

 LA SETTIMANA HORIZON EUROPE 2021 



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La dimensione nazionale e il  
posizionamento italiano nel tema  
Euratom-Fission



## Outline

1. Budget
2. WP areas
3. Relevant aspects
4. General aspects



## Budget for Work Programme 2021-2022

- ↗ The total financial envelope for the WP implementation is
- ↗ **€ 676,7 million = € 313.8 million (2021-2022 budget)  
+ € 363 million (2023 - 2025 budget)**

### Breakdown:

- ↗ **€ 99.350 million for the call (source of funding: fission: 95%, fusion 5%)**
- ↗ **€ 547 million for EUROfusion (2021-2025 budget)**
- ↗ **€ 30 million for Partnership in Radiation Protection (2021-2025 budget)**
- ↗ **€ 10.45 million for other actions**



## WP Areas

- 1. Nuclear Safety**
- 2. Safe spent fuel and radioactive waste management, decommissioning**
- 3. Nuclear science and ionising radiation applications, radiation protection, emergency preparedness**
- 4. Expertise and competence in the nuclear field within the Community**
- 5. Other actions not subject to calls for proposals**



## Nuclear Safety

- ↗ **Safety of operating nuclear power plants and research reactors**
- ↗ **Safety of advanced and innovative nuclear designs and fuels**
- ↗ **Multi-recycling of spent nuclear fuel from light water reactors (LWR)**
- ↗ **Advanced structural materials for nuclear applications**
- ↗ **Safety of High Temperature Reactors**
- ↗ **Harmonisation of licensing procedures, codes and standards for future fission and fusion plants**
- ↗ **Development of tritium management in fusion and fission facilities**



## Safe spent fuel and radioactive waste management, decommissioning

### ➤ **Towards a harmonised application of the international regulatory framework in waste management and decommissioning**

Here we have a single topic, as there are several ongoing H2020 projects on decommissioning and waste management (MICADO, PREDIS, CLEANDEM, INNO4GRAPH, SHARE, etc). Additional topics will be discussed in the near future, based on the mid-term evaluation of the EJP EURAD and the outcome of the project SHARE.



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

- ↗ **European Partnership for research in radiation protection and detection of ionising radiation**
- ↗ **Safe use and reliable supply of medical radionuclides**
- ↗ **Cross-sectoral synergies and new applications of nuclear technologies**



## Expertise and competence in the nuclear field within the Community

- 🏢 **European facility for nuclear research**
- 🏢 **Towards a European nuclear competence area**
- 🏢 **Socio-economic issues related to nuclear technologies**
- 🏢 **Support for Euratom national contact points**
- 🏢 **Support for the Sustainable Nuclear Energy Technology Platform to address cross-sectoral challenges and non-power applications of ionising radiation**



## Other actions not subject to calls for proposals

- 🚩 **FISA-EURADWASTE conference on Euratom fission research and training**
- 🚩 **Training and information actions to integrate Ukrainian research entities into European nuclear research networks**
- 🚩 **Nuclear Innovation Prize**
  - There are two specific categories for this prize:
    1. Nuclear Innovation Prize in safety of reactor systems
    2. Nuclear Innovation Prize in radioactive waste management
- 🚩 **Support for MSCA in nuclear research and training**



## Relevant general aspects

- ▮ The objectives of the 2021-2025 Programme represent an evolution compared to previous Euratom programmes. Some priorities are changing with the evolving needs of the Union and its Member States. For example, the intensified fight against cancer and the greater importance accorded to health since the COVID-19 crisis mean a **bigger role for the Programme in researching the non-power application of nuclear science in the health and medical sectors**. Moreover, **other cross-sectoral synergies are unlocked** (e.g. digitalisation, artificial intelligence, robotics, internet of things, big data and novel manufacturing methods).
- ▮ **Horizon Europe provides a framework for synergies with the Euratom Programme** in education and training **and for joint research actions**. The latter will focus on ways in which non-power applications of ionising radiation can be used safely and securely in sectors such as medicine, industry, agriculture and space.
- ▮ In particular, the Euratom Programme will seek **synergies in medical applications of ionising radiation**, including improvements in the quality and safety of such applications as outlined in the SAMIRA action plan. **Whenever possible, there should be interactions with other Horizon Europe activities and Commission initiatives** (Europe's Beating Cancer Plan and the Cancer Mission).



# Relevant specific aspects: Nuclear Safety

## ▣ Safety of operating nuclear power plants and research reactors

### Italian competence pool and interest:

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



## Relevant specific aspects: Nuclear Safety

### 🔗 **Safety of advanced and innovative nuclear designs and fuels**

#### Italian competence pool and interest:

- Advanced and innovative designs, with 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

### 🔗 **Advanced structural materials for nuclear applications**

#### Italian competence pool and interest:

- 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



## Relevant specific aspects: Safe spent fuel and radioactive waste management, decommissioning

### ➤ **Towards a harmonised application of the international regulatory framework in waste management and decommissioning**

#### Italian competence pool and interest:

- 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
- Communication, information and training
- Site characterization procedures
- 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 and decommissioning, including robotics, automated site mapping, and digital twin technology

**Italy already partner of MICADO, SHARE, PREDIS, CLEANDEM, INNO4GRAPH and looking forward to EURAD follow-up Partnership**



## Relevant specific aspects: Nuclear science and ionising radiation applications, radiation protection, emergency preparedness

### 🏠 **European Partnership for research in radiation protection and detection of ionising radiation**

#### Italian competence pool and interest:

- Low dose radiation effects
- Uncertainties and modelling for decision making
- Stakeholders engagement in various scenarios
- Nuclear emergencies
- Innovative radiation therapy approaches and related dosimetry techniques

**Italy was partner of the H2020 EJP CONCERT and looks forward to the new Partnership where it can contribute with significant expertise**

### 🏠 **Safe use and reliable supply of medical radionuclides**

#### Italian competence pool and interest:

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



## Relevant specific aspects: Nuclear science and ionising radiation applications, radiation protection, emergency preparedness

### 🔗 **Cross-sectoral synergies and new applications of nuclear technologies**

This is «terra incognita» where Italy can play several cards:

- Innovative spirit in science and technology
- Vast industrial experience, from SMEs to medium to large industries
- Vast scientific, technological, industrial experience in a variety of projects:
  - ✓ Nuclear energy → material qualification, safety analyses, engineering design, experimental testing,...
  - ✓ Medical applications → dosimetry, radioprotection, radiopharmaceuticals, impact analyses,...
  - ✓ Space → engineering design, material qualification, high-tech components for harsh environments,...
  - ✓ Security → system design, cybersecurity, digital technologies,...
  - ✓ Vast effort to bring ideas and solutions from science to society and market....

**A lot of potential !!**



## Relevant specific aspects: Expertise and competence in the nuclear field within the Community

### 📌 **European facility for nuclear research**

#### ▪ **Possibility to join a European network based on :**

- ✓ Several centres of Excellence for Engineering, Physics, Biology (and radiobiology),...
- ✓ World-class laboratories for material qualification, testing, measurements,...
- ✓ Research reactors, hot cells and laboratories, mechanical and Thermal Hydraulic tests facilities, waste management facilities
- ✓ Fuel cycle research and development
- ✓ Advanced modelling and simulation
- ✓ Advanced reactor technology programmes

### 📌 **Towards a European nuclear competence area**

#### ▪ **This is a very important action where Italian Universities, Research Entities and Industry should play a major role based on:**

- ✓ Several centres of Excellence for Engineering, Physics, Biology (and radiobiology),...
- ✓ Top level laboratories for and facilities for a variety of technologies
- ✓ Several possibilities for advanced training in universities, research laboratories and industrial facilities



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Thank you !

