Advanced Research Projects Agency • ENERGY

BEETIT PROJECT

ASTRONAUTICS

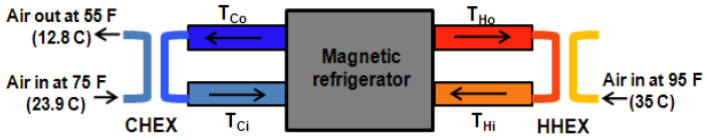
AIR CONDITIONING WITH MAGNETIC REFRIGERATION

PROJECT TITLE:	An Efficient, Green Compact Cooling System Using Magnetic Refrigeration		
ORGANIZATION:	Astronautics Corporation	LOCATION:	Milwaukee, WI
PROGRAM:	BEETIT	ARPA-E AWARD:	$2,889,676
TECH TOPIC:	Building Efficiency	PROJECT TERM:	9/1/10 – 8/31/13
WEBSITE:	www.astronautics.com		

CRITICAL NEED

New and more efficient cooling methods are needed to reduce building energy consumption and environmental impact. Residential and commercial buildings currently account for 72% of the nation's electricity use and 40% of our carbon dioxide (CO_2) emissions each year, 5% of which comes directly from air conditioning. In addition, the refrigerants used in air conditioning are potent greenhouse gases (GHGs) that may contribute to global climate change. Because the majority of cooling systems run on electricity, and most U.S. electricity comes from coal-fired power plants which produce CO_2, there is a pressing need to support improvements that increase the efficiency of these technologies and reduce the use of GHG refrigerants.

PROJECT INNOVATION + ADVANTAGES



Astronautics is developing an air conditioning system that relies on magnetic fields. Typical air conditioners use vapor compression to cool air. Vapor compression uses a liquid refrigerant to circulate within the air conditioner, absorb the heat, and pump the heat out into the external environment. Astronautics' design uses a novel property of certain materials, called "magnetocaloric materials", to achieve the same result as liquid refrigerants. These magnetocaloric materials essentially heat up when placed within a magnetic field and cool down when removed, effectively pumping heat out from a cooler to warmer environment. In addition, magnetic refrigeration uses no ozone-depleting gases and is safer to use than conventional air conditioners which are prone to leaks.

IMPACT

If successful, Astronautics' magnetic refrigeration could improve the energy efficiency of air conditioning systems without the use of polluting refrigerants.

- SECURITY: Increased energy efficiency would decrease U.S. energy demand and reduce reliance on fossil fuels—strengthening U.S. energy security.
- ENVIRONMENT: Refrigerants with polluting emissions could account for up to 10%-20% of global warming by year 2050. Astronautics' technology could eliminate the use of these refrigerants.
- ECONOMY: Widespread adoption of this technology could reduce energy consumption for building air conditioning—providing consumers with cost savings on energy bills.
- JOBS: As new technologies develop, there will be new job opportunities in the design, installation, testing, and maintenance of efficient heating and cooling systems.

CONTACTS

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