Driving Affordable Rates with EVs

California

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Over the past 14 years, electric vehicle drivers in California reduced pressure on electric rates by contributing $8.91 billion more in utility revenues than their associated electric system costs.

Evaluating the impact of electric vehicles (EVs) on the road today can help us understand their effect on the grid and how they might shape the power system in the future. This analysis examines utility costs versus revenues from EVs between 2011 and 2024 in California. When we also include the cost of utility EV programs, EV owners have contributed approximately **$7.61 billion**[1] more in revenues than in costs.

The widespread benefits EVs provide to utility customers are complemented by other societal benefits. EVs are responsible for far fewer greenhouse gases and local air pollutants than conventional gas vehicles[a] and become cleaner as more renewable electricity is added to the grid. In addition, EVs are generally much cheaper to operate than conventional vehicles, providing drivers relief from inflationary gasoline prices.[b]

Consumer demand for EVs continues to grow. By the end of 2024, more than 2 million EVs were on the road in California.[c] This transition has been accelerated by increasingly compelling vehicle offerings, complemented by public actions and supportive policies in recent years.[d] The new electricity load and flexible demand represented by these vehicles have major implications for our future energy system. This analysis demonstrates that electric vehicles have and can continue to put downward pressure on rates, benefiting everyone, especially when they charge during hours of the day when there is less demand on the grid.

Electricity Rates Can Improve Affordability

Recent growth in EV adoption has raised the question of how EVs affect the electricity rates paid by all households, including those that do not own EVs. Determining the effect of EVs on rates requires comparing electric utility revenues from EV charging against utility costs associated with serving EV load. If the utility revenues from EVs exceed the incremental utility system costs, then EV adoption can put downward pressure on electricity rates for all customers in California because of revenue decoupling, where revenues from electricity sales are returned back to offset costs for all customers.[e] Conversely, if the costs are greater than the revenues, non-EV owners could end up paying more for their electricity.

Multiple prospective studies have forecasted that utility revenues will exceed costs with future electrification.[f] However, this analysis uses real-world data to evaluate utility system revenues and costs associated with EVs purchased from 2011 to 2024 in California.

Specifically, this analysis tracks revenues and costs associated with over 2 million battery electric and plug-in hybrid EVs sold between 2011 and 2024 in California.[g]

For each year, Synapse analyzed the electricity rates that EV owners pay compared to the marginal cost of providing that electricity (generation, transmission, and distribution costs) plus the expenditures associated with utility EV programs. We used hourly marginal costs based on the California Public Utilities Commission (CPUC) Avoided Cost Calculator and load curves from

[1] All dollar values are in 2025 real dollars.

the CPUC Load Research Reports. We also use a database of EV program expenditures,[h] assuming that these investments will be paid off over 10 years.

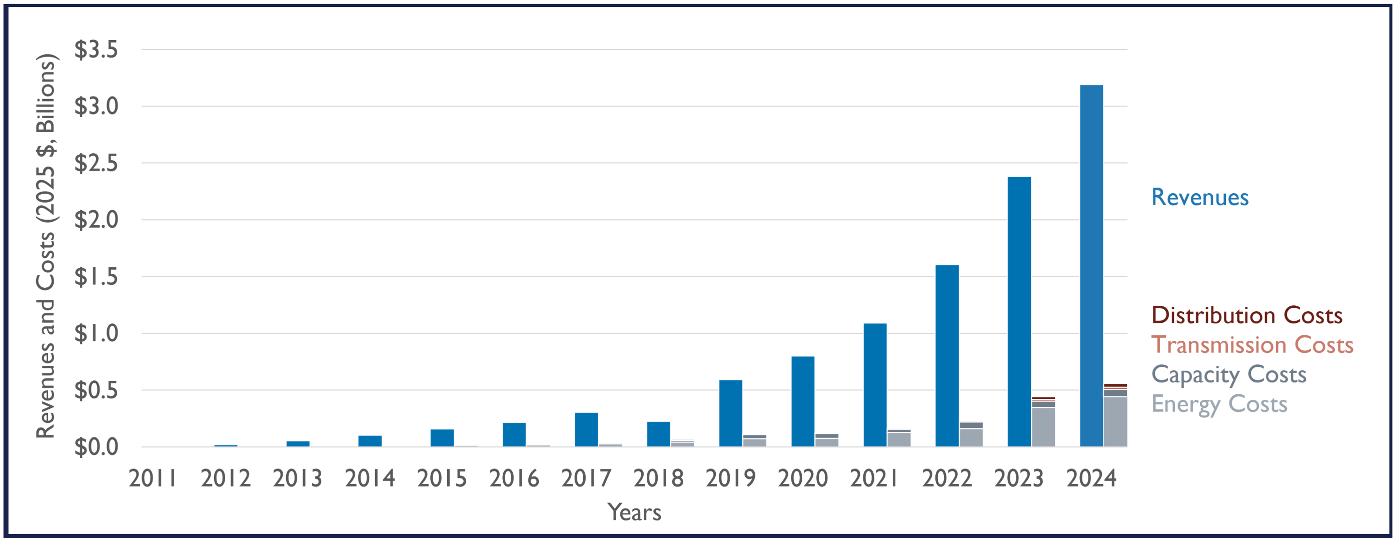
Impact of EV Charging on Electricity Rates in California

By comparing the revenues generated by EV charging to the utility's marginal cost to serve these EVs, we can construct a picture of whether EVs are creating more revenues than costs (driving down rates for everyone) or creating more costs than revenues (driving up rates for everyone). The results of our analysis indicate that in California,

EVs have increased utility revenues more than they have increased utility costs, leading to downward pressure on electric rates for EV-owners and non-EV owners alike.

We estimate that EV drivers across California have contributed $8.91 billion more in revenues than associated costs, cumulatively between 2011 and 2024, even assuming significant levels of on-peak charging. Figure 1 shows the extent to which revenues from EVs outweigh the generation (energy and capacity), transmission, and distribution costs for the period 2011-2024.

Figure 1. Total costs versus total revenues of EV charging in California, per year from 2011-2024.

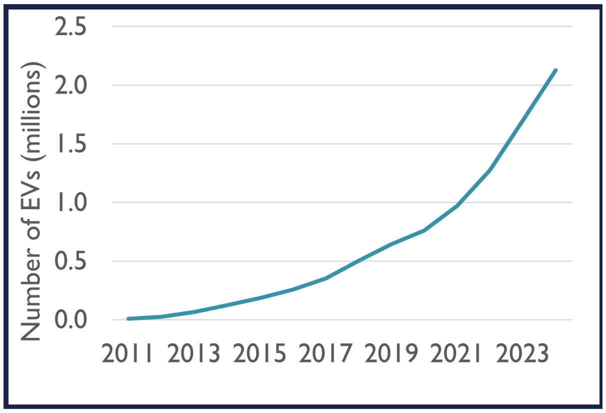


As electric vehicle adoption accelerates across the country, utilities are implementing programs to expand charging infrastructure and help accelerate electrification. Our analysis shows that in California, revenues created by EV charging support both the costs to serve EVs as well as EV programs themselves. When utility spending on EV programs is included in the analysis, EVs contributed $7.61 billion more in revenues than costs.

Tracking EV Adoption Across California

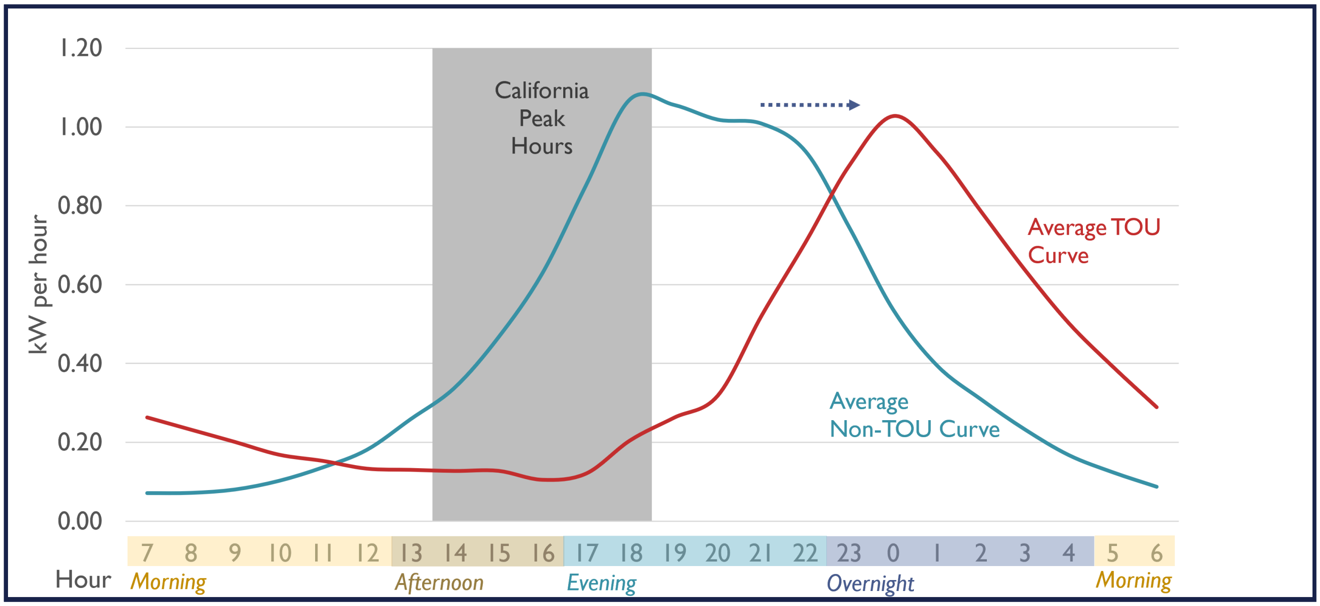
In 2011, which was the first year of our analysis, over 6,000 EVs were on the road in California. By 2024, the number of EVs surpassed 2 million[i] –more than a 300-fold increase from 2011.[j] As can be seen in Figure 2, EV adoption rates have accelerated rapidly in recent years; this trend is also evident in the revenues and costs, which closely track EV adoption.

Figure 2. Cumulative EV on the road in California, 2011-2024



Note: Figure 2 includes new EV sales and vehicle replacement of older vehicles.

Figure 3. Typical non-TOU EV charging curve versus the California TOU average EV charging curve, with California peak hours



EV Charging Patterns and Time-of-Use Charging

The time of day that EV charging occurs is a significant determinant of grid impacts and costs. If vehicles charge when demand is already high and electricity is the most expensive, EV load could exacerbate grid conditions, leading to more expensive generation coming online and potentially additional infrastructure investments. If EVs take advantage of low overnight demand or plentiful solar power in the afternoon, they can improve the economic and environmental performance of the power system.

For this analysis, we assume the majority of EVs are charged at home and mostly in the early evening at the end of the workday. This hourly use pattern was developed by the DOE's Alternatives Fuels Data Center,[k] representing charging patterns of EVs not taking service on time-of-use rates (which is consistent with the vast majority of EVs on the road in California).

For this analysis, we assume the majority of EVs are charging mostly at home and overnight. This hourly use pattern is most typical of the charging patterns of California EVs taking service on time-of-use rates (which represents a large number of EVs on the road currently in California). Time-of-use tariffs affect the costs that consumers pay depending on when they use electricity and can incentivize consumers to use electricity when it is least expensive for everyone (i.e. when there is less overall demand on the grid). Figure 3, below, shows the average daily charging curve for EVs on TOU rates in California alongside average charging curves for EV owners on non-TOU rates.[l] The grey shaded area represents the hours in California when the electric grid peaks[m] and when electricity is most expensive.

As Figure 3 shows, the price signals provided by the TOU rates shift typical EV charging from times of peak use to overnight periods, when demand is typically low. This shift reduces costs to EV owners and operators for charging their vehicles, while also more efficiently using electricity infrastructure and reducing costs for everyone.

A key reason why revenues from EVs outweigh the costs is that EV customers — particularly those on TOU rates — tend to charge during off-peak hours. By charging during off-peak hours, EVs impose minimal additional costs on the grid and help to utilize resources more efficiently. In fact, a report published in 2019 by Lawrence Berkeley National Laboratory, PG&E, and the Natural Resources Defense Council shows that shifting EV charging to off-peak times could allow the grid to accommodate all homes having EVs without upgrading most parts of the distribution system.[n]

EVs Can Continue to Put Downward Pressure on Rates and Improve Affordability

EVs can provide substantial emissions reductions while also helping to reduce electricity rates for all customers by using the system more efficiently. Utilities can play an important role in ensuring that EVs maximize benefits for both EV drivers and non-EV drivers alike by encouraging EV customers to enroll in TOU rates and charge during off-peak periods. In addition, utility investments that facilitate the deployment of charging infrastructure can accelerate the EV market, growing the potential benefits from widespread EV adoption.

Our analysis indicates that EV adoption in California has already resulted in more electricity revenues than costs, and future growth in the EV market will lead to further increases in utility revenues. Further implementation of TOU rates and targeted investments in charging infrastructure can accelerate EV adoption, reducing utility bill costs and harmful emissions for EV and non-EV owners alike.

This factsheet is part of a series of state-specific factsheets, based off a national analysis of the rate impact of EVs. More information can be found at: https://www.synapse-energy.com/evs-driving-affordable-rates.

Endnotes

[a] Rocky Mountain Institute (2022). More EVs, Fewer Emissions. Available at: https://rmi.org/insight/more-evs-fewer-emissions.
[b] Taylor, T., Rosenburg, J. (2022). Total Cost of Ownership Analysis. Atlas Public Policy. Available at: https://atlaspolicy.com/wp-content/uploads/2022/01/Total-Cost-of-Ownership-Analysis.pdf
[c] Alliance for Automotive Innovation (2025). Advanced Technology Vehicle Sales Dashboard. Data retrieved December 2025. Available at https://www.autosinnovate.org/resources/electric-vehicle-sales-dashboard.
[d] For example, in 2022, California adopted the Advanced Clean Cars II regulations that requires 100% of new passenger vehicles meet zero-emission standards (including plug-in hybrids) by the 2035 model year. Available at: https://ww2.arb.ca.gov/our-work/programs/drive-forward-light-duty-vehicle-program/advanced-clean-cars
[e] S&P Market Intelligence. November 12, 2019. RRA Regulatory Focus Adjustment Clauses.
[f] For example, see: Public Advocates Office, Distribution Grid Electrification Model – Study and Report, 2023, available at https://www.publicadvocates.cpuc.ca.gov/-/media/cal-advocates-website/files/reports/230824-public-advocates-distribution-grid-electrification-model-study-and-report.pdf, and California Public Utilities Commission, Utility Cost and Affordability of the Grid of the Future: An Evaluation of Electric Costs, Rates, and Equity Issues Pursuant to P.U. Code Section 913.1, 2021. Available at: https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/office-of-governmental-affairs-division/reports/2021/senate-bill-695-report-2021-and-en-banc-whitepaper_final_04302021.pdf
[g] Alliance for Automotive Innovation (2025). Advanced Technology Vehicle Sales Dashboard. Data retrieved December 2025. Available at https://www.autosinnovate.org/resources/electric-vehicle-sales-dashboard.
[h] Atlas EV Hub. Electric Utility Filings. Available at: https://www.atlasevhub.com/materials/electric-utility-filings/
[i] Alliance for Automotive Innovation (2025). Advanced Technology Vehicle Sales Dashboard. Data retrieved December 2025. Available at https://www.autosinnovate.org/resources/electric-vehicle-sales-dashboard.
[j] Assumed survival rates from the EPA's mid-term evaluation of the Light Vehicle Greenhouse Gas Emissions Standards and Corporate Average Fuel Economy Standards. Oak Ridge National Laboratory, January 2022. Transportation Energy Data Book, Edition 40, Table 3.15. Available at: https://tedb.ornl.gov/data/
[k] Department of Energy, Alternative Fuels Data Center. Electric Vehicle Infrastructure Projection Tool (EVI-Pro) Lite. Data retrieved December 2025. Available at: https://afdc.energy.gov/evi-pro-lite
[l] National load curve developed using data from DOE's EVI-Pro Lite tool. We took an average of the load curves from each state's largest city, weighted by number of registered EVs per state. Department of Energy, Alternative Fuels Data Center. Data retrieved July 2023. Electric Vehicle Infrastructure Projection Tool (EVI-Pro) Lite. Available at: https://afdc.energy.gov/evi-pro-lite.
[m] System peaks from 2019 – 2021. Peak load data from U.S. Energy Information Administration, form 930.
[n] Coignard et al., "Will Electric Vehicles Drive Distribution Grid Upgrades?: The Case of California". June 5, 2019. Institute for Electrical and Electronics Engineers. Available at https://ieeexplore.ieee.org/document/8732007.