Evaluating the Impact of Compensation Structures on Residential Solar Net Metering

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ABSTRACT

This research paper explores how policy design and government incentives regarding residential solar net metering programs have changed over time. This study analyzes how electricity pricing structures have decreased, and how such decrease in compensation affects participation of residential solar customers in net metering programs. Employing a policy review and data analysis approach, the study found that the percent change in customers opting into residential solar net metering continued to increase beyond decreased compensation. Customers demonstrated a lack of price sensitivity to utility compensation rates.

BACKGROUND & INTRODUCTION

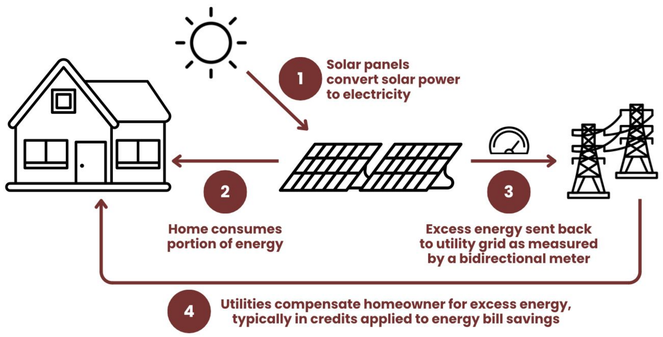

Figure 1. Net metering laws allow homeowners to sell excess solar energy back to the grid for profit.

The electricity savings are priced at a compensation structure decided by the state's Public Utilities Commission or by utilities, typically at a retail rate or an avoided cost rate (Comello & Reichelstein, 2017). Net metering also benefits the utility companies and the grid who can redirect the energy to another user in the energy network and match the supply and demand of electricity.

METHODS

The methodology will consist of two parts:

1) Policy review of the net metering law landscape across 50 states. States that have reduced their compensation structure from a retail rate will be selected for further analysis.
2) Time series analysis of the percent change in residential solar net metering customers by month and year with Year 0 representing the implementation of a reduced compensation structure. Standard deviation ratios will be utilized to measure the variability in data before and after Year 0.

RESULTS

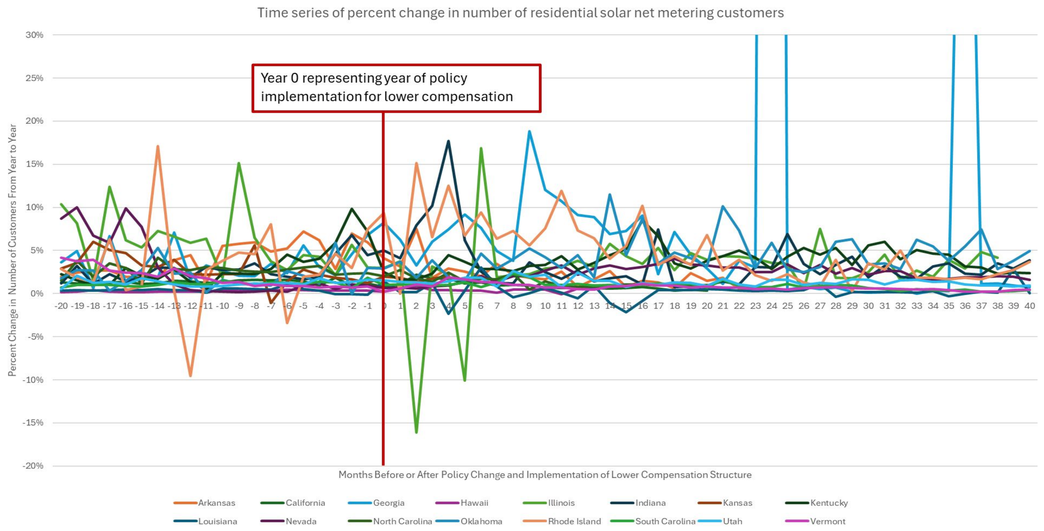

Figure 2. Time series of the percent change in number of residential solar net metering customers across 16 states that have reduced compensation from a retail rate. Year 0 as indicated represents the year a lower compensation was implemented.

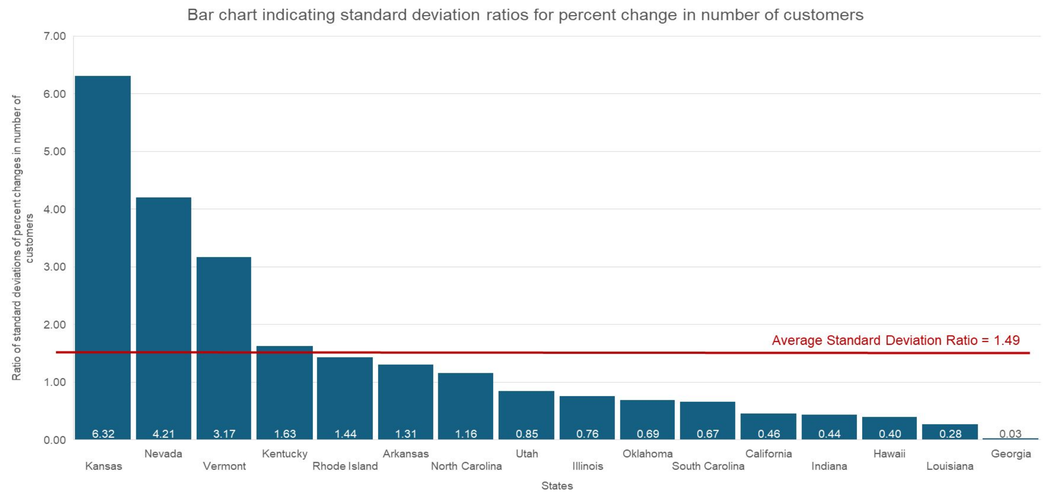

Figure 3. Bar graph illustrating the standard deviation ratios (SDR) for the time series data in Figure 2. A SDR equal to 1 indicates equal variability in data before and after Year 0. An SDR greater than 1 indicates more variation in the data prior to the implementation of a lower compensation rate. Nine states demonstrated a SDR less than 1, indicating more variation in data after a lower compensation rate. An average SDR of 1.49 across the states indicates a stabilization in the percent change in net metering customers following the policy change.

DISCUSSION

Given the net metering data from the EIA database, further analysis demonstrates the increasing adoption rate of net metering until present day. A steady increase in adoption rates would indicate a lack of customer sensitivity to changing compensation structures. Despite the decline in compensation at Year 0 for excess electricity produced, more people continue opting into the net metering program. The stabilization in data after Year 0 as demonstrated by the high SDR also may also be attributed to a policy-induced rush and uncertainty caused by mixed signals leading up to a policy change (Darghouth & Barbose, 2014). Anticipation of lower compensation structures may have led to greater volatility in the months leading up to Year 0, hence the higher SDR.

The lack of sensitivity to changing electricity pricing structures can be further attributed to how utilities operate in the energy markets as monopolies for most states (Bhattacharya, Morgan, & Rego, 2021). The monopolistic nature of utilities can lead to more pricing power to the utilities with customers having limited ability to pursue alternative pricing structures.

CONCLUSION

Residential solar adoption continues to grow despite reduced compensation, showing limited price sensitivity among customers. The higher variability before policy changes suggests a rush to enroll, followed by stabilization. These findings highlight the resilience of net metering adoption that will continue to benefit the clean energy transition.

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