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Thinking in alternatives and reflecting possible futures in German nuclear waste management: insights from technology assessment

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Abstract. The disposal of highly radioactive waste in Germany is a task that extends beyond the near future and is a task on which high demands are placed. In addition to the central paradigm of "safety first", the quality characteristics of being science-based, transparent, participatory, step by step, and facilitating learning are defined as guiding principles for the process in the German law on site selection. In a project of the TRANSENS (transdisciplinary research on the disposal of high-level radioactive waste in Germany) research network, the boundary conditions for these quality characteristics are being analysed. The focus is on the question of how the ability to act flexibly can be ensured in the German site selection procedure without jeopardising the goal of nuclear waste disposal in the deep geological underground. It is taken into account that, in modern Western societies, contradiction and protest are continuously to be expected as part of ongoing processes of interest aggregation. Stakeholders and collective actors from civil society will also participate with self-confidence over time, with respect to the system of multi-level governance, just as politicians and experts traditionally do in the established system of radioactive waste (Radwaste) governance (Hocke and Brunnengräber, 2019).

In order to be able to ensure the capability to act flexibly, it seems sensible to think of the future in terms of being an open space that can be shaped in a particular way. In this context, it is advantageous to recognise that thinking in alternatives (even with a fixed goal such as deep underground nuclear waste disposal) can be a reflexive practice by all interested actors. Conceptually, and in terms of planning, this changes the present and, from the perspective of the technology assessment, removes the restriction of the principle path dependency through collective learning processes (Grunwald, 2019; Böschen et al., 2021). In this respect, various futures are possible that provide orientation, especially in the case of technical infrastructures that must be created, operated, and monitored over several decades. Mid-term futures, which are to be operated until 2080 or possibly into the next century, thus become designable spaces.

In the TRANSENS sub-project "Capability to act and flexibility in a reversible site selection process", these analyses serve to provide knowledge about possible futures in the form of orientation knowledge. Following the existing research about socio-technical processes, imagination and narratives are very influential, as they steer the framing of problems in the public debate.

Initial empirical results show that representatives of the interested public in addition to young adults are able to play through images for the future and think about the boundary conditions for different decision paths. Based on explorative and evaluative methods, intermediate results were empirically determined, which are linked with path heuristics to three plausible and goal-oriented selected disposal paths (Scheer et al., 2023). This showed that repository-related narratives are nodes that can support the processes of understanding about collective action, according to the Repository Site Selection Act (StandAG). At the same time, they are also sites of hegemonic disputes. Regardless of this, young adults can deal with images for the future without being hindered by dystopian fantasies. These results based on the images and narratives are furthermore integrated into a political–sociological innovation model, which integrates the socio-technical processes of decision preparation and decision-making.

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