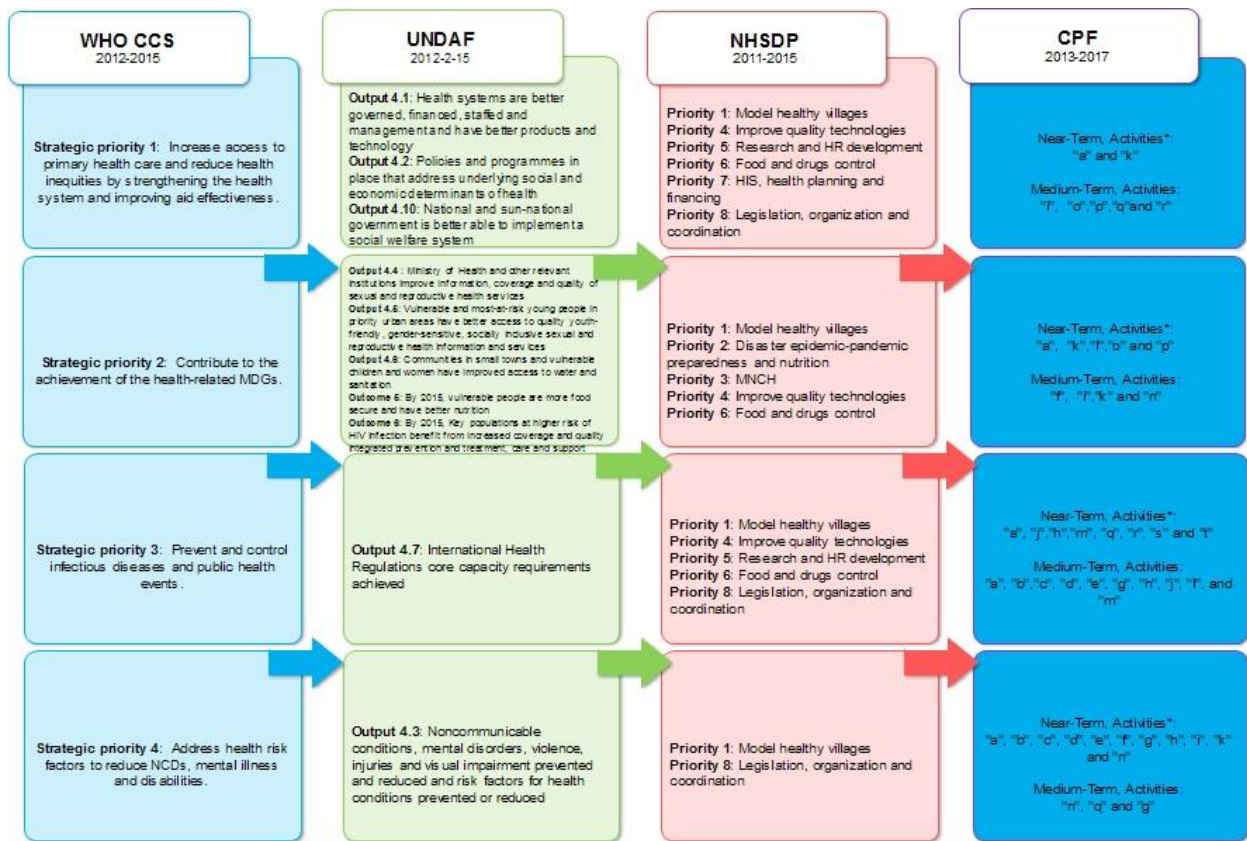


Figure 3.1. A comparison of WHO CCS 2012, the UNDAF action plan 2012-2015, 7th NHSDP 2011-2015 and CPF for Lao PDR.
* Reference to "Table I. Summary of Objective and Priority Activities of Each Programme Focus, Human Health"

ANNEX 1 – List of Resource Institutions

Nuclear Sector Institutions

The establishment of a functional regulatory infrastructure for radiation protection and the control of radioactive sources is a prerequisite for the IAEA to assist the country in promoting a socio-economic development programme involving the application of nuclear techniques. Although Lao PDR has no nuclear power reactors or nuclear fuel cycle facilities, nuclear techniques have been used in the medical field as well as industry.

Lao PDR is on starting stage of using nuclear techniques and radiation safety monitoring by planning and design of projects under 2014-2015 cycle IAEA'S TC which covered the area of with strengthening and establishment of a basic National Radiation Safety Infrastructure in Lao PDR, establishing the quality and safety of diagnostic radiology services, and food safety and agriculture. At the present time, Lao PDR has very limited resources in the area of nuclear activities. However planning to establish a number of service providing centres with necessary laboratory facilities and equipment, trained working scientists, and developed supporting facilities through active collaboration with the IAEA.

No.	Institution's Name	Field of Activities	Existing Capacity
1.	National Agriculture and Forestry Research Institute (NAFRI), Ministry of	Need more input from NLO/NLA	1. Experts 2. Training 3. Analytical Services (accredited ISO-17025)
2.	Agriculture and Forestry	Need more input from NLO/NLA	Need more input from NLO/NLA
3.	Research institute Education and Science, Ministry of Education and Sports	Need more input from NLO/NLA	Need more input from NLO/NLA
4.	Strategy Research and Education Analysis Center, Ministry of Education and Sports	Need more input from NLO/NLA	Need more input from NLO/NLA
5.	Economic and Trade Research Institute, Ministry of Industry and Commerce	Need more input from NLO/NLA	Need more input from NLO/NLA
6.	Law Research Institute, Ministry of Justice	Need more input from NLO/NLA	Need more input from NLO/NLA
7.	National Economic Research Institute, Ministry of Planning and Investment	Need more input from NLO/NLA	Need more input from NLO/NLA
8.	Tropical Disease Analysis Center (Christophe Mérieux Lao Center), Ministry of Public Health	Need more input from NLO/NLA	Need more input from NLO/NLA
9.	Drugs and Food Testing Center, Ministry of Public Health	Need more input from NLO/NLA	Need more input from NLO/NLA

No.	Institution's Name	Field of Activities	Existing Capacity
10.	Traditional medicine Research Institute, Ministry of Public Health	Need more input from NLO/NLA	Need more input from NLO/NLA
11	Biotechnology and Ecology Institute, Ministry of Science and Technology	Need more input from NLO/NLA	Need more input from NLO/NLA
12.	Public Administration Research and Training Institute, Ministry of Home Affairs	Need more input from NLO/NLA	Need more input from NLO/NLA
13.	Institute for Sociological Research, Lao National Academy of Social Sciences	Need more input from NLO/NLA	Need more input from NLO/NLA
14.	Institute for Political Sciences Research, Lao National Academy of Social Sciences	Need more input from NLO/NLA	Need more input from NLO/NLA
15.	Institute for History Research, Lao National Academy of Social Sciences	Need more input from NLO/NLA	Need more input from NLO/NLA
16.	Institute for Culture Research, Lao National Academy of Social Sciences	Need more input from NLO/NLA	Need more input from NLO/NLA
17.	Research and Training Institute, The Office Supreme People's Prosecutor	Need more input from NLO/NLA	Need more input from NLO/NLA

ANNEX 2 – Resource Estimates and Forecast

		€
1.	Historical reference figure for approved national programme (average of e.g.; 1999-2000, 2001-2002, 2003-2004, 2005-2006, 2007-2008), as an indicative planning figure ¹ for the period of coverage.	NA
	Estimated Government cash contribution ² for the planning period	€ 0
	Estimated Government in-kind contribution ³ for the planning period	€ 0
2.	Preliminary estimates for the agreed programme/projects reflected in the CPF	182,700 + 149,200+ 143,200= 475,100 (2 years)
	Title	
1	Agreed programme/projects reflected in the CPF (2013-2014).	475,100€
2	Preliminary estimates for the proposed programme/projects reflected in the CPF (2015-2016).	500,000€
3	Preliminary estimates for the proposed programme/projects reflected in the CPF (2017-2018)	500,000€

¹ The country indicative planning figure does not obligate the Agency to provide such funding, nor does it suggest the expectation of continued levels of Agency funding. The sole purpose is to assist planning and prioritization of the country framework.

² The indicative government cash contribution does not commit the government to the stated amount, but indicates the intent and likelihood of such support.

³ In-kind contributions represent the value assigned to non-cash contributions such as providing experts, training courses, and infrastructure. Planning for in-kind contribution can also include bilateral trade and intergovernmental cooperation agreements in the respective programme area.

ANNEX 3 – Detailed Plan of Action

CPF Referenced Planning Opportunity	Proposed Action	Action Party	Expected Output	Time Frame
Human Health	To improve medical diagnosis of patients through the establishment of a quality management and safety programme in diagnostic radiology practice	MOH IAEA	<ol style="list-style-type: none"> 1. Trained staff to support QA/QC programmes and techniques 2. Establishment of QA/QC procedures 	2014-2017
Agriculture	To promote the rice crop grown production by using technology packages based on mutation induction, mutant varieties and best fit soil-water nutrient management practices in the different regions of Laos	MOA IAEA	<ol style="list-style-type: none"> 1. Upland and lowland rice production systems with enhanced nutrient use efficiency 2. Improved soil, crop and nutrient management practices for optimizing nutrient and water use efficiencies, and improving soil fertility and quality developed 3. Capacity building to use isotopic and nuclear techniques for quantifying nutrient 	2014-2017
Environmental Protection	To study dispersion of pollutants in the environment using appropriate nuclear and related analytical techniques in support of the national development programmes.	MORE IAEA	<ol style="list-style-type: none"> 1. Monitoring of air quality and assessment of policies adopted for reduction of short-lived climate forcers; 2. Characterization and source identification of particulate air pollution in the Asian region; 3. Monitoring of food quality in terms of health and environmental factors; 4. Baseline data and monitoring of pesticide residues in the environmental samples; 5. Detoxification and disinfection of different kinds of industrial effluents applying nuclear techniques (e.g., by ionizing and non-ionizing radiation); 6. Control of microbiological hazards by radiation. 	2014-2017
Water	To identify natural resources,	MoRE	1. Sustainable groundwater	2014-2017

<p>Resources Management</p>	<p>in particular water resources, to protect these resources against pollution.</p>	<p>IAEA</p>	<p>resource</p> <ol style="list-style-type: none"> 2. Capacity building to use isotopic and nuclear techniques for water use efficiencies 3. Strengthening of a national isotope hydrology based capability for planning and management of groundwater resources in coastal area; 4. Assessment of trends in freshwater quality using environmental isotopes and chemical techniques for improved resource management; 5. Applying isotope techniques to investigate groundwater dynamics and recharge rate for sustainable groundwater resource management; 6. Establishing monitoring network and model study to assess saline water intrusion in groundwater around Mekong river of Lao PDR due to climate change; 7. Providing water supply and sanitation facilities in arsenic affected and saline prone areas. 	
<p>Sustainable Energy Development</p>	<p>To study energy resources to design a Sustainable Energy Development able to satisfy the future energy demand, with low energy related environmental impacts.</p>	<p>MEM IAEA</p>	<ol style="list-style-type: none"> 1. Enhancing the using water and other natural resources effectively and economically, to ensure sustainability of the environment; 2. Enhancing the human resource capacity (in both quality and quantity) especially in 3. the field of energy and mining sectors; 4. Applying the use of new technology in conducting surveys, exploration and processing mines; 	<p>2014-2017</p>

			5. Supporting the improvements of policies, laws, regulations, coordination mechanisms and procedures.	
Industry	To introduce the use of new technologies and safety and security aspects in supporting the socio-economic development.	IAEA	<ol style="list-style-type: none"> 1. Establishing modern management system for operational, regulatory and project management organization; 2. Developing essential legislative and regulatory infrastructures for establishing the regulatory body; 3. Developing an integrated national HRD programme for the operational, regulatory and TSO personnel; 4. Developing national stakeholder management programme and formulating strategic plan for public information and stakeholder involvement; 5. Preparing a comprehensive radioactive waste management policy documents as well as corresponding strategy documents; 6. Human resource development for the introduction of nuclear application in Lao PDR, with particular emphasis on the areas related to nuclear safety and safety analysis, radiological protection, regulatory infrastructures, and radioactive waste management from both regulatory and operational perspectives; 7. Development of Radioactive Waste Management policies and strategies; 8. Establishment of appropriate organization and management system for managing the pre- 	2014-2017

			<p>project and project activities;</p> <p>9. Establishment and implementation an integrated Management System including QA/QM in the existing organization;</p> <p>10. Improving public information and education to get better public acceptance on utilization of nuclear energy for energy system.</p>	
Radiation and Nuclear Safety	Establishing a viable national infrastructure for radiation safety and radiation protection to meet the IAEA Safety Thematic Areas 1 and 2	MoST IAEA	<ol style="list-style-type: none"> 1. Establishment of Nuclear Law 2. Infrastructure for core regulatory functions in place 3. Capacity-built for occupational exposure 4. Emergency preparedness and response plan in place 5. Infrastructure for safe management of radioactive waste 	2014-2017
Nuclear Security	To ensure security of the use of radioactive sources and materials, radiation and nuclear equipment and facilities in order to gain public confidence for the application of nuclear science and technology in different fields.	MoST IAEA	<ol style="list-style-type: none"> 1. Combating of illicit trafficking in radioactive and nuclear material and nuclear terrorism; 2. Promotion of peaceful applications of nuclear science and technology. 	2014-2017

**ANNEX 4 – Compilation of Treaties under the Auspices of
the International Atomic Energy Agency**

<u>Multilateral Agreements</u>	Title	In Force	Status
P&I	Agreement on the Privileges and Immunities of the IAEA		Non-Party
VC	Vienna Convention on Civil Liability for Nuclear Damage		Non-Party
VC/OP	Optional Protocol Concerning the Compulsory Settlement of Disputes		Non-Party
CPPNM	Convention on the Physical Protection of Nuclear Material	10/29/2010	accession: 2010-09-29
CPPNME	Amendment to the Convention on the Physical Protection of Nuclear Material		Non-Party
NOT	Convention on Early Notification of a Nuclear Accident		Non-Party
ASSIST	Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency		Non-Party
JP	Joint Protocol Relating to the Application of the Vienna Convention and the Paris Convention		Non-Party
NS	Convention on Nuclear Safety		Non-Party
RADW	Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management		Non-Party
PVC	Protocol to Amend the Vienna Convention on Civil Liability for Nuclear Damage		Non-Party
SUPP	Convention on Supplementary Compensation for Nuclear Damage		Non-Party
RSA	Revised Supplementary Agreement Concerning the Provision of Technical Assistance by the IAEA (RSA)		Non-Party
RCA	Fifth Agreement to Extend the 1987 Regional Cooperative Agreement for Research, Development and Training Related to Nuclear Science and Technology (RCA)		Non-Party
AFRA	African Regional Co-operative Agreement for Research, Development and Training Related to Nuclear Science and Technology (AFRA) - Fourth Extension		Non-Party
ARCAL	Co-operation Agreement for the Promotion of Nuclear Science and Technology in Latin America and the Caribbean (ARCAL)		Non-Party
ARASIA	Co-operative Agreement for Arab States in Asia for Research, Development and Training Related to Nuclear Science and Technology (ARASIA) - First Extension		Non-Party
<u>Safeguards Agreements</u>			
1728	Agreement between the Lao People's Democratic Republic and the International Atomic Energy Agency for the Application of Safeguards in connection with the Treaty	2001-04-05	Signature: 1991-11-22

	on the Non-Proliferation of Nuclear Weapons		
<u>International Organizations</u>			
United Nations (UN)			Member
Conference on Disarmament (CD)			Member
International Atomic Energy Agency (IAEA)			Member
Organization for the Prohibition of Chemical Weapons ² (OPCW)			Member
Comprehensive Test Ban Treaty Organization Preparatory Commission			Member
<u>Chemical & Biological</u>			
Nuclear Non-proliferation Treaty (NPT)			State Party
Comprehensive Nuclear Test Ban Treaty (CTBT)			State Party
Partial Test Ban Treaty (PTBT)			State Party
IAEA Safeguards Agreement			Yes (INFCIRC 917)
Convention on the Physical Protection of Nuclear Material			State Party
Southeast Asian Nuclear-Weapon-Free-Zone (SEANWFZ) Treaty (Bangkok Treaty)			State Party
<u>Counter Terrorism Conventions & Obligations</u>			
Security Council resolution 1373 (2001) ⁶			Report submitted 02/25/02
Security Council resolution 1267 (1999) and 1455 (2003) ⁷			Report submitted 07/10/03
Suppression of the Financing of Terrorism			State Party
Suppression of Terrorist Bombings			State Party
Against the Taking of Hostages			State Party

Table I. Summary of Objective and Priority Activities of Each Programme Focus

No	Priority Sector	National Objectives
1	Human Health	<p>To provide nuclear medicine technique packages for diagnostic, therapeutic and palliative uses with a view to overcoming the cancer and infectious diseases.</p> <p><u>Priority Activities in Near-term:</u></p> <ol style="list-style-type: none"> a. Enhancing prevention, treatment and control of diseases; b. Protecting patients and workers by applying Quality Assurance in Radiation Medicine; c. Management of thyroid related disorders; d. Management of coronary artery and other cardiac diseases; e. Development of Positron Emission Tomography (PET) for nuclear oncology and cardiology; f. Development of Molecular and Allied (e.g. Ultrasound, MRI) Imaging; g. Development of radiotherapy programmes for detection and management of cancer; h. Development of Therapeutic Nuclear Medicine; i. Development of radioimmunosciintigraphy and therapy; j. Early detection and management of infectious and communicable diseases using isotopic techniques e.g. TB, Hepatitis, Malaria, Dengue, AIDS etc.; k. Use of nuclear and non-nuclear techniques for screening of congenital diseases of newborn; l. Detection of malnutrition and bio-availability of essential nutrients through isotopic method; m. Management of infectious diseases; n. Strengthening of Tissue Banking and Biomaterials research and applications; o. Education and training of nuclear medicine physicians and medical physicists working in nuclear medicine; p. Education and training of medical physicists working in radiation oncology / radiation oncologists in both public and private sectors; q. Enhancement of tissue banking activities, and to work on cell culture & stem cell for clinical applications; r. Technical support for PET CT setup projects; s. Promoting evidence based radiation oncology practices; t. Upgrading of existing nuclear medicine facilities. <p><u>Priority Activities in Medium-term:</u></p> <ol style="list-style-type: none"> a. Improvement of medical applications, both diagnostic and therapeutic; b. Upgrading of the knowledge and skills of medical staff through long-term, intensive training, thus improving the quality of services necessary to meet massive physical investments in radiotherapy and increasing demand for new technologies; c. Upgrading of nuclear medicine services; d. Ensuring of the safe and secure use of radiation sources, with focus on: regulatory oversight of radiation safety and the security of radioactive sources; education and training; radiation protection of the public, professionals, patients and the environment e. Strengthening and expansion of National Nuclear Cardiology Management; f. Body composition assessment and Impact on Foetal Development; g. Human resource development in application of nuclear technology in

No	Priority Sector	National Objectives
		<p>healthcare;</p> <ul style="list-style-type: none"> h. Assistance in establishment of 3D Radiotherapy for Cancer Treatment in Lao PDR; i. Nutritional interventions to improve childhood nutrition and reduce under-five mortality in Lao PDR; j. Establishing a sustainable mechanism to conduct training on radiation oncology; k. Management of insect pests of medical importance; l. Education and training of nuclear medicine physicians and medical physicists working in nuclear medicine; m. Education and training of medical physicists working in radiation oncology/radiation oncologists in both public and private sectors; n. Development of Nuclear Magnetic Imaging; o. Expansion and application of radiation sterilization of medical products; p. Further expansion of radio- immunoassay and other in-vitro facilities; q. Continuous collaboration with more advanced nuclear medicine centres for interchange of scientific information and technology transfer; r. Enhancement of tissue banking activities, and to work on cell culture and stem cell for clinical applications.
2	Food and Agriculture	<p>To increase the quality of food and agricultural items produced and to enhance the adaptation capabilities of food crops to climatic stress conditions with a view to ensuring national food security and protection of the environment.</p> <p><u>Priority Activities in Near-term:</u></p> <ul style="list-style-type: none"> a. Increased production of crops through conventional breeding and application of nuclear and biotechnology; b. Increasing and diversification of crop productivity in problem soil and water; c. Improve milk and meat production through nuclear and nuclear related technologies for improving animal breeding, nutrition and control of animal infectious diseases; d. Improved food safety through Pre and post-harvest treatment methods of insect pests and microbial decontamination using irradiation and other eco-friendly approaches; e. Improved food quality and safety through better food preservation and processing for cereals, meat, fish, and dairy products by irradiation and other techniques; f. Microbial quality improvement for fresh and processed fruits and vegetables and other food products for immune-compromised patients and other potential target groups; g. Development of Bio-fertilizers and soil and water conservation measures to improve land productivity for crop/animal production and enhance soil resilience against climate change impacts; h. Development of soil and water management practices including improved irrigation scheduling through tracer techniques to improve natural resource use sustainability in agricultural sector and minimize greenhouse gas emissions from farmlands; i. Development of climate resilient crop varieties, through irradiation and biotechnological approaches. <p><u>Priority Activities in Medium-term:</u></p>

No	Priority Sector	National Objectives
		<ul style="list-style-type: none"> a. Increase crop, meat and dairy production; b. Increase and diversification of crop production in farm lands with soil (e.g., low fertile and degraded soils) and water (alternating drought-flooding events) problems; c. Strengthening the capacity of sanitary and phyto-sanitary treatment using irradiation of fresh and processed products for commercial application; d. Area-wide management of insect pests of economic importance, initially on the use of the sterile insect technique for fruit flies in combination with other suppression techniques; e. Management of soil and water fertility using nuclear analytical techniques; f. Microbial quality improvement for fresh and processed fruits and vegetables and other food products for immune-compromised patients and other potential target groups; g. Development of climate resilient crop varieties, through irradiation and biotechnological approaches; h. Strengthening the capacity of bio-fertilizer production; i. Monitoring of pesticide and veterinary drug residues in food and environment; j. Field trials of promising mutant lines of crop; k. Development of microbial mutants using nuclear and biotechnology; l. Process development to monitor, to prevent or, to eliminate biohazards in food and food products and in animal feeds; m. Strengthening the capacity of food preservation and process development using irradiation and techniques; n. Diagnosis of animal diseases using nuclear and nuclear related techniques; o. Instrumentation, repair and maintenance of equipment; p. Training programmes for the scientific and technical staffs in the field of food and agriculture.
3.	Environmental Protection	<p>To study dispersion of pollutants in the environment using appropriate nuclear and related analytical techniques in support of the national development programmes.</p> <p><u>Priority Activities in Near-term:</u></p> <ul style="list-style-type: none"> a. Monitoring of air quality and assessment of policies adopted for reduction of short-lived climate forcers; b. Characterization and source identification of particulate air pollution in the Asian region; c. Monitoring of food quality in terms of health and environmental factors; d. Baseline data and monitoring of pesticide residues in the environmental samples; e. Detoxification and disinfection of different kinds of industrial effluents applying nuclear techniques (e.g., by ionizing and non-ionizing radiation); f. Control of microbiological hazards by radiation. <p><u>Priority Activities in Medium-term:</u></p> <ul style="list-style-type: none"> a) Application of analytical techniques in sustainable management of human health and environment; b) Transboundary air quality monitoring and relation to climate change parameters; c) Evaluation and formulation of air quality assessment policies; d) Pesticides, chemical fertilizers residue analysis in the environment; e) Environmental radioactivity monitoring; f) Application of nuclear techniques for controlling microbial hazards in water environment;

No	Priority Sector	National Objectives
		g) Treatment of industrial effluents by nuclear and related techniques; h) Biodegradation of chemical pollutants using potential microbial strains along with nuclear approaches. i) Development of non-nuclear power applications, in particular: j) Promotion of nuclear analytical techniques in environmental monitoring, food and quality control, in preparation for major nuclear power facilities planned in the region; k) Participation in international environmental monitoring networks in accordance with international conventions and protocols; l) Collection of information on nuclear technology for energy production and seawater desalination; m) Establishment of a stationary national air monitoring network and an early notification air pollution network; n) Determination of traces of heavy metal in the environment.
4.	Water Resources Management	To identify natural resources, in particular water resources, to protect these resources against pollution. <u>Priority Activities in Near-term:</u> <ol style="list-style-type: none"> a) Strengthening of a national isotope hydrology based capability for planning and management of groundwater resources in coastal area; b) Assessment of trends in freshwater quality using environmental isotopes and chemical techniques for improved resource management; c) Applying isotope techniques to investigate groundwater dynamics and recharge rate for sustainable groundwater resource management; d) Establishing monitoring network and model study to assess saline water intrusion in groundwater around Mekong river of Lao PDR due to climate change; e) Providing water supply and sanitation facilities in arsenic affected and saline prone areas. <u>Priority Activities in Medium-term:</u> <ol style="list-style-type: none"> a. Development of analytical methodologies for assessment of radionuclides in groundwater resources in Lao PDR; b. Investigation, monitoring and management of climate change impact on groundwater resources of Lao PDR through isotopic techniques; c. Water quality monitoring and mitigation of Arsenic and other trace element contaminations in groundwater; d. Isotope monitoring in precipitation network-develop isotope fingerprints for water and climate studies; e. Monitoring of isotopic composition of large rivers from headwaters to deltas; f. Action research on groundwater buffering in Lao PDR; g. Development of non-nuclear power applications, in particular: <ul style="list-style-type: none"> • Exploration of the possibility of using radiation technology for flue gas and wastewater treatment; • Development of research methods to monitor radioisotopes in the rain or snow in order to protect groundwater; • Monitoring of substances and residues in food, water and soil.
5.	Sustainable Energy Development	To study energy resources to design a Sustainable Energy Development able to satisfy the future energy demand, with low energy related environmental impacts. <u>Priority Activities in Near-term:</u> <ol style="list-style-type: none"> a. Optimizing the use of energy resources and energy technology to ensure the development of a Sustainable Energy Development, minimizing its environmental impacts; b. Enhancing the using water and other natural resources effectively and economically, to ensure sustainability of the environment; c. Enhancing the human resource capacity (in both quality and quantity)

No	Priority Sector	National Objectives
		<p>especially in</p> <ul style="list-style-type: none"> d. the field of energy and mining sectors; e. Applying the use of new technology in conducting surveys, exploration and processing mines; f. Supporting the improvements of policies, laws, regulations, coordination mechanisms and procedures. <p><u>Priority Activities in Medium-term:</u></p> <ul style="list-style-type: none"> a. Continuing the using water sources, minerals and other natural resources effectively and economically; b. Ensure sustainability of the environment; c. Enhancing the human resource capacity (in both quality and quantity) especially in the field of energy and mining sectors; d. Continuing the application of new technology in conducting surveys, exploration and processing mines and concerning activities; e. Studying the need of developments laws and regulations on mechanisms and procedures in energy and mining activities.
6.	Industry	<p>To introduce the use of new technologies and safety and security aspects in supporting the socio-economic development.</p> <p><u>Priority Activities in Near-term:</u></p> <ul style="list-style-type: none"> a. Establishing modern management system for operational, regulatory and project management organization; b. Developing essential legislative and regulatory infrastructures for establishing the regulatory body; c. Developing an integrated national HRD programme for the operational, regulatory and TSO personnel; d. Developing national stakeholder management programme and formulating strategic plan for public information and stakeholder involvement; e. Preparing a comprehensive radioactive waste management policy documents as well as corresponding strategy documents; f. Human resource development for the introduction of nuclear application in Lao PDR, with particular emphasis on the areas related to nuclear safety and safety analysis, radiological protection, regulatory infrastructures, and radioactive waste management from both regulatory and operational perspectives; g. Development of Radioactive Waste Management policies and strategies; h. Establishment of appropriate organization and management system for managing the pre-project and project activities; i. Establishment and implementation an integrated Management System including QA/QM in the existing organization; j. Improving public information and education to get better public acceptance on utilization of nuclear energy for energy system. <p><u>Priority Activities in Medium-term:</u></p> <ul style="list-style-type: none"> a. Following up the activities on the establishment of modern management system for operational, regulatory and project management organization; b. Continuing activities on developing legislative and regulatory infrastructures for establishing the regulatory body; c. Continuing activities on developing an integrated national HRD programme for the operational, regulatory and TSO personnel; d. Planning activities for a comprehensive radioactive waste management; e. Continuing for human resource development for the introduction of nuclear application in Lao PDR, with particular emphasis on the areas related to nuclear safety and safety analysis, radiological protection, regulatory infrastructures, and radioactive waste management from both regulatory and operational perspectives;

No	Priority Sector	National Objectives
		<ul style="list-style-type: none"> f. Following up the activities of establishment of appropriate organization and management system for managing the pre-project and project activities; g. Following up the activities of establishment and implementation an integrated Management System including QA/QM in the existing organization.
7.	Radiation and Nuclear Safety	<p>To strengthen all the infrastructures needed for introduction of safe nuclear technology.</p> <p><u>Priority Activities in Near-term:</u> Establishment of a functional, effectively independent regulatory infrastructure in line with international requirements of IAEA, including:</p> <ul style="list-style-type: none"> a. Legal framework providing laws, regulations and guidance, setting out provisions for authorization, review and assessment, inspection and enforcement; b. Regulatory body, with emphasis on authorization, review and assessment and inspection and enforcement competences; c. Technical capability with appropriate equipment and sufficiently qualified staff d. Monitoring of radioactive waste management; e. Adherence to relevant international conventions and code of conducts in the field of radiation safety, including radioactive waste management. <p><u>Priority Activities in Medium-term:</u></p> <ul style="list-style-type: none"> a. Human resource development for regulatory review, inspection and approval of nuclear application and related safety documentations, QA/QC and emergency planning and response preparedness; b. Development of necessary legislative and regulatory infrastructures in connection with nuclear application.
8.	Nuclear Security	<p>To ensure the safety and security of the use of radioactive sources and materials, radiation and nuclear equipment and facilities in order to gain public confidence for the application of nuclear science and technology in different fields.</p> <p><u>Priority Activities in Near-term:</u></p> <ul style="list-style-type: none"> a. Combating of illicit trafficking in radioactive and nuclear material and nuclear terrorism; b. Promotion of peaceful applications of nuclear science and technology. <p><u>Priority Activities in Medium-term:</u></p> <ul style="list-style-type: none"> a. Human resource development with particular emphasis on construction management as well as on testing, commissioning, operation and maintenance of nuclear application and related systems/facilities; b. Development of national strategy for radioactive waste management methodology including treatments, conditioning, disposal and development of System Information Management for Radioactive waste (SIM-RW) and for associated R&D programme; c. Development of necessary legislative and regulatory infrastructures in connection with nuclear application.
	General Support Activities	<ul style="list-style-type: none"> a. Full exploitation of the possibilities offered by the IAEA's technical cooperation programme to meet national needs and priorities; b. Sustained support for nuclear and related R&D activities; c. Radioactive waste management, ratification of IAEA conventions and other relevant international treaties; d. Development and/or upgrading of the country's relationships with the most prominent international organizations in the relevant fields; e. Securing of financial resources for the health sector; f. Creation of national development plans in which the place and role of

No	Priority Sector	National Objectives
		<p>nuclear energy is clearly defined and for which a strong national commitment and resources exist, in order to select and prioritize programmes under the IAEA technical cooperation programme;</p> <p>g. Human resources development (HRD) in the area of:</p> <ul style="list-style-type: none"> ○ Physical protection of nuclear installations and radiation sources; ○ Use of electron beam for the treatment of industrial effluents; ○ Use of accelerator facilities (e.g., Tandem Accelerator) for environmental sample analysis; ○ Radiation processing technology; ○ Application of the sterile insect technique as part of an integrated approach; ○ Repair and maintenance of sophisticated equipment being used in nuclear science and technology institutions; ○ Development of nuclear instrumentation etc.

REFERENCES

- 1) Millennium Development Goals (MDGs): Needs Assessment and Costing Report 2009-2015,
- 2) Seventh Five Year National Socio Economic Development Plans 7th NSEDP): Government of Lao PDR, 2011-2015
- 3) Seventh Five Year of National Health Sector Development Plan (7th NHSDP) Government of Lao PDR, 2011-2015
- 4) The United Nations Development Assistance Framework (UNDAF) for Lao PDR, 2012-2015
- 5) WHO Country Cooperation Strategy (CCS) action plan, 2012-2015