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Implementing renewable energy portfolio standards: The good, the bad, and the ugly in a two state comparison

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HIGHLIGHTS

- Over half of the U.S. states have implemented renewable portfolio standards (RPS).
- RPS mandates sometimes include provisions for residential solar technology.
- This solar-sets asides have different implementation structures.
- The specifics of these policies affect the actual practices of adopters.
- This examination of solar-set aside policy is intended to improve policy.

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ABSTRACT

Understanding how household practices with regard to energy usage change and how to most effectively encourage the adoption of technologies that utilize renewable energy sources at the residential scale are important issues for addressing the environmental impacts of energy use. Here, the social practices model (Spaargaren, 2003) is applied to examine solar technology adopters in two U.S. States who were interviewed about adopting residential solar electric technology and specifically about their experiences with the rebate and incentive programs available to them. Examining the policies and interrogating their potentially unintended consequences from the perspective of the user sheds light on how residential solar incentive programs act as systems of provision, shaping the practices of solar technology adopters, in hopes of improving these incentive programs and effectively encouraging increased residential solar technology adoption. Findings suggest that feed-in tariffs offer additional positive outcomes related to broadening the context for adoption and encouraging future energy conservation while size restrictions, wholesale pricing in net metering agreements, and inconsistent policy mechanisms across utilities in the same state all have potentially unintended negative consequences. Utilizing a perspective attentive to social practice offers a means of improving the design and implementation of energy policy.

1. Introduction

In the United States, there is no federal climate policy and little real policy conversation about climate issues at the national level (Lutzenhiser, 2001), although it is increasingly acknowledged that the burning of fossil fuels is contributing to atmospheric climate change that will negatively impact the well being of our complexly coupled human–nature systems. In the United States, the electricity sector is a major contributor to global climate change, accounting for roughly 40% of the nation's carbon dioxide emissions and 30% of all U.S. greenhouse gas emissions (Carley, 2011). There has long been an interest in understanding energy usage from a social and cultural perspective (Lutzenhiser, 1992, 1993), although recent research has focused on many of the barriers to changing energy usage and energy practices (Shwom and Lorenzen, 2012).

There are two primary methods for addressing energy usage to decrease the impact of fossil fuel consumption: decrease the amount of energy being used through increased efficiency and conservation, or change the kind of energy being used to production via renewable energy resources. One means of addressing the sources of electricity generation that contribute to carbon emissions is through a Renewable Portfolio Standard (RPS), which mandates that utility companies provide a stipulated percentage of their electricity via specified renewable energy sources. While there is no RPS at the federal level in the U.S., state governments across the country have assumed leadership roles in the energy policy arena (Rabe, 2006) through the implementation of RPSs. These policies often involve particular mechanisms to promote certain kinds of renewable energy adoption,

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such as rebates and incentives that apply to the adoption of residential solar electric (also called photovoltaic of PV) technologies that, once installed, utility companies can claim as part of their energy generation portfolio.

This paper presents a comparative study of the rebate and incentive structures in two U.S. states (Wisconsin and Colorado) meant to encourage the adoption of residential PV technology. These incentive policies emerged in response to RPS mandates in both states and are intended to encourage renewable energy technology adoption, specifically the installation of residential PV technology. This paper utilizes the social practices model (Spaargaren, 2003) to examine how the specific policy mechanisms related to incentive structures implemented in conjunction with RPS measures impact the behavioral patterns of residential solar technology adopters in the two U.S. states. This paper considers the good, the bad, and the ugly – the environmental and social benefits that accrue beyond the initial aim of facilitating technology adoption as well as the perhaps unintended consequences of specific policy mechanisms on the patterns of practice among adopters.

2. Examining social practices

Much of the scholarship that shapes policy debates about how to encourage environmentally responsible practices, such as reducing energy consumption or adopting renewable energy technologies, focuses on how values (such an environmental values or values of economic rationality) influence the choices people make (Shove, 2010). Criticizing these social psychological approaches to understanding human practice, Spaargaren (2003) argues that scholars and policymakers alike "need to conceptualize sustainable consumption behavior, lifestyles, and daily routines in such a way as to avoid the pitfalls of many of the so called micro-approaches that have been developed to date" (687) and puts forth "social practices as the proper unit of analysis for researchers and policymakers" (688). Individual considerations such as values only become meaningful in context; they may influence social practice or may be constrained by social practice, but they are always shaped by contextual factors that facilitate practice and give social practices meaning.

Spaargaren (2003) argues that policy design and implementation, as well as understandings of policy effectiveness, often ignore the actual practices in which humans engage, even though human practice hugely impacts the effectiveness of particular environmental policies. The social practices model offers an approach to developing and analyzing policy that contextualizes consumption as a pattern of human practice. In the social practices model, "the central point of analysis is not the individual attitude or norm but rather the actual behavioral practices, situated in time and space, that an individual shares with other human agents" (Spaargaren, 2003, 688).

In other words, policy makers and policy analysts need to be attentive to the actual (socially contextualized) practices of human beings, both when creating and when assessing environmental policies, because patterns of human engagement ultimately shape policy success. Practice theory is gaining support from ecological economists (Røpke, 2009) and others interested in examining technological and consumption practices that affect environmental sustainability (Shove and Walker, 2010; Lorenzen, 2012; Shwom and Lorenzen, 2012). It offers a means of improving policy making by asking important questions about how policies themselves shape patterns of human practice.

This paper applies this perspective to the experience of residential solar technology adoption in order to consider how policy interacts with practice to shape who adopts solar energy technologies, and why and how they do so, in order to inform and improve future renewable energy policy. Specifically, the policy instruments that shape adoption in the two case studies compared below are analyzed as systems of provision. Spaargaren (2003) argues, "When the social practice of 'inhabiting a house' is taken as a starting point, the possibilities for householders to green their consumption can be said to be determined to a large extent by the green alternatives made available" (691). Systems of provision shape patterns of practice by making some options available at the expense of others.

Architecture and infrastructure operate as systems of provision, wherein "certain forms of demand are unavoidably inscribed, for example, in the design and operation of electricity and water infrastructures and in the architecture of the home itself" (Shove, 2010, 1278). Energy technologies are also systems of provision, in that they embed users within a structural system and social context that is often difficult to understand or alter at the level of individual practice (Shwom and Lorenzen, 2012). Policies, and particularly the specific policy mechanisms through which policy is implemented, operate as systems of provision, embedding users and shaping practice, and the social practices model highlights how human agents "*make use of the possibilities offered to them in the context of specific systems of provision*" (Spaargaren, 2003, 688, emphasis in original).

Systems of provision operate as social structures to shape patterns of human practice (Spaargaren et al., 2006). A more traditional policy perspective that ignores the context of systems of provision "leaves policy makers free to focus selectively on those barriers which are unrelated to the role or previous effects of policy itself" (Shove, 2010, 1275, citing Blake, 1999), and most policy analyses ignore how systems of provision shape patterns of practice (Shove, 2010). As an alternative, this research utilizes the social practices model to interrogate the specific questions: how do the policy mechanisms intended to promote residential PV technology adoption in Wisconsin and Colorado operate as systems of provision, shaping patterns of human practice among adopters? What insight is offered by a comparative approach examining these two case studies with a specific focus on how systems of provision give contextualized meaning to emergent patterns of human practice?

This analysis demonstrates that the social practices model highlights how policies operate as systems of provision, providing a more comprehensive analysis of actual practice taking place in response to policy than explanations based on value-orientations or economic calculation. Examining these two policy case studies illustrates how policy mechanisms provide the context that shapes individual practice, and systems of provision operate to give contextualized meaning to other forms of explanation, shaping practice in ways that may contradict other micro-level value considerations. Thus, accounts for behavior organized around value motivations, incentives, and economic reward, which are popular in the policy realm, have limited explanatory power. These factors are more clearly understood when considered from a social practices perspective.

3. Background of RPS policy in Wisconsin and Colorado

A Renewable Portfolio Standard (RPS) mandates that electric utilities integrate a designated percentage of renewable energy resources into their portfolios. Over half of the U.S. states have RPS policies. The specifics of each RPS – including the amount and sources of energy and the financial mechanisms utilities use to reach the mandates – vary with each policy in each state. No two state RPS policy portfolios are the same in either the types of energy sources included or in the design of policy implementation (Rabe, 2006). Each state varies in how it structures its RPS, including which energy sources it allows or mandates, which electric utility companies are mandated to comply, and which policy features are included (Holt et al., 2006; Holt and Wiser, 2007; Wiser and Barbose, 2008; Crandall, 2010).

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