Advanced Research Projects Agency • ENERGY

FIRST OPEN SOLICITATION

PHONONIC DEVICES

IMPROVED THERMOELECTRIC DEVICES

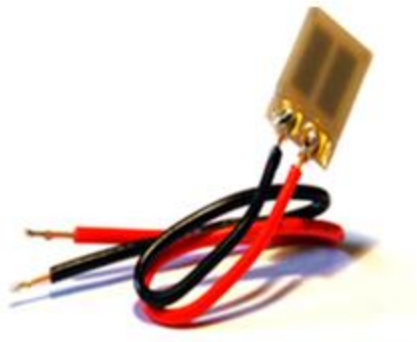
PROJECT TITLE:	Advanced Semiconductor Materials for Thermoelectric Devices		
ORGANIZATION:	Phononic Devices, Inc.	LOCATION:	Raleigh, NC
PROGRAM:	FOA1	ARPA-E AWARD:	$3,000,000
TECH TOPIC:	Waste Heat Capture	PROJECT TERM:	12/11/09 – 8/31/11
WEBSITE:	www.phononicdevices.com		

CRITICAL NEED

Wasted heat is an unavoidable by-product of any power produced by electrical devices or machines. While a little heat from a computer or cell phone does not seem like a big deal, the cumulative loss of heat from all power generated in the U.S. each year is over 50%. In some cases, air conditioners are even used to expel waste heat, which creates more wasted energy and can cause temperatures to rise in dense urban environments. Waste heat capture, which turns excess thermal energy into electricity, has the potential to provide consumers with billions of dollars in energy savings each year.

PROJECT INNOVATION + ADVANTAGES

Phononic Devices is working to recapture waste heat and convert it into usable electric power. To do this, the company is using thermoelectric devices, which are made from advanced semiconductor materials that convert heat into electricity or actively remove heat for refrigeration and cooling purposes. Thermoelectric devices resemble computer chips, and they manage heat by manipulating the direction of electrons at the nanoscale. These devices aren't new, but they are currently too inefficient and expensive for widespread use. Phononic Devices is using a high-performance, cost-effective thermoelectric design that will improve the device's efficiency and enable electronics manufacturers to more easily integrate them into their products.



IMPACT

If successful, Phononic Devices would improve the efficiency of thermoelectric devices by 30% and make it easier to incorporate energy-saving thermoelectric devices into mainstream cooling, refrigeration, and waste-heat recovery equipment.

- SECURITY: Turning waste heat into useable electric power would reduce energy consumption and U.S. dependence on foreign oil.
- ENVIRONMENT: Efficient, low-grade, waste-heat recovery can eliminate the use of over 400,000 tons of coal per year.
- ECONOMY: Thermoelectrics have the potential to create a $125 billion industry and save consumers and businesses from wasting their hard-earned money on paying for waste heat.
- JOBS: An improved domestic thermoelectrics industry could create high-skill jobs in manufacturing and engineering.

CONTACTS

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