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**Industry Workshop on
Cryogenics in Big
Science**

Future opportunities of contracts at F4E and ITER

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Systems

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**Bringing
the power
of the sun
to earth**



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Content

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- **Cryoplant and Fuel Cycle programme**
- **Future Opportunities:**
 - Neutral Beam Cryopumps
 - Isotope Separation System
 - LN2 distribution cryoline
 - Non-cryogenic systems
 - IFMIF-DONES





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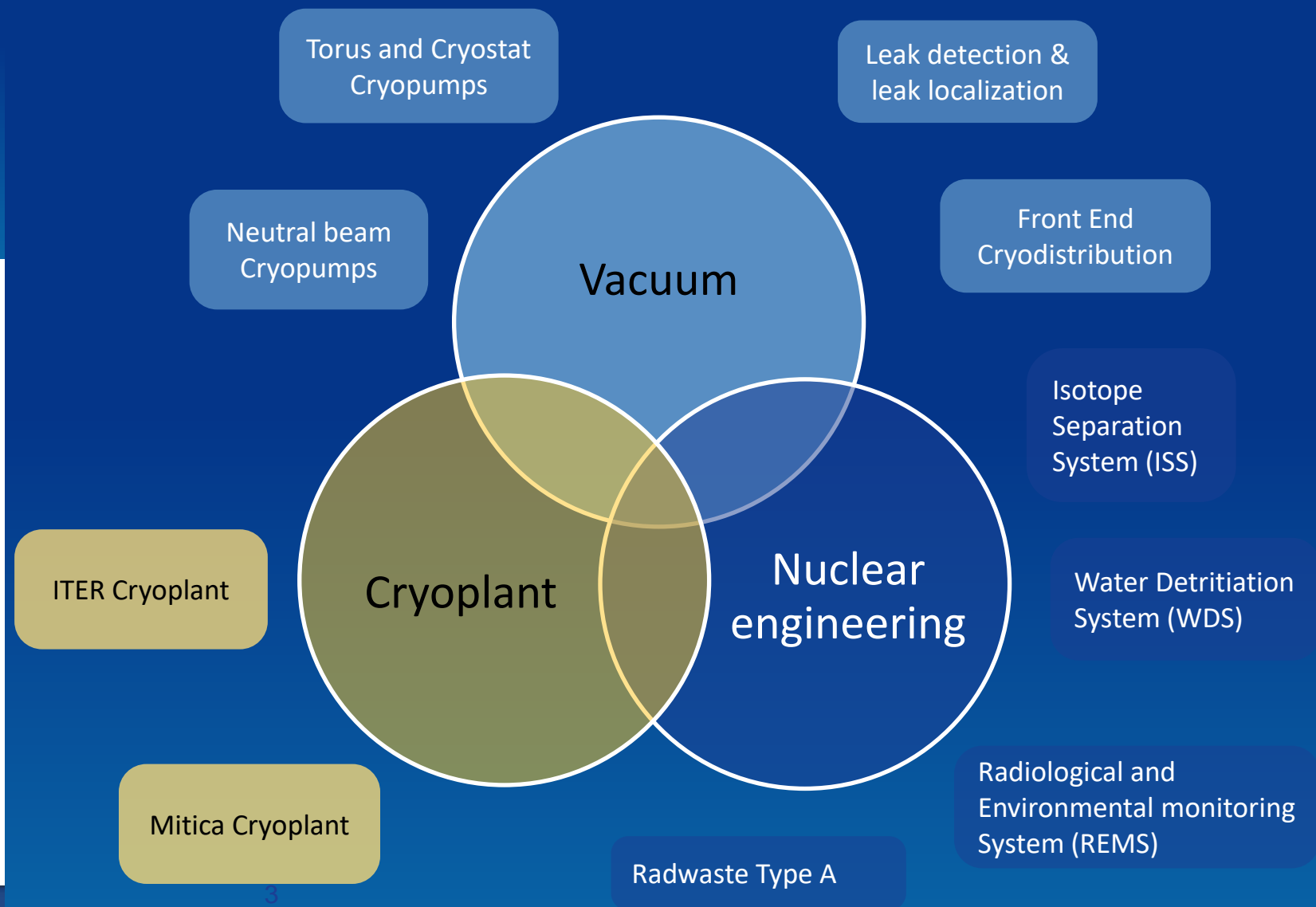
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Since 2009

> 45 contracts placed
Value >150 MEUR



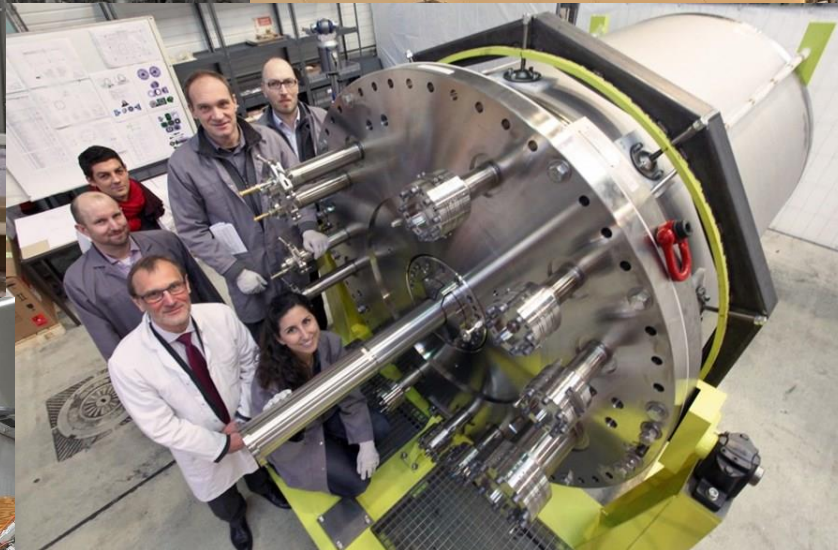
Cryoplant and Fuel Cycle Programme





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Future opportunities

- A** Item range 300 000 – 2 000 000 EUR
- B** Item range 1 500 000 – 5 000 000 EUR
- C** Item range 4 000 000 – 12 000 000 EUR
- D** Item range above 10 000 000 EUR



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Neutral Beam Cryopumps



- 2+1 cryopumps (2 sides each)
- >100m² pumping surface
- >500 cryopanel
- >650 thermal shield panels



- 1000s of radiography films
- >500 leak tests
- Protection Important Activities
- Tight tolerances



- Est. 1st contract: 2025
- Value: >10MEUR 





Mitica cryopump – Prototype

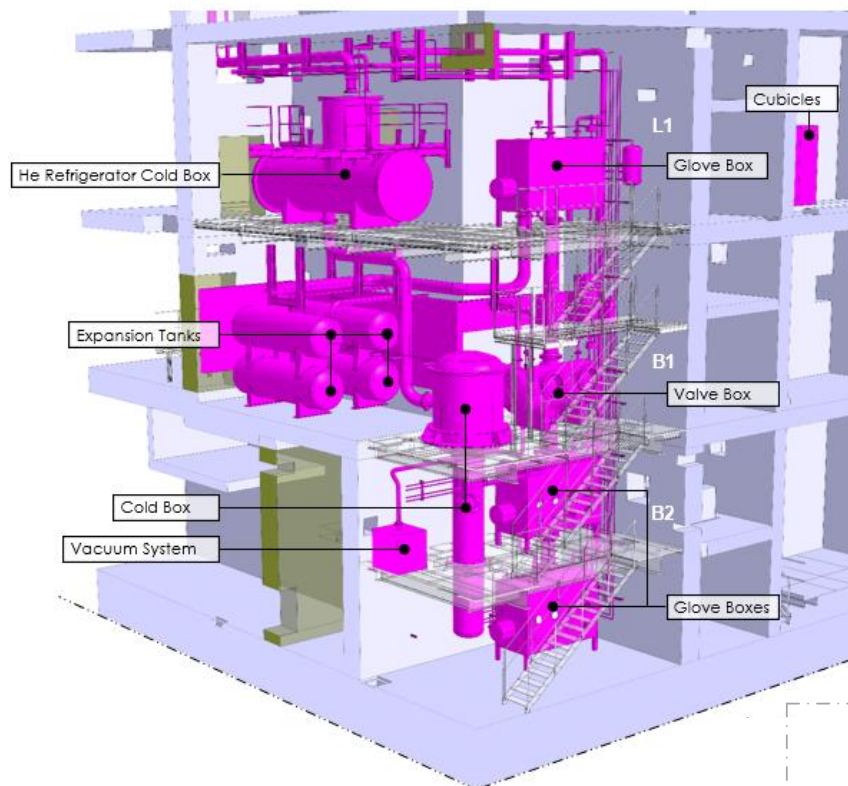




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Isotope Separation System

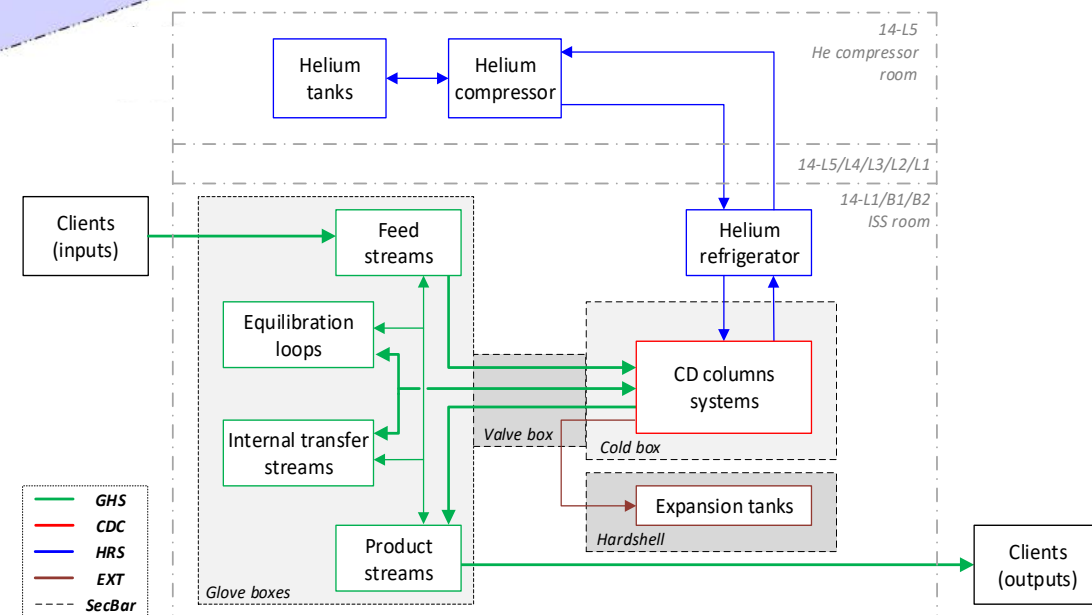
- Cryogenic distillation of H-D-T
- Ongoing sizing studies
- Cold box $\approx 7.5\text{m}$ high
- He refrigerator $\approx 3\text{kW}$ @ 16K
- Tritium containment function
- Complex qualification scope
- Contracts ongoing with 
- Est. 1st F4E contract: >2026
- Value: >10MEUR 



Baseline is currently under evaluation – opportunity of size reduction and alternative technologies for He refrigerator

Opportunities for:

- Integration services
- Final design & procurement
 - Refrigeration system
 - Cold box manufacturing
 - Pressure vessels
 - Piping and structure



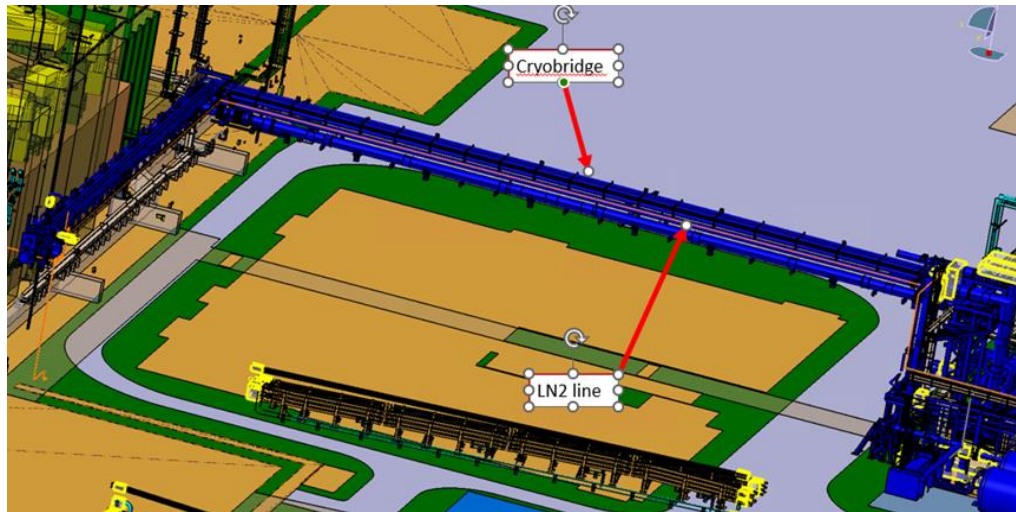
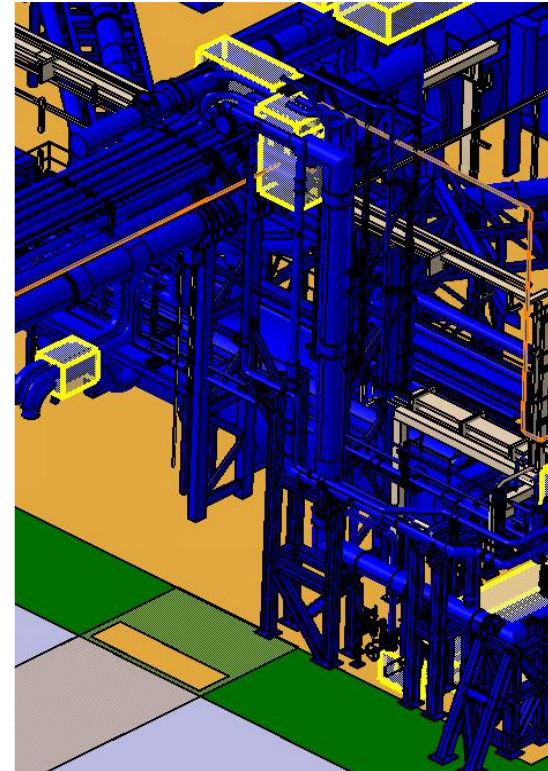
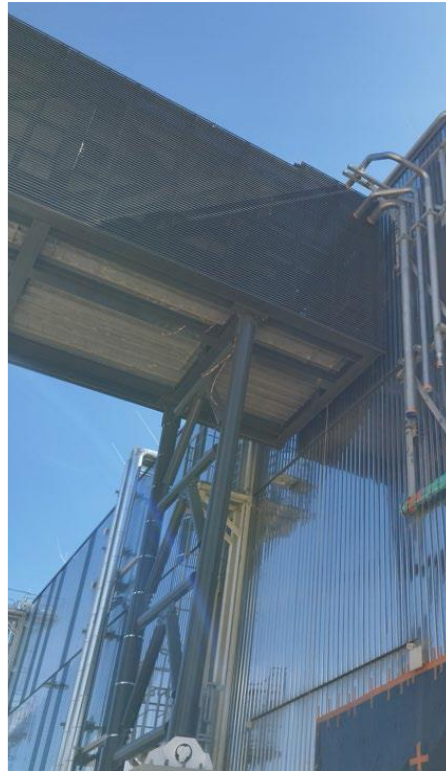


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LN2 distribution cryoline

- LN2 distribution from LN2 plant to users
- Simple LN2 line in complex installation environment
- PN15/DN25
- ~300 m long
- Route from cryoplant over cryobridge to Tokamak complex
- Est. F4E contract: 2025
- Value: ~1MEUR **A**





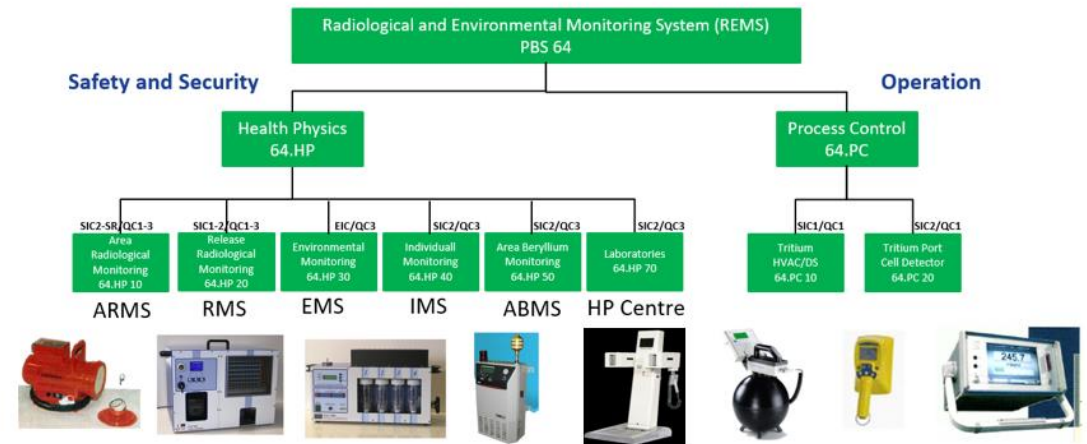
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Non-cryogenic systems

D

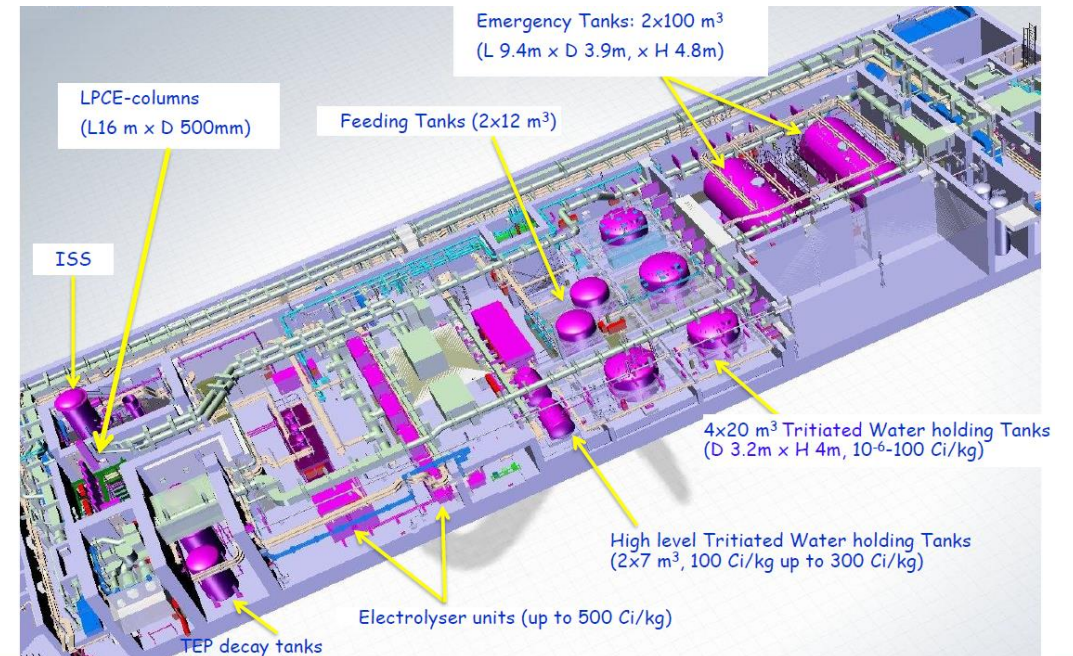
Item range above 10 000 000 EUR

Radiological and Environmental Monitoring System



Est. next F4E contract: 2025

Water Detritiation System



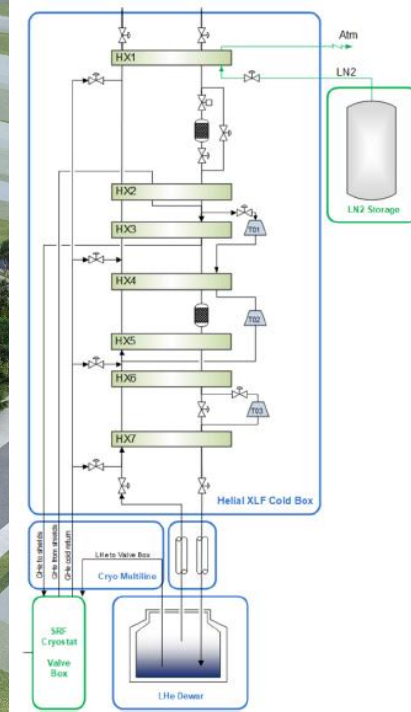
Est. 1st F4E contract: 2026



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IFMIF-DONES

- Cryoplant for IFMIF-DONES for cooling down cryomodules
- Compressor station, Coldbox, GHe and LHe tanks, cryolines and valve boxes
- Cooling down cryomodules and thermal shields
- Mixed refrigeration and liquefaction loads
- Preliminary design stage





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