Recent achievements of IRE's LEU conversion project

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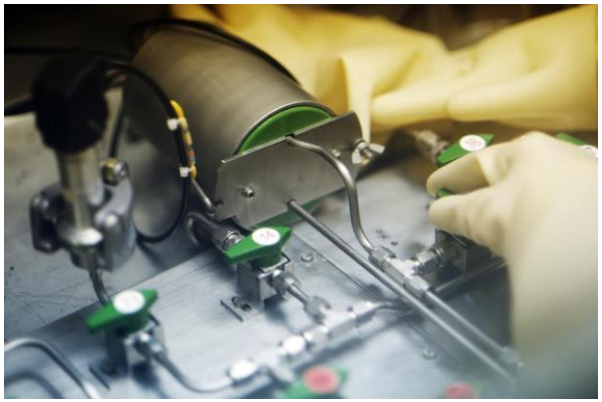
Mo-99 Topical Meeting 2015, Boston

IRE Elit
Environment & Lifescience Technology

Excellence dedicated to nuclear medicine, healthcare and environment

IRE, a world leader

- **Major producer of fission ^{131}I**
- **Major producer of ^{99}Mo**
  - 3 productions/week ; 365 days/year
  - 50 % of European needs,
  - 175 employees
  - Exportation
    - Europe
    - USA
    - Asia
    - Middle east
  - Other Isotopes: Y-90, Re-188, ...

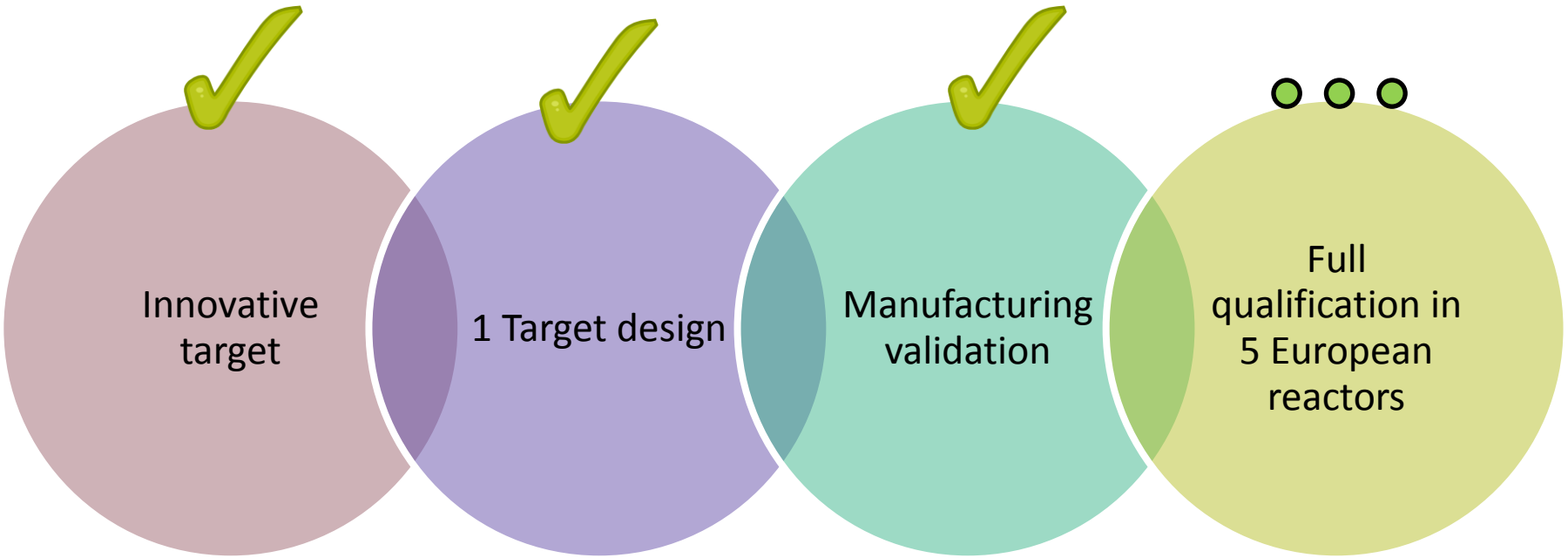


IRE specific LEU challenges

- Increase overall process safety
- Reduction of gaseous releases
- Production capacity : 3500Ci/week – 6d calibration
- No interruption of HEU process
- Stress test results compliance

First commercial LEU production July 2016

Target specifications



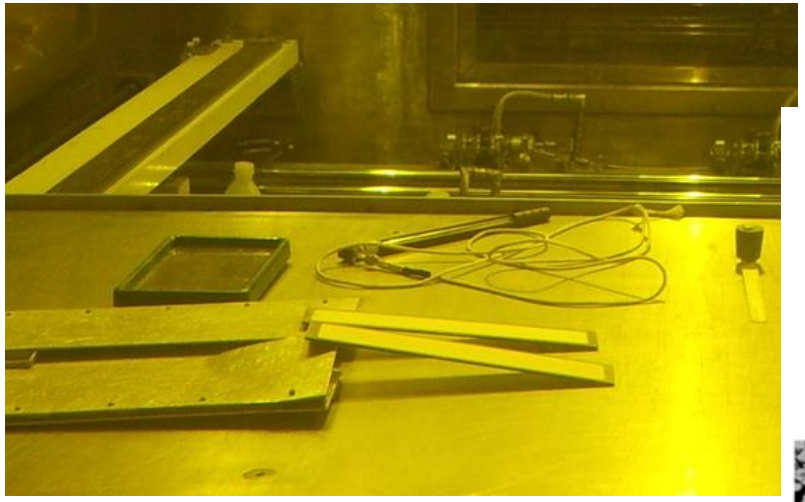
- At least maintain the ^{235}U content
- Increase the uranium loading
- Al alloy cladding

Fits all reactors

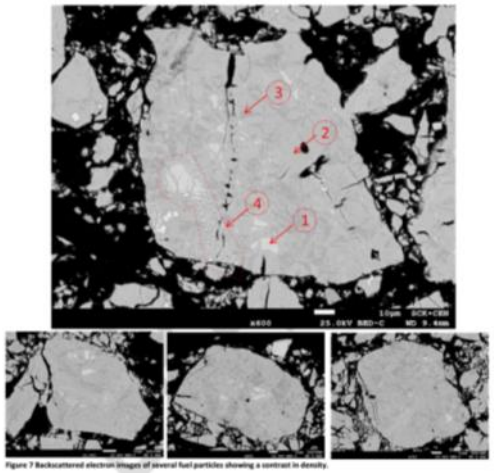
Reliable supply of ^{99}Mo

LEU target qualification in BR2

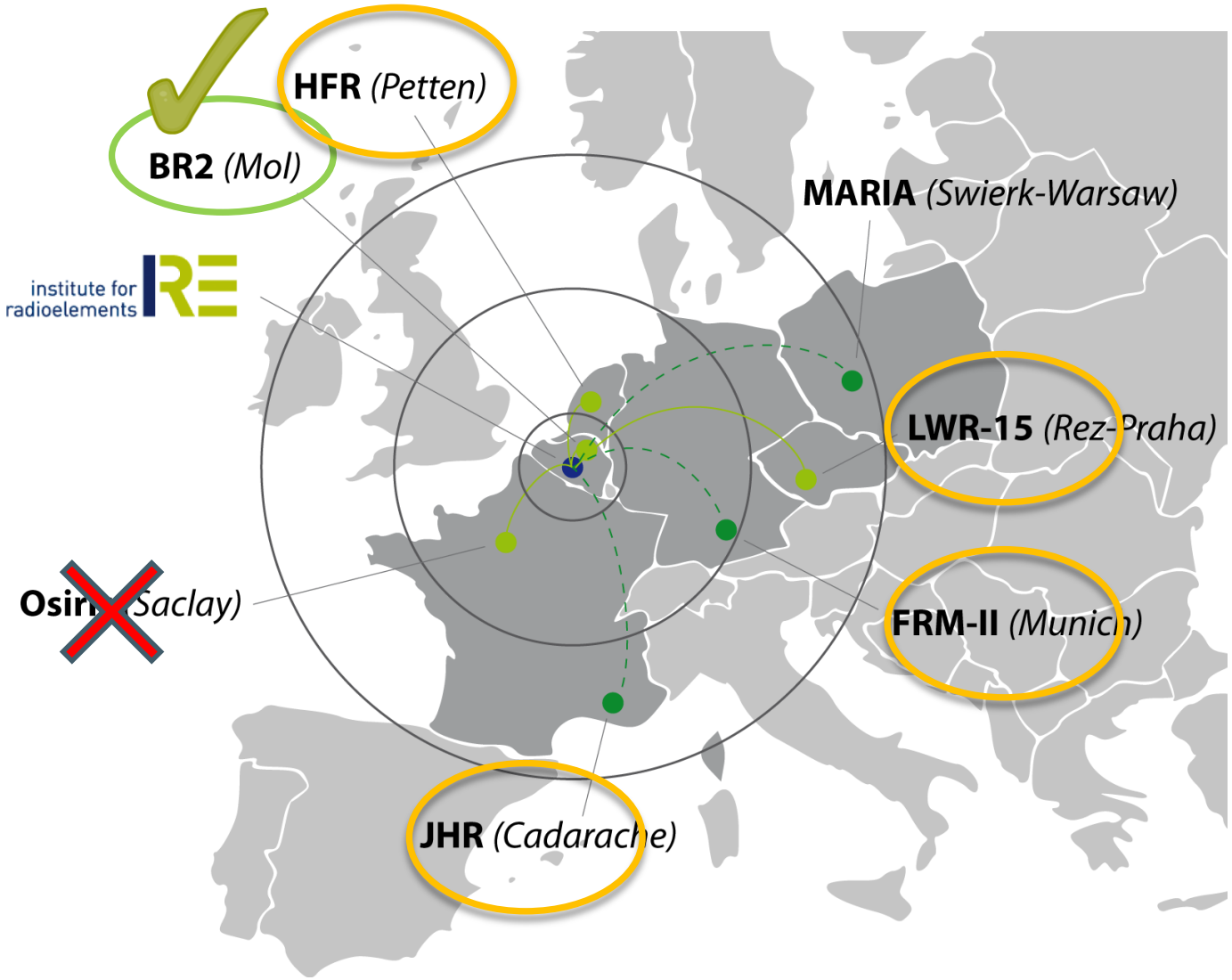
- Completed !
- All tests are successfull YTD.
- Awaiting formal approval from safety authority



Courtesy SCK-CEN



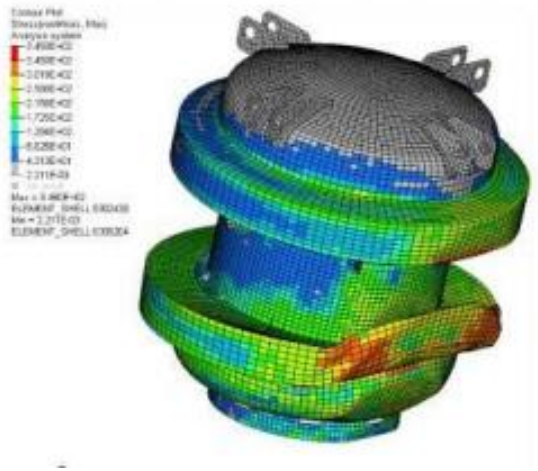
Conversion plan for reactors



Transport container

- Modifications of inner parts to fit plates
- Coupled with the five-years container assessment
- Modifications of the overpack

- New transport license have been obtained !



Transport container

Hot cell refurbishment

- Hot refurbishment completed !
- Dedicated hot cell for the process upstream
  - Dissolution
  - ^{99}Mo-^{131}I separation step
- Guaranty of the security supply

Hot cell refurbishment

Decontamination work

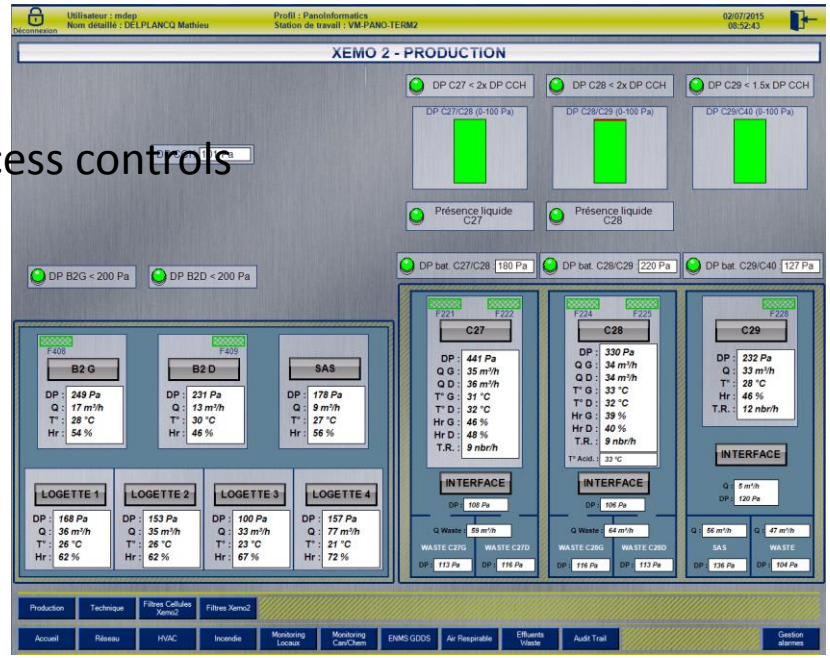
Hot cell refurbishment

According to stress test results

Hot cell refurbishment : waste tank

Hot cell refurbishment

- ✓ Air flow, pressure and humidity
- ✓ Radiological monitoring
- ✓ Hot cell operations : door lock, power, in-process controls



Process modifications

LEU conversion impacts

- Target design
- Target specifications

- Dissolution
- U filtration

- ^{99}Mo - ^{131}I separation step

- ^{99}Mo purification
- ^{131}I purification

→ **Improved safety**

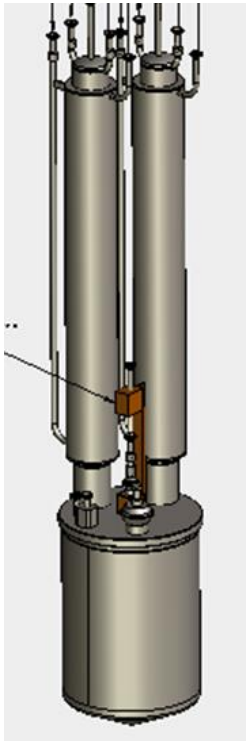
Process off-gas management

- Passive system

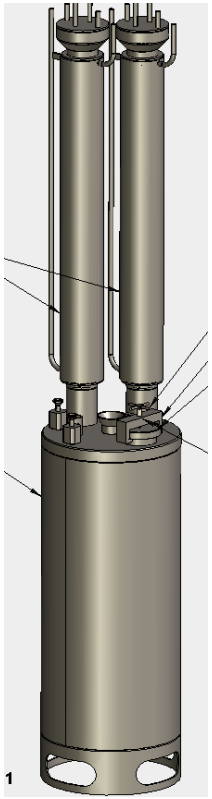
Example impact of the conversion

- Modification of the process equipment

HEU



LEU



- Volume ↗
- New targets introduction
- Compliant with new P condition

Cold commissioning

- On going : several successful runs have been performed

- Increase progressively the batch size
- Processing on Al plates and non-irradiated uranium targets
- Spike with limited amount of activity

- Develop new Standard Operating Procedures
- Perform operator training
  - New production environment
  - Process

Hot commissioning

- Ramp-up
  - Increase progressively the batch size
  - Processing of irradiated targets to full scale

- Validation
  - Full scale runs
  - Record stability data and perform extensive QC
  - Regulatory file modifications

- Obtain GMP certificates and validation by customers

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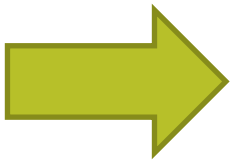
Conclusions

- Project running full steam ahead and on time
- Several major milestones have been achieved
- Cold commissioning of the process has started
- Possible conflicts with HEU productions during hot commissioning and process validation (S1-2016)



But no compromise on the security of supply

RE

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