IGS Policy Brief

Energy Storage Innovations to Unlock More Renewable Energy and Cleaner Transportation across Massachusetts

Researchers: Emily Ryan, Srikanth Gopalan, Sean Lubner, and Joerg Werner



Boston University engineers are developing better energy storage technologies to store renewable power and give electric vehicles longer range.

Massachusetts is investing in clean energy infrastructure to achieve net-zero greenhouse gas emissions by 2050. However, wind and solar energy generation happens intermittently. Storing excess power can facilitate the dispatching of clean energy during peak demand when wind and solar energy generation is unavailable.

KEY TAKEAWAYS

- **Building batteries from abundant materials can lower costs and extend battery life.** The Werner and Lubner labs are replacing rare materials like cobalt with abundant alternatives such as iron and titanium, which are cheaper and more durable, but lower in energy density. Their research into battery architecture aims to close the performance gap, making sustainable materials viable for high-performance batteries.
- **New testing methods are speeding up battery development.** The Ryan lab uses computer models to predict battery performance and lifespan without building every prototype. The Lubner lab is developing thermal wave sensing methods, a non-invasive diagnostic similar to ultrasound but with low-temperature heat, to monitor batteries during testing.
- **Researchers are developing new ways to store energy beyond batteries.** The Gopalan lab is advancing reversible fuel cells that switch back and forth between producing hydrogen and producing electrical power. New ceramic materials being designed in the Lubner lab can store energy as high temperature heat, and deploy it as either electricity or heat.
- **Carbon capture technologies can be powered independently from the grid.** The Lubner lab is developing a system powered by solar energy or wast heat from data centers, for example. The Werner lab is researching small-scale and efficient carbon capture materials and processes. This can reduce the state's need to buy carbon credits, or even generate sellable credits, while removing legacy emissions.

PARTNERSHIP OPPORTUNITIES

BU energy storage innovation researchers are available to help state agencies and companies understand next-generation battery capabilities and offer technical support. Partnerships between researchers, government, and industry can help keep purchasing decisions current as technology rapidly evolves. State and utility investment in grid infrastructure is critical to ensure the grid can flexibly integrate improved technologies as they come to market. Massachusetts can fund basic research to bridge federal funding gaps, and BU energy storage researchers are seeking partnerships with local startups.

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