

DEMONSTRATOR OF HLW DISPOSAL CANISTER RETRIEVAL

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Reversibility in Cigeo Project: 2016 French Act

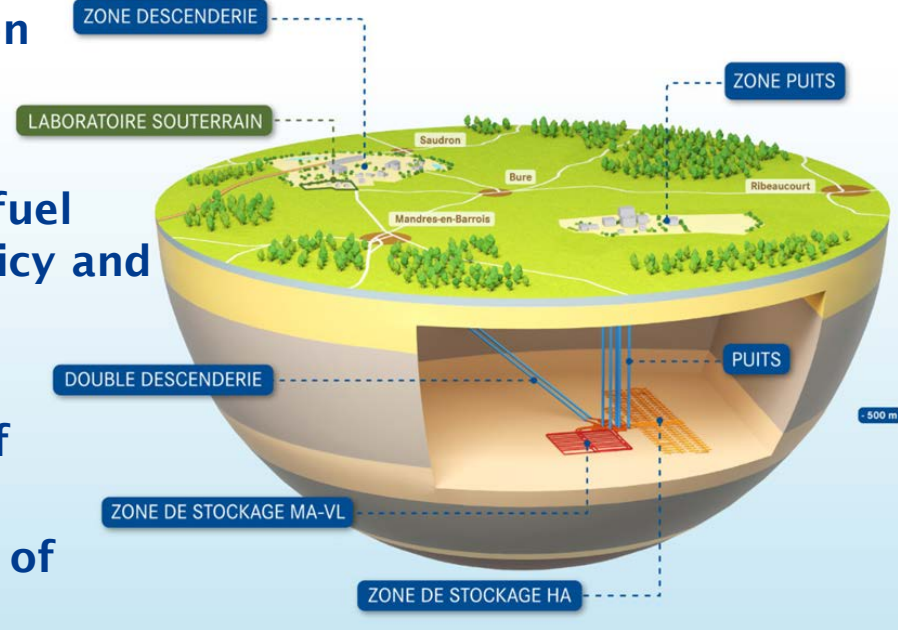
LOI n° 2016-1015 du 25 juillet 2016 précisant les modalités de création d'une installation de stockage réversible en couche géologique profonde des déchets radioactifs de haute et moyenne activité à vie longue (1)

« La réversibilité est la capacité, pour les générations successives, soit de poursuivre la construction puis l'exploitation des tranches successives d'un stockage, soit de réévaluer les choix définis antérieurement et de faire évoluer les solutions de gestion.

« La réversibilité est mise en œuvre par la progressivité de la construction, l'adaptabilité de la conception et la flexibilité d'exploitation d'un stockage en couche géologique profonde de déchets radioactifs permettant d'intégrer le progrès technologique et de s'adapter aux évolutions possibles de l'inventaire des déchets consécutives notamment à une évolution de la politique énergétique. Elle inclut la possibilité de récupérer des colis de déchets déjà stockés selon des modalités et pendant une durée cohérentes avec la stratégie d'exploitation et de fermeture du stockage.

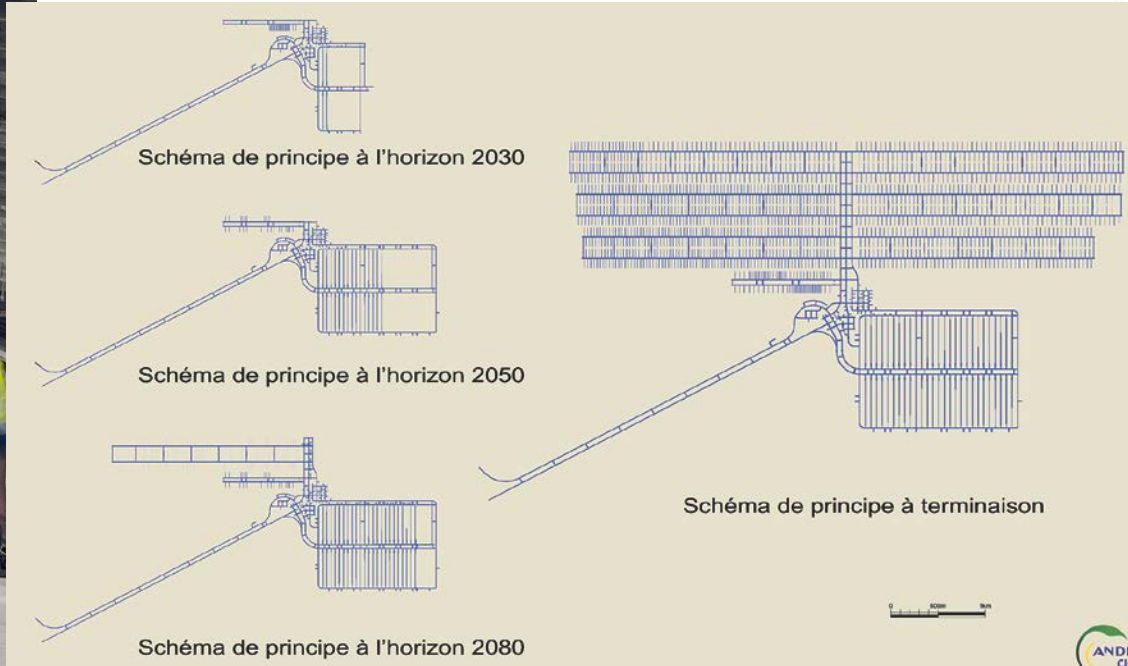
Reversibility in Cigeo Project

- Incremental development and progressivity of construction
- Flexibility of operation
- Adaptability with regard to potential changes in spent fuel and waste management policy and strategy)
- Retrievability
- Continuous improvement of knowledge
- Transparency, participation of Society in decision making

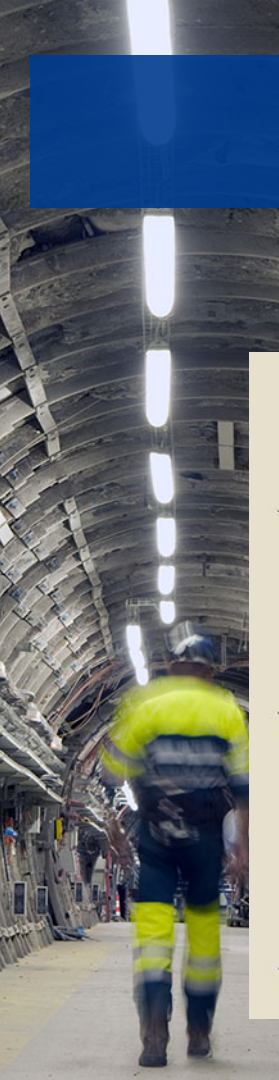
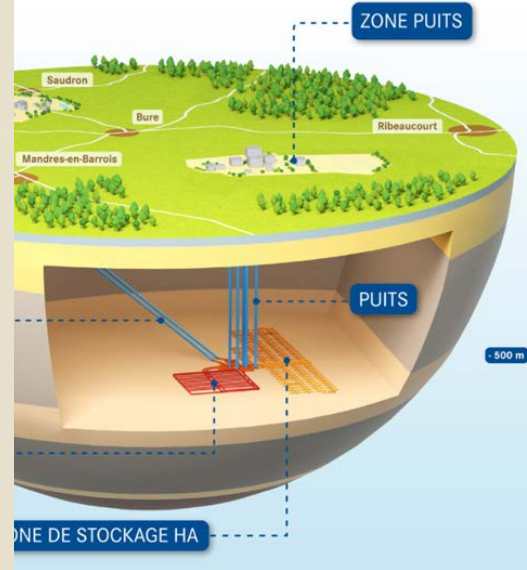


Reversibility in Cigeo Project

- Incremental development and progressivity of construction

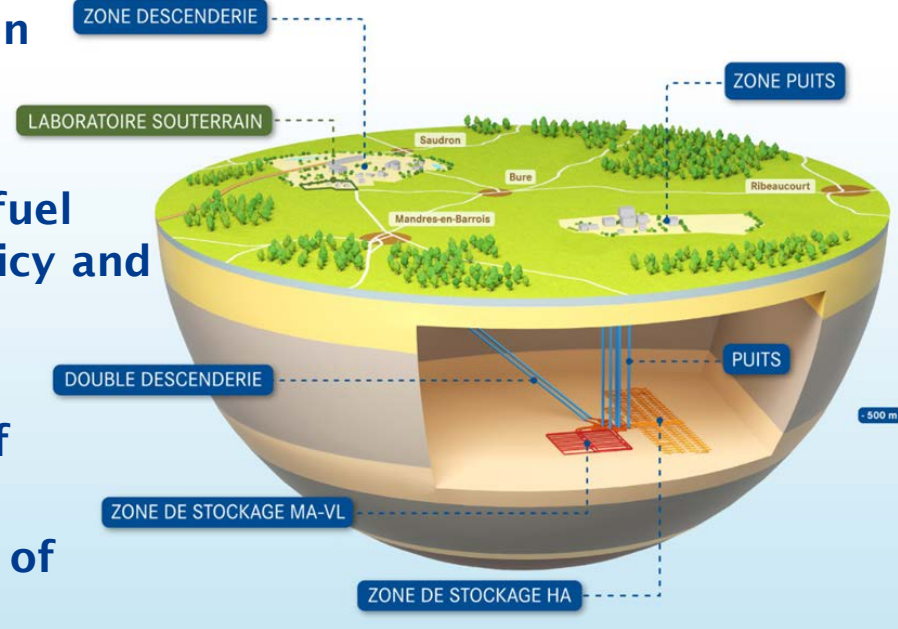


ZONE DESCENDERIE

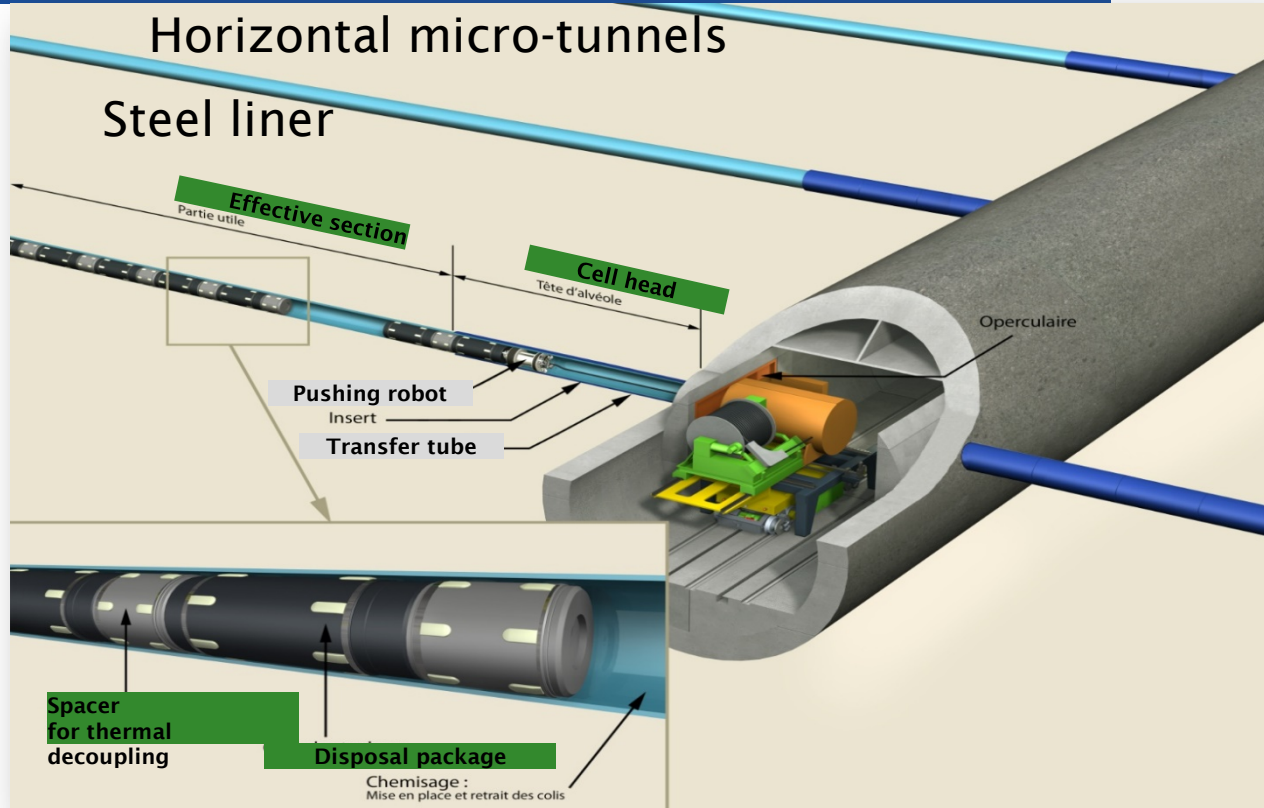


Reversibility in Cigeo Project

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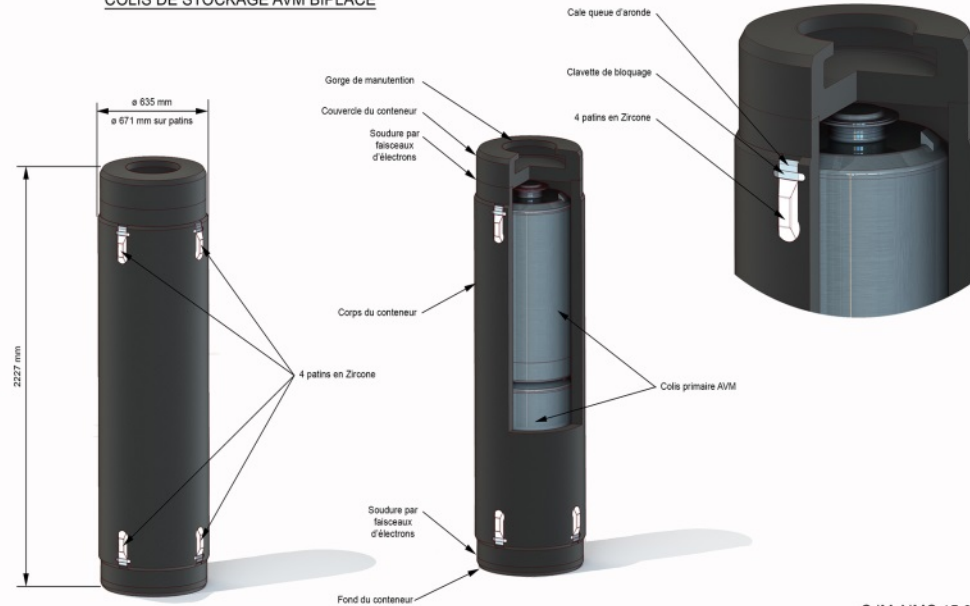
Retrievability enhanced by design



Retrievability enhanced by design

Carbon steel overpack equipped with ceramic sliders

COLIS DE STOCKAGE AVM BIPLACE

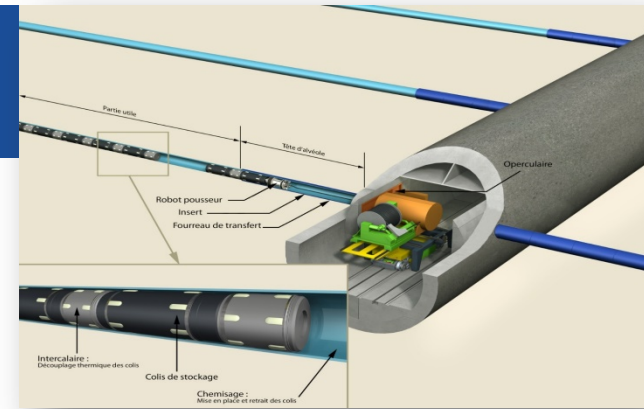


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2014-2015 Test Campaign

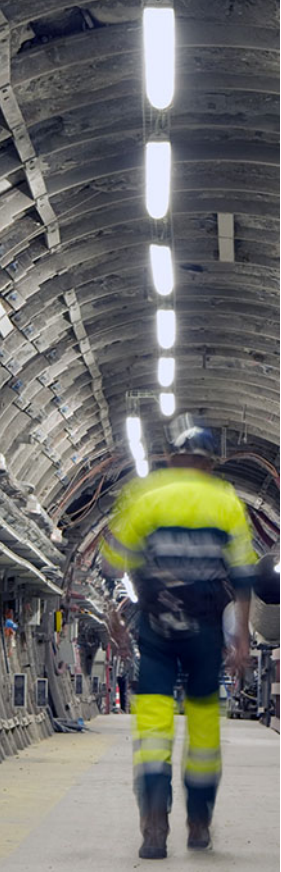
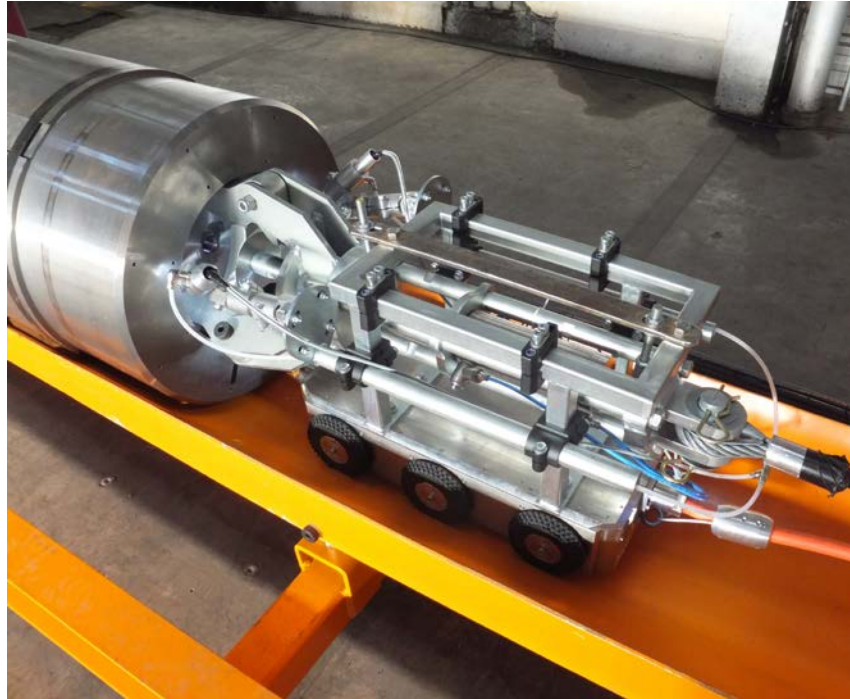
Test bench created for a retrieval test campaign in 2014-2015:

- Devices installed to provide heat and humidity:
 - Temperature maintained at 90°C inside the steel liner;
 - Salt spray (generating a flow of condensed water running on the liner bottom intrados);
 - Creation of corrosion products on steel casing intrados and container wall;
- Conditions created considered as a very penalizing situation:
 - in the real U/G environment the thermal peak should be reached after some 10 years;
 - while water inlet peak may be somehow deferred in time by comparison to the one created on the test bench.



2014-2015 Test Campaign

Retrieval Robot Prototype



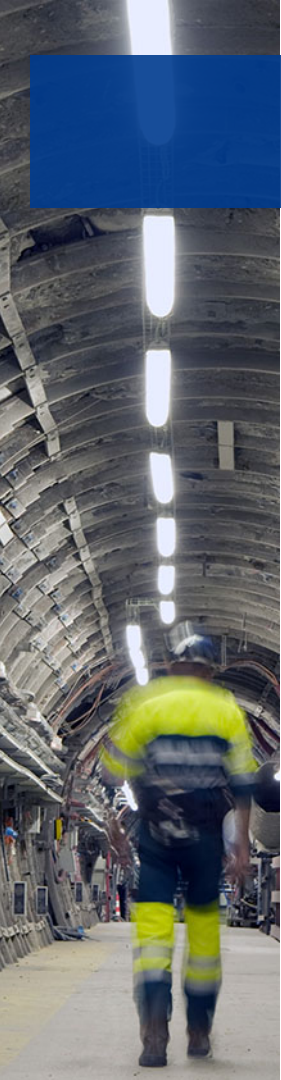
IGDTP-EF8, Berlin December 2018

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2014-2015 Test Campaign

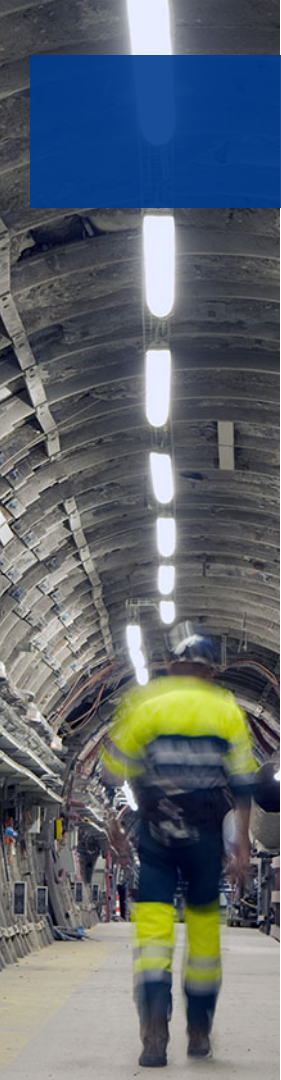
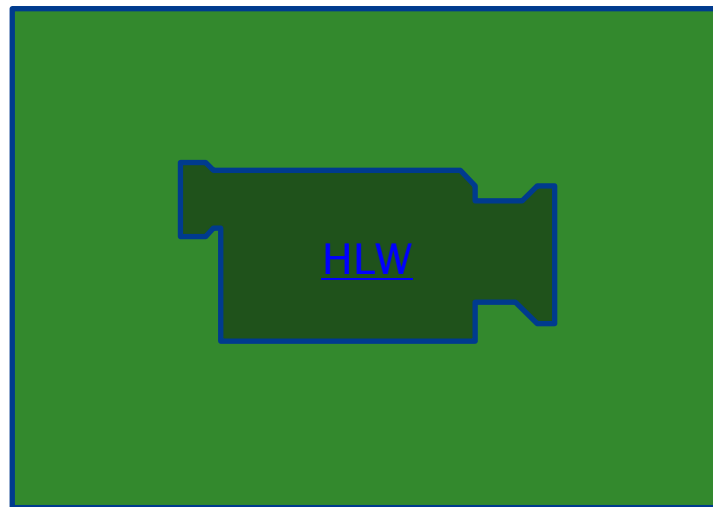
Retrieval Test



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2014-2015 Test Campaign



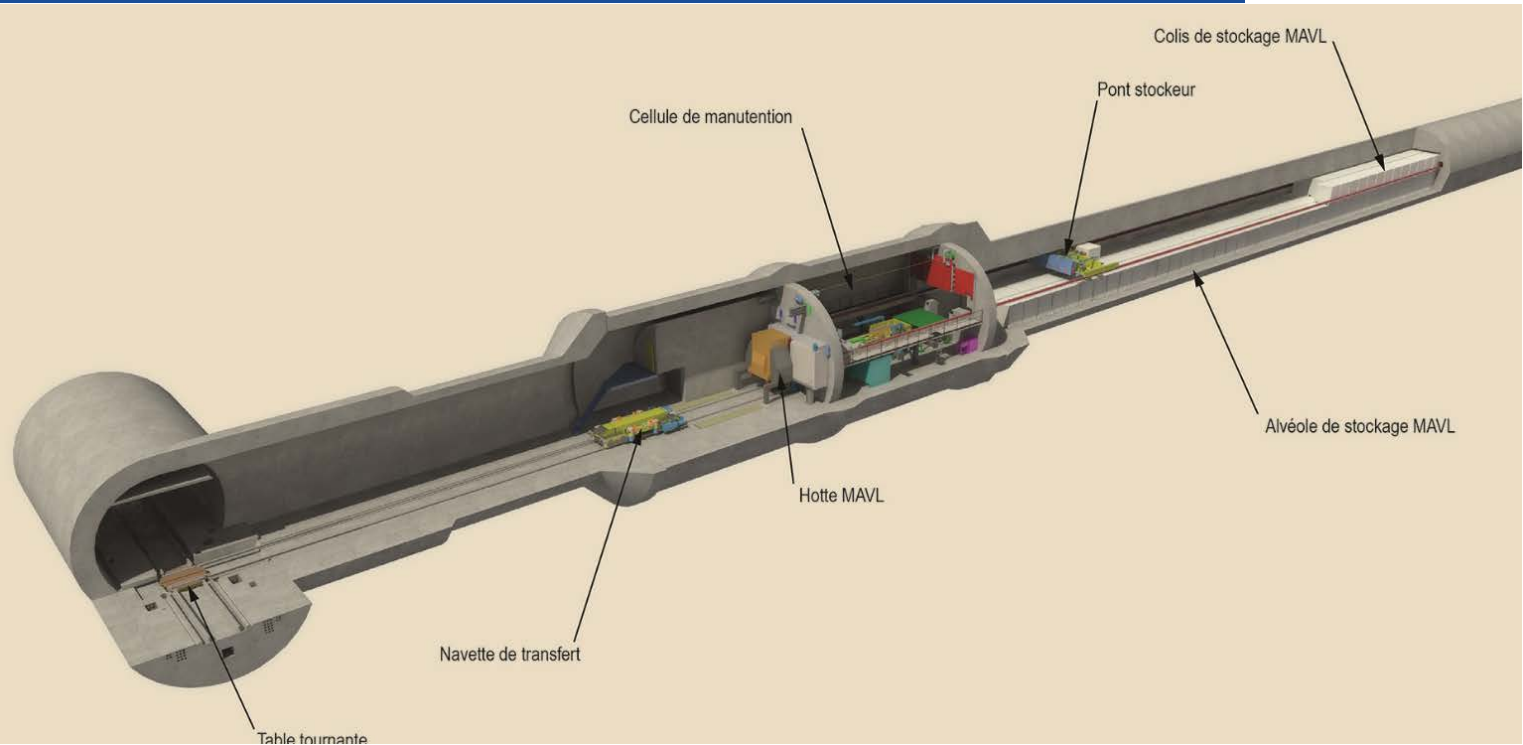
Latest Developments

Design, fabrication and test of a cleaning robot

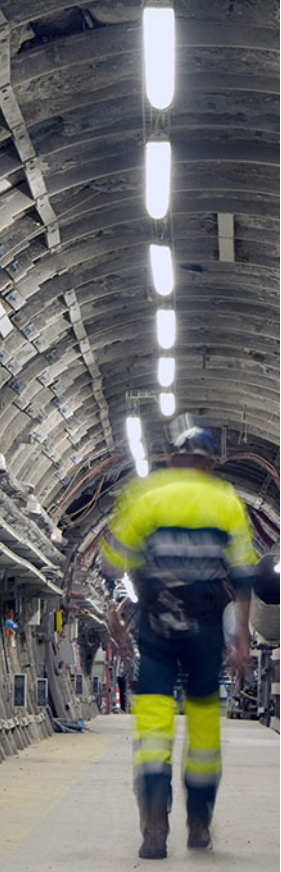


+ improvement of the design of the handling robot

Retrievability is also considered for ILW



Retrieval tests have also been performed for ILW packages



ILW Package Emplacement and Retrieval System



Further Work

- Retrieval systems are to be implemented in the Pilot Industrial Phase
- Significant work is to be carried out to pass from prototypes to industrial devices:
 - Monitoring devices;
 - Inspection robot;
 - Cell atmosphere control system (H₂ purging);
 - Rust cleaning robot;
 - Retrieval robot.

Thank you for your attention

