

# Research on the long-term evolution of high-level waste forms in the frame of the Belgian research programme on geological disposal of high active and/or long lived waste

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# **O/N is responsible for the long-term management of B&C waste**

## **40 years of RD&D on the development of a geological repository**

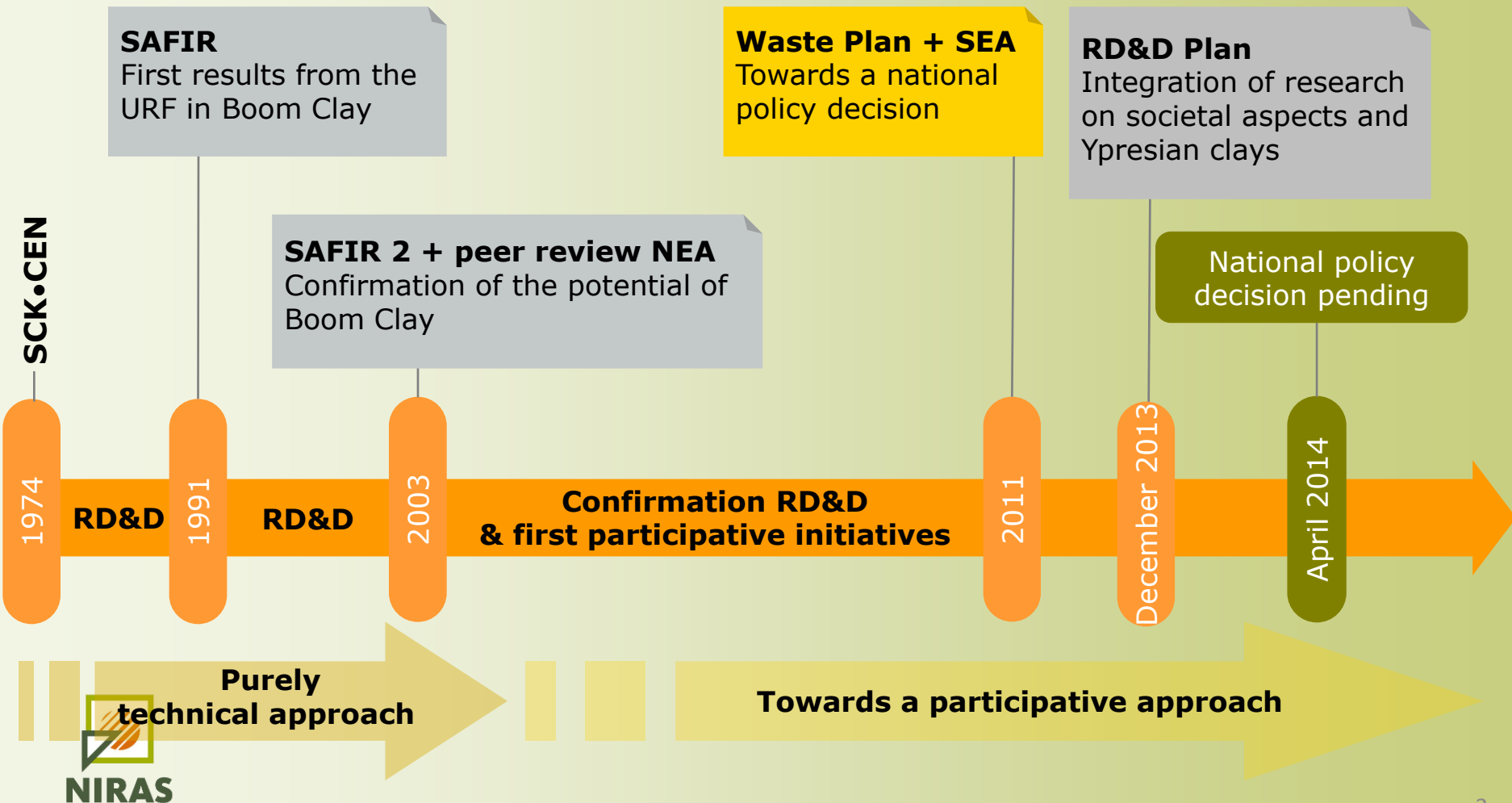
- Initiated by SCK•CEN in 1974
- In line with international recommendations
- With benefits from intensive international collaboration

## **Waste Plan handed over to the Federal Government in September 2011**

with all elements necessary to enable the Federal Government to make a decision in principle

**In the absence of decision in principle, continuation of the RD&D on geological disposal in poorly indurated clay**

# ONDRAF/NIRAS has synthesised the RD&D relating to geological disposal in several reports



***The peer review of SAFIR 2 stated that “The Belgian programme for the disposal of B&C waste is well developed and sufficiently advanced to address the siting issue”***

**However, the peer review identified the need:**

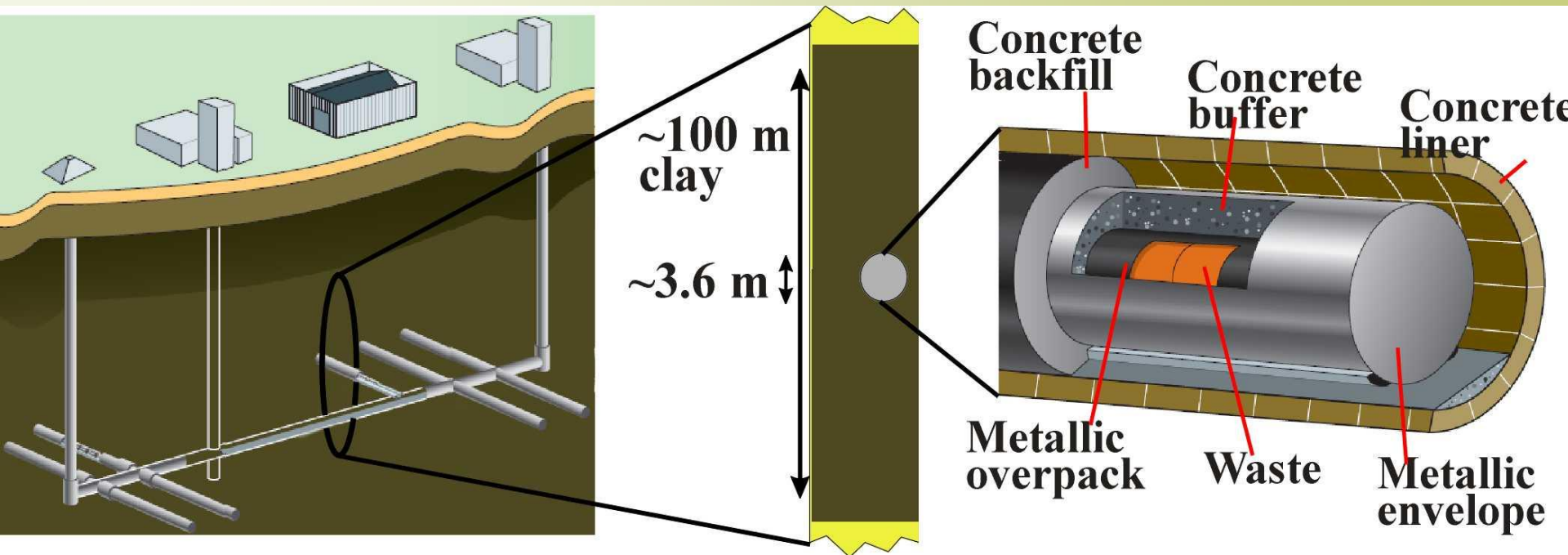
- **to refine the safety strategy and the methodology for assessing the safety**
- **to continue the RD&D to reduce the remaining significant uncertainties**
  - disposal of waste other than vitrified category C waste
  - performance of the engineered barrier system
- **to extend the programme to societal aspects**

**→ O/N has thus re-evaluated its RD&D programme**

# Since SAFIR 2, O/N has developed a new concept for the engineered barrier system (EBS)

The supercontainer is designed to fulfil several requirements, including

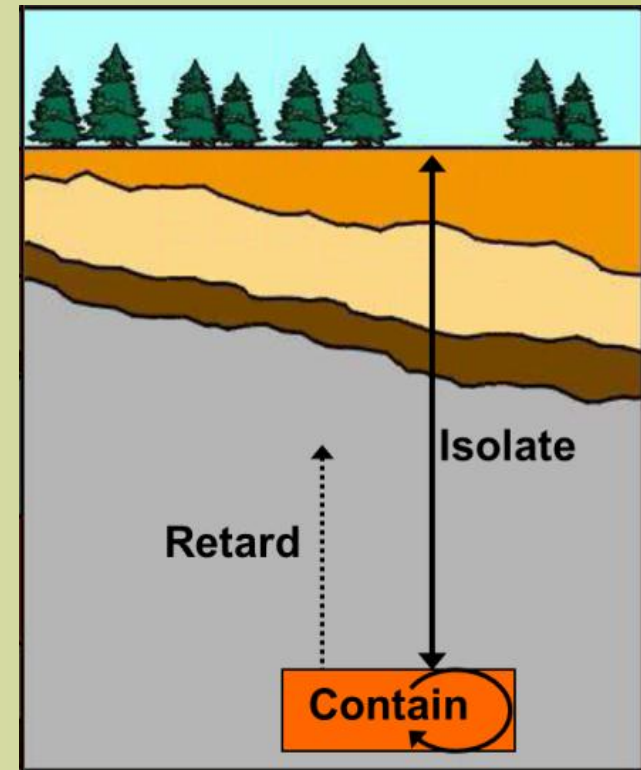
- radiological shielding,
- ease of handling and emplacement in the repository and
- containment of the wastes during the thermal phase



# Since SAFIR 2, O/N has refined and formalised its safety approach

The safety strategy sets out in broad terms how it is envisaged that safe disposal will be achieved .

The disposal sytem must fulfil 3 safety functions to protect man and the environment through passive safety.



# The Safety concept for C-waste (heat-emitting)

## Engineered containment phase

**Safety function fulfilled :** engineered containment (C)

**Contributing components :** supercontainer

**Factor determining time frame :** loss of integrity of supercontain

## System containment phase

**Safety function fulfilled :** delay and attenuation of releases (R)

R1 : limitation of contaminant releases from the waste forms

R2 : limitation of water flow through the system

R3 : retardation and spreading in time of contaminant migration

**Contributing components :** waste forms, engineered barrier system, Boom Clay

**Factor determining time frame :** dissolution properties of waste forms, transport properties of Boom Clay for contaminants

## Geological isolation phase

**Safety function fulfilled :** isolation (I)

**Contributing components :** Boom Clay, geological coverage

**Factor determining time frame :** geological stability

## Thermal phase

0

$10^3$

$10^4$

$10^5$

$10^6$