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Cost/Risk-optimised fuel cycle decision-making in uncertain market futures

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The various options for the management of spent fuel (SF) from nuclear power reactors is a topic that has been debated from multiple dimensions, being it the socio-political concerns with regard to geological disposal, the technical-economic competitiveness of options such as reprocessing and recycling, as well as from the growing discussion on sustainability and international policy.

Many of the discussions relating to SF-management have historically been rather binomial between, on the one hand, the socio-political concerns on the direct disposal of SF and the proliferation concerns regarding reprocessing, and, on the other hand, the uncertain costs of such disposal facilities versus the economics of reprocessing and recycling schemes. Especially since the 1990s, various intergovernmental and national organisations initiated studies on very advanced SF-management schemes such as separation and transmutation also impacting the progress towards a proper solution-oriented and responsible and above-all timely SF-management.

After some decades of - generally - indecisiveness on SF-management, and with nuclear energy increasingly in the spotlight in the context of sustainable energy mixes, a more solution-oriented and responsible SF-management becomes necessary, if not urgent.

Especially as the uncertain costs and timing for such SF-management become increasingly translated into financial risks for the SF-owners, i.e. utilities. Many discussions on SF-management options were in the past coloured by strategic reflections on Unat availability and pricing, sustainable nuclear fuel cycle options (including Generation-IV systems [1]) and political considerations regarding non-proliferation. Today, there is a growing financial risk presented to utilities which becomes a more compelling trigger towards a decision on various SF-management options.

This paper addresses the changing market context for nuclear energy and particularly how SF-management options are increasingly assessed in such uncertain futures. Cost/risk optimising SF-management schemes are crucially important for utilities not to have SF as such remaining a hurdle for the future of nuclear energy' s use.

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