Advanced Research Projects Agency • ENERGY

BEETIT PROJECT

INFINIA

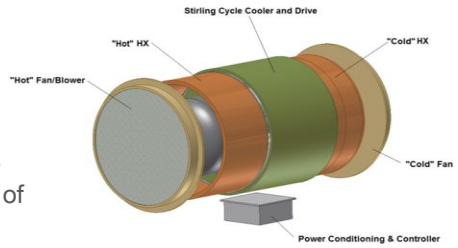
HIGH-EFFICIENCY STIRLING AIR CONDITIONER

PROJECT TITLE:	Stirling Air Conditioner for Compact Cooling		
ORGANIZATION:	Infinia Corporation	LOCATION:	Kennewick, WA
PROGRAM:	BEETIT	ARPA-E AWARD:	$3,000,617
TECH TOPIC:	Building Efficiency	PROJECT TERM:	9/1/10-8/31/13
WEBSITE:	www.infiniacorp.com		

CRITICAL NEED

New and more efficient cooling methods are needed to reduce building energy consumption and environmental impact. Buildings currently account for 72% of the nation's electricity use and 40% of our CO_2 emissions each year, 5% of which comes directly from air conditioning. The refrigerants typically used in air conditioners are greenhouse gases (GHG) 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



Infinia is developing a compact air conditioner that uses an unconventional high efficient Stirling cycle system (vs. conventional vapor compression systems) to produce cool air that is energy efficient and does not rely on polluting refrigerants. The Stirling cycle system is a type of air conditioning system that uses a motor with a piston to remove heat to the outside atmosphere using a gas refrigerant. To date, Stirling systems have been expensive and have not had the right kind of heat exchanger to help cool air efficiently. Infinia is using chip cooling technology from the computer industry to make improvements to the heat exchanger and improve system performance. Infinia's air conditioner uses helium gas as refrigerant, an environmentally benign gas that does not react with other chemicals and does not burn. Infinia's improvements to the Stirling cycle system will enable the cost-effective mass production of high-efficiency air conditioners that use no polluting refrigerants.

IMPACT

If successful, Infinia's new air conditioning system would be more energy efficient than conventional air conditioning systems while using a refrigerant with zero global warming potential.

- SECURITY: Increased energy efficiency would decrease U.S. energy demand and reduce reliance on fossil fuels—strengthening America's energy security.
- ENVIRONMENT: Refrigerants with polluting emissions could account for up to 10%-20% of global warming by year 2050. Infinia's technology could eliminate the use of these refrigerants.
- ECONOMY: Widespread adoption of this technology could reduce energy consumption for air conditioning of buildings—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

ARPA-E Program Director:
Dr. Ravi Prasher,
ravi.prasher@hq.doe.gov

Project Contact:
Dr. Songgang Qiu ,
sqiu@infiniacorp.com

Partner Organizations:
Enertron Inc., International Copper Association