Small Wind Energy Policy Making in the States: Lessons for a Shifting Energy Landscape

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INTRODUCTION

Growing concerns about global climate change, the safety and security of America's energy supply, and the economic hardship caused by high fossil fuel prices have brought energy-related issues to the forefront of contemporary public discourse. Confronting these complex challenges will require diverse solutions within the public and private sectors, along with a willingness to move away from current "business as usual" practices. Although the political will and financial means for confronting these issues may be diminished in the face of the current national economic crisis, economic circumstances do not lessen the need to adapt the nation's energy system to meet these difficult demands. In fact, as economic recovery spurs demand for additional energy, alternative sources will become more important than ever.

Distributed energy generation (DG) represents one technology-based approach that satisfies these requirements by altering the conventional energy production system. In particular, DG technologies generate energy close to where it is consumed (U.S. Department of Energy, 2007; Clark and Isherwood, 2004). This represents a significant shift away from traditional energy production practices, which have focused on building large, fossil fuel generating plants in remote locations (closer to fuel sources) and then transmitting the power over high-voltage transmission lines to the eventual end-users (Chowdhury and Tseng, 2007).

This study examines one distributed generation technology, small-scale wind generation. "Small wind" energy describes wind-powered electric turbines with a maximum capacity of 100 kilowatts (kW), designed to produce electricity for local use (AWEA, 2009a). Small wind energy refers to wind turbines that are located on the distribution side of the electric grid and provide power directly to homes, farms, and businesses. Unlike utility-scale wind facilities, small wind turbines can be effective in areas beyond the central plains, coastal locations, or mountain ridges, making them a valuable alternative option for communities or individuals that are interested in renewable energy but are unable to utilize other technologies. According to the National Renewable Energy Laboratory, at least 48 of the 50 states in the country have some areas of land with a strong enough wind resource for small wind turbines to be effective (NREL, 2005). Importantly, small wind also constitutes a unique economic advantage for the United States as it represents the only renewable energy industry segment that the United States still dominates in technology, manufacturing, and world market share (U.S. Department of Energy, 2007).

Although small wind energy represents only a small fraction of the entire wind energy industry, the small wind market has experienced considerable growth in recent years. This growth was highlighted by a 78 percent increase in the installed capacity of small wind technologies in 2008 over what had been installed in 2007 (AWEA, 2009a). According to the American Wind Energy Association (AWEA, 2009a), the cumulative installed capacity of small wind energy by the end of 2008 had reached 80 MW and yearly sales surpassed 10,000 units in the United States. Although

the small wind market refers to turbines with rated capacities as large as 100 kW, smaller residential systems in the 1-10 kW range represent the largest segment of the market (AWEA, 2009a). The year 2008 marked a potential turning point in the future trajectory of the small wind market, due to the introduction of a new 30 percent federal investment tax credit slated to be available through 2016. Based on the prior experience of the solar photo voltaic industry with a similar federal tax credit, it is expected that this new federal small wind tax incentive will enhance the growth of small wind technologies in the coming years (AWEA, 2009a).

In addition to the recently enacted federal tax credit for small wind, many state governments have implemented a wide variety of innovative policies and incentive programs to encourage their citizens and businesses to adopt small wind. However, in spite of the public expenditures and environmental importance associated with these initiatives, little academic research has been conducted to evaluate these state efforts, and as a result very little is known about the small wind energy policy environment at the state level. Although many different levels of actors are involved in small wind energy, this study focuses on the role of state governments within the small wind universe. We address two primary research questions:

1. What is the current status of state small wind energy policies in the United States?
2. Which policy tools are perceived to be most effective for increasing the adoption of small wind energy technologies?

The first question is answered through a survey sent to state wind energy officials across the United States (Phase 1). The second is answered through in-depth case studies of three different states (Phase 2). Methods and results are discussed below, although for more information the reader is directed to the full study (Wiener, 2009).

Phase 1 — Survey Instrument

The first phase of this study utilized a survey instrument to address the question, "What is the current status of state small wind energy policies in the United States?" An explanation of the methodology used to answer this question and the results that were uncovered is presented below.

Methodology

To obtain the status of state small wind policies, the researchers developed an online survey instrument. Survey respondents for the questionnaire were selected based on their knowledge of their state's wind energy policies and incentives, as identified through websites and phone calls to the state's energy office.

To understand the kinds of policy tools used at the state level, the questionnaire asked questions about the particular mix of policy tools in operation to promote small wind technologies. Policy tools (or instruments) are the mechanisms chosen by a state government to translate its policy goals (in this case greater adoption and installation of small wind energy technologies) into concrete actions that achieve the desired policy purposes (McDonnell and Elmore, 1987; Schneider and Ingram, 1990). Governments use a wide variety of policy instruments to accomplish policy goals, with each policy tool offering a unique way to produce the desired end-result.

State governments currently use eleven different policy tools to support small wind (Bird et al. 2005; AWEA 2008; Database of State Incentives for Renewables & Efficiency 2009). These eleven tools can be grouped into four primary types: mandates, inducements, capacity building tools, and system changing incentive tools (see Table 1).[1]

Table 1 – Policy Tools Framework

Type of Policy Tool	Policy Instruments Categorized Within Each Policy Tool Type
Mandates	1) Renewable Portfolio Standard
Inducements	1) Tax Credits 2) Grants (designed to lower upfront capital and installation costs) 3) Tax exemptions, deductions, abatements, or reductions 4) Loans with zero, below market, or low fixed-interest rates 5) Consumer subsidies or rebates
Capacity Building Tools	1) Policies promoting knowledge transfer or public outreach 2) Policies promoting research in renewable energy technologies 3) Program to loan wind measurement equipment to interested consumers
System Changing Incentive Tools	1) Net Metering

Mandates refer to policies that require a particular action from a targeted entity. This type of policy tool is not commonly used to promote small wind energy, and the only widely adopted policy tool example is a Renewable Portfolio Standard (RPS). A RPS generally establishes a requirement that a state must generate a specified percentage of its electricity from renewable sources by a certain date. Small wind energy can be categorized as a permissible renewable source, and thus is one option that policymakers and utilities can consider to fulfill their state's

[1] It is important to note that a Public Benefit Fund (also referred to as a System Benefits Fund) is a policy tool that bundles together multiple policy tool types and therefore it is not classified as belonging to one of the four groups. In particular, Public Benefit Funds include a mandate that requires electricity consumers to contribute a small percentage of every bill payment to this fund. Subsequently, states generally use the money in these funds to pay for renewable energy financial incentives (inducements) or capacity building programs.

RPS requirements. As a result, it is reasonable to expect that establishing a RPS will have the effect of encouraging greater support for small wind energy within the states that have adopted these mandates. However, it is important to note that a RPS generally does not require a state to use small wind energy, but rather just includes this technology within a bundle of acceptable renewable energy technologies from which policymakers can select to support. Further, a RPS does not represent a mandate on individual behavior, but rather mandates that a state and the utilities operating within the state must meet certain requirements. There is no guarantee that adopting a RPS will lead to greater small wind usage in a state, but in most cases implementing a RPS will increase the potential benefits for state governments and utility companies associated with promoting small wind energy.

Inducements are tools that encourage consumers to install small wind energy technologies by providing a variety of financial incentives designed to reduce the costs associated with acquiring these systems. Examples of these policy tools include tax exemptions or deductions, tax credits, grants, consumer subsidies or rebates, and loans with zero, below market, or low fixed-interest rates.

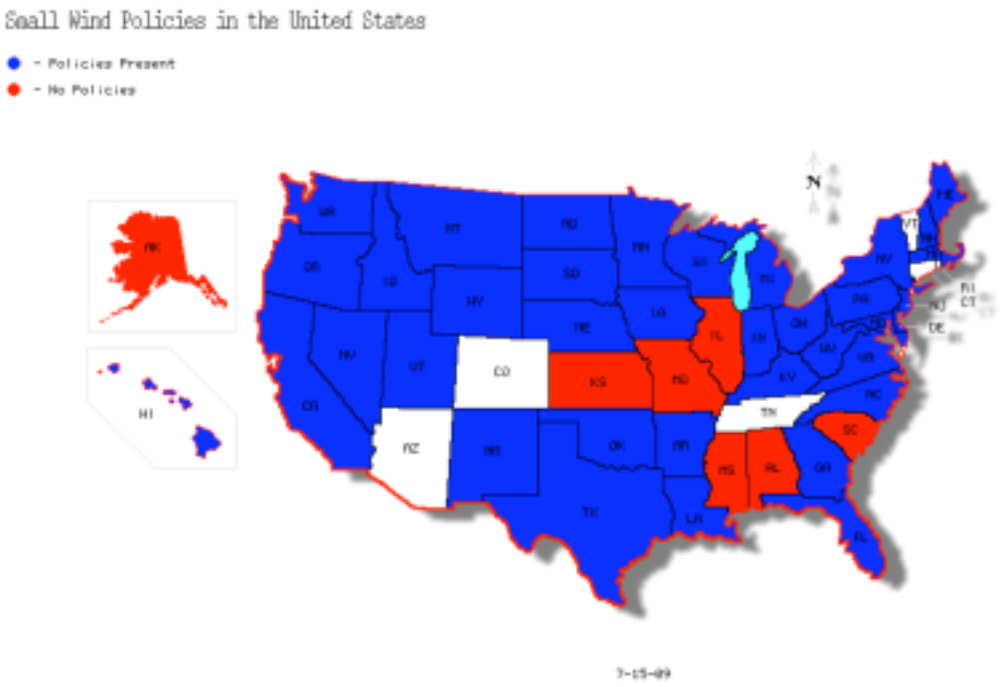
Capacity building tools include policies or programs that provide money for investment in material, intellectual, or human resources that are expected to increase the eventual adoption of small wind energy technologies. For small wind energy, capacity building tools consist of policies promoting knowledge transfer or public outreach, policies promoting research in renewable energy technologies, and programs to loan wind measurement equipment to interested consumers.

The final set of policy tools are system changing incentive tools, which redistribute authority over the energy generation and selling process and provide financial incentives to consumers to sell excess electricity generated by small wind turbines back to the power grid. Net metering represents the only example of this type of policy tool, and by providing compensation for small-scale electricity generation this policy instrument forces utilities to become energy buyers while allowing private consumers to assume the role of an energy seller.

Results

State small wind policies serve as the dependent variable in this study and were collected and evaluated based upon the online questionnaire responses provided by the top small wind energy officials in each state. Officials from 44 states (out of 50 total) completed the survey, producing a response rate of 88 percent. According to these small wind energy officials, 37 of the 44 states (84 percent) have at least one policy or incentive in place to support small wind energy. Figure 1 illustrates the geographic distribution of states with policies to support small wind. States shaded blue have at least one small wind policy or incentive, while states shaded red do not have any of these policies and states colored white are those states that did not complete the survey instrument.

Figure 1 – Small Wind Policy Map[2]



The survey instrument also collected additional data about state small wind programs that helps to provide context about the current small wind policy environment in states throughout the country. For example, the 37 small wind states have implemented an average of 4.88 different policy tools apiece. This figure suggests that many states are using a variety of approaches to try to expand small wind energy adoption rather than simply relying on one policy instrument. Table 2 displays the frequency of usage of each of the policy tools within the small wind states.

[2] This map was created using the website: http://monarch.tamu.edu/~maps2/us.htm#top and developed from date contained in this study's survey responses.

Table 2 – Policy Tool Usage in Small Wind States

Policy Tool (and policy tool type)	Percentage of states supporting small wind energy that use the policy tool
Net Metering (System Changing Incentive)	82%
Policies promoting knowledge transfer or public outreach (Capacity Building)	68%
Renewable Portfolio Standard (Mandate)	47%
Tax Credits (Inducement)	47%
Policies promoting research in renewable energy technologies (Capacity Building)	47%
Program to loan wind measurement equipment to interested consumers (Capacity Building)	38%
Grants (designed to lower upfront capital and installation costs) (Inducement)	38%
Tax exemptions, deductions, abatements, or reductions (Inducement)	38%
Loans with zero, below market, or low fixed-interest rates (Inducement)	29%
Public Benefit Funds (Hybrid)	29%
Consumer subsidies or rebates (Inducement)	24%

Source: Survey responses (44 states).

In order to measure the complexity of each state's approach to supporting small wind energy, the small wind states were evaluated based upon how many of the four types of policy tools they use. Grouping states in this manner reveals that 35 percent of the states use policy tools from all four types, 29 percent use policy tools from three of the types, 32 percent of the states use policy instruments from two of the types, and 3 percent of the states were found to be using policy tools from only of the four groupings.

States using policy tools from three or four of the groups are considered to have "complex small wind policies," and states using policy tools from only one or two of the groups are considered to possess "straightforward small wind policies." This characterization is not meant to suggest that having a greater number of small wind policies is inherently better than having fewer policies (for example, one well targeted policy could potentially be more effective than three poorly run programs). Nevertheless, while not judging the effectiveness of a state's small wind policy system by the number of policies or policy tool types that have been adopted, this measure is used to gauge, albeit imperfectly, a state's level of support and commitment to small wind energy. Additionally, as discussed earlier a Public Benefit Fund is a hybrid policy tool that is not included in the four policy tool types. However, it is interesting to note that all of the states that use a Public Benefit Fund to support small wind energy are states that fall into the complex small wind policies category.

The results presented in the first phase of the study provide a broad overview of the small wind policy environment aggregated across all states throughout the country. While this is useful for developing a general understanding of state small wind policies, assessing the impact of these policies is best accomplished by focusing on the experiences of individual states that have adopted particular policy tools of interest. The second phase of this research project expanded upon these findings by investigating the specific small wind policy experiences of three states through in-depth case study analyses.

Phase 2 – Case Studies

An important question related to small wind policy is how effective these different policy tools, and types of policy tools, are in different states. Have state policies designed to promote small wind energy achieved their desired objectives? Which policy tools are perceived to be most effective, and what are the advantages or costs associated with applying policy instruments in one manner compared to another? The second phase of this study consisted of case study examinations of three small wind states to address the question, "Which policy tools are perceived to be most effective for increasing the adoption of small wind energy technologies?" The methodology used to answer this question, relevant background information, and the results that were uncovered during this phase of the research are presented below.

Methodology

Comparative case studies help researchers understand complex phenomena in situations where multiple factors are potentially important and need to be considered. This situation certainly applies in the case of state small wind energy policies, given the high variability in polices across states and the numerous factors that interact to determine the effectiveness of different policies in different contexts. For the purpose of this analysis, we chose three states with different levels of policy tools for small wind: Oregon, Ohio, and Oklahoma.

In each state, we collected data from interviews with representatives of the state government, environmental advocacy groups, and employees of wind turbine installation companies. These three groups of stakeholders were chosen in order to obtain a variety of perspectives and opinions regarding the situation surrounding small wind energy in each state. State government officials were selected based on their familiarity and involvement with their state's small wind policies and were identified via the same combination of online research and telephone inquiries used to select survey respondents in each state. Representatives from advocacy groups and turbine installation companies were then identified based upon the recommendations of the state government officials as well as the lists of qualified installers provided by the Oregon and Ohio energy offices. Online queries were also performed to uncover other important stakeholders, and each interviewee was asked to recommend other individuals or groups that serve as key actors in the small wind policy arena in their state. Following Silverman (2000),

interviews were conducted with representatives of these three groups of stakeholders until the point of saturation when little additional information could be obtained from subsequent interviews.

These interviews took place between December 2008 and July 2009, and in total 33 interviews were conducted for the case studies, with 10 interviews in Ohio, 11 in Oklahoma, and 12 interviews in Oregon. The interviews were conducted via both telephone and in-person (when possible) in Ohio, with all interviews in Oklahoma and Oregon conducted via telephone. Interviews typically lasted 30 minutes to one hour, with notes carefully written and follow-up phone calls or emails used when appropriate to ensure that accurate and complete information was obtained. Furthermore, interviewees were given an assurance of confidentiality in order to encourage honest discussions about their state's small wind policies. In order to maintain this confidentiality, citations to individual interviews are formatted as "(State – Interviewee Number)," for example (Ohio – 1).

In addition to the interviews, we reviewed documents to provide background information about the small wind policy situation in each state. Documents examined included state government websites and brochures, relevant environmental advocacy group reports, newspaper articles, and the Database of State Incentives for Renewables & Efficiency (DSIRE) operated by the North Carolina Solar Center and the Interstate Renewable Energy Council. Qualitative analysis of the information obtained in the interviews was then performed following standard techniques of summarizing, coding, and pattern searching (Miles and Huberman, 1994). Although these data are not generalizable to all 50 states, they do provide insights into the wind policy context and perceived effectiveness across a diverse set of states.

Background Information

Before analyzing the effectiveness of different small wind policy tools, it is important to describe the policy tools in place in each of the case study states, as well as the quality of the wind resources in these states. Table 3 summarizes the small wind policies that are currently in place in each of the case study states. These policies will be evaluated further in the following results and discussion subsections.

Table 3 – Current Small Wind Polices in the Case Study States

	Small Wind Policies							
State	**Net metering**	**RPS**	**Public Benefit Fund**	**Grants**	**Tax Incentives**	**Loans**	**Education/ Outreach**	**Anemometer Loan Program**
Oregon	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Ohio	Yes	Yes	Yes	Yes			Yes	Yes
Oklahoma	Yes				Yes (for manufac-turers	Yes (limited to schools)	Yes	

Source: Interviews and documents.

Oregon

Although Oregon contains the most extensive and well funded set of policies focused on promoting small wind energy out of the three states included as case studies, it does not possess the best wind resource among the case study states. In fact, Oregon possesses only a moderate wind resource that is not among the twenty best in the nation, but the state has not let the lack of a stellar wind resource prevent it from adopting some of the most aggressive small wind policies in the entire country.

Ohio

Ohio has adopted a wide variety of policies and programs designed to support small wind energy. Similar to Oregon, the development of a complex small wind policy system in Ohio occurred even though the state does not benefit from having a high-quality wind resource within its borders. Ohio ranks in the bottom half of the country based on the quality of its wind resource, and has the lowest quality wind resource of the three states selected for the case studies. Geographically, Ohio has an excellent wind resource located in the waters of Lake Erie, but its strongest land-based wind resource is found in the northwestern third of the state (NREL, 2007).

Oklahoma

Even though Oklahoma has the best wind resource out of the three states being examined in these case studies, it also has the fewest programs in place to support small wind energy. The state's high quality wind resource (particularly in the western portion of its territory) suggests a great potential for small wind systems to thrive within its borders, but the state government has done relatively little compared to Oregon and Ohio to encourage its citizens to adopt this technology.

Results

The case study results are presented first as within-case analyses, focusing on the perceived effectiveness of the policy tools being used in the states from the perspective of the interviewees

and supported by existing secondary documentation when applicable. Second, patterns are identified across the three states via cross-case analysis.

Case Study #1 – ***Assessment of Oregon's current small wind policies***

On average, the interviewees in Oregon support the small wind policies and programs currently in place and feel that they have mostly been effective in promoting the growth of small wind energy in the state. In particular, respondents are complimentary of the well-rounded portfolio of financial incentives offered to all different customer classes, although many expressed concerns about restrictions on eligibility for some of the programs. Perspectives on each of the policy tools are provided below.

Net Metering

The overall perception of Oregon's net metering policy was mixed. All interviewees appeared to think that net metering is very important in order for small wind to succeed in Oregon, but several respondents expressed concerns about the way that the current policy is being implemented. In particular, three interviewees mentioned that the state's investor-owned utilities tend to have better net metering policies for consumers than do the rural electric cooperatives. Many of Oregon's best wind areas (largest wind resource) are serviced by some of these electric cooperatives, and as a result of this inconsistent application of net metering some of the customers with the best potential to utilize this program receive the least amount of benefit from it. Furthermore, other interviewees expressed concern that requiring net excess generation to be donated to low-income energy assistance programs reduces the incentive for small wind owners to install larger small wind systems since they will not be individually compensated for excess generation.

Renewable Portfolio Standard

The general assessment of the RPS was that it has been very helpful for large-scale wind projects, but has not had a significant direct impact on small-scale wind energy in Oregon beyond increasing the general level of public and legislative interest in renewable energy. However, one official remarked that the RPS' level of impact on small wind could potentially increase in the future if a decision is made to allow small wind systems' emissions savings to count toward the utility companies' renewable energy credit requirements.

Energy Trust's Small Wind Incentive Program

This program was widely considered one of the most important policies Oregon has established in support of small wind energy. For example, one installer said that none of his customers would have been able to afford their small wind turbines without the Energy Trust incentive, and many interviewees stated that small wind would not be financially feasible for most people in Oregon without this incentive program. However, Energy Trust's programs do not cover the entire state and only customers of the investor-owned utilities are eligible to take advantage of these incentives. Several interviewees cited this restriction as a major drawback to the incentive that has limited its ultimate impact on small wind in the state. Many of the windiest

areas in Oregon are located in rural parts of the state that are not covered by Energy Trust, thus eliminating many of the best potential small wind customers from qualifying to take advantage of these funds. Overall this incentive appears to have a large impact on those who are eligible to apply for it, but the impact of this program at the state level can only be considered moderate at this point due to limited geographic coverage.

Tax Credits

The state's small wind tax credits were also perceived to be important in the development of small wind energy in Oregon, and several interviewees argued that combining tax credits with the Energy Trust incentives is crucial to the success of Oregon's small wind efforts. Either of these policies alone would likely not be enough to overcome the financial barriers to installing small wind in Oregon, but together they allow many people and businesses to afford a small wind turbine. In particular, the Business Energy Tax Credit (BETC) has made a significant impact on businesses and agricultural interests (such as farms and wineries) that want to install small wind, with a few interviewees describing BETC as the most important small wind policy tool in Oregon. However, one concern about BETC is that many entities that want to use it do not possess a large enough tax liability to take full advantage of the credit and are forced to utilize the less rewarding and more cumbersome pass-through option.

Finally, the Residential Energy Tax Credit (RETC) is not perceived to have as much of a positive impact on small wind energy growth due to the maximum benefit level of the credit being capped at $6,000. Depending on the size of the system, many of the small wind turbines used in Oregon can cost more than 10 times that amount, in which case this tax credit only accounts for a small portion of the total installation costs. Most interviewees were supportive of having a Residential Energy Tax Credit, but they generally expressed a desire to raise or eliminate its maximum cap level.

Small-Scale Energy Loan Program

Oregon's small-scale energy loan program was perceived to be a potentially attractive way to finance the debt side of small wind projects, but interviewees expressed concerns that the application process is cumbersome and that it currently is not used often for small wind.

Education and Public Outreach

Although some interviewees expressed a desire to expand educational and public outreach efforts focused on small wind energy in Oregon, several people also mentioned that they think Energy Trust has done a good job building public awareness about small wind. Additionally, two officials stressed that they would like to see a better assessment of the wind resource across the entire state in order to help people evaluate the small wind potential on their property. Energy Trust operates a computer modeling program that assists with this task, but these officials noted that they would like this evaluation software to go more in-depth, and similar to the situation with the incentives this computer program is only available to customers living in Energy Trust's service areas. As a result, it can be difficult to assess the wind resource in places outside of these

areas, which is particularly frustrating when it is a location that is believed to have a potentially strong wind resource.

Recommendations for Additional Policies

In addition to the policies already in place in Oregon, the most commonly cited policy tool that interviewees would like to see Oregon adopt in support of small wind was a feed-in tariff that would require utilities to pay above-market rates to customers with small wind systems. Furthermore, a common concern expressed by many interviewees was that inconsistent local permitting processes and zoning requirements make it difficult for many people to install small wind turbines. Some interviewees recommended that limitations on local zoning restrictions for small wind systems be adopted at the state level (a similar policy was recently implemented in Wisconsin) to minimize further local zoning conflicts.

Case Study #2 – ***Assessment of Ohio's current small wind policies***

For the most part the interviewees were fairly supportive of the current policies Ohio has adopted to promote small wind energy and believe that these programs are having the sort of impact they were designed to produce. Numerous concerns were expressed about these programs and their long-term viability, but others remained optimistic that small wind energy is poised to grow considerably in Ohio in the near future. The perceived effectiveness of each of Ohio's small wind policy tools is examined below.

Net Metering

The common sentiment about net metering in Ohio is that the policy has an important role to play in encouraging people to install small wind, but five of the ten interviewees expressed specific displeasure with the current way in which this policy has been implemented. In particular, several respondents were concerned that the buy-back rates paid by utilities to customers are too low, and thus they do not offer enough of an incentive for people to generate their own electricity. Beyond rate concerns, the most common criticism of Ohio's net metering program was that customers have struggled to work with the utilities to establish the net metering agreements.

Renewable Portfolio Standard

Overall, interviewees perceived the RPS as having great potential to contribute to significant future growth in small wind energy in Ohio, although the exact extent of its current impact on small wind energy at the time of writing remained up for debate. Nevertheless, four of ten interviewees agreed that including electricity generated by small wind systems in the proposed Renewable Energy Credit (REC) purchasing program could significantly boost the small wind industry in Ohio. Currently the RPS does not directly account for the impact of small renewables, which are disaggregated among numerous residential and business customers. However, including small wind energy in the proposed REC purchasing program would aggregate the benefits of small renewables so that they can be counted towards achieving the requirements of the RPS. Customers would receive financial compensation in return for allowing utilities to use

their RECs, reflecting one interviewee's assessment that the goal of this effort is to "make sure residential customers with small renewable energy systems are able to partake in the REC gold rush" (Ohio – 1).

Advanced Energy Fund

Although interviewees seem to like the small wind incentive that is funded through the Advanced Energy Fund (AEF) they expressed several concerns about the manner and extent to which the AEF is funded. In particular, four of ten respondents criticized the funding format, noting that charging a flat-rate fee per customer regardless of energy usage places a disproportionate share of the financial burden on residential customers. Similarly, others would like to see the total budget of the fund increased beyond its current $5 million level, and they voiced concerns that the small size of the fund's budget may reduce the overall impact and effectiveness of the programs associated with the AEF. One interviewee justified this concern by citing the results of a 2007 report that revealed Ohio ranks near the bottom of all states with Public Benefit Funds in terms of its per-capita spending on the AEF as well the AEF's total budget (Woodrum, 2007). Furthermore, the AEF is currently set to expire at the end of 2010, raising concerns among several respondents that the fund risks not being re-approved at that time. In light of this possibility, one installer mentioned that stabilizing this funding stream and guaranteeing the long-term availability of the AEF is important for the success of his business going forward (Ohio – 2).

Residential Wind Energy Incentive

The current Residential Wind Energy Incentive was widely viewed to be the most important small wind policy in Ohio and was perceived to have made the greatest positive impact on the development of small wind energy in the state. For example, one installer mentioned that approximately one third of the calls he receives about small wind come from people who are interested in learning more about this incentive. Similarly, another installer estimated that at least half of his customers would not have been able to afford their turbines without using the grant money they received through this program. Several people also complimented the structure of this incentive program in that the grant funds are tied to the actual amount of power produced by a customer's small wind system, although one person felt that the minimum power production requirement was too high. This requirement has encouraged customers and installers to do a better job siting turbines in order to maximize the amount of energy that will be produced, and it is complemented by the program's establishment of a list of certified small wind installers located in Ohio.

Despite the incentive program's wide popularity, a few respondents still mentioned some problems that they would like to see addressed in the program in order to strengthen it. In particular, since the incentive program is funded through the AEF it faces the same uncertainties about its long-term funding status after 2010 when the state's Public Benefit Fund is currently set to expire. Furthermore, one installer mentioned that he would like to see a higher cap on the

maximum amount of the grants awarded through the incentive program in order to allow more adequate funding for larger small wind turbines (particularly 50 kW systems).

Education and Public Outreach

The results of the case study revealed fairly widespread agreement that a greater focus on public outreach and education about small wind energy would be important for the continued growth of this technology in Ohio. In particular, one environmental group member suggested that the state should emphasize reaching out to children in its education efforts in order to develop a long-term base of support for renewable energy. Two ways in which this task could be approached include incorporating renewable energy in school curriculums or installing small wind pilot projects on school grounds to serve as hands-on learning tools. Additionally, four of ten interviewees also cited the need for increased technical assistance from the state in order to ease the process of identifying high quality wind sites and to help customers feel more comfortable with installing this new technology. Most importantly, some interviewees suggested that the state should reacquire a high quality wind resource mapping tool that can be used to evaluate the quality of the wind resource on any citizen's property. In the past Ohio possessed an interactive wind resource map that could zoom into a specific property to estimate its wind speed and other information, but ODOD elected to end its subscription to this service after its price increased. It is believed that the Ohio Power Siting Board may be trying to create its own version of this type of map for Ohio, but this has not been completed yet and thus the state currently does not have direct access to this type of important detailed wind resource information.

Anemometer Loan Program

Although this program has only been in operation for two years, it has been well received by the public in Ohio and has experienced a significant increase in the number of applications from the first to the second year of the program. The program currently has the capacity to monitor just two sites annually, and as a result most of the applications have to be denied. One official familiar with the program explained that they are currently investigating ways to increase funding in order to expand the availability of the program, including applying for federal stimulus money earlier this year.

Case Study #3 – Assessment of Oklahoma's current small wind policies

All of the people contacted for this case study agreed that Oklahoma does not currently possess adequate policies to support the development of a strong small wind energy market within the state. Although the outreach conducted by the state Energy Office and the Oklahoma Wind Power Initiative were perceived to be somewhat effective, it was apparent that most people believed that a much larger effort needs to be made to educate the public and the legislature about small wind. One interviewee explained that renewable energy supporters "have not won the hearts and minds in Oklahoma on these issues (e.g., climate change and renewable energy)," and that for small wind to succeed in the state progress first needs to be made in changing the prevailing mindset (Oklahoma – 4). In order to accomplish this goal, respondents

said that it will be important to produce studies highlighting the potential economic benefits of small wind in Oklahoma that can be distributed to state legislators, as well as to install small wind pilot projects in schools and other public locations.

The only significant policy currently in place in Oklahoma that benefits all small wind consumers is net metering, but respondents indicated that this program has not been very effective in the state. In particular, interviewees expressed concern that low buy-back rates from utilities have reduced the profitability of participating in this program, and that many of the utility companies (particularly some of the electric cooperatives) are difficult to work with on this issue. The lack of consistent net metering rules between the regulated utilities and unregulated electric cooperatives makes it difficult for installers to help their customers take advantage of this opportunity.

Recommendations for Additional Policies

Most interviewees expressed hope that Oklahoma will adopt some sort of financial incentive for small wind in the future. Tax credits and grants were the two most frequently cited policy tools that the interviewees would like to see the state develop, although a few people mentioned low-interest loans as well. Some interviewees stated that they would like to see a Renewable Portfolio Standard in Oklahoma that includes a role for small wind energy, but they also acknowledged that the likelihood of passing a RPS in Oklahoma is low due to political realities.

Cross-case summary

Table 4 below presents a summary of the perceived impact of each of the policy tools currently being used in Oregon, Ohio, and Oklahoma on the growth of small wind energy in each state.

Table 4 – Policy Tool Impact

	Small Wind Policies							
State	**Net metering**	**RPS**	**Public Benefit Fund**	**Grants**	**Tax Incentives**	**Loans**	**Education/ Outreach**	**Anemometer Loan Program**
Oregon	Medium	Low	Medium/ High	Medium/ High	BETC – High RETC - Low	Low	Low/ Medium	n/a
Ohio	Low	Low/ Medium	Medium	High	n/a	n/a	Low	Low
Oklahoma	Low	n/a	n/a	n/a	Low	Low	Low	n/a

Source: Interviews with 33 energy policy officials, small wind industry representatives, and members of environmental interest groups in the three states (12 in Oregon, 10 in Ohio, and 11 in Oklahoma).

According to the results presented in Table 4, financial incentives appear to be the most effective policy tool for promoting small wind energy, although the exact benefits and impact of particular incentive programs vary between states depending on how these programs are structured.

It is important to note that these rankings only reflect the impact that the tools have had on small wind energy in these particular cases. Other states could implement these same general policy tools in different ways that could either strengthen or weaken their effectiveness, and these results cannot be interpreted as an overall measure of the effectiveness of the tools in all situations across the country. The findings presented in Table 4 will be examined in greater detail in the following discussion section.

Discussion

The small wind industry continues to face numerous barriers and obstacles to overcome as it seeks to expand and become a more established part of American society. Most significantly, the initial investment costs dissuade many people from purchasing a small wind turbine that otherwise may be interested in doing so. For example, the American Wind Energy Association estimates that it costs approximately $40,000 to install a small wind system large enough to supply the electric needs of an average home (AWEA, 2009b). From a financial perspective, small wind energy is a long-term investment that will help customers save money over time, but quite frequently people who would like to install a turbine do not have the necessary financial resources to cover all of the upfront costs on their own. Perhaps it should not be a surprise then that the interviewees in the case study states seemed to view the various financial incentive programs and net metering to be the most effective policy tools for helping to expand small wind adoption. Furthermore, 9 of the 11 interviewees in Oklahoma (the only case study state without any broad financial incentives beyond net metering) identified financial incentives as one of the key policies they would like to see their state government implement in regard to small wind. Across all three states there seemed to be considerable agreement that these programs are essential for making small wind systems affordable and attractive to consumers.

However, financial concerns are not the only barriers restricting the growth of the small wind industry in the United States. Since small wind energy is still a relatively new and unfamiliar technology to most people, the private market is not strong enough at this time to produce sufficient demand and growth without support from the government. People often do not understand small wind energy and the full benefits it presents, nor do they often recognize the challenges and limitations associated with the technology. Public education and outreach efforts are essential for overcoming this knowledge and information gap, and until the industry becomes more established it will largely be left up to the government to pursue these activities. The results from the case studies suggest that simply educating the public about small wind will not be enough on its own to expand the industry, but combining these efforts with financial incentives and net metering were perceived to produce the best outcomes for small wind. Financial incentives are only effective if people know about them and understand the technology enough to feel comfortable with it, and thus the success of these incentive programs seems to be magnified by the presence of effective public outreach and education programs.

Another financial concern that arose in both Oregon and Ohio centered upon the long-term stability of the state's small wind financial incentives. In particular, interviewees expressed concern that if people cannot rely on an incentive to be there over the long-term (such as a 5 year tax credit) they will be less likely to rely on this incentive to help with the financing of their proposed small wind systems. This concern is particularly relevant in regard to tax credits. Although most interviewees agreed that tax credits could provide an effective incentive to encourage people to invest in small wind, multiple respondents also stated that tax credits were not their preferred incentive because they can easily be revoked or reduced during difficult economic times. A second problem that was identified involving tax credits is that they require the recipient to have a large enough tax liability in order to receive the full benefit of the tax credit. Not all small wind customers have large tax liabilities (e.g., some farms, schools, non profit organizations), and thus these customers are at risk for not being able to utilize the full benefit of some tax credit programs.

Conclusion and Recommendations

Wind energy is a small but growing field. As the only type of renewable energy where the U.S. has a dominant market share, small wind can play an important role in the "green economy." Our survey revealed that an array of state-level policy tools are in existence across the U.S. to promote small wind. In fact over 80 percent of the states have at least one policy tool in place to do so, with 35 percent using policy tools from all four types (mandates, inducements, capacity building, and system changing). The most common policy tool is net metering, followed by policies to promote knowledge transfer or public outreach.

Not all policy tools are effective, and some work in combination with others to increase their effectiveness. In-depth analysis of three different states provides suggestions for ways to improve the effectiveness of policies to promote small wind energy.

First, it is important to eliminate barriers to small wind. Interviewees in all three states emphasized that inconsistent local zoning codes regarding small wind energy greatly complicate the turbine installation process. To remedy this problem, it is recommended that policy makers adopt a statewide wind access law that defines how local governments are permitted to regulate small wind systems. Wisconsin currently has this type of policy in place, and this could serve as a potential model for other states interested in developing wind access laws (DSIRE, 2009). Second, policy makers should strive to avoid establishing small wind programs or policies that are not available to all citizens. Oregon and Ohio both have strong financial incentives programs for small wind, but numerous interviewees in both states noted that the effectiveness of these programs is diminished as a result of their lack of comprehensive coverage due to the funding structure of the Public Benefit Fund in each state. As a result, many otherwise well-qualified potential small wind owners have been shut out from these key financing mechanisms and then struggled to find alternative ways to go forward with the purchase of a small wind turbine. In response, states should work with rural electric cooperatives and municipal electric companies

to bring them into existing state small wind programs, or to help them develop similar policies for their own customers in order to make sure that all residents are eligible for some form of financial assistance.

Third, regarding financial incentives for small wind, the case study results from Oregon and Ohio suggest that this type of incentive works best when coupled with strong public education and outreach efforts focused on making people familiar and comfortable with this technology. However, in consideration of the concern that some people and businesses are not able to take advantage of tax credits as a result of not having a large enough tax liability, it is recommended that financial incentive programs do not just focus on tax incentives alone. Tax incentives can certainly be an important element of a comprehensive small wind policy regime, but for maximum impact they should not be the only type of financial incentive offered to residents or businesses. Of course, policy makers should be careful when considering the cost-effectiveness of financial incentives to make sure that they are utilizing the public's money in an efficient and beneficial manner before adopting any new policy. One way to ensure that financial incentive programs result in sufficient renewable energy production is to tie the incentives to the actual amount of energy that is generated, rather than basing them on the cost of purchasing and installing the small wind system. Furthermore, in recognition that most adopters of small wind systems appear to be driven by the motivation to lower their electricity bills, policy makers should target their small wind outreach efforts with this fact in mind, even if it is not the main reason why the state itself has chosen to support small wind.

Overall, the results presented in this report have helped to assess the state policy environment associated with small wind energy, a renewable energy technology that is quickly expanding its reach. Rather than generalize about policy tool effectiveness based on three cases, the more significant lesson to be drawn about small wind policy tools are some of the shared problems and successes experienced by these three states which may be applicable to other states. Although it remains unclear exactly how analogous these findings for small wind may be to other distributed renewable energy technologies, further analysis may reveal that other technologies experience similar challenges, pressures, and opportunities. Every indication from this study implies that the future for small wind energy appears promising in most states, although further evaluation of the effectiveness of various policy instruments under different circumstances would be useful to help guide future small wind efforts.

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* Title page image courtesy of the American Wind Energy Association. http://www.awea.org/Graphics%5FLibrary/images/image_91.jpg (accessed August 21, 2009).

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