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Fusion-Fission Transmutation Scheme-Efficient Destruction of Nuclear Waste[1] MIKE KOTSCHENREUTHER, SWADESH MAHAJAN, PRASHANT VALANJU, ERICH A. SCHNEIDER, University of Texas — A fusion-assisted transmutation system for the destruction of transuranic (TRU) waste is presented. Subcritical fusion-fission hybrids burn the intransigent transuranic residues (with most of the long lived bio-hazard) of a new fuel cycle that uses cheap light water reactors (LWRs) for the easily burned majority of the TRU. In the new fuel cycle, the number of hybrids needed to destroy a given amount of original LWR waste is 5-10 times less than the corresponding number of critical fast reactors. (Fast reactors, due to stability constraints, cannot burn the very poor quality TRU residue.) The new system comparably reduces the expensive reprocessing throughput. Realization of these advantages should lead to a great reduction in the cost of transmutation. The time needed for 99% waste destruction would also be reduced from centuries to decades. The centerpiece of the fuel cycle is a high power density compact fusion neutron source (CFNS-100 MW, with major radius + minor radius $\sim$ 2.5 m), which is made possible by a super-X divertor. The physics and technology requirements of the CFNS are much less than the requirements of a pure fusion power source. Advantages of the system as part of a timely strategy to combat global warming are briefly described.

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