INPRO Dialogue Forum on Opportunities and Issues in Non-Electric Applications of Nuclear Energy

(16th INPRO Dialogue Forum)

Meliá Vienna Hotel (DC Tower)
Vienna, Austria

12 - 14 December 2018

Ref. No.: EVT1702017

Information Sheet

A. Background

The International Project on Innovative Nuclear Reactors and Fuel Cycles (INPRO) was launched in the year 2000, based on resolution GC (44)/RES/21 of the International Atomic Energy Agency (IAEA) General Conference. INPRO's objective is to help ensure that nuclear energy is available in the twenty-first century in a sustainable manner.

Four tasks are reflected in the INPRO Biennium Plan for 2018–2019, as endorsed by the INPRO Steering Committee: Task 1: Global Scenarios; Task 2: Innovations; Task 3: Sustainability Assessment and Strategies; and Task 4: Dialogue and Outreach. Additional details on the INPRO project are available on the INPRO website: www.iaea.org/INPRO.

Nuclear energy has the potential to play a major role in solving global issues when deployed in cogeneration, i.e., for electricity generation and for providing process heat to non-electric applications such as desalination, district heating, hydrogen production, and other industrial applications. Non-electric applications can be seen as a catalyst for the newly addressed hybrid nuclear–renewable energy systems. In such a case, nuclear energy can offer sustainable and economic solutions for several energy challenges facing current and future generations. Consequently, there is increasing interest around the world in using nuclear energy for non-electric applications.

Technically, nuclear power reactors in operation or under development may well be integrated — to form a cogeneration system — with other systems for non-electric applications, depending on the temperature requirements of such application. However, such cogeneration systems have not been widely deployed for various technical, economic and social reasons related to both nuclear power plants (NPPs) and non-electric applications. For example, conventional NPPs have been mainly optimized in terms of design and capacity for electricity generation, and are not readily suitable to meet heat market requirements, such as: low power capacities; location near urban areas; short construction lead time; 100% reliability and availability; low capital investment; low financial risk, etc. Furthermore, conventional NPPs are not suitable for high temperature non-electric applications such as hydrogen production and the high temperature process heat needed for petrochemical, fuel synthesis, and other applications. The emergency planning zone (EPZ) concept in nuclear safety regulation can also have a negative impact on the need to locate an NPP close to a suitable district heat market. Finally, NPPs have not widely been used for desalination due to cheaper oil prices, and because most of the countries relying on conventional desalination are not nuclear technology holders and in most cases, are blessed with abundant oil to operate their desalination plants.

The economics of nuclear cogeneration will depend on the comparison with alternative options to provide heat or alternative energy carriers. Moreover, the trend in nuclear safety is toward fully independent decay heat removal systems and near-term emergency heat rejection systems for larger loads in the case of reactor accidents. Other non-electric applications may also have challenges and comparative economic analysis, including captured externalities, is essential to understand the merits of any given proposal.

Despite the above-mentioned challenges, one should consider that the expected deployment of small modular reactors, the rethinking of high and very high temperature reactors, and the potential advantages of cogeneration, could be important drivers for the deployment of nuclear cogeneration for various non-electric applications. Still, public acceptance of non-electric applications in specific and nuclear energy at large remains an important issue in increasing the deployment of nuclear cogeneration.

The IAEA supports and facilitates the development of new and emerging applications of nuclear energy and related technologies. It provides the forum for the exchange of information on the various non-electric applications; publishes technical and economic documents; and organizes technical meetings on the topic. Moreover, the IAEA has developed a variety of software tools to give decision-makers in the Member States information on the economic evaluation of desalination and hydrogen production using nuclear energy.

The 26th Meeting of the INPRO Steering Committee, in November 2017, endorsed the organization of the INPRO Dialogue Forum on Opportunities and Issues in Non-Electric Applications of Nuclear Energy, to be held in 2018. The INPRO Dialogue Forums offer a platform for technology holders, technology users and other stakeholders to share information, perspectives and knowledge on issues related to sustainable nuclear energy development. The Dialogue Forums focus on topics and issues relevant to global nuclear energy sustainability in the twenty-first century, long term nuclear energy strategies and the role of nuclear technology innovations. Information on the INPRO Dialogue Forums may be found at: http://www-legacy.iaea.org/INPRO/DFs/index.html.

This Dialogue Forum will include keynote speeches, lectures and presentations by the invited participants and discussions among participants from interested Member States and international organizations.

B. Objectives

The Dialogue Forum will focus not only on technology, but also institutional aspects, such as market, resources, effects of regulation and public acceptance issues.

The objectives of this 16th INPRO Dialogue Forum are as follows:

- Discuss and share information and knowledge on the current status and the potential of nuclear cogeneration for non-electric applications to greatly increase the efficiency of installed nuclear power;
- Identify the barriers to non-electric applications entering the heat and transportation commercial market and potential solutions;
- Explore the future perspectives for small modular reactors and innovative nuclear energy systems;
- Identify areas for additional research, development and demonstration needed to bring non-electric applications of nuclear power to full commercialization; and
- Draw up recommendations for the IAEA Secretariat and the Member States on non-electric applications of nuclear energy.

C. Expected Outputs

The expected outputs of the Dialogue Forum are:

- Collecting information and insights from the participants on their experiences and best practices.
- Identifying the considerations in further research, development and demonstration planning and implementation.
- Identifying any additional IAEA actions necessary to help Member States with decision-making and planning for the deployment of non-electric applications.
- Drafting the meeting report.

D. Expected Participation

The INPRO Dialogue Forum is open to participants from the Member States, which includes INPRO Members:

Algeria, Argentina, Armenia, Australia, Austria, Bangladesh, Belarus, Benin, Belgium, Bolivia Brazil, Bulgaria, Burkina Faso, Cambodia, Canada, Chile, China, Croatia, Czech Republic, Cuba Ecuador, Egypt, Estonia, Ethiopia, Finland, France, Germany, Ghana, Hungary, India, Indonesia, Iran, Israel, Italy, Japan, Jordan, Kazakhstan, Kenya, Korea Republic of, Latvia, Lesotho, Libya, Lithuania, Malaysia, Mali, Mexico, Mongolia, Morocco, Namibia, Netherlands, Niger, Nigeria, Norway, Oman, Pakistan, Panama, Paraguay, Peru, Philippines, Poland, Romania, Russian Federation, Rwanda, Saudi Arabia, Senegal, Serbia, Singapore, Slovakia, Slovenia, South Africa, Spain, Sri Lanka, Sudan, Sweden Switzerland, Tanzania, Thailand, The Former Yugoslav Republic of Macedonia, Tunisia, Turkey, Ukraine, Uganda, United Arab Emirates, United Kingdom of Great Britain and Northern Ireland, the United States of America, Bolivarian Republic of Venezuela and Viet Nam; and from the following organizations: the European Atomic Forum (FORATOM), the European Commission (EC), the Generation IV International Forum (GIF), the International Framework for Nuclear Energy Cooperation (IFNEC), the Multinational Design Evaluation Programme (MDEP), the Nuclear Energy Agency of the Organisation for Economic Co-operation and Development (OECD/NEA), the

Sustainable Nuclear Energy Technology Platform (SNETP), and the World Nuclear Association (WNA).

All persons wishing to participate in the Dialogue Forum are required to complete the attached Participation Form (Form A). Designations by a formal letter with the completed Participation Form attached should be submitted to the IAEA through the established official channels (e.g. Ministry of Foreign Affairs or National Atomic Energy Authority; or by an organization invited to participate), indicating as a reference number: **EVT1702017**

Designations should be submitted for the attention of the Scientific Secretaries of the Dialogue Forum, Mr Bongsoo Kim, Mr Ibrahim Khamis and Mr Maxim Gladyshev (please see contact details in Section H below). The full names and complete contact details (including postal address, telephone/fax numbers, and email address) of designated participants should be provided. The designations with the completed Participation Forms attached should reach the IAEA not later than **7 November 2018**. They should be sent to the Scientific Secretaries of the Dialogue Forum by email to: B.Kim@iaea.org , I.Khamis@iaea.org and M.Gladyshev@iaea.org with a copy to: K.Robinson-Onorati@iaea.org.

When completing the Participation Form please indicate whether you are planning to give a presentation, state the topic(s) that would be addressed in your presentation, and provide a brief explanation (about five to seven lines) of the content of the proposed presentation. The Scientific Secretary may contact participants to discuss the content of their presentations. Also, in accordance with the IAEA's policy, all presentations and other files should be loaded in advance on a computer used at a meeting room. Therefore, the presentations and any other supplementary files should be sent to the Scientific Secretary by email not later than **07 November 2018** (Microsoft PowerPoint files are preferable, although PDF format may also be used). When submitting the files electronically, please note that the size of an email should not exceed 5 MB.

The Dialogue Forum is, in principle, open to all officially designated persons. The IAEA, however, reserves the right to limit participation should this become necessary due to limitations imposed by the available seating capacity. It is therefore recommended that interested persons take the necessary steps to obtain their official designation as early as possible.

E. Working Language

The working language of the Dialogue Forum will be English with no interpretation provided. All communications, abstracts and papers must be submitted in this language.

F. Venue

The Dialogue Forum will commence at 9.30 a.m. on Wednesday, 12 December 2018, in Golden Wave II, Meliá Vienna Hotel in the DC Tower (Donau-City-Strasse 7, Vienna 1220 Austria / Tel: +43 1 90104).

G. Visas

Participants who need a visa to enter Austria should submit the necessary application to the nearest diplomatic or consular representative of Austria as early as possible.

H. Organization

Official correspondence regarding the technical aspects of the Dialogue Forum should be addressed to the Scientific Secretaries:

Mr Bongsoo Kim

Scientific Secretary
INPRO Section
Division of Nuclear Power
Department of Nuclear Energy
International Atomic Energy Agency
Vienna International Centre
PO Box 100
1400 VIENNA
AUSTRIA

Tel.: +43 1 2600 22818
Fax: +43 1 26007
Email: B.Kim@iaea.org

Mr Ibrahim Khamis

Co-Scientific Secretary
Nuclear Power Technology Development Section
Division of Nuclear Power
Department of Nuclear Energy
International Atomic Energy Agency
Vienna International Centre
PO Box 100
1400 VIENNA
AUSTRIA

Tel.: +43 1 2600 22822
Fax: +43 1 26007
Email: I.Khamis@iaea.org

Maxim Gladyshev

Co-Scientific Secretary
INPRO Section
Division of Nuclear Power
Department of Nuclear Energy
International Atomic Energy Agency
Vienna International Centre
PO Box 100
1400 VIENNA
AUSTRIA

Tel.: +43 1 2600 22809
Fax: +43 1 26007
Email: M.Gladyshev@iaea.org

Official correspondence regarding administrative issues should be addressed to the Administrative Secretary:

Ms Karron Robinson-Onorati
INPRO Section
Division of Nuclear Power
Department of Nuclear Energy
International Atomic Energy Agency
Vienna International Centre
PO Box 100
1400 VIENNA
AUSTRIA

Tel.: +43 1 2600 22885
Fax: +43 1 26007
Email: K.Robinson-Onorati@iaea.org