



THE UTILITY BILL SPEEDBUMP ON THE ROAD TO A CARBON-FREE FUTURE

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CALIFORNIA'S RESIDENTIAL RATES



California's largest IOUs have increased residential electricity rates 75-125% over the last decade

21% of California's largest IOU residential customers are in arrears



HOW IS CALIFORNIA AFFECTED?



California has a goal of generating 60% of electricity from renewable resources by 2030, and 100% by 2045



CARB & many cities banned the sale of new residential gas appliances in new construction



TECH initiative & goals of installing 6 mil. HP by 2030

WHY IS THIS IMPORTANT?

High electric rate inflation +
Substantial electric bill increases
⇒ ***puts California Electrification
Goals in jeopardy***

Residential customers must be
convinced to electrify and rising
electricity rates discourage customers
from doing so

EXPLORING CALIFORNIA'S ELECTRIFICATION LANDSCAPE

How do
*traditional
EE retrofits*
impact bills?

How do
*electrification
retrofits*
impact bills?

How do
*electrification
rates* impact
bills?

How do DERs impact all of these?



BUILDING
SIMULATIONS

BILL IMPACTS

MODELING APPROACH SIMULATIONS



NREL's BeOpt
& OpenStudio-
HPXML

Models:



- ✦ Baseline Home
- ✦ Deep Dual-Fuel Retrofit
- ✦ Gas Water Heater Retrofit (Tankless)
- ✦ HVAC Electrification
- ✦ Water Heating Electrification

Scenarios include:

- ✦ PG&E, SCE, SDG&E
- ✦ Inland vs Coastal CZ



Rates & DERs:



- ✦ TOU vs Electrification (NBT Rates)
- ✦ No Solar, Solar, Solar & Storage
- ✦ CA Alt. Rates for Energy (CARE-2024)

MODELING APPROACH BILL CALCULATOR



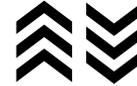
Verdant's DER-CAT tool calculates cost-effectiveness and bill impacts

Python Script

Data Management

DER Simulations

Avoided Cost Calculations



Microsoft Excel GUI

Input Dashboard

Bill Calculator

Pro Forma

Cost of Service



Inputs



Outputs

SUMMARIZING THE FINDINGS

1a

Traditional EE retrofits lead to customer bill reductions. Electrification retrofits can lead to reductions or increases in bills.

1b

Rate design plays a major role in bill impacts from electrification measures.

2

Customers with DERs have fewer opportunities for bill reductions from fuel substitution measures.

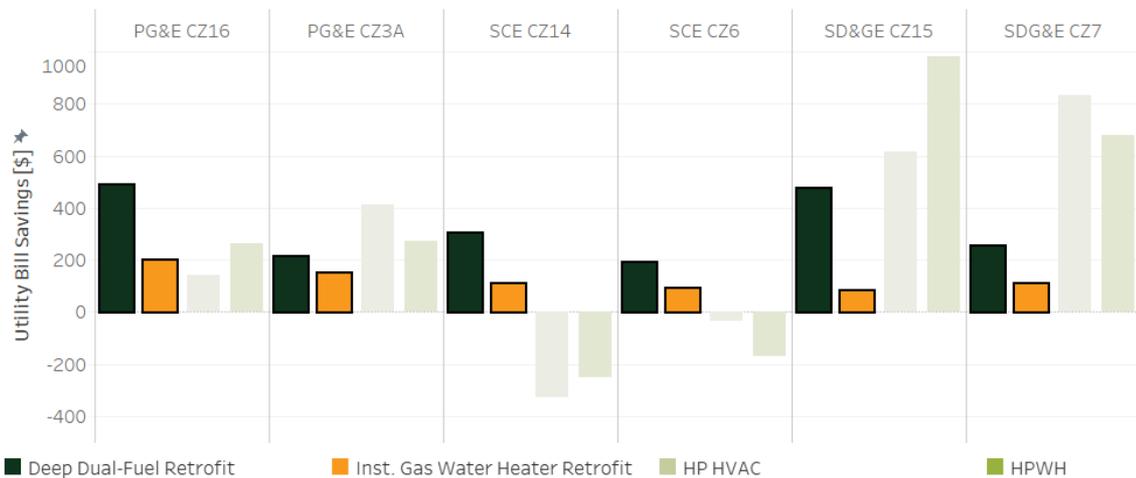
EXPLORING THE FINDINGS

Traditional EE retrofits lead to customer utility bill reductions.

Fuel substitution retrofits can lead to reductions or increases in bills.

Impacts for Scenarios with no Solar or Storage

1a



*First Year Electric Plus Gas Bill Impacts for Homes **without PV or PV + Storage***

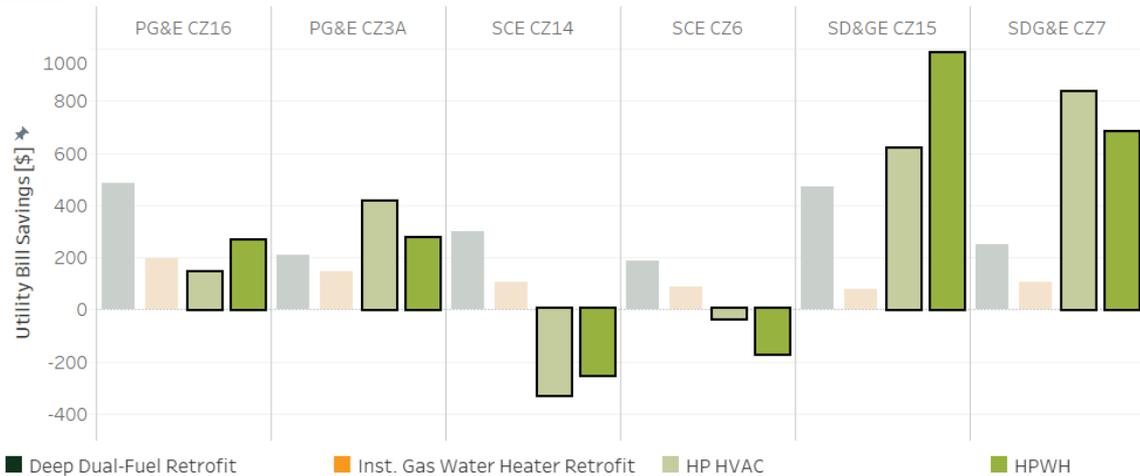
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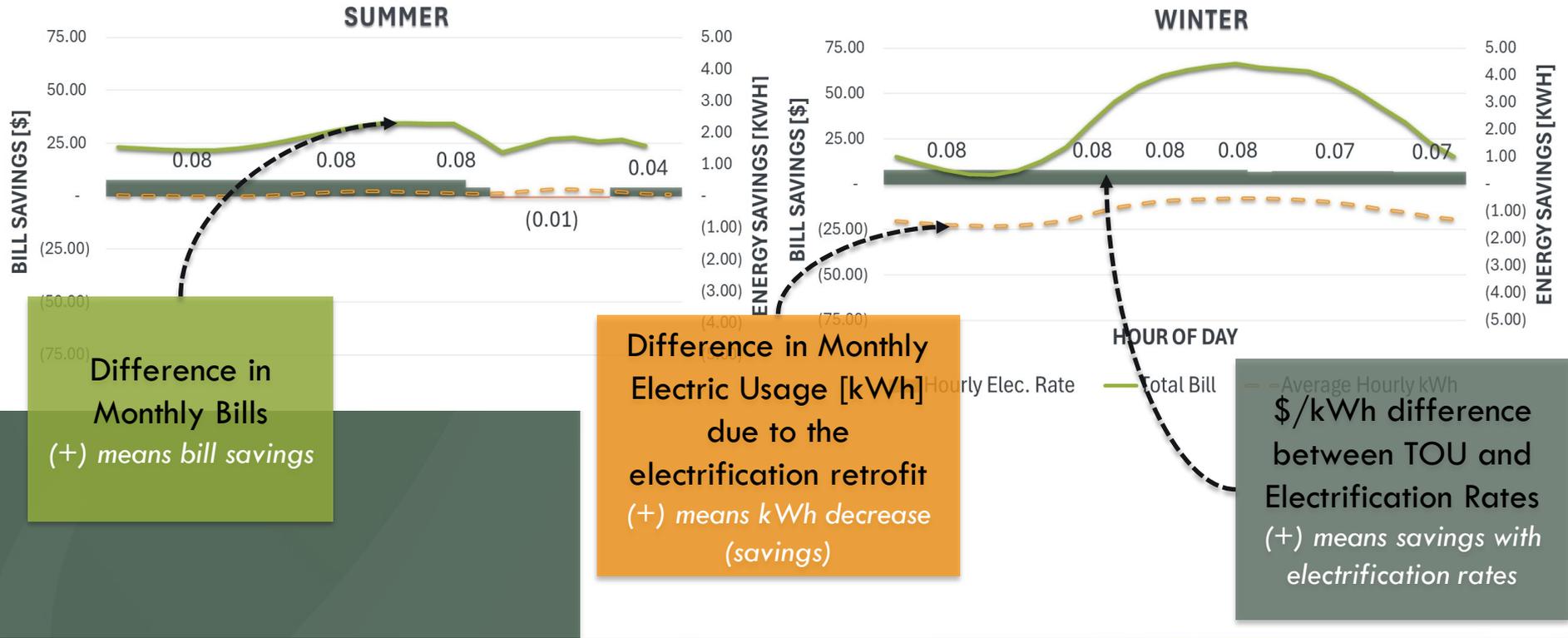


*First Year Electric Plus Gas Bill Impacts for Homes **without PV or PV + Storage***

DIVING DEEPER

Impacts for Scenarios with no Solar HVAC Electrification – PG&E

1b



DIVING DEEPER

Impacts for Scenarios with no Solar HVAC Electrification – PG&E

1b



🔥 Electrification Rates are *(mostly)* lower resulting in summer bill savings.

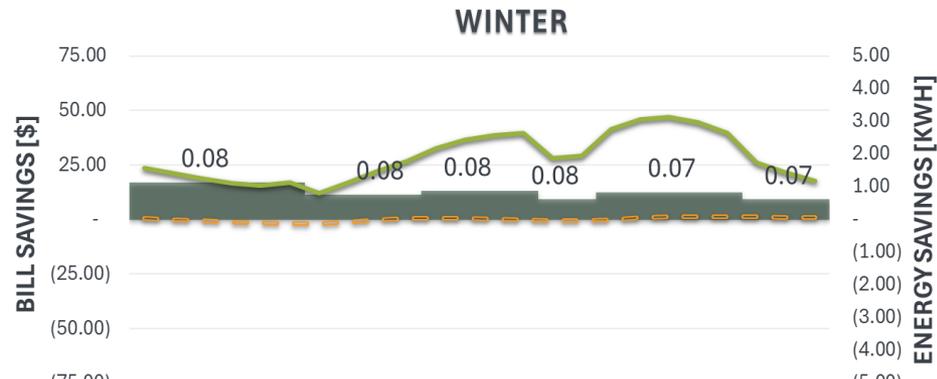


🔥 Even during the winter with higher electricity usage, lower electrification rates leads to winter savings

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Impacts for Scenarios with no Solar HVAC Electrification – SDG&E

1b



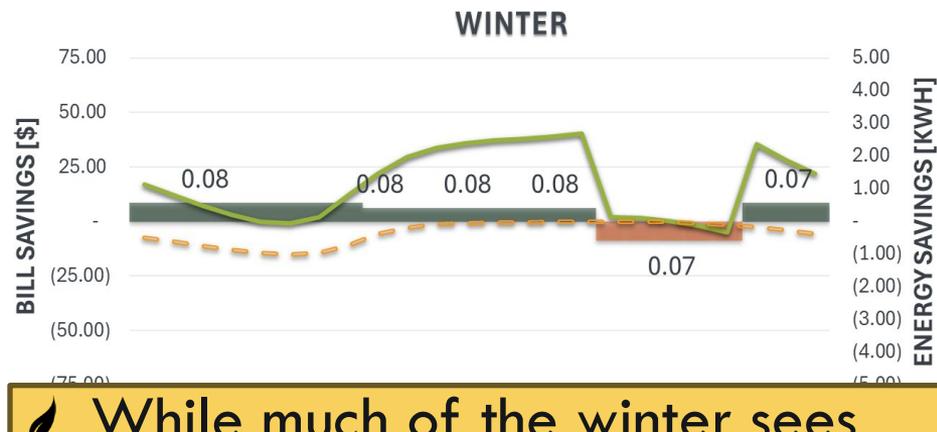
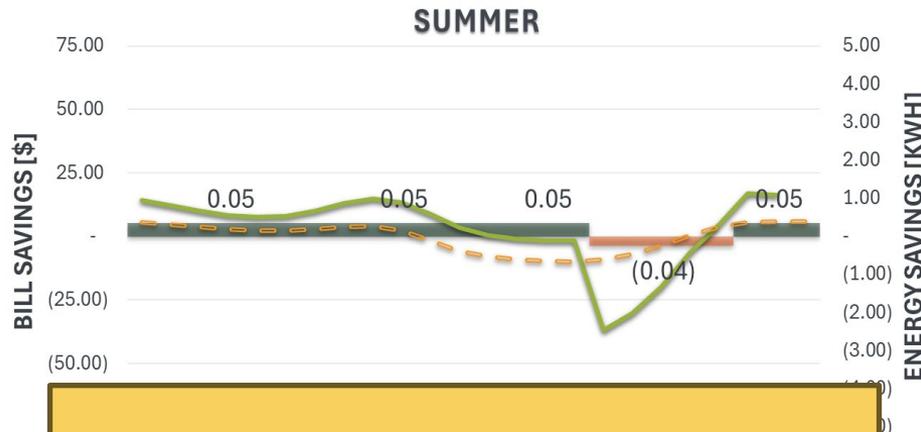
🔥 Electrification Rates are lower, but variation in kWh shows some summer bill increases.

🔥 Lower winter rates, and very little change in kWh drives year-round bill savings.

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Impacts for Scenarios with no Solar HVAC Electrification – SCE

1b



🌿 Electrification rate increases over peak hours show sharp bill increases.

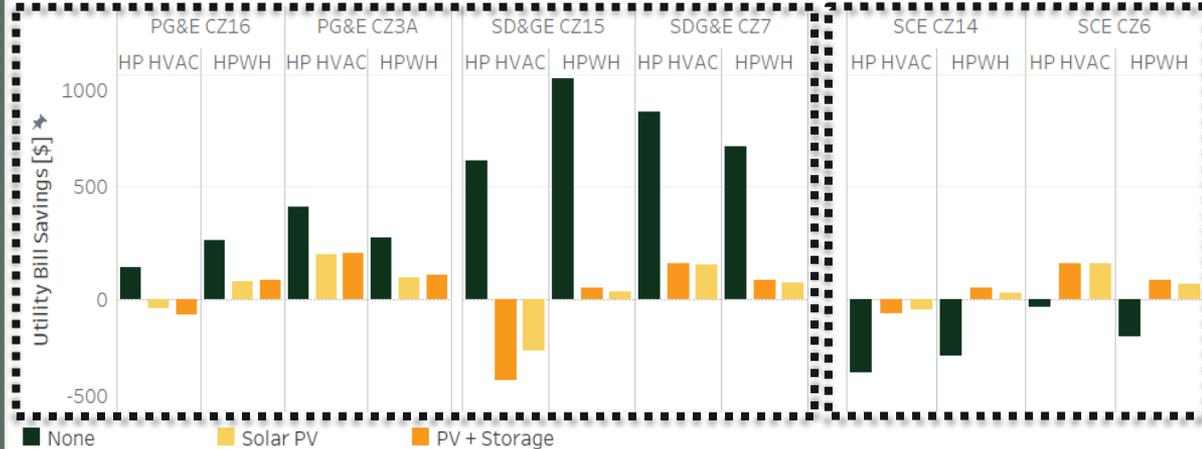
🌿 While much of the winter sees bill savings, the electrification rate increases correspond with a sharp decrease in bill savings.

EXPLORING THE FINDINGS

Customers with PV or PV+Storage have substantially fewer opportunities for bill reductions from fuel substitution measures.

Electrification Measures by Distributed Generation

2



TAKEAWAYS

Modeling rate designs and running scenario analyses is crucial to ensuring electrification will not significantly increase customer bills.



Rate Design considerations are critical to ensure electrification is affordable.

Gas Usage & Costs

Electric Load Shapes

Seasonal Usage

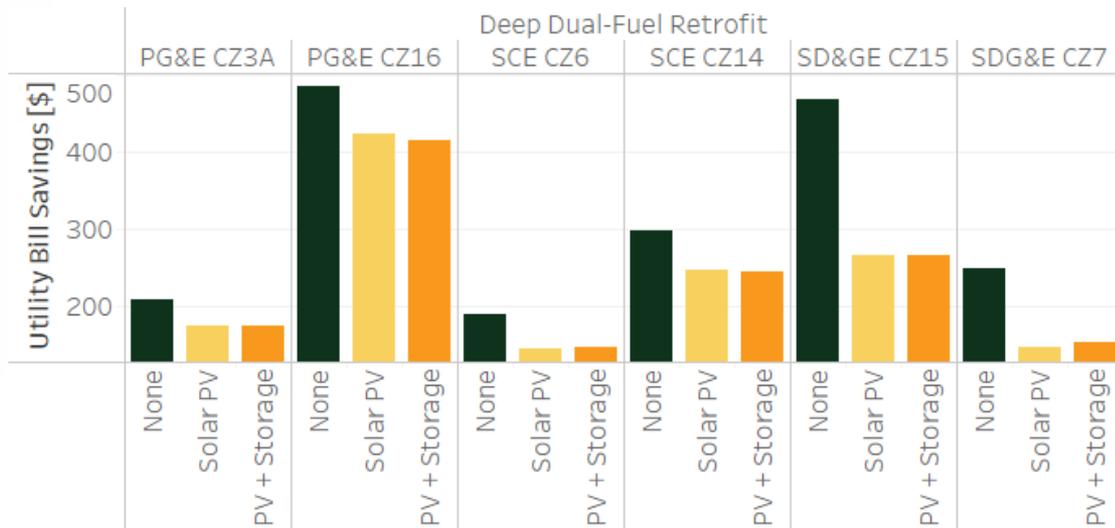
Time of Use

DER Installations

- 🔥 Customers won't electrify if bills increase, especially low-income sectors
- 🔥 Utility costs can be recouped through higher volumes

TAKEAWAYS

Traditional Energy Efficiency Measures still provide utility bill savings.



RELATED USES OF VERDANT'S DER COST EFFECTIVENESS TOOL

Testing rate designs to understand impacts on utility revenue requirement

Targeting customers that benefit from electrification

Cost-effectiveness and bill impacts of DER adoption

Bill impacts for a low-income electrification program

CONTACT DETAILS

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**THANK
YOU**

VERDANT