Advanced Research Projects Agency • ENERGY

HEATS PROJECT

UTRC

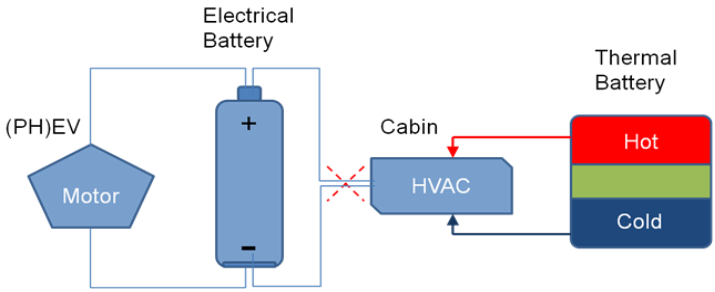
HYBRID VAPOR COMPRESSION ADSORPTION SYSTEM

PROJECT TITLE:	Thermal Storage Using Hybrid Vapor Compression Adsorption System		
ORGANIZATION:	United Technologies Research Center (UTRC)	LOCATION:	East Hartford, CT
PROGRAM:	HEATS	ARPA-E AWARD:	$2,646,699
TECH TOPIC:	Electric Vehicles	PROJECT TERM:	1/4/12 – 1/3/15
WEBSITE:	www.utrc.utc.com		

CRITICAL NEED

The transportation sector is the dominant source of U.S. dependence on foreign oil and a major contributor of greenhouse gas emissions. Enabling more widespread use of electric vehicles (EVs) would reduce both our dependence on foreign oil and our harm to the environment. Inefficient heating and cooling systems can limit the driving range of EVs by acting as a drain on their batteries. More efficient technologies are needed to provide heating and cooling to EVs without draining the on-board battery packs, in effect extending the driving range of EVs per electric charge. These efficient technologies may also enable thermal management of internal-combustion engine vehicles.

PROJECT INNOVATION + ADVANTAGES



UTRC is developing a new climate-control system for EVs that uses a hybrid vapor compression adsorption system with thermal energy storage. The targeted, closed system will use energy during the battery-charging step to recharge the thermal storage, and it will use minimal power to provide cooling or heating to the cabin during a drive cycle. The team will use a unique approach of absorbing a refrigerant on a metal salt, which will create a lightweight, high-energy-density refrigerant. This unique working pair can operate indefinitely as a traditional vapor compression heat pump using electrical energy, if desired. The project will deliver a hot-and-cold battery that provides comfort to the passengers using minimal power, substantially extending the driving range of EVs.

IMPACT

If successful, UTRC's thermal energy storage system would extend the driving range of EVs by 10-30%, enabling their widespread use as environmentally friendly alternatives to petroleum-based vehicles.

- SECURITY: Increased use of EVs would decrease U.S. dependence on foreign oil – the transportation sector is the dominant source of this dependence.
- ENVIRONMENT: Greater use of EVs would reduce greenhouse gas emissions, 28% of which come from the transportation sector.
- ECONOMY: This technology would increase the marketability of EVs—helping spur growth in the automobile industry.
- JOBS: Increased use of EVs could create new manufacturing and engineering jobs in the automobile industry.

CONTACTS

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

Project Contacts:
Dr. Bart A. van Hassel,
vanHasBA@utrc.utc.com

Partner Organization:
Ricardo, Inc.