Project Concept Template

Project Proposals for the RCA Programme 2024/2025

Part 1: Information Sheet

Project proposals for the RCA Programme 2024/2025 are to be prepared using the attached template and submitted BEFORE 31ST OF DECEMBER 2021. Completed templates will be reviewed by the RCA PAC in January 2022.

Resource documents required for developing Project Concepts can be found in the RCA web-site – (RCA Regional Office (rcaro.org)), under Projects/Resource Documents. (see below for the list of resource documents.

The Project Concept should be prepared in consultation with the stakeholders of the other participating GPs. Information on RCA stakeholders can be found in the RCA web-site (RCA Regional Office (rcaro.org)), under Projects/Project Information.

Please request access to the RCA Members Only web-site from RCARO (email: rcaro@rcaro.org) through your National RCA Representative if you do not already have access.

A proposal will be evaluated against the following criteria:

- Alignment of the objectives with priorities set out the RCA Regional Programme Framework (RPF) for 2024/25.
- Whether the project addresses a regional need.
- Whether nuclear technology is an essential component of the project.
- Whether outcomes and achievements of previous projects in this area of technology are considered.
- Does the proposal overlap or duplicate current or previous RCA projects?
- Is a convincing case made to justify further projects in this area?
- Is there a strong TCDC component?
- If the proposal is essentially an extension of previous projects in this area that have been implemented for more than 2 TC Cycles, does the proposal include arrangements for the transfer of project leadership to another GP?

List of Resource Documents on RCA web-site (www.rcaro.org)

1. Timeframe for preparation, review and approval of Project Concepts
2. Brochure on Logical Framework Matrix (Quick Reference Guide on Designing IAEA TC Projects)
3. RCA Regional Programme Framework for 2024-29
4. Details of RCA TC Projects implemented in 2007-2019
5. List of TC Projects being implemented in 2020/21 and projects approved for 2022/24
6. Recommendations on Technical Cooperation among Developing Countries (TCDC)

Please note that your National Representative will be reviewing the concept document to ensure that it has been prepared in compliance with the RCA and IAEA Criteria for TC Projects

Please contact the Chair of the RCA Programme Advisory Committee, Dr. Prinath Dias at prinathd@yahoo.com if you need assistance.

Part 2: Concept Template[1]

Title:

The title should be as concise as possible and should summarize the objective of the project.

Radiation Processing Applications for Wastewater Treatment and Recycling in the Asia-Pacific Region

Analysis of gaps / problems / needs as applied to the RCA region:

Outline the major gaps / problems/ specific needs to be addressed by the project (~ max 300 words):

With the rapid development of the economy and urbanization in the Asia-Pacific region, the problem of water pollution, especially industrial wastewater is becoming more and more prominent. Due to the complicated component of industrial wastewater, current ordinary wastewater treatment technologies such as Fenton process and ozone process have some drawbacks, which limited their practical application. How to effectively treat industrial wastewater has been a bottleneck for the sustainable development of industry in the Asia-Pacific region.

As a promising, cost-effective and environmentally-friendly treatment method, irradiation technology has shown huge application potential in the treatment and recycling of wastewater. It is suitable for the Asia-Pacific region where the economy is developing rapidly, on the premise of economic rationality, to solve the problem of wastewater treatment and recycling, and achieve coordinated social and economic development and environmental protection and sustainable development.

In 2014, the first commercial electron beam (EB) treatment plant for 10,000 m^3/day of dyeing wastewater was constructed in the Taegu Dyeing Industrial Complex in Korea. In 2017, EB irradiation was successfully applied for the treatment of dyeing wastewater (2,000 m^3/day) in Zhejiang, China. Moreover, in year of 2019, the largest full-scale EB wastewater treatment plant (30,000 m^3/day) in Guangdong China was constructed. Since then to now, EB irradiation has been widely applied to treat coking wastewater, pharmaceutical wastewater, medical wastewater and chemical industrial wastewater in China. Based on these engineering projects, much experience which has not been elucidated before in the treatment of industrial wastewater by EB such as the combination of EB with other regular wastewater treatment process was accumulated and the formulation of standards for the treatment of refractory wastewater was promoted. For the treatment of industrial wastewater in practice, the combination of various treatment processes is usually adopted, which makes the process complicated and requires high treatment cost. In comparison, irradiation technology could simply the treatment process and lower the treatment cost which is more suitable for underdeveloped GPs.

However, some underdeveloped GPs in the Asia-Pacific regions do not have corresponding irradiation equipment and the research on wastewater treatment using radiation technology is not fully carried out.

[1] If you have not been involved in drafting a concept before and if you are not fully acquainted with the RCA and its Programme you are encouraged to support advice and assistance from your RCA National Representative.

Moreover, up to now, the Asia-Pacific region has not yet established a research and exchange center for wastewater treatment by using ionization radiation technology (for example,^{60}Co or electron beam), and no corresponding communication or exchange platforms and mechanisms are established. Therefore, it is necessary to increase the promotion of this technology to drive all countries in the Asia-Pacific region to achieve coordinated and sustainable development of socio-economic development and environmental protection.

Review the resource documentation and list any past RCA projects that have addressed similar problems/needs in this area of technology. Consider outcomes and achievements of previous projects, and avoid any overlap or duplication.

No similar problems/needs in this area of technology has been addressed before in the resource documentation or past RCA projects.

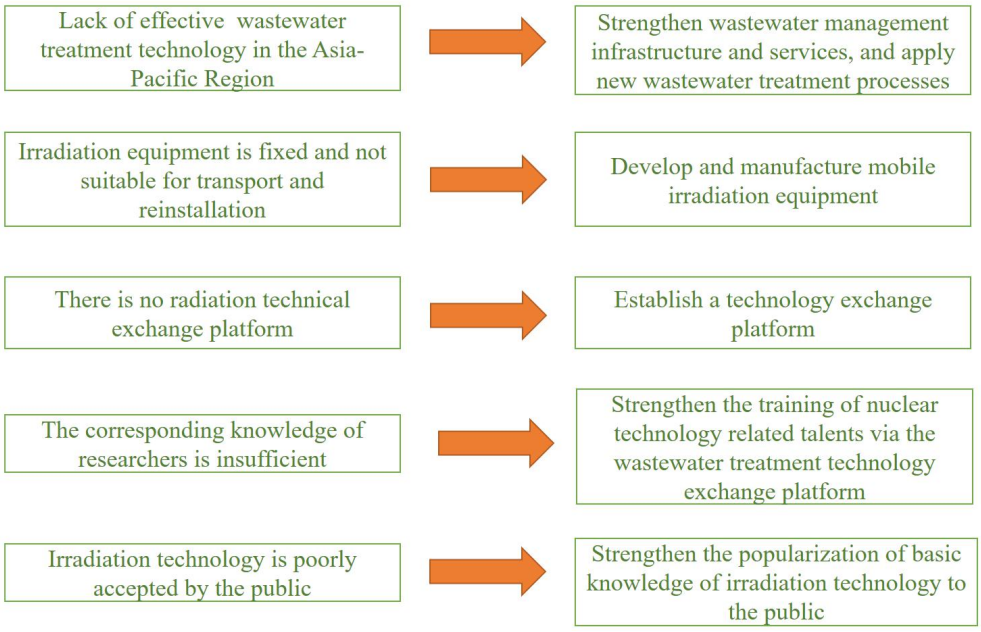
What are the major additional capabilities/skills in this area of technology that will be provided through this project (~ max 200 words).

The following capabilities/skills will be provided to the radiation techniques implementation including: to establish a technical exchange platform, carry out exchange and training activities, strengthen the communication among researchers, transfer talents and technology.
The objectives of this project are: 1) To strengthen the exchange and cooperation of radiation technology for wastewater treatment in the Asia-Pacific region; 2) To carry out expert missions and training courses and other activities for wastewater treatment by using radiation processing; 3) To promote the application of nuclear technology to wastewater treatment and recycling in the Asia-Pacific region.

Overall Objective: (Required for the preparation of the IAEA Regional Programme Note)
State the overall long-term objective to which the project will contribute. This should reflect an impact related to the RCA Regional Programme Framework for 2024/29.

Irradiation technology as a high-tech means of wastewater treatment will provide an promising solution for the treatment of industrial wastewater and promote the sustainable development of industries in the Asian-Pacific region.

Problem and objective analysis using objective and problem trees is recommended. (See pages 9 and 10 of the Quick Reference Guide on Designing IAEA TC Projects in resource documents)



Project Outcome: (Required for the preparation of the IAEA Regional Programme Note)

The outcome is the planned result of a project, achieved through the collective effort of stakeholders and partners. It represents the change or improvement that occurs as a result of the project. Should be worded in past tense. (eg. The capability for ……developed)

The irradiation technology was widely promoted in the Asia-Pacific regions and more professional capabilities for wastewater treatment were trained. The technology exchange among countries would been deepened and the irradiation coupling technology suitable for different wastewater was developed. Furthermore, the application of irradiation technology in the field of wastewater treatment was increased.

RCA Projects are to be designed to have a Socioeconomic Benefit:

What is the potential socioeconomic benefit that would be realised from the project concept over a 5 to 7-year horizon?

Irradiation technology is a high-tech means of wastewater treatment. 1) It can effectively reduce the use of chemical agent and save the cost of wastewater treatment. 2) In addition, the combination of irradiation technology and other treatment technologies can decontaminate and disinfect the water matrices containing almost any pollutant without harmful impact on the environment. 3) It provide an effective solution for the treatment of industrial wastewater, and promote the sustainable development of industries in the Asian-Pacific region and alleviated the shortage of water resources.

Proposed Participating Government Parties:

List the Government Parties expected to participate in the project. Indicate target and resource GPs:

Target GPs: Bangladesh, Cambodia, Fiji, Indonesia, Laos, Malaysia, Mongolia, Nepal, Pakistan, Philippine, Palau, Sri Lanka and Vietnam;

Resource GPs: China, Korea, Japan, Singapore, Australia, New Zealand, Thailand and India.

Technical Cooperation among Developing Countries (TCDC) Project Component:

Please refer to the resource documents (RPF and Recommendations on TCDC)

This project is a good example of TCDC in that China will provide the lead in training and auditing. TCDC will be achieved through development and dissemination of training material, technical exchange and regional training courses led by China. The following TCDC strategies will be used in this project:

(a) Sharing of a Developing Country's own expertise, technology, resources, facilities, and other capacities with another or other Developing Countries;

(b) The project input(s) will be directly from a Developing Country (DC) and implemented through defined contributions such as inputs of technical expertise or other technical inputs, or cost sharing or cost minimisation;

(c) Developing Countries will provide cost-free experts for the RCA Programme;

(d) Providing services to a Cooperative Project through the establishment by a DC of a Regional Resource Unit (RRU);

(e) Making equipment/facilities available for the training;

(f) Bearing the costs, or part costs, of subsistence of participants in events hosted by the DC;

Will the project design feature partnering arrangements between those advanced and those less advanced in the technology to be transferred through this project?

Yes.

If so, list those expected partnerships.

The expected partnerships include GPs with advanced technology, such as China, Korea and Japan et al. and other GPs (such as Pakistan, Vietnam and Indonesia, etc.) with less advanced technology in the RCA region.

Requirements for participation:

Indicate the minimum requirements that the counterpart institutions in Government Parties would need to meet in order to participate in this project.

GPs have the intention to use new wastewater treatment technology, and have relevant environmental protection policies and regulations for the application of irradiation technology. GPs already have or can build radiation facilities and equipment (for example, ^{60}Co or electron beam).

Stakeholder analysis and partnerships:

Briefly describe who are expected to be the end-users and principal beneficiaries of this project. Indicate whether the end-users contributed to development of the Concept.

The principal beneficiaries of this project would be those RCA countries would know radiation processing applications for wastewater treatment and recycling. Also, all RCA countries would benefit from updated

training material and enhancing the communication via technical exchange. Moreover, the application of the technology will promote the sustainable development of industries in the Asian-Pacific region.
End users: Industries that has problems with the wastewater.

Have any extrabudgetary funding possibilities been identified?

Yes. They have been involved in the concept stage. We have contacted the major vendors for electron accelerator and some research institutions as the extra budgetary funding sponsors and partners. They will provide personnel and devices for the training for this project through coordinated visits with expert mission, training workshop, remote training, et al.

Role of nuclear technology:

Indicate the essential nuclear technique that would be used and outline why it is suitable for addressing the problems/needs in question.

Irradiation technology is used to treat industrial wastewater by high-energy radiation. When the wastewater is radiated by high-energy ray (gamma ray or electron beam), water molecules break down to form reactive species with strong oxidation and reduction properties. These active species will rapidly undergo advanced oxidation or reduction reaction with pollutants in the water, and finally decompose and remove pollutants or inactivate microorganisms to disinfect and sterilize the wastewater. Radiation pollution control technology can be widely used in various industrial wastewater treatment, as well as wastewater disinfection treatment in large general hospitals.

Is this the only available technique that could be applied to address the problem/ need?

No. To now, for the treatment of industrial wastewater in practice, the combination of several treatment processes is usually adopted such as biological treatment combined with Fenton process or ozone process, which makes the process complicated and requires high treatment cost.

Does it have a comparative advantage over non-nuclear techniques?

Yes, it has a comparative advantage over non-nuclear techniques such as :1) short treatment time; 2) strong processing ability; 3) low treatment cost;4) no secondary pollution;5) easily combined with other wastewater treatment processes.

Duration of the project:

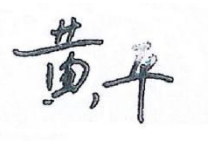
Indicate the number of years required to complete the project.

Four years.

Part 3: National Representative Endorsement for Project Concept

As the RCA NR of ….*(RCA GP)……,* **I have reviewed the Project Concept thoroughly and confirm that it meets the following requirements:**

1. The objective of the Project Concept is aligned with priorities set out the RCA Regional Programme Framework (RPF) for 2024/25.
2. The project addresses a regional need.
3. Nuclear technology is an essential component of the project.
4. Outcomes and achievements of previous projects in this area of technology have been taken into consideration
5. There is no overlap or duplication with current or previous RCA projects
6. Further projects in this area can be justified (if relevant)
7. The Project Concept has a strong TCDC component

Signature: 

Deputy Director General
Department of International Cooperation
China Atomic Energy Authority

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Date: 31/12/2021