# IAEA ACTIVITIES ON SYNERGIES IN TECHNOLOGY DEVELOPMENT BETWEEN NUCLEAR FISSION AND FUSION FOR ENERGY PRODUCTION

V. KRIVENTSEV

IAEA

Vienna, Austria

Email: V.Kriventsev@iaea.org

V. KRIVENTSEV1, L. DI PACE1, N. VIRGILI1, L. GAERTNER1

1IAEA, Vienna, Austria

Email contact of corresponding author: V.Kriventsev@iaea.org

As ITER’s experiment start-date to create plasma comes closer to fruition, the IAEA is working to facilitate sharing of relevant experience in fission technology to benefit the fusion community in technology development for electricity production. Taking into account the worldwide acceleration towards the early deployment of nuclear fusion for energy production, the IAEA launched a new initiative aimed at addressing the great engineering challenge of fusion, by promoting transfer of technology and know-how from fission to fusion. The main objective is to identify and analyse, with an international perspective beyond ITER and towards DEMO and industrial deployment of nuclear fusion, all the possible synergies on technology development and deployment between nuclear fission and nuclear fusion.

The fission based nuclear power plants have a long history of development and operational experience; the advanced nuclear fission reactors are at an early stage of deployment and several lessons are being learned in the process of their development. It is expected that the development of future fusion based nuclear power plants for energy production will face many challenges already well-known and addressed for the deployment of nuclear fission power technology, from design to construction to decommissioning through operation, including, infrastructure needs and economic competitiveness. While the fusion technology is rapidly maturing through the realization of large experimental facilities like ITER and other innovative fusion machines (also funded by the private sector), it is of paramount importance to develop a thorough techno-economic understanding of the subject matter for an optimized and well-informed development path of nuclear fusion power plants.

The IAEA is undertaking the development of a framework on synergies between nuclear fission and fusion. The objective is to support the fusion community in its effort to accelerate the technology development and deployment of nuclear fusion systems for energy production, including the early identification of possible showstoppers in the areas of technology development and qualification of structures, systems and components, technology safety, security and safeguardability, human resources and knowledge management, construction and commissioning, economics.

The work is being developed based on the following steps, in addition to the information already provided by:

* Collection of technical information;
* Analysis of the information collected to identify synergies between nuclear fission and fusion for energy production;
* Identification of knowledge gaps;
* Promote and facilitate the exchange of information on synergies between advanced nuclear fission and fusion technologies;
* Summarize the current status of cooperation between fission and fusion technology development;
* Discuss and identify areas of development to bridge the gap to deployment and to assess requirements in the field, leading to more focused efforts in specific areas;
* Document the discussions and major findings among subject matter experts to support Member States to better understand and benefit from such synergies.

The work is progressing through a series of Technical and Consultancy Meetings, with participation from a number of member states. Final output will consist in the production of an IAEA Nuclear Energy Series publication on Synergies in Technology Development between Nuclear Fission and Fusion for Energy Production.

References

IAEA-TECDOC-1912 Challenges for Coolants in Fast Neutron Spectrum Systems, IAEA, Vienna (2020).

IAEA-TECDOC- 1851 Integrated Approach to Safety Classification of Mechanical Components for Fusion Applications