

Abstract Submitted  
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**Theoretical design of an energy recovering divertor** D.A. BAVER,  
Lodestar Research Corporation — An energy recovering divertor (ERD) is a device for converting thermal to electrical energy in the divertor channel of a tokamak. Because ERD's are a type of heat engine operating at plasma temperatures, they have the thermodynamic potential for extremely high efficiencies. An ERD offers several important benefits to a tokamak fusion reactor. First, any energy recovered by the ERD is subtracted from divertor heat load, thus circumventing materials limitations. Second, energy recovered by the ERD is available for auxiliary heating, thus allowing the reactor to break even at a lower Lawson parameter. Third, an ERD can be used to power auxiliary current drive, thus reducing dependence on bootstrap current. We will present a design for an ERD based on amplification of Alfvén waves in a manner analogous to a free-electron laser. While its projected efficiency falls short of the thermodynamic potential for this class of device, it nonetheless demonstrates the theoretical viability of direct power conversion in a tokamak divertor. We will also present potential approaches towards higher efficiency devices of this type. Work supported by the U.S. DOE under grant DE-FG02-97ER54392.

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