Application No: R.22-07-005

Exhibit No.: NRDC-TURN-02

Witnesses: Mohit Chhabra, Sylvie Ashford

REBUTTAL TESTIMONY OF MOHIT CHHABRA AND SYLVIE ASHFORD, SPONSORED BY THE NATURAL RESOURCES DEFENSE COUNCIL AND THE UTILITY REFORM NETWORK ADDRESSING OPTIONS FOR AN INCOME-GRADUATED FIXED CHARGE

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I. INTRODUCTION (SA & MC)

The Natural Resources Defense Council (NRDC) is a non-profit membership organization with more than 95,000 California members who have an interest in receiving affordable energy services while reducing the environmental impact of California's energy consumption and achieving California's environmental goals cost-effectively and equitably. The Utility Reform Network (TURN) is a non-profit ratepayer advocacy organization representing the interests of the residential customers served by California utilities. This testimony is jointly sponsored by Sylvie Ashford (SA) and Mohit Chhabra (MC) of NRDC on behalf of both NRDC and TURN.

With the enactment of Assembly Bill 205 (2022), the Commission has a unique opportunity to implement a progressive fixed charge that can help align residential rate design with the state goals of prioritizing affordability, equity, fairness, and beneficial electrification.

Our opening testimony explains how the development of a progressive fixed charge is not adequate to make customer rates and bills affordable in California. True affordability will only be achieved when the Commission keeps utility revenue requirements in check and works with the Legislature to fund social policy costs and other shared cost obligations via sources outside electric rates. NRDC and TURN have historically opposed residential fixed charges in California. However, rising rates, affordability challenges, and the imperative to decarbonize buildings and transportation requires a novel solution. In the meantime, California's generation mix has become one of the cleanest in the nation and is set to be near zero carbon by 2045. In this context, income-graduated fixed charges (IGFC) are necessary and justified in California.

The hypothesis underlying this policy proposal is broadly applicable. However, this policy proposal is germane solely to the specific circumstances currently present in California: extremely high electric rates; significant portions of utility costs unrelated to demand or consumption; aggressive decarbonization goals; specific legislative direction to implement a progressive fixed charge; and an increasingly clean electricity generation mix.

A. Summary of Recommendations

Comparison of Party Proposals

- The TURN/NRDC proposal best meets AB 205's criteria with a reasonable fixed charge and significantly (21-24%) lower volumetric rates that reduce bills for CARE/FERA customers and the operating costs of electric appliances and vehicles.
- CARE and FERA customers see significant bill savings ($10-$40 each month) under the TURN/NRDC proposal across baseline territories and income levels.
- The Solar Energy Industry Association's (SEIA) proposal does not fulfill AB 205's requirement of reducing the average low-income customers bills in each baseline territory, instead raising average CARE monthly bills in some coastal climate zones. SEIA's fixed charge insignificantly (5-6%) reduces volumetric rates and is too low to send price signals for beneficial electrification.
- The Public Advocates Office's (PAO) proposal does not fulfill AB 205's requirement of reducing the average low-income customer's bill in each baseline territory through rate design. PAO's exogenous recommendation of reappropriating the California Climate Credit to offset their proposed fixed charge for households earning less than $50,000 falls outside the scope of this proceeding.
- The IOUs' proposal does not reduce bills across all CARE customer income bands, with higher fixed charges than any other party ($15-$34 for CARE customers).

Income Verification and IGFC Implementation

- The Commission should implement an adequate income-graduated fixed charge in the near term. Options to minimize complexity and costs of income verification include low-tier assignment based on CARE and FERA status, and middle-tier assignment based on self-attestation, with random verification.
- Customers living in deed-restricted affordable housing should be placed in the low-income tier to ensure the fixed charge helps alleviate energy burdens and encourages affordable housing development.
- The IOUs' proposal does not include an income verification approach that can be launched within five years and does not guarantee timely implementation of the

income-graduated fixed charge.

The Commission is justified in adopting the TURN/NRDC fixed charge on legal, policy, and economic grounds.

- Based on direction provided in Decision 21-11-016 and AB 205, prior Commission decisions limiting the scope of costs included in a residential fixed charge are no longer controlling.
- SEIA's proposal and recommendations are based on inaccurate rate design theory and should be rejected.
- The Commission should not let faulty economic theory constrain what can and can't be included in a fixed charge.
- The TURN/NRDC proposal provides the right approach to setting an average fixed charge and ensuing average volumetric rates. The Commission should follow this template and recognize that setting a fixed charge is about balancing policy objectives, equitable outcomes, and economic efficiency.
- Ideally, prices for all fuels would account for societal costs of consumption. Gasoline and natural gas don't include these externalities. Therefore, setting the right social cost of electric consumption should also consider that electrification requires that electricity usage be much cheaper than natural gas and gasoline.

Customer Response to IGFC

- In the short run, a decrease in rates will cause a much smaller than proportional increase in consumption. In the long run, lower marginal rates should encourage beneficial electrification.
- Customer education is necessary to help customers differentiate between fixed and volumetric charges on their bill.
- Current high electricity rates have regressive impacts. The impact of this pricing inefficiency is most felt by lower-income customers. The TURN/NRDC proposal will alleviate some of this regressivity.

Grid defection risks should be analyzed comprehensively.

- Any serious claims about grid defection should, at minimum, account for variation in customer loads, reliability, all private customer costs, any environmental impacts, and related permit costs of using a backup fossil fuel generator for reliability.
- Grid defection could become a serious issue if the private cost to customers of reliably meeting their full power needs are lower than the aggregate bills they pay to the electric utility, regardless of whether there is any fixed charge.

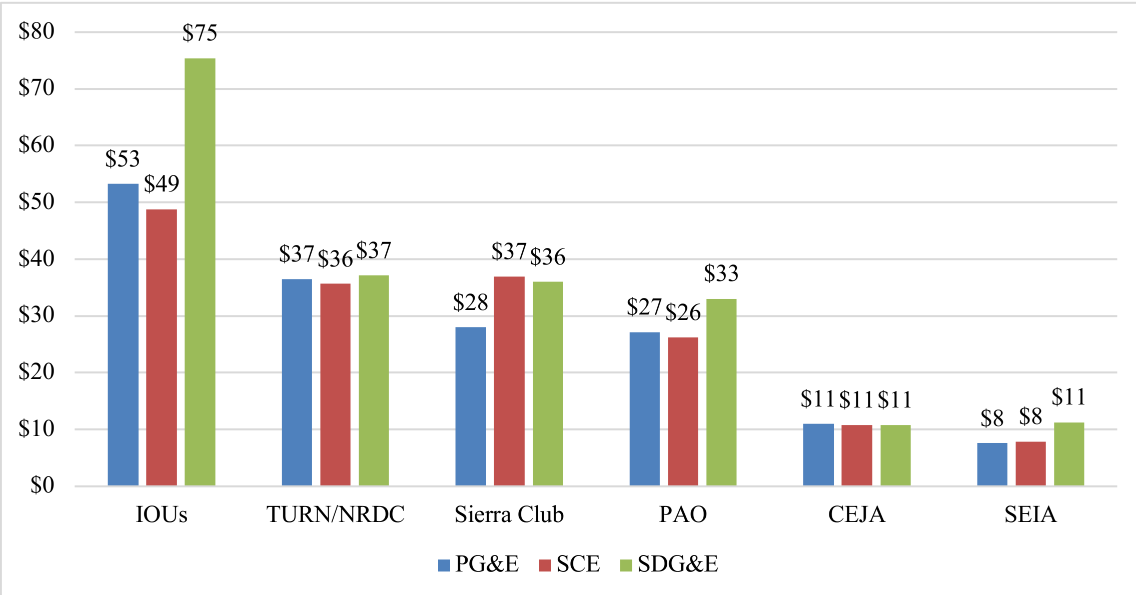
II. COMPARISON OF PARTY PROPOSALS (SA&MC)

A comparison of findings from proposed income-graduated fixed charges shows that the TURN/NRDC proposal is best-suited to meaningfully lower bills for low-income customers and create the right price signals for beneficial electrification, while being realistically implementable in the near-term, and minimizing adverse effects on any customer group.

A. Proposed Fixed Charges

TURN and NRDC propose an average fixed charge of around $37. Figure 1 displays parties' proposed weighted average fixed charges for standard TOU rates. Our proposed average of $36-$37 for each utility falls in the middle of party proposals, which range from a low $8-$11 in SEIA's proposal to a high of $49-$75 recommended by the IOUs. Our average fixed charge for optional electrification rates is slightly higher ($46-$47), as is Sierra Club's ($33-$39), to further reduce volumetric charges for customers with electric homes and vehicles.

Figure 1: Average Fixed Charge for Default TOU Rates by Party Proposal[1]



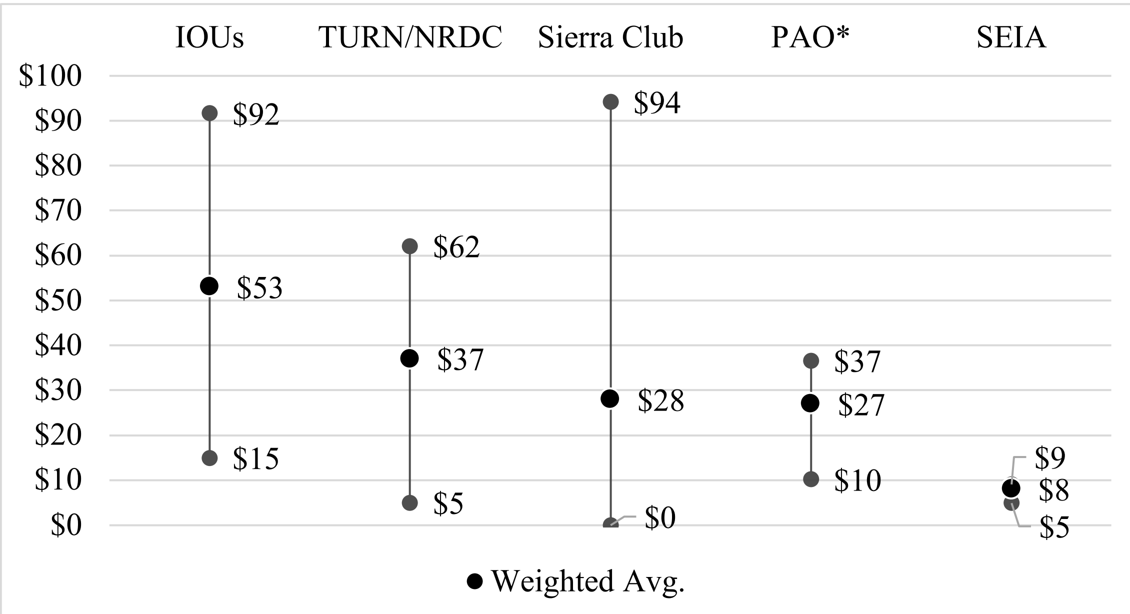
The spread of the proposed fixed charges across income bands is illustrated in Figure 2, 3 and 4 for each utility.[2] This data was taken from each party's model using the E3 tool, and the tier graduation is displayed in detailed tables in the Appendix. PAO proposes a $0 fixed charge for CARE customers after reallocation of the California Climate Credit, but this assumption was not incorporated in their E3 tool. The use of the climate credit for this purpose would increase non-CARE residential customer bills by depriving these customers of their share of the Credit. Given that the climate credit is separate from electric rates, fluctuates annually, and is not addressed in other parties' proposals, their modelled minimum charge ($10-$14) for lowest income CARE customers is displayed here. CEJA's proposed range is not included here because it was not reflected in their tool (the tool's maximum income band is $200,000+, while CEJA's proposed highest tier is for households earning over $5 million). However, CEJA presents the broadest range of the fixed charge, given they recommend a "ratio of fixed charge payment by customer" that ranges from 0 for customers earning less than $100,000 to 418 for customers

[1] Weighted average of the fixed charges in each party proposal for customers on default TOU rates (E-TOU-C, TOU-D-4-9, and TOU-DR1).

[2] Minimum, maximum, and weighted average fixed charges in each party's E3 tool model for default TOU rates (E-TOU-C, TOU-D-4-9, and TOU-DR1). *PAO modelled charges are shown here without use of the Climate Credit.

earning over $5 million.[3] Of the proposals modeled, Sierra Club and the IOUs propose the highest fixed charge for high-earning households of $85 up to $189 across utilities. SEIA proposes the lowest maximum charge of $9-$13, as well as the smallest graduation of the charge.

Figure 2: Proposed Ranges for the Fixed Charge by Party Proposal, PG&E



[3] See CEJA's recommended fixed charge weighting by income band in Table 8 of their opening testimony.

Figure 3: Proposed Ranges for the Fixed Charge by Party Proposal, SCE

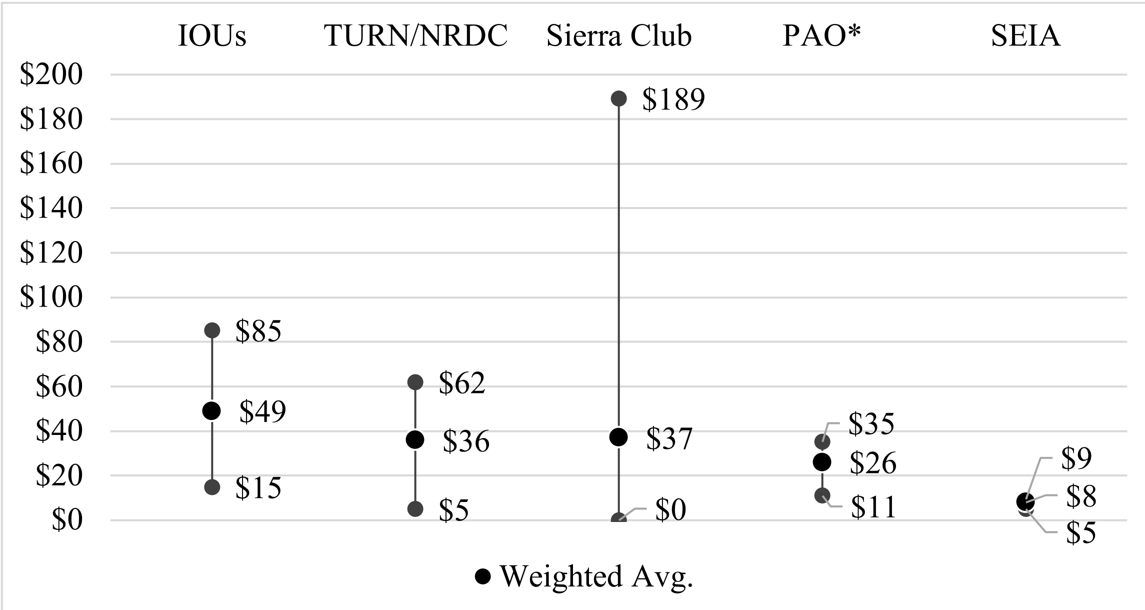
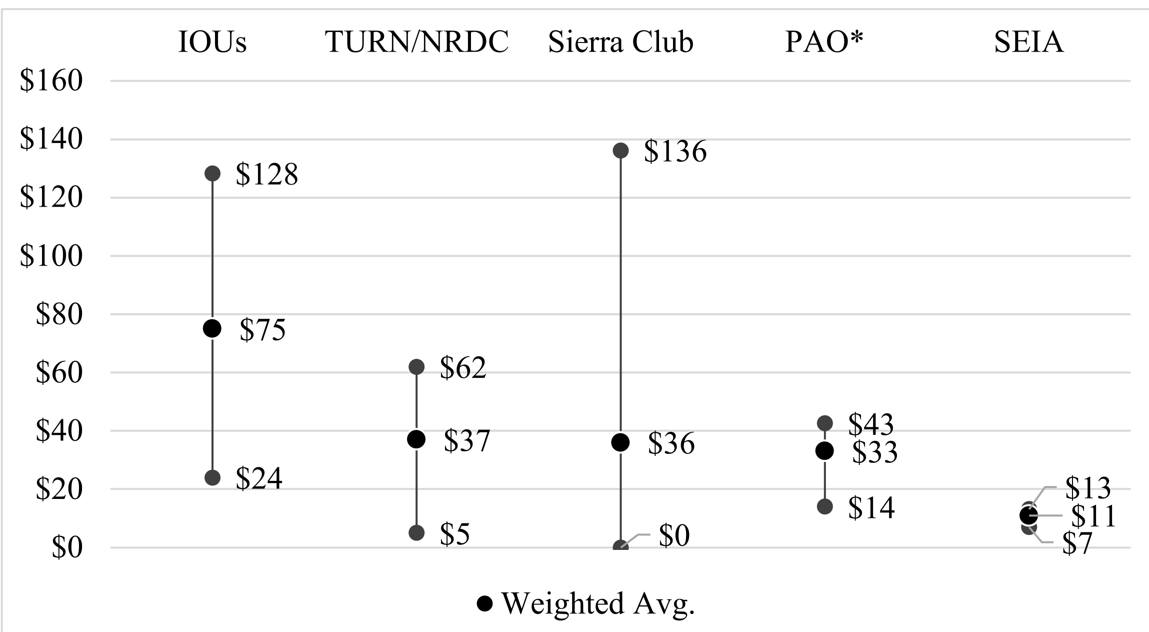


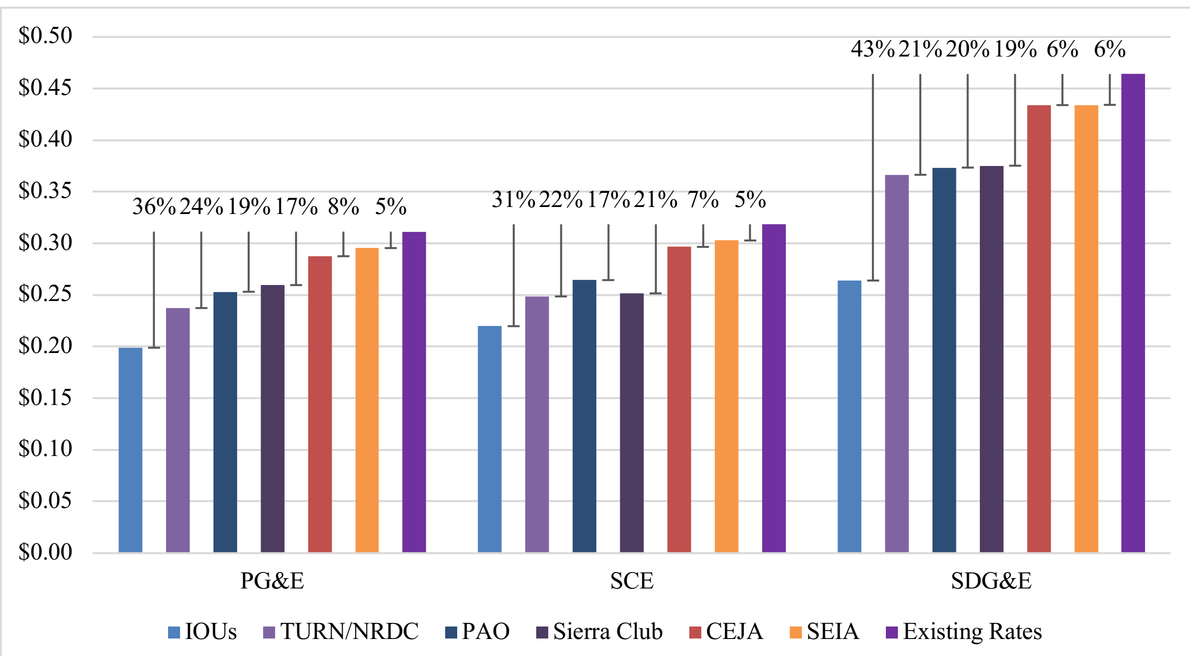
Figure 4: Proposed Ranges for the Fixed Charge by Party Proposal, SDG&E



B. Impacts on Volumetric Charges

The impact of proposed fixed charges on volumetric charges is illustrated in Figure 5 which shows the volumetric revenue requirement for each utility divided by total usage in dollars per kWh. This is a broad representation of how each party's fixed charge lowers usage charges overall relative to existing rates, although decreases are not uniform across rate types (e.g. TURN/NRDC and Sierra Club propose a larger fixed charge for optional electrification rates, which brings those usage rates down more significantly). Proposals that shift the greatest share of costs into the fixed charge lower volumetric charges the most; the IOUs reduce $/kWh by 31-43%; TURN/NRDC by 21-24%; PAO and Sierra Club by 17-21%. In contrast, CEJA and SEIA's proposals reduce volumetric cost collection by just 5-8%.

Figure 5: Volumetric Revenue Requirements by Proposal, Relative to Existing Rates (in $/kWh)[4]



[4] This graph displays volumetric revenue requirement divided by total usage for each utility. Percentages show the difference in volumetric $/kWh between each fixed charge proposal and existing rates without a fixed charge. Volumetric revenue requirements were taken from each proposal's model in the E3 tool for default tiered rates (volumetric generation plus volumetric delivery costs, on the 'Rate Design Dashboard' tab). Total usage per utility is the total IOU load (kWh) trued up to 2023 forecast billing determinants from the '8760 IOU Load Profiles' tab.

C. Impacts on Customer Bills

Shifting costs into an income-graduated fixed charge and commensurately reducing volumetric charges has distributional impacts on customer electricity bills. Assuming no change in electricity use after introduction of the fixed charge, high-usage, low-income customers are most likely to see bill decreases from paying a low fixed charge with lower volumetric rates (e.g. the average CARE customer in an inland climate zone). Low-usage, high-income customers are most likely to see bill increases from paying a high fixed charge with lower volumetric rates (e.g. the average high-tier customer in a coastal climate zone).

Figures in the Appendix display a broad comparison of bill impacts across utilities, climate zones, and CARE status for each proposal. [5] Two are shown below (Figure 6 and Figure 7) illustrating average monthly bill impacts of the fixed charge for non-CARE SCE customers in one inland and one coastal baseline territory. Bill impacts are taken from parties' models in the E3 tool, thus PAO's proposal does not include the impact of reallocating the Climate Credit. Any assessment of customer bill impacts that incorporates PAO's reallocation would also need to account for (a) the reduction in Climate Credit benefits for customers earning more than $50,000 as well as (b) the Climate Credit benefits received by customers under all other party proposals.

[5] Based on parties E3 tool models, 'Printable Results,' for default TOU rates (E-TOU-C, TOU-D-4-9, TOU-DR1). Illustrated climate zones: Coastal (T) and Inland (W) for PG&E; Coastal (6) and Inland (15) for SCE; and Coastal and Desert for SDG&E.

Figure 6: Average Monthly Bill Impacts for Non-CARE Inland SCE Customers

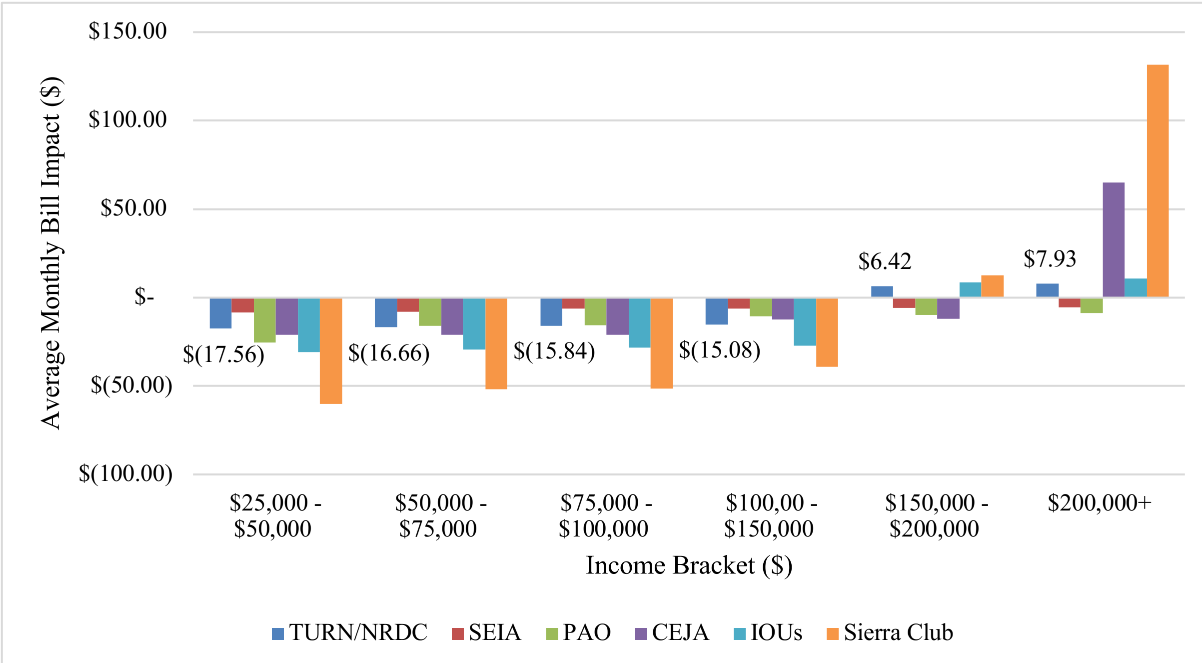
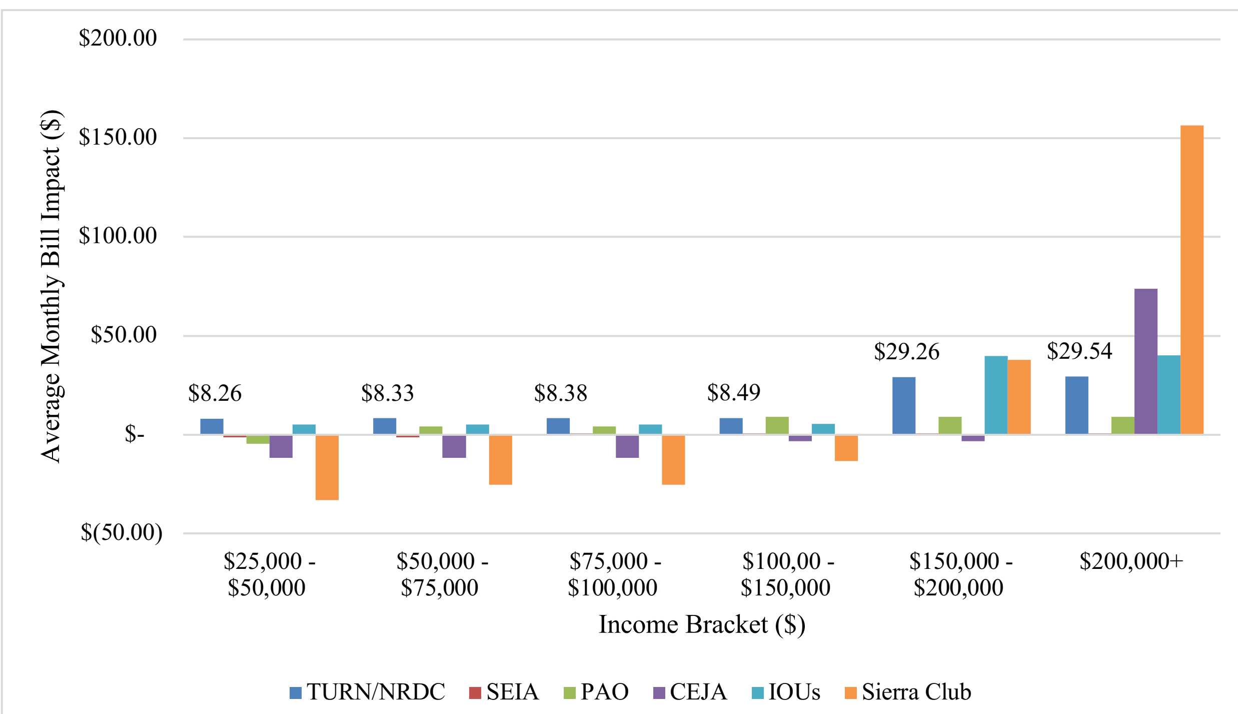


Figure 7: Average Monthly Bill Impacts for Non-CARE Coastal SCE Customers



In the example inland baseline territory, TURN/NRDC's proposal yields significant bill savings of $15-$18 each month ($180-$216 annually) for the average customer in the middle-income tier. Customers in the high tier see average bill increases of just $6-$8. In contrast, under Sierra Club's proposal, non-CARE customers earning less than $150,000 would save $40-$60 per month, while households earning over $200,000 would see an average bill increase of $132 (an additional $1,584 annually).

In the example coastal baseline territory, TURN/NRDC's proposal yields average $8 monthly bill increases for a middle-tier customer. The highest earners see maximum average bill increases of $30 a month ($360 annually). The IOUs proposal increases bills by $5 for non-CARE customers earning under $150,000, and over $40 for higher earners ($480 annually). SEIA's proposal has bill impacts across income bands of less than $1.

D. Impacts on CARE Customer Bills

Proposals by TURN/NRDC, Sierra Club, and the IOUs would produce the most savings for the average CARE customer across utility territories (Figure 8). Under our proposal, CARE customers save about $17-$18 each month, or $216 each year, on their electricity bill. This is equivalent to 15% bill savings.[6] SEIA's proposal would save the average PG&E CARE customer just $1 each month, or barely 1% in savings. TURN/NRDC's fixed charge also shows the most favorable bill impacts for CARE customers earning over $25,000, as illustrated by PG&E CARE customers in Figure 9. Under other proposals, monthly savings for PG&E CARE customers with incomes between $25,000 and $100,000 are just $10 or less.

[6] See the 'Heat Map Results' tab and base case assumptions of the E3 tool

Figure 8: Weighted Average Monthly Bill Impacts for CARE Customers by Party Proposal[7]

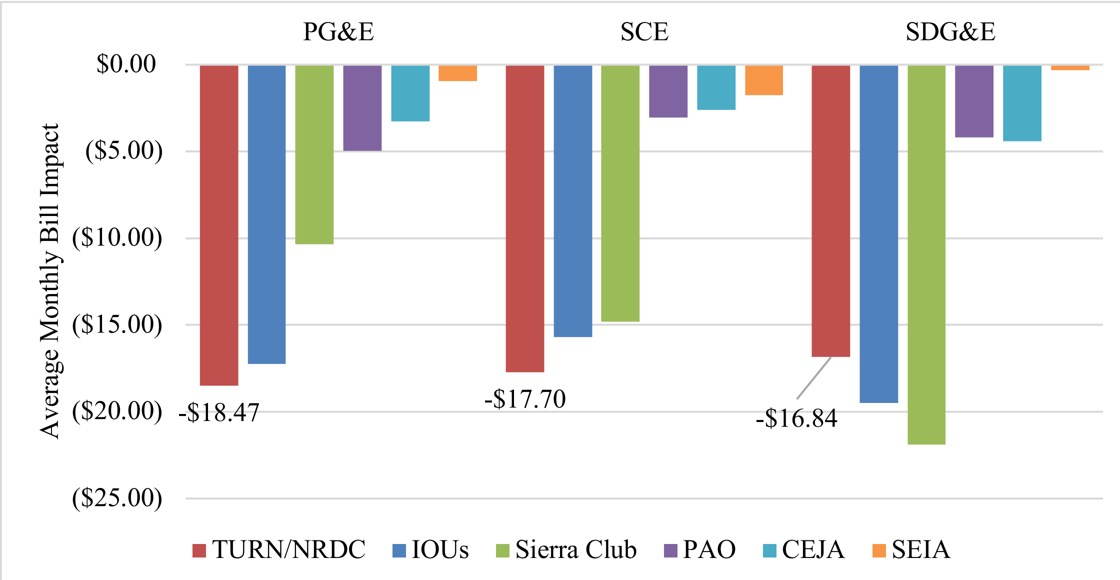
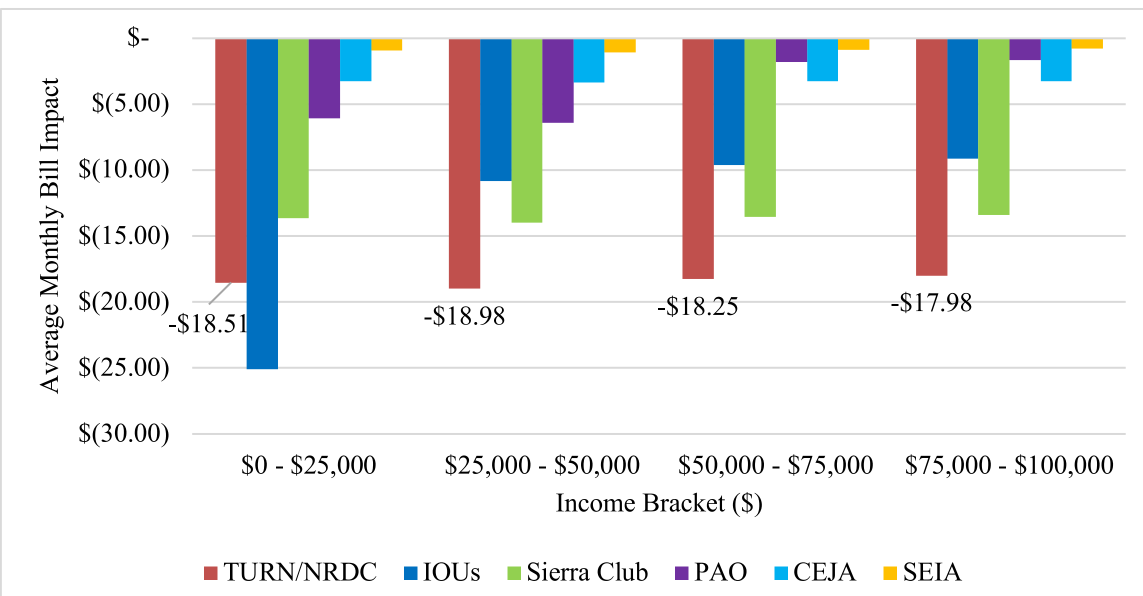


Figure 9: Average Monthly Bill Impacts for CARE PG&E Customers by Income Level and Party Proposal[8]



[7] Weighted average monthly bill impacts for CARE customers on default TOU rates (E-TOU-C, TOU-D-4-9, TOU-DR1), using data and customer counts from parties E3 tool models.
[8] Data from the 'heat maps results' tab of each party's E3 tool model of standard TOU rates (E-TOU-C)

AB 205 requires the fixed charge be designed so that "low-income ratepayers in each baseline territory would realize a lower average monthly bill without making any changes in usage."[9] As argued in our legal brief on statutory interpretation of AB 205, "low-income ratepayers" should be defined through this proceeding by a metric such as the federal poverty level (FPL) or area median income (AMI).[10] Portions of the Public Utilities Code reference "low-income" customers as including those eligible under CARE, FERA and the Energy Savings Assistance (ESA) program.[11] At minimum, the metrics proposed by other parties in legal briefs[12] encompass participants in the CARE program with household incomes below 200% of the FPL.

Some party proposals, however, do not achieve lower average monthly bills for CARE customers in every baseline territory.

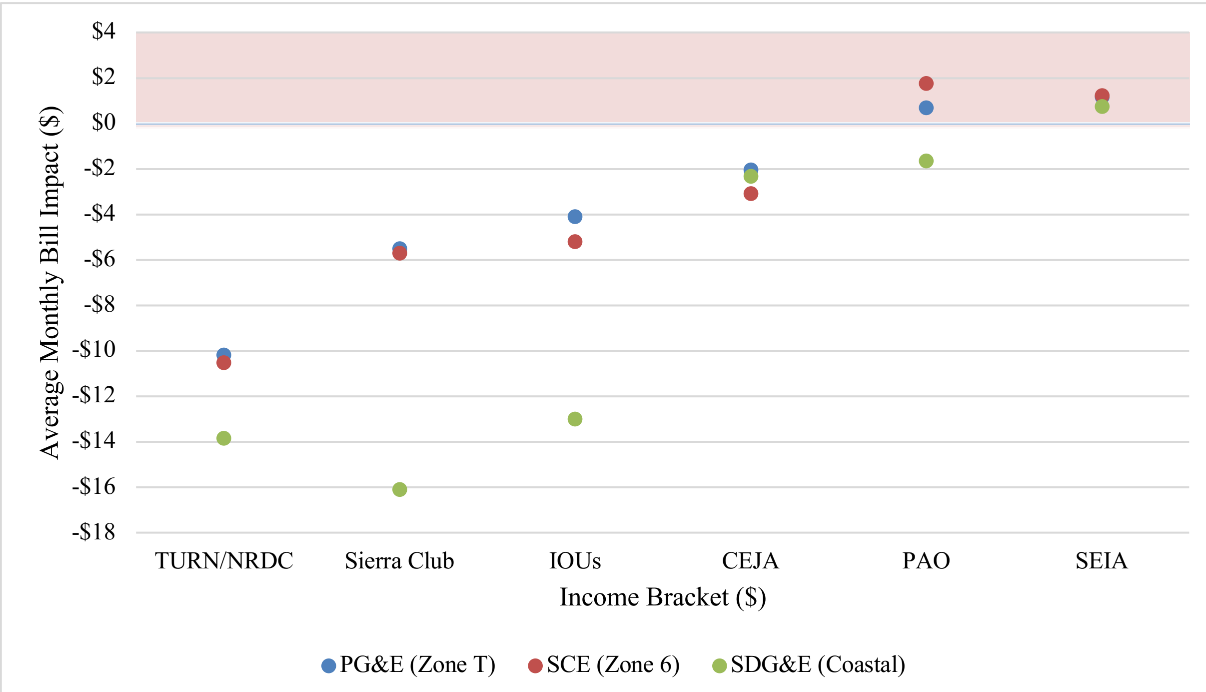
Figure 10 illustrates how CARE customers in some of the coastal baseline territories would instead see average bill *increases* from the fixed charges modeled by SEIA and PAO, on default TOU rates. SEIA's low fixed charge does not sufficiently reduce volumetric charges to achieve bill decreases for CARE customers in all territories. This is due to their introduction of a roughly \$5-\$7 fixed charge for CARE customers, with fixed charges for all other customers that are too low (< \$15) to reduce volumetric rates significantly.

PAO's proposal includes a recommendation to reallocate the California Climate Credit to reduce the fixed charge to zero for customers with household income below \$50,000, which would likely mitigate these projected bill increases.[13] However, the fluctuation of the climate credit year over year based on changing cap and trade auction revenues means the credit is not guaranteed to offset the fixed charge for lowest income customers. The Climate Credit is also distinct from rate components in this proceeding's scope. Their proposed income graduation of the fixed charge alone does not satisfactorily lower bills for the average CARE customer in each

[9] Cal. Pub. Util. Code §739.1(c)(1).
[10] Opening Brief of the Utility Reform Network and Natural Resources Defense Council on Statutory Interpretation of the Requirements of AB 205. January 23, 2023. Page 3.
[11] Cal. Pub. Util. Code §731(a), §739.1, §739.12, §2790.
[12] The IOUs recommend 200% FPL in their legal brief. Both Sierra Club and CEJA recommend 80% AMI, which as set by the California Department of Housing and Community Development, exceeds 200% FPL for 1-5 person households in every county in 2022. SEIA and PAO did not define low-income customers in their legal briefs.
[13] Public Advocates Prepared Testimony Chapter 1. April 7, 2023. Table 1.

baseline territory. Thus, both PAO and SEIA's proposals are not compliant with the statutory requirements of AB 205.

Figure 10: Average Monthly Bill Impacts of Fixed Charge Proposals for CARE Customers in Sample Coastal Baseline Territories[14]

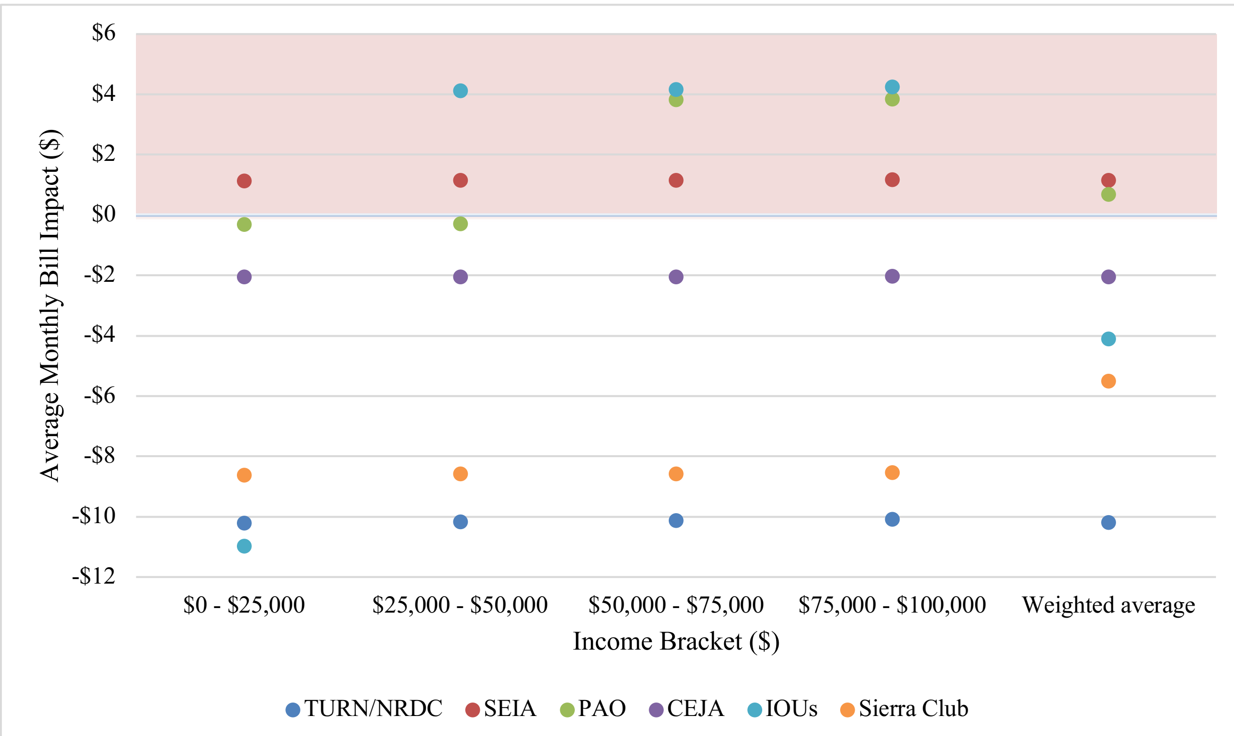


Even where the average bill decreases across a baseline territory, consideration of other subgroups is warranted. For example, in Figure 11, we can see that although the average CARE customer earning below $25,000 in PG&E Zone T would save slightly more under the IOU proposal than the TURN/NRDC proposal, CARE customers earning over $25,000 would see net bill increases from the IOU fixed charge while receiving sizable bill reductions from the TURN/NRDC proposal. Modeling in the E3 tool suggests that more than half of PG&E's CARE households earn above $25,000.[15] A fixed charge that raises monthly bills for large swaths of CARE, let alone FERA, customers does not represent a sufficiently progressive improvement on

[14] Weighted average of CARE customer bill impacts per example baseline territory (PG&E 'T', SCE '6', and SDG&E 'Coastal) based on monthly bill impacts and customer counts in each party's E3 tool ('Heat Map Results' tab), on default TOU rates (E-TOU-C, TOU-D-4-9, and TOU-DR1), assuming no change in usage before and after introduction of the proposed fixed charges.
[15] Customer counts from the E3 tool, 'Rate Design Dashboard' tab

current rate design. Under AB 205, the Commission must reject rate proposals that do not reduce bills for the average CARE customer in each baseline territory and *should* reject rate proposals that only achieve such reductions for narrow subgroups of CARE/FERA customers.

Figure 11: Average Monthly Bill Impacts of Fixed Charge Proposals for Coastal (Zone T) CARE Customers, PG&E



E. Signals for Beneficial Electrification

The TURN/NRDC proposal shows the strongest signals for beneficial electrification while remaining implementable. The introduction of the fixed charge and reduction in $/kWh volumetric rates (see

Figure 5) leads to savings over time in the costs to operate electric appliances and vehicles. Figures 12, 13, 14 and 15 illustrate the annual savings on electric heating and water heating operating costs after the proposed fixed charge is introduced, on optional electrification rates, for example customer types.[16] Under our proposal, an inland household earning $150,000 would save $72-$109 a year on those electric appliance operating costs from the fixed charge, compared to operating costs on existing optional electrification rates. Due to their larger fixed charge, IOUs proposal would yield the greatest operating cost savings for the same customer ($107-$138). PAO and Sierra Club's proposed fixed charges would result in lower savings ($41-$59). Our proposal also yields higher operating cost savings for coastal customers (Figure 14 Figure 15). Across fixed charge proposals, customers would save even more making the fuel switch to electric appliances from gas space and water heating.

Given SEIA's proposal does not recommend a fixed charge for optional electrification rates, their modelled electrification rates increase electric operating costs due to the removal of the existing fixed charge on those schedules. CEJA's proposal is not included in the graphs below, as their full proposal was not modelled with the E3 tool. Their modeled electrification rates would not lead to additional electric operating cost savings without lower volumetric charges. Their separate recommendation of a 50-100% discounted fixed charge for households undertaking whole home electrification (disconnecting from the gas system)[17] creates a separate electrification incentive but would not help lower operating costs for customers adopting incremental home and vehicle electrification measures and taking service on electrification rates.

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[16] Data from parties' E3 tool models, 'Electrification Dashboard' tab. Operating costs are assumed to be the difference between customers' electric bills before and after electrifying space and water heating.
[17] See CEJA Siegele Track A Opening Testimony, pages 33-34

Figure 12: Annual Savings on Electric Heating and Water Heating Operating Costs from Proposed Fixed Charges, Inland CARE Customers

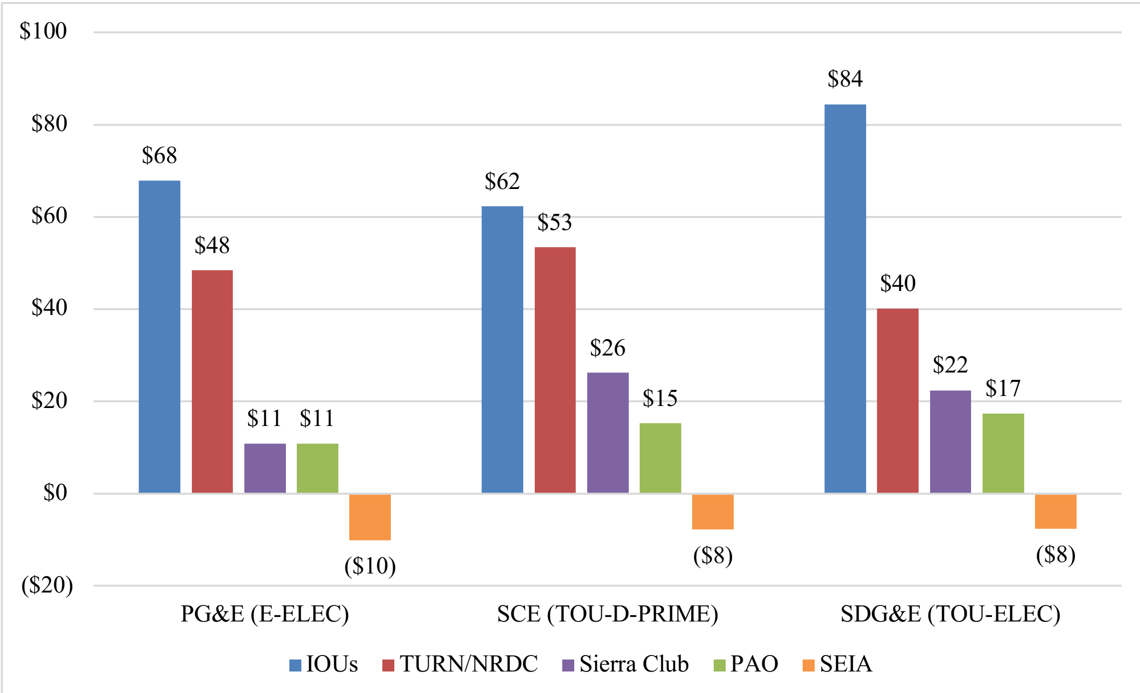


Figure 13: Annual Savings on Electric Heating and Water Heating Operating Costs from Proposed Fixed Charges, Inland Customers Earning $150,000

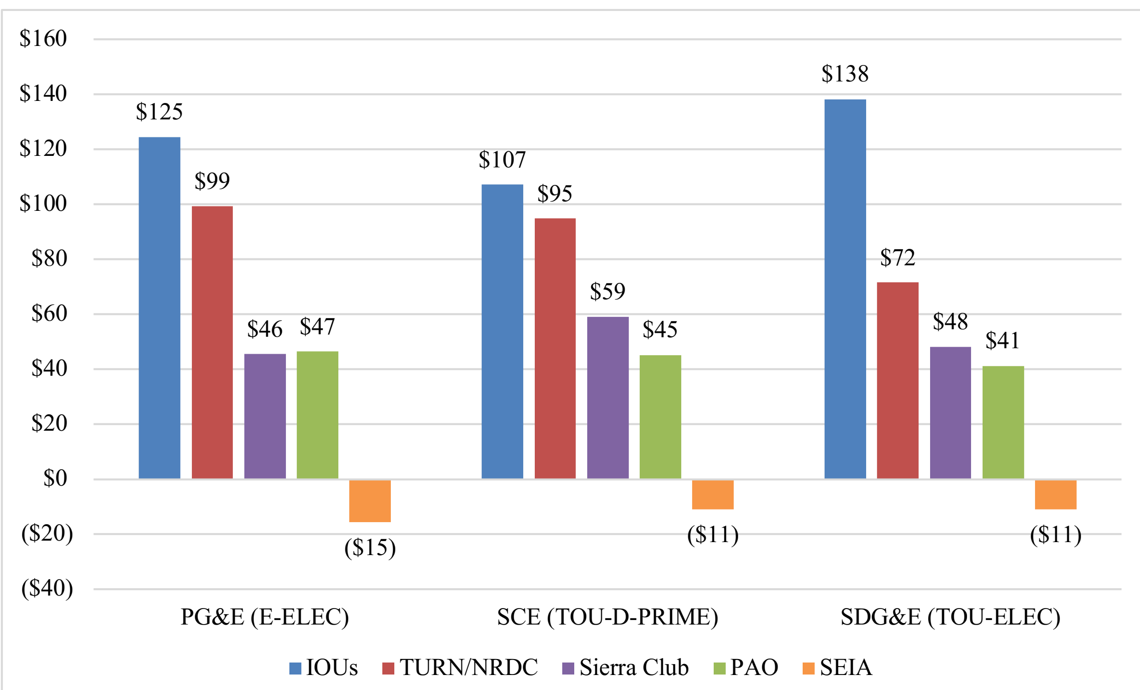


Figure 14: Annual Savings on Electric Heating and Water Heating Operating Costs from Proposed Fixed Charges, Coastal CARE Customers

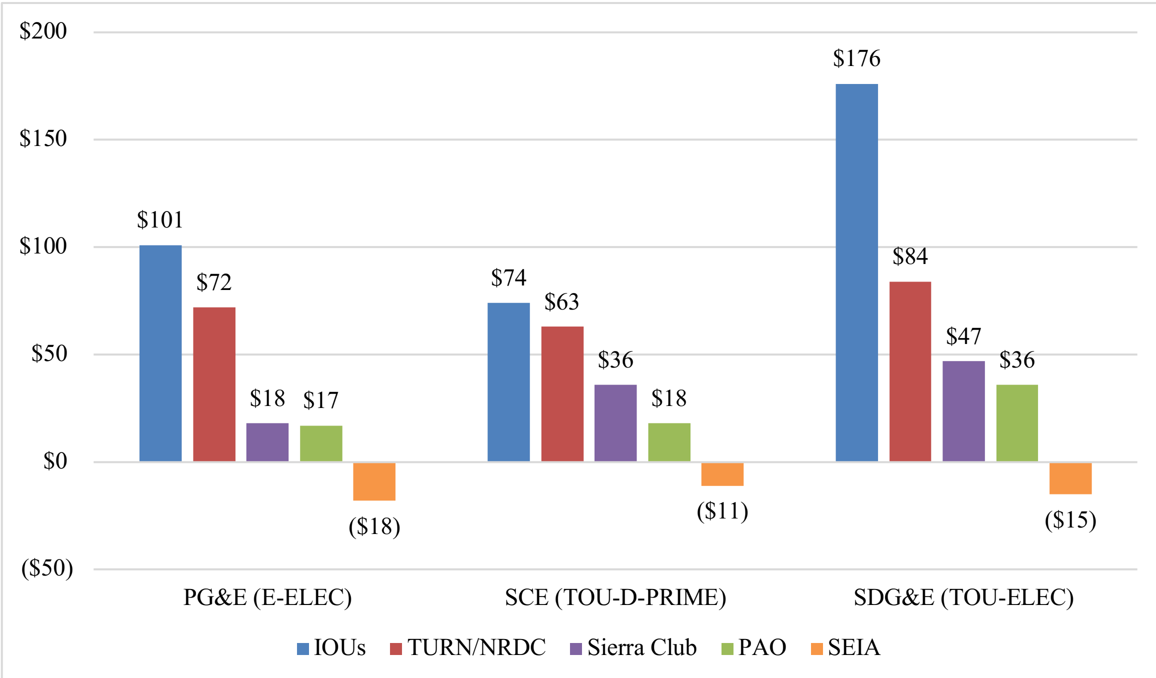


Figure 15: Annual Savings on Electric Heating and Water Heating Operating Costs from Proposed Fixed Charges, Coastal Customers Earning $150,000

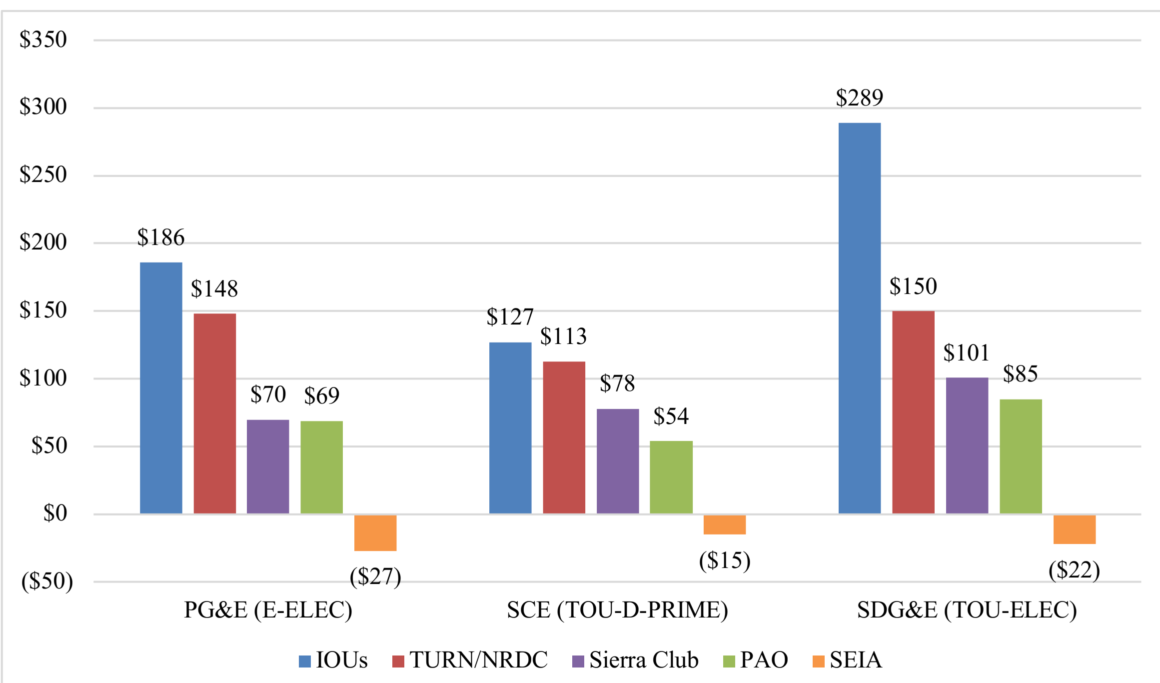
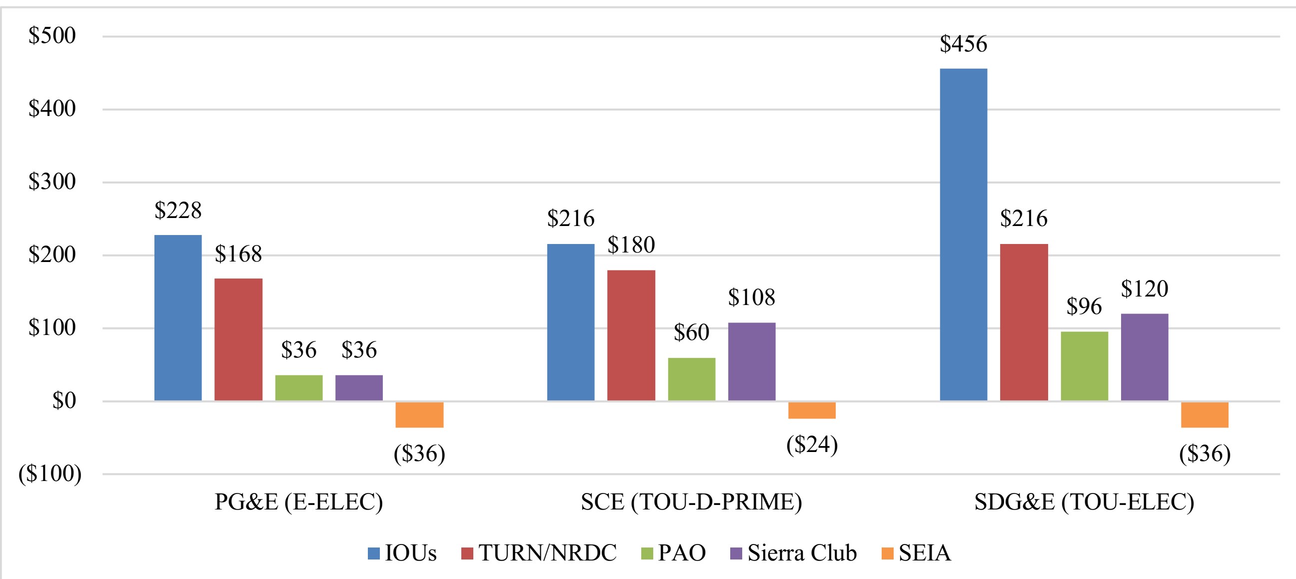


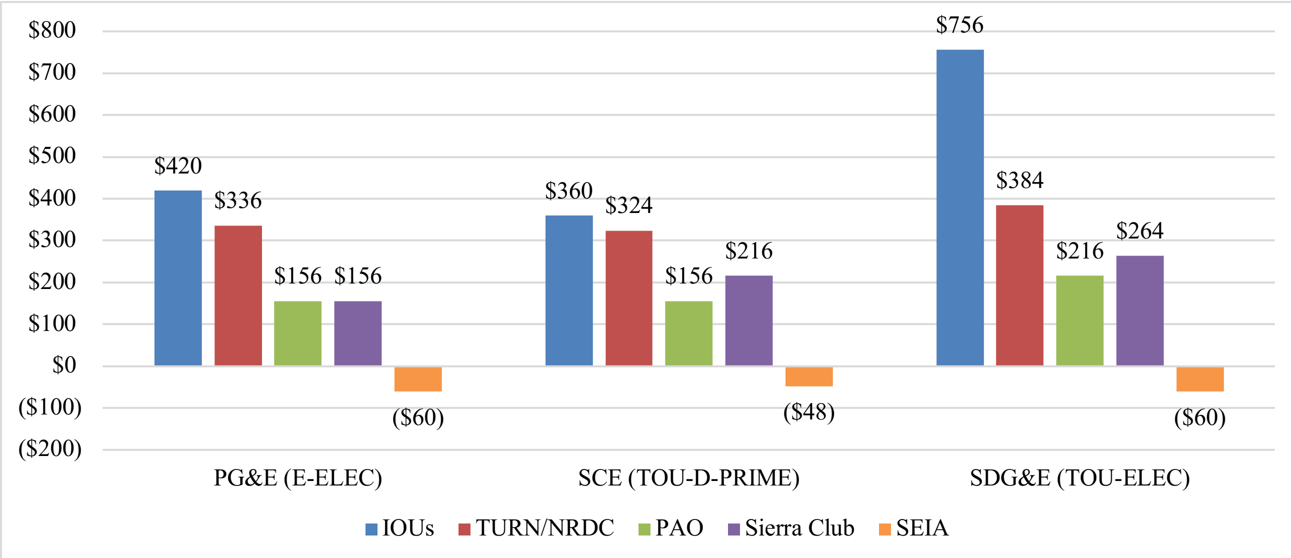
Figure 16 and Figure 17 illustrate the additional savings on EV charging costs after swapping existing optional electrification rates for the same rates with the proposed fixed charges.[18] The TURN/NRDC proposal yields even more significant savings, in the realm of $324-$384 per year for a $150,000-income household across utilities. The IOUs proposal yields the highest savings of $360-$756 each year, while the PAO and Sierra Club fixed charges would save that customer an additional $156-$264. Again, SEIA's proposed removal of the fixed charge from electrification rates would raise volumetric rates and increase electric vehicle operating expenses.

Figure 16: Annual Savings on EV Fueling Costs from Proposed Fixed Charges, CARE Customers



[18] Data from parties' E3 tool models, 'Electrification Dashboard' tab. Fueling costs and assumptions are provided, as is the difference between customers electric charging bills on existing and new rates.

Figure 17: Annual Savings on EV Fueling Costs from Proposed IGFCs, Customers Earning $150,000



III. INCOME VERIFICATION AND IGFC IMPLEMENTATION (SA & MC)

As discussed in the TURN/NRDC opening testimony, implementation of the fixed charge requires a process to assign customers to the appropriate income tiers. Priorities guiding design of the fixed charge tier enrollment process are: balancing accuracy and efficiency; establishing protections for low-income customers; fostering accessibility; and ensuring transparency and privacy.[19] We believe that the TURN/NRDC proposal for income verification, with potential modifications to streamline tier assignment, is feasible, economical, and equitable for a near-term rollout. We look forward to continuing to refine this approach with input from experts and stakeholders.

After reviewing the proposals made by parties in opening testimony, we have developed improvements to our proposal including expanding the low-income tier and reducing verification costs. This section discusses these improvements and responds to other parties' approaches.

To summarize our proposal for implementing the income-graduated fixed charge:

- A single Third-Party Administrator (TPA) should oversee the tier assignment process.

[19] See TURN and NRDC Opening Testimony at 32-41

- Customers enrolled in the CARE and FERA programs will be defaulted to the low-income tier. As an addition to our initial scheme, and explained in the following section, this tier should also include households living in deed-restricted affordable housing. All other customers will be preliminarily assigned to the high tier.
- The TPA will contract with an income estimation service to model household income and reach out to customers identified for the middle tier. All customers will have an opportunity to opt-in to income verification for sorting into the middle tier.
- The TPA will contract with an income verification service to identify and share those customers' categorical assignment with the IOUs. One modification to reduce costs, elaborated below, would be to perform verification only on customers who report incomes that differ from modelled estimates.
- All customers should be granted ample time to understand and, in case of a discrepancy, appeal their placement before the fixed charge takes effect.

A. Expansion of the low-income tier

In addition to customers eligible for the CARE and FERA programs, we recommend expanding the low-income tier to include households living in deed-restricted affordable housing. Deed-restricted affordable housing refers to residential units that are price-controlled and can only be purchased or rented by households below a certain income threshold.[20] As of January 2023, there were 527,528 such housing units in California.[21] Income qualification varies by housing program administrator based on federal limits set by the Department of Housing and Urban Development or state limits from the California Department of Housing and Community Development.[22] These limits are relative to household area median income (AMI) at the county level and updated annually. Low-income households are typically defined as those with incomes

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[20] The Commission has previously relied upon the requirements outlined in Public Utilities Code §2852(a)(3)(A)(i) for determining whether a multi-family residential building meets these requirements; See also "Deed-restricted homeownership." Local Housing Solutions, National Community of Practice on Local Housing Policy, 2023. https://localhousingsolutions.org/housing-policy-library/deed-restricted-homeownership/

[21] "324,000 Naturally-Occurring Affordable Homes at Risk." California Housing Partnership. March 2023. https://chpc.net/wp-content/uploads/2023/03/NOAH-2023_final-3.23.pdf

[22] "Income Limits." California Department of Housing and Community Development, 2023. https://www.hcd.ca.gov/grants-and-funding/income-limits

below 80 percent of AMI, with households under 30 percent considered extremely low-income.[23]

Including these households in the lowest tier will protect a wider range of low-income Californians. While a significant portion of these buildings house CARE and FERA customers,[24] some do not. In tenant-metered affordable housing units, rent is determined by subtracting expected utility costs (the utility allowance) from 30 percent of household income.[25] If an undiscounted fixed charge applies to some residents of these buildings, housing developers will anticipate higher estimated utility costs for a fraction of units, causing anticipated rent to be distorted and/or too low. Administrative difficulty in assigning different utility allowances and estimating unrealistically low rent for some units may discourage deed-restricted housing development. Placing all such households on the low fixed charge would mitigate this problem by ensuring that all residents' rents are calculated uniformly. In master-metered buildings, where utility costs are absorbed by owners, charging that meter the low fixed charge would also better reflect the households being served with minimal administrative hassle.

Ideally, customers at addresses of deed-restricted affordable housing units would be automatically defaulted to the low-income fixed charge tier. Deed restrictions are placed on properties, not residents, and are thus a matter of public record. The California Housing Partnership, for example, maintains a comprehensive database of California's affordable housing units by address including; HUD subsidized properties; USDA Section 514 and 515 rural properties; and properties financed with Low Income Housing Tax Credits.[26] Accessible to governments and nonprofit partners on request, they also provide a public data tool.[27] This database draws from the public inventories of federal and state subsidized housing programs.[28] In

[23] For example, see HCD state income limits for 2022: Kirkeby, Megan. "State Income Limits for 2022." Department of Housing and Community Development. May 13, 2022. https://www.hcd.ca.gov/docs/grants-and-funding/inc2k22.pdf
[24] 200-250% FPL is inclusive of 30 to 50 percent of AMI in most counties, based on the HCD state income limits.
[25] "An Affordable Housing Owner's Guide to Utility Allowances." California Housing Partnership Coalition. April 2016. https://chpc.wpenginepowered.com/wp-content/uploads/2016/04/UA-Guide_April-2016Web.pdf
[26] "Preservation Clearinghouse." California Housing Partnership, 2023. https://chpc.net/ta/preservation/preservation-clearinghouse/
[27] "AFFORDABLE HOUSING MAP & BENEFITS CALCULATOR." California Housing Partnership. 2021. https://chpc.net/datatools/affordablehomes/
[28] "METHODOLOGY DOCUMENTATION Quantifying Social and Economic Benefits of Affordable

the most efficient and economical manner, the TPA could work with the utilities to map a database of addresses to meters and categorically default affordable housing customers to the low tier along with those enrolled in the CARE and FERA programs.

Longer-term options for expanding or redefining the low-income tier include evaluating need based on regional income metrics and household type, as recommended by Sierra Club. Regional or geography-based income metrics, such as AMI, can better reflect the affordability challenges facing a 400% FPL household in a high-income area. However, exclusive reliance on AMI can also disqualify a 200% FPL household from receiving the lower fixed charge amount simply because they live in a low-income area. As a relative metric, it also adds a layer of complexity to the income verification process.

We would consider adopting a definition of low-income that accounts for AMI if it is included in an existing affordability process, such as the CPUC affordability proceeding or a modification of the CARE and FERA programs. We would also be open to making the fixed charge more progressive, with no charge for the lowest earning CARE households and higher charge for the highest earning households, once a basic IGFC has been successfully implemented. In the near term, aligning the definition of low-income customer with CARE and FERA guidelines, along with customers in affordable housing units, provides a feasible starting point for implementation of the fixed charge.

B. Response to alternative implementation plans

Parties broadly agree that a single facilitator and interface for tier assignment is important to avoid redundant programmatic costs and streamline the enrollment process.[29] Multiple parties also share concerns around data privacy and recommend that IOUs not be permitted to access customer financial data directly. Marketing, education, and outreach about new rate offerings are critical components across implementation proposals, for transparency and customer understanding. However, parties have put forth disparate methods for income verification that primarily rely on self-attestation, third-party estimation and verification services, or creation of a

Rental Housing in California." California Housing Partnership, October 2021.https://chpc.wpenginepowered.com/wp-content/uploads/2021/10/Affordable-Housing-Map-Benefits-Calculator-Methodology_October-2021.pdf

[29] For example, see Joint Large IOU Testimony, April 7, 2023, page 78.

new data model using Franchise Tax Board (FTB) income data. A few concerns and recommendations arise in response to alternative approaches.

The CPUC should not delay implementation by waiting for additional legislation as the IOUs recommend. In the income verification plan proposed by the investor-owned utilities, the TPA would verify income using a data model of FTB and DSS income records. This approach requires additional legislation enabling the FTB to share taxpayer financial information with the CPUC or TPA. Even if it was possible to introduce and pass this legislation in the 2023 legislative session (although no such language is currently in any bill), the IOUs estimate data sharing protocols and the verification process could begin development by 2026 at the earliest.[30] After this point, they estimate another two years for data integration, testing, and customer notifications, leading to implementation of the fixed charge in 2028. Given the possibility of legislative delays or challenges, this timeline could be extended even further.

The absence of a near-term income verification method, particularly in the event that legislation is stalled, would frustrate meaningful implementation. It is reasonable to expect the fixed charge to be implemented expeditiously given the urgency of reducing low-income customers' electricity bills and advancing beneficial electrification to meet California's climate goals. Based on monthly bill impacts in Figure 8, for each year that the implementation of the fixed charge is delayed, the average CARE household will miss out on between $202 and $222 in savings under the TURN/NRDC proposal (between $188 and $233 under the IOUs proposal). A five-year delay would amount to roughly $2.8 billion in lost benefits for low-income California households.[31] As laid out in our proposal, and that of the Public Advocates Office, income estimation and verification services exist that could be accessed within months[32] and verify income with a high degree of accuracy. Programs such as CalWORKS and CalFRESH already utilize the Equifax Work Number to assess income eligibility. We are continuing to explore, and would support, methods for further reducing the implementation timeframe.

Complexity and costs should be minimized in early implementation. Over time, costs to

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[30] Joint Large IOU Testimony, April 7, 2023. Page 94-95.

[31] Assuming about $1,000 in lost savings for each of California's CARE households (2.8 million in the E3 tool)

[32] E.g. the Work Number could launch verification within 3-4 months of signing a Master Service Agreement (MSA) with the CPUC, per Public Advocates Office Prepared Testimony Chapter 2, p.8.

implement the fixed charge should decline with an established administrative system overseeing reenrollment of customer subsets, enabling additional complexity in the income graduation of tiers and the verification process. In the short term, to reduce low-income households' immediate energy burdens, the CPUC should prioritize implementation of a functional IGFC over an elaborate design. Under the TURN/NRDC proposal, which leverages existing the CARE and FERA enrollment process to assign customers to the low-income tier, only middle-income households would require verification upon enrollment. Thus, less than half of customers would warrant additional verification costs (about 44% of PG&E, 50% of SCE, and 48% of SDG&E customers).[33] Setting different base tiers or splitting those programs into additional income tiers, as proposed by PAO and the IOUs, could trigger additionally burdensome reenrollment requirements for low-income customers.

Another way to reduce costs before access to FTB data or another long-term approach would be to apply a combination of self-attestation and household income modeling to sort customers in the middle-income tier. The Covered California program, for example, allows customers to submit their income on penalty of perjury without additional documentation.[34] Our proposal could be modified so that after the low-income tier is assigned based on program enrollment and affordable housing status, customers can self-sort into the middle tier through self-attestation, and give consent for possible verification by the Equifax Work Number service. Customers self-sorting could then be checked against household income modeling by one of the above-mentioned income estimation services, at a low cost of $0.005-$0.015[35] per household record, possibly in combination with other public data sources such as census tract incomes and property values, as described in CEJA's proposal. Households whose self-attestation conflicts with these checks against marketing and public data could be prompted to either submit documentation or be verified by the Equifax Work Number service. This process would create a

[33] Taken from the customer counts in E3 tool, "Rate Design Dashboard" tab (total customers minus CARE customers, FERA-eligible customers from January 2023 IOU reports, and customers earning more than $150,000)
[34] "Proof of Income." Covered California, accessed April 2023. https://www.coveredca.com/documents-to-confirmeligibility/income/
[35] Based on conversations with sales representatives that provided non-binding estimates; exact costs depend on
negotiated terms.

much smaller pool of customers to verify, cutting costs of the verification process significantly.

Earlier this month, the CPUC announced its intent to create a single web portal for low-income energy affordability program applications.[36] Using this interface for the fixed charge enrollment, as facilitated by the TPA, could also reduce administrative costs and streamline the process further. The CPUC should request state funding to cover the costs of the TPA and income verification in order to avoid increasing the burden on ratepayers. Given dual equity and climate policy goals, this funding could come from the legislature or any available cap-and-trade revenue. Bundling program costs into rates moves them further away from SRSMC and hinders rates' ability to send price signals for desired customer behavior.

Income must be assessed at the household level. Proposals were not all explicitly clear that income verification should occur at a household level.[37] As established in party legal briefs on statutory interpretation of AB 205, the Commission should find that each separately-billed account (or meter) at a single address is considered a "customer." This definition is administratively straightforward and reflects socioeconomic need better than defining customer as an individual. Interpreting customer to mean only the individual listed on the account would threaten the value and intent of the income-graduated fixed charge to meaningfully deliver progressive relief for California households. A high-earning individual with many non-working household members may garner an unreasonably high fixed charge tier assignment, while a non-working individual in a wealthy household receives an unreasonably low one. Using only the income of the individual listed on the account would motivate customers to game the process by listing the lowest earning individual in the home as the account holder. Metrics that account for family income are more indicative of quality of life and particularly relevant for households with caregivers, children, disabled, and elderly individuals. For this reason, CARE and FERA, along with many other public assistance programs, are assessed on a household-income basis. Both Experian and Equifax' income estimation services provide household income modeling on a

[36] "CPUC Creates Web Portal for Streamlined Access to Low-Income Programs." CPUC. May 18, 2023. https://www.cpuc.ca.gov/news-and-updates/all-news/cpuc-creates-web-portal-for-streamlined-access-to-low-income-programs-2023

[37] The Public Advocates Office Prepared Testimony Chapter 2, pages 10-11, suggests income verification through the Equifax Work Number will be completed for the household representative, but not other household members.

household basis.[38] The Equifax Work Number verification service can also assess income at the household level if a household representative opts in on behalf of the household.[39]

IV. COMMISSION IS JUSTIFIED IN ADOPTING THE TURN/NRDC FIXED CHARGE ON LEGAL, POLICY, AND ECONOMIC GROUNDS (MC)

A. Commission Decision D.21-11-016 and AB 205's Directive Overturn Previous Commission Decisions that Limited the Fixed Charge

SEIA provides a partial history of fixed charge determinations at the Commission as justification for its proposal. They explain how, in decisions as far back as 1986 (D.86-12-091) and as recently as 2020 (D.20-03-003), the Commission rejected proposals for material residential fixed charges based on concerns over incentives for efficiency and conservation, distributed generation, and customer acceptance. SEIA urges the Commission to make similar determinations in this proceeding.

This incomplete history lesson omits three important facts. First, a more recent Decision, D.21-11-016, concludes that the findings reached in D.17-09-035 and the prior residential rate reform rulemaking (R.12-06-013) relating to the design of a residential fixed charge do not hold precedential value. The Decision explains that "any future proposals for a default residential fixed charge or optional residential fixed charge (as in this case) should be able to proceed without the need to comply with cost category and [equal percent marginal cost] determinations made in a since-closed proceeding that failed to make a determination concerning a residential fixed charge on the merits."[40] As a result, the past decisions cited by SEIA should not be relied upon in this proceeding. Second, the enactment of AB 205 in 2022 modifies state law and specifically requires the Commission to set a residential IGFC that encourages beneficial electrification and results in lower bills for the average low-income customer in each baseline territory, among other requirements.[41] Third, volumetric electricity rates have increased in an unprecedented manner in the last few years and future rate trends are ominous. When the

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[38] On Experian's Consumer View product, see:
https://www.experian.com/assets/dataselect/brochures/consumerview.pdf
On Equifax's Income 360, see: https://assets.equifax.com/marketing/US/assets/income360_ps.pdf
[39] See the CalFresh application form (CF 258), question 6a:
https://www.cdss.ca.gov/Portals/9/FMUForms/A-D/CF285%206_19.pdf?ver=2019-05-08-151429-250
[40] D.21-11-016 at 114.
[41] Cal. Pub. Util. Code §739.9

Commission previously considered proposals for residential fixed charges, volumetric rates were much lower than what they are today.

For these reasons, SEIA's legal arguments in favor of a very limited fixed charge should be rejected.

B. SEIA's Proposal and the Inaccurate Rate Design Theory that Informs It Should be Rejected

The Solar Energy Industry Association (SEIA) proposal includes minimal fixed charges and it makes no improvements to current rate design. In fact, by proposing a reduction in existing electrification rate fixed charges, the SEIA proposal accomplishes the opposite. SEIA witness Thomas Beach makes the argument that distribution and other grid related costs are all variable and marginal to usage in the long run.[42] The theoretical foundation for this proposal is rate design literature by Lazar et al (hereafter Lazar). Sierra Club's witness John Wilson also draws on this literature to limit what costs are defined as fixed and thereby artificially constrains reductions in volumetric rates.[43] Lazar's theory of rate design is described in Smart Rate Design for a Smart Future[44] ("Smart Rate Design") and Electric Cost Allocation for a New Era: A Manual[45] ("Allocation Manual").

The foundational principles of Lazar's theory of rate design can be summarized as follows:

(1) Only costs of customers interconnecting and remaining connected to the grid

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[42] Prepared Direct Testimony of R. Thomas Beach on behalf of the Solar Energy Industries Association at 17. "I generally agree with the perspective of the Regulatory Assistance Project (RAP) in its paper Smart Rate Design for a Smart Future that including distribution and other costs in a high fixed monthly charge "is neither cost-based nor economically efficient" This approach [high fixed charges]… deviates from long-established rate design principles holding that only customer-specific costs — those that actually change with the number of customers served — properly belong in fixed monthly fees. It also deviates from accepted economic theory of pricing on the basis of long-run marginal costs."
[43] Direct Testimony of John D. Wilson On Behalf of Sierra Club at 7, 16-17.
[44] Lazar et al, *Smart Rate Design for a Smart Future*, Regulatory Assistance Project, May 2016. Available at: https://www.raponline.org/wp-content/uploads/2016/05/rap-lazar-gonzalez-smart-rate-design-july2015.pdf
[45] Lazar, *Electric Cost Allocation for a New Era: A Manual*, Regulatory Assistance Project, 2020. Available at: https://www.raponline.org/wp-content/uploads/2020/01/rap-lazar-chernick-marcus-lebel-electric-cost-allocation-new-era-2020-january.pdf

(typically called marginal customer access costs) are fixed.[46,47] All remaining system costs are variable over a long enough time period and should preferably be collected on the basis of usage.[48]

(2) Rates should reflect long run marginal costs, defined as the costs of building a correctly sized electric system to serve incremental load.[49]

(3) Regulators should set volumetric rates to simulate the results of a competitive market between utilities and distributed energy resources. Fixed charges (and resulting lower volumetric rates) would make some distributed resources less economic for customers and unfairly advantage the utility.[50]

SEIA relies on these principles to make the extreme case that all utility costs other than a small sliver related directly to connecting a customer to the grid should be recovered based solely on usage. There are three flaws with the economic theory underpinning SEIA's proposal. First, it fails to adequately reflect basic economic principles, several of which we outlined in opening testimony. Second, it confuses costs that are marginal with those that are unaffected by changes in customer usage. Third, it incorrectly describes the service a utility provides and thereby misunderstands the competing alternatives to being served by a utility.

First Flaw: Doesn't Accurately Reflect Economic Principles

As explained in our Opening Testimony, electricity sector economic efficiency is maximized when the price of electricity is set at short run social marginal cost (SRSMC).[51] The use of social marginal costs reflects the fact that generating electricity creates environmental externalities and assumes that the customer prices include both those externalities and the direct costs of generating and delivering electricity. The use of short-run marginal costs is appropriate

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[46] Specifically, service drop, billing, and billing collection only, per Smart Rate Design theory.
[47] Smart Rate Design at 23.
[48] See, for example, Allocation Manual at 14, which in the context of cost of service studies, it states that "All shared distribution costs should be apportioned based on the time periods when customers utilize these facilities. The system is needed to provide service in every hour, and in most cases a significant portion of the distribution system cost should be assigned volumetrically to all hours across the year."
[49] Smart Rate Design at 88.
[50] Smart Rate Design, D-4.
[51] See, for example: Viscusi , Vernon and Harrington, Economics of Regulation and Antitrust, at 344-345.

because generation, distribution and transmission capacity can't be adjusted quickly. When consumers make decisions about how much more electricity to use, the retail price should reflect the additional cost of delivering the next units of electricity (or savings from delivering fewer units) at that time and place, given the actual constraints faced by the producer.

As we also explained, there are practical drawbacks of setting price at SRSMC also recognized by A.E Kahn's seminal work.[52] Namely, it is complex and costly to administer, isn't customer friendly and may over-burden customers. There are policy benefits to providing consistent longer-run signals to influence customer behavior and guide appropriate long-term investment decisions. However, any economically efficient rate design must start with an assessment of pricing electricity according to the SRSMC.[53]

The CPUC methodology for determining avoided costs for distributed energy resources, subject to minor modifications (called ACC_M),[54] could provide guidance for setting average volumetric retail rates if policymakers choose to include some longer run marginal costs (as explained above) and/or anticipated capacity upgrade costs to recover future marginal capacity and grid expansion costs based on customer consumption patterns today. However, the downsides of including these additional longer run marginal costs from the ACC_M are loss of economic value in the short run when ACC_M is higher than SRSMC and a lack of signal to constrain use when SRSMC is higher, which leads to overbuilding capacity.

<u>Second Flaw: Confuses Marginal Costs with Average Costs</u>

Although the Lazar principles recommend using long run marginal costs as a guide to set volumetric rates, it gets the definition of long run marginal costs completely wrong. Long-run marginal costs are the additional cost incurred by the utility to provide one more unit of electricity if all inputs were adjusted optimally. The ACC_M is one application of long run social

[52] A.E. Kahn, The Economics of Regulation (Vol. I), at 75.
[53] NRDC-TURN Opening Testimony at 7.
[54] To apply the ACC, the GHG Adder should be replaced by social damage costs of carbon and air pollution. Commission's adopted ACC includes the cost of specific GHG reduction goals, or a shadow price of GHG reduction, without any new or additional distributed energy resources. This shadow price, called the GHG Adder, helps accounts for the fact that in the absence of DER, utilities will contract with more supply side resources to meet GHG reduction goals. Social marginal costs should represent the total cost to society if an extra unit of electricity is consumed including environmental externalities which in this case are the social cost of carbon and air pollution.

marginal costs. This isn't the same as or remotely equal to the full costs of building a new right sized grid.

In defining long run marginal costs as the full costs to build a rightsized utility system, the Lazar theory confuses *marginal* costs with *average* costs of providing electricity.[55] Relying on this theory, SEIA includes almost all costs incurred by the utility as entirely marginal to usage to justify recovering these costs via volumetric rates.

Once the grid is built, customers will use the electricity it delivers. Although expected customer load-shapes or electricity usage patterns are a consideration when either expanding or upgrading grid infrastructure, not all utility costs are *marginal* to usage. A cost that is marginal to usage is a cost that would be incurred only due to a change in usage, all else kept constant. In the short run, these costs marginal to usage are SRSMC and in the longer run, ACC_M. SEIA's approach, which assumes everything but customer connection costs are variable over a long enough time, is inaccurate because there are a variety of costs that do not vary due to long-run changes in usage.

There are many costs within the utility revenue requirement that would occur whether usage from the existing customer base increases or decreases. An obvious example is costs relating to wildfire hardening/mitigation and wildfire liability. Marginal changes in usage by existing customers do not reduce the risk of wildfires caused by transmission and distribution equipment. These changes in usage also do not affect the expenditures necessary to harden this infrastructure. The same applies to the costs of poles, trenching, and maintenance of distribution systems.

Mispricing electricity based on the SEIA average cost approach leads to obvious inefficiencies. Because SEIA would include many fixed costs within volumetric rates, it sets rates too high which discourages both efficient use of electricity and investments in electrification. For example, this approach sets rates far too high in the middle of the day when clean electricity is abundant in California and assumes that increasing consumption during these hours would require building more generation and grid capacity, even though it doesn't. This

[55] Average costs are equal to all costs incurred by utility divided by consumption; average future costs are equal to approved revenue requirement divided by expected consumption during that time-period.

discourages customers from using cheap, clean electricity at times when there is abundant surplus grid and generation capacity.

Illustrative example: Marginal costs of increasing or decreasing load.

Consider an imaginary California city, Flexville, whose population and housing stock remain constant. Fifteen years ago, this town was completely powered by fossil generation. The eco-conscious citizens of Flexville, CA decided to reduce their energy consumption by a third.[56] The transmission and distribution infrastructure serving these customers, and the sunk costs thereof, will still be necessary to provide reliable service.[57] In the short run, the only deferred costs were marginal generation energy costs and all the associated environmental externalities. In a year or two, less procured generation capacity was needed to maintain resource adequacy due to a permanent decrease in electric demand. As the grid in Flexville was built for higher use, no additional transmission and distribution capacity upgrades were needed, but past costs still needed to be recovered.

Fifteen years later, the town of Flexville is now powered mostly by clean electricity. This clean electricity is cheaper to produce. In response to this progress, the rational citizens of Flexville decide to use more electricity. They uniformly increase their consumption by a third. Their housing stock and population remains unchanged. The first incremental costs to show up are increased costs of generation to meet an increase in demand, and related environmental externalities. In a year or two they may sign more capacity contracts for resource adequacy, and then start upgrading the capacity of the grid to alleviate congestion.

This example illustrates that social costs marginal to usage in the short run are SRSMC while costs marginal to usage in the long run are the ACC_M. In neither case were the costs avoided or incurred reflective of the average cost of building a full grid. Average costs, similar to what SEIA proposes, would overestimate costs deferred when Flexville reduced its load and lead to missing revenue; it would also overcharge customers when they increased their consumption

[56] For simplicity, assume that the good citizens of Flexville reduce their consumption evenly, by a third, during every hour.
[57] While Flexville could remarket surplus energy and generation capacity, they can't remarket unused distribution capacity.

of clean energy.

Third flaw: Misunderstanding the Service that a Regulated Utility Provides

A regulated utility enables customers to use as much electricity as is feasible,[58] whenever a customer wants,[59] at predictable prices.[60] The regulator's role is to ensure that the utility provides this service reliably in a manner consistent with state policy and only recovers just and reasonable costs in retail rates.

Lazar's principles incorrectly claim that energy efficiency and distributed generation compete with a utility, and a regulator must encourage this competition by setting higher than necessary volumetric rates. This is a false comparison and a bad solution to a non-existent problem. A true alternative to being served by an electric utility is to purchase or lease products that enable a customer to entirely disconnect from the grid. As long as a customer is connected to the grid, all distributed energy resources that the customer installs only meet part of a customer's need and aren't complete substitutes to the full service a utility provides. No competition to utility service is being simulated or stimulated by minimizing fixed charges and recovering almost all revenue through volumetric rates.

Policy Implications of Rates Based on this Incorrect Theory

These three flaws lead to mispricing volumetric rates, which in turn cause distortions and inefficiencies that work against California's decarbonization policy and result in inequitable outcomes.[61] These distortions and inefficiencies are illustrated through two examples. The first example shows how an all-volumetric rate structure penalizes beneficial electrification. The second shows how an all-volumetric rate structure collapses under a high distributed generation adoption scenario. SEIA's proposal and other proposals based on the Lazar principles should be

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[58] Feasible, considering the hardware limitations of the customer's panel and interconnection.

[59] The one obvious recent failure to provide service are power outages due to public safety power shutoff events. IOUs claim that these events and customer's impacted are reducing, and improvements are being made. See, for example, https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/safety-and-enforcement-division/meeting-documents/psps-prep-staff-briefings-july-2022/pge_cpuc-staff-psps-briefing_20220712_rev-prep.pdf

[60] Rates are updated each year and stay fixed for that time period.

[61] See NRDC-TURN opening testimony at 12 for an illustration of the regressivity of current volumetric rate structure.

rejected.

Example 1: Overcharging for beneficial electrification

Table 1 presents the marginal operating costs of an air source heat pump (ASHP) in PG&E territory. For simplicity, this calculation assumes an annual ASHP consumption of 1,163 kWh per year,[62] and applies an average annual rate for each category weighted by a whole home consumption profile. Current electrification rates, which are meant to favor heat pumps, vastly overcharge the customer relative to the marginal costs incurred to serve that load. SEIA's proposal, which has even higher average volumetric rates, would do worse.

Table 1. Annual Marginal Costs of Operating an Air Source Heat Pump in PG&E Territory

	SRSMC	ACC	ACC_M	TURN/NRDC Electrification (Non-CARE)	Current Electrification (E3 Model)
Operating Costs, Heat Pump	$ 104	$ 157	$ 195	$ 284	$ 371

Charging customers extra, per the current electrification rate, will dissuade beneficial electrification. The TURN/NRDC proposal doesn't reduce volumetric rates to SRSMC or ACC_M either, but it meaningfully reduces the gap.

Example 2: Perverse outcomes in high distributed generation scenarios

SEIA proposes an average monthly fixed charge of $7.59 per month for PG&E customers.[63] To understand one implication of the SEIA proposal, consider the following hypothetical scenario where a vast majority of PG&E customers install rooftop solar and storage and take service under the net billing tariff (NBT). A simple calculation using the data in the E3 rate design tool shows that in this hypothetical scenario, the bill impacts of SEIA's proposal

[62] Source: CEC, 2019 RASS, Table 14 (for PG&E service territory), https://www.energy.ca.gov/sites/default/files/2021-08/CEC-200-2021-005-RSLTS.pdf.
[63] Prepared Direct Testimony of R. Thomas Beach on behalf of the Solar Energy Industries Association at 17.

become untenable for non-NBT customers.[64]

Rooftop solar and storage customers on the Commission-approved Net Billing Tariff (NBT) can greatly reduce their volumetric bill. Tesla claims that their products could reduce customer bills on the NBT by 92%.[65] If a very large fraction of PG&E customers, say 80%, install solar and storage and take service on the NBT, these NBT customers will only pay a fraction towards the Transmission & Distribution (T&D) revenue requirement.[66] NBT customers need the grid to export electricity when they have excess and import electricity whenever they need, such as during cloudy weeks of the year. In this scenario all PG&E customers will end up paying approximately $1.7 billion toward T&D revenue recovery and fixed charges.[67] Per the E3 rate design tool, however, PG&E's forecasted residential class share of the T&D revenue requirement for 2023 is $4.7 Billion. There will be a shortfall in T&D revenue collection of $3 billion.

Due to revenue decoupling, the $3 billion under collection of the T&D revenue requirement will be added to the following year revenue requirement. The T&D revenue requirement for the following year will increase to approximately $7.7 billion.[68] Again, assuming NBT customers save 92% the following year too, and thus only pay 8% toward all revenue components, they will only pay $491 million in T&D charges through their bills. All customers will pay fixed charges of approximately $455 million. There's still $6.7 billion remaining.

The responsibility for recovering this $6.7 billion in T&D costs will fall to non-NBT households. In our hypothetical example, this amount equates to approximately $560 per month per non-NBT customer. This is additional to the SEIA fixed charges and other bill components

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[64] Calculation details available at this link.
[65] See: https://www.tesla.com/sites/default/files/downloads/powerwall-net-billing-tariff-white-paper.pdf. Accessed on 5/26/2023.
[66] Here we assume that when NBT customers reduce their bill by 92%, they pay 92% toward all revenue components including T&D.
[67] This is calculated as the sum of fixed charges collected and the proportion of customer bills collected that go toward T&D revenue requirement. We take the average bills for customers not on NBT, multiply it by T&D revenue requirement proportion, and then multiply that with number of customers not on NBT. To this we add average bills of NBT, multiplied by T&D revenue requirement proportion, multiplied by number of customers on NBT.
[68] Assumption: T&D revenue requirement stays constant. And missing revenue is added to next year's revenue requirement.

these customers would also pay. NBT customers will cause a decrease in *future* T&D need if all customers use their solar plus storage systems in concert with T&D grid constraints.[69] Present (sunk) committed T&D costs still need to be recovered from either customers or by utility shareholders.

V. THE TURN/NRDC PROPOSAL FOLLOWS THE CORRECT APPROACH TO SETTING AVERAGE FIXED CHARGES AND VOLUMETRIC RATES (MC)

Effective rate design balances economic efficiency, equity, and policy priorities. Economic efficiency supports setting volumetric rates to reflect social marginal costs.[70, 71] Equitable outcomes support making electricity rates customer-friendly with economically progressive bill impacts. California's policy priorities support rates providing customers the right signal to use electricity in a manner that minimizes grid emissions, lowers system costs, encourages beneficial electrification, and maintains adequate incentives for cost-effective conservation. Current volumetric rates are misaligned with these goals.

The TURN/NRDC proposal is a good starting point for rate reform as it meaningfully reduces volumetric rates to bring them closer to ACC_M and SRSMC. Reduced volumetric rates will better encourage beneficial electrification. The TURN/NRDC proposal retains a strong signal for energy conservation and distributed generation since its proposed volumetric rates are much higher than both SRSMC and ACC_M. The progressive fixed charges in the TURN/NRDC proposal will lead to more equitable outcomes than the status quo and other party proposals.

A practical consideration with including externalities in electric pricing is that unless externalities are included consistently across all alternative fuels, distortions will be introduced to price signals. The Commission does not regulate the price of gasoline, and the rates for natural gas consumption don't account for the societal costs of greenhouse gases or pollutants. Building in large externalities to the price of electricity without including them for natural gas and

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[69] The amount of future T&D costs they decrease is the product of hourly avoided costs for these customers and their savings load-shape. Using the Avoided Cost Calculator, we estimate that if customers could save at most 12% of the year 1 shortfall of $3 billion in the extreme case if they were to import no power from the grid.
[70] See NRDC-TURN opening testimony at 7.
[71] *Borenstein, Severin.* "Pricing for the Short Run", *Energy Institute Blog,* UC Berkeley, August 19, 2019, https://energyathaas.wordpress.com/2019/08/19/pricing-for-the-short-run/

gasoline may not make electrification as appealing to customers as it should be. Moreover, key inputs for calculating social costs, such as the social cost of carbon, have a wide range of possible values and are sensitive to uncertain inputs such as long-term societal discount rate assumptions. To this end, the Commission needs to solve for both including an appropriate societal cost into the price of electricity while keeping electricity affordable relative to alternate polluting fuels and for low-income customers. Moreover, as the grid keeps getting cleaner and the marginal emissions rate decreases – such as in hours where we already curtail solar – the social costs of electricity consumption would keep decreasing. Societal costs of consuming more natural gas and gasoline will only increase as climate change worsens.

To this end we recommend that the Commission recognize that:

- In the short run, all costs other than SRSMC are fixed. In the long run all costs other than ACC_M are fixed. Ideally, prices for all fuels would account for societal costs of consumption. Setting the right social cost of electric consumption should also consider that electrification requires electricity usage be much cheaper than natural gas and gasoline.
- Fixed charges would need to be very high to recover all fixed costs. TURN and NRDC are not recommending fixed charges that achieve this objective.
- The Commission is justified in setting fixed charges at a level that results in volumetric rates that encourage beneficial electrification, lead to progressive outcomes, do not adversely affect affordability, and maintain a signal for energy efficiency and conservation.
- The Commission should regularly update the IGFC to set a volumetric rate that balances the aforementioned policy goals. This update can occur either through Phase 2 General Rate Case proceedings for each Investor Owned Utility (IOU) or a multi-utility rulemaking.
- The TURN/NRDC proposal is an appropriate starting point that balances numerous policy objectives including a significantly more progressive rate structure that encourages beneficial electrification, ensures that all customers are charged for a reasonable portion of fixed costs, and aligns rates with established economic principles.

VI. CUSTOMER RESPONSE TO IGFC (MC)

A. Reducing Volumetric Rates Will Help Achieve Policy Goals; They Wouldn't Cause Inefficient Cost Overruns

The TURN/NRDC fixed charge proposal reduces volumetric rates by about 20% to 25% relative to the status quo where utilities recover almost all residential revenue through volumetric rates charged on consumption.[72] Recent rate increases have been so steep that the TURN/NRDC fixed charge proposal reduces volumetric rates to what they were between 2020 and 2022 in the PG&E and SDG&E service territories.[73] These new reduced volumetric rates would still be among the highest in the nation.

A decrease in average volumetric rates will cause an increase in electricity use, an outcome that shouldn't be interpreted as encouraging wasteful consumption. To cause wasteful use, rates would have to fall below short run social marginal cost (SRSMC). Electricity rates higher than SRSMC cause customers to forego what would otherwise be economically efficient electricity use such as beneficial electrification. In addition to this deadweight loss, extremely high electricity rates have regressive impacts. The impact of this pricing inefficiency is most felt by lower-income customers.

The TURN/NRDC proposed rates are still three to five times SRSMC and at least twice modified avoided costs (ACC_M).[74,75] No party proposes to reduce volumetric rates to either SRSMC or ACC_M; all rate proposals thus continue to over-emphasize energy efficiency and distributed generation.

The policy and electric system implications of the TURN/NRDC proposal are as follows.

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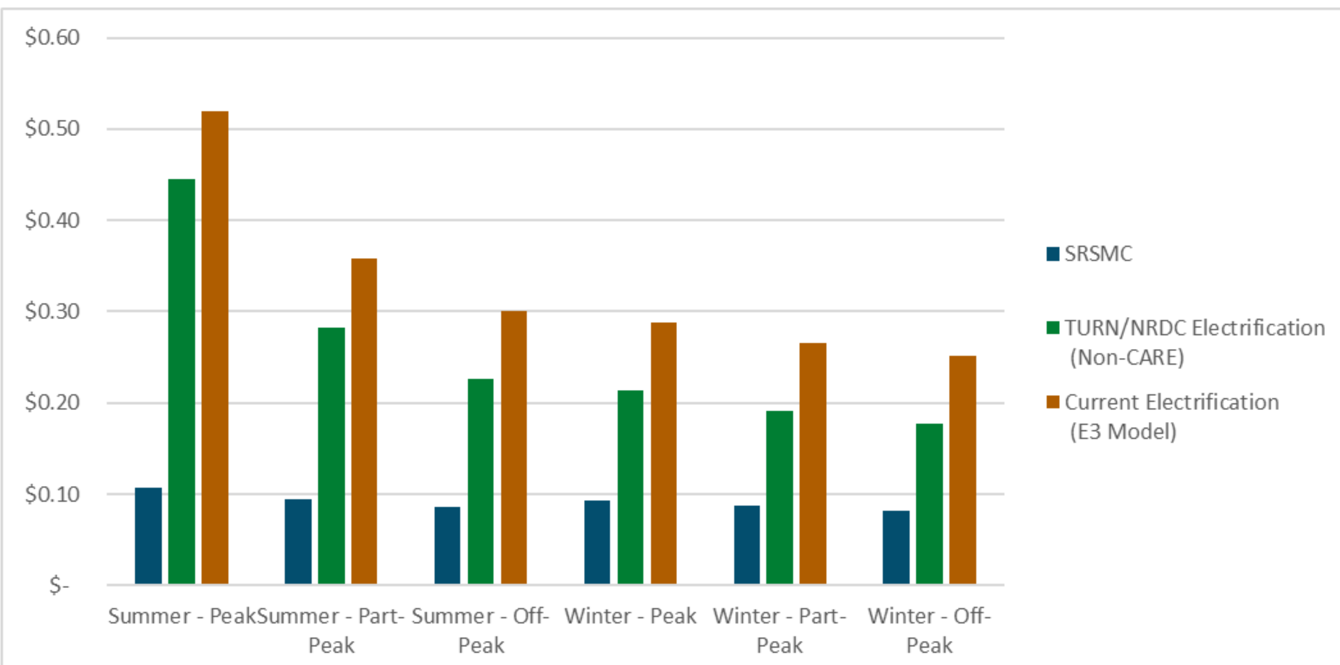
[72] Save a $1/month fixed charge for SCE residential customers and customers of all three utilities served under electrification rates.
[73] Source: TURN compilation of PG&E and SDG&E residential revenue requirements and advice letters. Spreadsheets available upon request. TURN does not have the same data for SCE.
[74] See NRDC-TURN Opening Testimony at 9.
[75] See NRDC-TURN opening testimony. The avoided cost calculator (ACC) with minor modifications, henceforth called ACC_M, could provide guidance for setting average volumetric rates if policymakers choose to include some longer run marginal costs and/ or collect some future fixed costs via volumetric rates to recover future marginal capacity and grid expansion costs based on customer consumption patterns today. The ACC_M is the ACC corrected to include all social marginal costs. The ACC_M is an application of long run social marginal costs for the electric sector.

In the short run, a decrease in rates will cause a much smaller than proportional increase in consumption. Only a fraction of this increase in consumption may occur during peak periods, and a large on-peak and off-peak price differential can mitigate any increase in peak period usage. Because peak rates are significantly higher than SRSMC, Figure 18: , the value customers get out of any increase in consumption during this period is likely much greater than the social marginal costs their usage causes. As a result, increased usage will result in a contribution towards fixed cost recovery that places downward pressure on overall rates. The benefits of increased usage, when priced above both SRSMC and ACC_M, should be understood to include the spreading of fixed costs over a larger base of sales and a reduction in average rates for all customers.

Figure 18: SRSMC vs Current and Proposed Rates Broken out by TOU Period[76]



In the long run, lower marginal rates should encourage beneficial electrification. However, customer education is necessary to help customers differentiate between fixed and volumetric charges on their bill. There isn't much consensus in economic literature on how to ensure that customers adequately differentiate between fixed and variable charges. The Commission should require utilities to conduct pilot programs to test which information

[76] Source: Synapse analysis for NRDC-TURN model using E3 data.

messaging schemes best help educate customers to understand the difference between fixed and volumetric charges and the impact of changes in usage on their bills.

B. Price Elasticity of Electric Demand

The short-run elasticity of demand explains how much an average customer changes consumption in response to a change in electricity prices in the near term. The term short run implies that other fixed inputs are kept constant, i.e., without any changes to efficiencies of electric equipment, home insulation or other drivers of usage.[77] An example of the short-run elasticity effect would be a customer adjusting their thermostat in response to a change in the price of electricity.

The long-run elasticity of electricity demand explains the long-term changes in customer behavior both in terms of how customers use their existing appliances and customer investment decisions in new electric appliances. The short-run elasticity of demand is relatively low, and the long-run elasticity of demand is much higher. This implies that a unit decrease in electricity prices would cause a much smaller than proportional increase in electricity usage in the near-term, but it would encourage customers to increase usage over time by making more investments in building and transportation electrification relative to the status quo.

The most relevant research to inform short- and long-run elasticities of demand in California is by Buchsbaum (2022).[78,79] Buchsbaum leveraged differences in volumetric rates across baseline territories within PG&E to determine how similar homes in similar conditions, or (almost) matched pairs, just across the baseline-territory border from each other use electricity differently. Aggregate differences in electricity consumption patterns for similar homes in similar locations can be attributed to difference in electricity prices.

Buchsbaum finds that the short-run demand elasticity is -0.36 and the long-run elasticity

[77] See also, for example, this Energy Information Administration (EIA) explanation of short- and long-run demand elasticity of electricity in Price Elasticity for Building Energy Use in the United States (2021) at 1, here: https://www.eia.gov/analysis/studies/buildings/energyuse/pdf/price_elasticities.pdf
[78] Buchsbaum, Jesse "Long-Run Price Elasticities and Mechanisms: Empirical Evidence from Residential Electricity Consumers" (October 2022) | WP-331
[79] *Meredith Fowlie,* "Who (Besides the EI Blog) Pays Attention to Electricity Prices?", *Energy Institute Blog,* UC Berkeley, October 17, 2022, *https://energyathaas.wordpress.com/2022/10/17/who-besides-the-ei-blog-pays-attention-to-electricity-prices/*

is -2.4 for residential customers. This California specific short-run elasticity estimate conforms with wider literature on the short-run elasticity of demand globally to be around -0.22 to -0.23.[80,81] Recent studies have also found that elasticity of demand for electricity increases over time periods longer than the short-run.[82,83]

C. Short-run impact of the TURN/NRDC proposal: No Inefficient Cost Increases

A short-run demand elasticity of – 0.36 implies that for every 1% decrease in electricity price, customers would use 0.36% more electricity. The TURN/NRDC proposal reduces volumetric rates by between 20% to 25%. Applying the short-run elasticity, a 25% decrease in volumetric rates implies an 9% increase in electricity consumption relative to no IGFC.

An increase in usage in the short run does not necessarily translate to more investments in capacity and grid infrastructure. Only a fraction[84] of the total increase in usage will occur during summer peak periods. And only sustained electricity demand that exceeds generation capacity or transmission and distribution capacity will cause incremental investments. This increase in demand during the peak period can be mitigated through time varying prices, or time of use (TOU) rates, and continued customer outreach and education to help them best avail of TOU rates. As previously noted, increased usage will also result in a spreading of those fixed costs recovered in volumetric rates across a larger base of sales which puts downward pressure on average rates.

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[80] Zhu, Xing, Lanlan Li, Kaile Zhou, Xiaoling Zhang, and Shanlin Yang. 2018. "A metaanalysis on the price elasticity and income elasticity of residential electricity demand." Journal of Cleaner Production, 201: 169–177 https://www.sciencedirect.com/science/article/abs/pii/S0959652618323588

[81] Labandiera et al, A Meta-Analysis on the Price Elasticity of Energy Demand, European University Institute, (2015), at 7. https://cadmus.eui.eu/bitstream/handle/1814/40870/RSCAS_2016_25.pdf?sequence=3

[82] See for example, Deryugina et al (2018) who found the short run elasticity for residential electric demand in Illinois to be -0.09, this increased to -0.27 in two years. https://www.nber.org/system/files/working_papers/w23483/w23483.pdf

[83] These findings represent elasticity of demand at the electric rates and demographic conditions studied, California's current rates are much higher and the elasticity of demand at these rates may be different. For simplicity, we assume that these elasticities still apply.

[84] Approximately 15%, calculated using residential sector hourly consumption data for PG&E provided in the E3 tool.

D. Impact in the Long-Term: More Electrification

A higher long-run demand elasticity of -2.4, based on more than 10 years of billing data, implies that over time customers make permanent behavioral adjustments and investment decisions based on the price of electricity. This, the research estimates, is likely because of investments in air conditioners by customers that may have unmet cooling needs, especially in warmer climate zones. Further, Buchsbaum found that although lower income CARE customers have relatively lower short-run elasticities than non-CARE customers, they have higher long-run elasticities. A possible explanation for this is that lower income customers have less ability to respond to prices in the short term through behavioral adjustments, but they are more sensitive to electricity prices while making investment decisions.

The policy implication of these findings is that customers are sensitive to electricity prices when making electric appliance and electric vehicle purchasing decisions. And these policy implications are corroborated by research. Davis (2021) finds that electricity prices account for 70% of the reason why electric heating has grown significantly in the United States. While only 1% of homes had electric heating in 1950 nationwide, approximately 39% of homes have electric heating as of 2018. Further, Davis finds that a 10% increase in electricity prices decreases incidence of electric heating by 4.2%.[85]

Although Davis's model focuses on choice of heating fuel when a home is constructed, the findings of this study could possibly be extended to instances when customers in California make significant renovations in heating equipment as well. Historically, fuel decisions have been made at the time of home construction and whatever heating fuel is chosen at time of construction persists. In the future, as electrification is incentivized by state, state regulatory, and federal policy, customers will face this decision when renovating or considering upgrading their existing heating systems. This implication of the long-run elasticity of electricity extends to adoption of electric vehicles as well.

Higher electric rates dissuade customers from adopting EVs, and lower electric rates

[85] *Davis, Lucas.* "What Matters for Electrification?" *Energy Institute Blog,* UC Berkeley, January 4, 2021, https://energyathaas.wordpress.com/2021/01/04/what-matters-for-electrification/
Or, Davis (2021), NBER, What Matters for Electrification? Evidence from 70 Years of U.S. Home Heating Choices. http://www.nber.org/papers/w28324

encourage them. Bushnell, Muehlegger, and Rapson (2021) compared household electric vehicle (EV) adoption rates within census block groups along the boundaries of PG&E, SCE, and SDG&E and neighboring municipal-owned utilities. Customers within the same census block that belong to different utilities adopt electric vehicles at different rates. This research found that each 1 cent/kWh increase in electricity rates accounts for a 2% decrease in adoption rates of electric vehicles. They also found that EV adoption is even more sensitive to gasoline prices; when gasoline gets expensive, households are more likely to buy EVs. However, this effect will change as EVs become more prevalent and customers get accustomed to thinking about electricity rates and vehicle efficiencies in the same way they consider vehicle mileage and gasoline prices when deciding what gasoline fueled car to buy.[86]

The high long-run elasticity of electricity doesn't mean that customers will make wildly inefficient equipment purchase decisions. First, California's history of energy efficiency achievements, efficient new construction codes, appliance standards, and (relatively) transformed markets for energy efficiency means that customers have a more efficient set of choices available to them when they make purchase decisions. [87] Second, the fact that volumetric rates are so much higher than both SRSMC and ACC_M means that energy efficiency and conservation are still strongly incentivized.

E. Time Varying Rates Can Help Manage Peak Load

An evaluation of the California Statewide Opt-In Time of Use Pricing Pilot found that time varying rates caused customers to reduce peak period consumption relative to customers on tiered rates.[88,89] The evaluation shows a statistically significant reduction in peak period usage for all utilities. Summer peak savings on weekdays range between 4% and 6% except for a couple of observations which show savings of around 2.5% to 3.5%.[90] A recent study on the impacts of

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[86] Bushnell, J., Muehlegger, E., & Rapson, D. (2021). Do Electricity Prices Affect Electric Vehicle Adoption? *UC Office of the President: University of California Institute of Transportation Studies*. http://dx.doi.org/10.7922/G29S1PB5 Retrieved from https://escholarship.org/uc/item/5f80503b
[87] See, for example, https://appliance-standards.org/states
Or, the CEC's portal of energy efficiency, building and appliance standards: https://www.energy.ca.gov/programs-and-topics/topics/energy-efficiency
[88] See: https://www.cpuc.ca.gov/-/media/cpuc-website/files/legacyfiles/s/6442457172-statewide-opt-in-tou-evaluation-final-report.pdf
[89] SDG&E, unlike the other utilities had two rates for summer and winter seasons.
[90] Ibid. at 4.

time varying prices in Spain by Enrich et al (2023) shows that steep time varying prices reduced peak electricity use by 10%. They also found that customer outreach and education is necessary to elicit this response, and changes in behavior could be habit forming.[91] That last part is particularly important because previous research on this topic of time varying prices in Spain found that if time varying prices aren't sufficiently differentiated and if they aren't accompanied by successful customer outreach campaigns, they don't elicit customer response.[92]

F. Helping Customers Understand New Rate Structure is Critical to Its Success

Ensuring that customers understand the difference between the portion of their bill that is fixed and that which varies with usage is critical to the success of this rate design reform. Research by Ito (2014), conducted using data on California customers' bills, found that customers on tiered increasing block pricing (IBP) respond to their average rate (total bill divided by total kWh consumed) which is perceived to be the marginal rate.[93]

This research has implications for implementing a fixed charge to decrease volumetric rates because part of the success of IGFC lies in customers realizing that the volumetric rate applied on electricity consumption has decreased. If they understand this fact, then, compared to current rates, they're more likely to adopt electrification. Recent research from China shows that customers on a fixed and marginal rate are also likely to confuse their average rate for their marginal rate.[94] This research, however, studies the impact of going from a fully fixed bill for heating, to a fixed charge and volumetric rate; as opposed to going from an almost all volumetric rate to a mix of fixed charge and volumetric rate. Still, the conclusions of this study have policy implications for IGFC implementation.

In the TURN/NRDC proposal, customers outside the lower income tier have a

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[91] Jacint Enrich, Ruoyi Li, Alejandro Mizrahi, Mar Reguant (2023). Measuring the Impact of Time-of-Use Pricing on Electricity Consumption: Evidence from Spain. https://mreguant.github.io/papers/Time_of_Use_Impacts_Enrich_Li_Mizrahi_Reguant.pdf

[92] Fabra, Natalia, David Rapson, Mar Reguant, and Jingyuan Wang. 2021. "Estimating the Elasticity to Real-Time Pricing: Evidence from the Spanish Electricity Market." *AEA Papers and Proceedings*, 111: 425-29.

[93] Ito, Koichiro. 2014. "Do Consumers Respond to Marginal or Average Price? Evidence from Nonlinear Electricity Pricing." *American Economic Review*, 104 (2): 537-63.

[94] Koichiro Ito & Shuang Zhang (2022), Do Consumers Distinguish Fixed Cost from Variable Cost? "Schmeduling" in Two-Part Tariffs in Energy. NBER Working paper. https://www.nber.org/papers/w26853

meaningful fixed charge. On average, IGFC for the middle tier counterbalances bill reduction of volumetric rate reduction; and on average, IGFC for the high tier leads to an overall bill increase. This means that the average perceived rate (total bill including IGFC divided by usage) for customers in the middle and higher income tiers is higher than the volumetric rate or marginal rate for consumption. These customers need to be educated on how to differentiate IGFC from their volumetric charges so that they make usage and investment decisions based on lowered volumetric rates.

Understandable bills and customer outreach are critical. There isn't much consensus in economic literature on how to ensure that customers adequately differentiate between fixed and variable charges. The Commission should first adopt the IGFC then require utilities to test different messaging, billing, and informational schemes to determine what best help customers differentiate between fixed and volumetric charges.

VII. COMPREHENSIVELY ANALYZING RISKS OF GRID DEFECTION (MC)

Grid defection could become a serious issue if the private cost to customers of reliably meeting their full power needs is lower than the aggregate bills paid to the electric utility. This implies that low usage customers with a high fixed charge are the most likely of all customers to consider grid defection. Any serious claims about grid defection should, at minimum, account for the following:

- Variation in customer loads: utilities and CCAs maintain a capacity reserve margin to account for higher-than-expected spikes in electricity demand, e.g., due to a heat wave. Grid defection study should account for customer valuation of reliability (explained next) and account for that along with variation in electric demand to size systems accurately. On the flip side, studies should also account for a customer's ability to use their loads flexibly to better enable reliable service from their personal system.
- Value of reliability: The biggest challenge in providing off-grid services to customers is ensuring year-round reliability. A study by Gorman et al (discussed below) found that more customers would grid defect if they accept that a small fraction – 1% – of their load will go unmet and they can't choose when this power shortage occurs. To

determine whether and to what extent customers would accept energy insufficiency as a consequence of grid defection, it is necessary to understand the value that customers place on having 100% of their electric needs met.

- All private customer costs: Studies should account for all private customer costs including any costs of efficiency and demand flexibility upgrades to decrease electric load, accurate and up to date installation costs of solar and storage systems, and backup fossil generators.
- Any environmental impacts and related permit costs of using a backup fossil fuel generator for reliability.

To our knowledge, there are two prominent studies on grid defection. A study by the Rocky Mountain Institute (RMI)[95] and one by Gorman et al at University of California.[96] Both studies look at the probability of grid defection using rooftop solar and storage. The RMI study forecasts that parity between utility and solar plus storage is already here in parts of California, especially if customers install other demand side measures. This finding would imply that significant grid defection is already occurring in California. It isn't. In a briefing to the National Academies of Sciences (NAS) committee on net energy metering, RMI staff confirmed that grid defection hasn't occurred at a rate their study estimates, and that their study analyzes an average customer and does not fully account for variability in demand, added electrification loads, tail events, and extreme weather, among other considerations.[97]

Gorman analyzes three demand cases and the impacts of fixed charges high enough to reduce the volumetric rate to utility private marginal cost (PMC). Gorman finds that approximately 3% of California homes could grid defect. Importantly, Gorman find that whatever grid defection they do find mostly occurs for homes with low demand and when utility volumetric rates are equal to PMC. Caveats when applying the Gorman study are that this analysis is based on 2016 rates; it considers future cost decreases in solar and storage which should be compared with current installation costs; the PMC scenario implies a volumetric rate

[95] Creyts and Guccione, *The Economics of Grid Defection: When and Where Distributed Solar Generation Plus Storage Competes with Traditional Utility Service*, Rocky Mountain Institute. (2014)
[96] Gorman, Jarvis, and Callaway (2020), *Should I Stay Or Should I Go? The importance of electricity rate design for household defection from the power grid*, Applied Energy Journal.
[97] See minute 30 - 45 of the presentation available at: https://www.nationalacademies.org/event/04-27-2022/the-role-of-net-metering-in-the-evolving-electricity-system-meeting-4

of approximately 5 cents a kWh and a correspondingly high fixed charge. The study also doesn't account for high variability in demand such as demand spikes during hot summer days. Neither study considers the fact that customers could use fossil powered generators as a reliability back up. These generators could bridge the reliability gap. This comes at the cost of purchasing a generator, buying fuel, keeping adequate fuel stocks, and managing operation of the full customer power plant – solar, storage, and a backup generator. Large backup generators, to serve multiple units, also require expensive air quality permits.[98]

Any assessment of grid defection should also account for the portion of housing units that are rental properties given the split incentive problem (landlords own the property, tenants pay the bills). While 45% of California households are renters, for householders with incomes below 200% of the Federal Poverty limit, approximately 67% are renters.[99] Further, many residential properties are unsuitable for the oversized solar installations needed to supply 100% of a customer's annual electricity needs, especially in densely populated areas, which limit available space to host the needed number of panels. Finally, any assessment should examine trends in grid defection amongst non-residential customers that are subject to sizable fixed and demand charges under existing tariffs.

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[98] See, for example, Bay Area Air Quality Management District's requirements for $1,313 and $2,357 for gas and diesel generators larger than 50 BHP. https://www.baaqmd.gov/permits/apply-for-a-permit/engine-permits

[99] https://calbudgetcenter.org/app/uploads/2021/01/IB-Renters-Remediated.pdf

APPENDIX

PROPOSED FIXED CHARGE TABLES AND BILL IMPACT GRAPHS

Appendix: Tables – Proposed Fixed Charges by Income Band

<table>
<tr><th colspan="7">PG&E (E-TOU-C) Non-CARE Income Graduated Fixed Charge</th></tr>
<tr><th>Income Band</th><th>IOUs</th><th>PAO</th><th>TURN/NRDC</th><th>SEIA</th><th>CEJA</th><th>Sierra Club</th></tr>
<tr><td>$0 - $25,000</td><td rowspan="5">$51</td><td rowspan="2">$23</td><td rowspan="5">$41</td><td rowspan="3">$7</td><td rowspan="4">$0</td><td rowspan="2">$0</td></tr>
<tr><td>$25,000 - $50,000</td></tr>
<tr><td>$50,000 - $75,000</td><td rowspan="2">$32</td><td rowspan="2">$8</td></tr>
<tr><td>$75,000 - $100,000</td><td rowspan="4">$9</td></tr>
<tr><td>$100,00 - $150,000</td><td rowspan="3">$37</td><td rowspan="2">$6</td><td>$15</td></tr>
<tr><td>$150,000 - $200,000</td><td rowspan="2">$92</td><td rowspan="2">$62</td><td>$45</td></tr>
<tr><td>$200,000+</td><td>$61</td><td>$94</td></tr>
</table>

<table>
<tr><th colspan="7">SCE (TOU-D-4-9) Non-CARE Income Graduated Fixed Charge</th></tr>
<tr><th>Income Band</th><th>IOUs</th><th>PAO*</th><th>TURN/NRDC</th><th>SEIA</th><th>CEJA</th><th>Sierra Club</th></tr>
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<tr><td>$25,000 - $50,000</td></tr>
<tr><td>$50,000 - $75,000</td><td rowspan="2">$31</td><td rowspan="2">$8</td></tr>
<tr><td>$75,000 - $100,000</td><td rowspan="4">$9</td></tr>
<tr><td>$100,00 - $150,000</td><td rowspan="3">$35</td><td rowspan="2">$9</td><td>$20</td></tr>
<tr><td>$150,000 - $200,000</td><td rowspan="2">$85</td><td rowspan="2">$62</td><td>$71</td></tr>
<tr><td>$200,000+</td><td>$85</td><td>$189</td></tr>
</table>

<table>
<tr><th colspan="7">SDG&E (TOU-DR1) Non-CARE Income Graduated Fixed Charge</th></tr>
<tr><th>Income Band</th><th>IOUs</th><th>PAO</th><th>TURN/NRDC</th><th>SEIA</th><th>CEJA</th><th>Sierra Club</th></tr>
<tr><td>$0 - $25,000</td><td rowspan="5">$73</td><td rowspan="2">$26</td><td rowspan="5">$41</td><td rowspan="3">$11</td><td rowspan="4">$0</td><td rowspan="2">$0</td></tr>
<tr><td>$25,000 - $50,000</td></tr>
<tr><td>$50,000 - $75,000</td><td rowspan="2">$37</td><td rowspan="2">$11</td></tr>
<tr><td>$75,000 - $100,000</td><td rowspan="4">$13</td></tr>
<tr><td>$100,00 - $150,000</td><td rowspan="3">$43</td><td rowspan="2">$7</td><td>$23</td></tr>
<tr><td>$150,000 - $200,000</td><td rowspan="2">$128</td><td rowspan="2">$62</td><td>$62</td></tr>
<tr><td>$200,000+</td><td>$66</td><td>$136</td></tr>
</table>

<table>
<tr><th colspan="7">PG&E (E-TOU-C) CARE Income Graduated Fixed Charge</th></tr>
<tr><th>Income Band</th><th>IOUs</th><th>PAO*</th><th>TURN/NRDC</th><th>SEIA</th><th>CEJA</th><th>Sierra Club</th></tr>
<tr><td>$0 - $25,000</td><td>$15</td><td rowspan="2">$10</td><td rowspan="7">$5</td><td rowspan="7">$5</td><td rowspan="7">$0</td><td rowspan="7">$0</td></tr>
<tr><td>$25,000 - $50,000</td><td rowspan="6">$30</td></tr>
<tr><td>$50,000 - $75,000</td><td rowspan="2">$14</td></tr>
<tr><td>$75,000 - $100,000</td></tr>
<tr><td>$100,00 - $150,000</td><td rowspan="3">$16</td></tr>
<tr><td>$150,000 - $200,000</td></tr>
<tr><td>$200,000+</td></tr>
</table>

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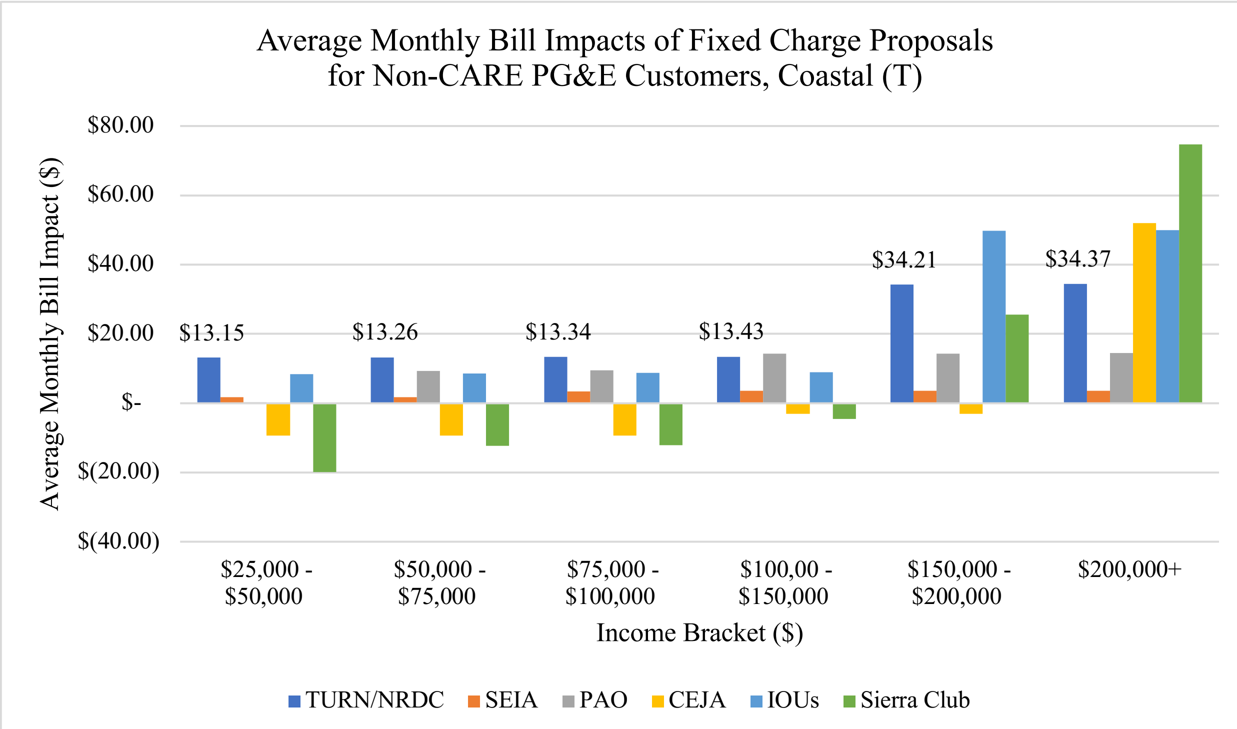
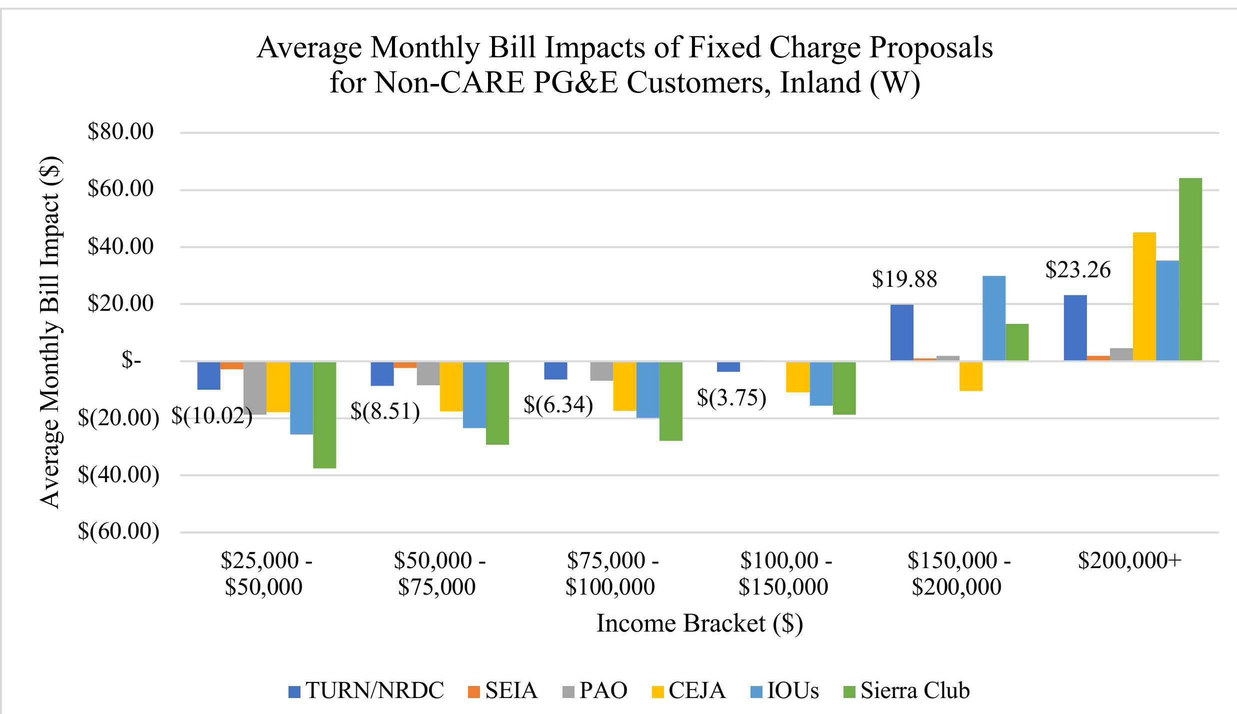
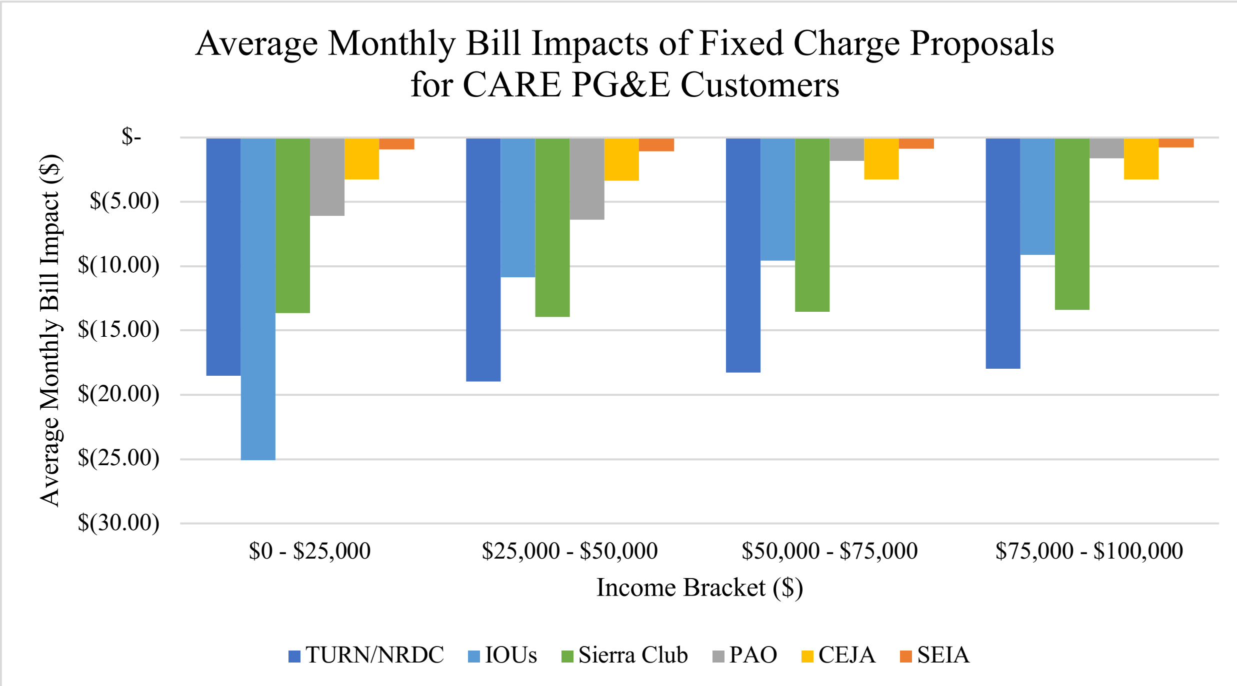
<tr><td>$25,000 - $50,000</td><td rowspan="6">$20</td></tr>
<tr><td>$50,000 - $75,000</td><td rowspan="2">$15</td></tr>
<tr><td>$75,000 - $100,000</td></tr>
<tr><td>$100,00 - $150,000</td><td rowspan="3">$17</td></tr>
<tr><td>$150,000 - $200,000</td></tr>
<tr><td>$200,000+</td></tr>
</table>

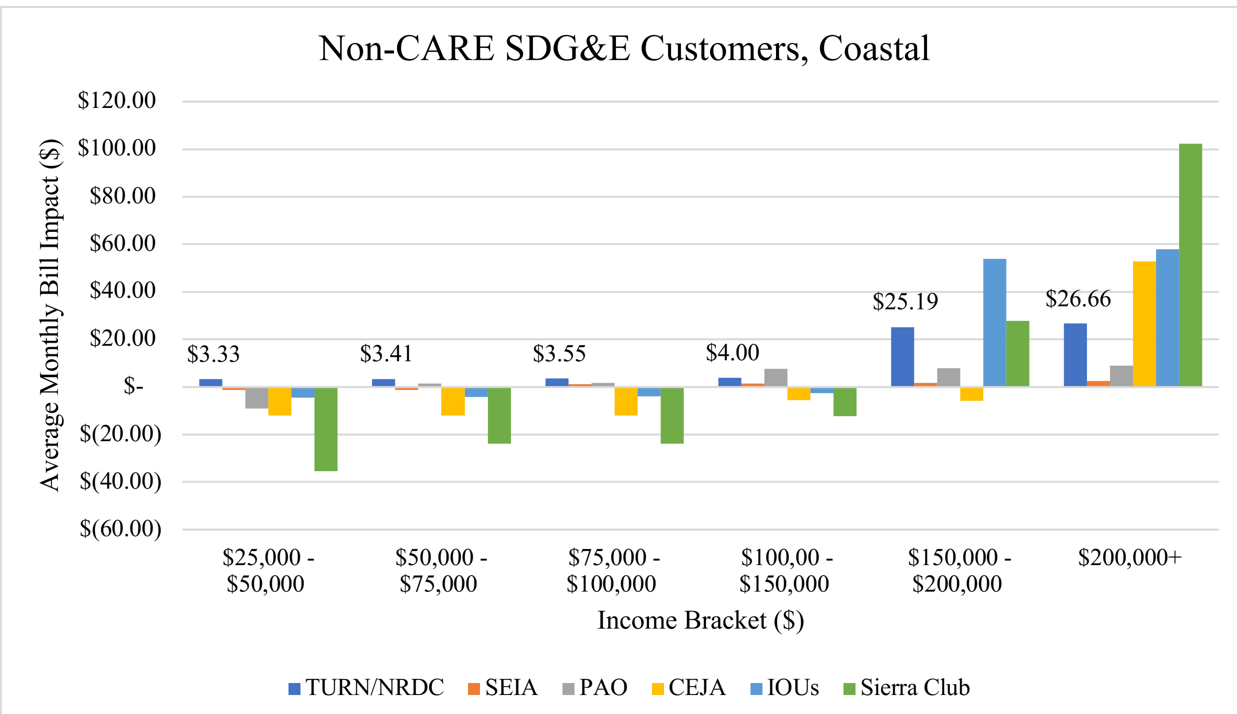
<table>
<tr><th colspan="7">SDG&E (TOU-DR1) CARE Income Graduated Fixed Charge</th></tr>
<tr><th>Income Band</th><th>IOUs</th><th>PAO*</th><th>TURN/NRDC</th><th>SEIA</th><th>CEJA</th><th>Sierra Club</th></tr>
<tr><td>$0 - $25,000</td><td>$24</td><td rowspan="2">$14</td><td rowspan="7">$5</td><td rowspan="7">$7</td><td rowspan="7">$0</td><td rowspan="7">$0</td></tr>
<tr><td>$25,000 - $50,000</td><td rowspan="6">$34</td></tr>
<tr><td>$50,000 - $75,000</td><td rowspan="2">$19</td></tr>
<tr><td>$75,000 - $100,000</td></tr>
<tr><td>$100,00 - $150,000</td><td rowspan="3">$22</td></tr>
<tr><td>$150,000 - $200,000</td></tr>
<tr><td>$200,000+</td></tr>
</table>

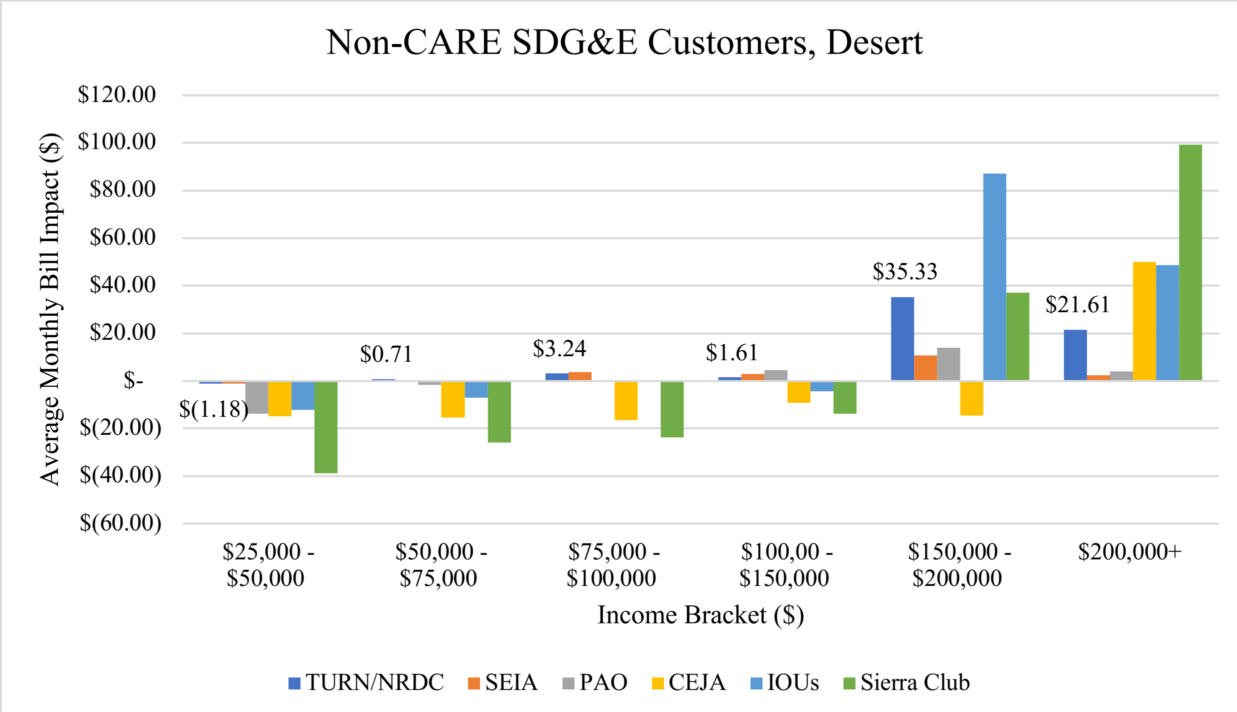
Bill Impacts (standard TOU rates)

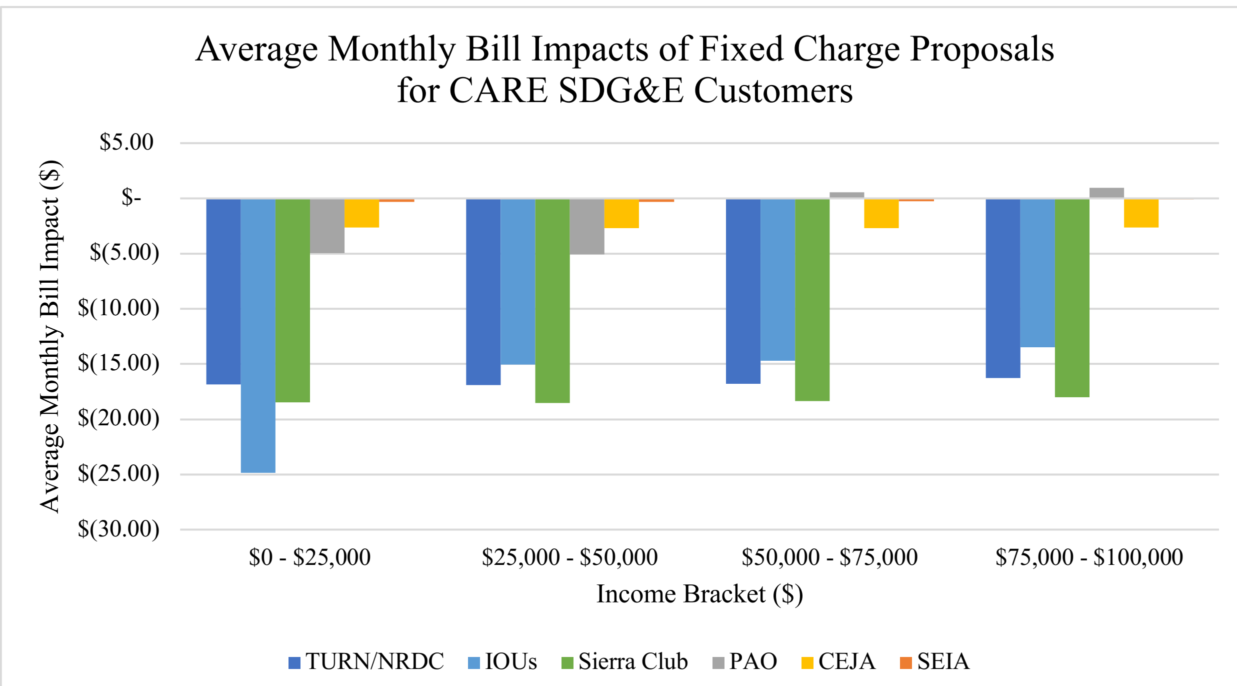


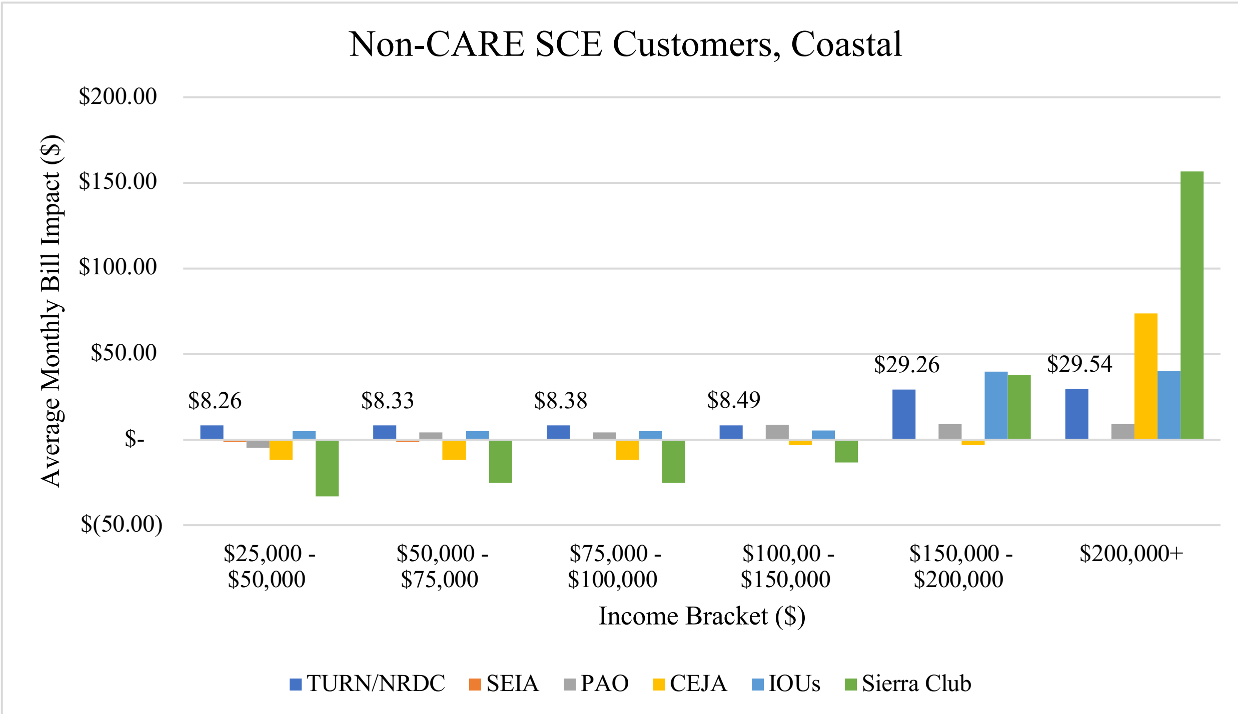


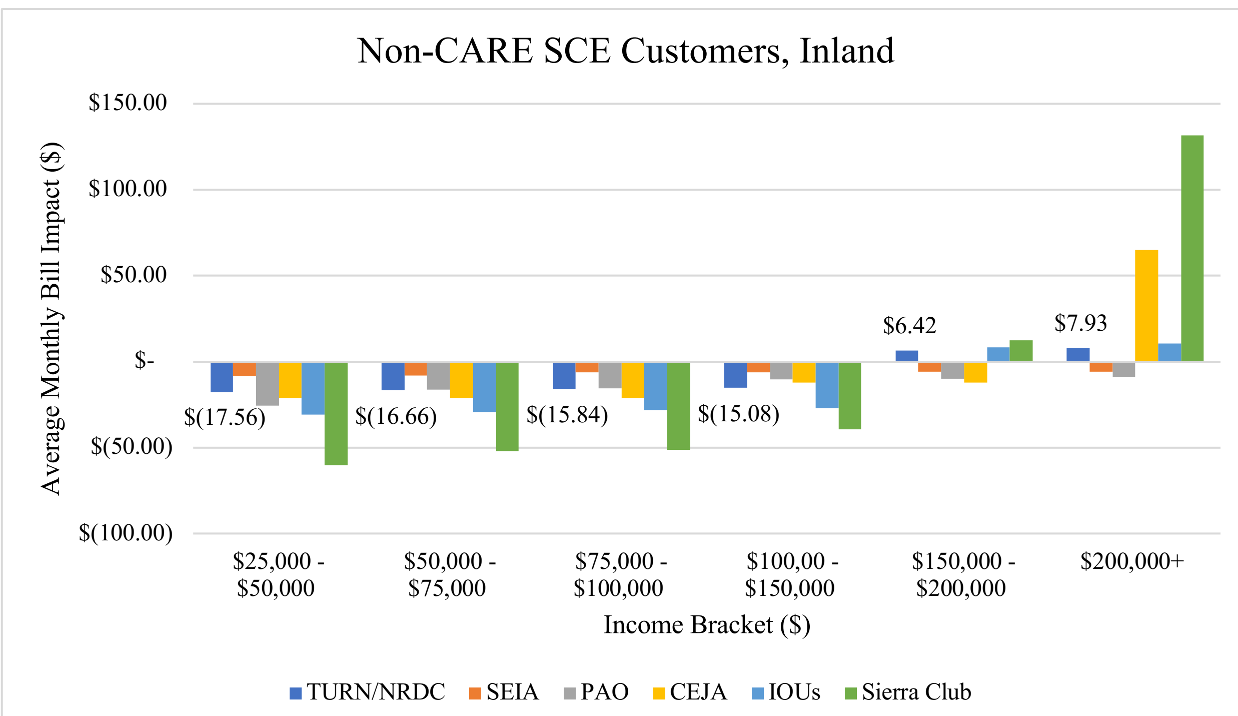

Average Monthly Bill Impacts of Fixed Charge Proposals for CARE PG&E Customers
Average Monthly Bill Impact ($)
$-
$(5.00)
$(10.00)
$(15.00)
$(20.00)
$(25.00)
$(30.00)
$0 - $25,000
$25,000 - $50,000
$50,000 - $75,000
$75,000 - $100,000
Income Bracket ($)
TURN/NRDC
IOUs
Sierra Club
PAO
CEJA
SEIA

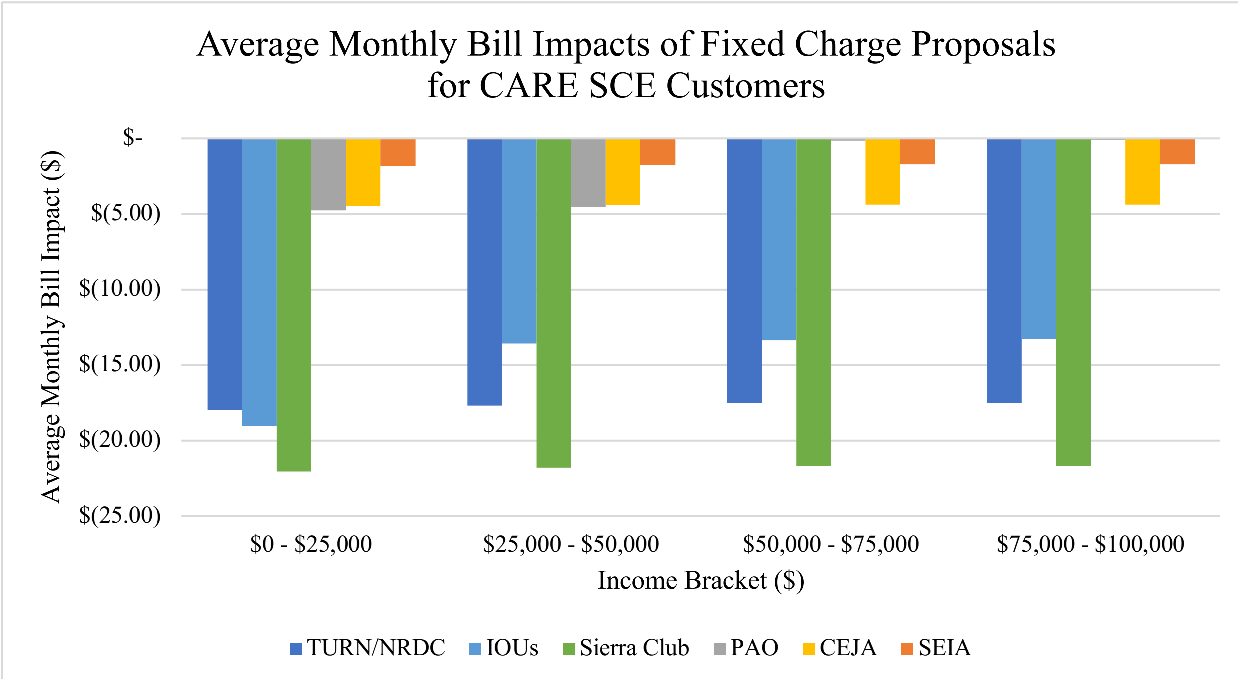

Non-CARE SDG&E Customers, Coastal
Average Monthly Bill Impact ($)
$120.00
$100.00
$80.00
$60.00
$40.00
$20.00
$-
$(20.00)
$(40.00)
$(60.00)
$3.33
$3.41
$3.55
$4.00
$25.19
$26.66
$25,000 - $50,000
$50,000 - $75,000
$75,000 - $100,000
$100,00 - $150,000
$150,000 - $200,000
$200,000+
Income Bracket ($)
TURN/NRDC
SEIA
PAO
CEJA
IOUs
Sierra Club


Non-CARE SDG&E Customers, Desert
$120.00
$100.00
$80.00
$60.00
$40.00
$20.00
$-
$(20.00)
$(40.00)
$(60.00)
Average Monthly Bill Impact ($)
$(1.18)
$0.71
$3.24
$1.61
$35.33
$21.61
$25,000 - $50,000
$50,000 - $75,000
$75,000 - $100,000
$100,00 - $150,000
$150,000 - $200,000
$200,000+
Income Bracket ($)
TURN/NRDC
SEIA
PAO
CEJA
IOUs
Sierra Club


Average Monthly Bill Impacts of Fixed Charge Proposals for CARE SDG&E Customers
$5.00
$-
$(5.00)
$(10.00)
$(15.00)
$(20.00)
$(25.00)
$(30.00)
Average Monthly Bill Impact ($)
$0 - $25,000
$25,000 - $50,000
$50,000 - $75,000
$75,000 - $100,000
Income Bracket ($)
TURN/NRDC
IOUs
Sierra Club
PAO
CEJA
SEIA


Non-CARE SCE Customers, Coastal
Average Monthly Bill Impact ($)
$200.00
$150.00
$100.00
$50.00
$-
$(50.00)
$8.26
$8.33
$8.38
$8.49
$29.26
$29.54
$25,000 - $50,000
$50,000 - $75,000
$75,000 - $100,000
$100,00 - $150,000
$150,000 - $200,000
$200,000+
Income Bracket ($)
TURN/NRDC
SEIA
PAO
CEJA
IOUs
Sierra Club


Non-CARE SCE Customers, Inland
Average Monthly Bill Impact ($)
$150.00
$100.00
$50.00
$-
$(50.00)
$(100.00)
$(17.56)
$(16.66)
$(15.84)
$(15.08)
$6.42
$7.93
$25,000 - $50,000
$50,000 - $75,000
$75,000 - $100,000
$100,000 - $150,000
$150,000 - $200,000
$200,000+
Income Bracket ($)
TURN/NRDC
SEIA
PAO
CEJA
IOUs
Sierra Club


Average Monthly Bill Impacts of Fixed Charge Proposals
for CARE SCE Customers
Average Monthly Bill Impact ($)
$-
$(5.00)
$(10.00)
$(15.00)
$(20.00)
$(25.00)
$0 - $25,000
$25,000 - $50,000
$50,000 - $75,000
$75,000 - $100,000
Income Bracket ($)
TURN/NRDC
IOUs
Sierra Club
PAO
CEJA
SEIA