CMI National Technology Roadmapping

**Objective:**
Focus Industry, laboratory, and university efforts on the common target of advancing and ultimately commercializing needed technology while avoiding duplications and mitigating risks

**Achievement:**
- Developed technology readiness level (TRL) definitions and roadmapping framework with focus on commercialization.
- Assessed current readiness of all project technologies
- Quantified potential market impact of each project technology
- Completed project roadmaps for 22 CMI project

**Impact:**
- In executing the technology roadmaps, researchers focus on addressing industry needs to enhance the probability of commercialization
- Application-specific roadmaps focus Rare Earth Element domestic supply diversification, substitution, and recycling on key energy efficient applications:
  - Wind Turbines
  - Energy Efficient Lighting
  - Electric Vehicles
  - Solar Energy

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**Critical Materials Institute – Rare Earth Magnet Technology Deployment from US Domestic Rare Earth Production**

**Permanent Magnet Wind Turbine Generators**

**Mission:**
Develop magnet materials to reduce weight, increase capacity, and decrease operation and maintenance costs of permanent magnet wind turbine technology in order to obtain an offshored wind infrastructure where magnet driven technology is not cost-effective.

**Outcome:**
Replace standard gear driven turbines with direct drive hybrid designs that improve uptime and use magnetic materials with:
- Reduced Dy use.
- Reduced Nd (other RE) content.

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**Energy-Efficient Lighting**

**Mission:**
Develop efficient lighting phosphor materials with less RE content to reduce US energy consumption from lighting.

**Outcome:**
- Lumen$/
  - Lumen$/Watt (L/PW)
  - Lumen$/
- Energy Savings from Lighting: 1,200 TWh

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**FA1/FA3 Impact**

**Potential Capacity per Annum Supply** (MW)

- Gear Driven Hybrid Designs
  - 954 mt
  - 6 mt Dy 5 wt. % in NdFeB
  - 1423 mt
  - 51 mt Nd

- Direct Drive Designs
  - 954 mt
  - 6 mt Dy 5 wt. % in NdFeB
  - 1423 mt
  - 51 mt Nd

**FA1/FA3 Impact**

- Without CMI Impact
- FA1 Impact

**20% US Energy Production from Wind by 2030**

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**Can the US meet DOE production goals with limited domestic rare earth production?**

**Can CMI help the US meet energy efficient lighting needs by increasing REE supply?**