

Reusing Nuclear: A Way our Nuclear Output and Decrease Radioactive Waste

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Introduction

While fracking and offshore drilling have substantially decreased the price of oil, it is in our best interest to move to a cleaner, fewer pollutant means of energy. One way of producing large amounts of energy with a low environmental impact is by harnessing nuclear energy. In using nuclear energy, we are splitting the nucleus of an atom in a process called fission. [1] This then creates heat, which boils water, creates steam, and spins a turbine in order to create electricity. [1] Basically, the process is identical to how coal power plants work but instead of burning coal, we are splitting the nucleus of an atom. Nuclear energy is sometimes perceived as creating significant air pollution, but this is not the case. [1] There also now exist ways to reuse nuclear waste that its environmental impact is minimized.



Fig. 1: La Hague nuclear reprocessing plant in France. (Source: [Wikimedia Commons](#))

Reusing Nuclear Fuel

During World War II, the United States developed a way to chemically separate and recover fissionable Plutonium material from spent fuel rods. [2] However, because the high cost and also the fear that nuclear materials could end up in the wrong hands and be used to build nuclear weapons, President Carter chose to ban nuclear reprocessing. [2] As a result, the United States buries its spent nuclear fuel underground. [3]

The standard and a most widely used process is currently PUREX (Plutonium and Uranium Recovery by Extraction). [4] In this process, the spent fuel is divided into small pieces and then dissolved in nitric acid. [4] Using tributyl phosphate, a surfactant, the uranium and plutonium are taken up and separated from the rest of the waste. [4] This process leaves behind a smaller volume of radioactive waste - fission products and neutron-activated isotopes - that must be disposed of. In France and Japan, the nuclear material that is not reused is embedded in glass. [5]

In France Great Britain and Japan, the PUREX technology is greatly used. In addition, they have started to develop alternative versions of PUREX. In France, in particular, nuclear energy accounts for about 80% of the energy production. [6] A large amount of this nuclear energy comes from fuel that is reprocessed in plants such as the La Hague Reprocessing Plant shown in Fig. 1. In the end, reprocessing on a ton of nuclear waste is equivalent to saving 100,000 barrels of oil. [5]

Conclusion

In the United States, nuclear reprocessing was banned for the fear of nuclear proliferation. Additionally, twelve states have also banned nuclear plants completely, due to the fact that they produce radioactive waste. [7] If we were to lift the ban on nuclear reprocessing, we could reuse this waste and be now have the ability to create nuclear power plants in the United States without increasing the mass of waste produced. The example of other countries shows that nuclear proliferation is not as great a problem as once thought, as the nuclear fuel are highly guarded and nuclear materials can be transported safely. [7] In the end, nuclear reprocessing is a sure way to increase the amount of nuclear energy that our country produces while reducing the mass of nuclear waste.

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