ET Summit 2024

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Household Electric Infrastructure Upsize Alternatives for Electrification

Market Study

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Research Scope

This project is a **market assessment of commercially available intelligent power management technologies (IPMTs)**

- **Market scan** of the IPMT landscape and **vendor interviews**
- **Stakeholder engagement**: investor-owned utility (IOU) program managers and program implementers, direct install contractors, and staff at community-based organizations (CBOs).
- **Intended audience:** Customers, direct install contractors, California IOU energy efficiency and beneficial electrification program managers, and the California Emerging Technologies Coordinating Council.

Background

The Problem

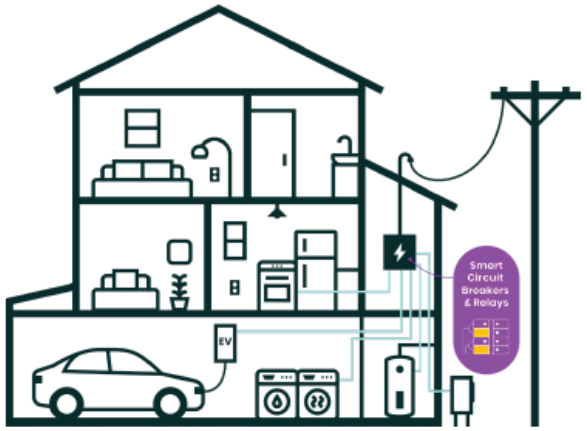
- Estimated costs to increase electrical capacity in residential homes varies, but a recent analysis by NV5 Inc. and Redwood Energy estimate that cost may range "**between approximately $2,000 to well over $30,000**" and may require a "**lead time up to 6 months**" if utility work is required.

Hypothesis

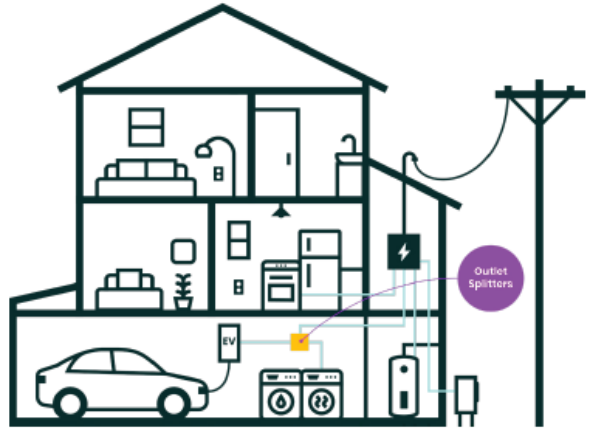
- Emerging intelligent power management technologies ("IPMTs") may avoid the need for costly and time-consuming infrastructure upgrades by optimizing electrified load.

Smart Electrical Panels

Circuit Control Units

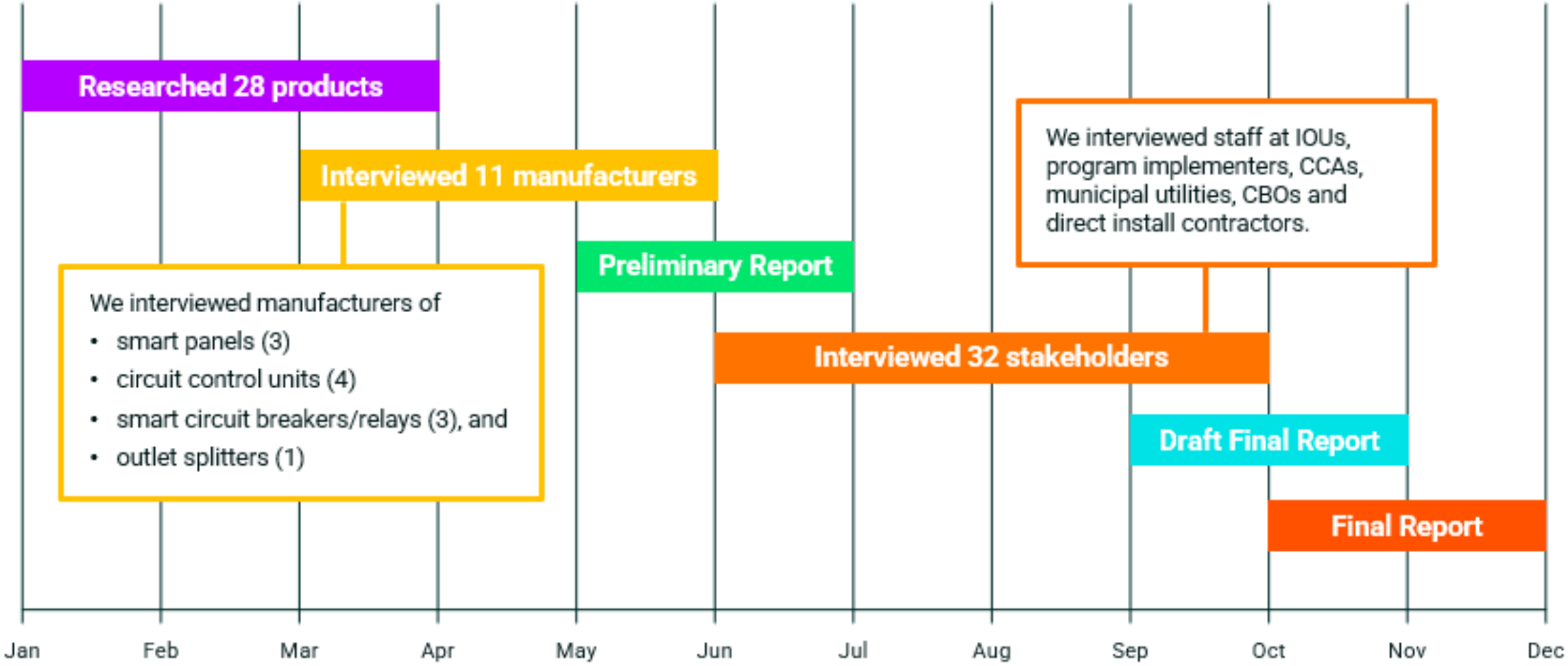


Smart Breakers and Relays



Outlet Splitters

What we did


Researched 28 products
Interviewed 11 manufacturers
Preliminary Report
Interviewed 32 stakeholders
Draft Final Report
Final Report
We interviewed manufacturers of
• smart panels (3)
• circuit control units (4)
• smart circuit breakers/relays (3), and
• outlet splitters (1)
We interviewed staff at IOUs, program implementers, CCAs, municipal utilities, CBOs and direct install contractors.
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Smart Electric Panels

Key Features

- Holistically manage all circuits
- Opportunity to integrate with energy storage

Advantages and Drawbacks

- All-in-one design
- Remote access & user experience
- Cost

Knowledge and Market Gaps

- Not widely deployed
- Limited ability to integrate with devices with variable control capability

Circuit Control Units

Key Features

- Only interface with wires
- Minimally invasive installation & easy set up

Advantages and Drawbacks

- Usability, easy installation
- Lower cost than panels
- Can't control whole home
- Higher cost than outlet spliters

Knowledge and Market Gaps

- Best use case – switching between two units that don't run concurrently
- Gap in flexible prioritization and load control

Smart Circuit Breakers and Relays

Key Features

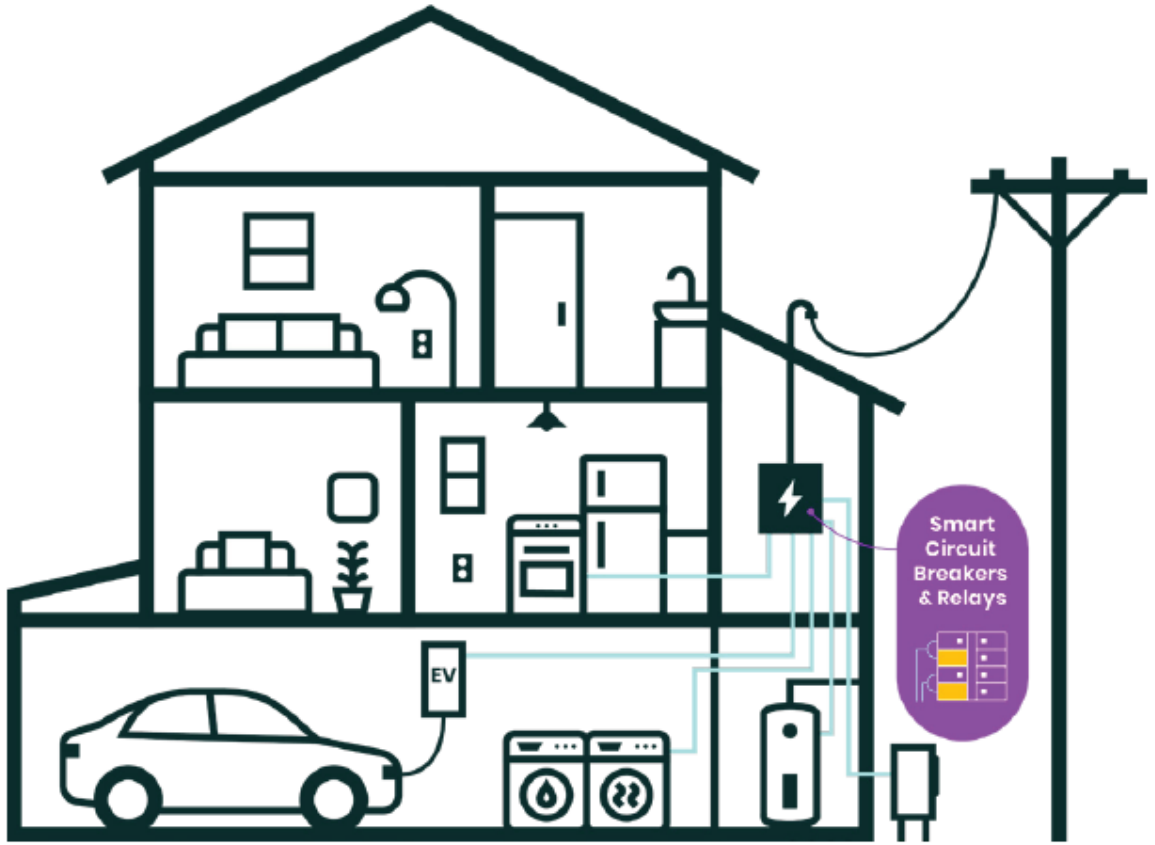
- Convert conventional panels to “smart panels” per circuit
- Configurable with simple set up processes

Advantages and Drawbacks

- User friendly, easy installation
- Modular set up allows owner to increase control overtime as needed
- Many devices need for whole home electrification

Knowledge and Market Gaps

- May be programmed in a way that does not meet code
- May require purchase of external hub
- May require integration with third-part systems



Outlet Splitter

Key Features

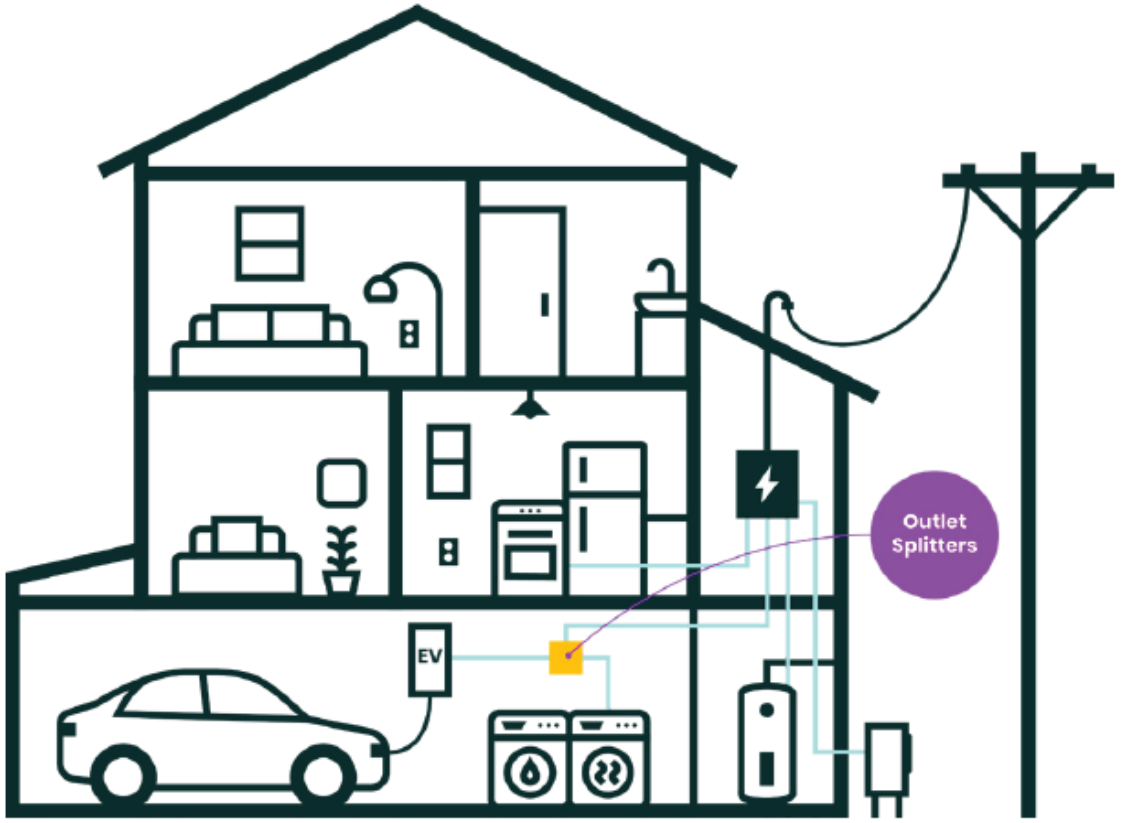
- For co-located plug loads
- Non-permanent

Advantages and Drawbacks

- Usability for plug loads
- Low cost
- Required load proximity

Knowledge and Market Gaps

- Lack of control to throttle loads w/in circuit capacity



Stakeholder Engagement Findings

- Familiarity
- Benefits
- Barriers
- Technology potential
- Program needs

120V Appliance Options

Recommendations

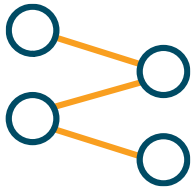
Create educational materials

Conduct lab and/or field demonstrations

Develop training materials

Consider providing customer incentives for low-cost IPMTs

Engage with code officials and local inspectors



Conduct modeling to compare the full costs of IPMTs

This project was funded by

CalNEXT

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The project report can be found here