

# CABLE Conductor Manufacturing Prize



U.S. DEPARTMENT OF ENERGY

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<b>Submission Title:</b>	<i>Super Cool Conductor</i>



## Description of Material

- *Super Cool Conductor* is a RE-Ba-Cu-O (REBCO, RE = rare earth) conductor that is 10x less expensive than the state-of-the-art superconductor.
- As a superconductor, *Super Cool Conductor* has infinite conductivity. But at ½ the price of copper wire in terms of \$/kilo-ampere-meter, *Super Cool Conductor* breaks the affordability barrier.

## Fabrication Approach

- *Super Cool Conductor* is made by an Advanced Metal Organic Chemical Vapor Deposition method where the REBCO is coated as a film up to 5 μm in thickness on a metal foil in a roll-to-roll continuous manufacturing process.
- Using direct heating and laminar flow methods, *Super Cool Conductor* is made with 5x performance as the state-of-the-art superconductor and at half the cost.

## Potential Impact

- *Super Cool Conductor* will be used for light-weight motors, cables, and generators that can enable electric aviation for passenger aircraft and reduce 5 metric tons of CO<sub>2</sub> for each hour of flight.
- Enables compact fusion power plants that are affordable and emit no CO<sub>2</sub> (1.2 million metric tons avoided with each plant each year).
- Enables industrial motors with 2% higher absolute efficiency (450 metric tons of CO<sub>2</sub> avoided with each 5.5 MW motor each year).
- Enables light-weight wind generators > 20 MW → makes wind power generation more economical with fewer turbines in a wind farm.
- Enables low-loss power transmission cables and high efficiency magnetic energy storage.