



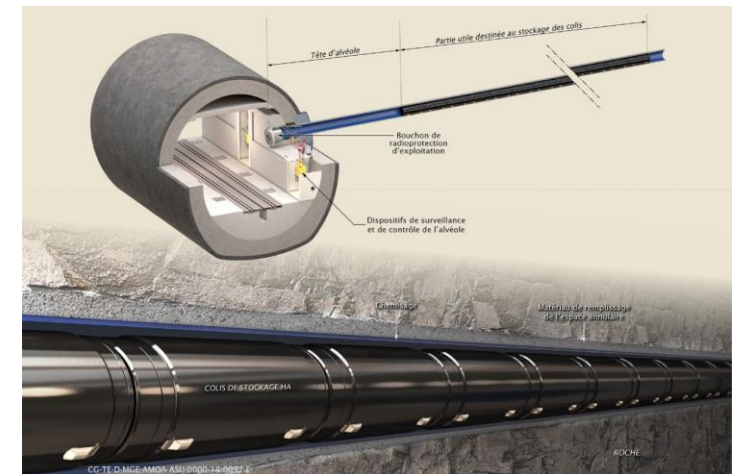
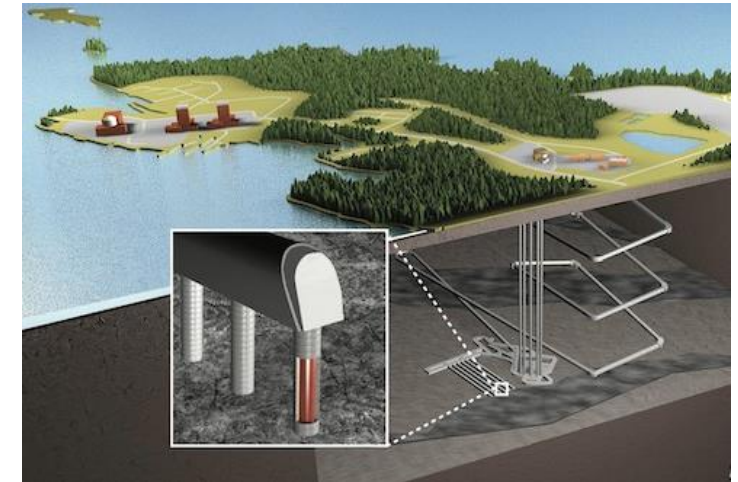
SNF Direct Disposal vs High level Waste Disposal

An absolute comparison is difficult.

Only a qualitative approach may be possible considering the direct disposal of a certain amount of SNF and the disposal of the HLW that would have been produced by the reprocessing of the SNF.

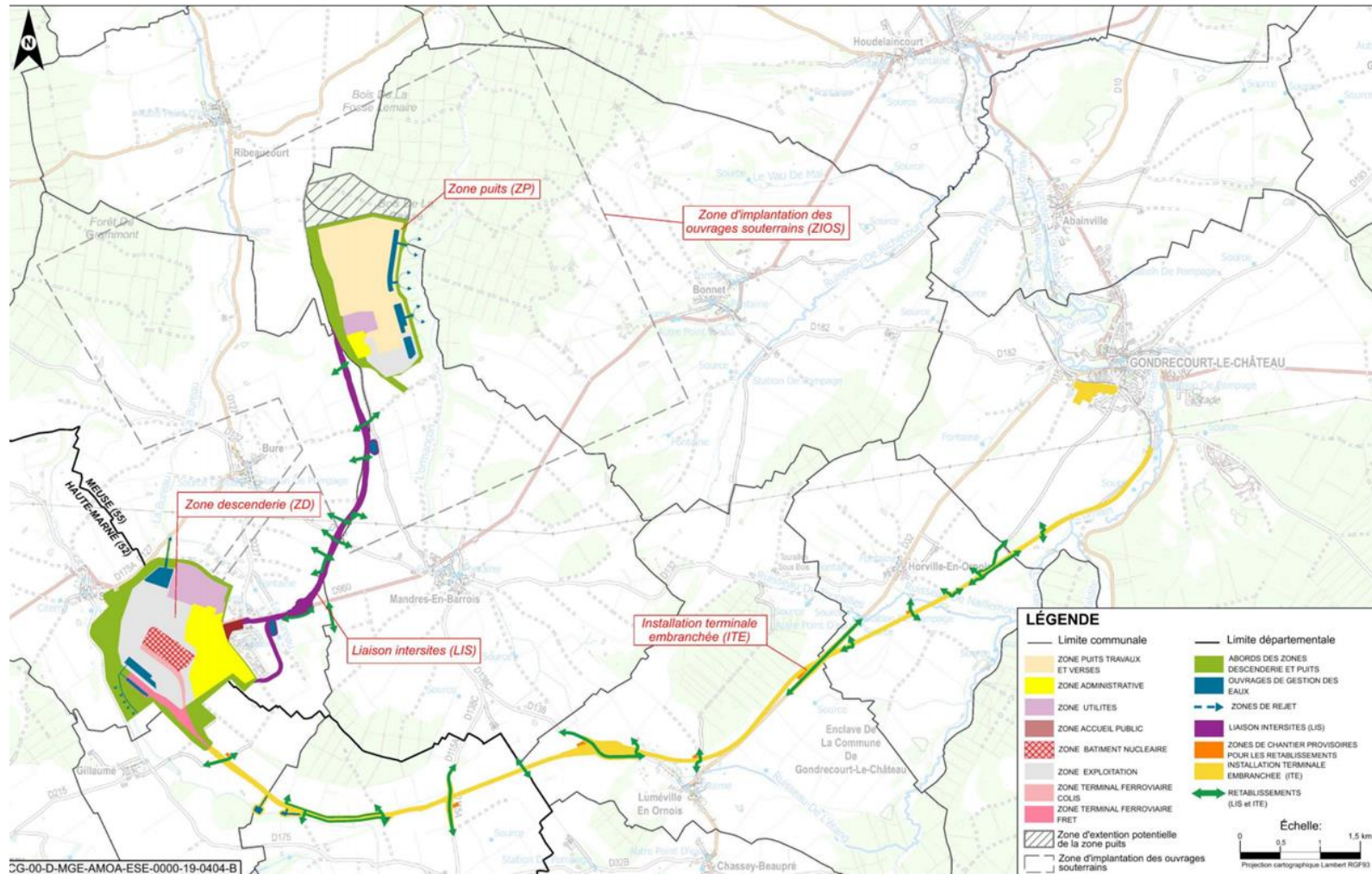
Technical solutions depend on the National context, on the site characteristics, on the design concepts and requirements of the disposal projects.

- Finland and Sweden are developing safe management solutions for SNF in Granite.
- France, Switzerland, Belgium are developing safe management solutions in Clay.
- Other countries may seek other rock formations.



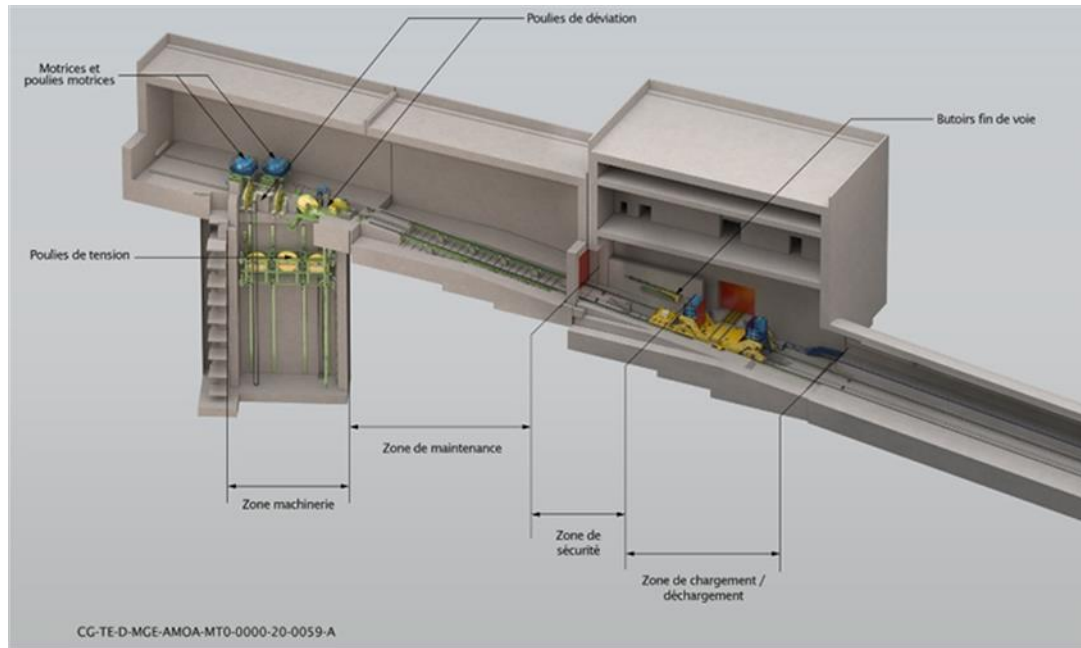


The General Layout of the Facilities of Cigéo



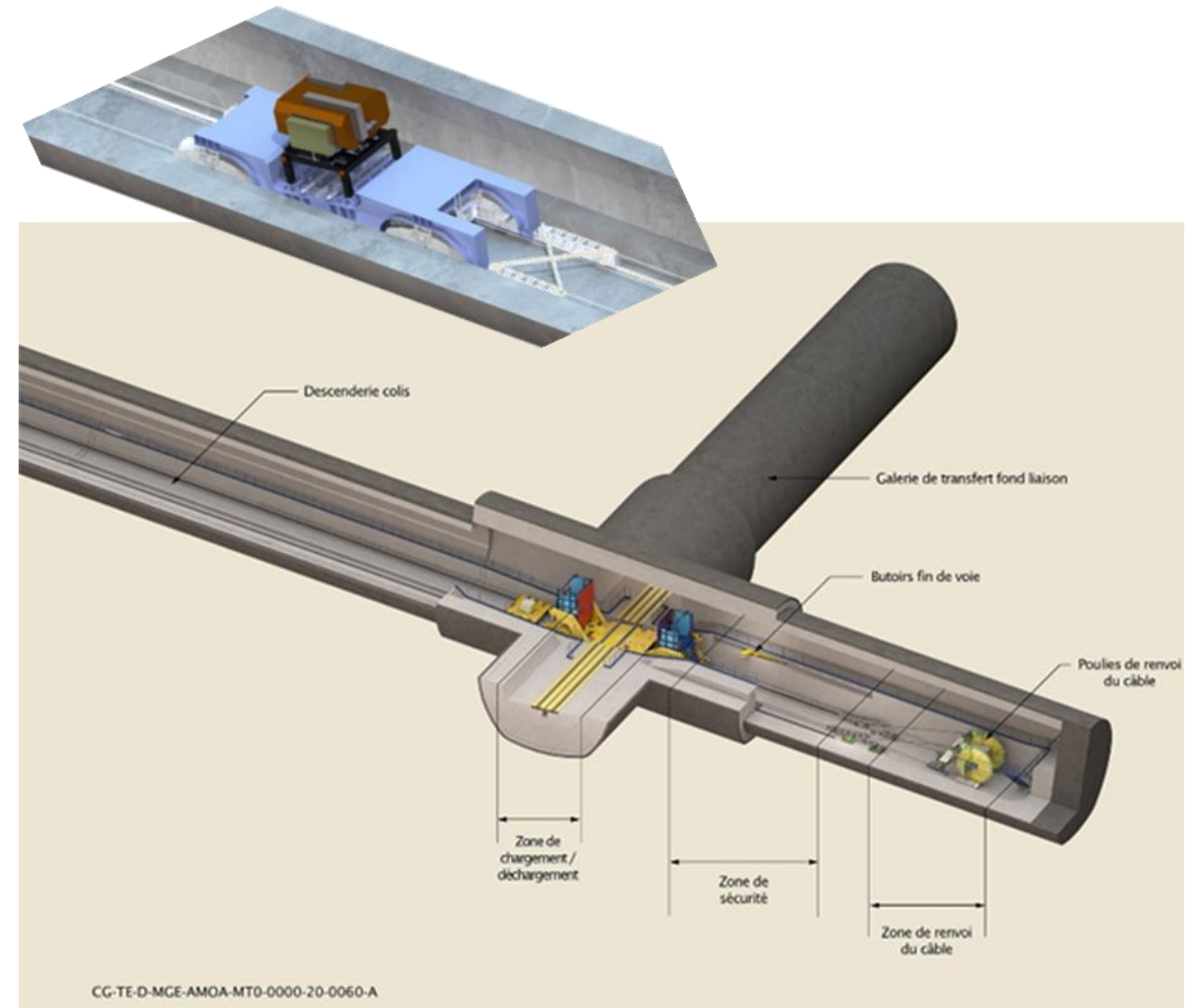


The Funicular to Transport the Waste to the Disposal Level



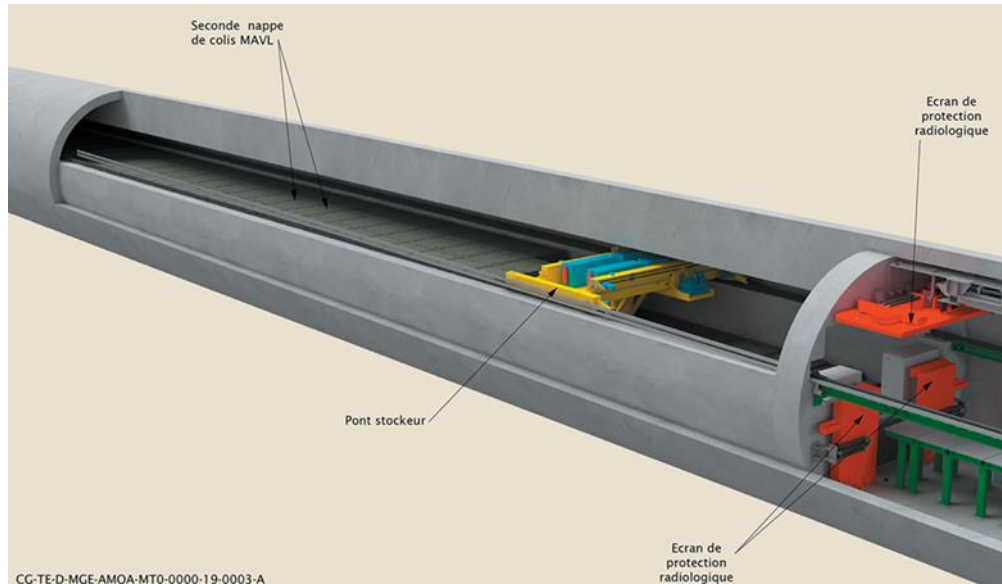
The waste is brought down on rails using an automated funicular (5 km long ramp / 12% slope / 10 km/h).

Internal transport cask containing the waste are loaded and unloaded on the carriage of the funicular.





The Disposal Concept for IL-LLW



ILW-LL disposal cells are concrete tunnels equipped with nuclear ventilation:

- about 500 m long
- about 10 m of diameter

ILW-LL packages are stacked on one, two or three layers. They are moved inside the vault using a bridge crane.

The distance between vaults (50m) prevents interactions.



Qualitative Approach

The main differences come from the nature, the radiological content and the geometry of SNF and HLW.

Reprocessing operations takes the assemblies apart and separates U, Pu and fission products. As a result :

- **HLW contains almost no fissile material and Boron is added during vitrification (Boro-silicated glass):**
 - HLW handling and disposal operations bear no criticality risks / very little dissemination risks
 - The thermal power of SNF is higher than for HLW, the evolution is different (^{241}Am), the footprint of SNF disposal may be larger
- **SNF contains material that may be recovered for defense purpose**
 - Safeguarding SNF disposal facility is a serious subject
 - Disposal of HLW equals termination of safeguards
- **The major part of long-lived mobile radionuclides ^{129}I , ^{36}Cl , ^{14}C ... are separated and released in the environment of the fuel reprocessing plant**
 - HLW contains very little amount of mobile radionuclides while SNF still holds the complete source term
 - In a comparative study (same site/same design) the potential long term radiological impact would be lower for HLW
- **SNF are long object, while HLW packages are relatively easier to handle (1/3 of the length)**
- **Reprocessing produces ILW-LL that usually also require deep geological disposal**



Cigeo's Adaptability Studies

[Pièce 07-VPRS-PARTIE 4 Volumes complémentaires Cigéo-Volume 12-Adaptabilité.pdf \(andra.fr\)](#)



Andra studied a variety of scenarios corresponding to potential nuclear policy evolutions over time and studied the feasibility of the disposal of the related waste in Cigéo.

The scenarios include the direct disposal of SNF in Cigéo :
The disposal concept for SNF and HLW in Cigéo are similar:

- horizontal vaults, steel container, thermal requirements...

