

Spent Fuel Management and Advanced Reactors

Summary

- Existing spent nuclear fuel is currently stored safely at reactor sites across the U.S.
- Eventually there will need to be a permanent repository for spent nuclear fuel, which some countries are starting to [develop](#).
- Advanced reactors are being designed to minimize waste through greater fuel efficiency or recycling, reducing spent fuel volumes requiring permanent storage.

Overview

Since the nuclear industry emerged over half a century ago, management of spent fuel has been conducted safely. Following decades of operations, around [84,000](#) tonnes of commercial spent nuclear fuel is currently stored at nuclear power plants in the U.S. Comparably, coal plants produce almost [100 million](#) tonnes annually of just coal ash. Even as the waste debate continues in the U.S., no member of the public has ever been harmed by commercial the used nuclear fuel stored in 35 states. Globally, Finland is currently constructing a long-term storage facility for used commercial nuclear fuel and Sweden is planning one. Countries have also built and are operating disposal facilities for less radioactive commercial and defense waste streams. As advanced reactor developers design the next generation of nuclear energy power plants, they are implementing innovations that can mitigate spent fuel challenges.

Today, numerous proven methods for the handling of used commercial nuclear fuel are in practice all over the world or are being pursued. These methods include:

- **Short-term storage:** The dominant method for addressing spent fuel is storing it at the reactor site after use, first in a spent fuel pool and then in [dry casks](#). The U.S. has 34 states with at least one spent fuel storage installation with dry storage.
- **Interim storage:** The U.S. Nuclear Regulatory Commission (NRC) is considering two license applications for a [Consolidated Interim Storage Facility \(CISF\)](#).
- **Fuel recycling:** While the United States does not currently pursue reprocessing due to proliferation concerns, other countries have successfully closed the fuel cycle, and innovative approaches to fuel recycling can reduce proliferation concerns.
- **Long-term isolation:** Eventually, some portion of spent nuclear fuel will need to be stored permanently in geological repositories. While Finland and Sweden are moving to establish the first commercial high-level repositories with consent-based solutions, U.S. progress focused on Yucca Mountain has stalled. Private companies, like [Deep Isolation](#), are also exploring innovative methods to dispose of used nuclear fuel.

Advanced reactors offer opportunities to change the conversation about nuclear waste and potentially new pathways for disposal. Numerous advanced reactor designs being pursued by U.S. developers could eventually run on fuel recycled from existing stockpiles using innovative methods. Additionally, advanced reactor designs generally offer greater efficiency and better utilization of nuclear fuel, reducing the rate at which waste is generated per unit of nuclear energy produced. Decreased waste yields from advanced reactors would limit growth in spent fuel stockpiles, easing the management of expanded use of nuclear technology.

For more information, please visit: <https://nuclearinnovationalliance.org/fuel-cycle>