

INTEGRATION OF SUPERCONDUCTING MAGNETIC ENERGY STORAGE (**SMES**) SYSTEMS OPTIMIZED WITH SECOND-GENERATION, HIGH-TEMPERATURE SUPERCONDUCTING (**2G-HTS**) TECHNOLOGY WITH A MAJOR FOSSIL-FUELED ASSET

AWARD: DE-SC002489

Prime: American Maglev Technology of Florida Inc.



PI: Tony J. Morris

Sub: University of Houston


UNIVERSITYof **HOUSTON**
TEXAS CENTER FOR SUPERCONDUCTIVITY

Location: Houston, TX

DOE: \$199,912
Non-DOE: \$ 0
Total: \$199,912

OBJECTIVES

- Design next-generation, modular Superconducting Magnetic Energy Storage (**SMES**) using 2G-HTS tapes optimized by University of Houston that is scalable to 500 MWh.
- Collaborate with industry partner (**NRG Energy**) to define compatibility, interconnection schematics and cost-effectiveness for integration with a fossil-fueled asset



RELEVANCE & OUTCOMES/IMPACT

- Lower-cost SMES technology could extend the lives of fossil assets as a “**hybrid**” **energy storage** solution.
- Co-location with a fossil asset could improve asset utilization, grid reliability & environmental footprint.
- Est. **\$100/kWh** capital cost would compete with lithium-ion in scaled solutions.



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INDUSTRY PARTNER



- Fortune 500 national utility
- Interest focused on:
 - < 500 MWh installation
 - 100 MW delivery
 - 5 hours
 - Merchant power provider
 - Leverage “negative pricing”

“**Cost-effective, grid-scale** energy storage is the problem of our generation.”

Grid-scale SMES:

- has no moving parts;
- requires no conversion (no losses);
- creates no environmental hazards; and
- enables **historically low costs** →

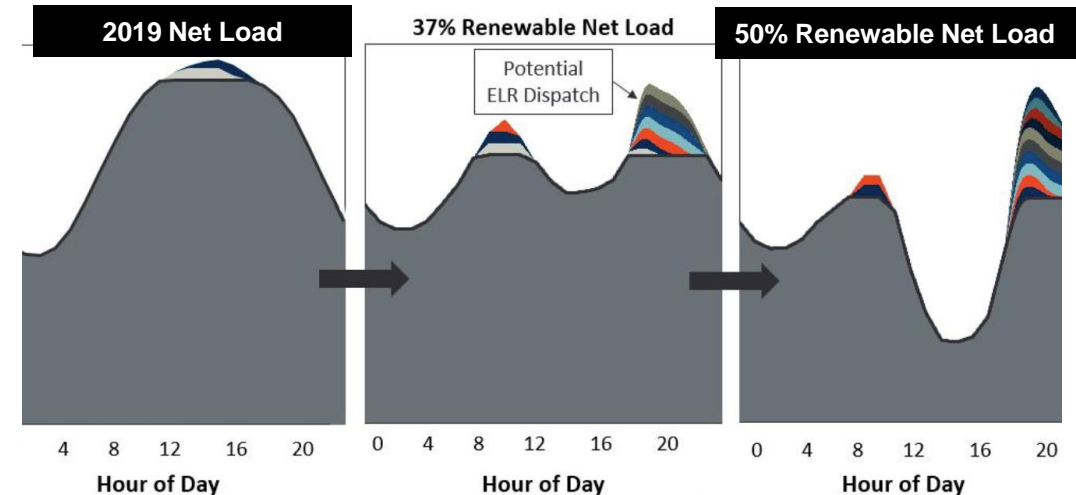


< \$100 / kWh capex
< 2¢ / kWh storage & delivery

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Phase I Development:

- 2G-HTS tape licensed from University of Houston with 10X improvement in current-carrying capacity)
- Low-cost cryocooling
- Robust power electronics



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Phase II Demonstration:

1 MWh on UH campus

- De-risk technology
- Confirm scalability
- Validate grid interconnection



Hybrid SMES can be an important tool in NETL's toolbox.

- Harness intermittent nature of **renewable energy**.
- Avoid high cost of continually powering up natural gas peaker plants.
- Create “right-sized,” **more efficient** coal plant infrastructure with higher mix of peak-power sales.
- Create **green, high-tech jobs** for the United States.
- Provide leadership in making sense of changing energy landscape.
- Promote hybrid, “all-of-the-above” strategy with **smart investments** in coal coupled with **grid-scale SMES** technology.

Phase III Deployment:

- **NRG Energy** candidate sites in metro Houston by 2025
- **California** has **80-GWh** grid-scale storage need



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