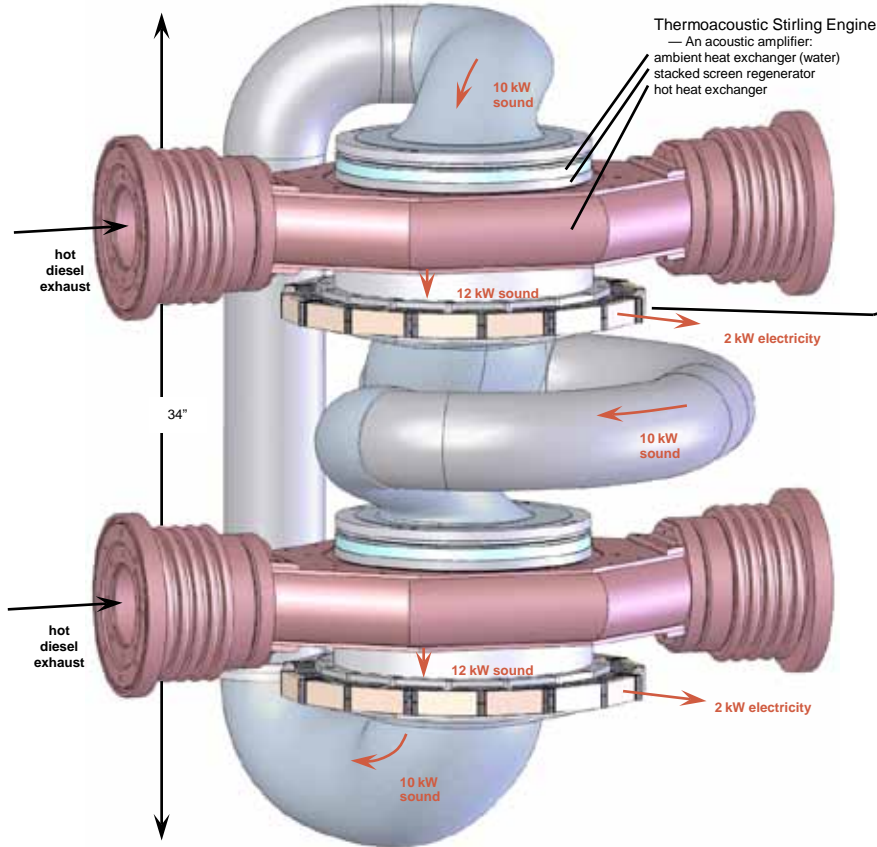


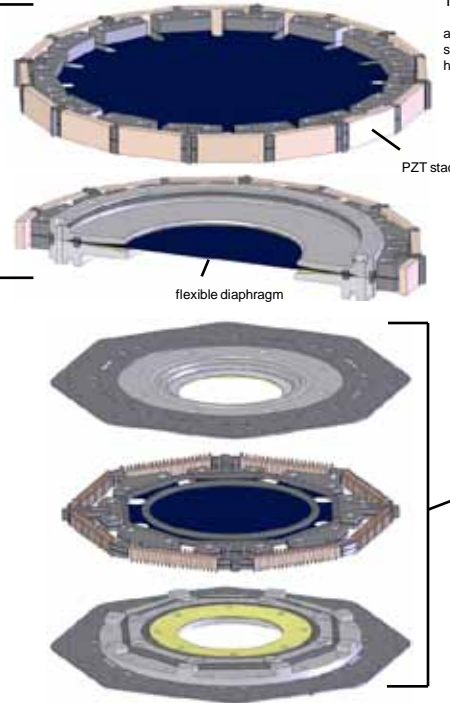
# Thermoacoustic Energy Conversion

Waste or prime heat  $\Rightarrow$  sound  $\Rightarrow$  oscillating stress  $\Rightarrow$  electricity  
A lighter, smaller, faster, cheaper version of free-piston Stirling

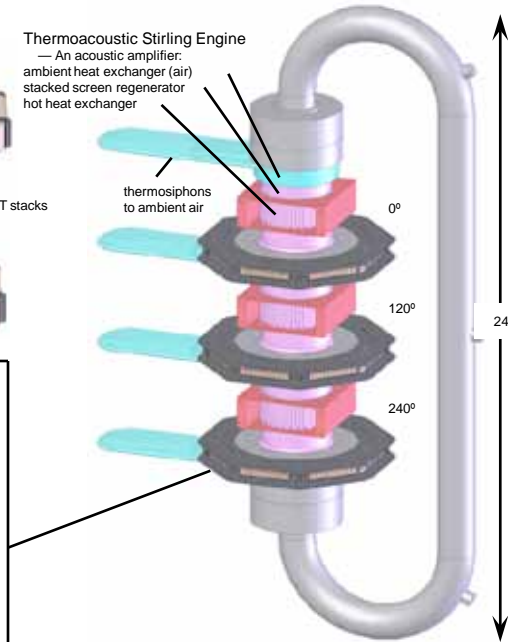
## 4 kW Diesel Truck Waste Heat Recovery



## Piezoelectric alternators:



## 500W Lightweight Power



All-metal bonded PZT stacks



Metal joints, rather than epoxy joints, between PZT elements allow stacks to generate high power continuously

A wide range of powers has been previously achieved with good thermoacoustic (heat to sound) efficiencies



Acoustic power: 100 W 1 kW 50 kW  
T.A. efficiency: 23% 30% 25%

### Modeled performance:

	Ave Power	Peak Power	Heat to Electricity Efficiency	Volume Envelope	Power/Volume	Mass	Power/Mass
Truck Generator	4 kW	8 kW	14%	34" x 28" x 25"	10 kW/m <sup>3</sup>	360 lb	50 W/kg
Lightweight Power Source	500 W	1 kW	20%	24" x 11" x 7"	33 kW/m <sup>3</sup>	34 lb	65 W/kg
Multiphase Inline System (not shown here)	1 MW	1 MW	18%	15' x 21" diam	1 MW/m <sup>3</sup>	6200 lb	360 W/kg