

# Overcoming Nuclear Power's Biggest Hurdle

by Noam Neusner

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A cap and trade system for storing radioactive waste may be the best means to wake up a critical but moribund industry.

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**T**he Obama administration is counting on nuclear power to be “an important factor in getting us to a low-carbon future,” says Energy Secretary Steven Chu. But that statement, so direct and clear in the abstract, does little to address the biggest problem plaguing the nuclear industry: What’s to be done with the radioactive spent fuel rods that these plants produce as waste? In other words, by opting for nuclear energy, which represents a carbon-free alternative to coal-firing and oil-burning utilities, are we trading one potential environmental disaster for another?

Nuclear power supporters had long hoped that the solution to the nuclear waste problem could be found in a storage facility hollowed out of Yucca Mountain, deep in the Nevada desert roughly 80 miles north of Las Vegas. But questions about Yucca’s long-term ability to keep radioactivity from leeching into groundwater energized nuclear opponents, as well as nearby residents and Nevada political leaders. Soon after taking office, President Obama defunded the project.

Pending another solution, the roughly 60,000 tons of nuclear fuel waste currently in the U.S. is stored on-site at nuclear plants, either in subsurface canisters or in secure “ponds” filled with boric acid. If this approach continues much longer, it could cost Washington a lot of money: Utilities have successfully sued the federal gov-

ernment for failing to provide a permanent storage solution after they ponied up roughly US\$30 billion in fees paid over several years to fund the Yucca project.

Indeed, untangling the nuclear waste problem may be more a matter of economics than of location. As of now, states have no real financial incentive to collect and store spent nuclear fuel, and doing so has serious downsides, including expensive environmental litigation and other unwelcome possibilities. But states’ resistance could ease if the U.S. adopted an intriguing option: a *price-to-store* system — nuclear waste’s version of cap and trade. That would not only address the storage problem, but also provide a new business opportunity by creating a market for long-term storage sites and nuclear waste reprocessing.

Under the price-to-store approach, utilities operating nuclear plants — currently, there are 104 reactors in 31 states, and 26 more reactors under consideration — would be compelled to buy spent-fuel vouchers with the annual environmental impact fees they pay each year to federal regulators; these fees now total close to \$800 million a year. The vouchers would then be given to states operating federally regulated, long-term waste disposal sites; in turn, the states could redeem the vouchers for federal dollars.

Although most states might initially reject the idea of having nuclear waste within their borders, the partici-

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pation of only a handful of states would be required to develop a market. And in reasonably short order, the price to store nuclear waste could become even attractive enough to make Nevada think twice about its not-in-my-backyard response to Yucca.

This idea is akin to the cap and trade systems that govern carbon emissions and pollutants in some parts of the world and are at the heart of the Obama administration's strategy for reducing greenhouse gases in the United States. In typical cap and trade schemes, governing bodies issue allowances to industry to generate a certain amount of a pollutant, with significant penalties if companies go above the ceiling. Companies can choose whether to use the full amount of the allowances or come in below the cap and sell the remaining allotments to another polluter.

In the U.S., emissions of sulfur dioxide, a major cause of acid rain, were cut in half after a cap and trade system was introduced in 1990. The European Union has imposed a similar program for greenhouse gases but it has not yet worked quite as hoped, in part because the E.U. has devalued its pollution vouchers by issuing too many. Also, the value of vouchers has tended to swing wildly with fluctuations in the overall economy.

However, a market for spent-fuel vouchers would be far more controlled and predictable because nuclear reactor construction is based on extensive studies of future energy use; hence, the number of spent-fuel vouchers could be closely linked to actual energy production. And although overall energy use does fluctuate with economic changes, over time it tends to move consistently upward in steady gradients.

In many ways, the cap and trade model for nuclear waste is already being tested in Europe. The U.K. has

announced it will accept nuclear waste from Japan, Germany, Italy, and other nations for a fee, with the funds being used to pay for its own nuclear waste storage. Though the move is not popular among Britons, it does affix a price to storage and proves that a market for it exists.

A price-to-store program in the U.S. would also create incentives to reduce the volume of nuclear waste going into long-term facilities, because states would want to optimize the storage fees they receive by keeping their sites open for as long as possible. This is not an insignificant issue, as even a fully active Yucca would fill up in about a dozen years. The best approach to minimize waste is to recycle or reprocess the spent-fuel rods.

Recycling involves chemically treating spent-fuel rods to pull out remaining useful uranium and plutonium — the primary elements in nuclear reactions — for reuse in producing electricity, and storing the rest long term. The end result is that more energy is produced from the fuel with less to store, which in turn expands storage capacity significantly. Some experts believe that recycling could reduce the volume of waste by as much as 90 percent.

One complication is that the post-recycling waste is far more radioactive and requires even greater long-term care. For several decades, the U.S. military tried reprocessing to obtain fissionable material for bombs but the efforts failed, leaving behind widespread contamination in Washington and South Carolina.

Still, although banned since 1977 in the U.S., reprocessing is going strong in Europe and Japan. The private French company Areva SA operates a large facility in La Hague, on the coast of Normandy, which reprocesses not only France's nuclear waste, but also radioactive by-prod-

ucts from other countries. This plant has generated enough new electricity from the spent rods to power France on its own for 14 years.

If the U.S. were to enter the market for nuclear waste recycling, the increase in activity would likely bring down sharply the cost of reprocessed uranium. If recycled fuel achieves parity with newly mined uranium, it is possible that utilities would want to squeeze more fuel out of the nuclear rods currently stored on-site, leading to even greater reductions in nuclear waste.

Although the price-to-store system has clear advantages, it would likely face opposition or at least only muted enthusiasm initially from the spectrum of nuclear power advocates and critics. Environmentalists are by and large opposed to all nuclear power projects because they refuse to believe that producing electricity in this way is anything but ecologically dangerous, no matter the safeguards placed on storage facilities, the intent to minimize radioactive waste, or the degree to which recycling is encouraged. Just as important, the utilities may have to be convinced that price to store is to their advantage before supporting the program. At first blush, the utilities may be wary about relinquishing a highly regulated and highly predictable economic model, and participating in a market in which the cost to operate is dependent on daily swings in the value of its waste product.

Adopting a market-based system to counteract the federal government's failure to find a regulatory solution for storing nuclear waste may seem like a questionable move in a deep recession brought on by market ineptitude. But if the nuclear industry is ever to play a big role in reducing carbon emissions, price-to-store may be the only workable response to decades of inaction. +

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## Resources

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Energy Information Administration Web site: Department of Energy statistics and forecasts related to the global nuclear power industry and energy production from nuclear reactors. [www.eia.doe.gov/fuelnuclear.html](http://www.eia.doe.gov/fuelnuclear.html)

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