

Supporting Grids and Buildings Through Hybrid Energy Storage

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The accelerating integration of renewable energy calls for innovative storage solutions capable of supporting both grid flexibility and building energy performance. This presentation explores hybrid energy storage systems (HESS), with a focus on advanced thermal storage technologies that combine short- and long-duration capabilities.

Two key approaches are examined: daily-cycle phase-change material (PCM) storage for heating, cooling, and domestic hot water optimization, and sorption-based thermochemical storage for multi-day buffering and seasonal shifts. These systems are designed to be compact, scalable, and cost-effective, incorporating environmentally safe materials such as bio-based PCMs and water-driven sorption media.

Demonstration projects in diverse climates show how smart integration of HESS with building management systems enables load shifting, peak shaving, and enhanced self-consumption of renewables. With digital modeling tools and flexible deployment strategies, these technologies offer a promising path toward buildings that actively contribute to grid stability while improving occupant comfort and energy efficiency.