Radioactive Waste Management Inventory and Planning in France

Dr Gérald OUZOUNIAN

International Director

ANDRA

Two essential and complementary tools for a clear management, rigorous, safe and consistent of all radioactive materials and waste

The National Inventory

identifies all stocks of radioactive materials and waste and provides forecasts

feeds

The National Management Plan

implements definitive solutions for all types of waste through agreed actions

Monitors decided actions

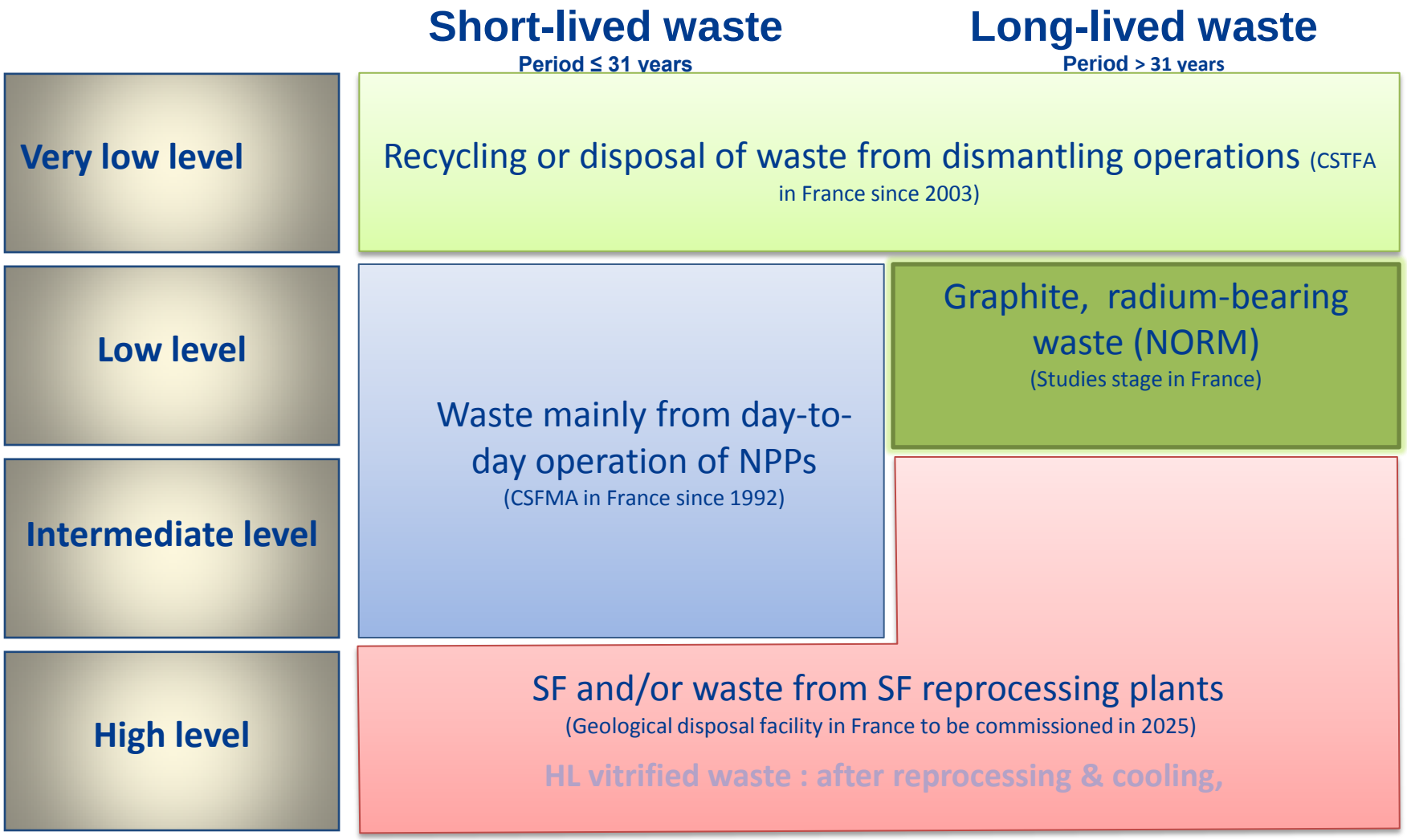
relies on the results of actions PNGMDR

National Inventory objectives

- To inform in a transparent way

- To help anticipate management solutions and contribute to energy policy choices

The French classification



2012 National Inventory : existing inventory and forecast

Waste volume (m^3)	Waste at end-2010	Forecast end-2020	Forecast end-2030
HLW	2,700	4,000	5,400
ILW-LL	41,000	45,000	49,000
LLW-LL	87,000	89,000	133,000
LILW-SL	830,000	1,000,000	1,200,000
VLLW	360,000	750,000	1,300,000
Total	**~1,320,000**	**~1,900,000**	**~2,700,000**

After 2030, taking into account two contrasted scenarios

Continuation of nuclear power generation

- ✓ Operating time of 50 years
- ✓ All spent fuel is processed
- ✓ Recycling of materials in the current nuclear fleet or a future one with a new reactors generation

Category	Ongoing electricity production using nuclear power
HLW	10,000
ILW-LL	70,000
LLW-LL	165,000
LILW-SL	1,600,000
VLLW	2,000,000

Volumes in m^3

Non-renewal of the nuclear fleet

Category		Non-renewal of electricity production using nuclear power
HLW	Spent UOX Fuel	~ 50,000 assemblies*
	Spent ENR Fuel	~ 1,000 assemblies*
	Spent MOX Fuel	~ 6,000 assemblies*
	Vitrified waste	3,500
ILW-LL		59,000
LLW-LL		165,000
LILW-SL		1,500,000
VLLW		1,900,000

The French National Plan for Management of Radioactive Materials and Waste (PNGMDR)

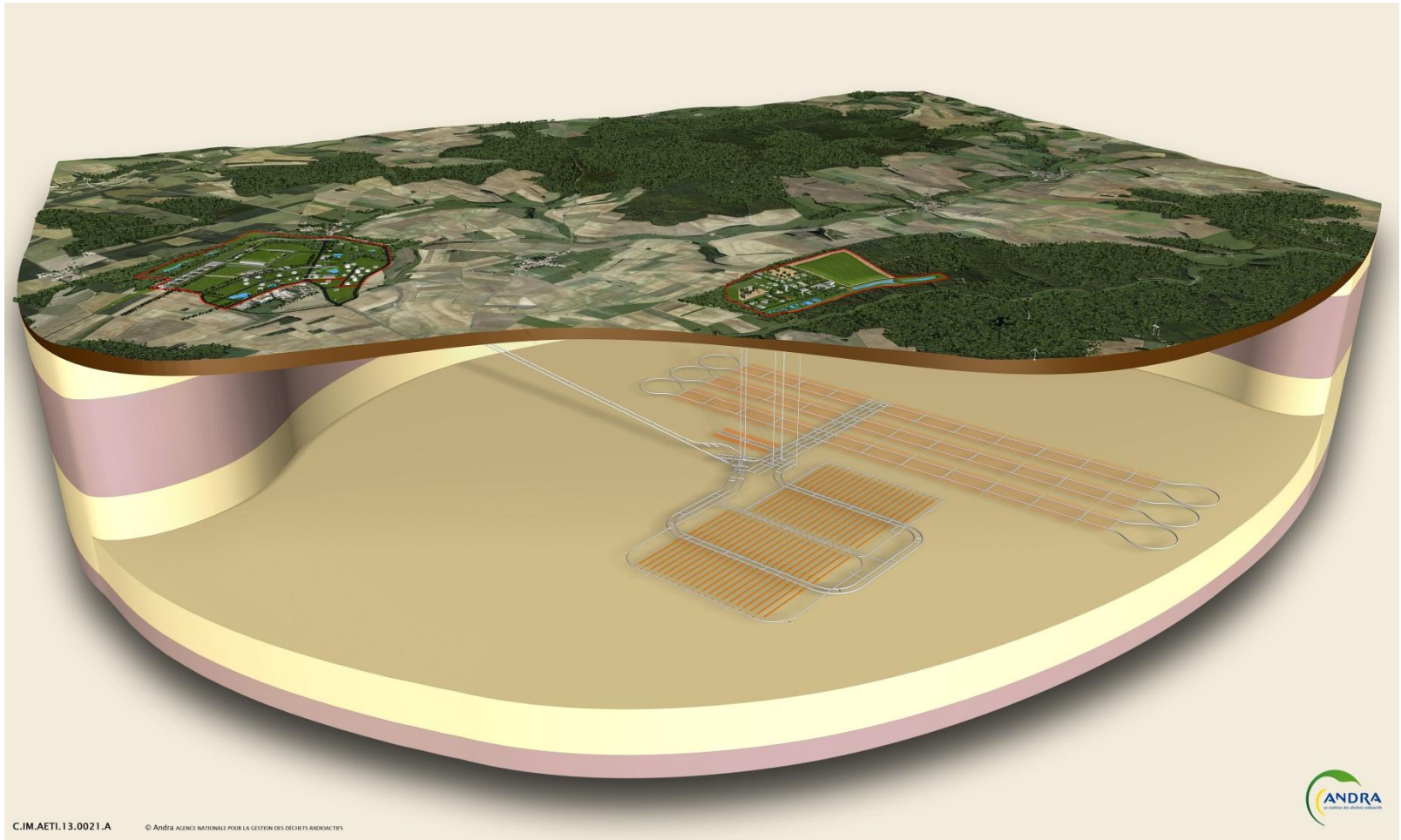
- The plan must be updated every 3 years
- The plan is the major tool for the management of materials and waste
- The PNGMDR is developed and maintained within a pluralistic working group co-facilitated by DGEC and ASN , which meets several times a year and involves
- The PNGMDR is transmitted to Parliament and gives rise to an assessment by the Parliamentary Office of Science and Technology Options and the publication of a decree prescribing the actions to be performed .

Centre de stockage de la Manche, LIL-SL waste

Centre de stockage de l’Aube, LIL-SL waste

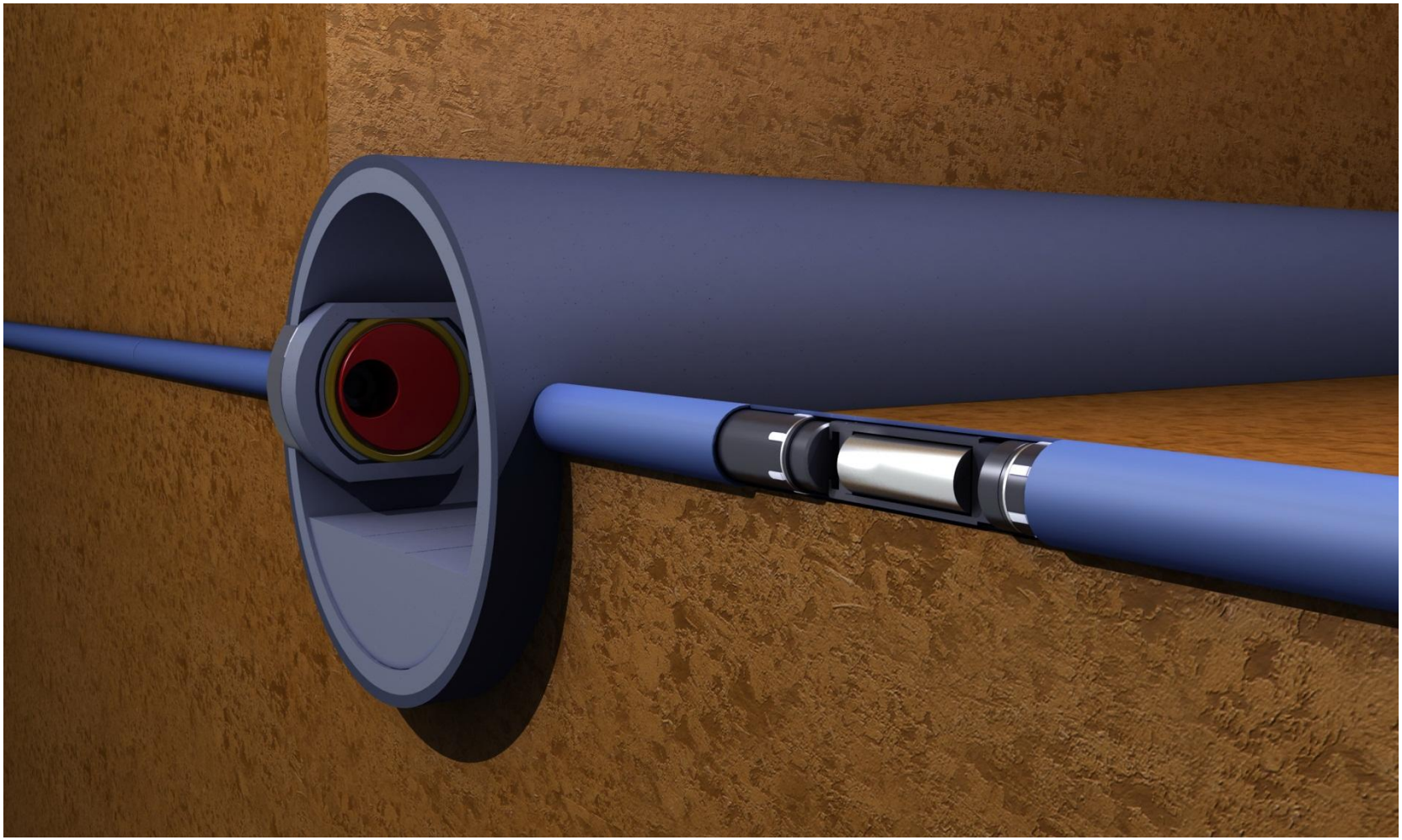
Centre de Stockage de l'Aube, VLL waste

Outline 2012 of the Cigéo project



General view at the end of operations

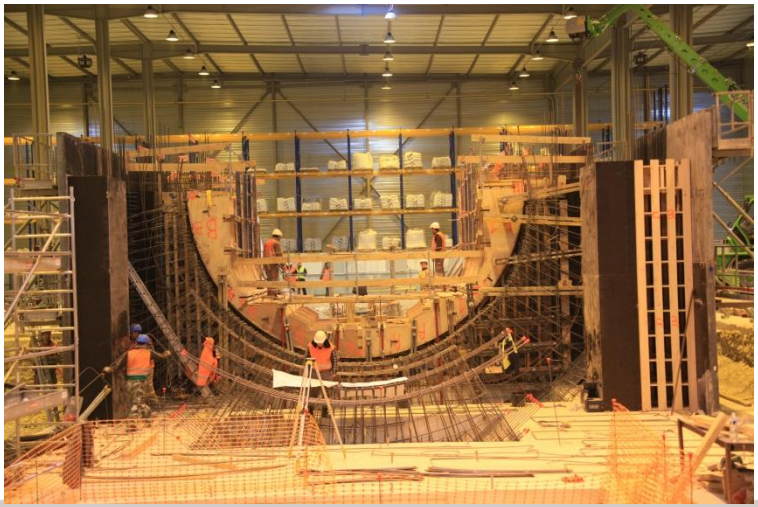
Basic concept for for high- and intermediate-level long-lived waste



Technology demonstration for the industrial development

Tunneling machine at the URL in 2013
(Andra/Eiffage TP/Antea-BG/Herrenknecht)

Boring of a HLW disposal cell (100 m) at the URL in July 2012 (Andra/CSM-Bessac)



Sealing test in Saint-Dizier, in the framework of the European « DOPAS » project (Demonstration of plugs and seals)

Four major changes

- The integration of a pilot industrial phase when the facility starts up
- The establishment of a regularly revised master plan for disposal operations
- The involvement of civil society in the project
- Changes to the calendar
  - 2015: submission of the Safety Demonstration, of the Retrievability options file, and first draft of the master plan to the Safety Authority
  - 2017: full license application, and beginning of amenity works
  - 2020: construction
  - 2025: commissioning, starting with the industrial pilot phase

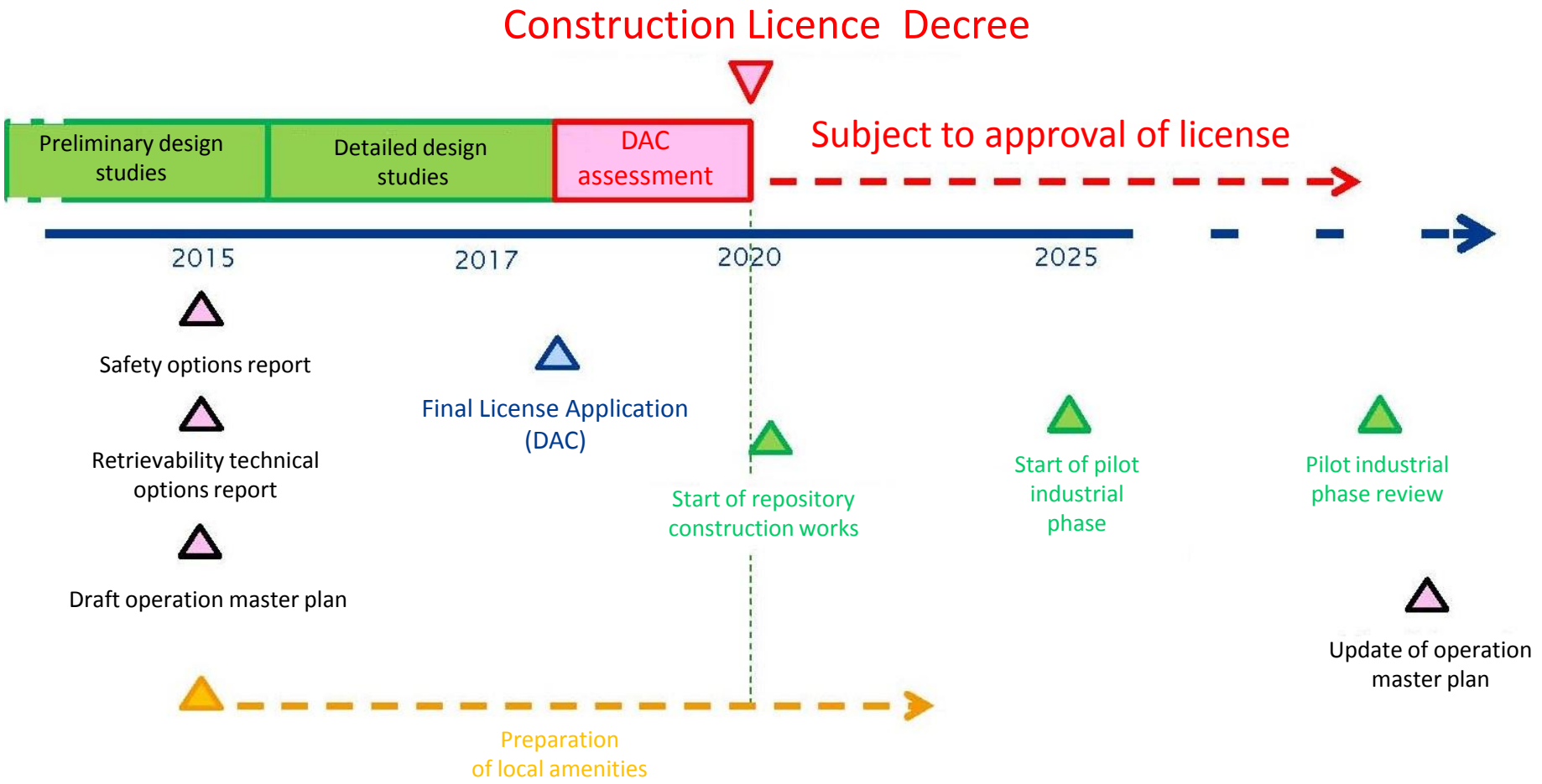
A proposal regarding reversibility

- Phased approach
  - » To allow retrievability for 100 years
  - » To assess closure scenarios, more or less progressive
  - » To perform retrievability and sealing tests during the industrial pilot phase
  - » To update of the master plan according to the feedback from the industrial pilot phase

Commitments

- Safety first
- Local development with local stakeholders
- Control costs without reducing safety

A modification of the project timetable



Conclusion

- 90% of the radioactive waste produced each year in France have an operational management solution on the long-term
- Implementing long-term management solutions is planned for HLW and ILW-LL, but also for LL-LL
  - through a legislative commitment
  - in the PNGMDR framework which provides a step-by-step control to ensure the overall consistency of management routes and their technical and economic optimization
- In parallel, the adequacy of storage capacity with the projected inventories and the availability of disposal facilities is checked.
- Finally, studies are conducted to identify management options:
  - in the case where the materials could be later classified as waste
  - In the case of studies on future nuclear facilities