

International Network on Innovation to Support Operating Nuclear Power Plants (ISOP)

Terms of Reference

1. BACKGROUND

Existing Light Water Reactor (LWR) technology is mature and current plants operate with high levels of safety, efficiency and capacity factors. The industry benefits from a highly skilled and motivated workforce and unique levels of cross-company and cross-border collaboration, that continuously need to be strengthened. Furthermore, climate change concerns and the need for non-carbon generation sources present a clear, continuing, vital role for nuclear power and there is growing recognition that nuclear and renewables are BOTH needed as part of the future generation mix. Energy end-use transition (electrification) will further amplify the need for non-emitting generation.

That said, the current transition of the electricity industry—including cheap natural gas and/or the increasing penetration of variable renewable generation—is putting economic pressures on nuclear, challenging the economic sustainability of many plants. Post-Fukushima public support of nuclear has been “dented” and the nuclear industry is widely perceived to be locked-in to “old technology” and slow to embrace newer technology to improve. Nuclear technology has been challenged to take hold of new manufacturing capabilities being used regularly in other sectors to enhance productivity. Finally, without a secure current fleet, it is unlikely the current staffing pipelines and supply chains will be sustained to support the future of the industry.

Many examples of innovations that could or should be adopted by the nuclear industry have been identified, but traction has been limited, challenges include:

- Incomplete understanding of opportunities and potential innovations such as broader use of new digital technologies;
- A view from the industry that nuclear is special and as such can't take in new innovations like other sectors;
- Supply chain support;
- Lack of a clear business case for deployment;
- Organizational culture & leadership;
- Risk management;
- Financing;
- Regulator alignment/ support;
- Licensing.

A coordinated international effort (leveraging the unique collaborative culture of the industry) to identify innovation opportunities, understand the benefits and remove barriers to implementation is increasingly regarded as necessary.

To reach this objective effort, two Global Forums have been co-organized by the IAEA, the Electric Power Research Institute (EPRI), the United Kingdom's National Nuclear Laboratory (NNL), the OECD's Nuclear Energy Agency (OECD/NEA) and hosted by Korea Hydro and Nuclear Power (KHNP) in Gyeongju, Republic of Korea in June 2019 and then hosted by EDF in the London, UK in July 2022. During the 2019 event, delegates prioritized the most critical innovation technologies or processes and answered a set of questions to begin to pursue a plan of action for each of those four innovations. During this first step of building the Plan of Action, the top innovations, barriers, timeframes, and needed organizational engagement are identified. At the second forum, participants explored key behaviors vital to accelerating the deployment of innovative solutions at NPPs.

The idea of creating and supporting a network on innovation that would enable the abovementioned *call to action* and momentum clearly appeared. The IAEA offered its capabilities to structure and facilitate this new initiative through the Nuclear Power Engineering Section (NPES).

2. VISION AND OBJECTIVES

VISION DEFINITION

People actively engage in the International Network on Innovation to Support Operating Nuclear Power Plants, collaborating to deploy innovation that helps ensure the sustainability of operating nuclear power plants.

OBJECTIVE DEFINITION

This network is being established to increase, structure and improve efficiencies of **collaboration and experience sharing** in the field of innovation for the nuclear industry. It also aims to complement the Global Forum and other international fora working to deliver innovation to support operating nuclear power plants.

In this context, the IAEA intends to:

- Provide a platform for organizations to collaborate to deploy innovation supporting the current fleet of nuclear power plants;
- Facilitate cooperation and exchange of knowledge on specific topics as mentioned above;
- Create a forum in which experts' advice and technical guidance may be provided;
- Share events and meetings put in place for the network and co-organized by the IAEA.

3. SCOPE AND ACTIVITIES

The scope of the network activities includes **all types of innovations** that could serve the purpose of the **sustaining operating reactors** in the current and future energy mix. It should include activities in terms of **technologies, processes, frameworks** including **regulatory aspects** and **collaboration, culture & leadership**.

Activities to deliver the ISOP objectives include:

- Organization and delivery of relevant workshops/meetings/conferences;
- Establishment of a web-based platform to facilitate a Community of Practice for innovation management encompassing:
 - o Database
 - o Contacts
 - o Interactive exchange of information
- Provide qualified peers amongst the partners and participants of ISOP to support the community efforts on peer reviews and technical support;
- Supporting the development of collaborative initiatives – case studies, methods, procedures for innovation, reports, newsletters, proceedings...
- Define and coordinate funded research projects, if relevant – i.e. IAEA (CRP's).

4. TARGET AUDIENCE

The global community of government, research, industry and academic organizations working to support or improve the economic sustainability of existing nuclear power plants.

5. WORKING MECHANISM, ORGANIZATION AND MEETINGS

The network and its associated web-based platform (CONNECT platform) is subdivided as follow:

1. The Network Coordination Group should be designed to fully satisfy the CONNECT procedure requirements:
 - Voting member of the CONNECT Governance Board;
 - Maintaining communication with other Network Coordinators;
 - Communicate to the Board his/her replacement when the case.
2. The Steering Committee is 'the Visionary Group' comprising diverse expertise external to the IAEA. It manages the networks strategic direction. Roles and responsibilities include:
 - Ownership of the network strategic vision (purpose and objective);
 - Ownership of network design (structure, features, access permissions, etc.), modifying as necessary to ensure the network adds ongoing, unique value to its members;
 - Establishing operational roles and accountabilities;
 - Strategic stakeholder engagement, as appropriate, external to the network.
3. The topical working groups are 'the Implementer Group' – An active subset of the community of users, including one or more IAEA staff members, to develop observation-based recommendations and, acting on these recommendations, develop Member State support via available IAEA implementation mechanisms. Within relevant IT platforms, moderate discussion and facilitate day-to-day network operations linked to topical areas of interest. Through these groups, other IAEA Sections will be engaged, such as NSNI/RAS, NSNI/SAS, NSNI/OSS, NENP/NPTDS and NEPK/PESS;
4. The regular users – the network community;
5. The guest users – default users, usually those users have a CONNECT access and are part of other networks. They do not have edit rights but can only read areas, files, etc. made available to the public.

In the meantime, the network shall be organized following the drivers below:

- Facilitation of ISOP goals will be based on a programme of activities determined by the topical working groups and approved by the Steering Committee. An inaugural meeting will be held to define the initial programme and prioritization of listed topics. Thereafter, the achievement of the objectives as well as the maintenance and fulfilment of the programme will be periodically reviewed—including by periodic online meetings of topical working groups or steering committee;
- Plenary meetings or sessions will be organized for specific members as means of developing ISOP goals;
- The IAEA will provide the administrative and secretariat services required to maintain the ISOP platform, including meeting facilities in Vienna, maintenance of records and distribution of documents. The IAEA will provide the services of a Scientific Secretary for the Steering Committee and online platforms from within the Nuclear Power Engineering Section (NPES). NPES and/or other Sections of the IAEA, mentioned above, will provide the services of a Scientific Secretary for topical working groups as appropriate;
- The Secretariat will record the outcome of meetings and other ISOP interactions;
- The establishment of a website (CONNECT platform) complimented by a dynamic platform (MS Teams) to provide continuity of personnel interaction between meetings and facilitate exchange of good practices. The platforms will provide a forum for exchange of ideas and information. As well, a number of other practical objectives may be served, such as to highlight upcoming events, facilitate on-line publication and utilization of IAEA reports, and promote individual contacts and their interests. The IAEA will assure the hosting of these platforms. Overarching network management, including day-to-day platform management, discussion moderation, etc. will be allocated external to the IAEA and defined and agreed during inaugural meeting;
- Where an organization has a demonstrated experience in a particular topic it may be proposed to lead or contribute to ISOP work in that area within a topical working group. This will enhance both visibility and credibility of their activities promoting their proven technology;
- Specialist groups may be formed under the auspices of ISOP. These may cover topics or facility types of common interest. Where appropriate, specific working groups may be formed to pursue these topics;
- ISOP will take advantage of the approaches used and experience gained within other IAEA Networks.

6. FUNDING

Network operation – to come from the Regular Budget

- Staff: 0.2 FTE
- Meetings: €15k for TM for the meeting of the OPIC steering committee (once / 2yr)
- IT infrastructure: €0

Work of the topical working groups

- TBD on a case-by-case basis depending on the activities to be implemented. In most cases events and activities would be implemented using RB or EB consistent with typical development and delivery of Member State support.

Level	Groups	Roles & Responsibilities	Non-IAEA people	IAEA people
CONNECT level	CONNECT Governance Board (Lead by IAEA)	- Governs the CONNECT platform - Supports the functioning of the system - Resolves issues of common concerns across all networks	None	- CONNECT administrator - Networks coordinators - Several IAEA representatives from different departments incl. IT
NETWORK level	Network Coordination Group (Lead by IAEA)	- Voting member of the CONNECT Governance Board; - Maintaining communication with other Network Coordinators; - Communicate to the CONNECT Governance Board his/her replacement when the case	Possible co-scientific secretary but will not be member of the CONNECT Governance Board (Not mandatory)	One IAEA scientific secretary
NETWORK level	Network Steering Committee	- Ownership of the network strategic vision (purpose and objective) - Ownership of network design (structure, features, access permissions, etc.), modifying as necessary to ensure the network adds ongoing, unique value to its members - Establishing operational roles and accountabilities - Strategic stakeholder engagement, as appropriate, external to the network	- External experts, formally nominated by MS - A chair will be selected from among this group	Possible, but not mandatory
NETWORK level	Network topical working groups (Lead by an external chair and supported by an IAEA topical lead)	- develops observation-based recommendations on a specific topic - develops and delivers MS support based on recommendations	Active subset of the community users	One or more IAEA staff members
NETWORK level	Network Regular User Group	- Contributes to the network work - Exchanges and communicates with other users to remain aware of activities and help achieve the agreed goals in a timely manner as appropriate	Network community	Network community
Public	Network Guest Group	- FOR CONNECT USERS (not part of this network but a member of another one): Has a read right on all network content (by default) but can be tailored if needed - FOR EXTERNAL USERS (any regular internet user): Has access to the network public site sharing controlled information	- Default CONNECT users not part of the network - External internet users	- Default CONNECT users not part of the network - External internet users