Declaration on EU SMR 2030

The role of Research, Innovation, Education and Training
in the safety of Small Modular Reactors (SMRs) in the European Union

1) The EU needs the effort of all sectors and all possible solutions to enable a transformational change to its economy and make Europe the first climate-neutral continent while ensuring energy security of supply, EU strategic autonomy and resilience. The Commission welcomes the collaborative efforts of the European nuclear industry and scientific community to achieve the common goal of a modern, resource-efficient and competitive economy.

2) The Commission is committed to continue to support research and innovation in nuclear safety through the Euratom Research and Training Programme, in this way complementing the achievement of Horizon Europe's general and specific objectives in the context of the energy transition. In order to achieve carbon neutrality by 2050, Member States' are putting efforts to increase all net-zero technologies.

3) For those Member States that choose to include nuclear in their energy mix, we see the deployment of SMRs as complementing existing assets. It is also an opportunity to further improve nuclear safety (through SMRs' inherent safety features) and increase the stability of the grid, complementing the higher penetration of renewables. SMRs could further guarantee baseload electricity production and meeting demand from the grid to better to make up for the intermittency of renewables. The EU SMR development would allow to face a strong international industrial competition in the sector (cf. USA, UK, Russia, Japan and Korea).

4) We recognise that nuclear, and particularly SMRs, can play an important role beyond electricity production in, for example, decarbonising hard-to-abate sectors. The Euratom community has committed research funding to these fields where different design solutions could offer wider application beyond electricity. This includes applications such as cogeneration for energy-intensive industries, district heating and desalination and in support of hydrogen production to decarbonise the industrial, residential and transport sectors. Several Member States and the private sector (cf. BE, DK, EE, FI, FR, IT, PL, NL, RO, SE) are committing significant funds to research, development and innovation on SMRs. The revamped SET-Plan (action 10) should optimise EU coordination on SMRs.

5) We underline that nuclear and radiation protection expertise is necessary across EU Member States to ensure safety, security and safeguards of existing and future nuclear power plants, including SMRs, industrial and medical applications and space exploration initiatives. With 2023 being the European Year of Skills, we need to seize the opportunities offered by all European programmes beyond Euratom, e.g. Marie Skłodowska-Curie actions and Erasmus+, to attract talents and leverage investments in education and upskilling that focus on key technology areas.

6) Building on past Euratom research programmes, the Commission is launching the first Innovation Action of EUR 15 million through the Euratom Work Programme 2023-2025 to support the demonstration of safety of European Light Water SMRs. In addition, this Work Programme will earmark EUR 12 million of co-funding to researchers and industry to work together on the safety

of Advanced Modular Reactors (AMRs) with interested Member States. In collaboration with the Joint Research Centre (JRC), the Euratom community is opening-up EU research infrastructures and supporting access to unique nuclear research infrastructures in Europe.

7) To maintain the highest safety and radiation protection standards, we stress the need for experimenting, testing and qualifying novel fuels, materials and technologies for the whole lifecycle of advanced SMRs, training and human capacity-building, disseminating knowledge and bridging the gap between research and industry.

8) We highlight that research on SMRs encourages new actors including SMEs and spin-offs to enter the civil nuclear sector, attracting additional investment for demonstration and earlier deployment.

9) We welcome Horizon Europe and Digital Europe Programmes' initiatives that can bring new benefits in additive manufacturing, digital technologies, robotics and artificial intelligence. Synergies between the Euratom Programme and other Programmes should be implemented, in particular but not only with the Horizon Europe cluster 1 'Health' on the radioisotope supply for medical applications and with cluster 4 'Digital, Industry and Space' (e.g. SMRs for space applications).

10) We acknowledge the possible socio-economic impact arising from the deployment of SMRs in terms of EU highly qualified jobs and high added-value companies created. We are committed to exploring new ways to address them through meaningful actions, including a series of stakeholder workshops as part of Euratom's socio-economic actions and in line with the expected stakeholders' views on the European SMR pre-Partnership activities.

Overall, we commit to continue to lead research, innovation, education and training for the safety of European SMRs in support to the EU pre-partnership on SMRs.

For the European Commission

Mariya Gabriel
Commissioner for Innovation, Research, Culture, Education and Youth

For nucleareurope	For SNETP	For ENS	For ENEN
European association of nuclear industry	*Sustainable Nuclear Energy Technology Platform*	*European Nuclear Society*	*European Nuclear Education Network*
Yves Desbazeille	*Bernard Salha*	*Leon Cizelj*	*Csilla Pesznyák*
Director General	President	President	President

Signed in Brussels on 4 April 2023

ANNEX - Explanatory memorandum of the Declaration

The European Council has acknowledged the need to ensure energy security while respecting Member States' right to choose their energy mix and to choose the most appropriate technologies. Some Member States use or will use nuclear energy as part of their national energy mix.

Nuclear technologies for both power and non-power applications are part of the EU's leadership in these fields. EU technological sovereignty will require joint efforts in education, training, research and innovation efforts. This is crucial for ensuring high-level safety and radiation protection in Europe, to properly manage radioactive waste and spent fuel and to develop the technologies of tomorrow including intrinsically safe reactors and closing the nuclear fuel cycle.

Research and Innovation for SMRs safety for power generation and beyond: Heat and Hydrogen

Small Modular Reactors (SMRs; reactors with a maximum output of 300 MWe) are expected to be cheaper and easier to build and operate while integrating inherent and passive safety features. SMRs are expected to offer a simpler, more standardised and safer modular design with enhanced, built-in by design safeguards (i.e. increased proliferation resistance).

SMRs is one promising option among others to replace fossil fuel-fired power plants, especially old coal power plants, and to complement the penetration of renewable energies. They should offer the flexibility of use for district heating, desalination, process heat for energy-intensive industries and production of hydrogen. SMRs should also offer flexibility with increasing penetration of renewables.

The EU must be at the forefront of new developments, ensuring a European industrial value chain while being at the top of safety and radiation protection standards for SMRs. To ensure EU leadership and strategic independence for SMRs, there is a need to support the best regulatory and institutional standards (cf. licensing, controls, inspection), to improve human resource management, to make nuclear careers more attractive, to optimise the use of nuclear research infrastructures and to stimulate the emergence of EU SMR design.

Education and Training (E&T) and access to nuclear research infrastructures

The European Union requires nuclear expertise. Considering that 2023 will be the European Year of Skills, the timing is right to take action and to make sure that there is and will be a well-qualified workforce for present and future nuclear applications, including for SMRs.

Half of the EU's workforce involved in the lifecycle of nuclear energy (e.g. mining, design, regulation, construction, operation, decommissioning and waste management of nuclear facilities) will soon reach retirement age[1]. It is therefore a matter of urgency that the know-how and competences are transferred to the next generation of scientists, engineers and technicians.

[1] Report from the French Presidency of the Council, 'For a European dynamic in nuclear skills', 9799/22 RECH 326 ATO 38, June 2022 - https://data.consilium.europa.eu/doc/document/ST-9799-2022-INIT/fr/pdf

To address this situation and the risk of knowledge loss, the EU is taking action to improve E&T in nuclear[2] by:

- giving access to students and researchers to large and, in some cases, unique nuclear research infrastructures[3];
- attracting the young generation to nuclear careers through Euratom-funded actions dedicated to E&T and schemes such as Marie Skłodowska-Curie Actions (MSCA);
- recognising the best talents in nuclear research, for e.g. through the SOFT Prize and Nuclear innovation Prizes for safety, radioactive waste management and radiation protection[4].

List of SMR Euratom Research and Training projects - https://research-and-innovation.ec.europa.eu/document/download/74b352e3-cd1e-4b53-a341-7f495b64ec46_en

[2] Euratom ENEN2Plus - European Nuclear Competence Area from 2022 to 2025 (EUR 7 million) for ensuring the availability of sufficient and skilled staff in the EU:

- Build a comprehensive pan-European E&T program in the areas related to the use of nuclear and ionizing radiation technologies.
- Detailed analysis of national strategies, E&T and knowledge management programs in terms of supply (academia) and demand (end-users).
- Focus on attracting new talents and tackling fragmentation of training opportunities.
- Include a mobility scheme within the EU and encourage mobility beyond Euratom with international organisations and institutions from third countries with the most advanced nuclear research programmes.
- Build long-term career perspectives involving Human Resources specialists.
- Bring together teachers, academia, operators, regulators, teaching and training organisations, industrial and non-industrial suppliers, end users of nuclear and ionising radiation technology.

[3] Euratom OFFERR project - European Facility in Nuclear Research (EUR 9 million):

- Transnational access for researchers from MS and AS to European and international state-of-the-art nuclear research infrastructures in other countries in order to advance research in all areas (except fusion).
- Common rules for the future sustainable operation of a network of 'Euratom user facilities'.
- Participation of major infrastructure operators.
- Support scheme operated by open calls.
- International cooperation is encouraged, i.e. support of international researchers when reciprocity in access to their infrastructures.

[4] European Commission, Euratom R&T Work Programme 2023-25, 17/3/2023 – wp_euratom-2023-2025_en.PDF (europa.eu).