Site characterisation in the Hungarian early-stage programme

Péter Molnár, Head of Research Department
Bálint Nős, Director of Strategy and Technology

PURAM

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Hungarian National Programme for RW and SF Management

4 VVER-440 type PWR blocks
50 years of operation

Planned: 2 VVER-1200 type reactors from late 20s

Interim storage of SF

Training and research reactors

Russia

Final disposal of operational and decommissioning HLW

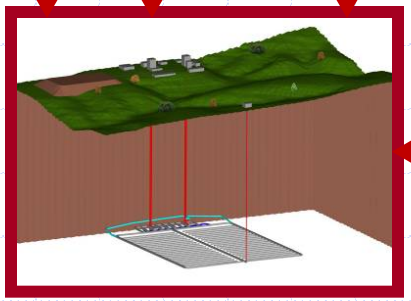
Final disposal of SF

Final disposal of SF

Interim storage of long-lived waste

Final disposal of institutional L/ILW

Final disposal of operational and decommissioning L/ILW



Final disposal of long-lived waste

Boda Claystone Formation
Ongoing site investigation for DGR

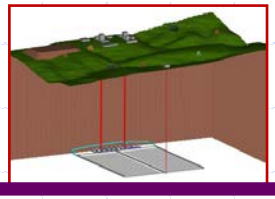
Milestones & Timeframes

since 1983
Operation
Shut down
Preparation
Guarded supervision (20ys)
Dismantling

Extension
since 1997
Operation
Surveillance and maintenance
Removal of SF
Dismantling

since 1977
Safety upgrade
Operation
Closure
Institutional control

Extension
since 2008
Operation
Surveillance and maintenance
Operation
Closure
Inst. control

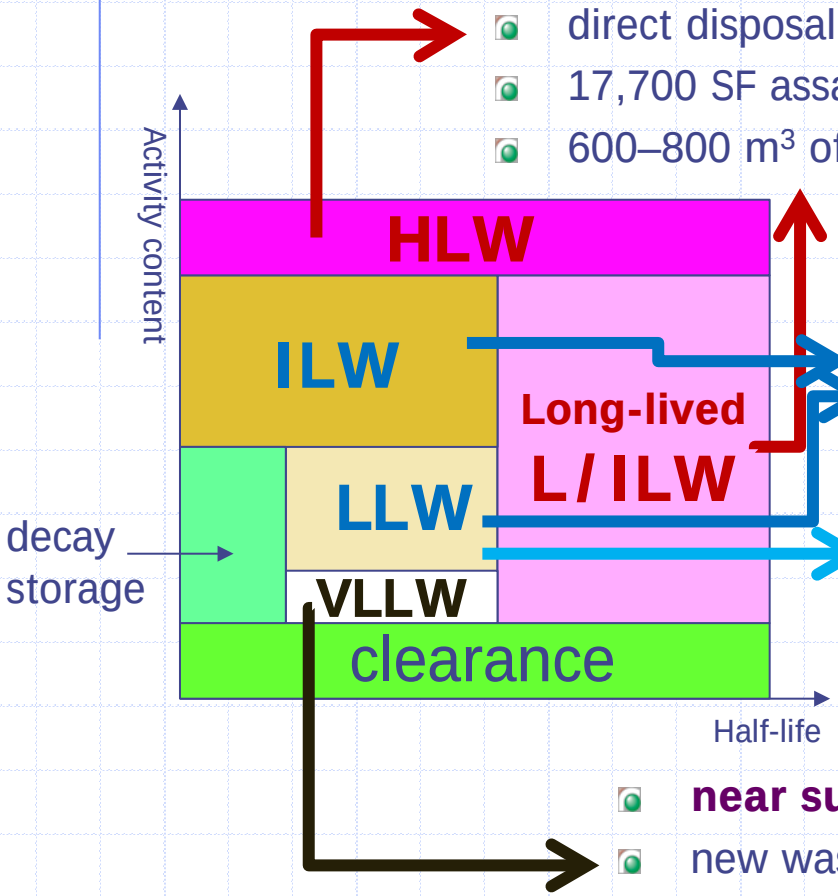


since 1993
Site selection & investigation
URL constr.
URL operation
DGR constr.
DGR operation
Closure
Inst. control

2018 2032 2038 2055 2064 2084

RW classification and inventory
(Without Paks2)

- **geological disposal in a domestic DGR (Boda Claystone F.)**
- **no final decision on back-end strategy yet**
- direct disposal of SF is the reference scenario
- 17,700 SF assamblies, 2100 tU, 4200 m^3 (1400 m^3 if reproc.)
- 600–800 m^3 of other HLW and long-lived L/ILW

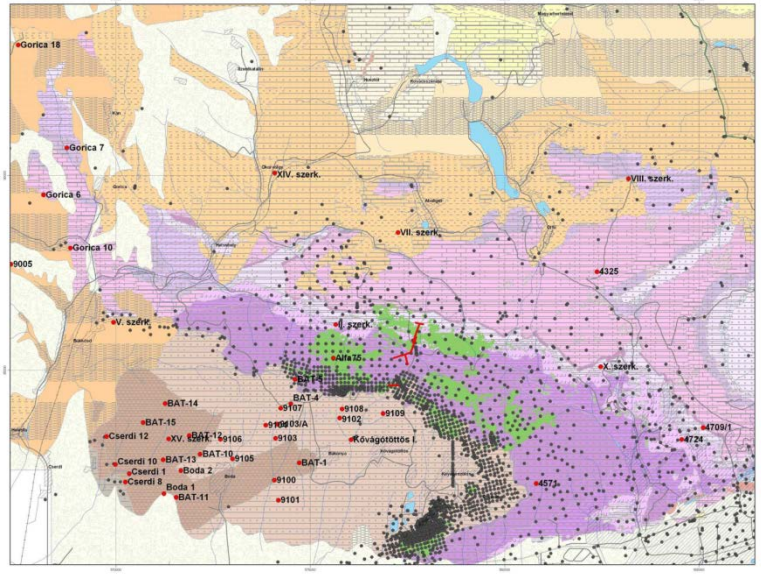


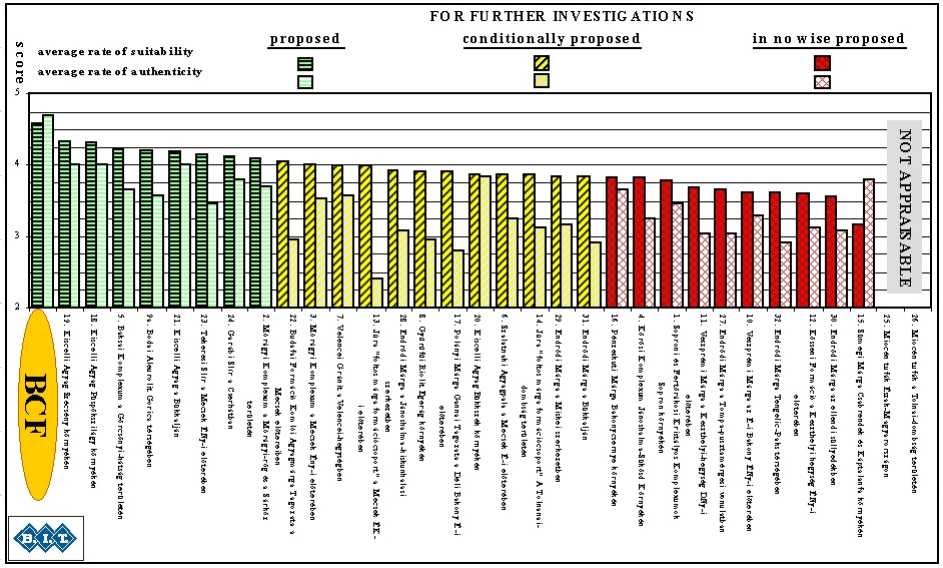
- **intermediate depth geological disposal (Bátaapáti)**
- NPP operation: 13,000 m^3 LLW and 2600 m^3 ILW
- decommiss.: 6000 m^3 L/ILW
- **near surface disposal (Püspökszilágy)**
- institutional waste: 5000 m^3 SL L/ILW

- **near surface disposal (siting to be commenced)**
- new waste category since 2018
- decommissioning: 22,000 m^3 VLLW

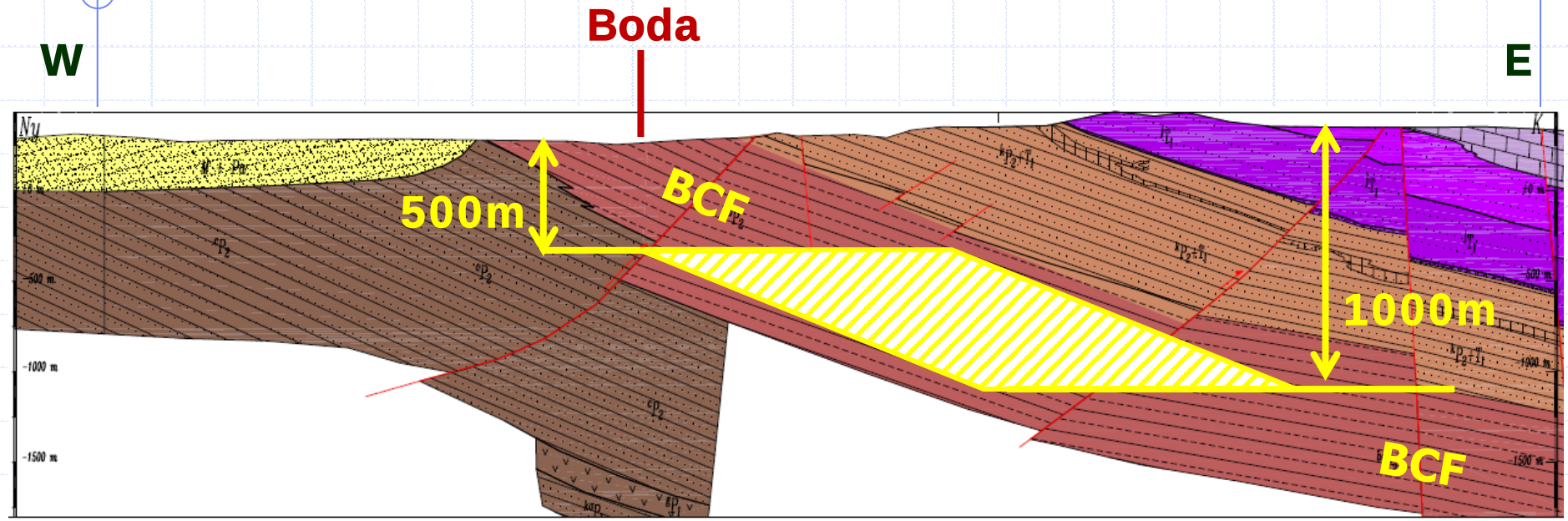
History of siting (Boda Claystone Formation)

- **1990's:** in-situ investigation from a **uranium mine**, BCF is the underlying formation, URL on a depth of 1100m
- **2000-2003:** country-wide **screening** and **ranking** of the potentional host formations
- **2004-2010:** 1st phase of surface investigation
- **2013-2018:** 2nd phase of surface investigation



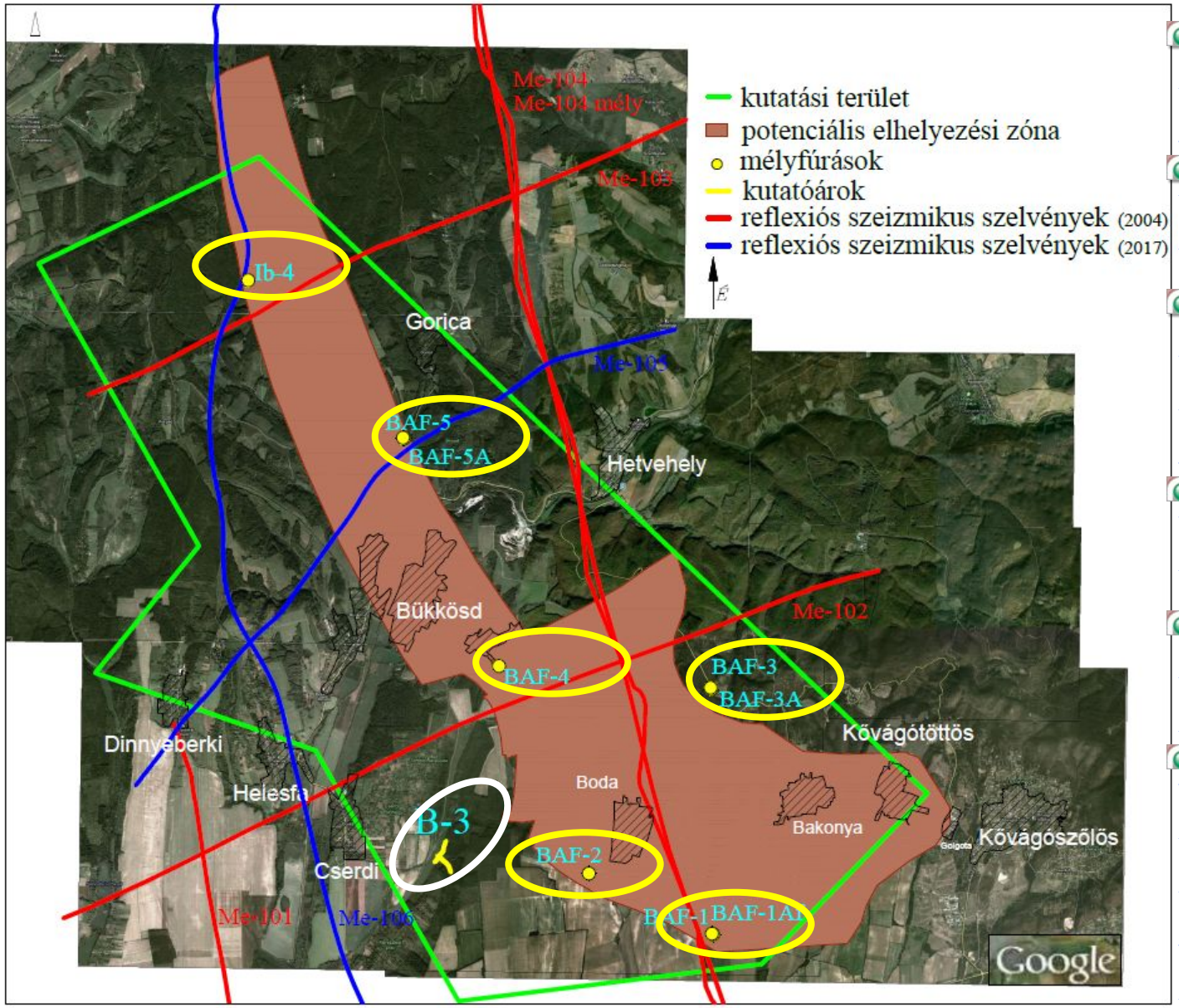


Potential Disposal Zone in a vertical cross-section



- BAF-2 drillcore, 713.0m

Siting territory, Potential Disposal Area



- **87km² siting territory**
- **32km² Potential Disposal Area**
- **Deep boreholes, in-situ testing**
  600–1500m depth
- **Trenches**
  700–1500m length
- **2D seismic profiles**
- **Geological, hydrogeological, geomorfological mapping**

Requirement for RD&D Planning

Council Directive 2011/70/EURATOM of 19 July 2011

establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste

Article 12: Contents of National Programme

1. (f): set out the „research, development and demonstration activities that are needed in order to implement solutions for the management of spent fuel and radioactive waste „

Member States have to develop their own RD&D plan as part of the National Programme

The Plandis Guide

- EURATOM FP7, SecIGD2 Project (2013–2015)
  - Member States with less-advanced National Programmes need help to develop an RD&D Plan
  - Guide has been developed by the Secretariat of IGD-TP, scope restricted to HLW and LL ILW, target end-users are WMOs
  - Usability testing: PLANDIS Workshop in 26 May 2015, Pitesti, Romania

EUROPEAN COMMISSION
Community research

SecIGD2 Project
(Contract Number: 323260)

RD&D Planning Towards Geological Disposal of Radioactive Waste
DELIVERABLE (D-N°: 2.3)
Guidance for less-advanced Programmes

Author(s): T. Beattie, R. Kowe, J. Delay, G. Buckau, D. Diaconu

Reporting period: e.g. 01/07/2014 – 31/12/2015

Date of issue of this report: 30th June 2015

Start date of project: 01/01/2013 Duration: 36 Months

Project co-funded by the European Commission under the Seventh Euratom Framework Programme for Nuclear Research &Training Activities (2007-2011)	
Dissemination Level	
PU	Public

SecIGD2

https://igdtp.eu/wp-content/uploads/2018/04/secigd2-d2-3.pdf

- PURAM reviewed and commented draft versions of the Plandis Guide, participated in PLANDIS workshop, and used it for the preparation of RD&D plans in the National Programme

Contents of the Plandis Guide

Establishing an RD&D plan

- Programme boundary conditions for waste disposal
- Milestones and timeframes
- Safety case as principal driver for RD&D
- Responsibilities and entities involved with RD&D
- Methodology for prioritising RD&D
- RD&D competence management, contractual mechanism and advisory support

Programme activities and RD&D tasks

- Inventory, Cost, Waste treatment and storage
- Implementation strategy, Generic Safety case development
- Competence development, Stakeholder engagement strategy
- Site characterisation, Post-closure safety assessment tools/methodology
- Environmental impacts and socio-economic effects
- Operational safety, Data management and preservation of records

Application of the Plandis Guide for planning site investigation

A new Governmental Decree was issued in Jun 2014, regulating safety requirements for RW disposal facilities

- „A framework programme has to be developed and implemented for the investigation and evaluation of the potential site."
- „The framework programme includes also the geological investigation programme."
- The framework programme defines phases of the stepwise investigation.

PURAM contributed to the formulation of legal requirements for site selection and characterisation

- The Plandis Guide was used as a reference document to develop the scope and the contents of a framework programme
- The framework programme was considered as a site-specific RD&D plan

Application of the Plandis Guide for planning site investigation

The framework programme must specify the followings:

- geographical location and host rock formation
- category and volume of the RW to be disposed
- type of the planned facility and its life-cycle
- phases of the investigation, schedule, decision points, licencing

Topics of RD&D activities in the framework programme:

- inventory, treatment and conditioning, characteristics of RWs
- waste forms, packages, long-term behaviour and interactions
- elements of the EBS, long-term behaviour and interactions
- natural, societal and geological environment, long-term behaviour and interact.
- layout of surface and underground facilities, construction and closure methods
- operational safety, transport, disposal, retrievability of waste packages, prevention of accidents
- measurements, modelling, assessment tools and methods
- data management and preservation of records

Application of the Plandis Guide for planning site investigation

RD&D activities are scheduled according to the phases of the geological site investigation

RD&D activities have to be prioritized:

- current understanding and knowledge gap, uncertainty
- importance and impact of the obtainable information
- time requirement, urgency

PURAM is now preparing the framework programme for the site investigation of the DGR for HLW in the Boda Claystone Formation

Future plans for site characterisation

- The long-term site investigation framework program is compiled on the basis of the IGD-TP „PLANDIS" guide and will be licensed
- Three phases were defined for surface based investigation until the URL construction
- Preliminary safety case to be compiled at the end of each phase to define further RD&D activities and priorities
- Final aim is to designate the location of the URL by the early 2030's

Stakeholder engagement is essential!

- Site investigation is fully supported by local people (informative and inspecting associations, financial promotion, open and authentic communication, activities, face-to-face channels)
- Abstention and opposition by the population of a nearby large city (**NIMBY** and also **NIMTO** – Not In My Term of Office!!)
- Revision of the country-wide screening and preliminary evaluation of an alternative host rock formation in 2019–2021

Some questions in an early-stage site characterisation programme

At which stage the **inventory** has to be primarily defined?

- decision on the back-end strategy of the fuel cycle influences the heat production and volume of the waste, footprint of the facility

At which stage **type of waste packages** has to be basically specified?

- influences the size of the shafts and tunnels, excavation and support methods, facility layout, disposal equipment etc.

At which stage decision has to be taken about the **location of an URL**? What are the most relevant considerations?

- complexity of the geology, transposition of information from URL to DGR
- influences the facility layout, methods of closure and seals etc.

Experiences and lessons learned in advanced programmes would help for planning of further RD&D activities including site characterisation in an early-stage programme

Thank you for your attention!