Building Energy Resilience Along the Path to Decarbonization

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California Grid Decarbonization

State met 2020 goal early, but 2030 goal is more ambitious

- 40% Reduction in GHG below 1990 levels by 2030
- Electrify 70% of CA’s space and water heating

How can buildings be more energy resilient?
What role can buildings play in supporting grid resilience?

Sources:
Priority Technologies

The pathway to building decarbonization in places with rapidly greening grids

- weatherization
- electrical upgrades
- heating equipment upgrade/replacement
- cooling equipment upgrade/replacement
- addition of back-up power
- addition of solar
### The Entire Energy System is Changing

#### Drivers of change:
- Climate-driven impacts
- Moving energy generation away from fossil fuels towards variable renewable sources
- Building and transportation electrification
- The changing and increasing use of aging gas and electric infrastructure
- Increasing virtual connectivity

#### Potential impacts:
- Increasing disruptions
- Intermittent, distributed generation
- Increasing demand
- Existing infrastructure is not resilient
- Load management; cyber vulnerability
Energy Resilience Starts with Basic Needs

1. Energy needs being met within the building…
2. …for as long as practically possible

Why?
To reduce negative consequences on households and limit or slow the burden placed on social infrastructure
Key Dimensions of Building Energy Resilience

- **Building Energy Resilience:** buildings meet needs of occupants across a range of operating conditions

- **Buildings As Grid Assets:** buildings help manage demand and limit peak loads to support grid resilience
What does good look like?

Building Energy Resilience + Building as Grid Asset
Solutions Vary

Based on Occupant Needs

**Homes:** Needs vary based on ability, age, medical needs

**Community Resilience Hubs:** Local facilities that can support in emergencies

**Hospitals:** Require highest levels of energy resilience
Upfront Costs Implementation

Electrification vs Routine Replacement (Whole Building Totals)

Ultimately, the cost of electrification can be thought of as:

- the first cost to prepare the building
- these deltas between electrical upgrades and natural gas equipment replacement

- 1. First cost to prepare base building
- 2. Common area equipment and panel upgrade
- 3. Apartment unit equipment and panel upgrade

31-unit Electrification (Natural Gas to Electric)
62-unit Electrification (Natural Gas to Electric)
31-unit Equipment Replacement (Natural Gas to Natural Gas)
62-unit Equipment Replacement (Natural Gas to Natural Gas)
Barriers exacerbate inequalities

• Low-income communities historically left out
  – Affordable and multi-family housing not well served by energy programs
  – Low-income communities of color bear the burden of climate impacts
  – First costs can trigger displacement
  – Excluding low-income communities of color perpetuates disinvestment
Changing the Frame

- Bottom-up market transformation

Due to the complexity of the affordable housing sector, starting with and centering affordable housing will more easily include everyone.

Focusing policy on market-rate risks leaving out affordable housing on the way to decarbonization.

Decarbonization

- Affordable Housing
- Market rate residential and commercial buildings
Equitable Solutions
Requires an Ecosystem Approach

• Put basic needs first and protect low-income communities
• Will require collaboration between utilities, local governments, funders, contractors, providers, others
• Pathways should be scalable across sectors
The Role of Codes and Standards

**Rethink What Buildings Need to Accomplish**

- How can buildings meet basic needs in a changing climate?
- Set standards for **energy resilient buildings** and buildings as grid assets
- Work with partners to protect affordable housing
- Build adaptive capacity at building and community scale
Allow Flexibility and Clarity

Timeframe
(when to install/upgrade)

- 0-2 years
- 2-5 years
- 10+ years

Investment
(cost, complexity)

- min
- higher
- enhanced