



Public Advocates Office study on the costs of upgrading the distribution grid for electrification

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SUMMARY

The Public Advocates Office is finalizing a study of the costs of upgrading the distribution grids of the three largest investor-owned utilities¹ to meet California's transportation electrification goals. Our preliminary results indicate that the total cost of upgrading the distribution grid by 2035 will be approximately \$15 billion to \$20 billion. This is approximately one third of the costs identified by a similar study conducted by Kevala, a consultant engaged by the California Public Utility Commission (CPUC). We intend to complete our study in August 2023.

BACKGROUND

As purchases of electric vehicles (EV) in California increase, the utilities' electricity distribution grid will need to be upgraded to support the additional EV charging infrastructure that will be required.

Forecasting the costs of these upgrades is critical to better inform electricity distribution grid planning, understand the potential future impacts to electric ratepayers, and quantify the potential benefits of incentives designed to encourage EV owners to charge at off-peak times when electricity prices should reflect lower system costs.

The Kevala study published on May 9, 2023, titled the *Electrification Impacts Study Part 1*,² preliminarily estimates that up to \$50 billion would be needed by 2035 to upgrade the utilities' distribution grids. In contrast, our study shows a preliminary cost estimate of one third the costs of Kevala's preliminary estimate.

CAL ADVOCATES' STUDY

Cal Advocates is undertaking a study of the estimated costs needed to upgrade the distribution grid to meet California's transportation electrification goals. Our methodology involves using

¹ Pacific Gas and Electric Company, San Diego Gas & Electric Company, and Southern California Edison Company.

² The Kevala study is docketed at: <https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M508/K423/508423247.PDF>. See also the Commission's rulemaking page at: <https://www.cpuc.ca.gov/industries-and-topics/electrical-energy/infrastructure/distribution-planning>.

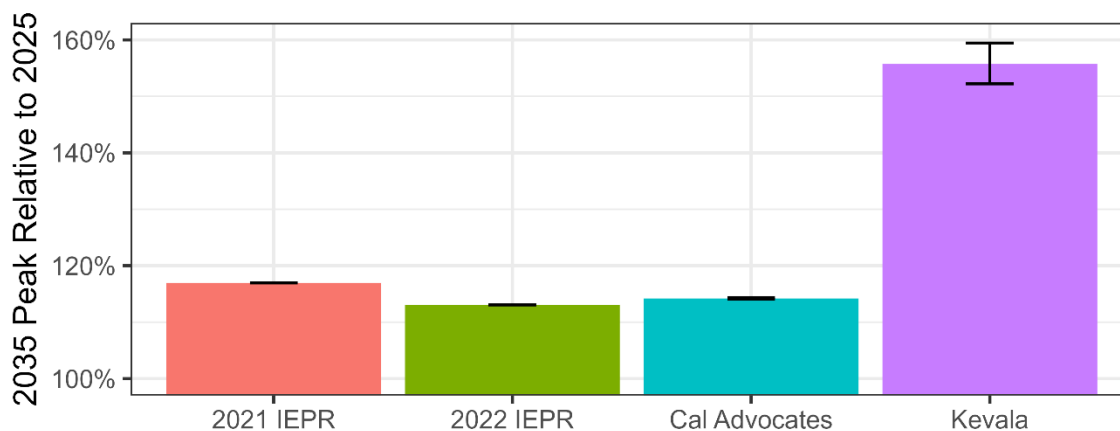
the registered address of every vehicle in California to estimate where electric vehicle uptake is likely to occur up to 2035. We use these locations to model what the additional charging load on the distribution grid will be. We then use this additional load data as the basis for determining where grid capacity will be exceeded and the cost to upgrade the distribution system in order to provide sufficient capacity.

Based on our preliminary study results, we estimate that through 2035, the costs to upgrade the electric distribution grid system could be in the range of \$15 billion to \$20 billion. We anticipate our study will be completed by August 2023.

KEY DIFFERENCES BETWEEN CAL ADVOCATES' STUDY AND KEVALA'S STUDY

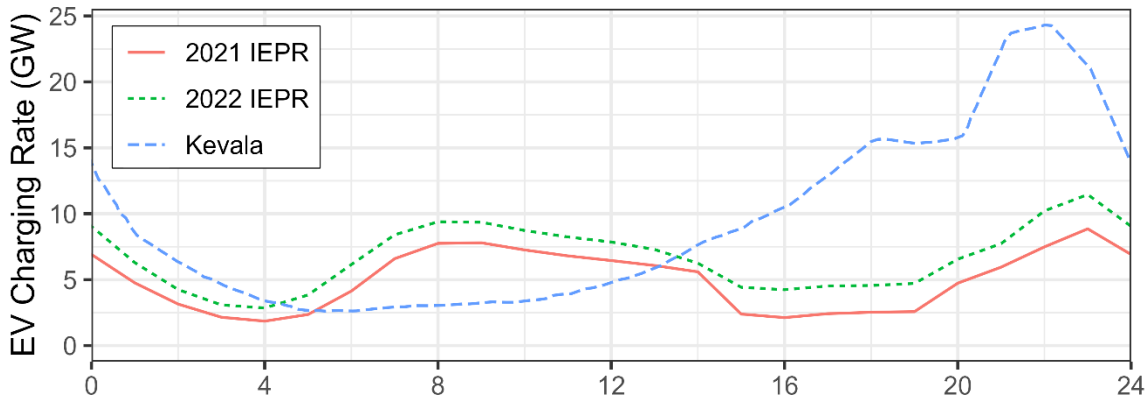
The difference between our preliminary cost estimate and Kevala's higher cost estimate stems from Kevala's forecast of a larger growth in peak load. Our peak load forecast is drawn from, and aligned with, the California Energy Commission's Integrated Energy Policy Report (IEPR); Kevala's peak load is the result of its unique model and assumptions. Figure 1, below, compares two IEPR forecasts to Cal Advocates' and Kevala's forecasts of peak load growth.

Figure 1: Peak load forecast comparison: 2035 peak load divided by 2025 peak load.



Kevala's higher growth in peak load appears to be caused by the times at which Kevala predicts EVs will be charged (the "load profile") relative to our source, the IEPR. Kevala predicts a significant peak in EV charging at 9 pm, driven by non-EV time of use rates which fall at 9 pm. The IEPR, which Cal Advocates uses, forecasts that EV charging occurs much more evenly across the day. As peak load is a key driver of the need to upgrade the distribution grid, Kevala's higher peak load growth forecast drives Kevala's higher costs. Figure 2 compares Kevala's and the IEPR's EV charging load profiles.

Figure 2: Peak day EV charging load profile used by Kevala and the 2021 and 2022 IEPRs.



In addition to the *shape* of the load profile, Kevala also forecasts that the *total* energy consumed in charging EVs will be 40% higher on the peak day than in the IEPR or in Cal Advocates’ study. Higher charging energy contributes to the difference in the peak loads and results in higher cost estimates.

FURTHER WORK AND NEXT STEPS

As noted above, the Cal Advocates’ study is not yet complete. We will continue to refine our analysis for completion in August 2023. We believe it is of paramount importance to understand the operational and cost implications of increased electrification to ensure system planning is undertaken optimally and that the most cost-effective approaches are taken. Studies that undertake this effort should use robust data, be explicit about the assumptions used, and be thoroughly vetted through stakeholder engagement. With this in mind, we welcome broad input and will engage with a wide range of stakeholders as we complete our study. Our study results will also be available to Kevala as it refines its analysis for *Electrification Impacts Study Part 2*. No single study or pair of studies, particularly this early in the electrification process, can definitively answer such a complex question as what the costs of distribution grid upgrades will be. Cal Advocates’ study aids the continuous discourse on electrification costs and benefits rather than establishing a final cost projection.

The Public Advocates Office represents utility customer interests before the California Public Utilities Commission and other forums. We develop recommendations that advance the state's climate goals in the most affordable ways for ratepayers. For more detailed information, please contact us at publicadvocatesoffice@cpuc.ca.gov or visit our website at www.publicadvocates.cpuc.gov.