



Putting nuclear waste on the sustainability agenda – integration into the concept of planetary boundaries

Fanny Böse^{1,2} and Christian von Hirschhausen²

¹BASE (Federal Office for the Safety of Nuclear Waste Management) F2 Social science research,
Berlin, Germany

²Workgroup for Economic and Infrastructure Policy (WIP),
Technical University Berlin (TUB), Berlin, Germany

Correspondence: Fanny Böse (fanny.boese@base.bund.de)

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Abstract. One part of sustainability discussions is the debate about the ecological carrying capacity of the Earth, which was initiated in the year 2009 by a group of scientists led by Johan Rockström, who proposed the concept of “planetary boundaries” (Rockström et al., 2009). The concept defines limits of the ecological carrying capacity based on scientific findings and on the application of the precautionary principle. Since then environmental and sustainability policies have increasingly referred to the concept as a global framework, as done, for example, by the Stakeholder Forum for a Sustainable Future (United Nations Department of Economic and Social Affairs, 2012) and the EU’s 8th Environmental Action Program, which calls for “a systematic change to a Union economy that ensures well-being within planetary boundaries” (European Parliament and Council of the European Union, 2022, p. 24).

As one of the nine boundaries, climate change requires strong decarbonization and has led to increased investments in low-carbon technologies. Hereby, nuclear power generation gains a new momentum for newly-built reactors as well as lifetime extensions due to its low-emission character required for climate change mitigation (MIT, 2018; Cometto et al., 2022). Furthermore, the EU taxonomy has set nuclear power as a “sustainable” technology classifying it as a “green” investment (JRC, 2021). Although no greenhouse gas emissions are produced during nuclear fission, it produces another form of hazardous and long-lasting waste through spent fuel accumulation. In this sense, human-made nuclear fission is also an anthropogenic impact, which increases the number of instable isotopes representing a persistent threat to humankind and ecosystems.

Although the planetary boundary concept has briefly mentioned radioactive waste as being part of other toxic and human-made waste under the category “novel entities”, it has not been further elaborated since the introduction of the framework (Steffen et al., 2015; Persson et al., 2022). Instead, other forms of human-made waste such as plastics have been analyzed and quantified (Persson et al., 2022).

The aim of the workshop is to discuss the role of radioactive waste management in the context of planetary boundaries from the perspective of the various disciplines of the workshop attendees. Therefore, the concept of planetary boundaries will be introduced and a global perspective on radioactive waste accumulation will be set. In small groups the workshop attendees will work on single aspects, such as reviewing the provided arguments and whether their suitability meets the criteria to establish nuclear waste as a control variable for the novel-entity boundary. The workshop can also include considerations about possible indicators and challenges for quantification as well as address the debate on whether radioactive waste may also become a resource for future generations. Finally, groups will present their results in front of the plenum and discuss the global perspective and its implications for radioactive waste management and challenges for the sustainability discourse in science and policy.

To provide a balanced and interdisciplinary discourse we will invite a few speakers, who will provide input statements, and other experts in the field. It is envisaged to provide a paper with background information and

data necessary to discuss radioactive waste as a planetary concept. This preliminary work serves as a basis for discussion for the workshop.

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