**Concept Number:** IRA2018001

**Title:** Enhancing safety, operation and utilization of Iran nuclear research reactors

**Original Language Title:** English

**Project Number:** ?????

**Project Type:** National

**Project For:** Iran, Islamic Republic of

**Submitted By:** Member State and/or Observers With Rights

**Priority:** 1

**Project duration (Total number of years):** 4

**Project duration (Start date):** 2020-01-01

**Field of Activity:** 08 - Research reactors

**FOA Distribution:**
FoA Code: 08 = 100%

**Sustainable Development Goal:**
09 - Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

**Link to RB Programme:** There is No RB Programme Link.

**Project Description/Abstract:** and operation three research reactors in Iran, namely ehran eseach eactor (TRR), a 5 MW pool type, Isfahan Miniature Neutron Source Reactor (IMNSR)- 30 kW- Tank in poolHeavy water Zero Power Reactor (HWZPR). It will also address enhancement of the

The improvement of human resource (HR) skills and knowledge and the improvement of hardware and software infrastructure that contribute towards improvement of safety and operation and utilization of the research reactors will be the focus of the activities. The project will also set up the managerial output as common output for all facilities, which is the design of a strategic business plan for future utilization including partnerships with potential governmental/research/education institutions in the country.

**Problem to be addressed:** Development of nuclear technology is related to the utilization of research reactors in the country, providing required research, education and training facilities in the field of nuclear science and technology. Currently, RRs in Iran are underutilized for various reasons such as shortage of well-trained human resources, equipment and financial support. There is also a need to improve some safety and operation aspects such as ageing management, maintenance programs, radiation protection program, safety analysis report, emergency program, etc. TRR has many of in-core and out-core irradiation channels which can potentially be upgraded for different applications such as radioisotopes production, neutron diffractometry, Si-doping, gemstone colouring, NAA, boron neutron capture therapy, neutron radiography, etc. In IMNSR there is the experience of the use of neutron activation analysis method which can be used for environment and air population studies.

**Stakeholder:** - Nuclear Science and Technology Research Institute is the owner and operator of the TRR, IMNSR and HWZPR research reactors, and is the main stakeholder of the project; - The nuclear medicine centres within the country which are the end users of the produced radiopharmaceuticals by TRR; - Ministry of Industry, Mine and Trade and Ministry of Health and Medical Education will be benefited by the isotopes produced and services provided by RRs; - Atomic Energy Organization of Iran; - This project will be supported by The Iran Nuclear Regulatory Authority which is the regulatory body of Iran; - All universities and other research centres within the country will be regarded as stakeholders.

**Partnerships:** - Financial and logistic support will be provided by Atomic Energy Organization of Iran; - Ministry of Science Research and Technology (some staffs from the universities like professors and students potentially can cooperate for implementing the project.

**Overall Objective:** Enhancement of the safe operation and utilization of Iran’s research reactors to strengthen the self-reliance through capabilities enhancement, increased engagement and cooperation with stakeholders, and optimization of the operations to meet national needs.

**Role of nuclear technology and IAEA:** The TRR, IMNSR and HWZPR research reactors are nuclear installations. The IAEA has played a significant role in the realization of projects connected with the increase of safety, operation and utilization of research reactors. The IAEA’s support is also requested in the development of human resources through participation in training and capacity building activities, as well as supporting safe operation and utilization through expert services and assistance by procuring equipment necessary to improve the safety, operation and utilization of the reactor.

**Participating Member State(s):** Iran, Islamic Republic of

**Physical infrastructure and human resources:** All facilities and staffs of the Iranian nuclear research reactors will be available to support the project. Iranian Nuclear Regulatory Authority (INRA) will also play its roles. Required laboratories and equipment will be available to support the implementation of the project. Personnel with required specialty and background are ready to undertake training opportunities in order to further improve their knowledge. The Integrated Management System (IMS) groups of RRs will take part and support this project.

**Sustainability:** Underutilization of research reactors threatens the sustainable operation of Iran research reactors. Implementing this project by preparing and finalizing strategic plans, establishment of different applications and enhancing safe operation of RRs will guarantee the safe continued operations of Iran RRs.

**Safety regulatory infrastructure:** TheIranian Nuclear Regulatory Authority (INRA) is the independent regulatory body responsible for establishing necessary regulations, review submitted safety documents, licensing, inspection and enforcement. The safety and regulatory infrastructure, associated standards and procedures are adequate for the implementation of this project.

**Other considerations, e.g. environment, gender:** The project is expected to have positive effect on the environment by improving the management practices and safety of the identified research reactors which should as a result, lowering the risk of hazard to the environment and public health. The project will equally benefit men and women and will have both male and female implementers.

**Implementation strategy:** IAEA review missions to assess current status on research reactor safety, operation and maintenance and utilization will be utilize at the beginning of the project. Implementation of the recommendations received together with improved capability of trained personnel under the project is expected to contribute towards meeting the project targets.

Counterparts, via the NLO and Permanent Mission will submit an official request to IAEA once this project is approved for timely preparation for the review missions.

**Monitoring and progress reporting:** The project will be monitored through regular discussions and meetings with the TO and PMO of the project as well as field expert missions. Progress reports will be communicated to the IAEA periodically. National counterparts will prepare and submit annually the Project Progress Assessment Report (PPAR) on the status of activities through the e-PPAR platform.

**Risk management:** The main risk is related to a change the priority of the Government for allocating resources. However, continued safe operation of RRs for production of radiopharmaceutical and human capacity building always has had high priority. Another identified risk is availability of suitable and qualified experts that can visit Iran in particular for the planned review missions. Procurement can be delayed or denied by suppliers due to external factors. A clear scope for each mission will be prepared early in the project, no later than Q2 of the first year of the project to ensure longer lead time for preparation and sourcing of expertise. All complete specifications will also be prepared by Q1 of the first year of the project.

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| **CORE FINANCING** |
| **Year** | **Human Resource Components** (Euros) | **Procurement Components** (Euros) | **Total** (Euros) |
| Experts | Meetings/ Workshop | Fellow-ships | Scientific Visits | Training Courses | **Sub-Total** | Equipment | Sub-Contracts | **Sub-Total** |
| 2020 | 29 400 | 8 400 | 0 | 0 | 0 | **37 800** | 0 | 0 | **0** | **37 800** |
| 2021 | 35 700 | 21 000 | 5 670 | 0 | 0 | **62 370** | 5 000 | 0 | **5 000** | **67 370** |
| 2022 | 31 500 | 10 500 | 0 | 3 150 | 0 | **45 150** | 0 | 0 | **0** | **45 150** |
| 2023 | 10 500 | 5 250 | 0 | 0 | 0 | **15 750** | 0 | 0 | **0** | **15 750** |
| **First Year Approved : 2019** |

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| **FOOTNOTE-a/ FINANCING** |
| **Year** | **Human Resource Components (Euros)** | **Procurement Components (Euros)** | **Total (Euros)** |
| Experts | Meetings/ Workshop | Fellow-ships | Scientific Visits | Training Courses | **Sub-Total** | Equipment | Sub-Contracts | **Sub-Total** |
| 2020 | 21 000 | 0 | 0 | 0 | 0 | **21 000** | 5 000 | 0 | **5 000** | **26 000** |
| 2021 | 21 000 | 0 | 0 | 0 | 0 | **21 000** | 5 000 | 0 | **5 000** | **26 000** |
| 2022 | 10 500 | 0 | 0 | 0 | 0 | **10 500** | 10 000 | 0 | **10 000** | **20 500** |
| 2023 | 26 250 | 0 | 0 | 0 | 0 | **26 250** | 0 | 0 | **0** | **26 250** |
| **First Year Approved : 2020** |

 **Logical Framework Matrix (LFM)**

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|  | **Design Element** | **Indicator** | **Baseline and Target** | **Means of Verification** | **Assumptions** |
| **Outcome** | Improved safety and effective operation and utilization of TRR, ZPR and MNSR research reactors  | Recommendations for improving safety and effective operation for TRR, ZPR and MNSR research reactors implemented by end of the project. Action plan to implement Strategic plan for TRR and MNSR finalized by end of project. | There are three operating research reactors TRR, MNSR and ZPR, target is enhanced the safety, operation and utilization of them | Project Documents | High level commitment of the national authority and institutions. Involvement of the project stakeholders. |
| **Output** | 1. Improved safety of TRR, ZPR and MNSR | Improved safety of TRR, MNSR and ZPR |  Baseline is INSARR mission report 2007 for TRR. Targets are new INSARR mission report , safety recommendations, reports on implementing of safety recommendations  | IAEA review and reports | Availability of committed resources |
| 2. Enhanced availability and reliability of TRR, ZPR and MNSR  | TRR, ZPR and MNSR updated the operational and maintenance programme by end of the project | Baseline is zero report, targets are OMARR mission report , recommendations, reports on operational recommendations | IAEA review and reports | Availability of committed resources |
| 3. Enhanced utilization capability of TRR and MNSR | Strategic plan for TRR and MNSR developed and implemented by end of project. | Baseline:No approved strategic plan for TRR and MNSR.Neutron imaging, scattering and BNCT not implementedTarget:Strategic Plan developed, reviewed and approved. Neutron imaging, scattering and BNCT implemented. | Review of strategic plan; project progress reports | Availability of committed resources |
|  | 4. Enhanced human capacity in safety, operation and utilization of RRs | Number of Personnel trained and effectively perform their role.  | Target: Trained the necessary number of experts and personnel | Training and Progress Reports | Action plan for human resource development exists and is implemented. The necessary personnel are available and the government commitment is present. |
|  | 5. Project management team operational  | Team created and staffed; counterparts identified | Baseline: National project team exist.Target: Project team comprised of national project team and support team from IAEA established.  | Meeting reports; EPPAR | Commitment, reactivity and availability of team members |
| **Activity** | 1.1 Assess and enhance safety at MNSR  |  |  |  |  |
| 1.2 Assess and enhance safety at ZPR  |  |  |  |  |
| 1.3 Assess and enhance safety at TRR |  |  |  |  |
| 2.1 Assess operations and maintenance practices and enhance availability and reliability of TRR |  |  |  |  |
| 2.2 Assess operations and maintenance practices and enhance availability and reliability of MNSR |  |  |  |  |
| 2.3 Assess operations and maintenance practices and enhance availability and reliability of ZPR |  |  |  |  |
| 3.1 Review and update strategic plans of TRR and MNSR |  |  |  |  |
| 3.2 Review and assess utilization of TRR, MNSR and ZPR  |  |  |  |  |
| 3.3 Enhance utilization infrastructure at TRR and MNSR |  |  |  |  |
| 4.1 Training of staff in safety, operation and utilization of RRs |  |  |  |  |
| 5.1 conducting project review meetings | Meeting held as planned |  | Meeting reports | MS utilize the results of the meetings |
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| **Input** | 1.1.1 INSARR mission to MNSR | Reduced expert |  |  |  |
| 1.1.2 EM to review and provide guidance on the implementation of recommendations of INSARR mission to MNSR | Footnote/a activity – this activity may not be needed as the INSARR mission report includes clear recommendations for follow-up actions |  |  |  |
| 1.2.1 INSARR mission to ZPR  | Reduced expert – move to 2021 to accommodate available resources |  |  |  |
| 1.2.2 EM to review and provide guidance on the implementation of recommendations of INSARR mission to ZPR  | If 1.1.2 is needed during implementation phase, it can be combined with 1.2.2 and 1.3.2 |  |  |  |
| 1.3.1 INSARR mission to TRR  | Reduced expert |  |  |  |
| 1.3.2 EM to review and provide guidance on the implementation of recommendations of INSARR mission to TRR | Footnote/a activity – this activity may not be needed as the INSARR mission report includes clear recommendations for follow-up actions. |  |  |  |
| 2.1.1 Pre-OMARR mission to TRR |  |  |  |  |
| 2.1.2 OMARR mission to TRR |  |  |  |  |
| 2.1.3 Follow-up OMARR mission to TRR | One Follow-up mission with TCF – for experience on how this is done for other RRs plus TRR is higher priority |  |  |  |
| 2.1.4 Procurement of detectors and radiation monitors | Move to 2021 |  |  |  |
| 2.2.1 Pre-OMARR mission to MNSR | Reduced expert |  |  |  |
| 2.2.2 OMARR mission to MNSR |  |  |  |  |
| 2.2.3 Follow-up OMARR mission to MNSR | Footnote/a –this may not happen due to time needed to implement all recommendations |  |  |  |
| 2.2.4 Procurement of detectors and radiation monitors | Footnote/a – similar to 2.1.4 |  |  |  |
| 2.3.1 OMARR mission to ZPR  |  |  |  |  |
| 2.3.2 Follow-up OMARR mission to ZPR  | Footnote/a –this may not happen due to time needed to implement all recommendations |  |  |  |
| 2.3.3 Procurement of detectors and radiation monitors | Similar to 2.1.4 – Footnote/a task |  |  |  |
| 3.1.1 EM on guidance for stakeholders survey and quantified analysis of needs for TRR, MNSR and ZPR  |  |  |  |  |
| 3.1.2 Review of strategic plans for TRR and MNSR (HBA) (2020,  | Reduced expert  |  |  |  |
| 3.2.1 Integrated Research Reactor Utilization Review Mission to TRR and MNSR (2021, 4Experts\*10days) | Reduced experts |  |  |  |
| 3.2.2 2x EM to review/provide guidance on implementation of recommendations of IRRUR mission to TRR and MNSR  | Footnote/a – Mission report should include clear recommendations for CPs’ follow-up action |  |  |  |
| 3.3.1 Procurement for neutron imaging and neutron scattering – detectors, data acquisition system and software  | Footnote/a |  |  |  |
| 3.3.2 2xSV on utilization of research reactor (2020, 2022, 2 participants\*1 weeks) |  |  |  |  |
| 4.1.1 Participation in Code of Conduct on safety operation of RR | This is not SV |  |  |  |
| 4.1.2. FE on application of neutron spectroscopy  | 1 FE |  |  |  |
| 4.1.3. Participation in TW on Strategic Planning (2020) | This is not SV |  |  |  |
| 4.1.4. Participation in TW on Neutron imaging (2021 and 2023) | This is not SV |  |  |  |
| 4.1.5. Participation in TM on Neutron Scattering (2021) | This is not SV |  |  |  |
| 4.1.6. Participation in TM on utilization (2020, 2022) | This is not SV |  |  |  |
| 4.1.7. Participation in TW on NDE and ISI (2020 and 2022) | This is not SV |  |  |  |
| 4.1.8. Participation in TM on ageing management, refurbishment and modernisation (2020, 2022) | This is not SV |  |  |  |
| 4.1.9. Participation in TM on digital I&C (2021, 2023) | This is not SV |  |  |  |
| 4.1.10. Participation in TM on good operating practices (2021, 2023) | This is not SV |  |  |  |
| 5.1.1 EM, midterm review mission (2021) | Footnote/a |  |  |  |
| 5.1.2 End project review meeting (2023) | Footnote/a |  |  |  |
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