Il posizionamento e le prospettive italiane nel programma Euratom-Fission

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Schema presentazione

- I risultati Italiani nel WP 2021-2022
- Le parole chiave e le novità del WP 2023-2025
- Competenze e prospettive Italiane

I risultati Italiani nel WP 2021-2022

- Participazione di entità italiane in molti progetti sulle seguenti tematiche:
  - ❑ Safety of operating nuclear power plants and research reactors (con 1 progetto a coordinamento italiano)
  - ❑ Safety of advanced and innovative nuclear designs and fuels
  - ❑ Advanced structural materials for nuclear applications
  - ❑ Harmonisation of licensing procedures, codes and standards for future fission and fusion plants
  - ❑ Development of tritium management in fusion and fission facilities
  - ❑ Towards a harmonised application of the international regulatory framework in waste management and decommissioning
  - ❑ European Partnership for research in radiation protection and detection of ionising radiation (nuovo Partenariato cofinanziato partito nel 2022): Progetto PIANOFORTE
  - ❑ Safe use and reliable supply of medical radionuclides
  - ❑ Cross-sectoral synergies and new applications of nuclear technologies
  - ❑ Towards a European nuclear competence area
  - ❑ Socio-economic issues related to nuclear technologies
  - ❑ Support for Euratom national contact point

Le parole chiave e le novità proposte nel nuovo WP

Aree tematiche

1. **Nuclear Safety**
2. **Safe spent fuel and radioactive waste management, decommissioning**
3. **Nuclear science and ionising radiation applications, radiation protection, and emergency preparedness**
4. **Other actions not subject to calls for proposals**

Nuclear safety…

- Operating NPP and RR
  - ❖ Cross-cutting technologies, like digitalisation, modelling and simulation to improve safety through ageing management and reactor safety margins
  - ❖ Advanced structural integrity assessment methods
  - ❖ State of the art integrity assessment methodologies
  - ❖ Connection with regulatory bodies and/or their technical support organisations
- Light Water SMR
  - ❖ Focus on safety features and passive safety systems
  - ❖ Regulator's approach
- Advanced and innovative designs
  - ❖ Focus on safety features from design to decommissioning
  - ❖ Regulator's approach
  - ❖ Innovation in all safety aspects (e.g. less waste)

Nuclear safety (...segue)

- **Nuclear Materials (proposta per nuovo Partenariato cofinanziato)**
  - Beneficia delle attività svolte nello "Joint Programme on Nuclear Materials" (JPNM), creato nel 2010 dalla European Energy Research Alliance (EERA) e delle attività svolte nel progetto Euratom "Organisation of the European Research Community on Nuclear Materials" (ORIENT-NM)
  - From "observe and qualify" to "design and control"
  - Structured consolidation of the European research community on nuclear materials
  - Contribute to maintaining the high-level of safety of nuclear installations for the current and future fleets
  - Coordinated use of infrastructures
  - Enhanced interaction with European nuclear regulatory bodies and their TSOs
  - Improved exchange of knowledge across research communities (e.g. including fusion and non-nuclear)
- Partitioning and Transmutation
  - Competencies and expertise in Partitioning and Transmutation (P&T) and actinide fuel fabrication processes
  - Improve the sharing of best practices
  - Safety aspects of the optimisation of fuel cycles
- Improved nuclear data for energy and non-energy applications
  - Nuclear data libraries and computer simulations
  - Reliable nuclear data and simulation tools
  - Access to key experimental infrastructures

Safe spent fuel and radioactive waste management, decommissioning

- Innovative technologies for decommissioning
  - ❖ Advancing safety
  - ❖ Waste minimization
  - ❖ Improvement in environmental remediation
  - ❖ Cutting-edge technological innovation
  - ❖ Competitive and resilient industry

Nuclear science and ionising radiation applications, radiation protection, and emergency preparedness

- Fuel for RR, medical radioisotopes
  - Connection with the 'Europe Beating Cancer' plan and the Strategic Agenda for Medical Ionising Radiation Applications (SAMIRA) initiative
  - Support world-leading neutron sources and reliable production facilities for medical radioisotopes
  - Improve the sharing of best practices
- Nuclear and radiation techniques for EU strategic autonomy, circular economy and climate change policies
  - Critical raw materials
  - Reduction, recycling and reuse of non-radioactive waste
  - Monitoring climate change and pollution of ecosystems
- Innovation in nuclear science, technology and radiation protection
  - Breakthrough innovation in radiation protection and emergency preparedness
  - Cross-cutting technologies
  - Safety aspects of alternative applications of nuclear energy
  - New or improved nuclear techniques, in the medical field or for the secure supply of stable isotopes
  - Innovation in communication about nuclear applications and their risks
- Supply of High-Assay Low Enriched Uranium Fuel (HALEU)
  - Security of supply, long-term availability, accessibility and strategic autonomy
  - Key challenges of
    - Horizon Europe missions
    - EU priorities in the sectors of energy and health
    - Recommendations from the Advisory Committee of the Euratom Supply Agency (ESA)
    - Europe's Beating Cancer Plan
    - Strategic Agenda for Medical Ionising Radiation Applications (SAMIRA) initiative
    - REPowerEU
  - Considering building a HALEU production facility

Other actions not subject to calls for proposals…

- **Co-funded European Partnership on Radioactive Waste Management (proposta per nuovo Partenariato cofinanziato)**
  - Build on the structure, the network and the tools established by EURAD-1
  - Improve, innovate and develop science and technology for the management and disposal
  - Safe start of operation of the first geological disposal facilities
  - Support all Member States national programmes
  - Provide input to next set of Member States with construction and operation in sight
  - **Reach out to the Member States that didn't participate in EURAD-1**
  - Reach out to the Regulatory Bodies
- FISA2025–EURADWASTE'25 conferences on Euratom fission research and training (Presidency event)
  - The next conferences should take place in 2025 during the Polish Presidency of the Council of the EU
- Education, training, capacity building and networking actions to strengthen Ukrainian and EU nuclear research
  - Further cooperation with Ukrainian (UA) research entities and academia, aiming to improve the participation of their researchers in co-funded Euratom research and training activities
  - Maintaining adequate nuclear knowledge and capabilities to safely operate nuclear installations in Ukraine
  - Realisation of full potential of Ukrainian research entities and infrastructures, and research programmes
- **Nuclear Innovation Prize 2025**
  - Nuclear Innovation Prize in safety of reactor systems
  - Nuclear Innovation Prize in safety of radioactive waste management
  - Nuclear Innovation Prize in radiation protection
- **MSCA Postdoctoral Fellowships** in research fields covered by the Euratom Programme 2021-2025

Competenze e prospettive: Nuclear Safety…

- **Operating NPP and RR**
- **LW-SMR**

Competenze italiane:

- Passive safety systems
- Innovative fuel and structural materials
- Improved evaluations of general safety margins
- Mitigation systems and strategies
- Severe accident sequences and management
- Emergency preparedness and response capacity and coordination
- External events impact analysis
- Sensitivity and uncertainty analyses
- Development and use of computational techniques based on big data and artificial intelligence to perform sensitivity and uncertainty analyses
- Capability of performing experiments

Nuclear Safety (segue)…

Advanced and innovative designs

Competenze italiane:

- Vast experience on development of Lead Fast Reactors both as Small Modular Reactors (SMR) for short-term deployment and as large, centralized power stations, top-scoring in economics, safety, sustainability and proliferation resistance for the longer-term future
- Small Modular Reactors
- Integration between nuclear and renewable energy
- Supplementing nuclear energy with storage solutions

Nuclear Safety (…segue)

Nuclear Materials

Partitioning and Transmutation

Competenze italiane:

- Innovative structural materials
- Development and qualification of improved materials
- Evaluation of the necessary related nuclear data
- Multi-scale and multi-physics numerical models
- Vast experience on both fission and fusion case studies
- Possibility to perform experiments

Improved nuclear data for energy and non-energy applications

Competenze e opportunità in Italia:

- Integral measurements with fast neutrons
- Improved cross section measurements for specific processes

Safe spent fuel and radioactive waste management, decommissioning

Innovative technologies for decommissioning

Competenze italiane:

- Minimization of long-life radioactive waste
- Site characterization procedures
- Advanced manufacturing technologies in decommissioning, including robotics, automated site mapping, and digital twins
- Communication, information and training

Nuclear science and ionising radiation applications, radiation protection, and emergency preparedness

Fuel for RR, medical radioisotopes

Competenze italiane:

- Various approaches on radionuclide production, from Research Reactors, to accelerator-based methods
- Radionuclides for diagnostics, therapy and theranostics

Nuclear and radiation techniques for EU strategic autonomy, circular economy and climate change policies

Innovation in nuclear science, technology and radiation protection

L'Italia può giocare molte carte in questi settori:

- Innovative spirit in science and technology
- Vast industrial experience, from SMEs to medium to large industries
- Ongoing efforts to develop solutions for circularity and recycling in different sectors
- Innovation potential in emergency preparedness and radiation protection, also based on cutting-edge technologies
- Innovation potential in alternative applications of nuclear energy
- Ongoing efforts to improve communication by using innovative approaches

Co-funded European Partnership on Radioactive Waste Management

Innovative technologies for decommissioning

Competenze italiane:

- Safety enhancement of waste by implementing specific treatment and conditioning projects
- Minimization of long-life radioactive waste
- Radioactive waste characterization, including radiological characterization of waste containing HTMR (Hard To Measure Radionuclides)
- Safe transport of radioactive waste
- Site characterization procedures
- Integrity monitoring technologies
- Environmental monitoring during the institutional surveillance phase
- Geological disposal
- Innovative processes for the treatment and conditioning of radioactive waste coming from advanced fuel cycles
- Advanced manufacturing technologies in waste management, including robotics, automated site mapping, and digital twin technology
- Communication, information and training
- **L'Italia è partner di MICADO, SHARE, PREDIS, CLEANDEM, INNO4GRAPH e può dare un significativo contributo a EURAD-2**

Ma non dimentichiamo

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Grazie !

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2021 - 2027