The Jules Horowitz Reactor and the radioisotope production

International Workshop on Medical Radioisotopes Supply

JHR project values and behaviours

- **Always give priority to SAFETY**
  - Occupational safety and nuclear safety are our first priorities
- **Speak the TRUTH**
  - Tell facts as they occur – Report issues – Accept problems and mistakes
- **Get RESULTS**
  - No postponement of decisions – Commit and meet commitments – Overall and clear responsibility
- **Promote TEAM SPIRIT**
  - Celebrate successes – Learn from failures – Respect people – Help and ask for help when necessary

Overall JHR Roadmap validated by the French authorities

During the Nuclear Policy Council of 19 July 2023, the French State decided to pursue the investments in this project and the nuclear field, acting the pathway to finalize the installation of the reactor by 2032.

Reaffirmation of the role of the JHR for the extension of the existing nuclear fleet and for the deployment of nuclear reactors, both EPR and SMR.

2021-2022 — **2023** — **Q4 2023** — **2032**

- Stabilization of the detailed design and 3D model
- Closure of remaining technical open issues
- Manufacturing and qualification of critical equipment
- Preparation of the electromechanical installation

Project Review Milestone in order to assess:

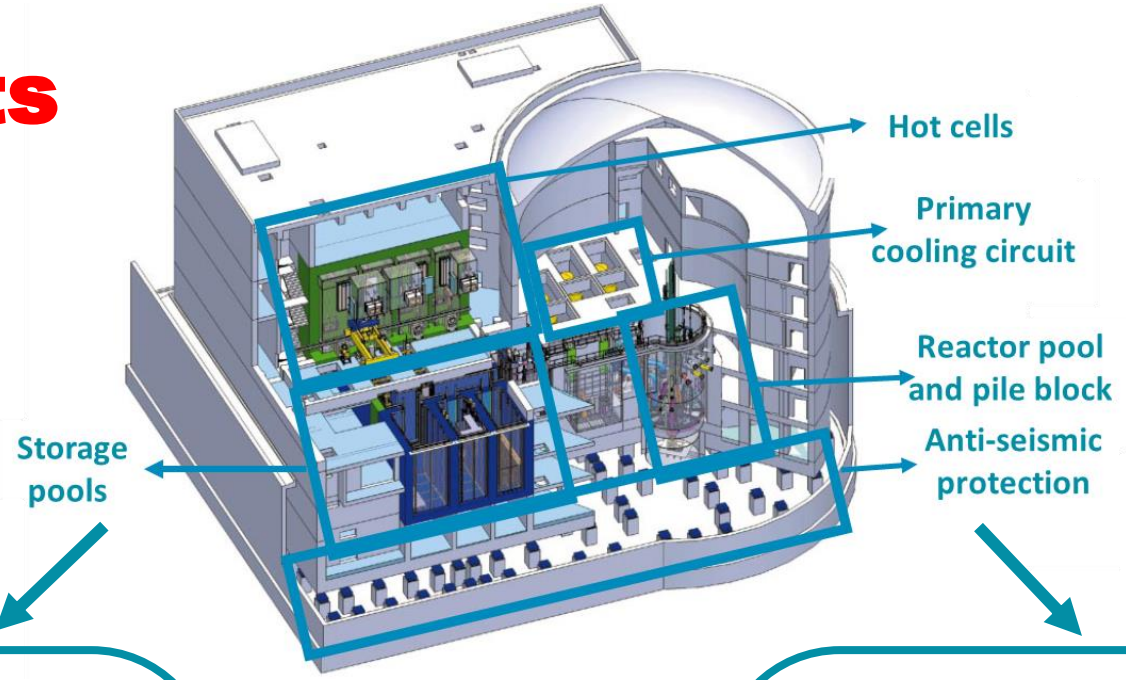
- Remaining activities and associated risks
- Project schedule up to start-up and first experiments
- Cost at completion

Full speed installation

Commitments

For research

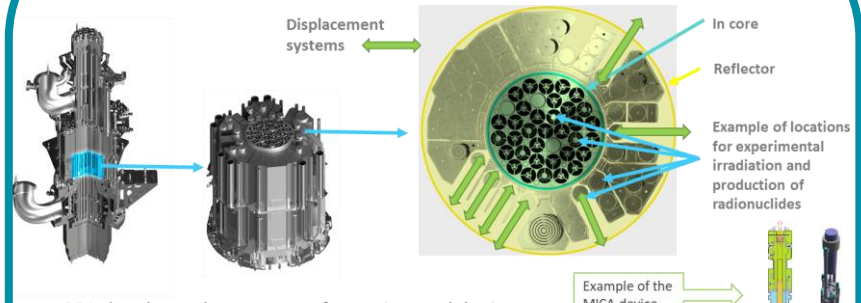
JHR is a Material Test Reactor dedicated to test the behavior of materials and fuels under irradiation in order to support current and future nuclear reactors (generation 2, generation 3, systems of the future), to allow to qualify fuels and materials.



For medicine and industry

JHR has to support the European needs in medical radioisotopes, and to ensure the European production of ^{99}Mo, between 25% (representing about 2 billion patients diagnosed) to 50% of the European yearly requirements if needed. The JHR is able to produce a large range of radioisotopes, according to the needs.

Fuel & material experiments



CEA develops a large range of experimental devices

RANGE OF EXPERIMENTS	KIND OF DEVICES	FUEL EXPERIMENTS	MATERIAL EXPERIMENTS
NORMAL	CAPSULE	1 FUICA	6 MICA 1 OCCITANE
	LOOP	1 MADISON 1 ADELINE	1 CLOE
INCIDENT	CAPSULE	-	-
	LOOP	1 ADELINE	-
ACCIDENT	LOOP	1 LORELEI	-

Characteristics

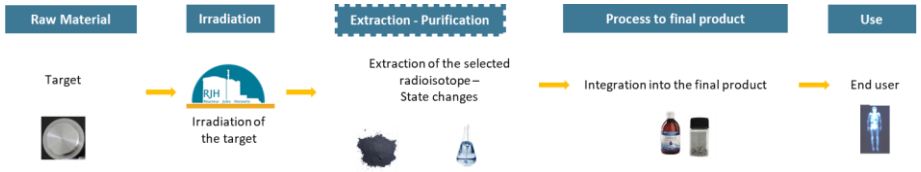
Power:
100 MWth

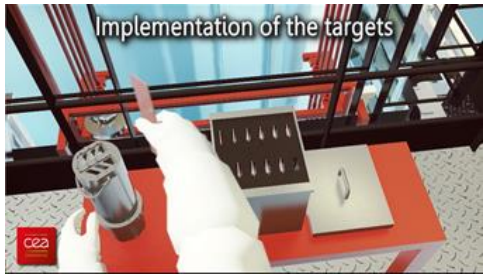
Operating days:
Cycles of 25 days

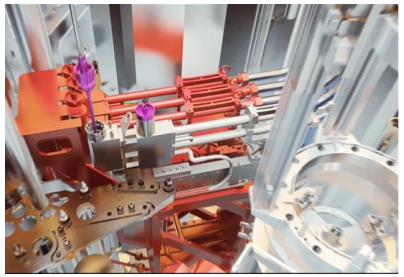
~20 simultaneous irradiation experiments

4 Displacement systems dedicated to the ^{99}Mo production

Production of radionuclides







JHR, in support to radioisotope production chain

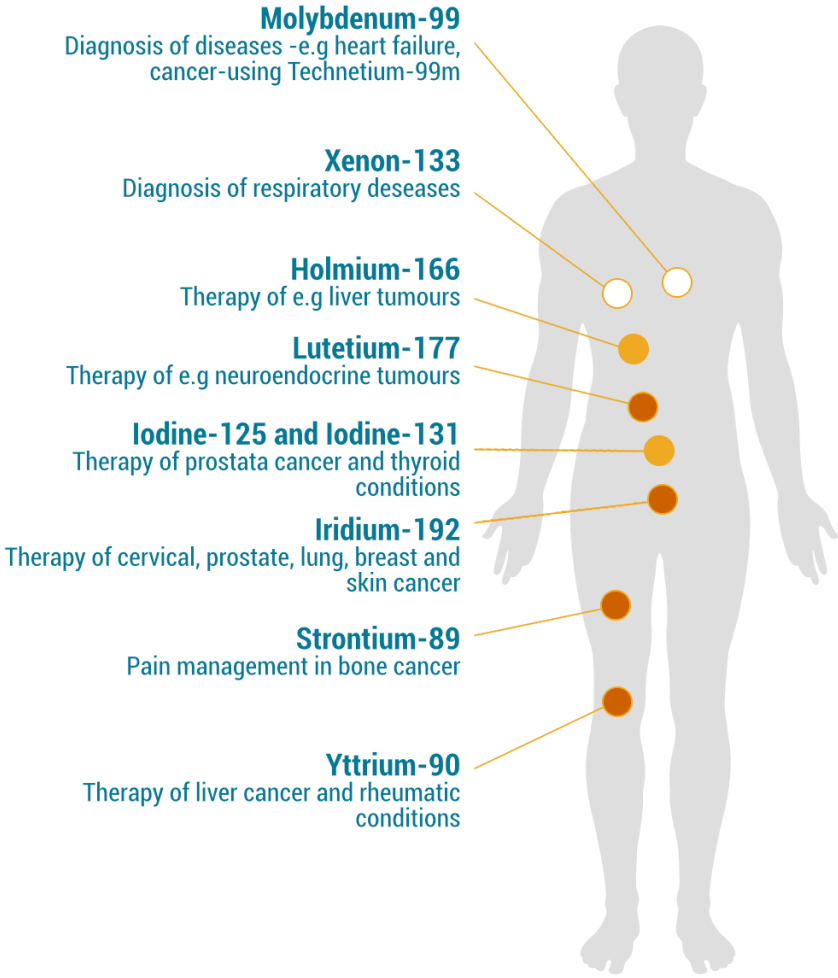
JHR is committed to irradiate between 25 and 50% of the European annual Molybdenum^{99} targets

Molybdenum but not only…

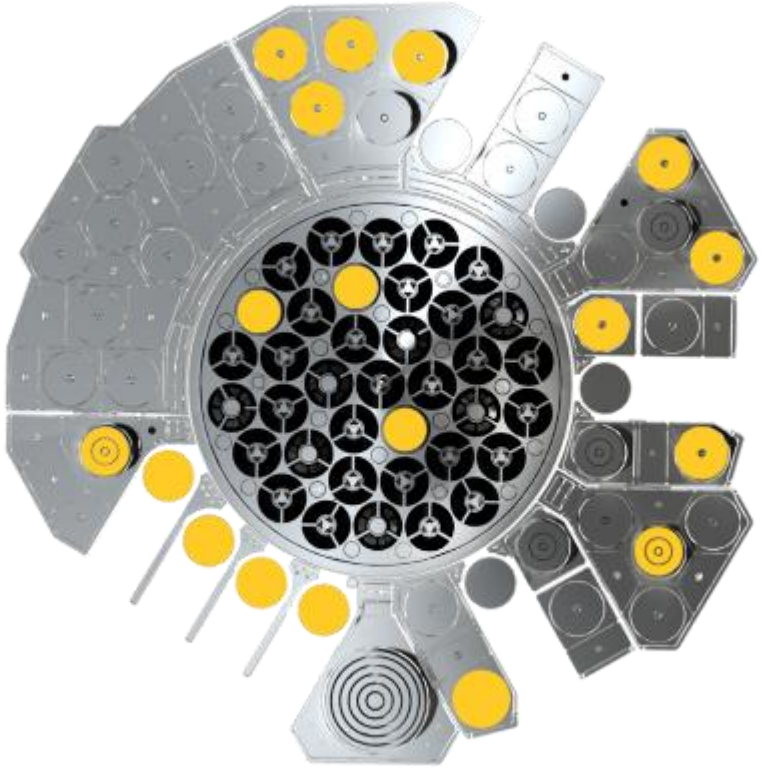
JHR aims to become a leading player in securing the European supply of medical radioisotopes. Due to its high thermal neutron flux, it makes possible to produce a wide range of radioisotopes.

Thanks to :

- **Large panel** of irradiation locations in core or in reflector
- Irradiation devices and containers **adapted** to the target specificities
- Flow studies to ensure the arrival and departure of targets during the **allocated time**
- An active role and listening into the radioisotope community to **anticipate and master** the evolution of the needs
- **Equilibrated** business model



20 locations suitable for the radioisotope production



- 4 displacement systems dedicated to the radioisotope production
- 3 core locations
- 13 other locations within the reflector, about 2 shared with fuel and material experiments.

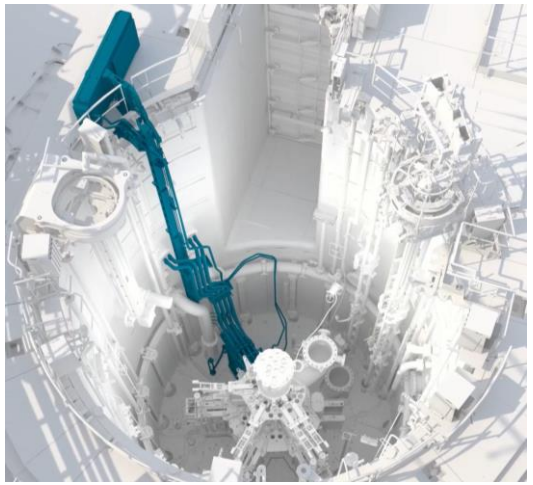
The molybdenium^{99} loading displacement system

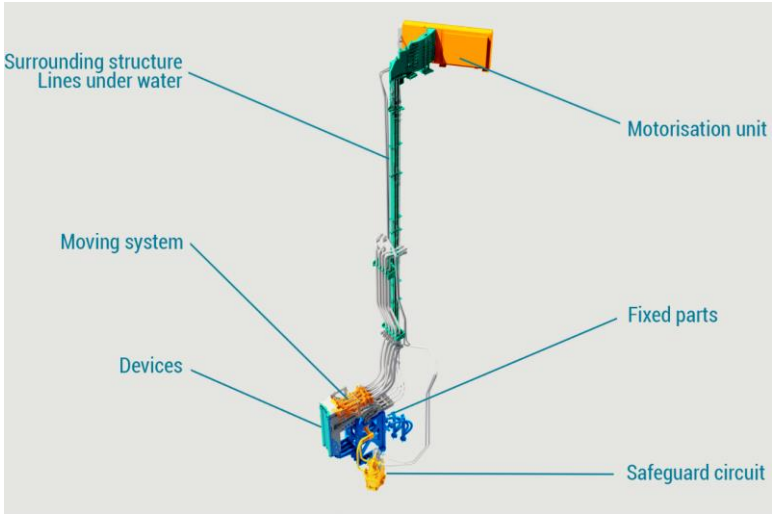
To ensure the Mo^{99} commitment, the JHR project designed 4 dedicated displacement systems that allow the loading and unloading of the targets during a JHR production cycle.

JHR will be able to irradiate from 720 to 1152 Mo^{99} targets per year:

- *depending on the number of production cycle per year (5 to 6)*
- *depending on the duration of the cycles: from 3 to 4 batch per cycle*
- *depending on the power 70 to 100MWTh*

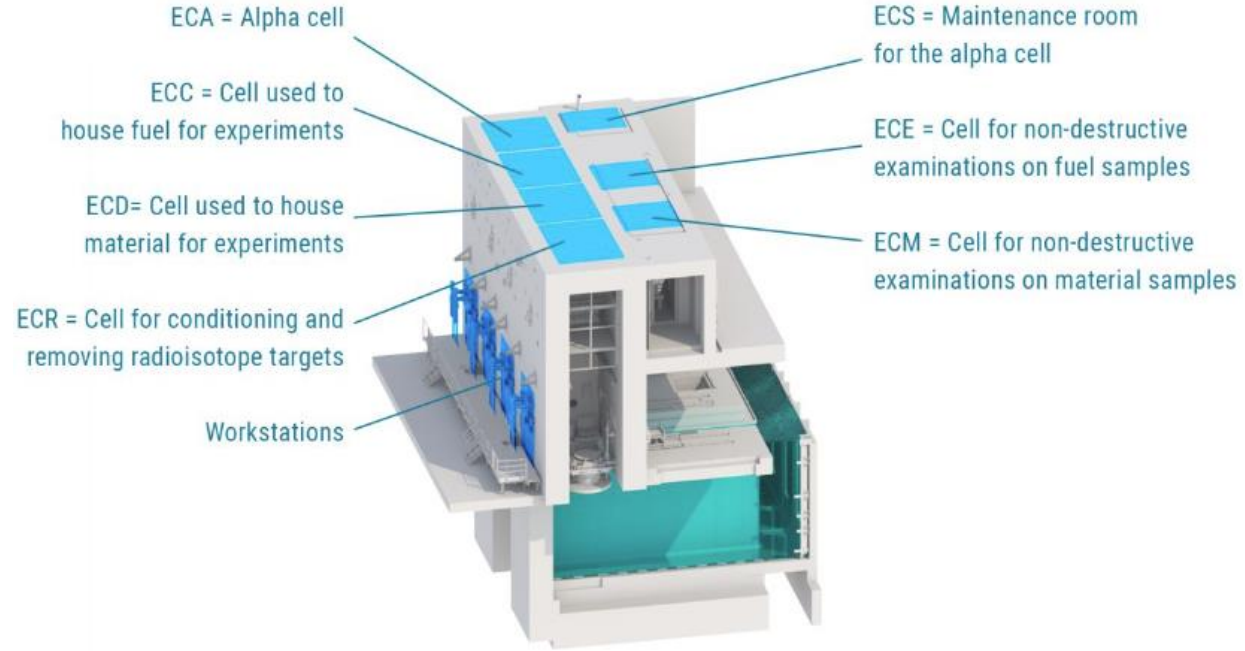
This system is also versatile as it could irradiate other kind of radioisotope, as the lutetium^{177} for example, depending on the demand.

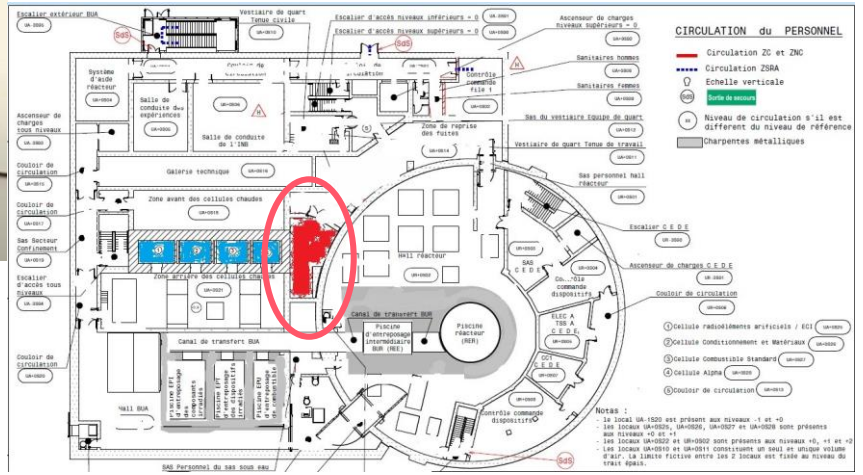




Specific extraction and conditioning rooms

- 1 hot cell dedicated to the Mo99,
- 1 hot cell mutualized with material experiments,
- 1 dedicated room with shielded box





Thank you for your attention

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