OpenMinds

Battery HVAC Project
Executive Summary

Carrier

CenterPoint Energy

The Problem

The grid is under pressure	Extreme weather, rapid electrification, and accelerating data-center and industrial demand are driving peak loads faster than new capacity can be built. By 2030, the system faces a ~200 GW shortfall, while unplanned infrastructure additions often require 5–20 years and billions of dollars to deliver.
HVAC sits at the center of the problem	Residential HVAC systems are among the largest drivers of peak electricity demand, yet they operate as rigid, passive loads — consuming most power precisely when the grid is under the greatest stress. Conventional HVAC offers no flexibility to shift load, reduce peaks, or support grid reliability.
Carrier's FOAK battery-enabled heat pump changes the equation	By integrating a behind-the-meter battery with a high-efficiency heat pump into a single, customer-invisible system, Carrier's technology transforms HVAC from a passive appliance into an active, dispatchable grid asset - storing energy when supply is abundant, discharging when the grid is stressed.
The challenge is not the technology, it's the incentive structures	FOAK hardware carries higher upfront costs, while today's utility programs are slow to evolve, narrowly scoped, and poorly aligned with the distributed benefits these systems create. Existing structures are not designed to recognize, allocate, or monetize that value.

~200 GW
expected U.S. energy gap by 2030

5–20 years
to build new unplanned capacity

~40%
of building energy use from HVAC

~100 GW
potential controllable capacity from homes

The Approach

The Core Question: What is the total, system-wide value created by distributed, battery-enabled HVAC and how much of that value can realistically be used to offset upfront battery costs?

QUANTIFYING THE VALUE CREATED

- This analysis uses a large state's electricity market as its foundation — a structure in which value flows across homeowners, Retail Energy Providers (REPs), and Transmission & Distribution Utilities (TDUs), with commercial and industrial customers identifiable
- Each stakeholder has distinct value streams: bill savings for homeowners, demand response revenue for REPs, and reduced grid congestion costs for other ecosystem partners. Each was quantified.
- Across all scenarios, the total system-wide value created is substantially larger than the upfront incentives required but realizing it depends on new program structures that share value across the ecosystem.

AN INTERACTIVE VALUE TOOL

- A scenario-based value calculator quantifies the economic value created by battery-enabled HVAC and distributes it across stakeholders enabling transparent comparisons across scenarios.
- The tool is fully customizable: proprietary inputs such as battery size, adoption scale, geography, and pricing can be adjusted to model specific territories, regions, or individual deployment cases.
- It gives partners a shared fact base for program design enabling informed discussions around cost-sharing and incentive structures and supports Carrier in turning distributed value into deployable capital.