New Ideas for Seeding Your Solar Marketplace

Program Pilots and Embedded Experiments

Workshop Pre-read Commentary by Adam B. Cohen

In 2014, major hurdles remain in meeting the SunShot affordability goals. Almost two-thirds of the costs for an average rooftop solar installation are not directly affected by hardware improvement. Non-hardware "soft" costs encompass an outsized portion of the total price. Even if solar panels were free, the SunShot prices are still out of reach for a majority of Americans. Soft costs – comprising permitting, inspection, interconnection, labor, and customer acquisition – are now the main deployment barrier.

An emerging set of tools – based on the tried-and-true method of observation, hypothesis, and experiment – can be applied to systematically measure and reduce soft costs. Social and behavioral scientists are probing foundational and practical questions using a host of techniques such as big data analytics, predictive numerical modeling, and randomized control trials. Harnessing these advances has the potential to be game changers for the solar industry. A new science of soft costs is taking root that fulfills the promise of applying scientific breakthroughs to make solar energy economical.

AMERICA'S SOLAR DIFFUSION LABORATORIES

The U.S. solar market is seeing tremendous growth, with cumulative installations doubling every 2.5 years. Near-term deployment strategies will determine how the market evolves – including the structure of soft costs. As new markets open up, new programs come online, and new program implementers learn about solar, there is an extraordinary opportunity to advance and apply a new science of soft costs. Solar program implementers can create pilots and scale up ideas with the 'biggest bang for the buck.'

The new science of soft costs

For half a century, innovation diffusion theory has been applied to accelerate the adoption of new technologies. An understanding of how a society moves an idea from obscurity to ubiquity has made 'early adopters' and 'tipping points' household terms. From the outset, it was recognized that innovation diffusion knowledge is limited by: (1) a lack of good data about the peer networks that spread information about innovations and; (2) the capacity to transform the theory's empirical observations into experimentally-validated predictions. The advent of large datasets – on adoption behavior and on social networks – coupled with data-driven evaluation is revolutionizing innovation diffusion science.

Predicting patterns of solar's spread

Granular spatiotemporal datasets about solar adoption ("The Solar W5": who, when, where, what [e.g., types of installed equipment], and how [e.g., type of financing]) are regularly aggregated from across the U.S. A decade's dataset of solar adoption is an extremely rich resource for charting evolving market dynamics – perhaps one of the cleanest observations of real-time market transformation. These data can establish a baseline for quantitatively comparing what's working for the industry and what's not. These data can also train cutting-edge computer simulations – called agent-based models – to predict market impacts of new programs and policies. For example, as incentive structures change or as group-buying programs are established, their formats can be tweaked and refined to optimize outcomes before broad implementation.

Impartial measurements of solar market responses

New solar energy programs and policies are rapidly being designed and implemented. State agencies are creating group-buying programs to simplify solar buying and reduce costs, like the Solarize campaigns in Massachusetts and Connecticut. Electric utilities are starting shared solar options for their consumers, like in Orlando and Colorado. Solar installers are strengthening and using their customer referral networks. Soft cost reduction relies on such marketplace innovation. However, beyond a qualitative narrative, it is challenging to determine why a given program is effective or not.

A randomized control trial (RCT) is a well-accepted methodology for measuring the impact of a newly launched energy program. By structuring a pilot about a series of research questions, hard evidence can be collected about what is most effective and cost-effective. This data-driven design ensures that the best program features are scaled up and ineffective parts are eliminated. Some of today's most innovative energy approaches are built directly on a platform of constant iteration through RCTs. For example, Opower's RCT-informed model for spurring energy efficiency has saved almost a half a billion dollars in energy costs.

WORKSHOP GOALS & FORMAT

During a one-day interactive workshop, held in conjunction with the Energy Department's SunShot Grand Challenge Summit, researchers and energy program implementers will work together to shape the future of soft cost science. The state of the art in the field and current research directions will be discussed and applied. The workshop themes are to:

- **Apply data-driven tools**: Solar program implementers will learn about a set of data-driven tools that can make their programs more effective, flexible, affordable, and defensible.
- **Advance soft cost science**: Soft cost scientists will discover what today's and tomorrow's most important questions for solar market transformation are and will be.
- **Create new teams**: Both groups will form new partnerships that will seed the next generation of soft cost pilots with embedded experiments.

The workshop agenda includes:

1. Keynote presentation on experiments and evaluation for energy programs and policies
2. Short talks on tackling soft cost grand challenges in customer acquisition, streamlining government processes, and ramping up demand
3. Short talks on novel soft cost tools, including data analytics, predictive modeling, market pilots, and leveraging peer effects
4. Brainstorming sessions on designing next generation data-driven solar programs
5. Participant-lead pitches on the most promising solar program designs

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WORKSHOP DETAILS

- In conjunction with DOE SunShot Grand Challenge Summit and Peer Review
- On Thursday, May 22, 2014, from 9:00 AM to 2:00 PM
- Held at Hilton Anaheim, California
- For more information, contact adam.cohen@ee.doe.gov.