**High-level waste deep repository optimisation including closure – a strategic study within EURAD 2**

Philipp Herold (*Philipp.herold@bge.de, Bundesgesellschaft für Endlagerung mbH (BGE), Eschenstraße 55, 31224 Peine, Germany*)
Anne-Catherine Dieudonné (*A.A.M.Dieudonne@tudelft.nl, Delft University of Technology, the Netherlands*)
Valéry Detilleux (*valery.detilleux@belv.be, Bel V, Belgium*),
Jiri Svoboda *(Jiri.Svoboda@fsv.cvut.cz, Czech Technical University Prague, Czech Republic)*

The strategic study “HLW Repository optimisation including closure (OPTI)” has recently been launched as part of EURAD 2 program. The study is motivated by the fact that the first HLW (high-level waste) repository projects are entering the licensing, construction and operation phases and that optimisation is becoming increasingly important to ensure that repository designs are not only technically robust but also economically efficient, environmentally sustainable, and socially acceptable. Furthermore, the discussion of optimisation is justified by the long-term nature scales of repository projects in general. Within each national program, changing boundary conditions (e.g. new waste types, updated regulatory frameworks, evolving societal expectations, etc.), technological developments, or the process adaptations based on operational experience will justify and require optimisation. The term “optimisation” covers a wide range of socio-technical and economic aspects. The term is further relevant for all steps of the repository programme, including site selection, design, construction, operation, closure, and post-closure monitoring. Optimisation in preparation of the safety case and licensing is an established engineering process ensuring compliance with regulatory requirements and enhancing the overall safety of repository systems. Optimisation after licensing or during construction and operation may have a different focus as safety is already demonstrated and a reduction of conservative assumptions is more important. In general, optimisation promises improvements in technical and economic aspects as well as with regard to flexibility and robustness. As such, optimisation is a process that should involve all stakeholders (e.g. research entities, regulators, waste management organizations), including the civil society. Different stakeholders will have different objectives and strategies for optimisation. OPTI will develop mutual understanding and provide recommendations on methods and further activities for the design and optimisation of specific HLW repository systems, structures and components (SSCs), and processes. For mutual understanding, it is important to know e.g. what are the main drivers for optimisation? At which points in the programme is optimisation required, recommended, not reasonable, or maybe even limited or restricted by regulatory requirements? The work package creates a platform to share best practice for optimisation strategies and processes. The results will notably help both advanced and emerging programmes. Knowledge transfer from advanced to developing ones will be facilitated. R&D needs for specific SSCs and procedures that could be further optimised will be identified.

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