Do Your Solar Panels Affect Your Electricity Consumption? Implications of a Study Challenging a Flawed Fundamental Assumption of Efficiency

PUBLIC UTILITY RESEARCH CENTER

## By PURC Team

## **Research Assumption about Efficiency** of Distribution Ownership Is Flawed

Many solar industry and environmental advocates promote the claim that distribution ownership of energy is efficient. In the "Solar **Impacts: Does Distributed Production Affect** Consumption Choices?" study, support for this claim rests upon a fundamental assumption shared by and "virtually every current model of compensating distributed generation." The study points out, however, that this fundamentally "assumes implicitly that one kWh of distributed generation displaces one kWh of generation from 'somewhere else." That is, the exchange involving distributed and centralized generation is roughly equivalent. The study targets that assumption, however, because if untrue, it carries profound financial implications for:

- Business model changes
- Pricing
- Grid design
- Terms for how customers interconnect with the utility grid; and
- Conditions for customer utilization of the grid

The study concludes that the fundamental assumption governing the widespread belief in 1:1 efficiency may be demonstrably and irretrievably flawed. As a direct consequence this assumption carried significant and widespread, complex financial consequences. In fact, research revealed that within the study sample, energy consumption increased in households that installed solar panels by a factor of 8 to 14 percent.

## **Implications for Policy Making**

The most important implications of the study for policy makers follow:

- The study confirms that "it is important to understand how customers change as their roles change".
- These changes are important not only for utility companies but also for "the broader picture of the impacts of electricity on the environment."
- The importance of objective data rather than popular opinion or endorsements upon which to base policy deliberations cannot be overstated.
- In addition to financial considerations, a range of social and political implications becomes apparent in issues surrounding topics such as climate change.
- Although previous studies of participants in environmental projects documented motivations such as "warm feelings" about improving environmental conditions, the study focused entirely on the quantifiable electricity consumption behavior of the participants.



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- Attention focused on distributed rooftop solar PV - the most prominent model for renewable energy production developed over the past decade.
- This model takes advantage of steadily decreasing costs of solar panels and equally steady increases in government incentives such as the generous federal tax credit and related state and municipal initiatives.

The study of the behavior of customers who install rooftop solar PV on their homes challenged a basic assumption underlying numerous important policy issues. It also raised several policy-related questions that resist simplistic prescriptions. Fresh dilemmas for policy makers to consider affect traditional financial implications.

The methodology and conclusion of the study enable policy makers and others to apply as they explore current concerns such as how and to what extent to compensate electricity producers. Although the implications remain complex, they clearly must be addressed:

• What do analyses of impacts on the financial compensation of resources reveal?

- Given the finding that the previous fundamental assumption about a 1:1 relationship between distributed and centralized resources may be incorrect, to what extent can roles in reducing emissions be quantified and assessed?
- How best can such analyses assess their impact on system reliability?

The growing role of distributed generation in electricity will continue to raise questions about its impact on the rest of the system – diverse impacts chiefly on finances as well as on the environment. If, as the study revealed, every 100 kWh generated by residential distributed solar displaces only 86-92 kWh from other sources, then:

- What are the resulting consequences affecting financial compensation?
- What are the resources' role and impact in reducing emissions? and
- What are their impacts on the overall reliability of the system, projected over time?

As PV technology continues to improve its sunlight-to-electricity efficiency and reduces installation costs, reaching grid parity in increasing numbers of markets, these questions and issues will increasingly become essential policy and implementation issues to be resolved through reliance upon objective, quantifiable data.



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