

Spent nuclear fuel is anything but waste
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University of Texas at Austin

Failure to pursue a program for recycling spent nuclear fuel has put the U.S. far behind other countries and represents a missed opportunity to enhance the nation's energy security and influence other countries, the former chairman of the Nuclear Regulatory Commission said Sunday.

Dale Klein, Ph.D., Associate Vice Chancellor for Research at the University of Texas System, said largely unfounded concerns and "long-held myths" about the reprocessing of spent fuel have prevented the U.S. from tapping into an extremely valuable resource.

Spent nuclear fuel, which includes some plutonium, often is inaccurately referred to as waste, Klein said.

"It is not waste," he said. "The waste is in our failure to tap into this valuable and abundant domestic source of clean energy in a systematic way. That's something we can ill-afford to do."

Klein, who also serves as an associate director at UT Austin's Energy Institute, made his remarks Sunday morning at the American Association for the Advancement of Science's (AAAS) annual meeting, in Washington, D.C.

Compared to other fuels used in the production of electricity, the energy density of uranium is remarkable, Klein said, noting that 95 percent of the energy value in a bundle of spent nuclear fuel rods remains available to be re-used.

"The once-through nuclear fuel cycle, which is our practice in the U.S., is an enormous waste of potential energy," he said.

Critics cite the potential for nuclear weapons proliferation as the biggest reason to oppose recycling. But such concerns are largely unfounded, Klein said.

"While it is true that the plutonium in recycled nuclear fuel is fissionable, no country in the world has ever made a nuclear weapon out of low-grade plutonium from recycled high burn-up nuclear fuel," he said. "It just doesn't work for a strategic or a tactical nuclear weapon."

While the U.S. has sat on the sidelines, other countries, including France, Japan, the United Kingdom, Russia, India, and China have dedicated significant resources toward their reprocessing programs, Klein added.

"U.S. leadership in this area has been lost, and the underlying technological capability and intellectual capital needed to compete internationally have diminished to near irrelevance."

Reprocessing not only recovers significant energy value from spent fuel, it substantially reduces the volume and radiotoxicity of high-level nuclear waste.

Today, U.S. utilities operating nuclear power plants continue to store spent nuclear fuel rods on site in pools of water, before eventually moving them to dry cask storage. And while there is some debate over whether the casks should be located in one central storage site, the practice is widely accepted as safe and secure.

"That's another myth – that we don't know how to safely store nuclear spent fuel," Klein said.

Establishing a program to recycle nuclear fuel will require a public-private partnership that operates outside normal Congressional appropriations and has a charter to manage the fuel over a period of decades, he asserted.

The government's Blue Ribbon Commission, chartered by the Department of Energy, is charged with making recommendations for the safe, long-term management of spent fuel. The 15-member commission is to issue a draft report this summer, with a final report to be completed in January 2012.

"At a time when we are seeking ways to limit carbon emissions from the generation of electricity, the recycling of spent nuclear fuel would appear to be a particularly good fit."

<https://phys.org/news/2011-02-spent-nuclear-fuel.html>

