The Impact of Utility Discretion on Residential Solar Requirements

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Overview

Studies have found that strategic government intervention and incentives can promote residential solar adoption in the US. However, less is understood about interconnection policies that utilities impose upon customers that may offset some of the benefits of government incentive programs. In a preliminary analysis of state interconnection rules, many states allow utilities discretion on equipment and insurance requirements for residential solar systems. Some of these requirements have been rendered obsolete by Institute of Electrical and Electronics Engineers (IEEE) 1547 standards required in nearly all state interconnection law for inverter-based, distributed generation systems. Oftentimes, utilities will require additional and unnecessary equipment, such as a disconnect switch, that increases the cost of the solar array to the customer. Similarly, liability insurance has been rendered unnecessary by updated safety standards for solar technology, yet many utilities require solar customer-generators to purchase it. Utilities may be adding these costly requirements because they are threatened by increased distributed generation which challenges the proven and reliable business and operating model of "one way" generation and distribution of electricity.

In this study, we evaluate state interconnection rules to determine where discretion has been given to utilities on external disconnect switches and insurance requirements. Then, we evaluate residential solar requirements by the utilities to estimate the costs of the redundant equipment. With this information, we conduct an empirical analysis to determine if state or utility requirements impact residential solar adoption.

Methods

We evaluate state interconnection rules using the Database of State Incentives for Renewables & Efficiency (DSIRE). In states with utility discretion, we analyze utility policies to determine if these unnecessary solar system requirements are included. With this information, small-scale solar capacity estimates, and customer estimates per utility from the Energy Information Administration (EIA) we estimate the costs of meeting these technically unnecessary requirements to customer-generators in the US. Next, using data from the National Renewable Energy Laboratory, we evaluate the impact of these policies on residential solar adoption from 2010-2017 using difference-in-difference models.

Results

Preliminary analysis reveals that 11 states require external disconnect switches, while 13 states explicitly leave it up to utility discretion whether to require (Figure 1). The remaining states either have no interconnection policies (4), prohibit requirement of external disconnect switches (2), or simply do not require external disconnect switches leaving the option for utility discretion in some, but not all, cases. Most of the older interconnection policies require external disconnect switches, indicating that updated policies could reduce unnecessary costs to solar system owners. In states with explicit utility discretion, 66% of utilities covering approximately 75% of customers in these states require external disconnect switches. Based on this, we estimate $363 million has been spent on external disconnect switches in the US to date.

The next phase of the research uses difference-in-difference models to evaluate the impact of external disconnect switch requirements on solar adoption at the state level. We anticipate that states with a high percentage of customers with external disconnect switch requirements will have lower solar adoption.

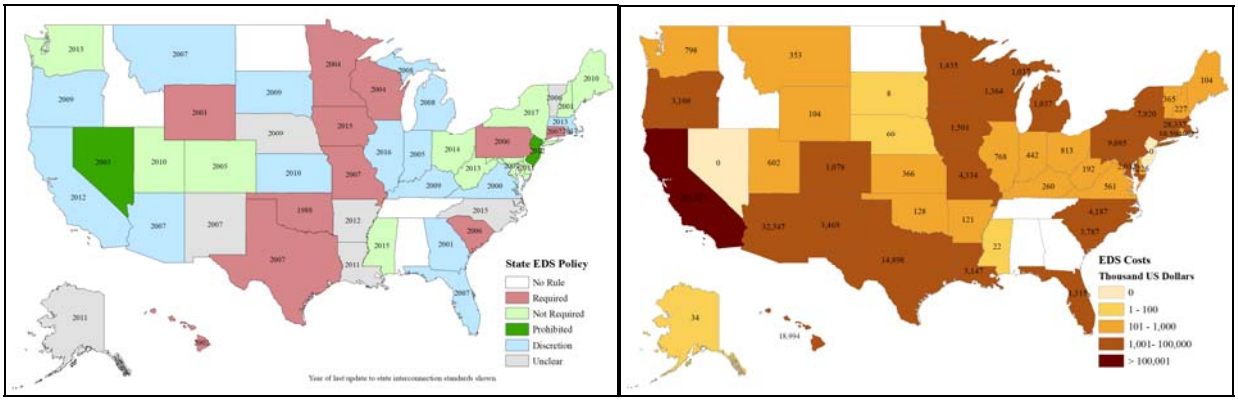

Figure 1: Left, state external disconnect switch requirements and year of the latest interconnection rule adoption at the state level, from DSIRE. On the right, estimated costs per state in thousand US dollars for redundant external disconnect switches using the methodology outlined above. White states have no interconnection policies (left and right), or no small-scale solar capacity data (right).

Conclusions

The goal of this research is to raise awareness to the public and policymakers about utility rules that may inhibit solar adoption, despite best intentions at the state level. Preliminary results indicate that outdated interconnection laws and utility discretion on safety equipment contribute to unnecessary costs primarily bestowed upon the customer-generator. The extra costs of this equipment may inhibit residential solar adoption, which can be remedied through improved utility and state interconnection policies.