Energy Research & Social Science 3 (2014) 124–130

Contents lists available at ScienceDirect

Energy Research & Social Science

journal homepage: www.elsevier.com/locate/erss

Original research article

Support for solar energy: Examining sense of place and utility-scale development in California

Juliet E. Carlisle[a,*], Stephanie L. Kane[b], David Solan[c], Jeffrey C. Joe[d]

[a] University of Idaho, 875 Perimeter Drive MS 5102, Moscow, ID 83844-3165, United States
[b] Washington State University, P.O. Box 641009, Pullman, WA 99164-1009, United States
[c] Energy Policy Institute, Boise State University, 1910 University Drive, Boise, ID 83716, United States
[d] Idaho National Laboratory, P.O. Box 1625, Mail Stop 3818, Idaho Falls, ID 83415-3605, United States

ARTICLE INFO

Article history:
Received 9 May 2014
Received in revised form 16 July 2014
Accepted 21 July 2014
Available online 20 August 2014

Keywords:
Public opinion
Solar energy
Renewable energy
Place attachment
Facility siting
Public acceptance

ABSTRACT

As solar costs have declined PV systems have experienced considerable growth since 2003, especially in China, Japan, Germany, and the U.S. Thus, a more nuanced understanding of a particular public's attitudes toward utility-scale solar development, as it arrives in a market and region, is warranted and will likely be instructive for other areas in the world where this type of development will occur in the near future. Using data collected from a 2013 telephone survey ($N = 594$) from the six Southern Californian counties selected based on existing and proposed solar developments and available suitable land, we examine public attitudes toward solar energy and construction of large-scale solar facilities, testing whether attitudes toward such developments are the result of sense of place and attachment to place. Overall, we have mixed results. Place attachment and sense of place fail to produce significant effects except in terms of perceived positive benefits. That is, respondents interpret the change resulting from large-scale solar development in a positive way insofar as perceived positive economic impacts are positively related to support for nearby large-scale construction.

1. Introduction

The Intergovernmental Panel on Climate Change (IPCC) contends that "it is extremely likely that human influence has been the dominant cause of the observed warming since the mid-20th century" [1]. Negative effects of climate change are being observed on a global level in flora and fauna [2], as well as in terrestrial and marine ecosystems [3]. In addition, rising energy prices, declining energy availability, and weakened energy security have led many countries to commit, with varying degrees of enthusiasm, to decreasing their dependence on fossil fuels and instead turn to renewable energy development. With the stark reality that global demand for energy is projected to more than double in the next 40 years and perhaps triple in the next 100 years (Energy Information Agency [4]), it is clear that the need for renewable energy development is ever more critical. In terms of global commitment to renewable energy, the U.S. ranks seventh, with only 2.7% of its energy derived from renewable sources, behind Germany, which ranks first with almost 11 percent of its energy derived from renewable sources, and the entire European Union (27 countries), which ranks second [5]. In the U.S., renewable energy initiatives such as geothermal, wind, solar, hydropower and bioenergy have been around for the better part of the 20th century, with varied impact. However, some technologies, especially wind and solar, are more recently gaining the traction they need in order to become viable alternatives to fossil fuels. In particular, with governmental support for solar R&D initiatives, solar technologies have vastly improved, thereby making solar a more accessible and affordable choice for many.

During the 2008 campaign, candidate Obama pledged to expand domestic energy production, especially renewable energy. His plan was to combine economic growth in a "green" economy. "If I am President, I will invest $15 billion a year in renewable sources of energy to create five million new, green jobs over the next decade—jobs that pay well and can't be outsourced; jobs building solar panels and wind turbines and fuel-efficient cars; jobs that will help us end our dependence on oil from Middle East dictators" [6]. In October of 2012, the Obama Administration made a tangible contribution to that goal when Ken Salazar, Secretary of the Interior, established 17 solar energy zones (SEZ), approximately 285,000 acres of public lands, in six western states (Arizona, California,

* Corresponding author. Tel.: +1 208 885 6328; fax: +1 208 885 5102.
E-mail address: carlisle@uidaho.edu (J.E. Carlisle).

http://dx.doi.org/10.1016/j.erss.2014.07.006
2214-6296/

Colorado, Nevada, New Mexico, and Utah). The SEZs are identified as priority areas for utility-scale solar and are established to expedite the permitting process [7]. Since 2009, the U.S. Department of Interior has authorized 18 utility scale solar developments. Clearly the U.S. appears to be setting a path for significant solar development. In fact, the U.S. Energy Information Administration forecasts solar electricity generation to increase by almost ten percent annually through 2035 [8, p. 90].

Solar energy is a promising source of energy to help alleviate the growing dependence on fossil fuel-based energy. Although utility-scale solar electricity generating facilities are not yet widespread in the U.S., both public opinion and the U.S. government support development of utility-scale solar. In particular, studies suggest that a majority of the American public supports renewable energy in general [9–13] and solar energy in particular [14]. Moreover, research demonstrates that Americans are even willing to pay more for clean energy production in order to decrease the production of energy from fossil fuels [14]. Nevertheless, even with widespread and growing support toward solar, development of utility-scale solar is often thwarted due to a variety of obstacles including cost, efficiency, and regulations [15]. The age-old explanation of slow development always seems to be one where blame is placed, often unfairly, on local residents' opposition to said development. However, we wonder about the case of utility-scale solar development.

Analyzing utility-scale solar development and public attitudes toward it are important in the context of global solar facilities growth. In the past decade Europe has led in solar installations but has been leveling off. However, the developing world, especially Asia and China in particular, now lead in new installations and total capacity. In 2013 China added more than eleven gigawatts of grid-tied solar photovoltaic (PV) systems, exceeding the combined growth of the next two countries, Japan and the United States [16]. Developing countries and emerging markets constitute the largest opportunity for growth in utility-scale systems because of the need for power to accommodate economic growth, whereas more established markets and slow growing population are more desirable for distributed systems that provide incremental and manageable additions to the grid [17]. Indeed, as solar costs have declined PV systems have experienced approximately 40 percent growth per annum since 2003 [18,19] while utility-scale concentrating solar power has steadily progressed. For these reasons, a more nuanced understanding of a particular public's attitudes toward utility-scale solar development, especially as it arrives in a market and region, is warranted and will likely be instructive for other areas in the world where this type of development will occur in the near future.

In the first volume, Benjamin K. Sovacool and Paul C. Stern define the scope of *Energy Research & Social Science* as multidimensional in terms of both energy and social science [20,21] and that energy research needs to be relevant to "what actual energy policymakers and businesspersons consider important" ([20], p. 1), considering the human causes, human effects and human understandings of energy phenomena, energy sources, and energy systems, respectively ([21], p. 42). The research presented in this paper moves beyond NIMBY and considers an alternative framework for examining attitudes toward solar energy facilities. Specifically, our study considers whether place protective action, based on the processes of place attachment and place identity, adequately explains opposition to renewable energy initiatives. By understanding the motives behind local support or opposition we hope to provide ways for stakeholders to understand the complexity of public attitudes about a proposed project. That is, we hope stakeholders will be able to mitigate costly opposition and instead, by better siting renewable energy projects, design projects and processes that will yield valuable public support. Thus, this research has both theoretical and practical relevance.

2. Previous research

Public opinion data suggest that a majority of the American public supports solar energy development [9–13,22] and the public is willing to pay more for clean energy production in order to decrease the production of energy from fossil fuels [14]. Moreover, when compared with different types of renewable energy, Americans tend to be more supportive of solar [23,24]. Nevertheless, a major obstacle to renewable energy development, including solar, is the siting process.

Many factors contribute to the success or failure of renewable energy projects including cost, efficiency, and regulations [15]. However, public opposition also proves to be a major obstacle in siting specific projects. Indeed, public opposition has thwarted many renewable energy developments. For example, local residents in the San Luis Valley of Colorado opposed a concentrated solar power (CSP) facility because of the impact it would have on the local ecosystem [25]. This example is not an isolated case; despite widespread support for renewable energy, specific projects are often met with strong opposition [11]. Many times, opposition by a vocal and engaged minority can delay or altogether halt a project. This influence by such a vocal minority is referred to as a "democratic deficit" [9].

Early academic studies of NIMBYism (Not In My Backyard) generally accepted the idea of responses being purely local. Dear [26] defines NIMBYs as "the protectionist attitudes of and oppositional tactics adopted by community groups facing an unwelcome development in their Neighbourhood" (p. 288). Many researchers considered local opposition to be akin to a prisoners' dilemma in which individuals generally supported structures or facilities in the abstract but then opposed them when they were sited or planned to be built in proximity to their homes. This attitude of "free-riding" occurs when individuals assume others will take care of the costs of a certain project while still benefitting from the project [27].

The early studies, however, have drawn a good deal of criticism. Indeed, scholars have found that in some cases the expected explanations did not hold up and that other more complex explanations to opposition prove significant. For example, contrary to NIMBY theory, proximity does not adequately explain opposition [28,29]. Rather, proximity can actually lead to greater support for projects, especially when economically stressed communities will financially benefit from building of some proposed infrastructure [12,30]. As well, the NIMBY explanation suggests that opposition is the result of ignorance or irrationality, but scholars have found that opposition can be both very informed [31,32] and rational [33]. Van der Horst [34] points out that opposition can ebb and flow depending on where in the process a project is. More specifically, opposition tends to be strongest at the beginning of a project (at proposal stage) and weaken as a project's construction process continues, implying that concerns are alleviated as the true impacts of a project are revealed. Also, opposition has been found to be the result of perceived unfairness [35,36] and the negative visual impact of a given structure [37,38]. Therefore, many scholars have urged moving beyond NIMBY explanations.

2.1. Place attachment

While Devine-Wright [39] urges consideration of place attachment in the development of energy infrastructure, the concept is not novel. Geographer Tuan [40] presents an early examination into the notion of attachment to place. What begins as *space* develops into *place* for individuals as they come to know and value places. Place attachment is a collective orientation and describes the process of becoming attached to an environmental setting [41] and this orientation need not be wholly positive. Manzo