SCE is actively pursuing the California goals for clean energy – energy efficiency, demand management, and GHG reduction.

Grid Fruit uses artificial intelligence to reduce demand and energy costs in food stores, so EPRI introduced them to SCE.

EPRI partnered through Incubatenergy Labs to explore customer cost savings, demand reduction, and lower GHG emissions in California.
REFRIGERATORS, FREEZERS, HVAC: WASTED ENERGY, HIGH COSTS
PROBLEM: COSTLY PEAKS FROM DAILY DEFROSTS

DATA FROM STORE PILOT

ENTROPY+

GRIDFRUIT
PROBLEM: EVENING GRID PEAK
STORES PAY PENALTY AND GRID POLLUTES
**SOLUTION**

**BEFORE GRID FRUIT**

- Refrigerators & Freezers

**WITH GRID FRUIT SOFTWARE**

- Power
- Maintenance
- Temperature
- Weather
- Renewables
- Peaking

AI RAISING EFFICIENCY & OUTAGE RESILIENCE
VISION: THE *NEST OF COMMERCIAL BUILDINGS*

- Energy management platform coordinating refrigeration with
  - HVAC
  - Lighting
  - Rooftop solar
  - EV charging
IEL SIMULATION PILOT

- Digital twins of 7-Eleven stores
- Optimized defrost schedules of 7 units/store
- Staggered demand spikes across SCE territory & entire state (11,990 stores)
  - 10 MW reduction (12.7%) in summer on-peak demand (LA county)
  - Reduced average peak demand and monthly peak demand in every month
- Expanding in SBIR (DOE): Predictive compressor efficiency optimization
DIGITAL TWINS FOR ANY GEOGRAPHY & TARIFF SCHEDULE

- Physics-based models of each store fill in gaps from data
- Defrost schedules by month and climate zone optimized for minimal monthly store charge
  - Utility time-of-use pricing (seasonal)
  - Utility demand charges (minimizing peaks)
Stores Demand Charges Reduced Up to 20%

- Predicting load profiles
- Optimizing defrost schedule to minimize energy bills & emissions
- Coordinating refrigeration with patterns of HVAC, lighting, and shopper traffic

Aggregate Peak of LA County’s 2204 Convenience Stores
28% lower refrigeration electricity consumption during high demand period

64% lower peak demand during high demand period

32% lower peak demand during business hours
VALUE FOR CUSTOMERS

Avg. Savings to Food Store

$36k/yr (energy and maintenance)
$10k in grid rebates

Savings to Grid (SCE)

4%-15% lower peak demand
5%-15% emissions reduction
NEW ADDITION: DASHBOARD AND AUTOMATED ALERTS

- Customizable online console provides
  - Real-time alerts
  - Data visualization
  - Visual forecasting of predictive controls
APPENDIX: VISUAL OVERVIEW WITH OUTAGE RESILIENCE

REFRIGERATION AND HVAC

DATA

GRID FRUIT MACHINE LEARNING SOFTWARE

POWER

MAINTENANCE

TEMP

PRICING

RENEWABLES

PEAKING

UTILITY INPUTS

OPTIMIZED CONTROL SIGNALS (PROVIDING IMPROVED STORE RESILIENCE, GRID RESILIENCE, AND EFFICIENCY)
APPENDIX: KEY MILESTONES

2015-2017 NSF I-CORPS CMU GRANTS

2017-2020 CONVENIENCE STORE PILOT

2018-2019 PGH TESTBED

2019-2021 TVA/ORNL FUNDING

JUNE-OCTOBER 2020 SCE UTILITY PAID PILOT

NOW SUPERMARKET-SCALE TESTING DOE SBIR

Confidential