

BATTELLE MEMORIAL INSTITUTE

CASCADE REVERSE OSMOSIS AIR CONDITIONING SYSTEM

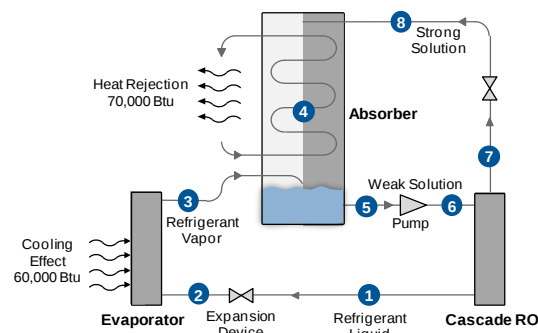
PROJECT TITLE:	Cascade Reverse Osmosis and the Absorption Osmosis Cycle		
ORGANIZATION:	Battelle Memorial Institute (Battelle)	LOCATION:	Columbus, OH
PROGRAM:	BEETIT	ARPA-E AWARD:	\$501,759
TECH TOPIC:	Building Energy Efficiency	PROJECT TERM:	9/1/10 – 4/30/11
WEBSITE:	www.battelle.org		

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 carbon dioxide (CO₂) emissions each year, 5% of which comes directly from air conditioning. The refrigerants used in air conditioners are potent greenhouse gases (GHGs) that may contribute to global climate change. Because most cooling systems run on electricity, and most U.S. electricity comes from coal-fired power plants which produce CO₂, 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

Battelle is developing a new air conditioning system that uses a cascade reverse osmosis (RO)-based absorption cycle. Analyses show that this new cycle can be as much as 60% more efficient than vapor compression, which is used in 90% of air conditioners. Traditional vapor-compression systems use polluting liquids for a cooling effect. Absorption cycles use benign refrigerants such as water, which is absorbed in a salt solution and pumped as liquid—replacing compression of vapor. The refrigerant is subsequently separated from absorbing salt using heat for re-use in the cooling cycle. Battelle is replacing thermal separation of refrigerant with a more efficient reverse osmosis process. Research has shown that the cycle is possible, but further investment will be needed to reduce the number of cascade reverse osmosis stages and therefore cost.



IMPACT

If successful, Battelle would provide an efficient cooling cycle.

- **SECURITY:** Increased energy efficiency would decrease U.S. energy demand and reduce reliance on fossil fuels—strengthening U.S. energy security.
- **ENVIRONMENT:** Refrigerant emissions could account for up to 10%-20% of global warming by year 2050. Battelle'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

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