



30 May - 3 June 2022
Lyon, France

Joint conclusion FISA 2022 / EURADWASTE '22:

FISA 2022 - Key messages and future perspectives

H. PAILLERE with input from
Ferry ROELOFS, Teodora RETEGAN VOLLMER and Said ABOUSAHL



10th European Commission Conference on EURATOM Research and Training in Safety of Reactor Systems
30 May - 3 June 2022 | Lyon, France

Joint Introduction Session (1)

- **Challenging times/opportunities:** war in Ukraine, high energy prices – and climate change
 - A time to revisit the role of Nuclear Energy in our energy systems and its contribution to net zero
 - Eg. RepowerEU explicitly mentions nuclear energy for its contribution to strengthening security of energy supply, and as a potential source of low C hydrogen
 - More and more EU countries looking at nuclear ; EU investing in SMRs
- **Euratom treaty 65 years old**
 - Europe can be proud of its achievements, how it build up competence in the nuclear energy sector, from fission to fusion
 - EU regulatory framework for safety and radwaste management
 - European Commission wants to exploit synergies, across sectors – and financial instruments
 - Marie Skłodowska-Curie actions (25y old) opened to nuclear research
- This conference is an **opportunity to learn and share knowledge through the outcomes of Euratom research programmes**
 - Hear recommendations from the research community
 - Better inform policy-makers about the future potential of NE but also challenges to be addressed, for example the ageing workforce
- **A tribute to Bernard Bigot**, recognized scientist and promoter of nuclear research



10th European Commission Conference on EURATOM Research and Training in Safety of Reactor Systems
30 May - 3 June 2022 | Lyon, France

Joint Introduction Session (2)

- **Rosalinde van der Vlies on behalf of Mariya Gabriel, Commissioner**
 - Research to build public confidence and acceptance, to make the nuclear sector more resilient and to attract young researchers
- **Claire Giry, Directrice Générale de la recherche et de l'innovation, France**
 - Nuclear science and technologies, an answer to the climatic crisis, the energy crisis and the health (cancer) crisis
- **Laurent Michel, Directeur General Energie et Climat, France**
 - Need for decarbonized energy (beyond decarbonized electricity): heat, H2
 - R&D challenges: Long Term Operation, High level waste and decommissioning, new technologies and construction
- **Rafael Mariano Grossi, DG IAEA**
 - Importance of knowledge sharing
 - Make (nuclear research) more visible to the public is how we demystify nuclear and allow people to make decisions based on science, rather than fear or ideology



Joint Introduction Session (3)

- **William D. Magwood, IV, DG OECD/NEA**
 - Today's crises are a wake-up call for the sleeping giant (nuclear energy), until recently considered an old technology with ageing staff
 - Have to go back to the 1960s to see so much excitement about nuclear energy
- **Francois Jacq, Administrateur Général, CEA**
 - New way of assessing the role of nuclear energy: integrated vision, complementarity between technologies, smart grids, flexibility of nuclear "offer": size, products
 - This leads to new research/innovation needs, importance of working together, especially at European level (example sharing infrastructures)
- **Baiba Miltoviča, European Economic and Social Committee**
 - Energy is more and more expensive → energy poverty
- **Marta Ziakova, Chair of the European Nuclear Safety Regulators Group**
 - Transparency and continuous enhanced nuclear safety are the two pillars of Nuclear Safety in Europe



Joint Introduction Session (4)

- **Yves Debazeille, DG FORATOM,**
 - without securing sufficient funding for research in the nuclear sector, the European Union will fall behind its competitors: serious consequences on EU targets related to climate, energy prices, and security of energy supply
 - It is time for Europe to rethink its position as a serious player in the nuclear sector.
- **Jadwiga Najder, Chair of the Young Nuclear Generation of ENS**
 - (Listen) to the perspectives of the youth
 - 36% of global nuclear workforce is 55y+



Session 1: Safety of Nuclear Installations (1)

- New nuclear reactors require **continuity in policy, a favorable regulatory context** and **financing mechanisms** reconciling revenue visibility and stable costs for customers.
- An **EU SMR partnership** is under preparation to support achieving **carbon neutrality** in Europe by 2050 and **sustainability** over the long term.
- With respect to safe and continued operation of current and future nuclear power plants:
 - Development, maintenance and preservation of **databases, advanced instrumentation, advanced destructive and non-destructive techniques.**
 - Development of **multi-scale multi-physics modelling and simulation tools.**
 - Simulation methods should be directly applicable to **industrial contexts, easy in use, robust, transparent,** available with **validated** software.
 - Exploiting and developing the use of transparent and robust **artificial intelligence** techniques.
 - Implementation of **uncertainty quantification** and **sensitivity analysis** as a standard.



Session 1: Safety of Nuclear Installations (2)

- It is important to improve the understanding of **phenomena influencing materials and components performance**.
- New code and fuel developments are encouraged in the field of **independent supply** for the existing and future VVER reactors in Europe.
- Experiments, instrumentation, and simulations should go hand-in-hand, **strengthening** each other and pushing each other **to the limits**.
- Novel **low enriched uranium fuels for research reactors** need to be tested and demonstrated for various high performance European research reactors.
- Guidelines to **design and implement new accident management procedures, validated simulation tools** (including **verification experiments**) and **safety devices** (including innovative passive safety systems) are expected and under development.
- There is a strong call to **set-up and maintain databases** collecting historic and new data for **validation and verification**.



Session 2: Advanced nuclear systems and fuel cycles (1)

- In this Session, some of the EURATOM Programme priorities were addressed, which are of paramount importance as these **projects and activities are contributing directly to the criteria for taxonomy compliance of nuclear projects** in line with the recommendations of the JRC report.
- Making nuclear energy more sustainable will require innovative thinking and technology breakthroughs allowing the **closing of the nuclear fuel cycle** as well as **advances in material science** and the **processing and disposal of nuclear waste**, including HLW.



Session 2: Advanced nuclear systems and fuel cycles (2)

- Realizing the **potential of nuclear energy to contribute fully to the decarbonization** of our energy system will require **extending the portfolio of nuclear technologies**, in large-scale installations as well as future SMRs, **beyond electricity production** towards other applications, such as heat and hydrogen production.
- This needs to happen **timely** and at the same time with full respect of utmost **priority on nuclear safety, transparency and public acceptance**.



10th European Commission Conference on EURATOM Research and Training in Safety of Reactor Systems
30 May - 3 June 2022 | Lyon, France

Session 3: E&T, RI, LD radiation protection, decommissioning and int. coop. (1)

- This session focussed on **horizontal pillars**: Training, Education, Knowledge Management, Open access of European Nuclear Research Facilities
- **Synergies**:
 - Fusion and Fission (an opportunity to promote scientific exchange across communities within the Euratom Programme (Fusion/Fission))
 - Nuclear Medical Applications
 - Radiation Protection
 - Decommissioning
- Also a number of **posters** addressed these topics



10th European Commission Conference on EURATOM Research and Training in Safety of Reactor Systems
30 May - 3 June 2022 | Lyon, France

Session 3: E&T, RI, LD radiation protection, decommissioning and int. coop. (2)

Education & Training / KM: attracting, developing and retaining young talents

- All the projects in sessions 1 and 2 have specific ET and KM components.
- **General Nuclear E&T** is done through projects such as ENEN+, or on thematic areas:
 - ENEN+ project: grant of more than 535 mobilities to BSc, MSc, PhDs and other young professionals to perform an E&T activity outside of their home country.
 - A-CINCH project: Augmented Cooperation in Education and Training in Nuclear and Radiochemistry, covers Nuclear wiki database of teaching materials Open Educational Resources to be shared, or Massive Open Online Courses.
 - ENEEP (European nuclear experimental education platform) demonstrates the European dimension of E&T activities, and a high attractiveness of the courses offers.
- **Knowledge Management:** a platform is being developed to improve the accessibility to the results of various EURATOM funded projects. The pilot project focuses on recent “materials projects”.



Session 3: E&T, RI, LD radiation protection, decommissioning and int. coop. (3)

Medical applications of ionizing radiation and radiation protection for European patients, population and environment

- Scientific evidence is to be comprehensively translated into procedure and practice guidelines as well as into policy recommendations, beyond the classical exploitation of scientific publications
- Several projects target applications of radiation in medicine:
 - Cancer treatment
 - Cardiology
 - Diagnostic exposures

Towards effective radiation protection based on improved scientific evidence and social considerations – focus on Radon and Naturally-Occurring Radioactive Materials

- RadoNorm aims at managing risks from radon and NORM exposure situations to assure effective radiation protection based on improved scientific evidence and social considerations.



Session 3: E&T, RI, LD radiation protection, decommissioning and int. coop. (4)

Radiation protection research and innovation

- MEENAS consortium of six European radiation protection research platforms behind PIANOFORTE partnership which aims to provide a European scientific and technological basis for a robust system of protection and consolidated science-based policy recommendations to decision makers.
 - In the long term, these efforts will translate into new and improved practical measures and better outcomes for the effective protection of people (public, workers, patients) and environment.

How to make the dismantling operations more efficient, safer and more cost-effective: SHARE - A roadmap for Research in Decommissioning

- Identifying the needs and opinions of stakeholders throughout the value chain. The project also considered existing and emerging innovative solutions, as well as international best practices in nuclear decommissioning.
- Need to rapidly bring to maturity technologies (digital technologies, automatised or semi-automatised robotics, LASER cutting). It is the common objective of the five European projects (INNO4GRAPH, LD-SAFE, PLEIADES, CLEANDEM and INSIDER).



Session 3: E&T, RI, LD radiation protection, decommissioning and int. coop. (5)

Supporting access to pan-European Research Infrastructures and International Cooperation

- OASIS: The current scheme of open ACCESS to JRC's infrastructure helps to bridge the gap between high and less wealthy institutions in the EU. The selection procedure is based on scientific merit of the proposals.
- The strategic planning for optimising the use of the research reactors (TOURR project) is on-going at the same time when one of the most important future research facility, namely the JHR, is under construction. On the other hand, the JHR will aim at new generation of research capacity with the wide experimental device fleet under construction.

The experiences gathered in the implementation of open access projects in previous and current Euratom research & training programmes, are a very good basis to be used for the design of future schemes, for all kinds of nuclear facilities.

