



Critical Materials Institute

An Energy Innovation Hub

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

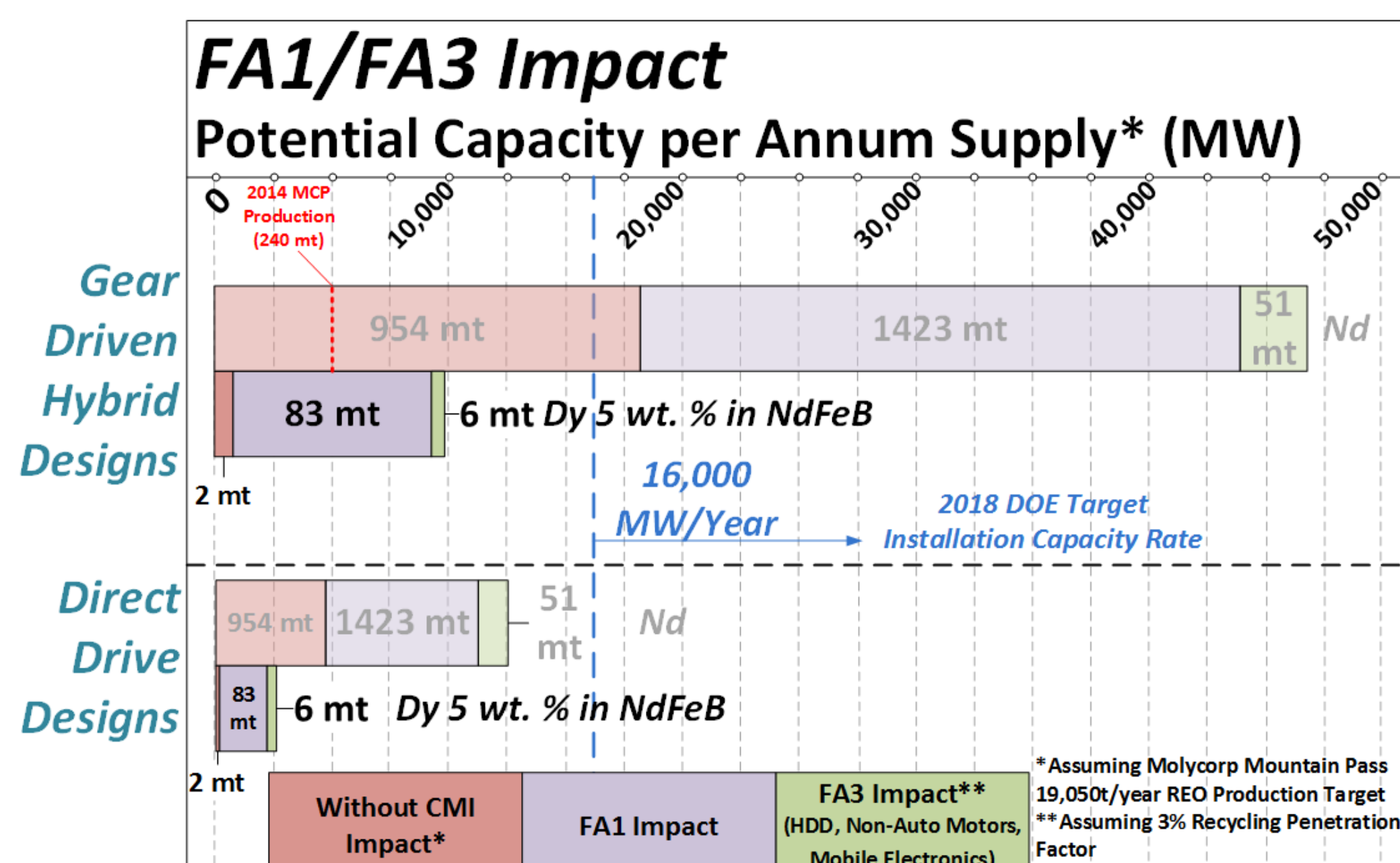
Critical Materials Institute – Rare Earth Magnet Technology Deployment from US Domestic Rare Earth Production

Permanent Magnet Wind Turbine Generators

Mission	Outcome
Develop magnet materials to reduce weight, increase capacity, and decrease operation and maintenance costs of permanent magnet wind turbine technology in order to establish an offshore wind infrastructure where gear driven technology is not cost-effective.	Replace Standard Gear Driven Turbines with Direct-Drive/Hybrid designs that improve uptime and use magnetic materials with: <ul style="list-style-type: none">• Eliminated Dy use• Reduced Nd (other RE) content

20% US Energy Production from Wind by 2030

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



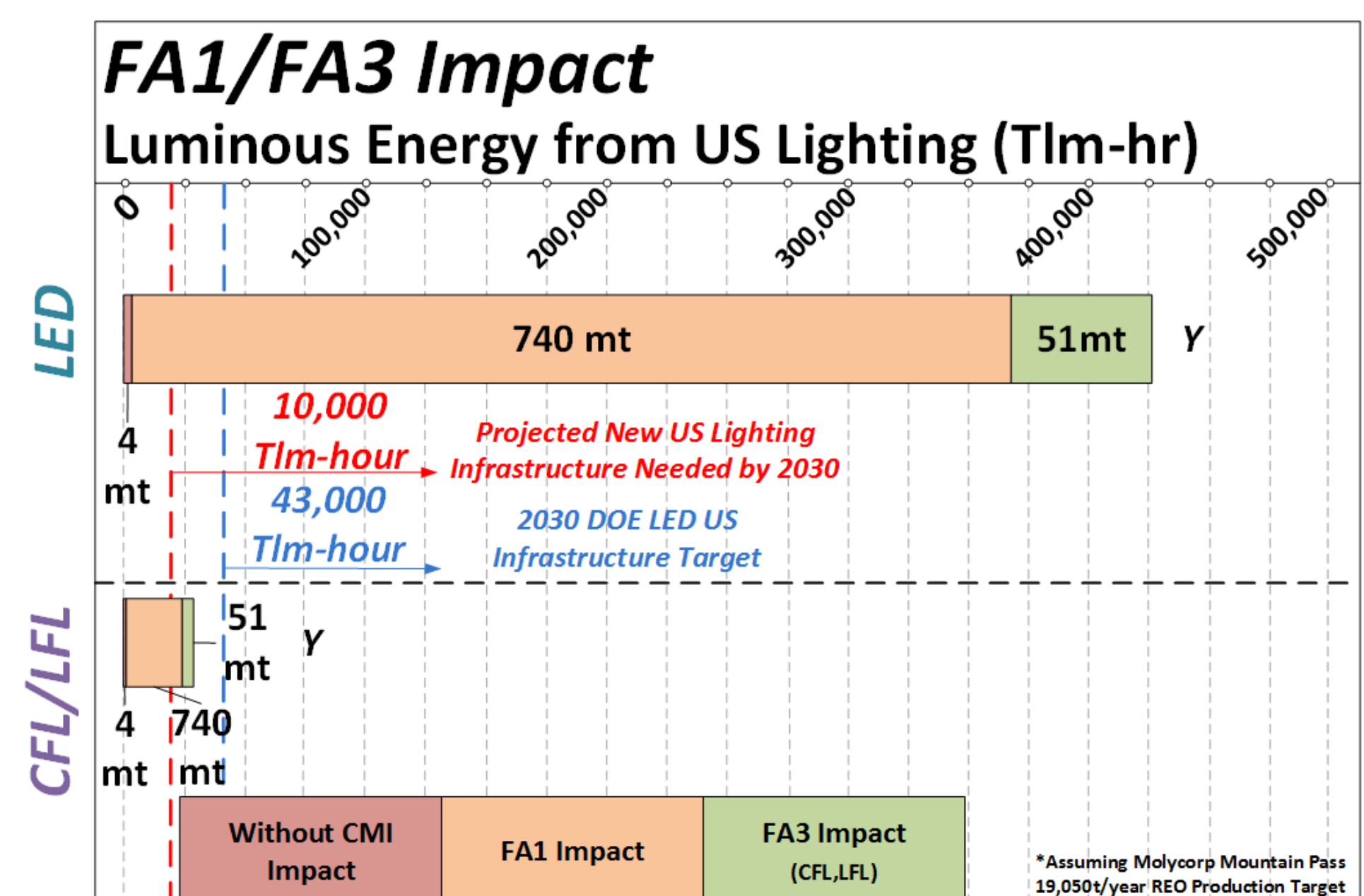
Energy-Efficient Lighting

Mission	Outcome
Develop efficient lighting phosphor materials with less RE content to reduce US energy consumption from lighting.	Develop a versatile lighting phosphor slurry that can be used in different applications, has reduced Eu, Tb, Y content, and has superior: <ul style="list-style-type: none">• Lumens• Lumens/Watt (LPW)• Lumens/\$ than current LEDs on an equivalent basis.

Energy Savings from Lighting: 1,200 TWh^{8*}

*Assuming complete adoption of solid state lighting

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



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