CRITICAL NEED
High-performance electric machines such as hybrid electric vehicles (HEVs), electric vehicles (EVs), and wind turbines require permanent magnets. Today’s best-performing magnets contain expensive rare earth elements that come from outside the U.S. In the absence of increased domestic supply, technological advances that utilize alternatives to rare earth elements must be made to ensure our national economic and energy security. These abundant alternatives must meet or exceed the performance of their rarer predecessors while remaining cost-competitive.

PROJECT INNOVATION + ADVANTAGES
GE is using nanomaterials technology to develop advanced magnets that contain fewer rare earth materials than their predecessors. Nanomaterials technology involves manipulating matter at the atomic or molecular scale, which can represent a stumbling block for magnets because it is difficult to create a finely grained magnet at that scale. GE is developing bulk magnets with finely tuned structures using iron-based mixtures that contain 80% less rare earth materials than traditional magnets, which will reduce their overall cost. These magnets will enable further commercialization of HEVs, EVs, and wind turbine generators while enhancing U.S. competitiveness in industries that heavily utilize these alternatives to rare earth minerals.

IMPACT
If successful, GE’s design would bring to market advanced magnets that enable HEVs, EVs, and wind turbines to produce more power at less cost.

- SECURITY: Over 99% of the world’s rare earth elements are found outside the U.S. The geographical distribution of these resources puts the supply at risk and increases our dependence on foreign countries.
- ENVIRONMENT: Advanced permanent magnet motors would enable the widespread adoption of HEVs and EVs, reducing nearly 2 million metric tons of carbon dioxide from the atmosphere each year.
- ECONOMY: Green energy technology, including wind turbines and EVs, is one of the fastest growing market sectors. Improved magnets will help maintain that rate of growth.
- JOBS: New high-skilled jobs in construction, manufacturing, and engineering would be needed to make the new magnets as well as the associated green energy technologies they will be used in.

CONTACTS
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