

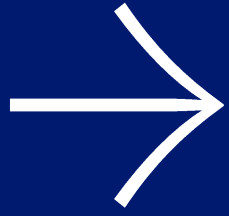
framatome

Position & Vision / MSR

Thomas Boisseau



SAMOSAFER Final Meeting – Avignon Nov. 29 2023



Vision

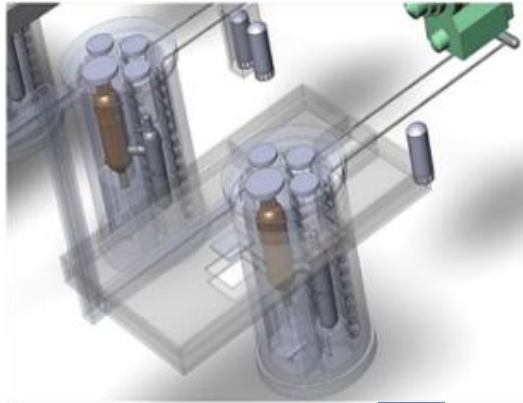
High-performing people and technologies for safe and competitive nuclear plants worldwide.



A photograph of a modern glass-fronted building with the word 'framatome' in large white letters on the facade. The building is partially obscured by green foliage in the foreground. A blue rectangular overlay is positioned on the left side of the image, containing white text.

Framatome
Position on
Advanced Reactors
development

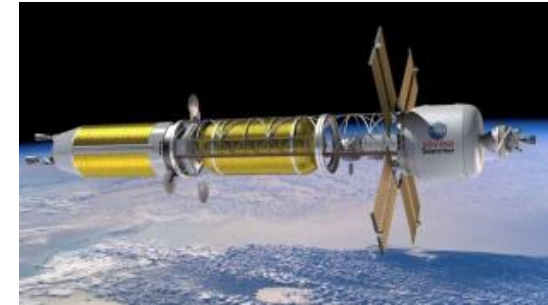
Framatome solid foundations: our continuous involvement in Advanced Reactors projects



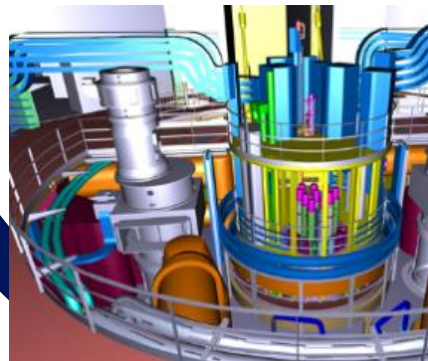
Framatome
SC-HTGR



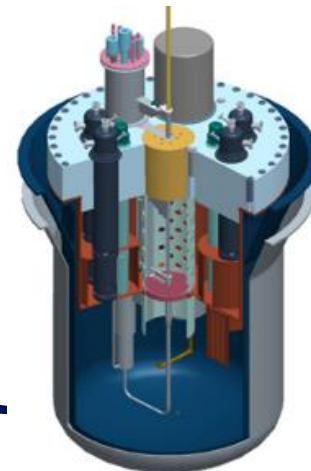
LW-SMR : NUWARD™



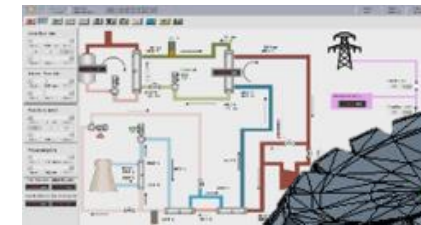
NTP: NASA / ESA



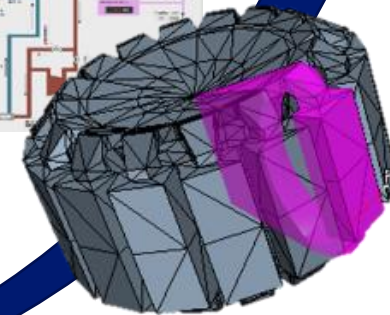
SFR : ASTRID
CEA-Framatome



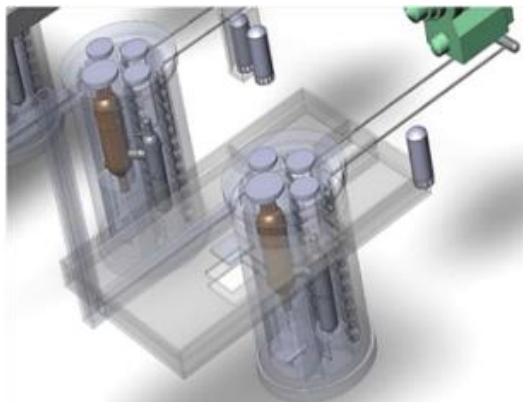
ADS



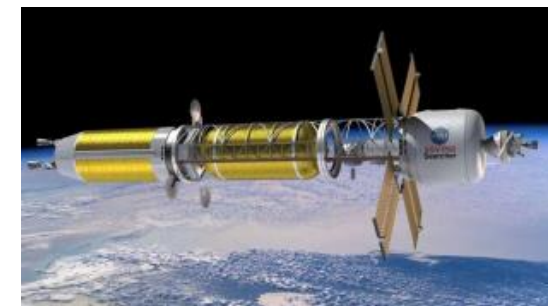
MSR



Framatome motivation: our continuous engagement towards sustainable nuclear energy and Gen4 systems design and deployment

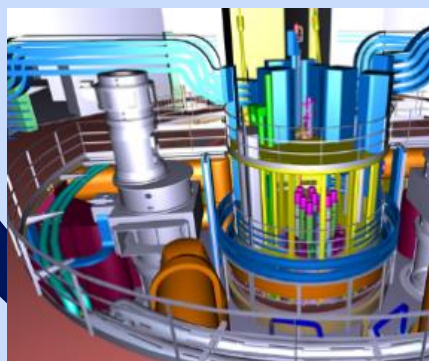


LW-SMR : NUWARD™

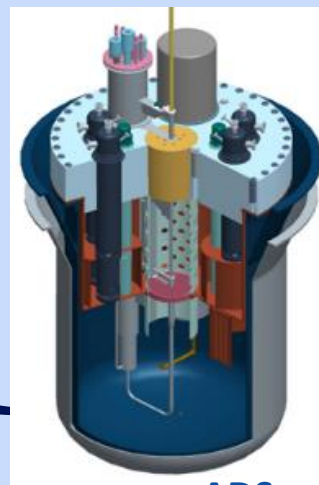


NTP: NASA / ESA

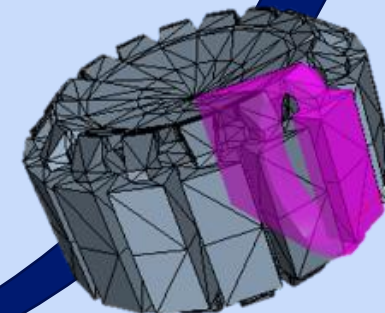
Framatome
SC-HTGR



SFR : ASTRID
CEA-Framatome



ADS



MSR

Framatome
Track Record in
Gen IV Reactors
design

Framatome investment in Advanced Reactors Collaborative Projects

SFR



HTR



New Micro-HTGR Proposal : PROMESAS

MSR



New MSR Proposal : ENDURANCE

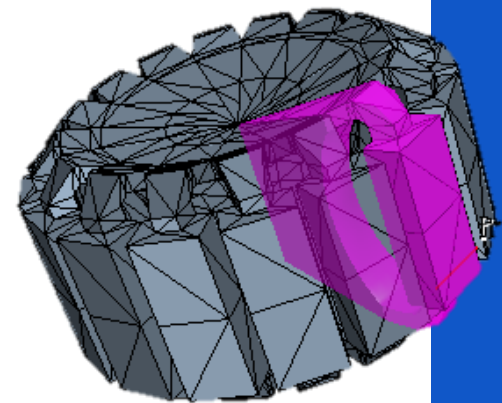
GENIV
Expertise | Collabora



LW-SMR



New proposal on LW-SMR safety : EASI_SMR



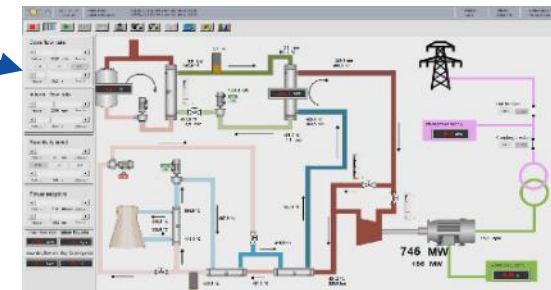
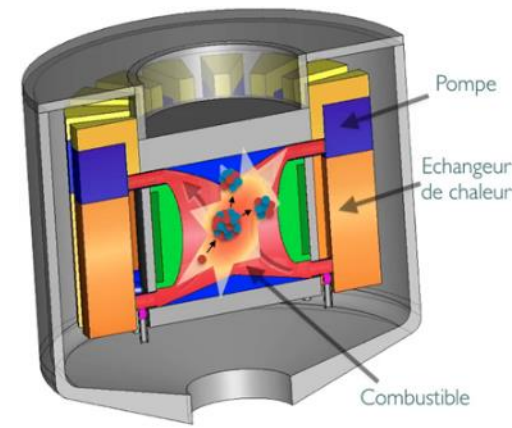
Focus on Framatome
engagement on MSR



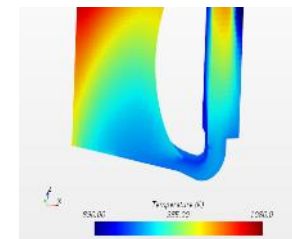
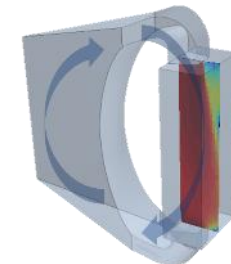
MSR development by Framatome

- Cooperation between CNRS and Framatome since 2014. Motivation for assessing the capability of a small modular Molten Salt Reactor to optimize Plutonium incineration
 - *Coupling between LICORE (MSR system code) and ALICE from CORYS to progress toward a whole MSR plant dynamic code*
- H20202: Completion of SAMOFAR (Safety Assessment of the Molten Salt Fast Reactor) Project
 - *Progress of safety approach for MSR, and key safety features evaluation*
- H2020: Launching of SAMOSAFER Project (October 2019) : Simulation Models and Safety Assessment for Fluid-fuel Energy Reactors
 - *Objective to develop and demonstrate new safety barriers for more controlled behavior of MSR in severe accidents, based on new simulation models and tools validated with experiments*
- IMSR (MSR from Terrestrial Energy) : PIRT review for CNL (Canadian National Lab)
 - *CNRS + Framatome asked by CNL to be part of this PIRT review*

MSFR by CNRS

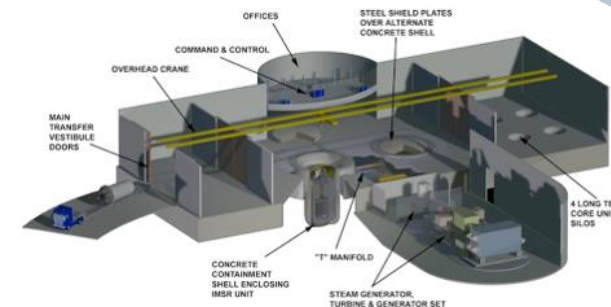


MSR Simulator by CORYS



Neutronics & Thy coupling by Framatome SAS

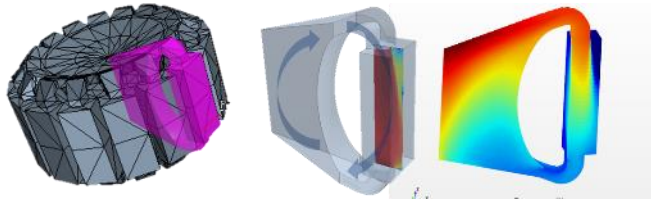
IMSR



ISAC: Framatome involvement as MSR « chaudieriste »

Lot 1: Project Management

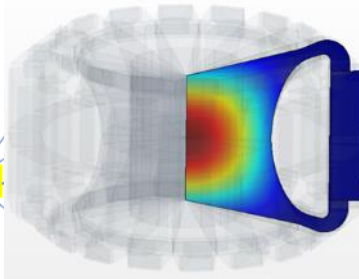
- System Engineering Principles
- Requirement capture and management
- Design Sequences & Milestones
- Technical Specifications
- Risks identification and future roadmap



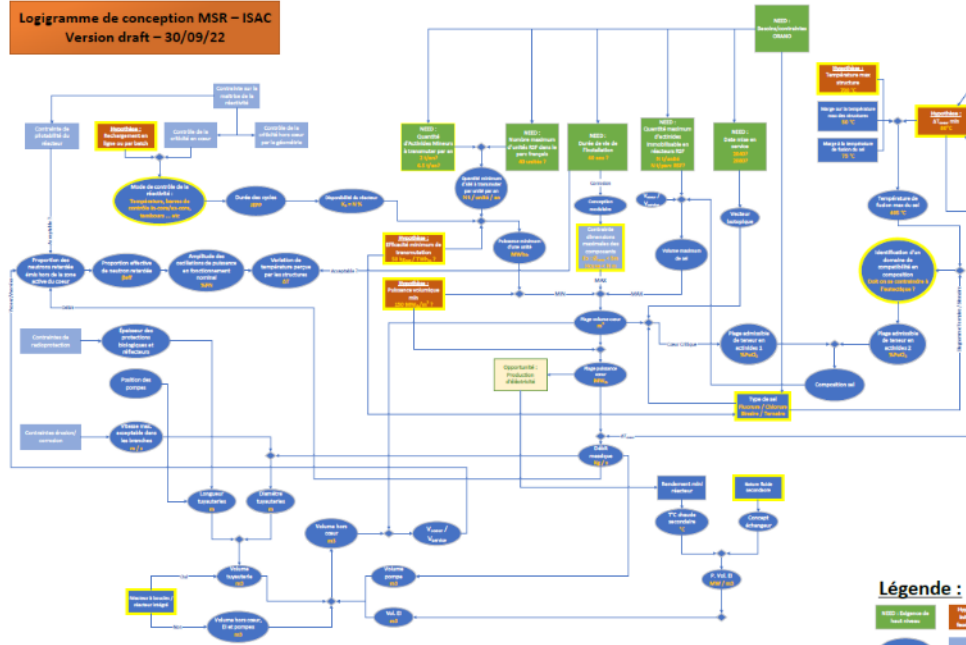
Lot 2 Esquisses

Architecture, Core and Fuel circuit, components, safety, maintenance

- Trade studies for main design orientations selection
- Multi-physics simulations to support safety analyses
- Maintenance: capture of requirements for maintenance and support systems preliminary definition



ISAC design options selection diagram



Légende :

MSR - Diagramme de base	Modèles de base à être développés par le client
Conception	Conception
Conception & base	Présentation d'un conceptuel non à terme

Lot 3 Scenarios

- Using of the Framatome COSAC code for scenarios simulation and the study of nuclear material inventory evolution taking benefit of MSR performances

Lot 5 Materials

- General approach for materials selection
- Materials specification and characterization
- Corrosion management
- Life duration management

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Framatome
Vision & Ambition
for the Future

Advanced Reactors

Vision

- *Nuclear future is a key contributor to net zero CO2 challenge*
- *Reinforce Nuclear usage beyond electricity production*

Ambition

- *Be an industrial leader servicing developing nuclear fleets in 2050*
- *Contribute to secure a durable Nuclear Energy involving Gen4 nuclear systems*



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Framatome
Nuclear Industrial
Innovation Hub :
A New Tool to address
the new challenges
and prepare the future

Framatome NIIH to sustain Advanced Nuclear Systems deployment



- Unique industrial experience from design to maintenance
- International industrial footprint and supply chain



- ↗ Long term perspectives
- ↘ Disruption for 'Fast Track' routes



- Standardization
- Qualified & licensed products
- Technology Centers
- Advanced Manufacturing methods



Nuclear Industria Innovation Hub by Framatome

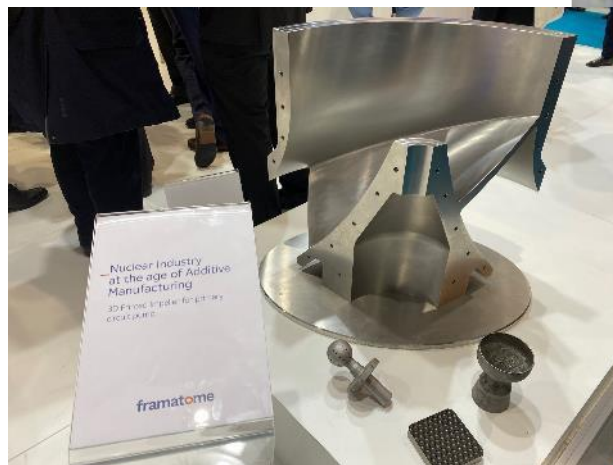


Advanced Reactors: Secure and accelerate TRL progress

through

- *Standardization*
- *Our technology bricks and qualified licensed products*
- *The support of our technology centers for testing, validation and qualification*
- *The benefits of Nuclear-adapted advanced manufacturing methods*

Qualification of Additive Manufacturing for nuclear grade components



I&C and cyber security solutions

Fluid-structure interaction test of new reactor design



“

Engaged to Deliver
the Low Carbon Energy
the world needs

”



Thank
you

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