

Designing Electricity Rates for an Equitable Energy Transition

Severin Borenstein, Meredith Fowlie, and Jim Sallee
UC Berkeley and the Energy Institute at Haas

Full report at <https://www.next10.org/publications/electricity-rates>



Residential electricity prices are high in California

FIG 1 Average Residential Price (\$/kWh) by Year for Major U.S. Utilities



Note: Observations are weighted by total annual consumption. The box represents the 25th, 50th, and 75th percentile. The whiskers represent the 5th, and 95th percentiles. Source: Data come from FERC Form 1.

Questions we investigate

1. Why are California's volumetric retail electricity rates so high?
 - In California, costs that are not going-forward incremental expenses of supplying electricity are recovered in volumetric (per kWh) electricity prices.
 - Residential prices are now 2-3 times the incremental social cost.

1. Who's paying these escalating costs?
 - Increasingly, it's the households who can least afford it.

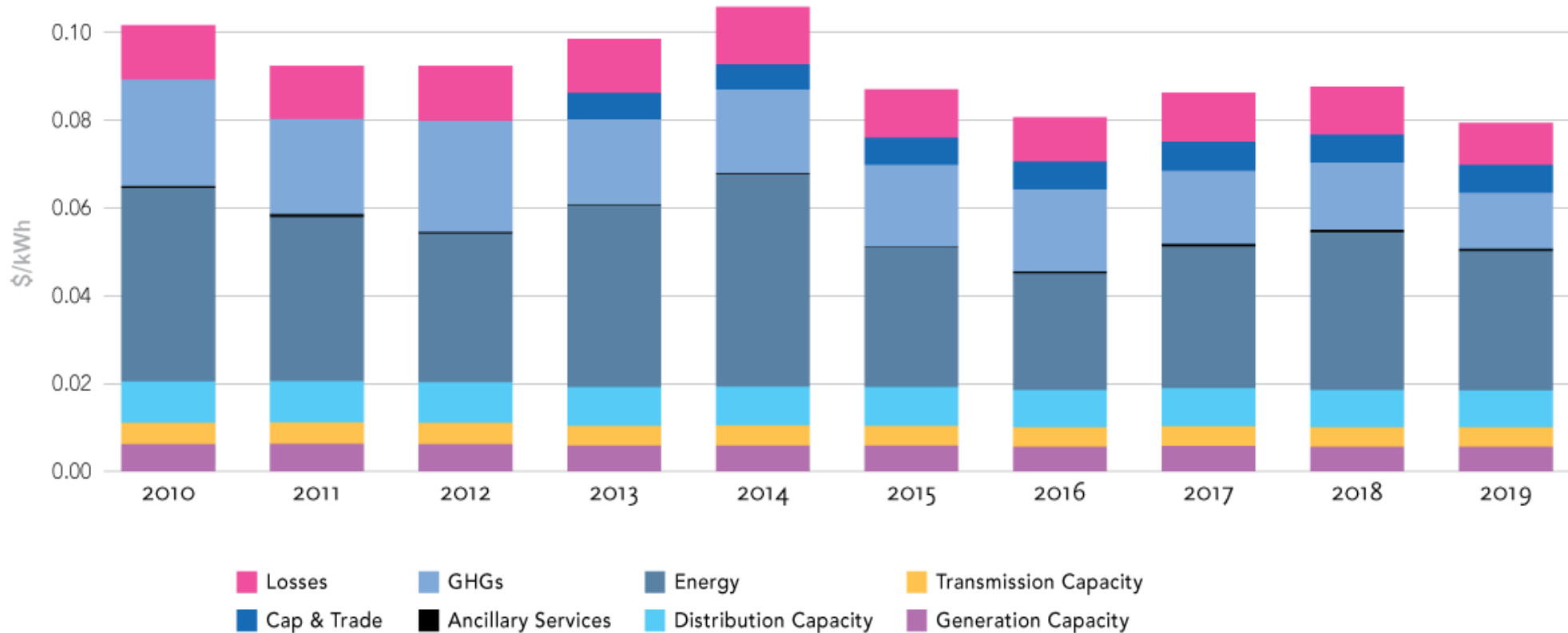
2. How might we recover these costs in a more efficient and equitable way?
 - We propose some more efficient and more equitable alternatives to raising needed revenues.

What's the *efficient* electricity price?

- Ideally, retail electricity prices would reflect the **time-varying social marginal cost (SMC)** of electricity consumption.
- The SMC captures all the incremental costs that electricity consumption imposes, including fuel costs, pollution impacts, etc.
- If price equals SMC, consumer deciding to use more electricity, or not, can trade off their own usage value versus full societal costs
- We estimate this efficiency benchmark for the 3 major IOUs over the last decade.

Annual social marginal cost estimates (\$/kWh)

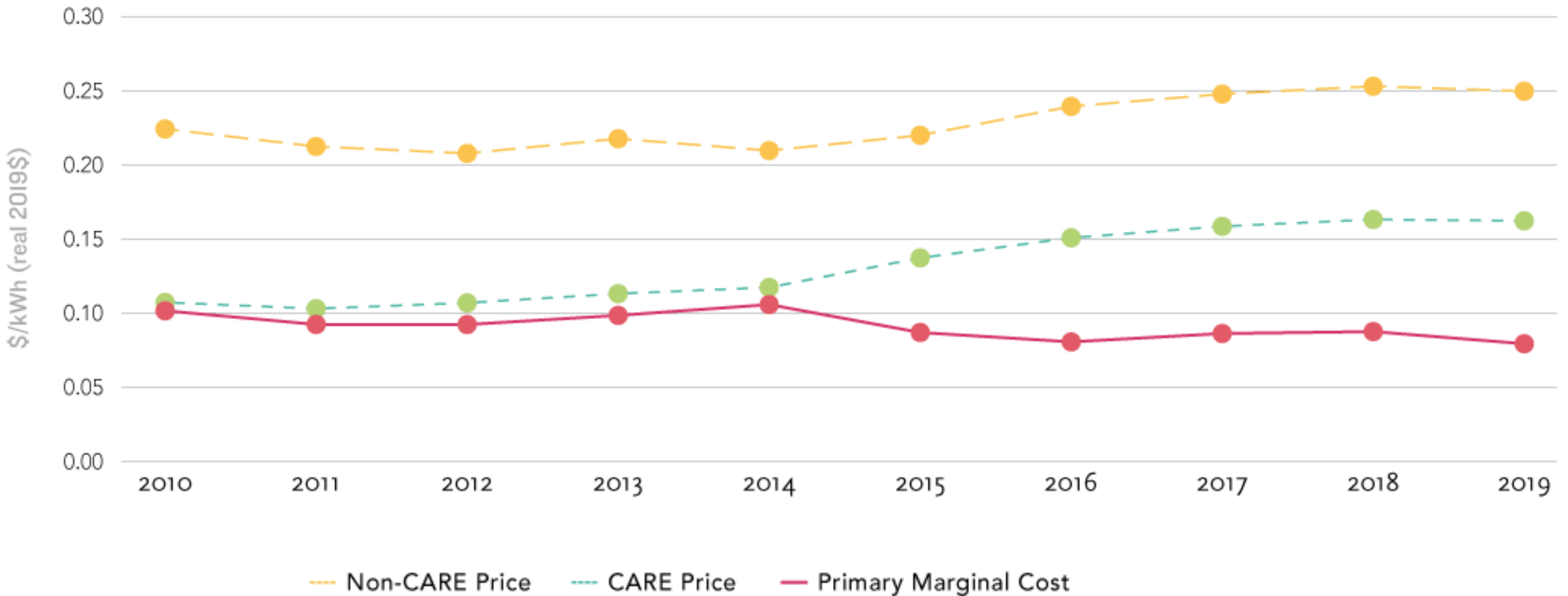
a. PG&E



Notes: Marginal cost components are weighted by IOU load. See text for details on the construction of cost components. Additional details on data sources and methodology behind author calculations can be found in the Appendix.

Residential prices versus social marginal cost (\$/kWh)

a. PG&E

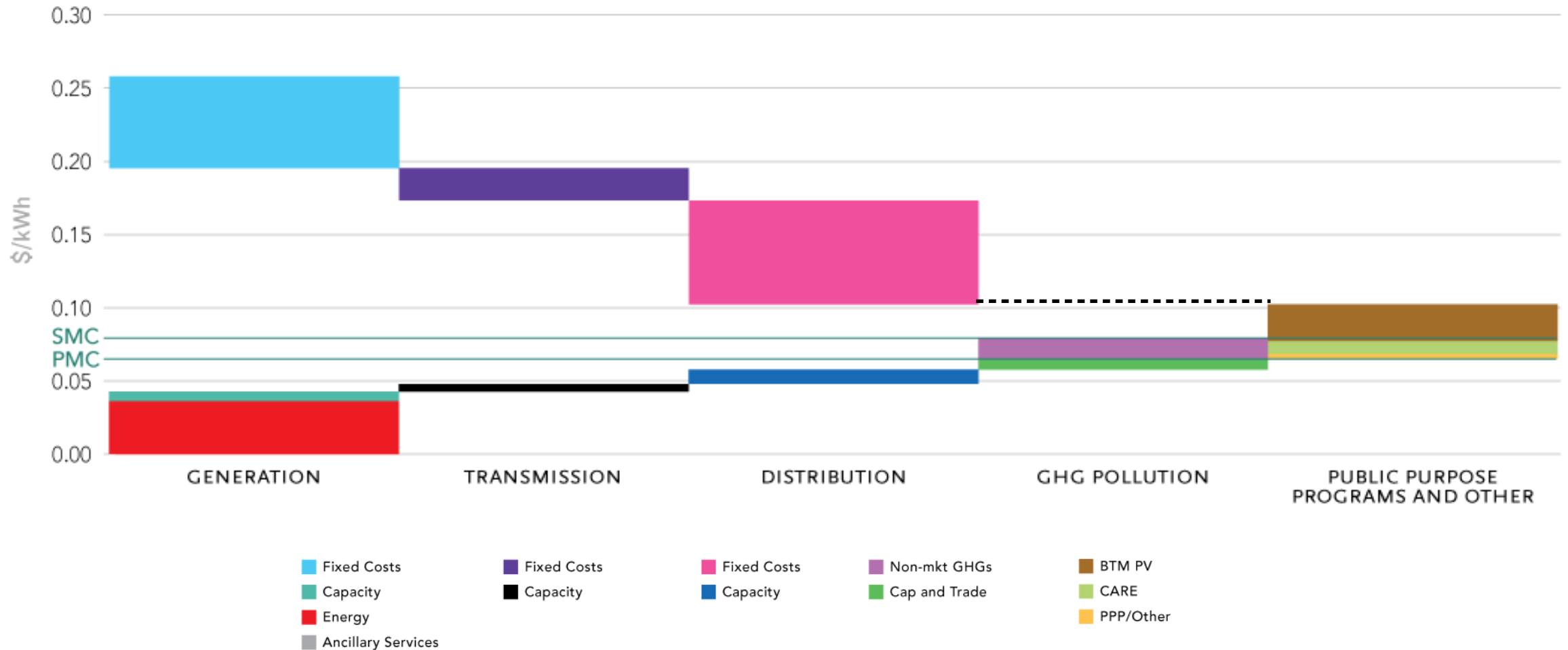


Why worry about high electricity prices?

- **Efficiency:** Burdening electricity prices with costs that are not going-forward incremental expenses of supplying electricity discourages efficient substitution from other energy sources towards electricity.
- **Equity:** Higher electricity prices can impose a large economic burden on lower-income households in an increasingly unequal economy.

2019 residential price decomposition (\$/kWh)

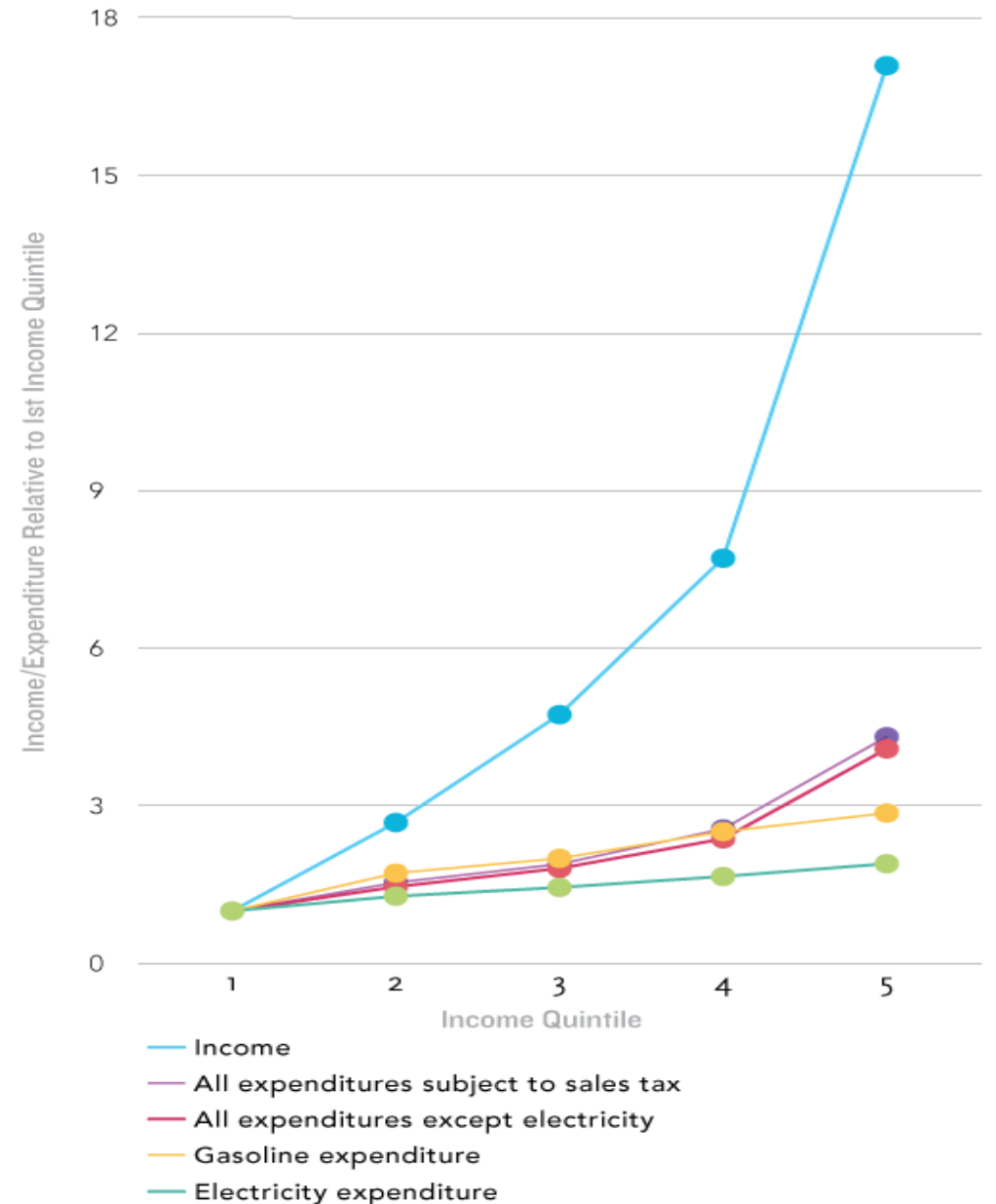
a. PG&E



Notes: Primary marginal cost estimates are weighted by IOU load. Average 2019 residential prices (CARE and non-CARE) are constructed using advice letters and rate schedules PG&E sources: 5366-E-A/B; 5444-E; 5573-E; 5644-E. SCE sources: 67666-E; 67668-E. SDGE: 31811-E; 31501-E. Details on the methodology behind author calculations can be found in the Appendix.

An unequal burden

- This figure charts relative income and relative expenditures across California households by income quintile.
- Lower-income households spend a much larger share of their income on electricity.



Equity/affordability implications

- We are taxing electricity consumption to pay for infrastructure, climate change adaptation, and public purpose programs.
- At this point wealthier households consume only slightly more (net) electricity from the grid than poorer households.
- **Implication:** a volumetric tax on electricity is more regressive than sales tax or gasoline tax, and far more regressive than income tax.

Equity/affordability solutions

- One solution: pay for state policy priorities through the state budget.
- Alternatively, infrastructure and public purpose investment costs could be recovered *via income-based fixed charges* paired with an efficient volumetric price that reflects the social marginal cost.
- Our report examines alternative ways this could be done
 - Declaration to utility, true up with Franchise Tax Board (FTB)
 - FTB transfers information on income categories to the utilities
 - Presumptive fixed charge by location

Conclusion

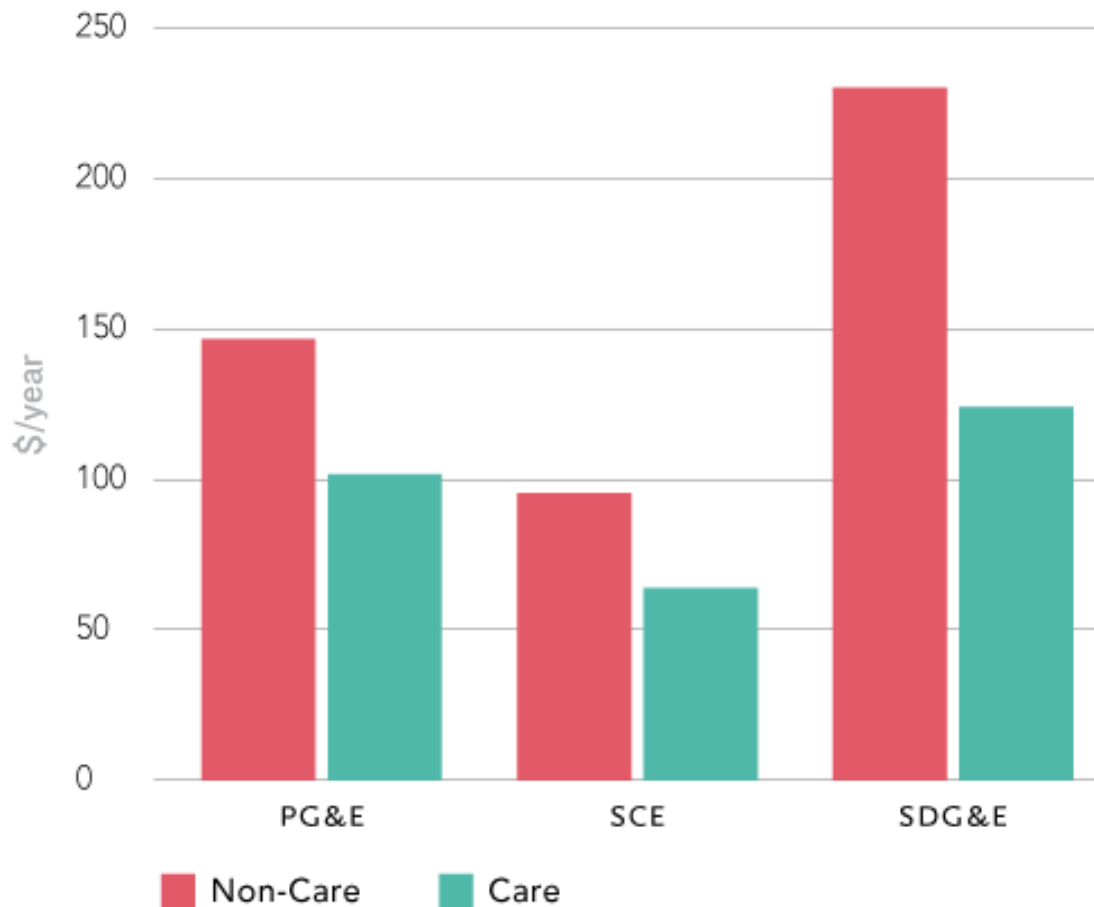
- In California, volumetric electricity rates are used to raise revenues for climate mitigation, infrastructure investments, wildfire mitigation, etc.
- This amounts to a highly regressive tax with negative implications for both efficiency and equity. Other states and countries are, unfortunately, following California's lead in this policy as well.
- Changing the way costs are recovered to reduce electricity rates can help ensure affordable and attractive electricity consumption as we look to rapidly increase usage on the path to decarbonization.
- Paying for most non-marginal costs through government budget or income-based fixed charges would improve equity by lightening the burden of cost recovery on households that can least afford to pay.

Thank You!

- Severin Borenstein
 - severinborenstein@berkeley.edu
 - <http://borenstein.berkeley.edu>
 - <https://ei.haas.berkeley.edu>
- Full report at <https://www.next10.org/publications/electricity-rates>

Net Metering for rooftop solar shifts cost recovery burden

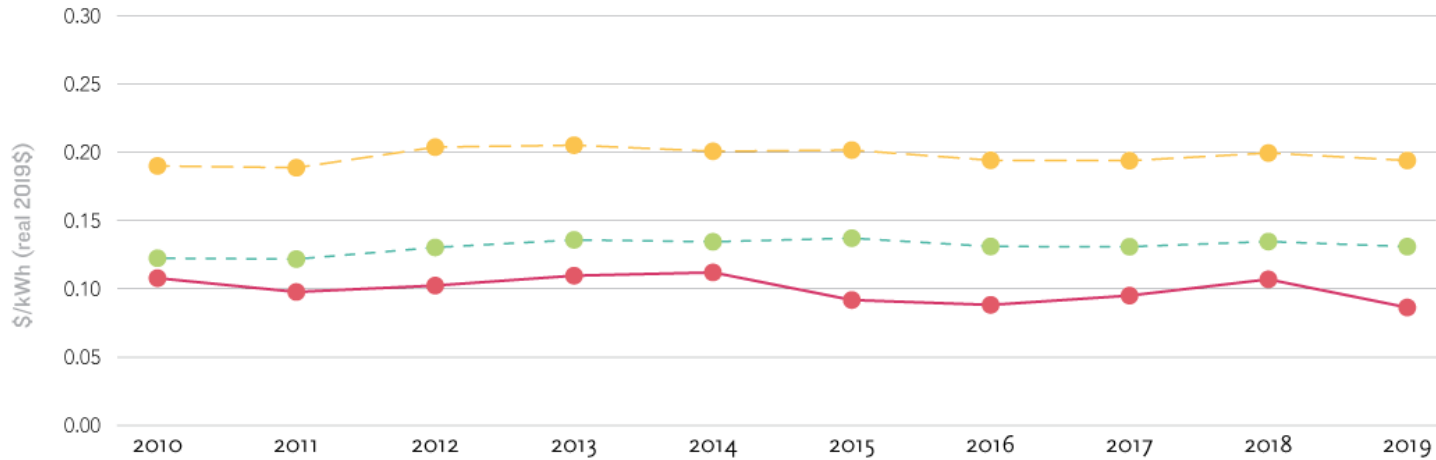
FIG 5 Household-Level Bill Impacts of BTM PV Incentives (\$/year)



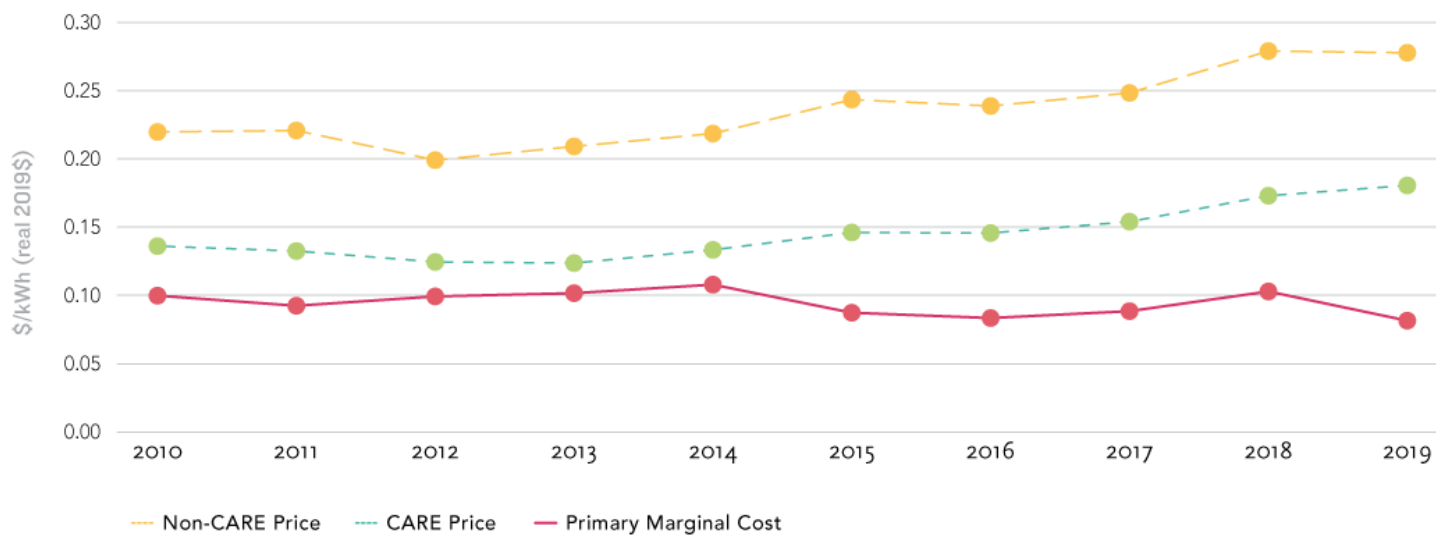
- Estimated bill impacts are based on average annual electricity consumption for CARE and non-CARE households, respectively.

Significant price-marginal cost gaps across all IOUs

b. SCE

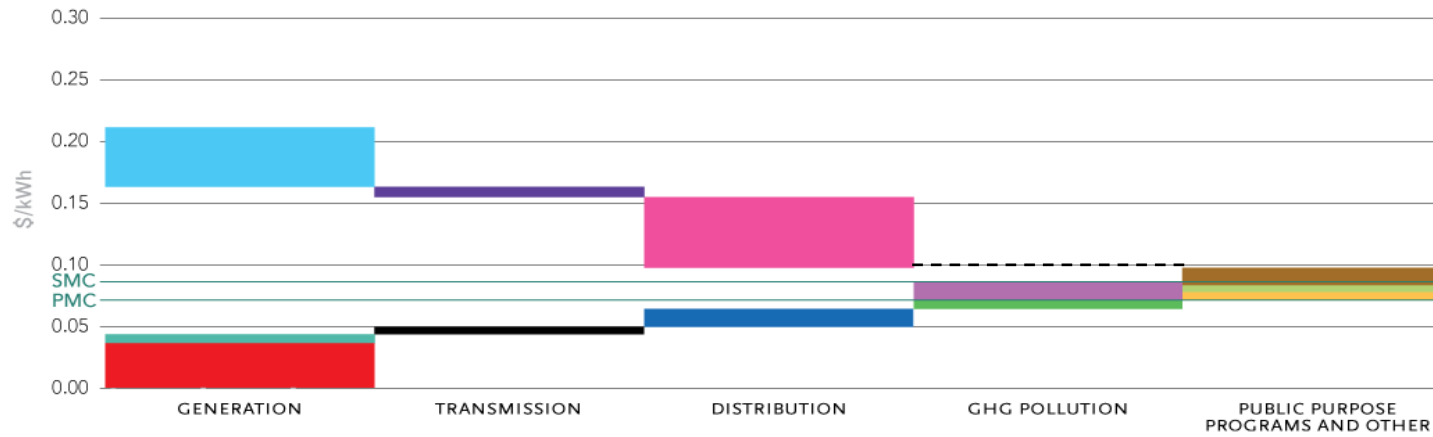


c. SDG&E



2019 residential price decomposition (\$/kWh)

b. SCE



c. SDG&E

