

GE and Hitachi want to use nuclear waste as a fuel

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(PhysOrg.com) -- One of the world's biggest providers of nuclear reactors, GE Hitachi Nuclear Energy (a joint venture of General Electric and Hitachi), wants to reprocess nuclear waste for use as a fuel in advanced nuclear power plants, instead of burying it in waste repositories such as that proposed at Nevada's Yucca Mountain.

Conventional [nuclear power](#) plants in the US only harness around five percent of the energy of nuclear fuels. The reprocessing technique would separate [nuclear waste](#) into different types of fuels, some of which can be used in conventional nuclear power plants, and some of which can only be used in advanced fast neutron reactors. Reprocessing of nuclear waste to extract more useable [fuel](#) has been criticized in the US because it produces pure plutonium, which could be stolen and used to make nuclear weapons. To get around this difficulty, GE Hitachi's proposed

method produces a fuel that is much harder to steal.

The GE Hitachi process separates wastes from conventional nuclear power plants into three streams, by applying voltage to a [molten salt](#). The first [waste material](#) consists of the products of fission, which cannot be further used as fuel and will need to be stored, but the storage time required is reduced from tens of thousands of years to a few hundred years (although a small fraction of the material will still need to be stored for over 10,000 years). The second material is uranium that does not have enough fissile material to be used in the light water uranium reactors in the US, which need enriched uranium, but it can be used by [deuterium](#) (heavy water) uranium reactors, which are used in Canada.

The final group of waste products is a mixture of transuranic elements including plutonium and neptunium. The plutonium is not separated from the other elements, and the mixture releases 1,000 times more heat and 10,000 times more neutrons than pure plutonium. This makes it much harder to steal, and therefore less of a security risk, and it is also much easier to detect. The mixture of transuranic elements can be used in nuclear reactors that use molten sodium as the coolant rather than water, and this type is used in Japan and a few other countries. GE Hitachi has designed a reactor known as the PRISM reactor that would be able to use the mixed fuel, but sodium cooled reactors have not been approved for use in the US.

A GE Hitachi spokesman said previous US administrations had little interest in re-using spent nuclear fuel, but the Obama administration is increasing support for nuclear power and looking at possibilities such as reprocessing. If adopted, the proposal would significantly decrease the amount of dangerous nuclear waste that needs to be stored.

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