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Applying a life cycle environmental perspective to the development of radioactive waste treatment technologies

Environmental life cycle assessment (LCA) is a standardised approach to evaluating and improving environmental sustainability in a holistic manner, and has been applied quite extensively to nuclear energy generation life cycles. However, there are very few examples of LCA being used to ensure more sustainable radioactive waste management. This presentation will begin by considering the prior use of LCA in this field and the potential benefits of its application, before focusing on work conducted as part of the EU/Euratom-funded PREDIS project which has applied LCA and the methodologically-related approach of life cycle costing (LCC) to a variety of novel treatment options for metallic, organic and concrete package waste streams. This has been conducted in close collaboration with partners across Europe to identify candidate waste forms and pretreatment methods and to coordinate data collection processes, which will be outlined. Subsequent LCA has been conducted using Sphera GaBi software with input from the Ecoinvent 3.9 database. The presentation will draw on this work to analyse cases of specific waste treatment techniques and to illustrate how LCA can be used to ensure that new waste treatment processes in the nuclear sector are designed with sustainability in mind from the outset.

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