No Place Like Home : California

Saving money and creating jobs by electrifying America's households

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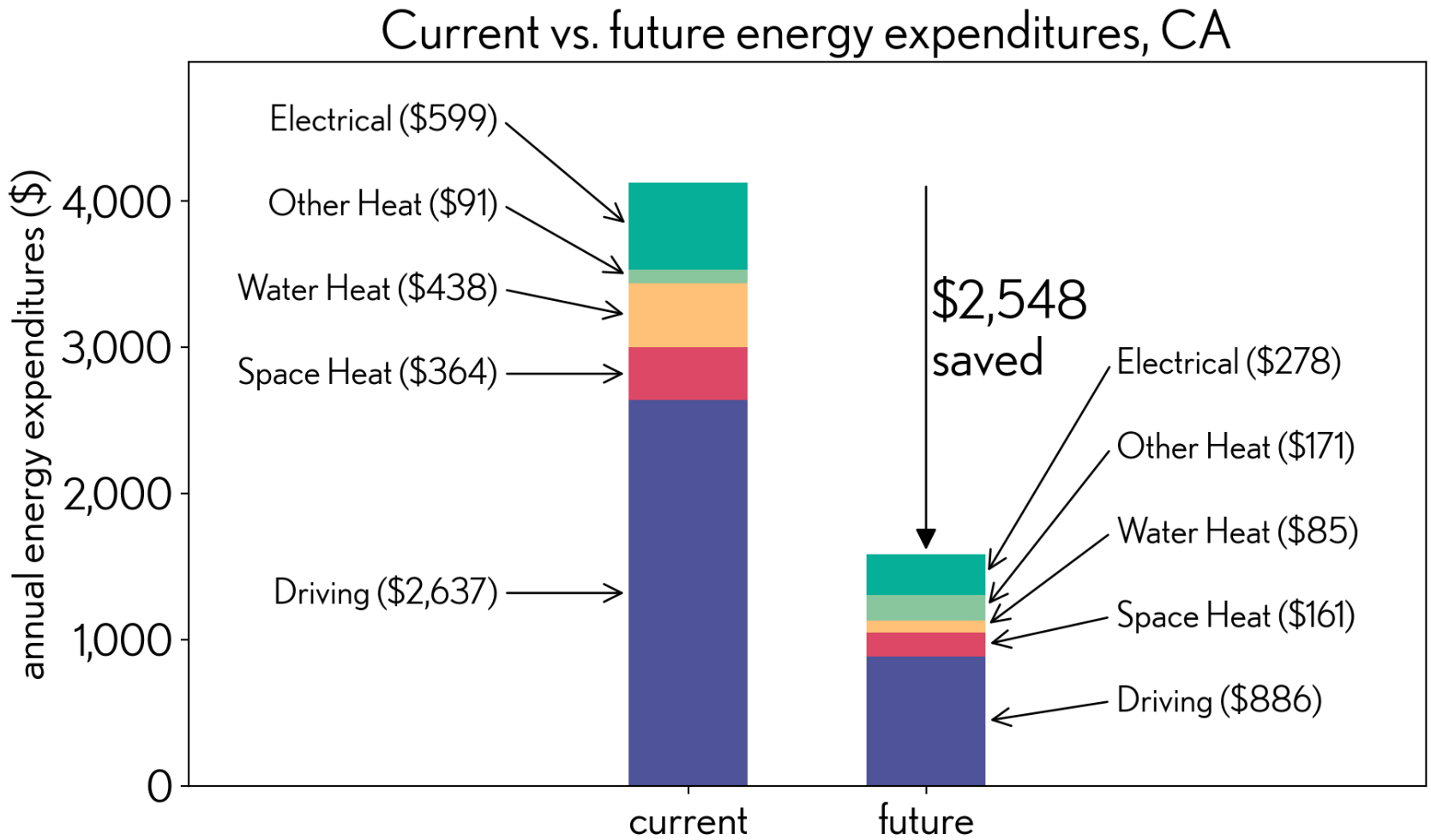
Electrifying California

- The average home in California currently spends $4,130 per year on all of their energy uses — space heat, water heat, cars and trucks, and electricity.
- Electrifying the households (including the vehicles) of California will create savings of $2,548 per household, every year.
- Electrifying the households of California will generate $34,016,000,000 of state-wide savings per annum.
- Electrifying the households of California will create 30,139 net new jobs.

Household savings from household electrification in California

By electrifying all energy use in the typical California household, we can see the potential for large annual household savings that could be realized as soon as 2025 if we get started today.



Modeling a clean energy future for your state.

Rewiring America has created forecasts of the rapid emissions reductions possible through electrification, detailing the inherent technological and economic advantages of this approach. In our "No place like home" study, we focus this work in the context of American households.

We chart a pathway of regulatory optimization, financing, industrial scale-up, and technology investments that not only eliminates 40-65% of our emissions by 2035, but saves the average American household around $2,500 per year.

To arrive at these results, we used detailed state-by-state data [1] and a model of future household energy use where we "electrify everything." The methodology can be seen in our detailed whitepaper hosted at RewiringAmerica.org.

[1] From the U.S. Energy Information Administration, U.S. Department of Transportation, and National Renewable Energy Lab, among others.

Households of the California future

Decarbonizing our households is simpler than people think. We can cut our emissions by electrifying the critical pieces of energy-using equipment in our lives. The technology to do so already exists and has the potential to save us all a substantial amount of money. The list of things to electrify actually isn't too long:

- Our vehicles
- Our space-heating systems
- Our water-heaters
- Our cooktops

These items need a little bit of supporting infrastructure:

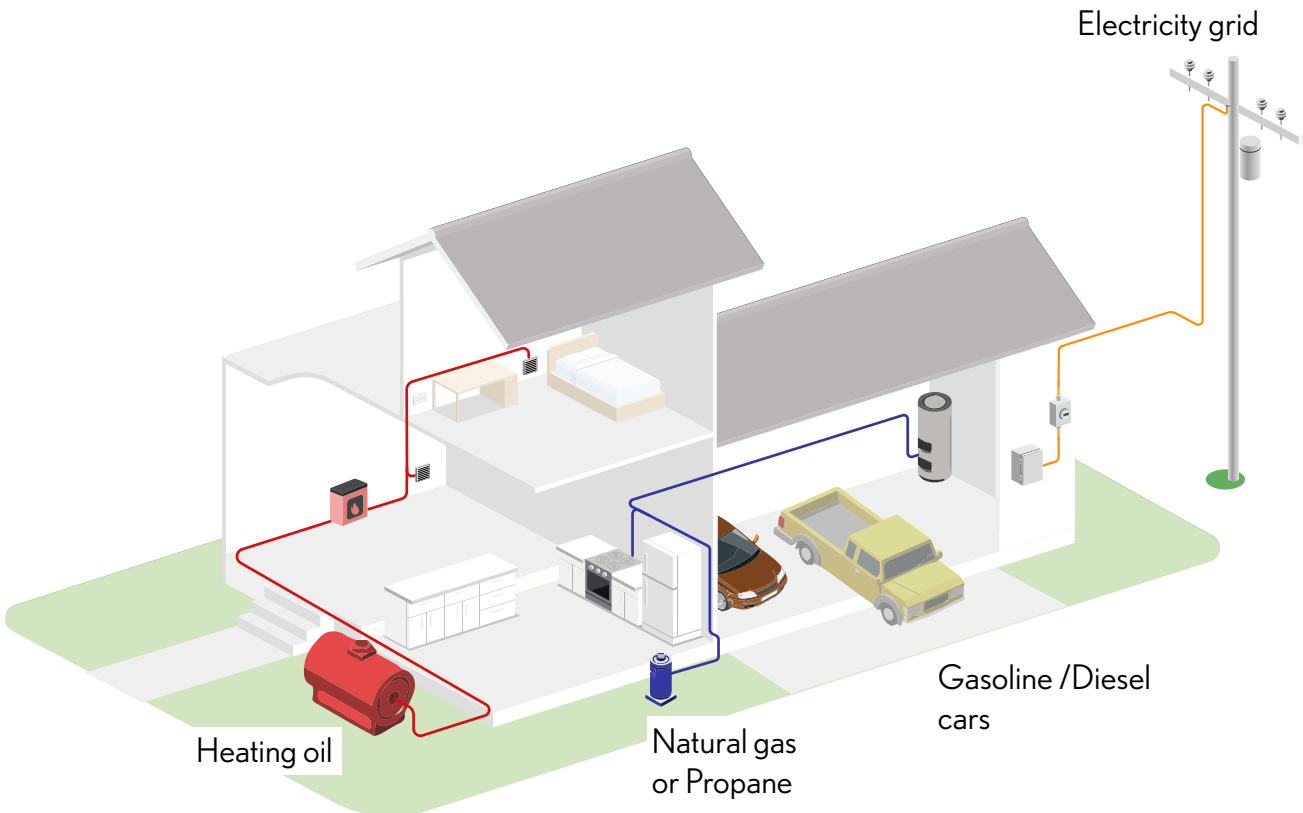
- Vehicle fast-chargers
- A home battery or batteries
- A load center upgrade

And in most places we can save the most money by powering them all with:

- Rooftop Solar

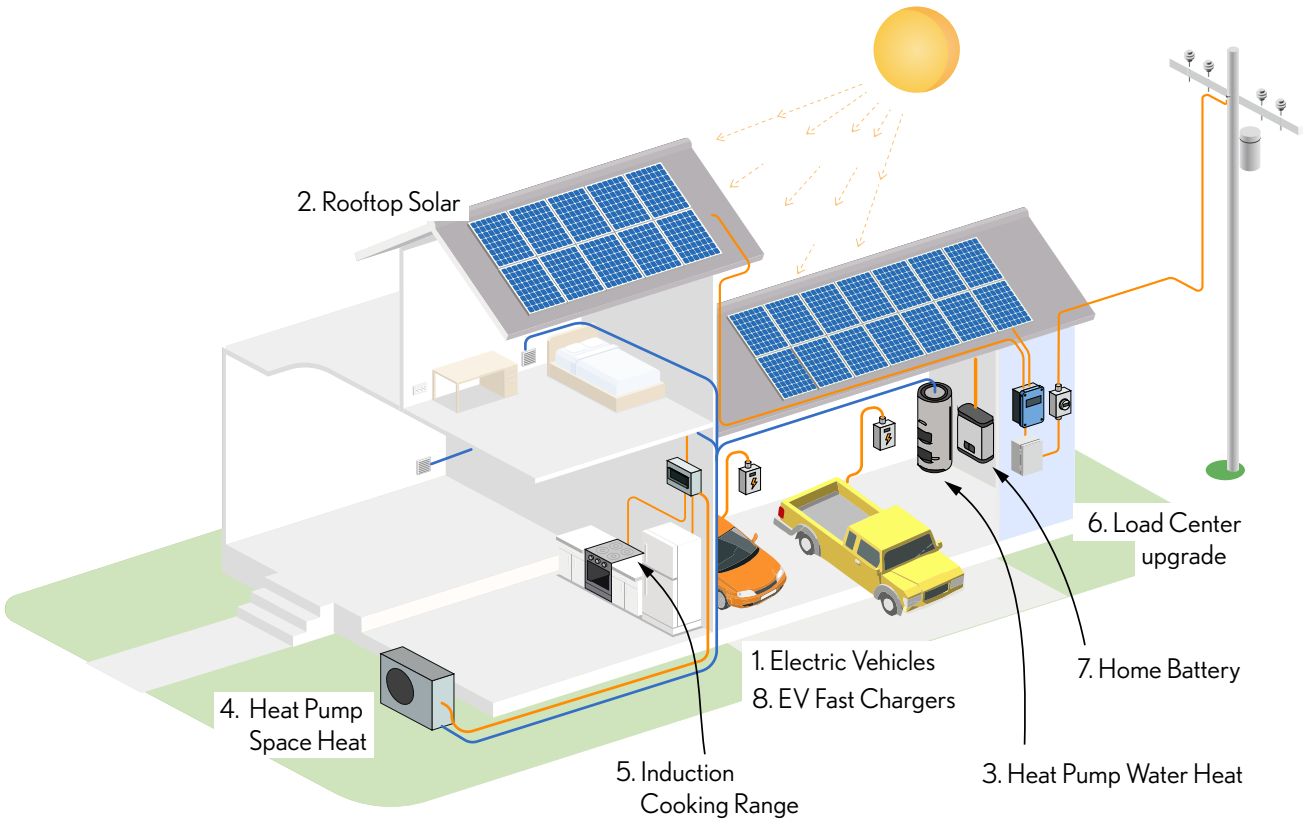
Current households

This is a cartoon of the fuel–burning infrastructure used to power households today: Gasoline or diesel powers most cars. Natural gas, fuel oil, or propane heats most homes. Natural gas is frequently used for cooking. Electricity lights up every home.



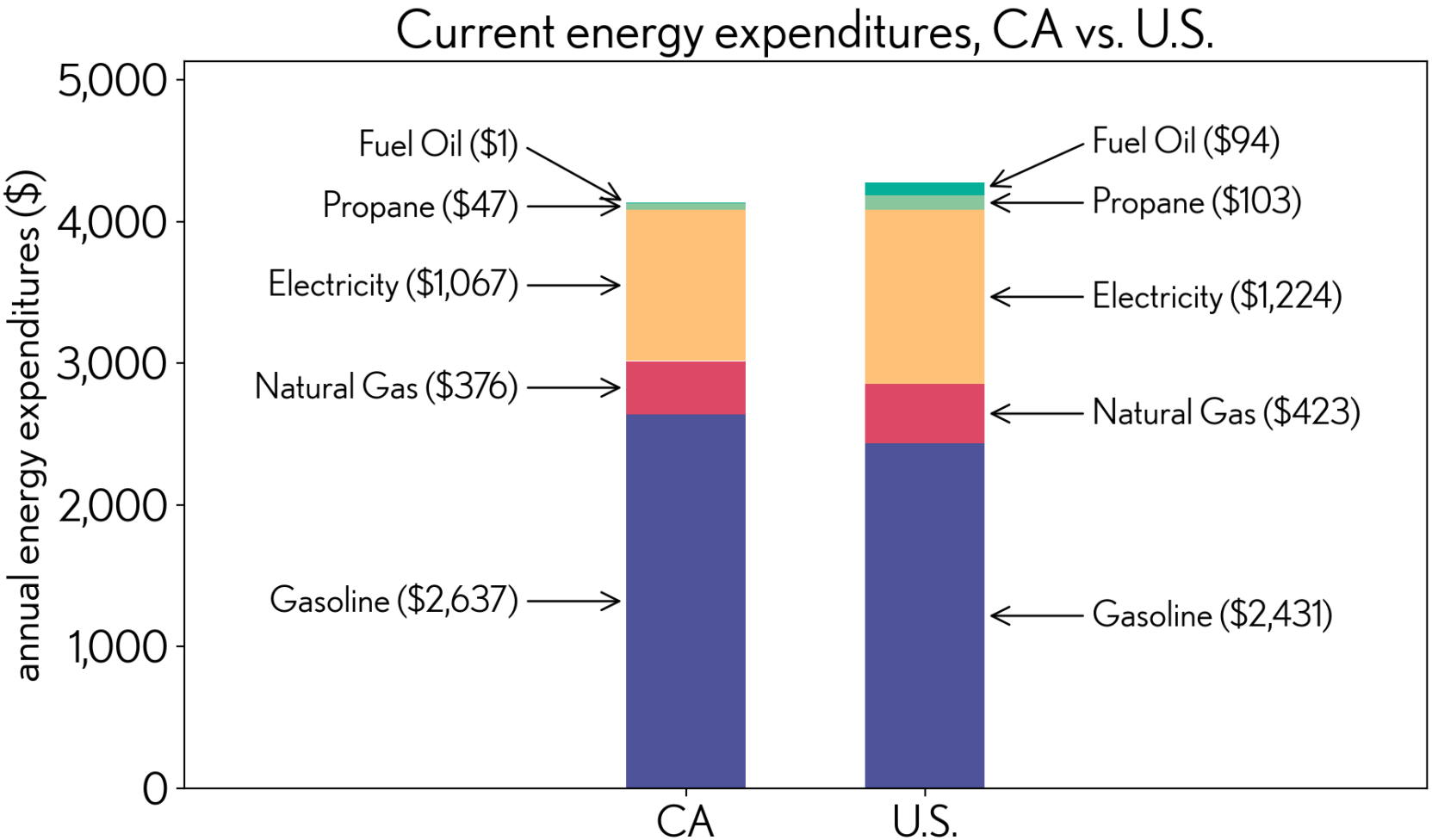
Future households

This is a cartoon of our electrified home infrastructure items, replacing the fossil fuel use above. Our houses and cars can stay the largely the same — we just need to power everything with electricity generated by renewable energy (mainly wind and solar).



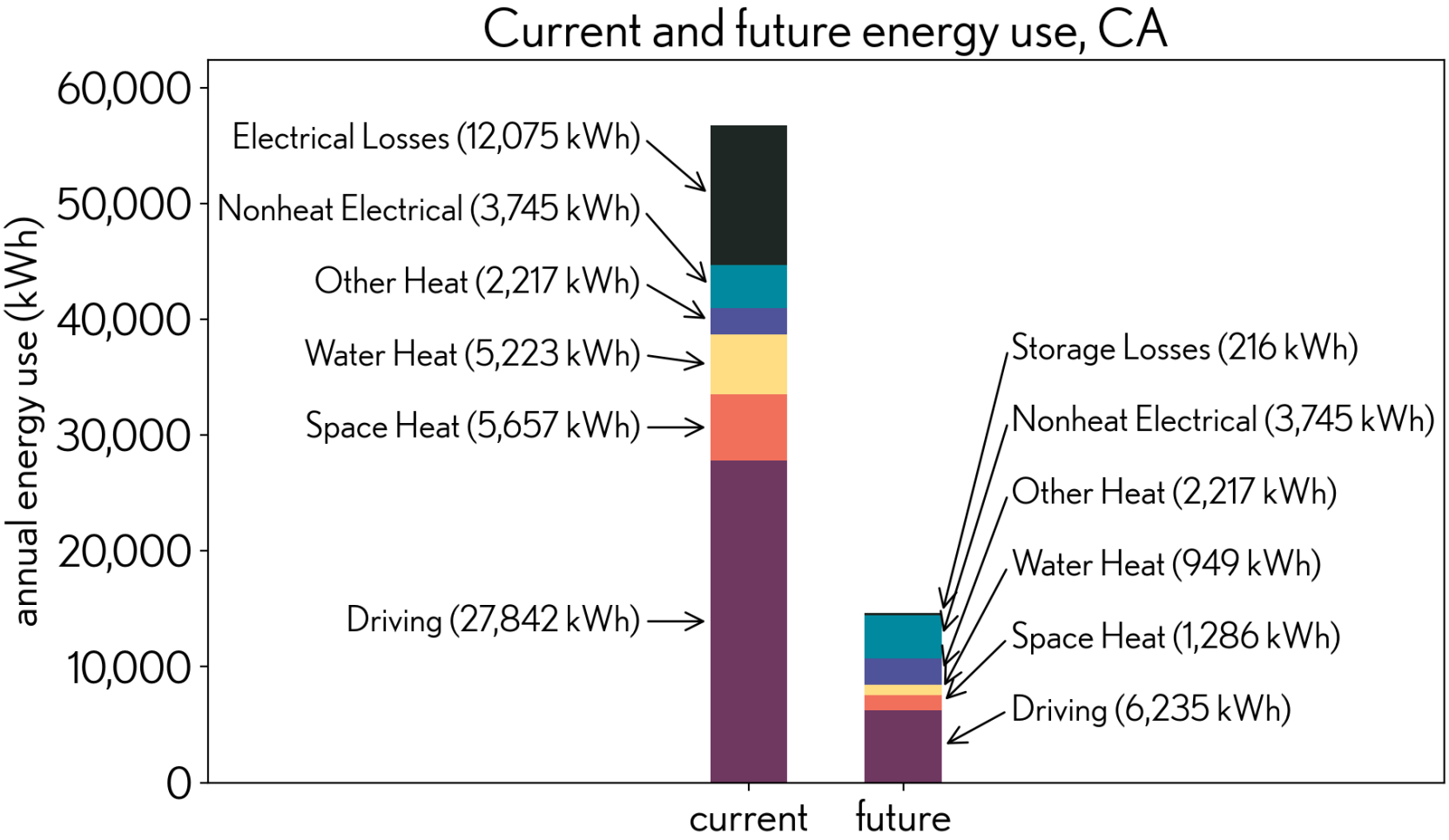
Household energy expenditures today

We can see today's average household costs of energy for California compared to the average U.S. home. Fossil fuels aren't cheap.



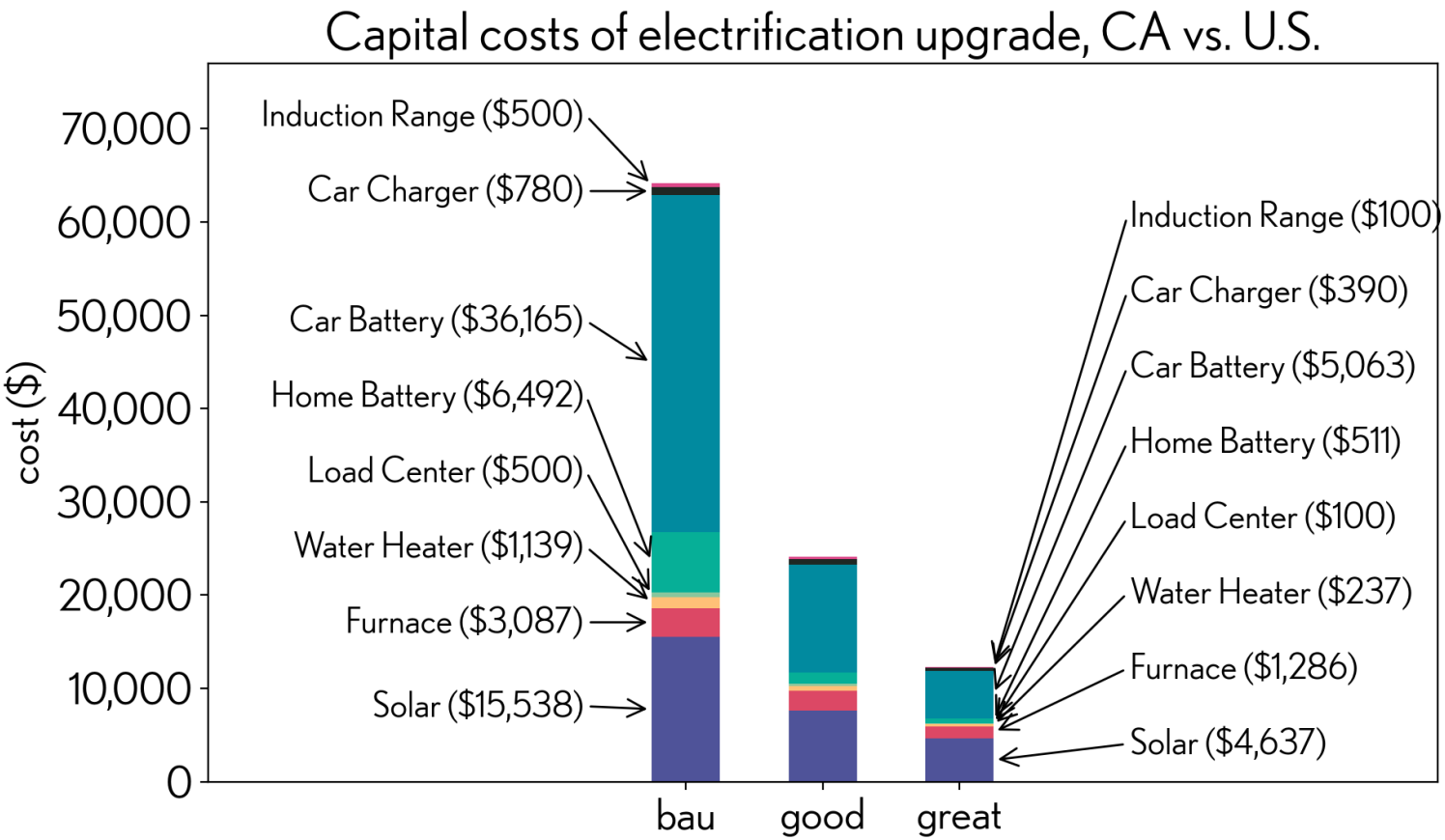
Current energy use vs. future energy use

Electrification, especially with clean or non-combustion sources, leads to significant efficiencies both in eliminating losses in electricity generation and in energy savings at the end use. This shows energy savings with the same–sized homes, same–sized vehicles, only electric, powered by clean electricity.



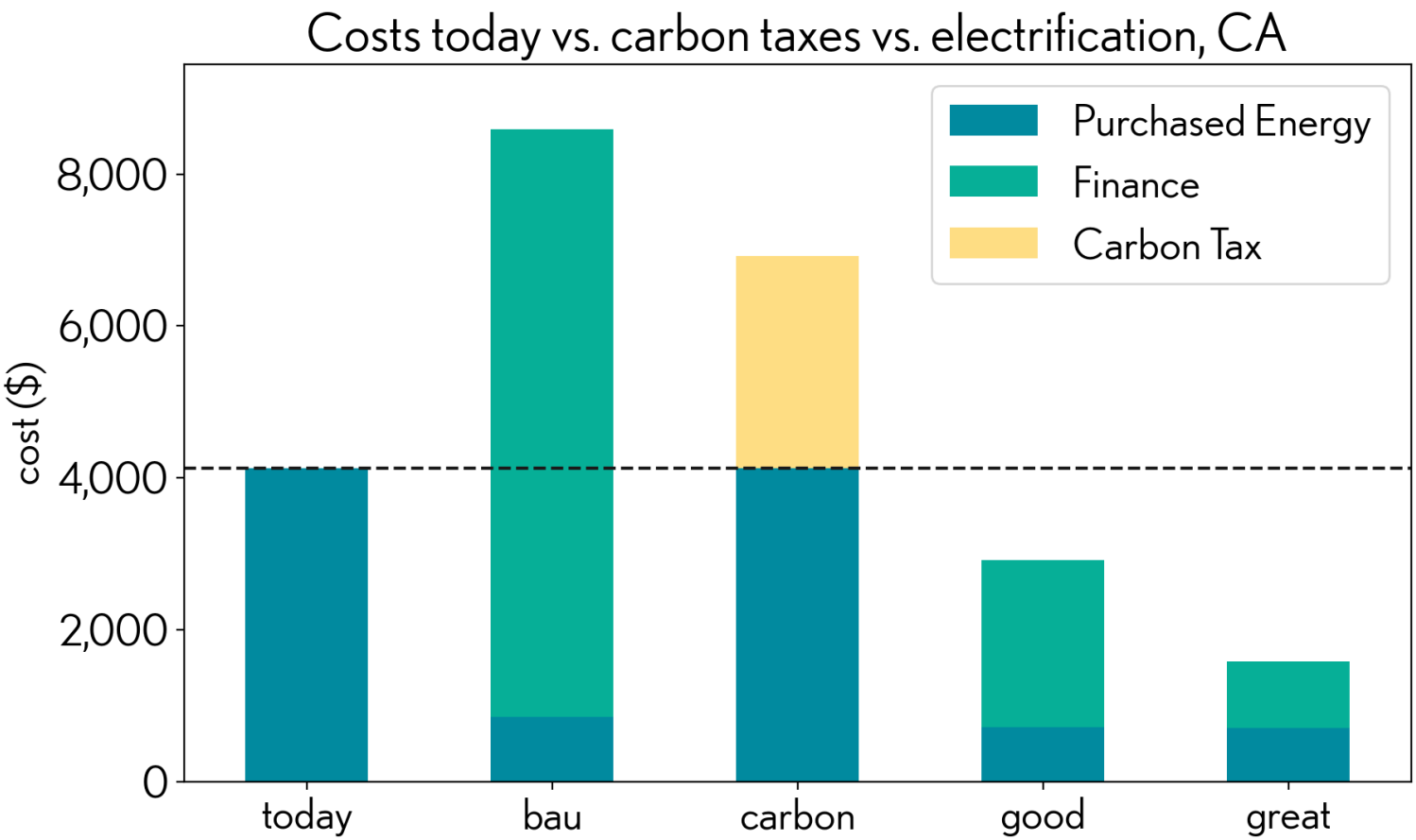
Capital costs

Critical to making electrification not only cost–effective, but a money saver, is lowering the cost of the upgrades. Batteries, solar, EV and heat pump prices are falling and will fall significantly further at the scale of deployment required in the US (130 million homes). Eliminating soft costs (for example regulatory, permitting, inspection, and installation costs) is an easy win that further lowers costs.



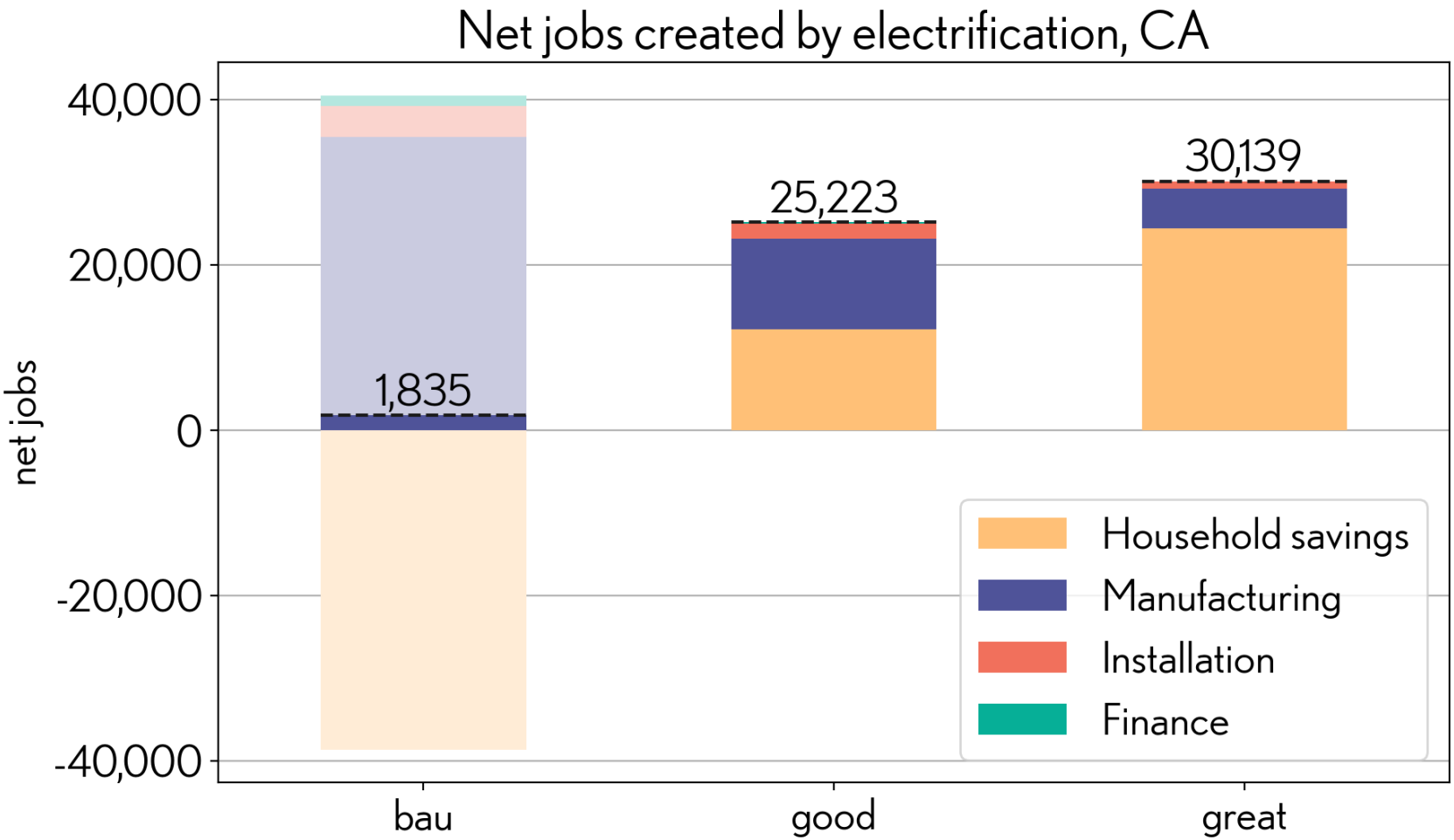
Comparison of energy costs

We can compare today's cost of energy for the average household in California (today) to the cost of electrifying that household today (BAU) to the cost of a carbon tax sufficient to fully sequester the carbon, to the good (2024 costs) and great (2028 costs) of energy for electrified households.



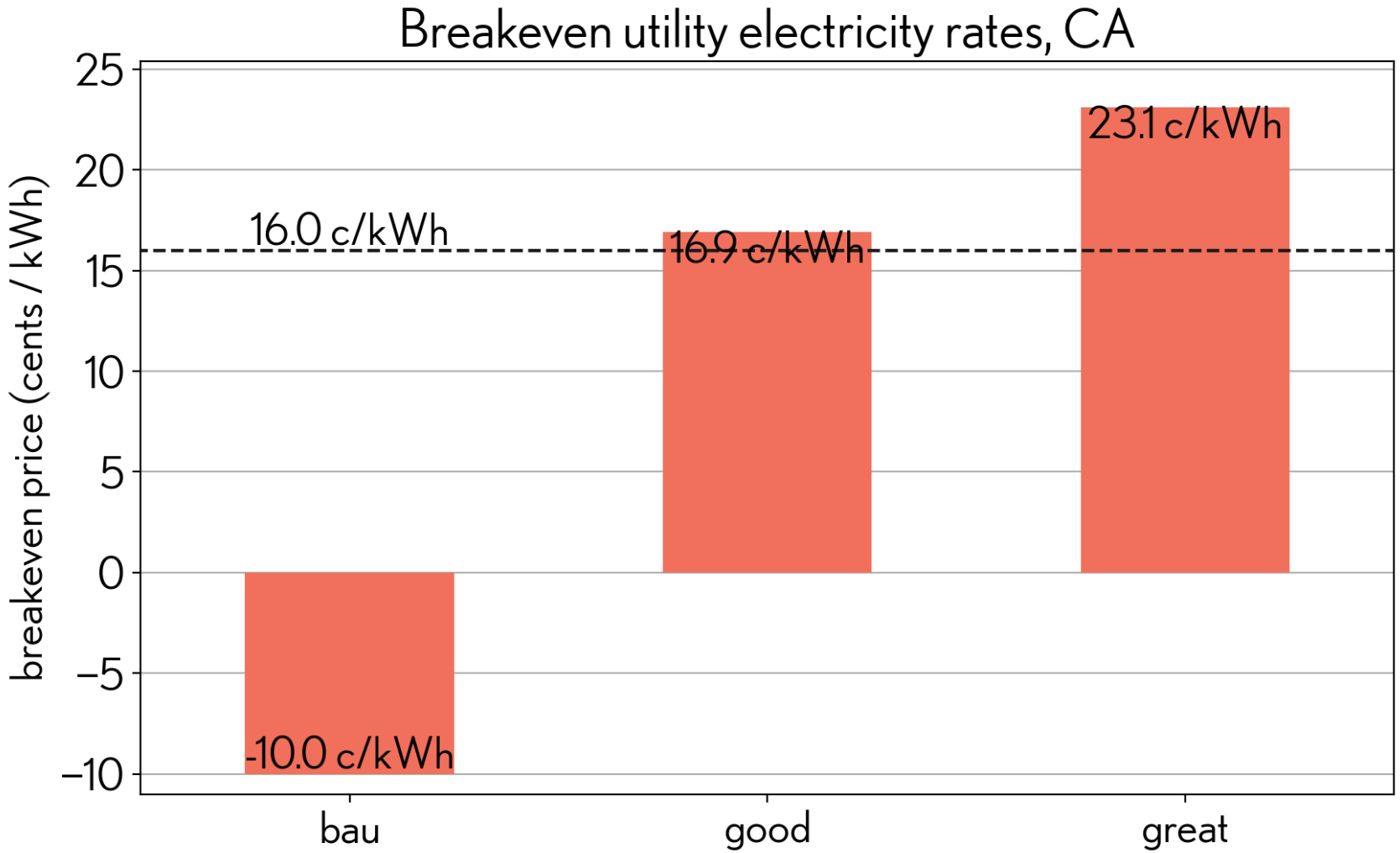
Net new jobs created in California by electrifying households.

We can model, using the IMPLAN database and traditional econometric methods, the numbers of net new jobs that will be created in California and what sectors those will be in.



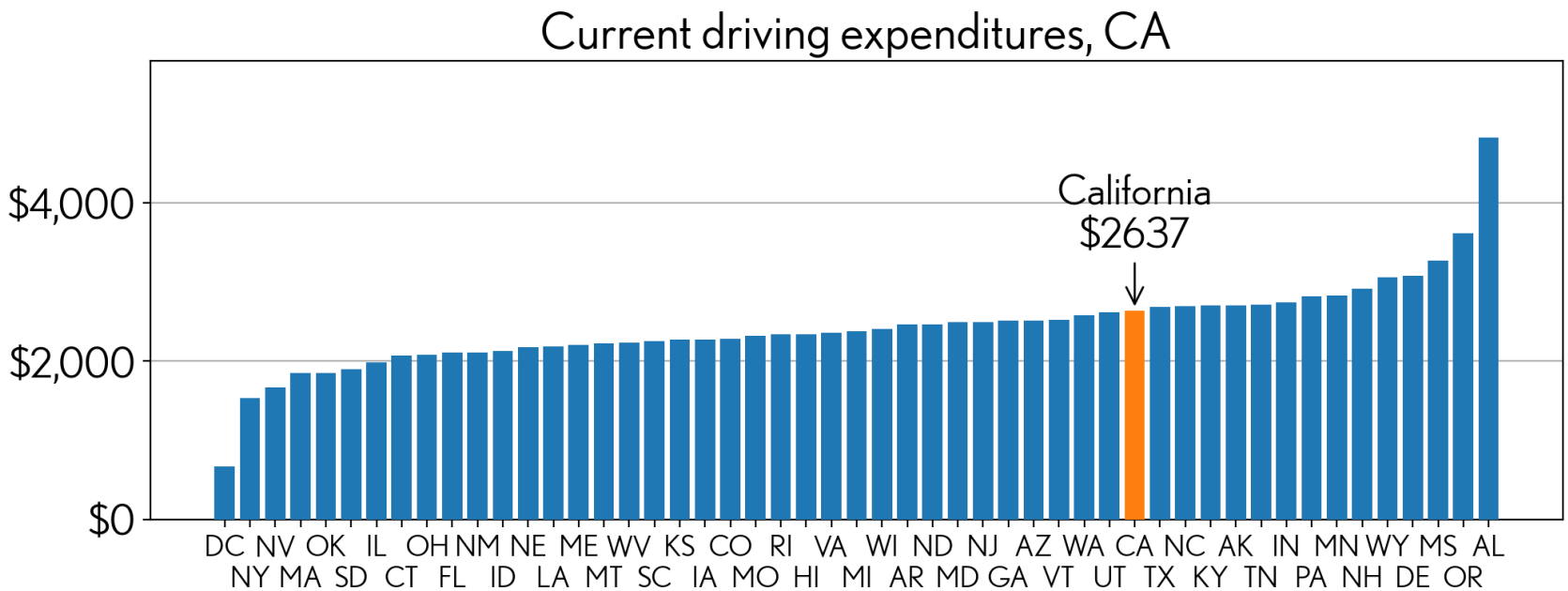
Break–even utility rates in California

Not every home will be able to install rooftop solar, so we also model the break-even rate for a household with utility–delivered electricity at its current rate. This is the highest price utilities can sell electricity for while households still break even.



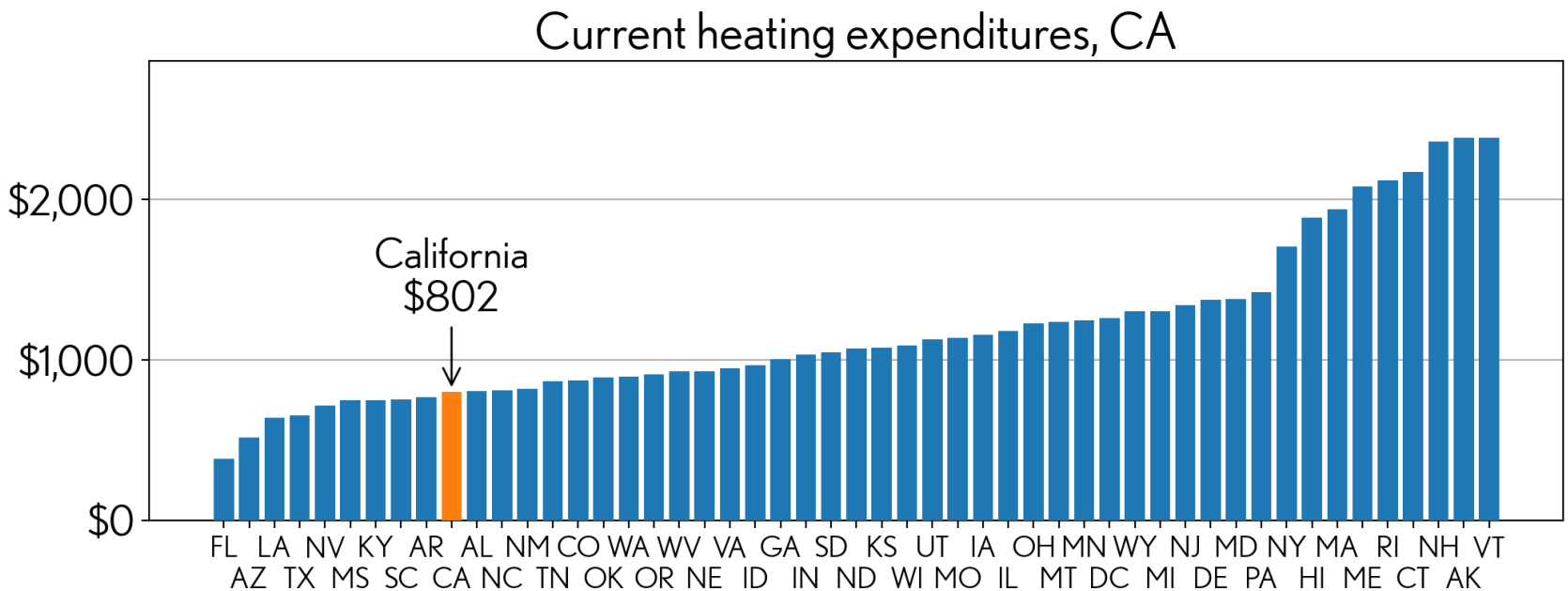
Comparing California to other states: Driving expenditures

Here we see how California compares to other states for current driving expenditures.



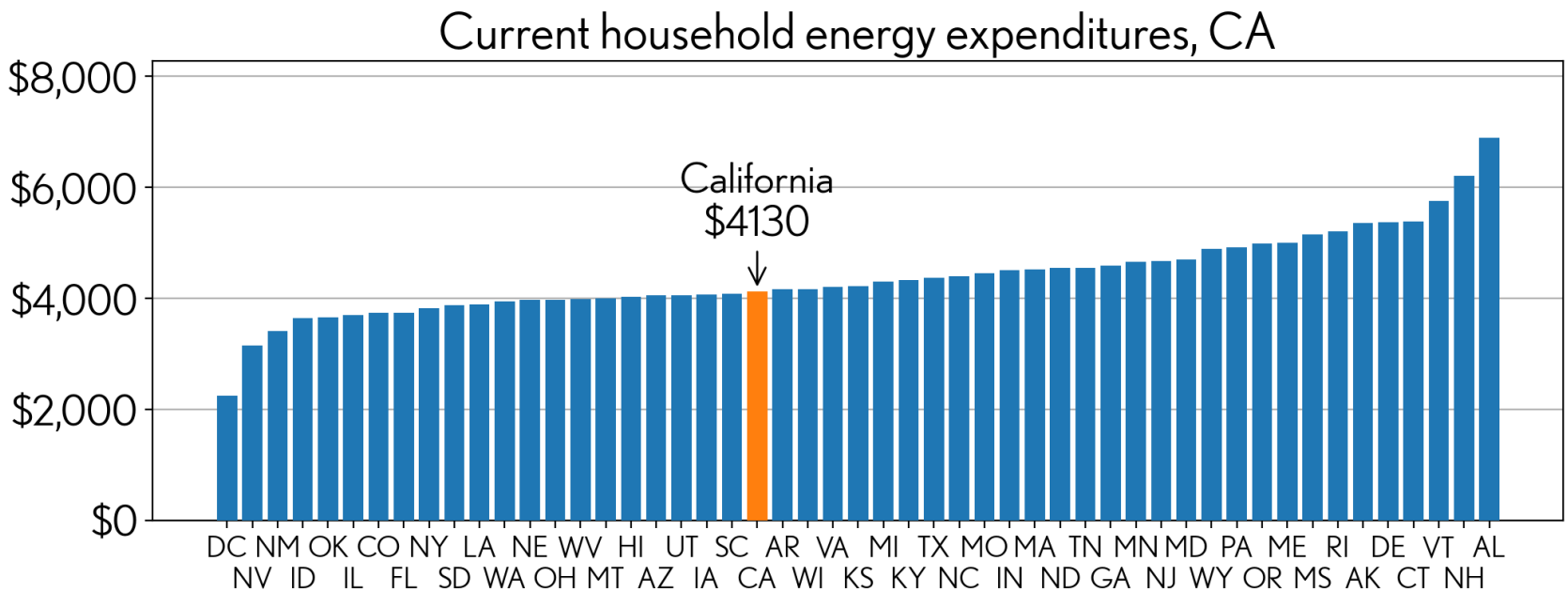
Comparing California to other states: Heating expenditures

Here we see how California compares to other states for current heating expenditures.



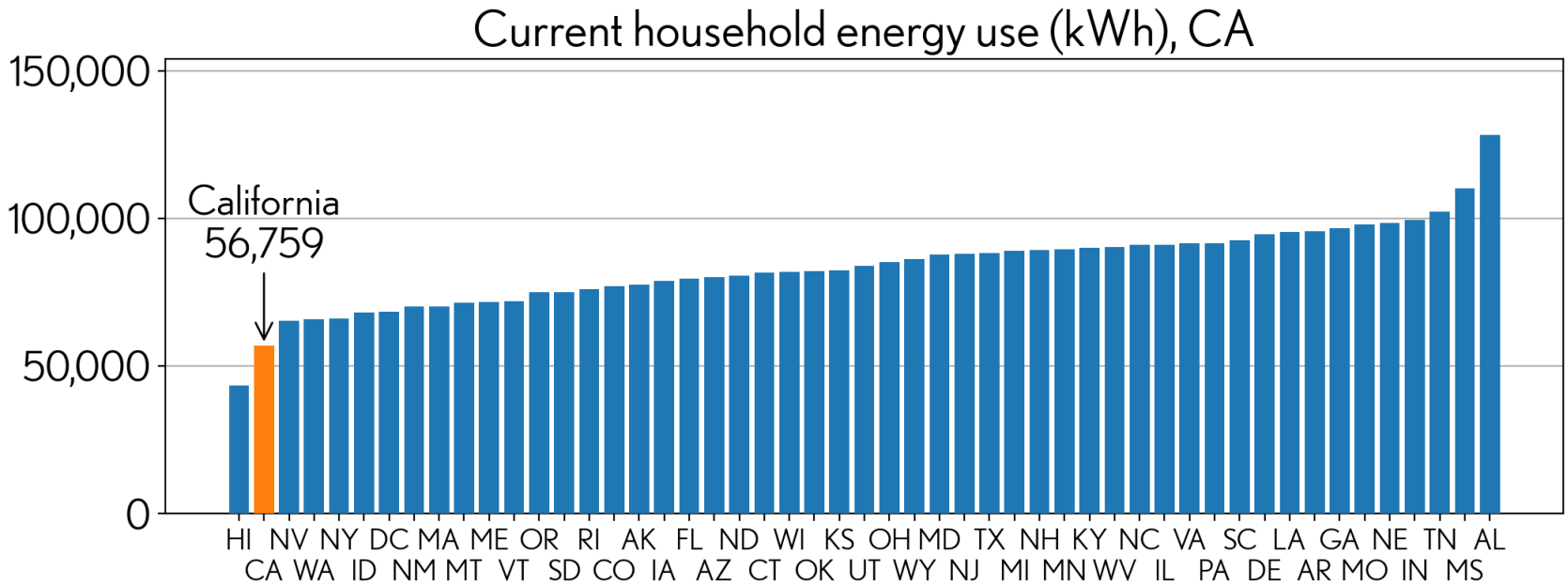
Comparing California to other states: Total energy expenditures

Here we see how California compares to other states for current total energy expenditures.



Comparing California to other states: Total energy use

Here we see how California compares to other states for current total energy use.



Author bios

Saul Griffith is an engineer, inventor, and Founder and Chief Scientist of Rewiring America. He is also Founder and Chief Scientist at Otherlab, an independent R&D lab, he helps government agencies and Fortune 500 companies understand energy infrastructure and deep decarbonization. He's been a principal investigator and project lead on federally-funded research projects for agencies including NASA, Defense Advanced Research Projects Agency (DARPA), Advanced Research Projects Agency–Energy (ARPA-e), National Science Foundation and United States Special Operations Command (SOCOM). He was awarded the MacArthur "Genius Grant" in 2007.

Sam Calisch is an engineer and scientist developing advanced manufacturing technologies for the decarbonization of our economy. He is a Research Fellow at Activate, and his current project, Elmworks, has received NSF and DOE funding to develop agile manufacturing of high performance electric motors. Sam earned his PhD in 2019 from Massachusetts Institute of Technology at the Center for Bits and Atoms, where he led successful technical collaborations within academia, in community fab labs, and with Global 500 companies. Before MIT, he worked at engineering R&D firm Otherlab, building analytical and computational tools for advanced manufacturing and energy projects. Sam also holds a M.S. from MIT and a B.A. from Grinnell College.