

# Session 1: Reprocessing and Disposal of Spent Nuclear Fuel

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## Summary

Decisions to reprocess spent nuclear fuel (SNF) and/or directly dispose of SNF from once-through fuel cycles require states to confront oft mischaracterized tradeoffs between hard and soft factors related to proliferation risk, repository performance, economics, safety, energy security and resource sustainability over the short and long term. Though reprocessing may simplify waste management, improve repository performance, and increase stakeholder acceptance, reprocessing does not obviate the need to site a long-term disposal facility. Given the cost premium and scaling issues with typical reprocessing technologies, the why, how, when, and where of closing the fuel cycle will likely require a confluence of rationales that will be state-specific and context dependent. For example, resource poor states with large nuclear programs may be more willing to accept the cost premium of reprocessing in exchange for the energy security benefits of utilizing plutonium in SNF.

The waste management experiences in Finland and the United States are studies in contrast. Though initially preferring to return foreign-origin spent nuclear fuel to the Soviet Union, the Finnish direct disposal strategy was influenced by the U.S. decision to abandon reprocessing, low uranium prices, and the network effects arising from the Swedish direct disposal plan. The relative success of the Finnish waste management program is credited to a systematic and consistent approach to repository siting focused on geological and safety factors with the final decision directed by a local and national response. The more contentious U.S. experience has struggled with the fundamental question of whether spent nuclear fuel (SNF) should be viewed as an asset or a waste. Historically, changes in the regulatory climate, technical failures, and policy reversals stymied the development of

reprocessing in the U.S. While often pitched as an “all-or-nothing” proposition, some combination of once-through and closed fuel cycles may be desirable to manage the backlog in SNF, possibly incorporating an interim storage facility of fixed capacity as a strategic reserve of SNF. Recently released draft findings of the Blue Ribbon Commission subcommittees established to revisit these issues have shed some light on the future of U.S. waste policy, provisionally recommending a “Fedcorp” entity to take responsibility for SNF as well as the continued pursuit of a centralized storage repository and advanced fuel cycle concepts while recognizing the limited rationale for reprocessing in the near term. A de facto interim and indefinite storage posture of the U.S. will likely require continuing funding, technology development, and siting efforts to constitute a credible waste management strategy.

Facing the costs associated with a geological repository, states with smaller nuclear energy programs may pursue multinational arrangements that rely upon “big friendly” states or cooperative partnerships between like-minded states such as those in Europe, the Gulf, and Asia. In the aftermath of Fukushima, concerns about the safety of the Japanese reprocessing facility are likely driven by its proximity to the damaged reactors - reprocessing poses similar issues to large onsite wet pool storage facilities, though reductions in front-end mining and enrichment requirements reduce the environmental and public health consequences of closed fuel cycles.

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