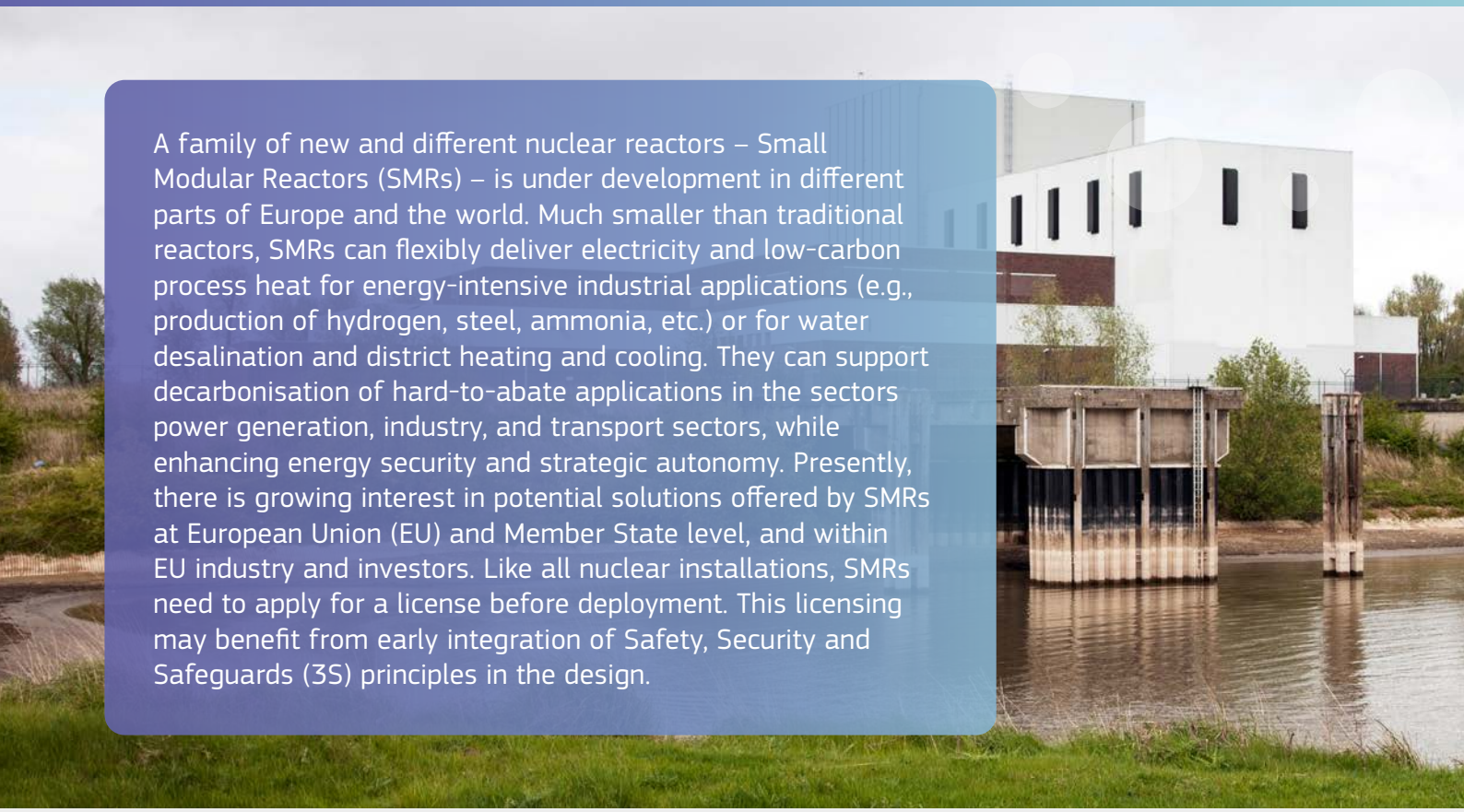
European Commission

JRC PORTFOLIO 05

SMALL MODULAR REACTORS



A family of new and different nuclear reactors – Small Modular Reactors (SMRs) – is under development in different parts of Europe and the world. Much smaller than traditional reactors, SMRs can flexibly deliver electricity and low-carbon process heat for energy-intensive industrial applications (e.g., production of hydrogen, steel, ammonia, etc.) or for water desalination and district heating and cooling. They can support decarbonisation of hard-to-abate applications in the sectors power generation, industry, and transport sectors, while enhancing energy security and strategic autonomy. Presently, there is growing interest in potential solutions offered by SMRs at European Union (EU) and Member State level, and within EU industry and investors. Like all nuclear installations, SMRs need to apply for a license before deployment. This licensing may benefit from early integration of Safety, Security and Safeguards (3S) principles in the design.

The portfolio aims to:

Support EU Member States and Commission services in assessing risks and benefits of Small (and Micro) Modular Reactors

Investigate the supply chain availability and long-term sustainability of components and critical materials required for the deployment of Small Modular Reactors

Evaluate the potential of Small Modular Reactors for decarbonising hard-to-abate sectors including electricity production and for enhancing energy security and strategic autonomy

Joint Research Centre

Delivering on anticipation, integration and impact of EU policies

- investigating how to increase strategic autonomy by consolidating the availability and long-term sustainability of supply chains for components and critical materials required for the deployment of SMRs,
- evaluating the potential contribution of SMRs to decarbonising hard-to-abate applications,
- assessing the economic viability and sustainability of different SMR designs, as well as their contribution to resilient energy production,
- supporting early integration of safety, security, and safeguards principles in SMR designs, including those coming from outside the European Union,
- Contributing to EU efforts regarding the improvement of existing data, codes, and standards to cover the design, manufacturing, and in-service inspection of SMRs.

Time frame

This portfolio provides research activities and input that support the deployment of SMRs with a horizon of 2030. The portfolio also aligns with the roadmaps of other deployment targets in the industrial nuclear field: the Sustainable Nuclear Energy Technology Platform (SNETP) – (the Nuclear Generation II & III Alliance (NUGENIA), the European Nuclear Cogeneration Industrial Initiative (NC2I), the European Sustainable Nuclear Industrial Initiative (ESNII) – the European Energy Research Alliance (EERA), the Joint Programme on Nuclear Materials (JPNM), the European initiative for the creation of an EU Small Modular Reactors (SMR) Partnership, contributing to the more forward-looking Green Deal objective of carbon neutrality in Europe by 2050.

Main partners

Partner DGs
ENER, GROW, RTD

Selected stakeholders
IAEA, OECD/NEA, Generation IV International Forum

Small Modular Reactor
Decarbonisation
Energy market
Minimisation of novel waste forms
SMR deployment
SMR licencing
Strategic autonomy
SMR fuels
Development of SMR technology
Climate change mitigation
Hard-to-abate applications
Strategic autonomy
Energy security

Find out more

SMALL MODULAR REACTORS

https://joint-research-centre.ec.europa.eu/jrc-research-portfolios/small-modular-reactors

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