

AMES LABORATORY

CERIUM-BASED MAGNETS

PROJECT TITLE:	Novel High Energy Permanent Magnet Without Critical Elements		
ORGANIZATION:	Ames Laboratory	LOCATION:	Ames, IA
PROGRAM:	REACT	ARPA-E AWARD:	\$1,661,463
TECH TOPIC:	Vehicle Technologies & Renewable Energy	PROJECT TERM:	1/1/12 – 9/30/13
WEBSITE:	www.ameslab.gov		

CRITICAL NEED

Rare earths are naturally occurring minerals with unique magnetic properties that are used in electric vehicle (EV) motors and wind generators. Because these minerals are expensive and in limited supply, alternative technologies must be developed to replace rare-earth-based magnets in motors and generators. Alternatives to rare earths will contribute to the cost-effectiveness of EVs and wind generators, facilitating their widespread use and drastically reducing the amount of greenhouse gases released into the atmosphere.

PROJECT INNOVATION + ADVANTAGES

Ames Laboratory will develop a new class of permanent magnets based on the more commonly available element cerium for use in both EVs and renewable power generators. Cerium is 4 times more abundant and significantly less expensive than the rare earth element neodymium, which is frequently used in today's most powerful magnets. Ames Laboratory will combine other metal elements with cerium to create a new magnet that can remain stable at the high temperatures typically found in electric motors. This new magnetic material will ultimately be demonstrated in a prototype electric motor, representing a cost-effective and efficient alternative to neodymium-based motors.



IMPACT

If successful, Ames Laboratory cerium-based magnets would be used to cost-effectively power an electric motor for use in wind generators and EVs.

- **SECURITY:** The U.S. produces a small fraction globally of industrial rare earths. Developing alternatives to the use of rare earths has potential to reduce our dependence on these materials and will have a positive impact on our national economic and energy security.
- **ENVIRONMENT:** The transportation and electric power sectors account for nearly 75% of U.S. greenhouse gas emissions each year. Better magnets would support the widespread use of EVs and wind power, significantly reducing these emissions.
- **ECONOMY:** The U.S. spends nearly \$1 billion per day on imported petroleum. Improvements in magnet technology would enable a broader use of EVs, which would help insulate our economy from unexpected spikes in the price of oil.
- **JOBS:** Construction and manufacturing of renewable power facilities and EVs could create tens of thousands of jobs by 2030.

CONTACTS

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