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Repository superfluous: New nuclear technology can recycle atomic waste

The liquid nuclear technology of the German company Dual Fluid promises to convert nuclear waste into energy. The available waste could supply all of Germany with low-emission electricity for hundreds of years. A geological final repository would become obsolete. This is possible thanks to a globally unique reactor design based on two circulating fluids. As a result, any fissile material can be recycled very efficiently - from thorium or natural uranium to nuclear waste. “Nuclear waste is a highly concentrated recyclable material that we should definitely put to use,” says Armin Huke, Managing Director of Dual Fluid.

New recycling process using liquid salt distillation

For recycling, the finely ground waste is transformed into liquid salt form and then separated by distillation (partitioning). The pure elements generated by this means are fed into the fuel cycle. In the reactor core, they are converted into fissile material (transmutation) and fully utilised - for the generation of energy or heat. This recycling process would even be profitable due to the utilisation of the energy generated - in contrast to permanent storage which is expensive and produces no benefits whatsoever. The remaining ashes would subside after a few hundred years. A simple interim repository would therefore suffice for storage.

Investment costs: Half of the annual expenditure on the transition to non-fossil fuel energy

Feasibility studies are well advanced, also thanks to academic cooperations with TU Munich and Szczecin University. “No fundamental questions are left unanswered anymore,” says Götz Ruprecht, head of research at Dual Fluid. As soon as the financing is in place, component tests in the laboratory can follow. This step will cost around 40 million euros. About 10 billion euros would be needed until a prototype is built, which could still be realised within this decade. “This sounds like a huge amount - but compared to the well over 20 billion that Germany spends on the transition to solar and wind energy each year, it is small,” says Götz Ruprecht. As the state is unlikely to contribute at present, Dual Fluid will soon found a holding company.

Why liquid nuclear technology?

Modern-day reactors are very inefficient: They can only extract one per cent of energy from natural uranium, which undergoes an energy-intensive mining and refining process. The remaining 99 per cent needs to be disposed of at a high cost. Modern liquid nuclear reactors, which are being developed by several companies worldwide, can utilise nuclear fuel fully and without long-lasting wastes. Liquid nuclear technology started with the Oak Ridge reactor in the USA, which was operated successfully in the 1960s. Dual Fluid has the only concept that decisively surpasses its historical predecessor both in function and efficiency. The company holds a patent on this - the first for a reactor design since the 1960s.

Media contact: Lisa Raß
Phone: (+49) 1577-1911784
lisa.rass@dual-fluid.com