Joint Research Centre research supporting safety, security & safeguards

Dr. Ulla Engelmann
Director

15 May 2025

European Commission

Scientific activities of JRC Dir G “Nuclear Safety and Security”

Radioactive Waste Management

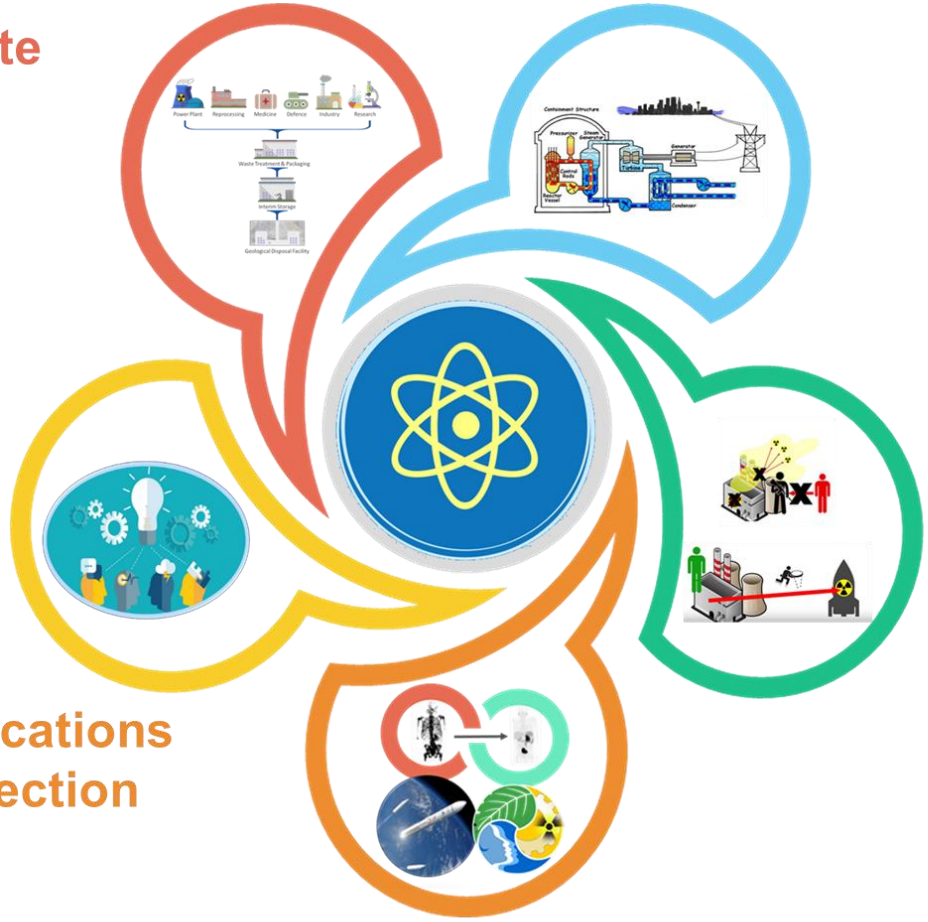
Deep Geological Disposal
Extended Interim Storage
New Waste Forms (ATF, SMR)
Regulatory framework
E&T, KM, Open Access

Nuclear Knowledge & Competence

Maintain Competence (E&T)
Human Resources Observatory
Support JRC Open Access
Reference Data & Standardization
Innovation & Technology
from Research to Industry

Non-power Applications & Radiation Protection

Medicine, Environment, Space
EU beating Cancer
Standardization
Accelerators
Open access, E&T



Nuclear Safety of Nuclear Power Plants

Nuclear reactor safety
Update of safety regulations
LTO, SMR, Gen-IV
Innovative materials
Fuel development and testing
Infrastructures: JHR, HFR and Open Access
Emergency Preparedness

Nuclear Safeguards and Security

EU Safeguards obligations
EU nuclear non-proliferation
Synergies with Security Union & Defense
International Partnership
E&T, KM

Work methodology and partnerships

- Institutional R&D,
  including exploratory component
- Administrative Agreements
  with policy DGs
- Collaborative EU projects
  (indirect actions)
- Collaboration with MS and
  international organisations

European Commission

JRC activities on SMRs

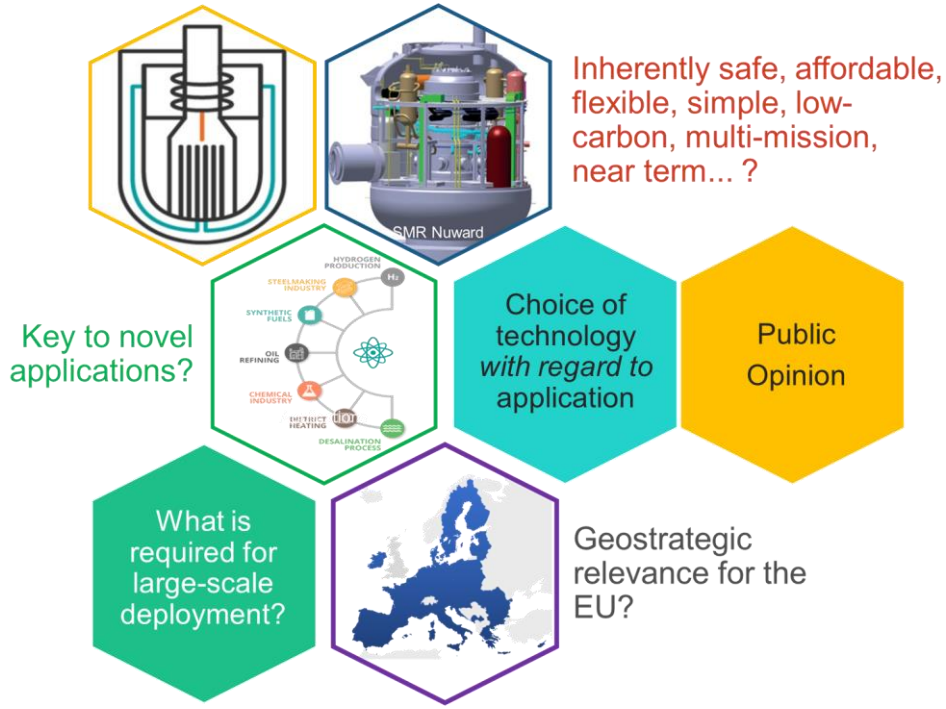
Decades of activities and experience in most SMR-relevant tech

- Fuel, Materials, Safety/Security/Safeguards, Waste, Licensing, Codes & Standards, Industrial Applications, Hydrogen, Energy System Integration…

Cooperation with industry on safe fuel and materials

- Molten Salt Reactor fuel characterization (Karlsruhe)
- Development of Design Codes & Standards (Petten)
- Nuclear Data (Geel)

Well integrated in European and international networks, Access to Intellectual Property from Euratom and Gen IV projects

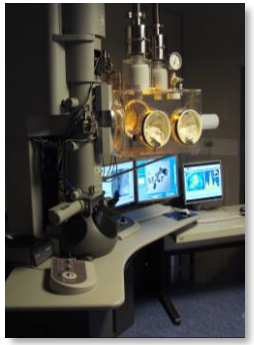


European Commission

Selection of JRC's nuclear research installations

Hot cells for irradiated-fuel studies

Water corrosion loop AMALIA



Transmission electron microscopy

Thermophysics & thermodynamics: Laserflash

Neutron facilities

Minor actinide lab

Large geometry secondary ion mass spectrometry (SIMS)

Advanced Safeguards Measurement, Monitoring and Modelling Lab (AS3ML)

“3S by Design” for SMRs and AMRs

Why

- Need to comply with Safety, Safeguards and Security
- Need to identify and manage 3S interfaces
- Complex (almost impossible) to do after design finalization

What

- Analysis of 3S needs at all design (and licensing) stages
- Identification of the whole range of 3S interfaces
- Exploitation of synergies while minimizing conflicts via optimal design solutions

How

- Through innovative, holistic approaches to nuclear systems design

European Commission