TILTING AT WINDMILLS? THE ENVIRONMENTAL MOVEMENT AND THE EMERGENCE OF THE U.S. WIND ENERGY SECTOR

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Abstract

Research in entrepreneurship has said little about the impact of large-scale social movements on entrepreneurial processes. Similarly, social movement scholars have paid little attention to how large-scale social movements external to any one industry can influence the creation of new market opportunities. We theorize that through the construction and propagation of cognitive frameworks, norms, values, and regulatory structures, and by offering preexisting social structure, social movement organizations influence whether entrepreneurs attempt to start ventures in emerging sectors. These activities also moderate the effect of material-resource environmental factors on entrepreneurship. We explore these claims in the context of the emergent U.S. wind energy sector, 1978–1992. We find that greater numbers of environmental movement organization members increased nascent entrepreneurial activity in a state and that this effect was mediated by favorable state regulatory policy. Greater membership numbers also enhanced the effects of important natural resources, market conditions, and skilled human capital on entrepreneurial activity. Taken together, these results have important implications for the study of social movements, entrepreneurship, and institutional theory.

A provocative new direction growing out of increased dialogue between social movement and organizational scholars (e.g., Davis and McAdam, 2000; Rao, Morrill, and Zald, 2000; McAdam and Scott, 2005) is the examination of how social movements[1] enable the creation of new organizational forms (Swaminathan and Wade, 2001). Past theoretical and empirical work has underscored the importance of collective action by market actors in securing needed sociopolitical and cognitive legitimacy in nascent economic sectors (Aldrich and Fiol, 1994; Fligstein, 1996; Rao, Morrill, and Zald, 2000). However, to date, most of the work that employs a social movement framework to explain the emergence of new forms generally does so in the context of industry players engaging in "social movement-like" collective action to change existing intra-industry arrangements or extra-industry constraints (e.g., Fligstein, 1996; Davis and McAdam, 2000; Swaminathan and Wade, 2001).

Other research (both qualitative and quantitative) has begun to consider more explicitly how broad, large-scale social movements can facilitate the emergence of new sectors and organizational forms (Schneiberg, 2002; Lounsbury, Ventresca, and Hirsch, 2003; Haveman, Rao, and Paruchuri, 2007). Past quantitative research on this topic tends to infer movement strength, relying on indirect proxies of social movement effects to support arguments regarding the founding and growth of new organizational forms (Schneiberg, King, and Smith, 2008). In one of the few quantitative studies that directly measure how social movement organizations[2] (SMOs hereafter) affect the prevalence of

[1] Following Zald and Ash, we define a social movement as "a purposive and collective attempt of a number of people to change individuals or societal institutions and structures" (1966: 329).

[2] By social movement organization, we mean "a complex, or formal, organization which identifies its goals and preferences with a social movement or a countermovement and attempts to implement those goals" (McCarthy and Zald, 1977: 1218)

new forms of organization, Schneiberg, King and Smith (2008) found that around the turn of the 20th century, higher membership in the Grange (an agrarian, anticorporate SMO) predicted greater densities of dairy and grain elevator cooperatives and fire insurance mutuals operating in the United States and moderated the impact of demographic changes and market prices on cooperative and mutual densities.

Building on this most recent work, we advance the dialogue between social movement and organizational scholars in several ways: First, we add to a small but growing number of studies that directly measure social movement activity and its impact on organizational dynamics (e.g., Lounsbury, 2001; Rojas, 2006; Soule and King, 2006). However, we focus on a previously unexplored relationship: how SMOs affect nascent entrepreneurial activity,[3] defined as attempts by entrepreneurs to found new ventures in new sectors—a fundamental but understudied entrepreneurial process (Aldrich, 1999). Past research on entrepreneurial firm founding has largely focused on ventures after they have reached operational start-up, a process that depending on the industry, can take several years. Since most ventures fail before they reach operational start-up, we know little about how social forces such as social movements shape nascent entrepreneurial activity (Aldrich and Ruef, 2006; Carter, Gartner, and Reynolds, 2004).

Second, by focusing on how large-scale social movements influence the creation of new markets, we advance existing theory regarding the rise of new industrial sectors. While several studies examine collective action by intra-industry actors (Fligstein, 1996; Carroll and Swaminathan, 2000; Davis and McAdam, 2000; Rao, Morrill, and Zald,

[3] Nascent entrepreneurial activity refers to activities that involve the gathering of necessary resources for producing and selling a product or service. Such activities can include obtaining state and federal permits; acquiring land, labor, capital, equipment, and customers; creating a business plan; and organizing a start-up team (Aldrich, 1999: 77). See Greve, Posner, and Rao, 2006, for a similar approach.

2000; Swaminathan and Wade, 2001; Greve, Posner, and Rao, 2006), we still know relatively little about how large-scale social movements external to any one industry can influence the dynamics of market creation. The emergence and substantial growth of industry sectors such as organic food, green building, fair trade coffee, eco-travel, and renewable energy provide anecdotal evidence that social movements can fundamentally challenge consumer preferences and consumption patterns, reframe marketing and distribution efforts, and alter the means by which goods and services are produced.

Finally, this study is one of the few that quantitatively assesses how social movements moderate the effects of broader demographic, economic, and geophysical factors on nascent organizations (Schneiberg, King, and Smith, 2008). Because knowledge of how movements moderate organizational contexts to facilitate the spread of novel economic practices is underdeveloped (Schneiberg and Lounsbury, 2007: 34), this study provides a significant theoretical contribution to institutional theory, entrepreneurship, and social movement theory.

We suggest that SMOs can play a critical role in fostering nascent entrepreneurial activity in new technology sectors in four ways: First, SMOs can act as disrupters of institutionalized arrangements in a market. Social movements offer critiques of existing conditions, advocate alternatives, and create legitimacy crises that increase public scrutiny and debate about existing practices or organizational forms (Hoffman, 1997; 1999, Schneiberg and Bartley, 2001; Schneiberg and Soule, 2005; Zald, Morrill, and Rao, 2005). By engaging in these framing activities and by mobilizing memberships to support and proselyte these frames, SMOs disrupt the taken-for-grantedness of existing technologies, resources, and market conditions, creating opportunities for entrepreneurs to start firms that provide an alternative to incumbent offerings.

Second, SMOs can serve as a valuable mobilizing structure for potential entrepreneurs. The term "mobilizing structures" refers to the "collective vehicles, informal as well as formal, through which people mobilize and engage in collective action" (McAdam, McCarthy and Zald, 1996: 3). Such structures include formal SMOs (McCarthy and Zald, 1977), work, neighborhood and religious organizations (McAdam, 1982), and informal friendship networks (Tilly, 1978). We argue that mobilizing structures can decrease the costs of collective action and enhance the probability that entrepreneurs will be aware of new opportunities, gain new information about these opportunities, and acquire and marshal necessary resources to exploit them (McCarthy, 1987; Swaminathan and Wade, 2001).

Third, SMOs can embed their values into regulatory structure, thereby transforming regulatory environments into supportive contexts for new types of entrepreneurial activity. Legal endorsement of one form of organization over others figures prominently in the survival of organizational forms (Ingram and Rao, 2004). As such, SMOs can indirectly shape the prospects of nascent entrepreneurs in new sectors by influencing regulative environments (Wade, Swaminathan, and Saxon, 1998; Schneiberg and Bartley, 2001; Ingram and Rao, 2004; Schneiberg and Soule, 2005).

Fourth, SMOs can influence entrepreneurial activity by moderating the effect of the material-resource environment[4] on entrepreneurial activity. Prevailing thought in

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[4] We conceptualize the material-resource environment as composed of supply and demand-side factors (Scott, et al., 2000: 18-19).

entrepreneurship, organization theory, and strategy largely takes for granted the value and utility of those resources that constitute entrepreneurial opportunity (Baker and Nelson, 2005). In the context of new sector creation, we challenge these assumptions and show how broader social movements can influence the processes by which undervalued inputs become recognized as "resources." We propose that by challenging the status quo and promoting a new set of assumptions, norms, values, and regulations, SMOs can valorize an alternative set of technologies and related resources. Such actions shape which opportunities are salient to entrepreneurs, how people apply their knowledge and skills to create economic value, and the extent to which natural resources are perceived as valuable alternatives to existing taken-for-granted inputs.

The empirical context for this study is the early U.S. wind power sector from 1978 to 1992. Because wind energy production by independent power plants was nonexistent in the United States prior to the National Energy Act in 1978, this time frame provides a natural experiment to study how social movements influence entrepreneurial activity in an emergent sector. The energy crises of the 1970s provided moments "in social life in which the relevance or fit of extant cultural frames . . . [were] open to question, and thus contestable . . ." (Snow, 2004: 385). Examining how social movements leverage environmental jolts (such as the energy crisis) to construct new opportunities for entrepreneurs provides valuable insights into the mechanisms by which broader technological, economic, and demographic disruptions are translated into concrete economic opportunities.

This study builds on a small but growing body of literature on the emergence of the U.S. independent power sector that has shown that state policy, organizational density, and professional associations shape the founding rate of independent power ventures (Russo, 2001), the type of technology used by founders (Sine, Haveman, and Tolbert, 2005), and the likelihood that founders reached operational start-up (Sine, David, and Mitsuhashi, 2007). We contribute to this prior work in two important ways. First, extant research (Russo 2001, 2003; Sine, David, and Mitsuhashi, 2007) has not quantitatively assessed the impact of environmental SMOs on the development of the sector. In the case of wind power, we demonstrate how environmental movement organizations developed and advocated an alternative set of values and norms that justified the use of a unique set of resources and technologies to produce electricity through environmentally benign methods. We argue that these activities temporally preceded and precipitated many of the key independent variables used by Russo (2001), Sine, Haveman, and Tolbert (2005), and Sine, David, and Mitsuhashi (2007), such as density, industry associations, and favorable regulation. Our work also builds on past research which found that preexisting relationships between regulators and incumbents affect organizational foundings (Russo, 2001). Similar to Russo (2001), we emphasize the role of past relationships on entrepreneurial activity by highlighting the importance of preexisting networks of SMO members to the emergence of the wind energy sector.

Second, we extend research on the importance of natural resources in the U.S. wind sector (Russo, 2003) by showing how SMOs moderate the effects of the material-resource environment on entrepreneurial activity. Because our study differentiates between U.S. states with varying levels of resources and environmental group activity, we can tease out the differential effects of SMOs and material resources as well as their interactions on entrepreneurial activity. We expect that the relative impact of material resources on entrepreneurial activity will be enhanced in the presence of SMOs that advocate their use.

In the next section, we describe our research context and chronicle the establishment of the U.S. wind power sector. This is followed by a theoretical discussion of the relationship between social movements and nascent entrepreneurial activity. To illustrate our theoretical propositions, we embed them in the historical context of the nascent wind energy sector. We draw on a number of data sources to show how environmental groups directly impacted entrepreneurial activity, transformed the regulatory environment (which indirectly promoted entrepreneurial activity), and moderated the extent to which the material-resource environment affected entrepreneurial activity. We then empirically test our hypotheses and discuss our results.

THE EMERGENCE OF WIND ENERGY

Despite its inauspicious beginnings, the U.S. wind energy sector is thriving. From 1996 to 2006, wind energy enjoyed an unprecedented 29 percent average annual growth rate (Earth Policy Institute, 2006) and experienced a 45 percent growth rate in 2007 alone (American Wind Energy Association, 2008). Although wind energy accounted for less than one percent of total U.S. energy production capacity, its growth rate was significantly higher than the 2.5 percent average annual growth rate experienced by traditional electricity generation technologies that use oil, natural gas, and coal over the same period (Earth Policy Institute, 2006). The U.S. wind energy sector is a nine billion dollar industry and has 16,818 MW of installed capacity—enough to serve more than 4.5 million U.S. households and avoid 28 million tons of CO_2 emissions (American Wind Energy Association, 2008). Most of this capacity is relatively new. Until the late 1970s, electric utilities depended almost exclusively on a combination of oil, coal, large hydroelectric facilities, and, to a lesser extent, natural gas and nuclear technology to generate power. For example, in 1978, of the 2,206 billion kilowatt-hours (kWh) of power generated by utilities for retail sale, none were produced using wind power (U.S. Department of Energy, 2001).

Before 1978, the electric utility industry was dominated by large regional monopolies of vertically integrated utilities that generated and distributed electricity to captive customers. Utilities shunned wind technology because it was viewed as expensive and uncertain. In the 1970s, the cost of wind-generated electricity was projected to be five to six times higher than that of electricity generated with traditional coal and oil technology (Federal Energy Administration, 1976). Wind technology was also considered risky compared with traditional, highly developed, and reliable generation technologies. Because local utilities controlled power generation and distribution in all regions of the United States, wind technology enthusiasts were unable to access retail markets without their cooperation. And because interconnecting with independent power plants would be costly and would increase competition, utilities typically rejected such requests (Righter, 1996).

This situation changed dramatically in the late 1970s. In 1973, a Saudi oil embargo severely disrupted U.S. oil markets. By 1974, oil prices had more than doubled, with prices moving from $10 to $25 per barrel. By 1978, oil prices had doubled again, causing electricity prices to increase sharply. These price increases motivated policymakers to search for other means of electricity generation that would decrease the country's dependence on foreign oil. This in turn provided institutional entrepreneurs, such as environmental groups, opportunities to more effectively promote new technological agendas (Sine and David, 2003).

During this period, environmental activists brought their energy agendas to the fore by calling into question existing energy policies and practices. Environmental movement organizations such as the Sierra Club, the Audubon Society, Friends of the Earth, the Union of Concerned Scientists, and others began to actively promote an energy conservation agenda that included increased use of renewable energy[5] and more efficient use of energy from all sources (McCloskey, 1992; McLaughlin and Khawaja, 2000).

Environmental activists contended that although wind power technology was underdeveloped, it was a better source of power than conventional means for several reasons. First, unlike coal, oil, and gas production, the process of generating power with wind produces neither air nor water pollution, and its environmental footprint is smaller than that of large-scale hydroelectric facilities. Moreover, unlike coal production, the generation of wind power does not require large mines or, as in the case of oil, run the risk of spills. Second, wind facilities can be placed in locations where there is little or no potential for hydroelectric power. Third, unlike fossil fuels, wind is a local source of energy and thereby promotes local jobs. Finally, given technological progress, wind power had the long-term potential to be priced similarly to energy produced by traditional sources. However, like most claims about future technological progress, this last point

[5] Renewable energy is typically defined as energy that is not subject to depletion. This category also included solar-based renewable technology, which referred to a broad array of energy sources derived from the sun's rays such as photovoltaic, solar thermal, wind, biomass, wave, and hydroelectric technology. Thus, when environmental groups referred to solar-based renewables, they referred to more than just photovoltaic technologies.

was highly contested because during the time frame of this study, the cost of wind power generation was always significantly higher than that of using conventional technology.

Nonetheless, with the passage of the National Energy Act in 1978, entrepreneurs were able to construct nonutility facilities free from the constraints of traditional utility regulation. Under Section 210, known as the Public Utilities Regulatory Policies Act (PURPA), utilities were required to interconnect with nonutility power plants and to purchase power from these qualifying facilities at the utilities' generation cost (which came to be known in the industry as "avoided cost"). Independent power plants qualified under Section 210 if they used alternative energy resources such as wind. While Section 210 provided supportive legal structure at the national level, the Federal Energy Regulatory Commission (FERC) left the interpretation and enforcement of Section 210 to state governments. In the 14 years following this act, hundreds of entrepreneurs attempted to construct wind energy generation facilities. Figure 1 shows the geographic distribution of qualifying wind facilities per 10,000 square miles from 1978 to 1992. Figure 2 shows the distribution of windy available land to entrepreneurs and reveals expansive swaths of windy accessible land in North Dakota (286,900 acres), South Dakota (240,000 acres), Nebraska (163,100 acres), Montana (207,500 acres), and Texas (235,300 acres). Comparing Figures 1 and 2, it is apparent that much of the entrepreneurial activity in the wind sector occurred in states with less than ideal amounts of windy land. This presents a conundrum that motivates the following question: What accounts for this geographic variation in entrepreneurial activity in this nascent technology sector?

*****ADD FIGURE 1 ABOUT HERE *****

*****ADD FIGURE 2 ABOUT HERE *****

THEORY AND HYPOTHESES

Founding an organization in an emerging economic sector is substantively different from founding an organization in an established one. Those engaged in the former must overcome opposition from incumbent organizations and the institutional arrangements that favor them (Aldrich, 1999). Moreover, key constituents such as suppliers, customers, and regulators may lack knowledge about the new sector, be skeptical of it, and withhold support. The lack of integration of new organizational forms into existing institutional structures results in low cognitive and sociopolitical legitimacy (Aldrich and Fiol, 1994). Therefore, institutional entrepreneurs must engage in an institutionalization project (DiMaggio, 1988) whereby they seek to rationalize the value of the new form yet at the same time differentiate it from existing types of organizations.

SMOs can engage in such institutional work by articulating problems and theorizing solutions to those problems (Suchman, 1995; Benford and Snow, 2000; Strang and Bradburn, 2001), by mobilizing their memberships to promulgate these frames (McAdam, McCarthy, and Zald, 1996), and by serving as a social infrastructure through which information and resources flow. These activities also indirectly affect the growth of new industry sectors by influencing regulatory environments that favor new entrants (Wade, Swaminathan, and Saxon, 1998; Schneiberg and Bartley, 2001). Finally, these activities can moderate the effects of the material-resource environment on entrepreneurial activity.

We theorize that the strength of an SMO, operationalized as greater numbers of supportive social movement activists within a given state's boundaries engaging in the "cultural work" necessary to overcome liabilities of newness (Stinchcombe, 1965; Aldrich and Fiol, 1994), will increase the likelihood that a new economic sector will emerge and grow. This approach allows us to directly and systematically measure movement strength, providing greater analytical traction in assessing the impact of SMO strength in bounded geographical areas.

SMOs as Institutional Disrupters

Suchman (1995) argued that the recognition and development of a problem to which there is no adequate solution is the first step in creating new types of practices. The recognition of a common problem that existing institutions do not address creates an opportunity for advocates of new practices to challenge those institutional arrangements. Developing a description of and detailed evidence about a problem, its cause, and its negative consequences—and proselytizing this knowledge—focuses the attention of publics and powerful actors on unsolved difficulties. Unresolved problems call into question existing institutional arrangements and incumbent organizations that are unable to address the problem, thereby providing the advocates of new practices the opportunity to promote solutions.

Thus, new types of economic practices or activities often require institutional entrepreneurs to create and propagate theories about unresolved problems and about how new firms and their distinctive products or services will solve these problems to the benefit of consumers and stakeholders. Acting as institutional entrepreneurs, social movements can create conditions that favor ventures engaging in new types of economic activities. Social movements instigate institutional change by promulgating critiques and introducing alternative solutions that spark controversies, conflicts, and crises that shatter taken-for-granted institutional arrangements (Hoffman, 1997; 1999, Schneiberg and Bartley, 2001; Sine and David, 2003; Schneiberg and Soule, 2005; Zald, Morrill, and Rao, 2005). A number of studies have documented the importance of these framing processes for organizations (Schneiberg, 2002; Lounsbury, Ventresca, and Hirsch, 2003; Greve, Posner, and Rao, 2006). For example, Schneiberg (2002) showed how the Grange and the Farmers Alliance articulated a forceful critique of the emergent corporate order that favored powerful railroad interests, middlemen, and financiers. These SMOs concomitantly promoted as a solution autonomous regional development grounded in the concept of cooperatives and sought state and national regulation to create a more supportive regulatory environment for this organizational form. Similarly, Lounsbury, Ventresca, and Hirsch (2003) demonstrated how recycling advocates, through careful and strategic framing, effectively halted the construction of waste-to-energy incinerators as a viable solution to the waste problem. By critiquing the use of this technology, recycling advocates implicitly pointed to the need for more environmentally friendly methods for dealing with waste. These efforts produced a more favorable environment for the articulation and eventual acceptance of recycling as the preferred solid waste solution.

In the case of wind power, environmental movement organizations played a pivotal role in disrupting the status quo of energy production by constructing and propagating the "problem" of environmental degradation and industrial pollution and the "solution" of renewable energy. Before the 1960s, Americans cared little about industrial pollution. In the early 1960s, water and air pollution was ranked ninth out of ten domestic problems to which Americans wanted the government to dedicate more attention (Gallup, 1970). Similarly, environmental groups such as the Sierra Club paid little attention to the link between pollution and conservation. Before 1965, the predominant concern of such organizations was the preservation of natural environments and wildlife, which typically involved protecting certain natural areas from development (Mitchell, Mertig, and Dunlap, 1992).

Rachel Carson's watershed book, *Silent Spring* (1962), focused attention on the dangers of the indiscriminate use of insecticides in industrial farming and their detrimental effect on the natural environment. Environmental organizations reacted to the concerns Carson raised by broadening their agenda to include the protection of natural areas, wildlife, and humans from industrial pollution. Environmental groups such as the Sierra Club, Friends of the Earth, the National Audubon Society, and the Union of Concerned Scientists initiated nationwide campaigns to generate public awareness about air and water pollution and those industries that produced it. For an illustrative example, we highlight the evolution of the Sierra Club's involvement in the campaign against pollution and its advocacy for wind and other renewable energy sources in Table 1.

*****ADD TABLE 1 ABOUT HERE*****

The development and subsequent promulgation of frames that identified current methods of electricity generation as a problem and alternative energy as its solution became the basis for mobilizing support for wind energy and other renewable energy sources. Before 1965, there was no discussion in the Sierra Club's newsletter of the environmental hazards of generating electricity from coal, oil, or gas. However, by 1978, Sierra Club membership surveys made it clear that pollution related to energy production had become a high priority for both Sierra Club rank-and-file members[6] and their leaders (Mitchell, Mertig, and Dunlap, 1992). Similarly, articles in *Sierra* (the membership publication of the Sierra Club) from 1965 to 1977 provide further evidence of the growing concern of environmental SMOs regarding energy production and pollution. In 1968, only 12 percent (1 of 8) of articles that mentioned pollution linked its source to power generation. By 1977, the share had increased to 78 percent (79 of 101). This growing linkage between pollution and the incumbent energy industry was reflected in the Sierra Club's day-to-day activities that supported wind power as a solution to the growing pollution problem.

Mobilizing Resources

Although identifying problems and theorizing solutions are essential to catalyzing social change, the propagation of such frames and the mobilization of resources at the local level have a powerful influence on entrepreneurs. To realize the solutions they advocate, SMOs must mobilize resources such as time, money, effort, skills, and knowledge. For example, Lounsbury (2001) found that the Student Environmental Action Coalition was instrumental in mobilizing students' efforts to establish full-time recycling coordinator positions at colleges and universities because it sponsored national networking meetings and diffused knowledge of effective protest and negotiation tactics. Such mobilization success initially depends on an SMO's ability to create and proselytize motivational frames, or rationales for taking action (Benford and Snow, 2000). Motivational frames emphasize the severity of a problem and the urgency to solve it in

[6] These surveys revealed a membership highly committed to promoting renewable energy, with 75 percent of Sierra Club members expressing a strong interest in wind and solar power and 81 percent agreeing with the view that "the key to our energy problems is to develop alternative or soft technologies which are nonpolluting and low energy and resource consuming" (Utrup, 1979: 16).

order to persuade people to act. These frames are most successful when they delineate the appropriate type of action to be taken and assure potential advocates that their contributions will result in positive change (Benford, 1993). Environmental organizations provided such frames for their members. For example, the Audubon Society emphasized both the urgency of the problem and the need for individual action at the community level:

> It is not enough to be convinced that the solar[7]/conservation approach is the most economic and environmentally benign energy strategy. If organizations like Audubon and the many environmentally-oriented individuals who make up the membership of such organizations are unable to communicate to their neighbors and governmental leaders both the merits and the urgency of the solar/efficiency approach, then the goals of this Plan and others like it will not be met. (National Audubon Society, 1984: 52–53)

Environmental group memberships readily accepted these mobilization frames promulgated by their leadership. For example, Sierra Club membership surveys reveal that as early as 1972, while government and media paid scarce attention to renewable energy (Sine and David, 2003), over 50 percent of the Sierra Club's members were contributing both money and time to support its energy agenda (Coombs, 1972). This dedication to renewable energy continued through the 1970s, as indicated by a 1978 Sierra Club survey in which a majority of respondents expressed a willingness to spend more time working on energy-related issues (Utrup, 1979). Sierra Club members also engaged in a wide range of activities that encouraged the development of renewable energy technologies. Grassroots action included opening monthly membership meetings to the public, publishing newsletters, gathering data about pollution produced by fossil

[7] In this publication, the Audubon Society included wind, biomass, biogas, and wave energy in their definition of the "solar approach."

fuels, filing lawsuits, testifying at public hearings, and working with other environmental groups to educate local communities through invited speakers and films (Billings, 1971).

As environmental groups expanded their objectives to include the advocacy of renewable energy technology as a moral solution to rising energy demand, they provided a new action agenda for existing environmental group networks. Preexisting organizational structures and networks have long been recognized as important resources for the emergence, viability, and success of social movements (McCarthy and Zald, 1977; Snow, Zurcher and Olson, 1980; McAdam, 1982; McCarthy, 1987; Clemens, 1993). Similarly, SMOs themselves serve as preexisting networks that can play an important role in catalyzing and supporting new types of entrepreneurial activity (Swaminathan and Wade, 2001). New organizational forms that can "piggy-back on an organizing infrastructure or an existing ecology of movement organizations" are more likely to be successful (Schneiberg, 2002: 62). Established social infrastructure as found in and among SMOs can serve as a conduit by which information about resource opportunities reaches entrepreneurs (Shane, 2000). Diverse networks increase one's "risk" of discovering innovative opportunities (Burt, 1992). Thus, potential entrepreneurs are more likely to be aware of opportunities and the resources required to exploit them if they belong to a diverse network. SMOs such as the Sierra Club serve as important networks because they bring together people from a variety of occupational, socioeconomic, religious, and neighborhood backgrounds. In states with strong environmental groups, these networks can be valuable structural resources to potential wind power entrepreneurs because individuals in these networks have been primed by their leadership to support wind power entrepreneurship.

SMOs not only provide a means to diffuse information about the availability and moral value of opportunities but also are a means for garnering the resources necessary to start a new venture (Greve, Posner, and Rao, 2006). Forming a new venture requires labor, capital, and other resources that are often generated via collective action efforts. Because SMOs can "reduce the cost of organizing by facilitating the acquisition of resources through collective action" (Swaminathan and Wade, 2001: 294), they increase the attractiveness of new sectors for potential entrepreneurs.

The successful propagation of the renewable energy agenda by local chapters of environmental movement organizations led to networks that expanded beyond environmental group boundaries, creating a wider community of supporters who shared a vision about the importance of renewable energy. A shared vision increases the extent to which people see others within a social aggregate as honest, loyal, and cooperative (Kramer, 1999; Kane, Argote, and Levine, 2005). This type of trust facilitates the flow of capital, knowledge, and expertise between potential resource providers, entrepreneurs, investors, technologists, employees, and customers (Stinchcombe, 1965). For example, the founders of the Wind Harvest Company were brought together through Sierra Club connections. Sierra Club member Alan Sieroty introduced George Wagner, a prospective entrepreneur and active member of the Sierra Club, to Sam Francis, a wealthy artist, fellow Sierra Club member, and supporter of renewable energy. Wagner had difficulty finding funding for his company until he met Francis, who provided the initial investment for the Wind Harvest Company. The potential investors outside of the Sierra Club whom Wagner had approached were not as dedicated as Francis to alternative energy and were not interested in investing because of the risks associated with wind power technology

(Asmus, 2001). This example illustrates how local environmental groups can be important sources of social capital that potential entrepreneurs can leverage (Burt, 2000). We argue that the environmental group networks formed prior to the founding of independent wind power plants were an important resource for early entrepreneurs seeking to start wind energy firms. Absent such networks, potential entrepreneurs may not have viewed the founding of a wind generation facility as a worthwhile opportunity.

To summarize, social movements can play a central role in motivating and facilitating entrepreneurial activity in emerging sectors. They can increase the likelihood of entrepreneurial activity by undertaking the necessary institutional work (framing problems, theorizing solutions, and mobilizing resources) to support new categories of economic activity. This institutional work (1) disrupts the status quo by rationalizing alternatives to previously taken-for-granted technologies and their associated inputs, (2) increases the number of potential entrepreneurs who are knowledgeable and supportive of a new economic activity, (3) expands the number of people and organizations willing to support such activities, and (4) forms a network of like-minded people over which resources can flow, reducing costs and increasing the probability of organizational founding (Swaminathan and Wade, 2001). Thus we posit,

Hypothesis 1: Higher levels of environmental group membership will increase wind energy entrepreneurial activity.

Indirect Movement Effects via Regulation

These mobilized networks of social movement members not only directly promoted wind energy but also sought to construct favorable regulatory regimes. Social movements and similar forms of collective action can shape industry regulation

(Schneiberg and Bartley, 2001; Ingram and Rao, 2004; Schneiberg and Soule, 2005), facilitating the emergence and growth of new organizational forms. For example, Wade, Swaminathan, and Saxon (1998) found that the Women's Christian Temperance Union and allied SMOs successfully transformed local regulatory environments by advocating for laws that discouraged the production, exchange, and consumption of alcohol. These SMOs mobilized their membership to collect signatures on petitions, engage in demonstrations, and write thousands of letters to local officials, resulting in the passage of prohibition laws in 34 states. Not surprisingly, breweries reacted by moving operations to states with less restrictive alcohol regulations. Schneiberg and Bartley (2001) described how the Grange and the Farmers Alliance successfully lobbied for anticompact laws and co-insurance measures that resulted in significantly greater numbers of insurance mutuals. In their study of the transformation of the California thrift industry, Haveman, Rao, and Parachuri (2007) found that state laws, as potent and visible artifacts of the Progressive movement, increased the number of bureaucratized thrifts.

Collectively, these studies demonstrate that SMOs can and do transform regulatory environments in ways that shape the growth of organizational populations. We build on this work by arguing that the effect of greater numbers of SMO activists on nascent entrepreneurial activity will be mediated by favorable regulatory environments that they help construct.

In the context of the U.S. wind power sector, regulatory environments that were hostile to founders' activities provided fewer tax incentives, less favorable rate structures, and burdensome regulatory processes. By contrast, states with regulatory environments that were more supportive of the emerging wind power sector provided richer opportunities for nascent entrepreneurs, thus increasing their motivation to attempt a wind power venture.

Fully aware of the importance of local regulation in fostering the development of renewable energy technologies, the Sierra Club urged its members to become politically involved. They persuaded their membership to engage in myriad political activities, ranging from calling elected officials and asking them to support renewable energy to filing lawsuits to thwart anti-renewable policies (Billings, 1971). In a note to its members, the Sierra Club stated,

> The board of directors has called for the mobilization of the Club's full resources for this Energy Campaign. Only a massive outpouring of grass-roots concern can transform the present political climate . . . intensive organizing efforts have already been set in motion, and letter writing and media contacts have begun. (Snyder, 1979: 5)

In a follow-up directive, the club leadership wrote,

> It is time for face-to-face mobilization. Conservationists must start meeting with their elected officials and candidates to tell them what they, as voters, expect and want . . . if, in the next six months, every Sierra Club member would just once personally attend and participate in a political event, it would make a world of difference. (Coan and Pope, 1980: 47)

Surveys suggest that these attempts to mobilize club membership were successful. In 1979, 60 percent of Sierra Club members surveyed (most of whom were also members of at least one other environmental organization) reported that they had expressed their views on energy matters to governmental officials at least once in the past year, with 15 percent having done so nine or more times. Moreover, 40 percent of those surveyed reported attending one or more political meetings or rallies in the past year (Utrup, 1979). Thus we posit that because environmental groups such as the Sierra Club sought to transform the political environment to be more favorable for renewable energy such as wind power, the effects of SMOs on entrepreneurial activity will be mediated by the regulatory environment they help create:

Hypothesis 2: The effect of Sierra Club membership on entrepreneurial activity will be mediated by the state regulatory environment.

Social Movement Organizations and Resource Valuation Processes

Past research has shown that environmental factors can moderate the processes and outcomes of both SMOs and firms (Amenta, Carruthers, and Zylan, 1992; Amenta, Dunleavy, and Bernstein, 1994; Amenta and Young, 1999; Scott et al., 2000; Bartley and Schneiberg, 2002; Soule and Olzak, 2004). For example, in their analysis of fire insurance rate regulation, Bartley and Schneiberg (2002) argued that institutional factors condition the effect of market factors on the adoption of industry regulation and on the number of market actors within a state. They found that only under institutional conditions that limited political risks did market changes affect whether fire insurance firms supported state regulation.

Similar moderating effects have been documented in the context of firms. Thornton and Ocasio (1999) found that distinct logics conditioned the determinants of executive succession in the higher-education publishing industry. From 1976 to 1990, when a market logic dominated in the publishing industry, acquisitions and resource competition predicted executive succession, whereas in an earlier period dominated by an editorial logic, organizational size and rank and the power of independent CEOs relative to division heads were the most salient determinants. In the context of the Massachusetts railroad industry during the 19th and early 20th centuries, Dobbin and Dowd (2000) found that market concentration had no significant effect on the likelihood that a given railroad would be sold or would acquire another railroad. However, during a period of antitrust enforcement, concentration increased the likelihood of both selling and buying.

A more recent study charts an important new direction by showing how social movements moderate the effects of the broader economic and political environment on organizational outcomes. Schneiberg, King, and Smith (2008) demonstrated how, during the late 19th and early 20th centuries, anticorporate movement organizations such as the Grange moderated the impact of political, demographic, and economic forces on the prevalence of cooperatives and mutuals in U.S. states. They found that greater movement strength intensified the effects of adverse pricing, failures to provide service, and population density on the prevalence of mutuals and cooperatives. They also found that the Grange decreased the negative effects of population change, residential instability, and economic/ethnic heterogeneity on the number of cooperatives and mutuals, suggesting that the social movement served as a supplement or partial substitute for stable, homogeneous communities.

We expand on these efforts by arguing that SMOs can transform those taken-for-understandings that shape the perceived value of the material-resource environment and thereby moderate its impact on entrepreneurial activity. This approach is grounded in the premise that the meaning and value underlying the material-resource environment is socially constructed (Berger and Luckman, 1966). Social movements can create and promulgate frames that are transformative, "altering the meaning of the object(s) of attention and their relationship to the actor(s)" (Snow, 2004: 384). While the purpose of collective action frames has generally been conceptualized as a means to mobilize adherents, recruit bystanders, seek concessions from targets, and neutralize opponents to a movement (Snow, 2004), framing and its promotion by a primed network of advocates can also lead to sweeping changes in how the "objects of orientation [of the social movement] . . . come to be seen by the participants or other relevant parties as something quite different from the way in which they were previously viewed and regarded" (Snow, 2004: 393). Thus, we argue that through framing and subsequent mobilizing, social movements can change the taken-for-granted objective interpretations of the value of the material-resource environment.

A prerequisite for the emergence of a new product or service is the identification of the types, quantity, availability, appropriateness, and efficacy of resources required for its production. Once identified, the use of these resources tends to become routinized over time, and shared understandings about their efficacy, availability, appropriateness, and value develop and become taken for granted, resulting in identifiable input markets and stabilized exchange. Once taken for granted, resources are utilized in particular applications more readily and become "forgotten" in the sense that people's actions are not needed to maintain or recreate their value or importance (Berger and Luckmann, 1966; Douglas, 1986). Commodity markets and information technologies are particularly prone to this type of collective forgetting (Bowker and Star, 2000). However, the taken-for-granted superiority of a particular resource can be called into question when it is publicly challenged by salient social actors (Berger and Luckmann, 1966). When this occurs, "there is a greater awareness of alternatives and future lines of action" (Carruthers and Babb, 1996: 1557).

SMOs can strategically deploy frames through mobilization to devalue currently employed technologies and resources used by firms and to simultaneously advocate the use of an alternative set of technologies and resources. We argue that social movements can facilitate changes in the relative value of material resources, the skill sets and knowledge bases of individuals, and the market conditions encountered by entrepreneurs which can fundamentally transform the "relative prices of alternatives for actors within fields" (Schneiberg and Soule, 2005: 153).

Changes in the electric power industry illustrate how the loss of taken-for-grantedness of particular technologies and their associated inputs leads to an expansion of the scope of both technologies and inputs considered by policymakers and entrepreneurs. Before 1968, electricity was viewed as a commodity, and as with most commodities, the process for producing electricity was valued only to the extent that it lowered energy prices. Thus, electricity generation technologies and their associated inputs were chosen by power companies based on technical attributes associated with low-cost energy generation, with little regard for the negative environmental impacts associated with their use. However, environmental movement organizations successfully linked the use of oil, coal, and nuclear fuels to environmental degradation and public health concerns, developing a coherent, consistent, and salient critique of the energy sector's technologies, resources, and underlying values. For example, by 1970, the Sierra Club was already advocating that "[t]he generation and use of electricity in the United States have increased to the point where their adverse effects on the total environment are evident, unmistakable, and undeniable" (Sierra Club Bulletin, 1970: 3). Coupling this critique of the status quo with the advocacy of renewable energy as the solution, environmental movement organizations created a coherent and resonant "renewable energy frame" that simultaneously delegitimated the use of oil, coal, and nuclear fuels as the key inputs to energy production and valorized more benign inputs such as wind, photovoltaic, geothermal, and biomass. For example, the Union of Concerned Scientists strongly advocated wind power, promoting it as the most viable, safe, benign, and easily commercialized of all alternative energy technologies:

> Wind represents a large and nondepletable energy resource that can be utilized with minimal impact on the environment, producing no air and thermal pollution and requiring no water in its utilization. The simplicity of wind technology will allow for rapid deployment in comparison to many other energy technologies. (Union of Concerned Scientists, 1980: 145)

Similarly, the Audubon Society advocated using .4 percent of U.S. land to build 50,000 windmills in the Midwest to rid the nation of air pollution (National Audubon Society, 1981: 15). Environmental organizations not only advocated wind power but also funded scientific research to rationalize their arguments. During the period of our study, environmental organizations financed well over 30 studies that demonstrated the benefits and feasibility of wind power. These studies provided a powerful rationale for using wind to generate electricity and argued compellingly for the economic viability of wind energy.

As discussed, the strategic construction of transformative frames, the marshalling of evidence to support them, and their promotion by a cadre of social movement activists transformed the underlying value associated with the geophysical environment. Hence, we posit that land with robust wind[8] is more likely to be viewed as a resource for

[8] Typically, land with average wind speeds of at least 6.4 meters/second is considered the most fertile for the harvesting of wind power.

founding new generating facilities in states where social movements promote wind energy as normatively appropriate and as the most "sensible" solution to the energy generation question. Thus,

Hypothesis 3: The availability of land with high-quality wind flows will have a greater positive effect on wind energy entrepreneurial activity in the presence of greater environmental group membership.

SMOs and their actions can not only transform perceptions of resources but also enhance the effect of shortages of local capacity on fostering entrepreneurial activity. States in which demand outpaces electricity generating capacity (supply) are attractive locations for entrepreneurs to build new generating facilities. However, the type of facility entrepreneurs construct to meet this demand is open to question. Shortages in state-level energy capacity lead actors to engage in problem/solution-oriented search processes (Cyert and March, 1963). These processes include scrutinizing the appropriateness of current taken-for-granted technologies, evaluating the causes of the shortages, and assessing the range of potential solutions available (Sine and David, 2003). Under conditions of heightened uncertainty, entrepreneurs are more aware of and open to using alternative technologies to meet excess demand. SMOs can enhance the attractiveness of alternative technologies by framing and advocating them as rational solutions to new problems. This institutional work, coupled with effective mobilization, can increase the likelihood that these conditions will be seen as consequential issues that require action (Hoffman and Ocasio, 2001). Hence, SMOs and their advocacy can serve as attention structures (March and Olsen, 1976; Ocasio, 1997), channeling the allocation of time, resources, and effort of entrepreneurs. We therefore argue that in states where existing generation capacity is unable to meet electricity demand, a greater concentration of environmental advocates will enhance the effect of such demand on entrepreneurial activity in the wind sector.

Hypothesis 4: Shortages of state-level electricity generating capacity will have a greater positive effect on wind energy entrepreneurial activity in the presence of greater environmental group membership.

Subjective interpretations of technological solutions propagated by social movements affect not only resource inputs and market conditions, but also the time and effort of skilled labor—a critical element for new venture creation (Zucker, Darby, and Brewer, 1998; Stuart and Sorenson, 2003). Economic exchange is not solely motivated by self-interest or profit, but is driven by norms and moral obligations that inform the responsibilities and rights of individuals and shape their relation to other people, to goods and services, and to the broader environments in which they are embedded (Polanyi, 1944; Parsons, 1951; Selznick, 1957). Therefore, the value that skilled workers and entrepreneurs see in any activity and its related resources is affected not only by the assessed profit potential but also by the extent to which the activity is congruent with those skilled workers' and entrepreneurs' beliefs and values (Scott-Morton and Podolny, 2002). Thus, as SMOs interpret particular activities as morally sanctioned and link those activities to deeply held values, entrepreneurs can be persuaded to engage in those activities, even if they are extremely risky. Just as SMOs can persuade their members to take action via the construction and promulgation of motivational frames, they can also influence potential entrepreneurs to pursue some opportunities and not others. The construction and promulgation of these frames are not cool, cognitive activities, but rather are affective processes of persuasion and socialization that seek to create shared values around which to build consensus. Sierra Club members advocated wind power in their local communities through local educational programs. Some members actively proselytized these values to friends and family. Potential entrepreneurs were likely influenced by such face-to-face contact with ideologically driven members of social movements. For example, Russell Wolfe, an early wind entrepreneur and idealistic engineer, quit his job to form a wind power firm after his daughter suggested that he "do something in his life as worthwhile as developing renewable energy" (Asmus, 2001: 57). For Wolfe, the motives for starting a wind power company were complex. The venture was not just about making money; it was also about engaging in a cause he believed in. Moreover, his entrepreneurial work for a positively regarded cause increased the extent to which his daughter and others who shared his values held him in high esteem. He was not just one more person trying to make a lot of money; he was trying to save the world from industrial pollution. We expect that efforts on the part of SMOs to create and advocate normatively held values that define new types of economic activities as good or right will shape the extent to which human capital with related skills will engage in these activities.

Hypothesis 5: Human capital with related technological expertise will have a greater positive effect on wind energy entrepreneurial activity in the presence of greater environmental group membership.

DATA AND METHODS

Sample

To test our hypotheses, we gathered state-level data on entrepreneurial activity, environmental SMOs, and the regulatory environment in the U.S. wind energy sector from 1978 to 1992. We end our observation window at the end of 1992 because the regulatory environment changed dramatically with the passage of the Energy Policy Act of 1992.[9] We focus on the state level because regulation in the industry occurred primarily at this level. In the analyses, all independent and control variables were lagged one year.

Dependent variable

As noted earlier, before the passage of PURPA in 1978, there were no opportunities for independent wind energy entrepreneurs to sell electricity to the grid. PURPA permitted the founding of new, independent electricity generation facilities. FERC required all ventures seeking qualifying-facility status under PURPA to file a notice reporting basic facts about their proposed facility. Because we are interested in how SMOs affected entrepreneurial activity in this new sector, our dependent variable is registration with FERC by an entrepreneur or entrepreneurial team.

Obtaining necessary governmental permits and licenses is an essential part of starting a new venture (Aldrich, 1999) and a common measure of nascent entrepreneurship activity (Carroll and Hannan, 2000; Reynolds, 2000). Registration with FERC required that the applicant determine the technology type, facility size, relationships with utility incumbents, and the approximate location for the facility—all of which require analysis, planning, and effort on the part of the applicant. Thus, registration with FERC indicates that an applicant is seriously engaged in trying to start a wind venture. Our approach is identical to past work in the independent power industry by

[9] The act created a new class of energy producers called exempt wholesale generators (EWGs). This meant that after 1992, wind generation facilities that would have been considered qualifying facilities could now choose to become EWGs and not register with FERC. Thus, while the FERC database from 1978 to 1992 contains the filings for all independent wind generators, it does not have the full data after 1992.

Russo (2001) and Sine, Haveman, and Tolbert (2005). A similar approach has also been used by Greve, Posner, and Rao (2006), who used a measure of license application in the radio industry; Baum and Oliver (1992), who measured childcare licenses; and Budros (2002), who counted the incorporation of firms claiming to sell life insurance. Interviews with founders suggested that receiving qualifying status from FERC was a necessary first step for establishing a viable wind facility. Many applicants had created legal structures such as corporations or limited liability partnerships. The applicants we interviewed came from a wide variety of backgrounds such as entrepreneurs with relevant technology backgrounds, recent college graduates with no technical experience, and farmers who owned windy land. Once an entity was registered as a qualifying facility, the federal government recognized its right to build the proposed facility and to generate and sell electricity.

We do not use the count of operational wind facilities as the dependent variable because it does not accurately reflect the entrepreneurial activity mobilized by the efforts of environmental groups. It typically takes between two and four years to build an operational wind facility. Selection pressures are very strong during this preoperational phase, and past research suggests that, depending on the industry, between 50 and 90 percent of nascent entrepreneurs fail to reach operational start-up (Reynolds and White, 1997; Carroll and Hannan, 2000, Carter, Gartner, and Reynolds, 2004). Available data from California and Texas suggest that approximately 46 percent of nascent entrepreneurs in the wind sector (qualifying facilities) reached operational start-up. Studies that account only for those ventures that reach operational start-up may not capture key factors that affect the number of entrepreneurs working toward operational start-up. This is important because transition rates to operational start-up cannot be fully understood without considering those forces that drive nascent entrepreneurship. For example, the number of nascent entrepreneurs trying to start a firm is obviously a fundamental driver of the number of ventures that eventually reach operational start-up (Kuilman and Li, 2006).

For our analysis, we narrowed the sample to wind energy ventures that filed with FERC between 1978 and 1992. The first registration occurred in 1980. From 1978 to 1992, few utilities invested in independent wind power generation, and only one wind facility reported partial ownership by an incumbent utility. During this period, 666 filing events occurred.

Explanatory variables

Social movement organization membership. We obtained state-level membership data from the Sierra Club, which over the period of our study was one of the three largest environmental SMOs in the United States (McCloskey, 1992). We chose membership because it reflects the size and strength of the Sierra Club more accurately than other measures such as the number of Sierra Club chapters within a state.

Regulatory environment. Because we are interested in the effects of the state regulatory environment on entrepreneurial activity rather than in the effects of any one policy, we constructed a variable that captures the number of regulatory policies adopted by a state that promoted renewable energy and energy conservation. This variable taps the degree to which a state's regulatory environment is supportive of renewable energy. We constructed this measure by summing state laws, agency rules, and commission policies that had been enacted or adopted with the intent to increase electricity conservation and the generation of renewable energy within a state. We included in our measure the following policies: inverted rate structure, solar and waste heat utilization policies, load management, tax incentives for investment in wind energy, defined avoided costs, and use of a standard contract. If the state had a given policy in place, that state received a "1" for that policy. These scores were then summed across the policy categories for each state-year. Data on these policies came from the National Association of Regulatory Utility Commissioners (NARUC) annual utility surveys, *Solar Law Reporter* (1981), *Energy User News* (1982–1985), and *Avoided Cost Quarterly* (1986–1992).

Control variables

We focus on how social movement activity moderates the effects of three core aspects of the material-resource environment: the availability of natural resources, state-level shortages of electricity capacity, and human capital. We obtained our measure of wind availability from the U.S. Department of Energy, using the number of acres of available land in each state that had wind quality rated at a wind class greater than 3.

We constructed a measure of human capital using data from the Covered Employment and Wages Program compiled by the U.S. Bureau of Labor Statistics (Bureau of Labor Statistics, 2008). We calculated the number of people in each state employed in technical fields relevant to wind energy technology. Wind power generation requires various types of knowledge related to electrical and mechanical engineering. The design of wind turbine blades requires an understanding of aerodynamics typically associated with the aircraft industry. An understanding of turbine technology and electronics is also essential. Using the SIC code as a guide, we included employment data from five major industry groups: engines and turbines, electric transmission and distribution equipment, electronic components and accessories, miscellaneous electrical machinery, and aircraft and parts. We filled in missing data points by linearly interpolating values within a state over time using the Stata statistical package ipolate command. Once the five major industry group variables were interpolated, we summed the number of workers in these five groups to obtain the aggregate number of technical workers with skills and knowledge relevant to wind energy technology for each state-year.

To capture the state-level shortages of electricity capacity, we used the amount of net electricity imports into a state as a proxy. This is a suitable proxy because it measures the degree to which a state is unable to generate sufficient electricity to meet electricity demand. These data come from the United States Department of Energy.

Higher prices for electricity are likely to increase entrepreneurial activity; thus we controlled for states' wholesale price of electricity for independent power plants (avoided cost) and the yearly average cost of fuels traditionally used to generate power (coal, natural gas, and oil). Avoided costs also typically included transmission costs. We obtained these data from the Department of Energy, *Energy User News* (1982–1985), and *Avoided Cost Quarterly* (1986–1992). Because entrepreneurial activity is affected by economic characteristics, we controlled for per capita gross state product, change in the gross state product, change in the gross domestic product, state population (logged), change in state population, prime interest rate, and electricity consumed per capita. These data come from the Department of Energy, the Census Bureau, and the Bureau of Labor Statistics.

Research in population ecology suggests that organizational density legitimates new types of economic activities (Hannan and Freeman, 1989), so we controlled for the number of wind facilities that are operational on a yearly basis in each state, and its square. We used data from the American Wind Energy Association, which collects data on operational wind power plants with greater than 1 MW of capacity. We were unable to find data on smaller facilities.

Previous research found that industry associations, sector foundings (regardless of specific technological form), and sector age all legitimate new sectors and increase their perceived viability (Russo, 2001; Sine, Haveman, and Tolbert, 2005). We therefore included a dummy variable for years in which a state had an industry association, controlled for yearly foundings of qualifying facilities that do not use wind power in each state, and operationalized sector age as the number of months since the passage of PURPA. Following Sine, Haveman, and Tolbert (2005), we controlled for the number of positive articles about the renewable energy sector in six national publications that included three major newspapers (the *Wall Street Journal*, *New York Times*, and *Washington Post*) and three business-oriented magazines (*The Economist*, *Business Week*, and *Newsweek*).

Because the political ideology of a state's residents may affect entrepreneurial activity, we also controlled for state political ideology using Berry et al.'s (1998) measure of citizen ideology. State citizen ideology is conceived as "the mean position on a liberal-conservative continuum of the 'active electorate' in a state" (Erikson, Wright, and McIver, 1993: 14). This measure was created by identifying the ideological position of each member of Congress in each year using interest group ratings. Berry et al. (1998)

then estimated citizen ideology for each voting district of a state using the ideology score of each district's incumbent, the estimated ideology score for a challenger (or hypothetical challenger) to the incumbent, and election results, which presumably reflect the ideological position in the electorate. These estimated citizen ideology scores for each district were then used to compute an unweighted average for the state as a whole.[10]

Finally, because the regulatory environment may have been affected by the extent to which regulators were willing to monitor compliance and punish firms for not following formal regulations or informal norms (Russo, 2001), we controlled for the activism of state utility commissions. To assess the level of commission monitoring, we measured the number of comprehensive audits per utility. Audits provide a good measure of activism because their purpose is to verify the information given to the commission by utility companies. Comprehensive audits are generally conducted on-site and examine purchasing, reliability indices, and affiliate transactions within a utility. Utilities view audits and rate cases as highly disruptive and expensive. Excessive audits can be viewed either as punitive measures or as a means of ensuring compliance with state regulatory policies. These data come from the NARUC annual utility surveys.

[10] For more details on how this measure was constructed, see Berry et al., 1998.

Model Specification and Estimation[11]

We test the relationship between the rate of entrepreneurial activity and Sierra Club membership using event history methods. Unlike aggregated event count models, event history analysis allows us to maximize the use of available information and to thereby increase the accuracy of the estimated effects of the independent variables (Carroll and Hannan, 2000).

In this analysis, we treated each filing within each state as a founding event and split these events by state-year. The start date of each event is the day on which the previous filing event occurred, and the end date is the day on which the focal filing event occurred (Carroll and Hannan, 2000). We reset the clock at the beginning of each year. We analyzed 666 filing events in 50 states over 14 years. We estimated the founding rate using the Gompertz model because this distribution provided a better fit for the data than the Weibull and exponential distributions (Allison, 1984; Hannan and Carroll, 1992). This model assumes the baseline hazard:

$$h_0(t) = \exp(a)\exp(\gamma t)$$

We used the streg procedure in the Stata statistical package for the analysis. We tested the robustness of our analysis using piecewise models. In these models, we split

[11] Simultaneity (the dependent variable causing the independent variable) is not likely to be a factor in these analyses. Entrepreneurial activity in the wind energy sector was unlikely to cause membership in environmental groups to increase, for three reasons. First, wind power technology did not mature during the period of our study and was marked by performance and reliability problems. This made it highly improbable that the technology's uncertain benefits enticed people to join the environmental movement. Second, because we observed state environments prior to any entrepreneurial activity in this sector, a reciprocal relationship is impossible in the early panels of our data. In results not included here, we conducted analyses that use data on state attributes prior to 1980 to predict entrepreneurial activity during the period 1980–1983. In these analyses, we found that pre-1980 measures of social movement membership predicted subsequent entrepreneurial activity. Third, during interviews with wind power entrepreneurs, we never encountered any indication that wind entrepreneurs were actively promoting environmental group membership.

the time interval into four periods: wind filings prior to the Supreme Court ruling in 1982 and filings during the periods 1983–1986, 1986–1989, and 1989–1993. The results for the piecewise models are similar to those from the Gompertz model. Our results are also robust to semiparametric analyses.

Several variables in our analysis are highly correlated, resulting in high levels of multicollinearity within our model. To reduce multicollinearity, we orthogonalized all interaction variables on the original main effect variables using a modified Gram–Schmidt procedure (Golub and Van Loan, 1989). This approach partials out the common variance among a set of variables, creating transformed variables uncorrelated with one another, and is a common technique for reducing multicollinearity due to interaction terms and the use of quadratics (Draper and Smith, 1981; Saville and Wood, 1991). We employed the Stata orthog command to generate orthogonalized measures.

RESULTS

Table 2 reports summary statistics and correlations, and Table 3 presents the results of the entrepreneurial activity analysis.

*****ADD TABLES 2 AND 3 ABOUT HERE *****

Table 3 displays the results obtained from modeling entrepreneurial activity. Model 1 provides a baseline that includes all control variables. Model 2 includes the regulatory environment variable, model 3 adds the Sierra Club membership variable, and model 4 includes the interaction variables. Model 5 is a robustness test using piecewise event history methods.

Several of the control variables in the model significantly increased levels of wind power entrepreneurial activity. As might be expected, our results suggest that size is an important control—larger state populations increased the level of entrepreneurial activity in a state. Consistent with past findings, we find that states with higher wholesale prices (avoided cost) were more likely to experience greater levels of entrepreneurship activity. However, this effect goes away once we control for Sierra Club membership. This is likely due to the fact that local Sierra Club chapters were strong advocates for higher avoided cost rates because this favored renewable energy development (Lee and Sine, 2007). Our results also indicate that states with declining economies (GSP) and populations experienced more entrepreneurial activity. One explanation for the relationship between GSP and entrepreneurial activity is that lower gross state products are associated with higher prices of conventional power sources such as oil and coal. These higher prices resulted in higher avoided costs, thus stimulating demand for power plants using alternative technology. Declining state population is likely correlated with entrepreneurial activity because net of available state generation capacity which we control for (energy imports), in general, a smaller population has fewer entrepreneurs. We also found (as expected), that the material-resource conditions needed for building wind power facilities, such as the availability of windy land, greater demand for additional capacity, and greater numbers of technical workers, led to greater levels of wind power entrepreneurship.

Unlike Russo (2001) and Sine, Haveman, and Tolbert (2005), we did not find a significant effect for industry associations in the final model. This may be due to the fact that the creation of an industry association is likely to occur in locations where there are sufficient entrepreneurs interested in building wind facilities, strong supportive social movements, and plentiful necessary resources—all of which are controlled for in our models.

The relationship between density and wind power entrepreneurial activity is somewhat complex. Initial density has a negative effect on entrepreneurial activity. This may stem from the many technical problems that early wind farms experienced. Density squared is significant in the first three models but loses significance once we account for the interaction between environmental group membership and material resources. This suggests that high density is likely associated with greater environmental group membership and resources and that once these interaction effects are taken into account, the variable loses significance.

Environmental group membership significantly impacts entrepreneurial activity in model 2. This effect is diminished once the regulatory environment variable is added in model 3. Using a Wald test, we compared the difference in coefficients for environmental group membership between models 2 and 3 and found that the difference between the coefficients is significant ($p<.05$). This result suggests that, as hypothesized, the effect of environmental group membership is mediated by the regulatory environment.

In the full model (model 4), all hypothesized relationships remain significant and in the expected direction. SMO strength and regulatory environment are significant in the full model. Holding all other variables constant, an increase of one standard deviation in regulatory policy (approximately 4 supportive policies) raised entrepreneurial activity by 55 percent; a standard deviation increase in Sierra Club membership (approximately 6,000 members) increases entrepreneurial activity by 59 percent.

Model 4 reveals that the interaction terms significantly impact levels of wind energy entrepreneurship. A standard deviation increase in Sierra Club membership increases the effect of available windy land and technical workers on entrepreneurial activity by 270 percent and 125 percent, respectively. A standard deviation in Sierra Club membership also increases the impact of capacity shortages on entrepreneurial activity by 102 percent.

Figure 3 illustrates the moderating effect of Sierra Club membership on available windy land, capacity shortages, and human capital. The x-axes in these figures are available windy land, net imports, and technical workers, respectively, measured in standard deviations from the mean. The three lines represent different levels of Sierra Club membership: one standard deviation below the mean (low Sierra Club membership), mean Sierra Club membership, and one standard deviation above the mean (high Sierra Club membership). These plots suggest that high Sierra Club membership has a greater moderating impact on the effect of technical workers and available windy land than net imports on entrepreneurial activity. At one standard deviation above the mean, Sierra Club membership effectively doubles the multiplier rate to 4 from approximately 2 for both technical workers and available land with high-quality wind when compared to the mean score for Sierra Club membership. For net imports, the multiplier rate increases from 2 to 3. In all three cases, the moderating effect of high levels of Sierra Club membership increases exponentially as the moderated variable increases.

DISCUSSION

In this paper, we have examined how social movements enable the emergence of new market sectors by fostering entrepreneurial activity. Environmental SMOs such as the Sierra Club, the Audubon Society, the Union of Concerned Scientists, and Friends of the Earth influenced the development of the wind energy sector by articulating problems associated with the use of brown fuels for the production of energy and advocating wind power as an environmentally benign solution. This framing, which vilified traditional technologies and inputs and promoted renewable alternatives, was promulgated at state and local levels by thousands of environmental activists through educational programs and public relations efforts. Environmental SMOs redirected and broadened their mobilizing efforts beyond wilderness conservation to promote renewable energy, which led to a significant shift in the values and norms surrounding electricity generation.

Environmental SMOs also staged successful lobbying campaigns directed toward state governments and regulators that indirectly increased entrepreneurial activity in the wind power sector. These same organizations also served as preexisting mobilizing structures through which wind entrepreneurs gained access and exposure to important information and resources. These normative changes and access to preexisting networks increased the likelihood that potential entrepreneurs saw wind power as a desirable opportunity.

This extensive mobilization effort, coupled with transformative framing, heightened the attractiveness of available windy land, enhanced the effect of human capital with relevant knowledge and skills, and increased the impact of state-level electricity shortages on stimulating entrepreneurial activity. In sum, environmental SMOs mobilized members and nonmembers alike to support the wind power sector, resulting in significant direct and indirect effects on nascent entrepreneurial activity and moderating effects on those conditions and resources that constitute entrepreneurial opportunity. We believe that these findings have important implications for the literatures on social movements, entrepreneurship, and institutional theory.

Contributions to Social Movement Theory

Significant progress has been made in understanding the consequences of social movements on legislation and state policy, the life course of individual activists, cultural elements of society, and other social movements (see Snow, Soule, and Kriesi, 2004, for recent reviews). Absent from recent reviews and the broader corpus of social movement literature is an explicit focus on how broad-scale social movements enable market creation and foster entrepreneurial opportunity. Some work bridging social movements and markets has focused on businesses as targets of social movements (Van Dyke, Soule, and Taylor, 2004; Luders, 2006; King and Soule, 2007). Underlying these research efforts to link social movements to market outcomes is the limiting premise that "creating disruptions is often the only effective means to compel change" (Luders, 2006: 963).

By contrast, this study corroborates and extends recent work that underscores the role of social movements in fostering the development and growth of organizational forms (Schneiberg, 2002; Haveman, Rao, and Parachuri, 2007; Schneiberg, King, and Smith, 2008). We have shown how collective action frames created and propagated by SMOs can transform the perceived value of technical processes and related resources, devaluing some processes and their related resources and valorizing alternatives. SMOs can alter the norms and beliefs that underlie individual economic action and coordinate how individual actors allocate their time and resources. Thus, social movements can shape individuals' decisions to engage in some kinds of economic activity and not others. The normative prescriptions proselytized by SMOs have powerful and enduring impacts not only on the biographies of their members (McAdam, 1999; Giugni, 2004), but also on those of individuals beyond those organizations' boundaries. The advocacy of particular activities as appropriate and morally right by collectivities such as social movements can significantly influence individual action. In the case of wind energy, qualitative evidence suggests that some set of entrepreneurs will go out of their way and even assume greater risk to create economic entities that further this agenda. Others are likely to see this growing support for new types of processes as an indicator of demand and economic opportunity. Thus, social movements can effectively change the extent to which people both within and outside their membership support and engage in particular market activities.

Our results also suggest that social movements can moderate the degree to which shortages of a particular product or service stimulate entrepreneurial activity. In the absence of sufficient production capacity to meet demand, the taken-for-granted superiority of established production methods and natural resources is called into question, and there is a greater awareness and openess to alternative options. Such conditions enhance the ability of social movements to encourage new types of economic activities. This suggests that social movements can moderate how changes in supply and demand affect entrepreneurial responses and thereby demonstrates how social movements can leverage broader economic changes to enable the rise of new sectors.

Finally, our findings corroborate the importance of considering the conjoint influence of social movement activity and the state on market outcomes (Haveman, Rao, and Parachuri, 2007). Clemens (2005) correctly pointed out that "if the agenda is to integrate the empirical study of social movements with the empirical study of formal organizations, the lack of attention to formal political institutions is problematic. Many critical struggles are *about* the rules of the game rather than *within* those rules" (p. 361). Our findings show that social movements can shape formal and informal rules, thereby having an indirect influence on the nature of entrepreneurial opportunity.

Contributions to Entrepreneurship

We contribute to the study of opportunity creation and identification—a central pillar of entrepreneurship research (Shane and Venkataraman, 2000). Entrepreneurship scholars generally agree on two sources of entrepreneurial opportunity. First, exogenous shocks such as technological change, new regulation, political shifts, and macroeconomic change lead to the creation of new opportunities (Schumpeter, 1934). Yet as Shane (2003) noted, while this research stream has aptly shown that "changes are associated with the creation of opportunities… [it has left] the mechanisms unspecified" (p. 263). Thus, past research in this area has treated sudden changes in regulation, technology, and even norms and values as exogenous and has generally ignored the role institutional actors such as social movements play in engineering and leveraging such changes.

A second approach, the Kirznerian perspective of entrepreneurial opportunity, suggests that entrepreneurial opportunities objectively exist independent of any exogenous shock and manifest themselves as entrepreneurial errors, shortages, surpluses, and misallocated resources (Kirzner, 1973, 1997). From this perspective, entrepreneurial opportunities are viewed as preexisting, objective phenomena waiting to be discovered by alert entrepreneurs (Kirzner, 1997).

Our findings suggest a bridge between these two perspectives. We have demonstrated that institutional actors such as SMOs can directly engineer broad social changes and leverage economic shocks to generate new economic opportunities. In the case of the oil crises of the 1970s, the fluctuation of energy prices alone might have had relatively little impact on wind power entrepreneurship. Indeed, a host of technologies and inputs existed at the time that could have been substituted for oil, including coal, natural gas, co-generation, trash incineration, and nuclear power. Thus, entrepreneurial activity in the wind power sector was not inevitable. During the period of this study, renewable technology such as wind power was viewed as "not for the faint-hearted. . . [because] it is impossible to estimate risks or rewards with any certainty, due to the untested technology and untried markets involved" ("The New Crop", 1980). Through their advocacy and regulatory reform, environmental organizations increased the normative and regulatory benefits of starting a new wind power venture. By generating problem/solution frames, mobilizing resources, advocating for favorable legislation, and influencing the cognitive valuation processes associated with key resources, environmental SMOs fundamentally transformed the entrepreneurial opportunity set associated with wind power. Starting a wind power venture or even supporting the wind power sector went from something unheard of to an activity viewed by many as "the right thing to do."

Understanding how such collective action shapes the relative attractiveness of a particular production process and its required inputs to potential entrepreneurs provides an important complement to existing entrepreneurship research focused on exogenous shocks and individual-level cognitive features of opportunity discovery. By shifting the focus from the individual entrepreneur to the collective actors that construct entrepreneurial opportunity, this study promotes an institutional and collective action–

based orientation to the study of entrepreneurship—an understudied, yet important approach to entrepreneurial research (Thornton, 1999; Schoonhoven and Romanelli, 2001; Swaminathan and Wade, 2001; Eckhardt and Shane, 2003; Ruef and Lounsbury, 2007).

Contributions to Institutional Theory

Our findings also expand recent attempts by institutionalists to understand the relationship between institutional and material-resource environments and how it impacts organizational dynamics (Scott et al., 2000). Institutional and material-resource dimensions have typically been treated as theoretically distinct elements of an organization's environment (Scott and Meyer, 1991; Fennell and Alexander, 1993), yet recent research shows how intertwined the two are. Scott and colleagues (2000) found that different regulatory periods in the health care industry in California moderated the effect of competitive intensity among hospitals on subsequent foundings. We extend and refine this position by showing how greater numbers of environmental activists moderated elements of the material-resource environment in the nascent wind energy sector. As SMOs and other types of institutional actors challenge existing practices and promote new ones, they can alter commonly held subjective interpretations of the material-resource environment and thereby create opportunities for new types of economic activities.

This is an important finding because the social and cognitive processes by which resources and products take on value is understudied (Podolny and Hill-Popper, 2004), and much of contemporary organization theory assumes that resources are objective realities operating on organizations in identifiable and predictable ways. Baker and

Nelson (2005) argue that typical conceptions of resources in organization theory take for granted a particular set of resources as part of the objective environment that shapes organizational and subunit outcomes. Even institutional theorists often assume the underlying value of resources, treating them as control variables, and focus on explaining the "terms on which scarce resources are made available" (Baker and Nelson, 2005: 331). Hence, examining how and under what conditions taken-for-granted assumptions regarding the use and value of components of the material-resource environment change—how undervalued inputs become recognized as economic "resources"—provides a new perspective on how collective efforts can reshape not only the institutional but also the material-resource environment in which firms emerge and operate.

CONCLUSION

In this paper, we have shown how SMOs can shape nascent entrepreneurial activity through direct, indirect, and moderating means. SMOs enhance entrepreneurial opportunity by creating and mobilizing support for frames that challenge existing processes and support new ones. We find that material resources, such as windy available land and skilled human capital associated with wind power, were of significantly less consequence to potential entrepreneurs without the accompanying normative and regulatory structures that valorized such resources and the preexisting networks that enabled resource mobilization. In the 1980s, wind power was much more expensive than standard methods of generating power from fossil fuels. A rationale that considered more than short-term power prices needed to be constructed and propagated for wind power to be viewed as a viable alternative to the existing technologies that relied exclusively on fossil fuels. At that time, advocates of energy independence pointed to coal and natural gas as the cheapest alternatives to oil. It was not until environmental groups articulated and proselytized the many drawbacks of using fossil fuels and the benefits of wind power that resources associated with this technology became valued. Ultimately this study points to the importance of treating the categorization of particular aspects of the material world as “resources” as a variable to be explained rather than merely as a way to control for the taken-for-granted objective world in which organizations and institutions exist.

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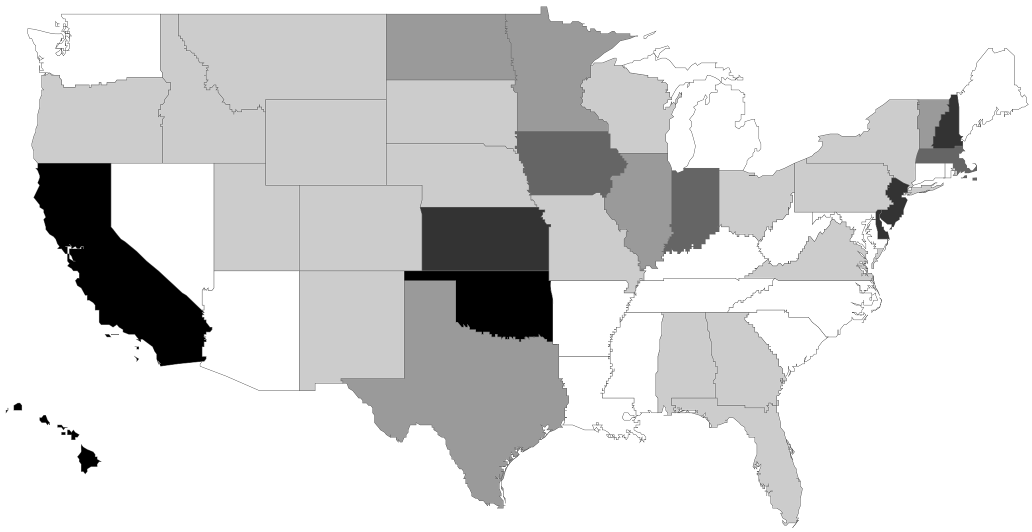
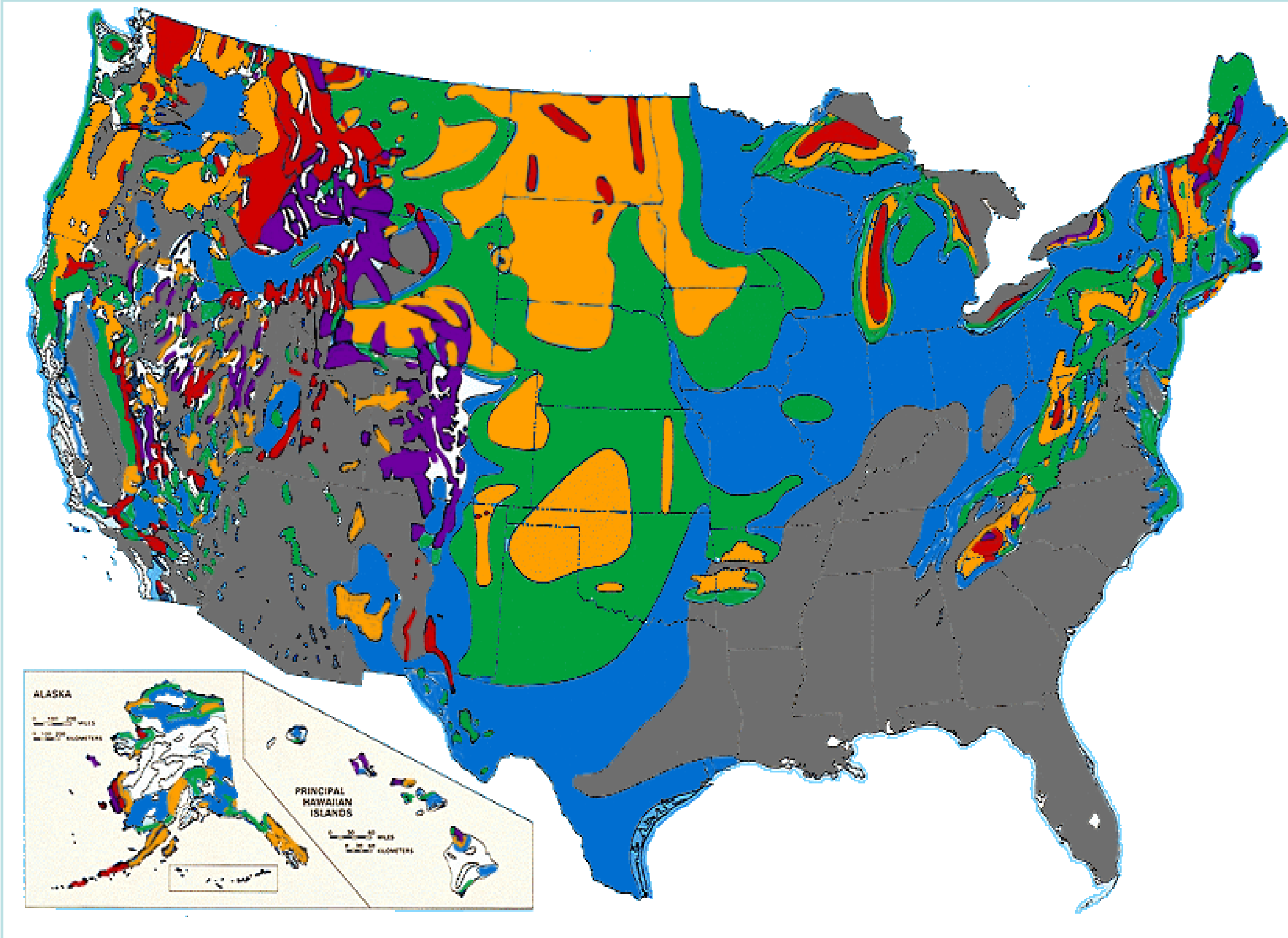
Figure 1: Geographic Distribution of Wind Qualifying Facilities, 1978–1992



Facilities per 10,000 miles^2

- 4.4 –
- 2.8 – 4.39
- 1.7 – 2.79
- .70 – 1.69
- $1x10^{-5}$ –
- 0

Figure 2: Geographic Distribution of Windy Available Land

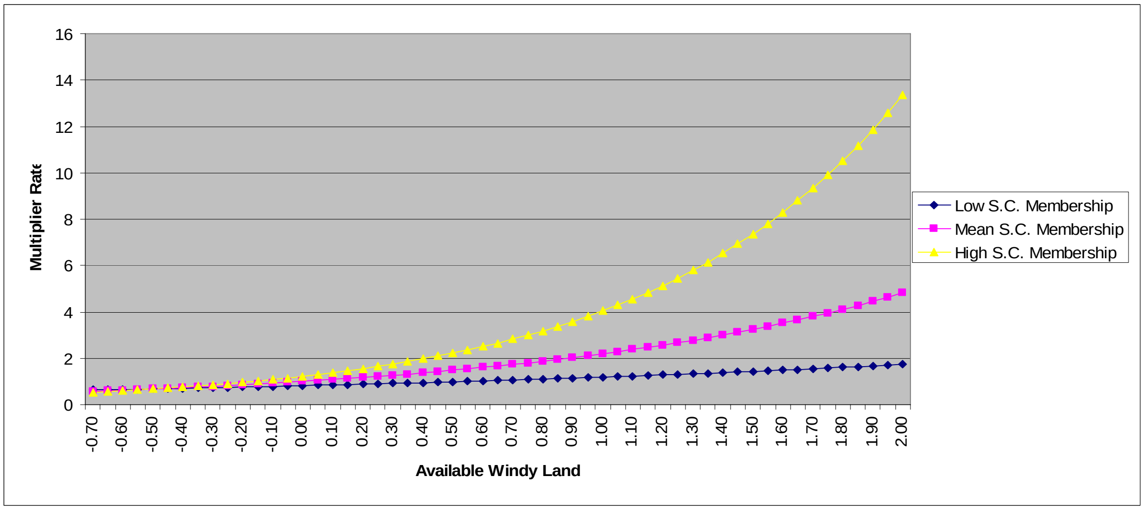


Wind speed (m/s)

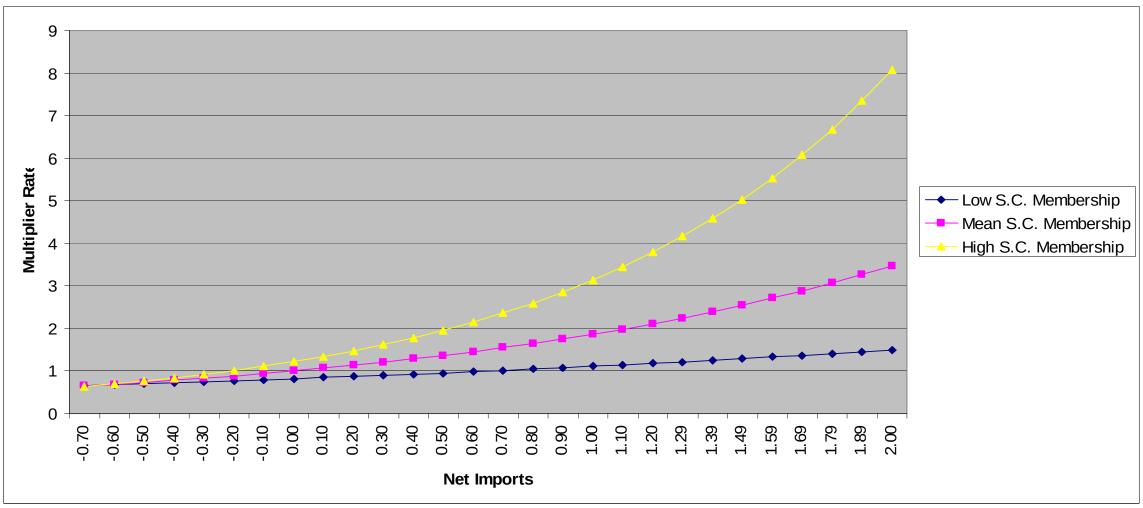
- **> 8.5**
- **7 – 8.5**
- **6 – 7**
- **5 – 6**
- **< 5**

Figure 4: Interaction Graphs

Sierra Club membership interaction with wind availability



Sierra Club membership interaction with net imports



Sierra Club membership and technical worker interaction

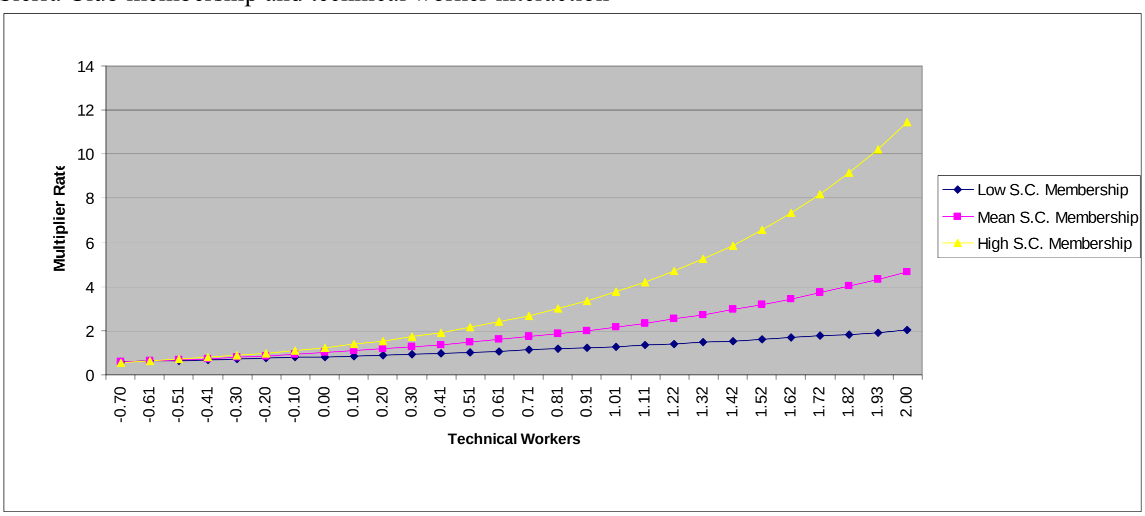


Table 1: Timeline of Sierra Club Advocacy of Renewable and Wind Energy

Date	Event
1892	Sierra Club is founded
1892–1960	Sierra Club Purpose and Policy Focus Purpose: Conservation and the preservation of nature for its own sake Policy Focus: The preservation of areas of natural beauty and wilderness for public enjoyment
May 1970	Sierra Club officially recognizes the link between pollution and energy
June 1970	Sierra Club shifts from a "conservation movement" to an "environmental movement"
Jan. 1971	First mention of renewable energy in Sierra Club's membership publication
Feb./Mar. 1971	*Sierra* outlines all major oil spills, 1967–1971, and the Club declares oil a hazardous substance
Apr. 1971	Sierra Club formulates an energy policy
June 1971	Sierra Club Board of Directors calls for a critical and exhaustive examination of Nixon energy policy
Sept. 1971	Sierra Club advocates use of alternative energy sources Sierra Club bulletin publishes an article that clarifies misconceptions about alternative energy sources and advocates their use
Oct./Nov. 1971	Sierra Club sponsors a power policy conference
Jan. 1973	Sierra Club board of directors calls for energy costs to reflect the "true costs" associated with energy production
Apr. 1973	Energy becomes the a central environmental concern for Sierra Club "one environmental issue dominates all the others—energy" (*Sierra*, April 1973: 17)
May 1974	Sierra Club explicitly advocates the use of wind energy in its newsletter
Feb. 1974	Sierra Club opposes the licensing, construction, and operation of new nuclear reactors Lobbies Congress for at least $2 billion/yr for renewable energy technologies
Mar./Apr. 1979	Sierra Club president offers an alternative energy policy that counters President Carter's
Mar./Apr. 1979	Sierra Club embraces renewable energy technologies as part of their mission statement

Table 2: Summary Statistics and Correlations for Entrepreneurial Activity Analysis[12]

	Variables	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	Avoided cost (cents/kWh)	2.84	2.00	1.00																						
2	Change in GDP (% change in current $)	3.11	2.44	0.23	1.00																					
3	Change in GSP (percent change in current dollar)	7.34	4.97	0.17	0.19	1.00																				
4	Change in state population (% change)	.005	.01	-0.17	-0.21	0.15	1.00																			
5	Class 3 and 4 wind availability (10,000 acres)	66.3	81.9	-0.03	0.16	-0.34	-0.23	1.00																		
6	Congressional voting record	49.5	15.8	0.20	0.09	-0.01	-0.01	-0.02	1.00																	
7	Energy consumed (kwh/year per capita)	341	122	-0.18	-0.06	-0.17	-0.11	0.21	-0.48	1.00																
8	Fuel cost	3.75	1.05	0.40	-0.02	0.30	-0.22	0.16	0.04	-0.05	1.00															
9	GSP per capita (10,000 people)	1.90	0.61	-0.10	0.01	-0.02	0.14	-0.21	0.06	0.11	-0.29	1.00														
10	Political ideology	52.4	17.1	0.18	-0.01	-0.09	0.13	-0.23	0.34	-0.13	-0.05	0.16	1.00													
11	Industry association	0.17	0.37	-0.05	0.08	0.10	-0.21	0.01	0.18	-0.35	-0.07	0.24	-0.06	1.00												
12	Net electricity import (1000 GWh/year)	1.03	2.35	0.02	0.07	0.10	-0.13	-0.02	0.25	-0.31	-0.05	0.17	0.10	0.63	1.00											
13	Non-wind foundings	44.1	83.9	0.11	0.26	0.01	-0.25	-0.05	0.25	-0.36	0.02	0.23	0.04	0.69	0.45	1.00										
14	Positive media	61.5	20.8	-0.09	-0.09	0.04	0.08	-0.02	0.09	-0.01	0.28	0.24	0.09	-0.05	-0.03	0.17	1.00									
15	Prime rate	11.9	3.28	0.22	-0.48	0.00	-0.19	0.18	0.00	0.01	0.77	-0.38	-0.04	-0.13	-0.10	-0.16	-0.14	1.00								
16	Regulatory activism	0.85	0.34	-0.04	0.07	-0.04	-0.17	0.09	0.30	-0.26	0.03	-0.09	-0.01	0.20	0.16	0.28	-0.02	0.03	1.00							
17	Sector age	19.8	3.70	-0.37	0.00	-0.27	0.29	-0.20	0.07	-0.02	-0.52	0.61	0.15	0.16	0.09	0.27	0.41	-0.65	0.01	1.00						
18	State population/100,000	924	1003	-0.03	0.13	0.15	-0.23	-0.23	0.23	-0.39	0.08	0.04	0.01	0.63	0.43	0.73	0.02	-0.03	0.39	0.07	1.00					
19	Technical workers	1010	136	-0.26	0.06	0.01	-0.23	-0.24	-0.09	0.04	0.03	-0.15	-0.18	-0.04	-0.09	0.11	0.00	0.01	0.39	-0.05	0.50	1.00				
20	Wind facility density	10.1	26.7	-0.29	0.05	0.05	-0.14	0.03	0.13	-0.24	-0.19	0.23	-0.06	0.63	0.46	0.52	0.05	-0.18	0.14	0.21	0.46	-0.07	1.00			
21	Wind facility density^2	813	3047	-0.17	-0.13	-0.10	0.15	0.00	-0.15	0.29	-0.04	-0.10	0.07	-0.62	-0.28	-0.52	0.35	0.02	-0.17	-0.01	-0.52	-0.01	-0.03	1.00		
22	Regulatory climate	6.76	3.70	0.55	0.23	0.13	-0.20	0.28	0.29	-0.37	0.20	-0.22	-0.14	0.20	0.11	0.35	-0.04	0.12	0.52	-0.22	0.22	-0.02	0.14	-0.21	1.00	
23	Sierra club membership/100	45.6	62.2	0.28	-0.02	0.23	-0.23	-0.01	0.21	-0.49	-0.02	0.13	-0.08	0.32	0.24	0.23	-0.05	-0.06	0.15	0.03	0.25	-0.26	0.24	-0.25	0.32	1.00

[12] Correlations are based on variables in model 4.

Table 3: Event History Analysis: Entrepreneurial Activity †

Variables/Model #	1	2	3	4	5
Control Variables					
Avoided cost (cents/kWh)	0.269**	0.011+	0.060	0.068	0.090
	[0.068]	[0.059]	[0.083]	[0.101]	[0.103]
Change in GDP (percent change)	-0.265**	-0.194+	-0.153	0.125	0.049
	[0.097]	[0.100]	[0.103]	[0.115]	[0.293]
Change in GSP (percent change)	-0.064**	-0.082**	-0.107**	-0.099**	-0.147**
	[0.019]	[0.019]	[0.020]	[0.023]	[0.024]
Change in state population (percent change)	-105.868**	-91.360**	-86.874**	-70.537**	-41.881**
	[13.041]	[12.519]	[12.034]	[12.600]	[12.409]
Class 3 and 4 wind availability (10,000 acres)	0.014**	0.010**	0.008**	0.747**	0.705**
	[0.002]	[0.001]	[0.001]	[0.118]	[0.125]
Congressional voting record[L]	0.747**	1.515**	1.524**	0.804*	0.904*
	[0.243]	[0.281]	[0.297]	[0.356]	[0.396]
Energy consumed/10 (kwh/year per capita)	-0.008**	-0.001	0.002	0.002	0.002
	[0.002]	[0.001]	[0.002]	[0.002]	[0.003]
Fuel cost	0.740**	0.479**	0.522**	0.114	0.502+
	[0.173]	[0.180]	[0.184]	[0.203]	[0.299]
GSP per capita/10	-195.662**	-192.146**	-204.915**	-102.671*	200.606**
	[57.110]	[56.019]	[57.324]	[52.229]	[60.341]
Political ideology	-0.066**	-0.090**	-0.079**	-0.038**	-0.079**
	[0.010]	[0.011]	[0.012]	[0.014]	[0.013]
Industry association	1.089**	0.925**	0.979**	0.082	-0.065
	[0.079]	[0.083]	[0.087]	[0.152]	[0.189]
Net electricity imports (1000 GWh/year)	0.000**	0.000**	0.001**	0.000*	0.000*
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Non-wind foundings[L]	0.483**	0.375**	0.318**	0.402**	0.180**
	[0.062]	[0.058]	[0.057]	[0.059]	[0.061]
Positive media[L]	0.022	0.349	0.344	0.606+	0.237
	[0.294]	[0.323]	[0.324]	[0.315]	[0.479]
Prime interest rate	-0.791**	-0.819**	-0.788**	-0.400**	-0.052
	[0.094]	[0.098]	[0.100]	[0.111]	[0.165]
Regulatory activism	-0.039	0.316	-0.004	-0.42	2.686**
	[0.430]	[0.444]	[0.535]	[0.604]	[0.913]
Sector age[L]	-183.395**	-208.380**	-211.347**	-229.051**	-2.144**
	[10.691]	[12.128]	[12.267]	[13.302]	[0.519]

State population[L]	0.451**	0.356*	0.526**	0.547*	0.572*
	[0.136]	[0.146]	[0.151]	[0.251]	[0.245]
Technical workers[L]	0.113*	0.564**	0.772**	0.657**	0.594**
	[0.031]	[0.136]	[0.135]	[0.180]	[0.187]
Wind facility density	-0.421**	-1.509**	-1.439**	-0.611**	-0.303
	[0.085]	[0.152]	[0.151]	[0.182]	[0.191]
Wind facility density^2	0.198**	0.840**	0.808**	-0.046	-0.023
	[0.067]	[0.087]	[0.089]	[0.163]	[0.170]
Independent Variables					
Sierra Club membership/1000		0.425**	0.392**	0.468**	0.725**
		[0.044]	[0.047]	[0.181]	[0.201]
Regulatory environment			0.217**	0.522**	0.450**
			[0.046]	[0.158]	[0.171]
Interaction Terms					
Membership x wind availability				0.820**	0.546*
				[0.231]	[0.278]
Membership x net electricity imports				0.712**	0.435*
				[0.174]	[0.200]
Membership x technical workers				1.309**	1.162**
				[0.392]	[0.397]
Constant	1,571.788**	1,794.421**	1,818.874**	1,949.917**	
χ^2	3055.56	3144.85	3169.28	3262.81	5794.86

[L]Logarithmic transformation +$p \leq .10$; *$p \leq .05$; **$p \leq .01$
†Standard errors in parentheses