DISCLAIMER

Cooperative Research and Development Agreement (CRADA) Final Report for PACE AI/LBNL

Report Date: Dec 28 2025

In accordance with Requirements set forth in the terms of the CRADA, this document is the CRADA Final Report, including a list of Subject Inventions. It is to be forwarded to the DOE Office of Scientific and Technical Information upon completion or termination of the CRADA, as part of the commitment to the public to demonstrate results of federally funded research.

Parties to the Agreement: PACE AI and Lawrence Berkeley National Laboratory

CRADA number: FP00016419

CRADA Title: DEMONSTRATION TRIALS OF AI/ML EDGE+CLOUD SUITE

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Sponsoring DOE Program Office(s): DOE Building Technologies Office

LBNL Report Number: 2001739

OSTI Number: *N/A per Sponsor program and CRADA terms a final publication was not developed for this work*

Joint Work Statement Funding Table showing DOE funding commitment:

Government (via CEC) Funding to LBNL	**$260,046**
Participant Funding to LBNL	**-**
Participant In-Kind Contribution Value	**$116,124**
Total of all Contributions	**$376,170**

Provide a list of publications, conference papers, or other public releases of results,

developed under this CRADA: *N/A per Sponsor program and CRADA terms a final publication was not developed for this work*

Provide a detailed list of all subject inventions, to include patent applications, copyrights, and trademarks: *N/A per Sponsor program and CRADA terms a final publication no inventions were developed for this work.*

Executive Summary of CRADA Work / Summary of Research Results:

PACE AI and LBNL partnered under this CRADA to test and evaluate the PACE5 edge node prototype, an AI/ML edge and cloud-based suite, at FLEXLAB.The objective of the test was to evaluate the PACE5 edge node prototype's ability to perform demand shed and take to dynamic price signals, and to demonstrate advanced fault detection and microgrid monitoring capabilities.

The PACE5 edge node prototype was installed in the FLEXLAB facility and tested over intervals of baseline and PACE AI active test periods. The results demonstrated that the prototype effectively performed demand shed and take, in response to changing electricity prices. Key findings are highlighted in the table below.

Table: A summary of metrics values for the normalized baseline operation and the PACE AI active day.

Metric	Normalized baseline: **median** value [25 percentile, 75 percentile]	PACE5 active day: **median** value [25 percentile, 75 percentile]	Savings or difference: **median**
Daily energy consumption (kWh)	**10.01** [9.75, 11.92]	**9.19** [7.72, 11.68]	**0.82**
Daily electricity costs ($)	**2.42** [2.37, 2.81]	**2.19** [1.92, 2.74]	**0.23**
Daily demand take 3am-5am (W)	N/A	N/A	**306.1** [285.9, 339.4][1]
Daily demand shed 5am-7am (W)	N/A	N/A	**-12.9** [-20.2, -0.4][1]
Daily demand take 1pm-4pm (W)	N/A	N/A	**-2.2** [-309.3, 129.5]
Daily demand shed 4pm-7pm (W)	N/A	N/A	**55.7** [-50.5, 338.7]
Daily 15-minute peak demand (W)	**1142.0** [1111.0, 1312.4]	**1232.0** [1150.5, 1408.4]	**-90**[1]
Daily station 1 thermal discomfort index	**0.0** [0.0, 0.16]	**0.11** [0.0, 4.06]	**-0.11**[2]

[1] Results for the 3am-5am period, 5am-7am period, and daily 15-minute peak were impacted by price-related prototype pre-cooling when not required by actual load conditions.

(°C-hour)			
Daily station 2 thermal discomfort index (°C-hour)	**11.18** [9.86, 22.29]	**14.37** [5.79, 24.8]	**-3.19**[2]

Additionally, the tests qualitatively evaluated the prototype's ability to monitor compressor vibrations and inverter voltage. The experiments also identified areas for improvement, such as the need for better coordination with lower-level HVAC controls, the occurrence of thermal comfort index excursions, due to direct sunlight exposure, and the impact of pre-cooling strategies on peak demand.

[2] Thermal comfort station index was impacted by unmeasured solar insolation changes during the test periods.