

Why Should We Care About Existing Buildings?

2024 CalBEM Power Talk

November 20th, 2024

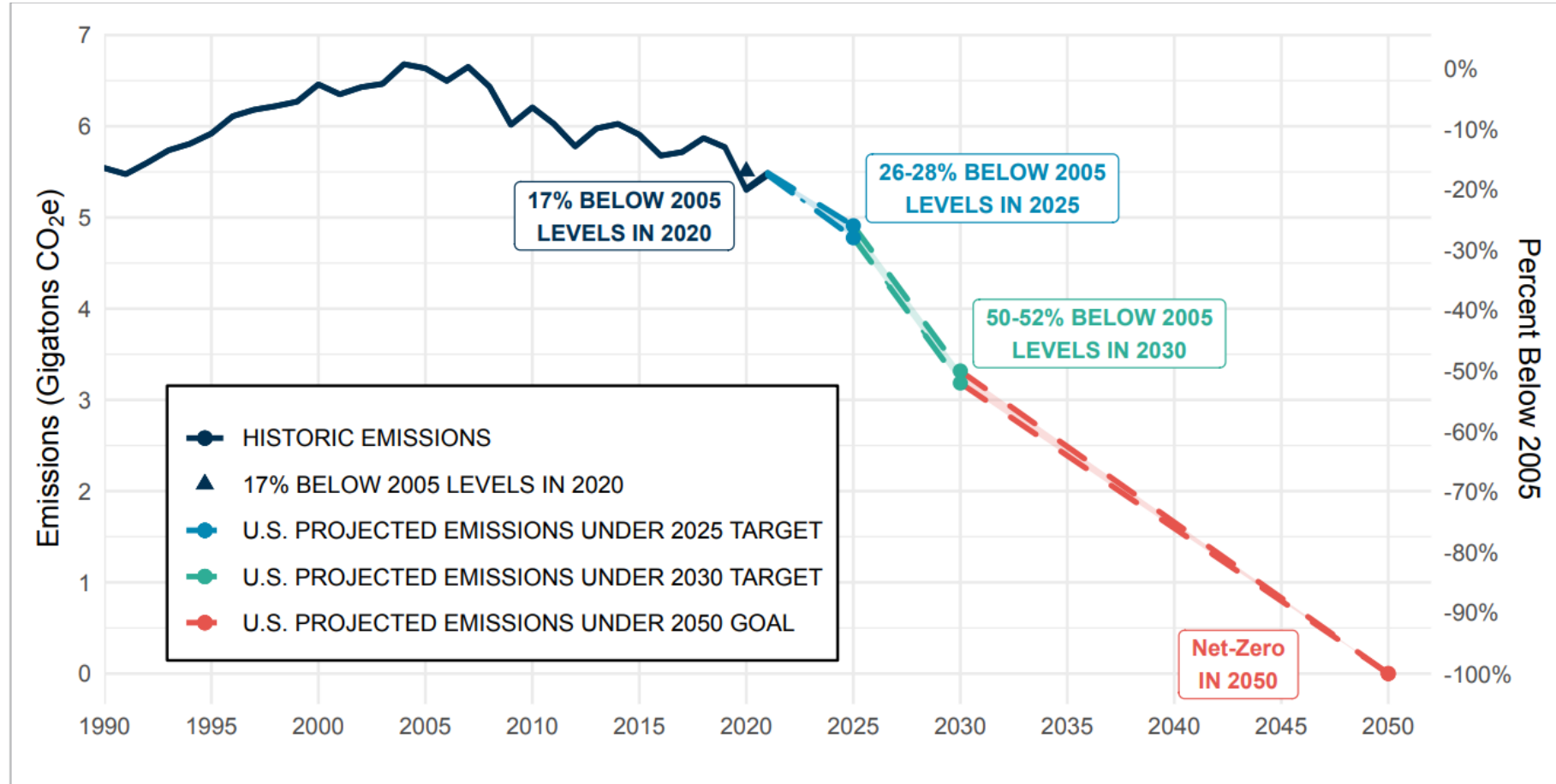


Energy+Environmental Economics

Jared Landsman

Net Zero GHG emissions goal is ambitious and necessary to avert the worst impacts of climate change

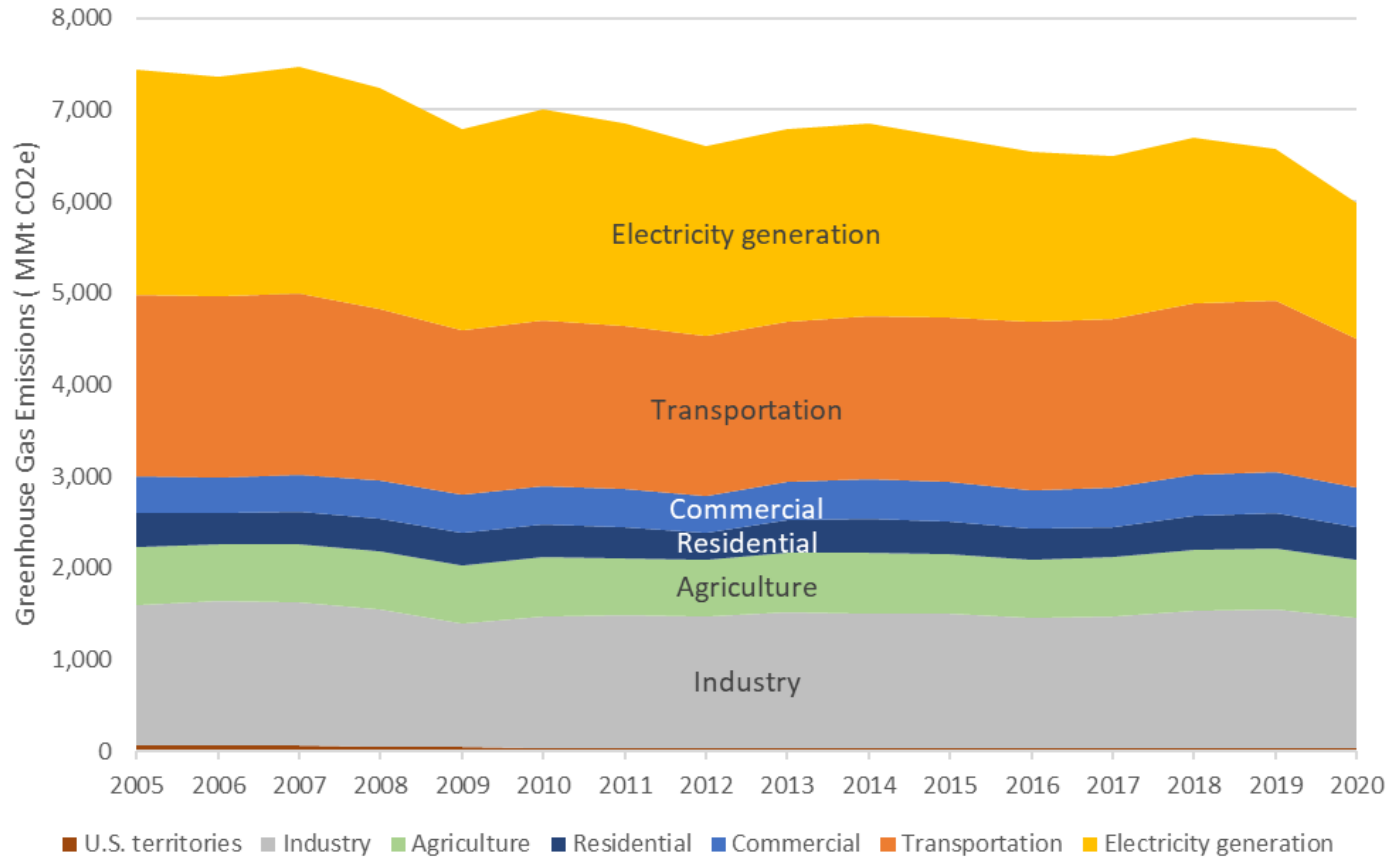
United States historic and projected greenhouse gas emissions under the 2050 goal for net-zero



Source: Biden White House, The Long-Term Strategy of the United States: Pathways to Net-Zero Greenhouse Gas Emissions by 2050, 2021.
Available: <https://www.whitehouse.gov/wp-content/uploads/2021/10/US-Long-Term-Strategy.pdf>

Reductions will be required in every sector; US GHG emissions show little progress-to-date in buildings

US Greenhouse Gas Emissions by Economic Sector, 2005-2020



Change in Emissions

2005 - 2020

Electricity generation -39.7%

Transportation -17.6%

Commercial 4.9%

Residential -2.4%

Agriculture 1.4%

Industry -7.2%

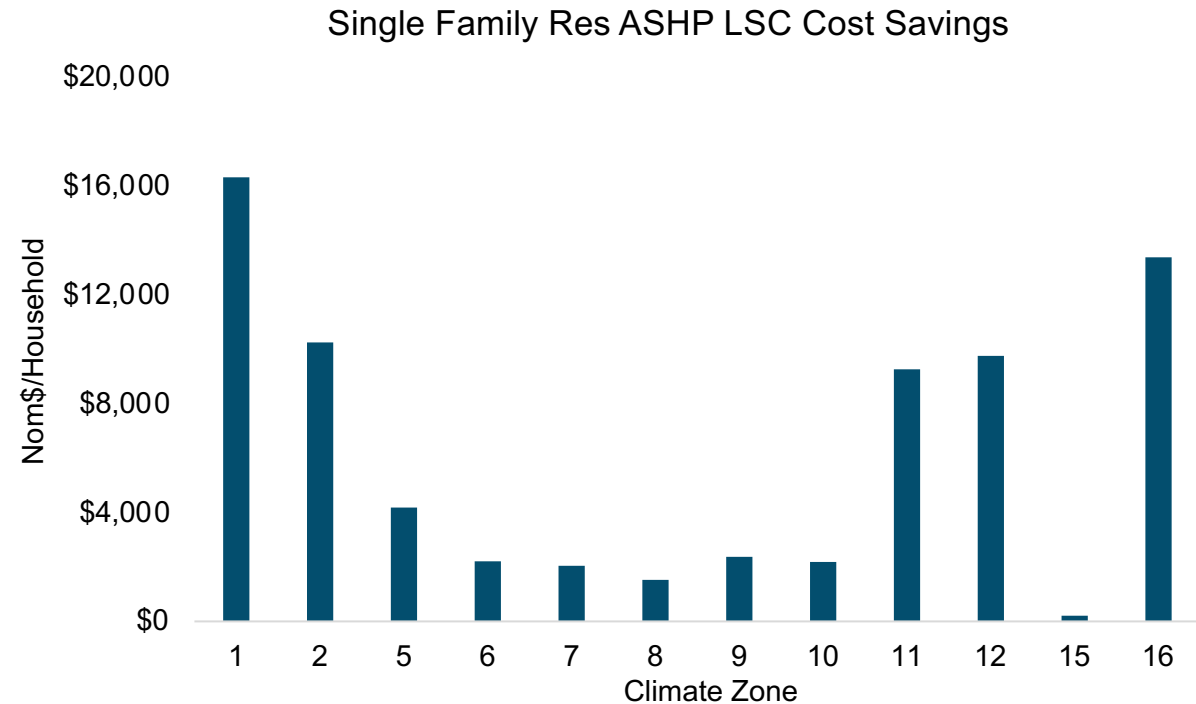
U.S. territories -63.9%

Total -19.5%

California is ahead of the pack on zero carbon new construction...

The California energy modeling community has put a huge effort into advancing codes & standards for new construction

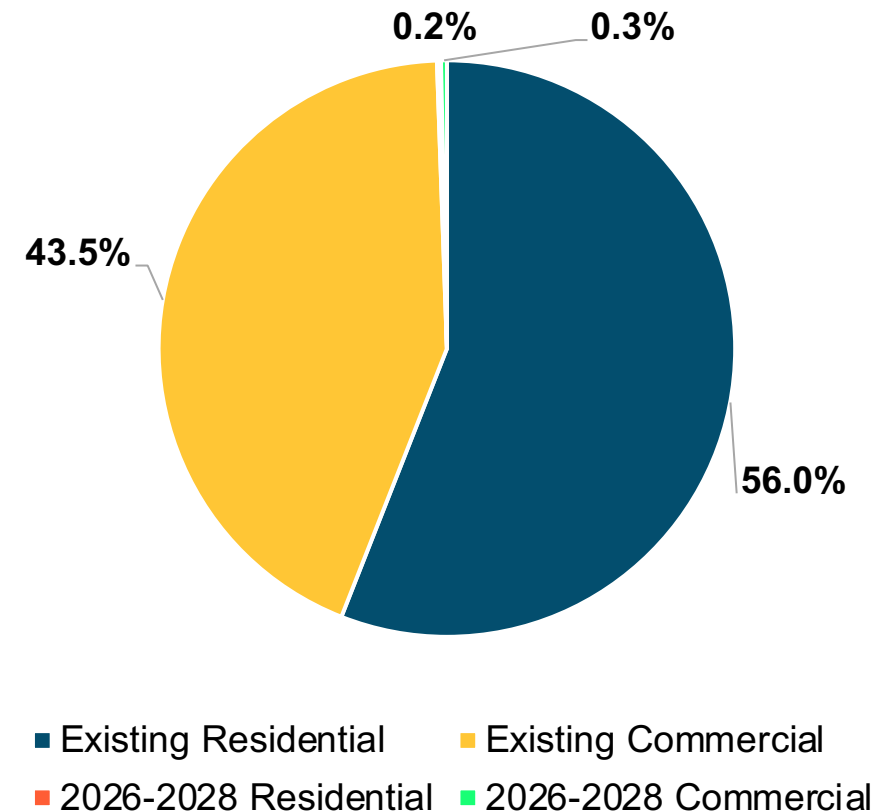
- + Under the 2025 code, all 16 climate zones have a heat pump baseline for **residential space heating and water heating**
- + **Non-residential space heating and water heating** heat pump baselines are likely on the way in the 2028 code cycle



...BUT, new construction is no longer the greatest opportunity for emissions reduction

- + Building construction from 2026-2028 in California will account for **<1% annual emissions** from California's building stock
 - New homes will generate **<50% annual emissions/household** than existing homes
 - New commercial buildings will generate **<33% annual emissions/sq ft** than existing commercial buildings
- + The existing code has already achieved such high stringency that the emissions reduction across code cycles is getting smaller and smaller

California Annual Average Long-Run Marginal Emissions from Buildings in 2028*

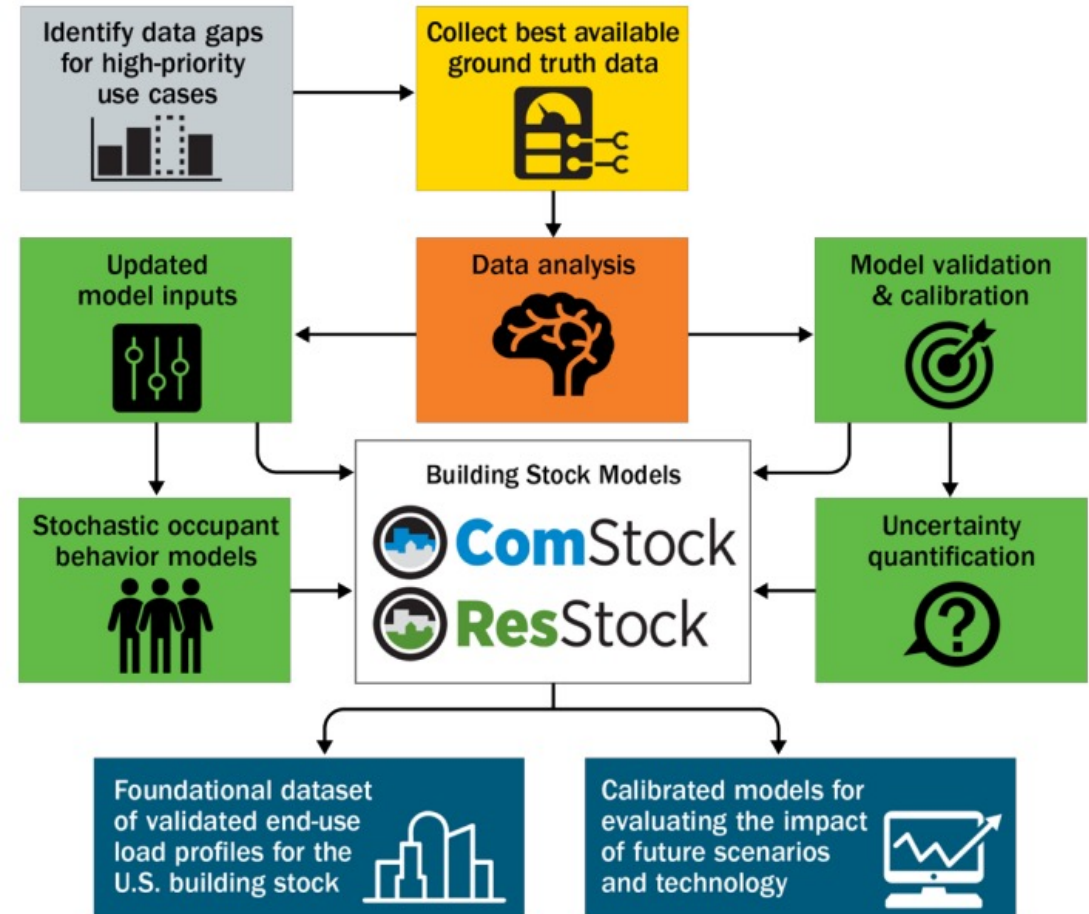


**To decarbonize buildings at scale,
we must shift focus to the existing
building stock**

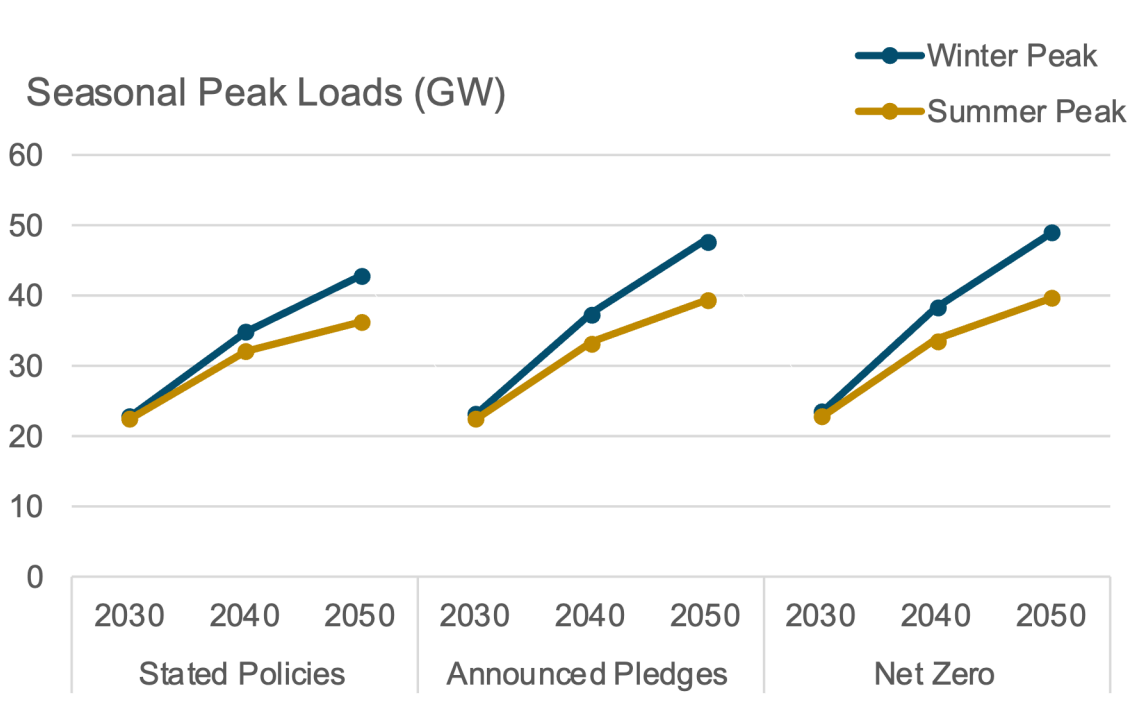
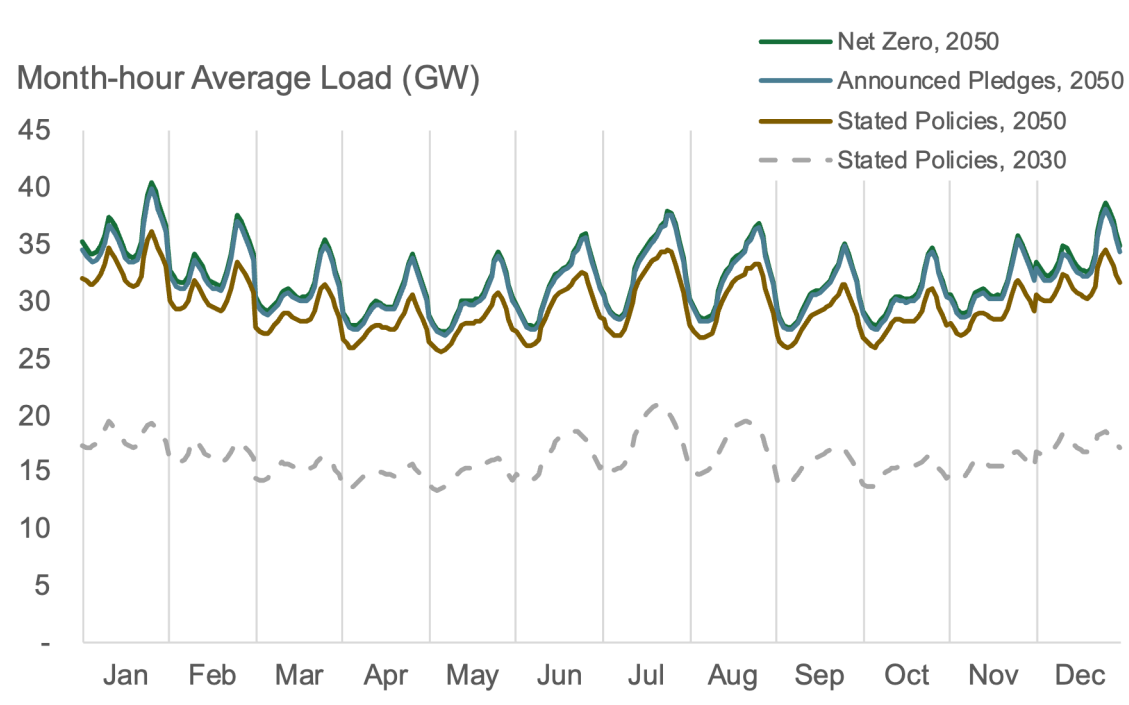
Newly available tools provide the opportunity to accurately evaluate the existing building stock

+ NREL's tools **ResStock & ComStock** is a collection of ~1 million **OpenStudio energy simulations** representing the entire US Building stock

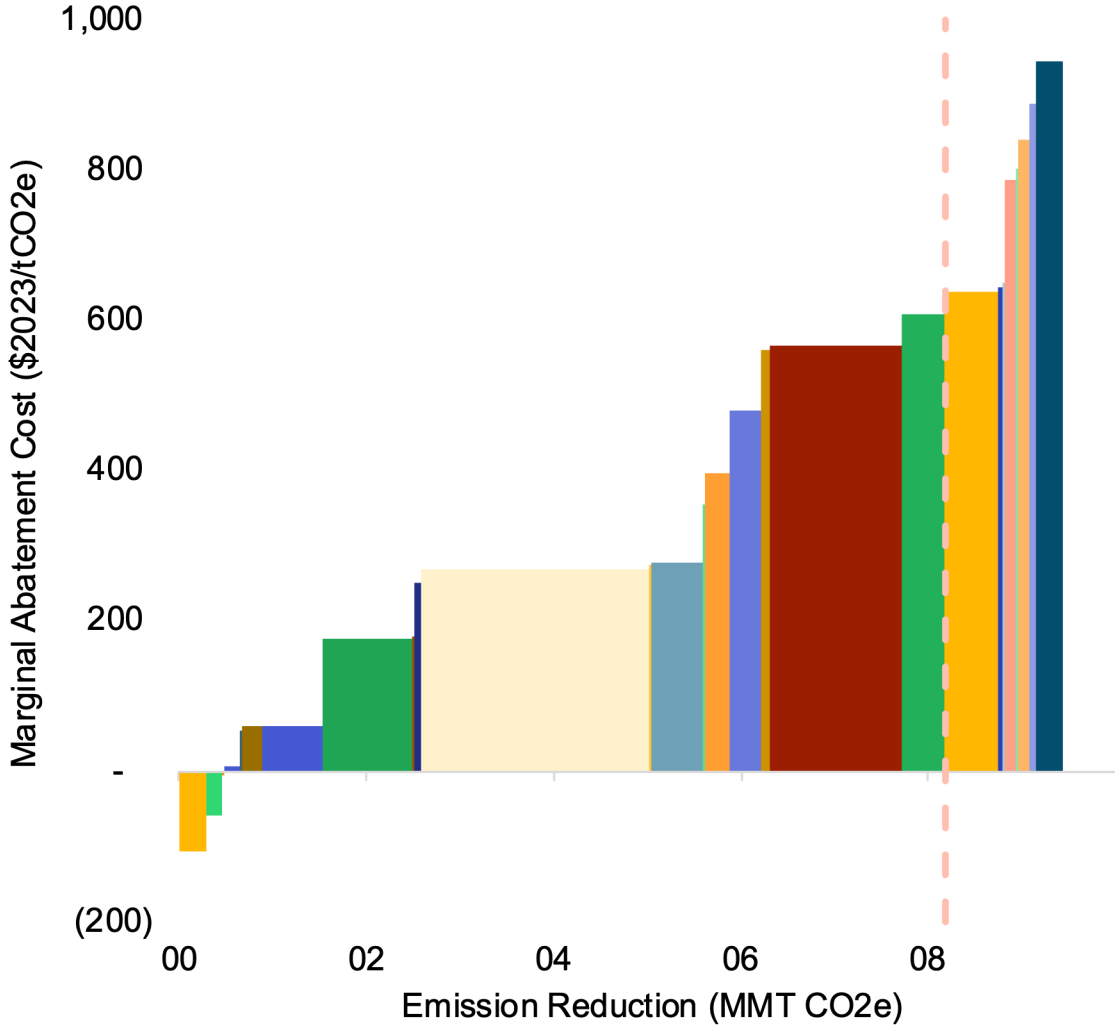
- Highly detailed, bottoms-up approach
- Based on a combination of calibrated and validated **ground truth data** and **stochastic occupant behavior**
- Loads can be broken out at an **end-use level** and filtered by **region, sector, building typology, technology, and more**



We can now forecast hourly building loads under different electrification futures...



...and optimize a portfolio of emissions reduction strategies to design new programs & policies



This is a call to action for the California energy modeling community to...

...develop programs and policies to address the existing building stock

- + Zero emissions appliance standards
 - CARB
 - BAAQMD
 - SCAQMD
- + Building performance standards
- + Advanced rate design
- + Funding & financing
- + Expand program scope
- + Targeted gas decommissioning

SB 48: Building Energy Savings Act.

Session Year: 2023-2024 House: Senate



3. Project Schedule

Date	Activity
November 2023	Research, Staffing, & Administration
June 2024	Request for Input / Information (RFI)
July 2024	Public Scoping / Kick-Off Workshop
September 2024	Technical Workshops & Collaboration
January 2025	Draft Strategy & Recommendations Development
December 2025	Final Strategy & Recommendations Development
August 2026	Report and Recommendations due to Legislature

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Thank You

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