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WIND AND WATER POWER PROGRAM

Deployment Barriers to Distributed Wind Energy: Workshop Report

October 28, 2010

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Cover photo: A Southwest Windpower Skystream wind turbine installed at the U.S. Botanic Garden in Washington, D.C. NREL/PIX 19410

Executive Summary

This report presents key findings from the Department of Energy's Deployment Barriers to Distributed Wind Technology Workshop, held on October 28, 2010 in Denver, Colorado. The purpose of the workshop was to identify and assess distributed wind deployment barriers and how the barriers could be reduced through federal policy action, federal interagency collaboration, or federal action of some other kind.

The workshop was designed to solicit findings related to small wind turbines (turbines with a rated capacity of less than or equal to 100kw) and midsize wind turbines (turbines with a rated capacity greater than 100kw and less than or equal to 1MW). Participants were separated into small and midsize wind turbine groups and discussed deployment barriers under five topic areas: interconnection, net metering policies, zoning ordinances, permitting requirements, and government incentives. As the midsize wind turbine market is considerably less developed than the small and utility scale wind markets, a sixth topic area was added to the midsize track: underdevelopment in the midsize market. Workshop findings are summarized in Table 1.

Table of Topic Areas, Descriptions of Associated Barriers, Recommendations, and Expected Results for Distributed Wind Technology Deployment

Topic Area	Description of Associated Barriers	Recommendations	Expected Results
Government Incentives	Technology exclusive, short term incentive programs, as well as limited access to financing, hinder project economic viability and deployment	Technology neutral, long term, and consistent incentive programs	Increases access to financing, reduces risk from uncertainty, and boosts consumer confidence
Interconnection Procedures	Delays caused by complex interconnection processes that vary by state and utility; lack of nationally accepted model procedures for all utilities including public power entities	Establish an interagency partnership between FERC and DOE Renewable Energy Programs to work with the Interstate Renewable Energy Council (IREC) on defining and implementing an updated national model of interconnection procedures for distributed generation	Eliminates project delays; accelerates deployment; and minimizes balance of station and project development costs

Topic Area	Description of Associated Barriers	Recommendations	Expected Results
Net Metering Policies	Public power entities such as rural electric cooperatives (RECs) and municipal utilities (Munis) typically lack net metering policies or have net metering policies that prohibit projects from being adequately compensated for generation	Establish an interagency partnership between DOE renewable energy programs, Interstate Renewable Energy Council (IREC), the Federal Energy Regulatory Commission, Public Utility Commissions (PUCs), and state energy offices to develop models for a standardized net metering policy to be adopted at the national or state level by public power entities for purchasing or crediting power produced by distributed generation projects	Requires public power entities to provide consistent policy for metering electricity generated by community and residential distributed generation projects to serve onsite load and acceptable rates for surplus electricity as it flows onto the local distribution system
Permitting Requirements	Permitting requirements at federal, state, and local levels can significantly delay and often thwart projects	Coordinate between DOE, EPA, FAA, and USFW to ensure distributed wind projects are not being held to the same permitting requirements as utility scale projects; produce a national set of fast track distributed wind specific permitting procedures at the local level	Establishes framework to distributed wind specific permitting, accelerates installation, and keeps balance of station and project development costs down
Zoning Ordinances	An incomplete understanding of distributed wind technology often leads local zoning boards to apply ordinances for utility scale wind technology to distributed wind projects, which can produces outdated and unnecessarily prohibitive regulations for siting distributed wind projects and delay or prohibit project deployment	Establish a national grading system to indentify best practices for state and local zoning policy as it applies to distributed wind technology; develop framework for a standard zoning policy model with the goal of implementing consistent, demonstrated best practice zoning ordinances for distributed wind technology	Eliminates zoning delays and siting process; accelerates deployment and keeps balance of station and project development costs down
Underdeveloped Midsize Market	Lack of awareness regarding midsize turbines among lawmakers, regulators, and consumers regarding market potential and technical characteristics has lead to a lack of supportive policies, turbine supply shortages, and difficulties in securing project financing	Targeted education; interagency communication and coordination; domestic technology research, development, and commercialization; financing structure development	Policy informed by the technical and market characteristics of midsize turbines; greater availability of domestically made midsize wind turbines; increased access to financing for turbine deployment; and acceleration of midsize market maturation

Workshop participants stressed that each of the policy recommendations outlined above must be carried out in accordance with the following principles. First, policy for renewable distributed generation should be technology neutral (e.g. not designed to show bias toward wind over solar energy or vice versa) while respecting differences in cost and resources of each technology. Second, policy needs to be in effect for longer periods of time and have quality assurance requirements to reduce risk and build investor confidence. Third, policies effecting renewable energy need to result from consensus across government agencies to ensure broad-based support for renewable energy and efficient and effective policy implementation. Guided by these policy principles, workshop participants identified policies capable of addressing the above mentioned deployment barriers and enabling the rapid deployment of distributed wind power projects and other forms of renewable distributed generation.

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1 Introduction

Purpose of Workshop

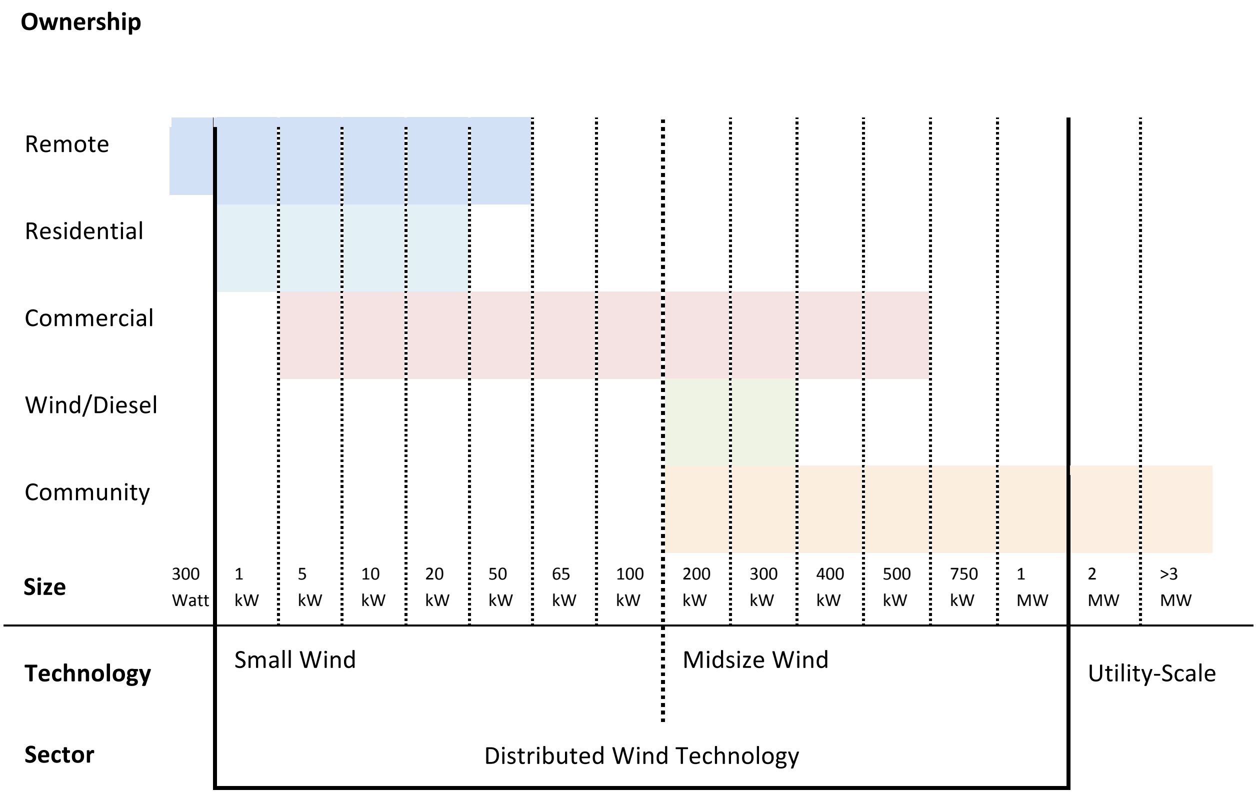
This report presents the key findings from the Deployment Barriers to Distributed Wind Technology Workshop organized by the U.S. Department of Energy (DOE) Wind and Water Power Program and held on October 28, 2010 in Denver, CO. The workshop convened experts from industry, non-profit organizations, academia, national laboratories, and the federal government to discuss the existing federal, state, and local policy frameworks and their relationships to the deployment of distributed wind technology. The purpose of the workshop was to identify and assess distributed wind deployment barriers and how the barriers could be reduced through federal policy action, federal interagency collaboration, or federal action of some other kind. The Wind and Water Power Program sponsored the workshop as part of its ongoing effort to increase public acceptance of wind energy and accelerate domestic wind energy deployment.

Distributed Wind Technology Background

The Wind and Water Power Program considers wind turbines that are typically behind the meter, connected to a distribution grid, and have a rated capacity between one kilowatt and one megawatt to be distributed wind technology. Distributed wind technology can be further defined by wind turbine size, project ownership, and market sector. For the purpose of the workshop and this report, distributed wind technology will be discussed in terms of small wind turbines (turbines with a rated capacity greater than one kilowatt and less than or equal to 100 kilowatts) and midsize wind turbines (turbines with a rated capacity greater than 100 kilowatts and less than or equal to one megawatt).

In 2007, DOE's National Renewable Energy Laboratory (NREL) generated an analytical report on distributed wind technology to identify market applications by rated capacity. The report categorized five subsectors of distributed wind technology and assigned rated capacity ranges to these subsectors (see table 2). Small wind turbines are most commonly used in residential, small-scale remote, or off-grid, and small-scale commercial applications (agricultural, business, industrial). Midsize wind turbines are most commonly used in hybrid wind/diesel, commercial, and small-scale community applications (Baring-Gould 2007).

Figure 1. Ownership, Turbine Size, Technology, Market Sector (Baring-Gould 2007)



At roughly 80 years old, the U.S. small wind turbine market sector has enjoyed unprecedented growth in recent years. More than half of its domestically installed capacity of over 100 megawatts occurred since 2007 (Stimmel 2010). Despite the global recession, 2009 saw the domestic installed capacity of small wind turbines increase by 15%. This growth was largely because of the 30% Residential Renewable Energy Investment Tax Credit (ITC) included in the American Recovery and Reinvestment Act (Stimmel 2010). However, this recent increased growth has not come without growing pains. A flood of new products have entered the U.S. market from both domestic and international suppliers without completing the tests required for certification to a technical standard such as the AWEA Small Wind Performance and Safety Standard. The lack of transparent, third party verified information on turbine performance and durability creates a barrier to distributed wind technology market growth. Without such information, consumers, lenders, and policy makers lack the necessary tools for comparing and evaluating small wind turbine products.

In response to the need for verified information, the American Wind Energy Association (AWEA), with support from DOE and other small wind industry leaders, finalized the Small Wind Turbine Performance and Safety Standard in December, 2009, and the Small Wind Certification Council (SWCC), an independent product certification body, opened its doors for business in February 2010. In December of 2010, roughly a year after the release of the AWEA small wind standard, the SWCC reported 22 wind turbine models with applications pending for SWCC certification. At least 11 states have indicated their intention to require SWCC certification to qualify for state incentive programs (Sherrwood 2010). Other policy related improvements include Congress' extension of the ITC through the close of calendar year 2016, the establishment of the North American Board of Certified Energy Practitioners (NABCEP) Small

Wind Installer Certification, and the promulgation of new National Electric Code (NEC) language for small wind systems.

In 2008, NREL, with support from ICF International, generated a report to determine the technical and economic potential for midsize distributed wind turbine technology. The report, *An Analysis of the Technical and Economic Potential for Mid-Scale Distributed Wind*, found that the significant growth experienced by small and utility scale wind technology in recent years has not been felt by midsize wind technology despite a 220 GW domestic midsize technology market potential (A. Kagel 2008). Deployment of midsize turbines is widely believed to be a viable approach to diversifying and revitalizing rural economies while creating domestic jobs and optimizing existing electrical distribution lines. According to the report, however, commercial and community wind projects across the U.S. are being thwarted in part by the lack of domestically available midsize wind turbines. Increasing the availability of midsize wind turbines could supply a variety of applications, including schools, farms, factories, private and public facilities, and small-scale community wind projects.

DOE and industry are working together to address technical aspects of this neglected area of wind turbine technology. In May, 2010 the DOE Wind and Water Power Program issued a Funding Opportunity Announcement (FOA) for midsize wind turbine technology development. The FOA is intended to accelerate the development and commercialization of innovative, domestically manufactured midsize wind turbines with a cost of energy that is comparable to the national average for retail electricity rates. With development of the next generation of midsize wind turbine products underway, the workshop provided attendees in the midsize discussion track an opportunity to brainstorm ideas for overcoming additional deployment barriers in the areas of project financing, government permitting requirements, and public awareness regarding the benefits of community wind.

Workshop participants in both discussion tracks shared the view that distributed wind projects using small or midsize turbines can provide tangible results for community members, increase acceptance of wind technology and contribute to the overall advancement in the growth of the wind power market. In addition, participants commented that distributed wind projects can be optimal for utilizing the available capacity on existing electrical distribution grids with minimal requirements for infrastructure upgrades. While the separate tracks identified significant overlap in deployment barriers to small and midsize wind technologies, participants also identified subtle differences between the two due to market maturity and scale differences. Findings from the workshop are reported in Section 2.

2 Workshop Results

The following section describes the barrier categories discussed by each of the two breakout groups, major policy recommendations discussed, and possible strategies for their implementation. Tables specified in each of the following subsections can be found in section 4.0 Policy Recommendations. In addition to the policy-related measures addressed in the subsections below, workshop attendees indicated a need to address certain technical barriers including the lack of a technical NABCEP Site Assessor Certification, a lack of appropriate tools for resource assessment, and a need for distributed wind technology component improvement. While these are important concerns and may warrant consideration, they are outside the scope of this policy barriers-related workshop and, subsequently, this report. Policy barriers to deployment addressed in the following subsections include inconsistent government incentives, restrictive zoning regulations, extensive permitting requirements, a lack of standardized interconnection procedures and net meeting policies, and the underdevelopment of policy support for the midsize market.

2.1 Government Incentives

Government incentives have the opportunity to greatly influence, both positively and negatively, the deployment of distributed wind power. While 2010 federal policies were more favorable to wind energy in general than they have been at any other time in the past decade (Bolinger 2010), inconsistencies in incentives from year to year or program to program can create significant barriers to distributed wind power deployment. For example, while tax grant programs such as the American Recovery and Reinvestment Act 1603 Treasury Grant Program can help unlock frozen capital markets for wind power development, short term extensions of such programs can inadvertently cause boom-bust cycles that diminish consumer and investor confidence in the market (see table 3). Additionally, in the development of national policies that are meant to accelerate the deployment of renewable energy, language that specifically addresses distributed generation may be lacking. For example, language which proposes a national renewable electricity standard within the Waxman-Markey Climate Change Bill (H.R. 2454) does not apply to a majority of the nation's smaller public power entities, such as rural electric coops. These entities own distribution grids with available capacity and have the authority to allow or disallow interconnection of distributed generation projects. The introduction of state or national renewable electricity standards would need to include language that specifically addresses smaller retail electricity suppliers (see table 1).

Workshop participants identified a number of areas in which government incentives could be created or modified to better support the development of a distributed wind power market. Ideas included longer-term extensions of existing tax credits and an effort to make these credits technology neutral (i.e. create parity in incentives among various types of renewable energy); introduction of a feed-in-tariff for renewable distributed generation (see table 2); provision for an adequately funded long term Renewable Energy Production Incentive (see table 4); adoption of a national renewable electricity standard that offers support to distributed generation (see table 1); modification of the FHA/HUD PowerSaver to support small turbine technology (see table 5 and appendix 6.2); and modification of the Rural Energy for America Program (REAP) to offer a simplified and open application cycle based on technical criteria and certified equipment (see table 9).

2.2 Interconnection Procedures

Interconnection is the technical process by which energy consumers electrically connect their renewable energy system to the distribution grid. Interconnection procedures are state or utility regulations that describe the technical requirements for grid connection and are typically put in place to maintain the safety and stability of the distribution system. Unfortunately for the renewable energy consumers, interconnection procedures can be a barrier to project deployment if a state or utility has designed requirements that are not base on the engineering and technical characteristic of the distributed generation project (Rose 2010). Workshop participants identified the following difficulties found in interconnection procedures: capacity limitations that are not based on engineering criteria; interconnection charges including fees for studies on the feasibility of interconnection and for the actual interconnection itself; the requirement of installation of external disconnect switches at the power producer's expense; lengthy system approval processes; variable connection specifications among states and utilities; exemption of publicly owned utilities from state policies; and the utility requirement that customers already carrying adequate polices purchase additional liability insurance.

While Colorado, Arizona, and New Jersey have emerged as leaders of uniform interconnection procedures by adopting the Interstate Renewable Energy Council's (IREC) Model Interconnection Procedures, most states have not adopted these procedures and 16 states currently lack any statewide interconnection procedures for renewable distributed generation systems (Rose 2010). The IREC model incorporates the best practices of small generator interconnection procedures developed by various state governments, the Federal Energy Regulatory Commission (FERC), the National Association of Regulatory Utility Commissioners (NARUC), and the Mid-Atlantic Distributed Resources Initiative (MADRI). An updated model that specifies state guidance for public power entities is a central component to overcoming the barriers caused by existing interconnection requirements for small and midsize wind technology. Participants in the midsize wind discussion track also stressed the importance of a standardized interconnection contract for midsize wind turbines. In addition, participants suggested that the midsize wind market likely would benefit from inclusion in the IREC Community Renewables Model Program Rules. In order to establish a nationally standardized distributed wind technology interconnection process consistent among all utility service areas, workshop participants recommended a feed-in tariff designed with guaranteed interconnection (based on IREC models) for distributed generation (see table 2). As another alternative, participants suggested a FERC amendment to the Public Utility Regulatory Policies Act (PURPA) based on best practices identified by the updated IREC models (see table 7), and a requirement that all utilities, public or private, receiving government funding for infrastructure improvement to adopt IREC Models (see table 6).

2.3 Net Metering Policies

Net metering is a billing agreement between utilities and customers that allows electricity generated by the customer to be metered and valued at the same retail rate as the electricity provided by the utility. In addition, net metering should allow customers to receive credit from the utility for surplus electricity that their grid-connected renewable energy system generates when onsite load is exceeded. Net metering programs are typically created and regulated by state law or Public Utility Commission (PUC) rules. In September, 2010, 43 states were reported to have some form of net metering program, though those programs varied in structure (Rose 2010). The great variability and, in some cases, total lack of net metering programs among states and utilities poses a barrier to deployment of renewable distributed generation projects. Workshop participants identified the following shortcomings in some net metering programs: inconsistent policies across states and service areas; restricted eligibility based on project size; lack of credit for excess generation; lack of credit rollover when excess generation is consistently in excess of on-site use; limitations on the amount of electricity that can flow through the meter back into the grid; discounted value of renewable energy compared to energy from traditional energy sources; lack of allowance for the aggregation of meters; and difficulty in working with public utilities such as Rural Electric Cooperatives (RECs).

In order to increasing the economic feasibility, and thereby the likelihood of increased deployment, of grid-tied renewable distributed generation systems, net metering programs should adequately compensate consumers for excess electricity produced. Standardized interconnection procedures also help create favorable project economics by providing a uniform set of technical requirements that must be executed by the customer in order to connect to a utility's distribution grid. Net metering policies compliment standardized interconnection procedures by providing a usable framework for a business agreement between utility and customer.

Though interconnection procedures and net metering policies serve different functions (in that the former is a set of technical requirements and the latter is a business arrangement), the barriers associated with them overlap, as do their solutions. In addition to IREC's contributions in the area of interconnection procedure development (discussed in section 2.2), beginning in 2003, the organization aggregated lessons learned and best practices from statewide net metering programs to create the IREC Model Metering Rules for consideration and possible implementation by state legislators and utilities (Rose 2010). These rules, including the development of IREC's Community Renewables for midsize turbine applications, comprise the major components necessary in the design of a feed-in tariff (see table 2). However, the current IREC rules are incomplete regarding net metering practices of public power entities. The IREC rules, therefore, would need to be expanded in order to completely address these practices. This expansion of IREC rules is necessary because public power entities (such as rural electric coops) own and operate a majority of the domestic distribution grid and are not required to make those grids available to renewable distributed generation. Participants suggested that once the IREC rules are expanded, FERC should amend PURPA based on best practices identified by the IREC Models (see table 7). This amendment, in conjunction with the interconnection recommendations above, will make the distribution grid more available to renewable distributed generation projects, and provide the opportunity for net metering programs to adequately compensate projects for excess generation. Additionally, participants recommended that FERC require all utilities receiving government funding for infrastructure improvement to adopt IREC Model Net Metering rules (see table 6).

2.4 Permitting Requirements

Permitting processes for distributed wind power are not standardized nationally and vary widely among government jurisdictions. Given the scale of many distributed wind power projects, particularly projects using small wind turbines, nonexistent or restrictive municipal permitting practices (e.g. restrictions on tower height) limits turbine deployment and has prevented roughly 1/3 of all planned small wind turbine projects from being installed (Stimmel 2010). Prohibitive permitting requirements, and the resultant customer discouragement, portend potential long term interest and investment problems for distributed wind technology. Workshop participants identified the following issues related to permitting requirements: U.S. Fish & Wildlife Service permitting processes being more appropriate for large utility-scale projects; lengthy National Environmental Policy Act (NEPA) review process for distributed generation projects that receive federal funding; outdated local permitting requirements and processes; redundant engineering certifications, known as “wet stamps”, for towers and foundations; and other applications of utility-scale wind project permitting requirements to distributed wind projects.

Recent efforts in some states show progress in the area of standardizing and streamlining permitting processes, but difficulties persist nationwide. Some workshop participants called for a federal pre-emption to modify local zoning ordinances and permitting requirements with proven, statewide best practices for distributed wind projects (see table 8). Others recommended that state level wind energy groups work with permitting authorities or serve as a resource for projects where local permitting processes are problematic. Consensus among workshop participants was built around the establishment of federal and statewide permitting requirements that are specific to the technical characteristics distributed wind technology.

2.5 Zoning Ordinances

Zoning ordinances are the tools that local governments use to regulate land use within their jurisdictions, including the placement of structures such as wind turbines. There are reported to be roughly 25,000 zoning jurisdictions in the United States (Green 2006). This multiplicity of jurisdictions presents a major challenge to distributed wind project developers whose client base may span multiple states and, therefore, jurisdictions with varying policies and procedures. In the past, distributed wind systems were found primarily in remote areas with flexible zoning regulations. However, recent deployment of distributed wind projects is trending toward less remote locations where zoning regulations can become a barrier to project development. Workshop participants noted that zoning officials and neighbors of potential small wind turbine consumers are often not fully informed on the safety and performance records of distributed wind turbines and are apprehensive about the possibility of acoustic, visual, and other impacts of wind power systems (Green 2006). Workshop participants identified the following obstacles related to zoning regulations: tower height restrictions; negative public perceptions regarding the actual visual and audible impacts of distributed wind technology; potential lawsuits from neighbors; project delays related to obtaining variances; and a lack of ordinances that specifically address distributed wind energy in many jurisdictions.

Similar to permitting, recent efforts in some states have made progress towards updating and standardizing zoning ordinances, but the problem persists across the U.S. Again, some workshop participants called for a federal pre-emption to modify local zoning ordinances and permitting requirements with demonstrated best practices for distributed wind projects (see table 8). Others, citing the improbability of such a federal mandate, recommended implementation of successful model zoning ordinances at the state level. Workshop participants agreed that modified federal and state permitting processes are needed, as are statewide permitting requirements specific to distributed wind projects. In addition, participants pointed to the effectiveness of the Network for New Energy Choices model for grading states on net metering programs and interconnection procedures and indicated that a similar model could be created and applied to evaluate local zoning ordinances and permitting requirements. Such a model transparently compares zoning and permitting structures among localities and allows for the identification of related best practices.

2.6 Underdeveloped Midsize Turbine Market

The midsize wind turbine (greater than 100 kW and less than or equal to 1 MW) market has lagged behind the small wind turbine market due primarily to two factors: a lack of supportive policies and limited turbine supply. Recently, more midsize turbines are entering the U.S. market from both domestic and international turbine manufacturers. Policy specifically designed for midsized wind turbines could help stimulate the market.

Special care must be taken when crafting policy regarding the midsize turbine market to recognize the unique uses of midsize machines. Due to factors such as cost and generating capacity, it often makes sense to site midsize wind turbines using a distributed model wherein turbines are sited in single units or small clusters. This distributed model is largely unfamiliar to many regulators and federal agencies because the wind power market is dominated by utility scale projects that are typically installed using a large wind farm siting model that consists of many, sometimes hundreds, of machines installed and operating together. Consequently, regulators and federal agencies are applying utility scale wind farm requirements to midsize turbine installations, adding cost to distributed projects.

Underdevelopment in the midsize turbine market produces a lack of familiarity with potential midsize turbine applications not only in local, state, and federal regulating agencies, but also in the wind developer community and the public at large. Distributed wind developers accustomed to working on projects using either small or utility-scale turbines may not be so adept at developing projects using midsize turbines. Such developers may be unfamiliar not only with midsize products, but also with any existing applicable incentives programs, the requirements and timing of those programs, and how to efficiently combine those programs with other funding opportunities. Finally, the underdeveloped market contributes to a lack of understanding among potential consumers regarding the accessibility of midsize turbines and distributed generation, as well as the various local benefits derived from local wind power.

A lack of access to traditional bank financing presents another barrier to the deployment of midsize wind turbines. The small and utility scale wind power markets have developed mechanisms to ensure the availability of traditional bank financing. For the small wind power market, financial institution confidence will be based on the certification of turbines to performance and safety standards such as those put forward by AWEA (American Wind Enegy Association 2009). Financial institution confidence in the utility scale market has evolved in conjunction with the typical pattern of wind energy development that deploys utility scale turbines: aggregated application of large numbers of utility scale turbines in wind farms. A similar environment of confidence has not developed around applications involving a single or a few utility scale machines grouped together as this has not been the typical pattern of utility scale turbine deployment. Utility scale wind farms are typically owned by for-profit entities capable of securing traditional bank financing through mechanisms such as energy production and availability guarantees. Such guarantees represent risk-sharing agreements between manufacturers and wind farm owners to meet their financial obligations to the lending institutions. Difficulties in financing wind projects involving midsize turbines are, in part, a product of a general lack of understanding of midsize wind power applications, investments, and paybacks. Additionally, a lack of nationally, or internationally, recognized technical standards impedes market acceptance and contributes to financial institutions' ambivalence toward the midsize wind market. Most midsize turbine projects are being used by the non-profit sector, which can accommodate a slightly longer payback period than commercial entities but requires independent validation and certification. Workshop participants felt the midsize wind turbine market would benefit from both standards development and turbine certification in order to mitigate production risks and increase lender confidence. While there has been some movement in the global market toward an International Electrotechnical Commission (IEC) standard, this work will take many years to complete.

Difficulties in zoning approval processes for projects involving midsize turbines are aggravated by a general lack of familiarity among officials regarding distributed wind projects and how these projects technically differ from large wind farms. While midsize turbines are often installed individually, utility-scale turbines are usually installed using a wind farm model requiring large infrastructure upgrades and more involved environmental impact assessments. Zoning officials who are unaware of the differences between project types and turbine sizes tend to place utility-scale wind turbine zoning requirements on midsize turbine projects, adding time and complexity to the approval process. In addition, projects involving midsize turbines also face siting and permitting challenges associated with federal agencies such as the Department of Defense (primarily regarding radar signals interacting with turbines) and the U.S. Fish & Wildlife Service (regarding wildlife such as birds, bats, and endangered species interacting with turbines).

Increased deployment of all turbine types, including midsize turbines, will depend on regionally based public outreach efforts to address public acceptance market barriers such as real or perceived turbine acoustics, public health impacts, radar interactions, property value fluctuations, etc. Removal of some barriers related to midsize wind turbines may be easily achieved through the inclusion of language specific to midsize turbines in existing federal, tribal, and state policies. Examples of such language include federal investment or production tax credits (see tables 3 and 4), state or PUC-dictated net metering programs and power purchase agreements without "all source" requirements (see table 10) or capacity limits that could accommodate midsize turbines, and federal or state renewable energy standards that could incentivize midsize turbines through credit multipliers or carve-outs (see table 1).

3 Conclusions

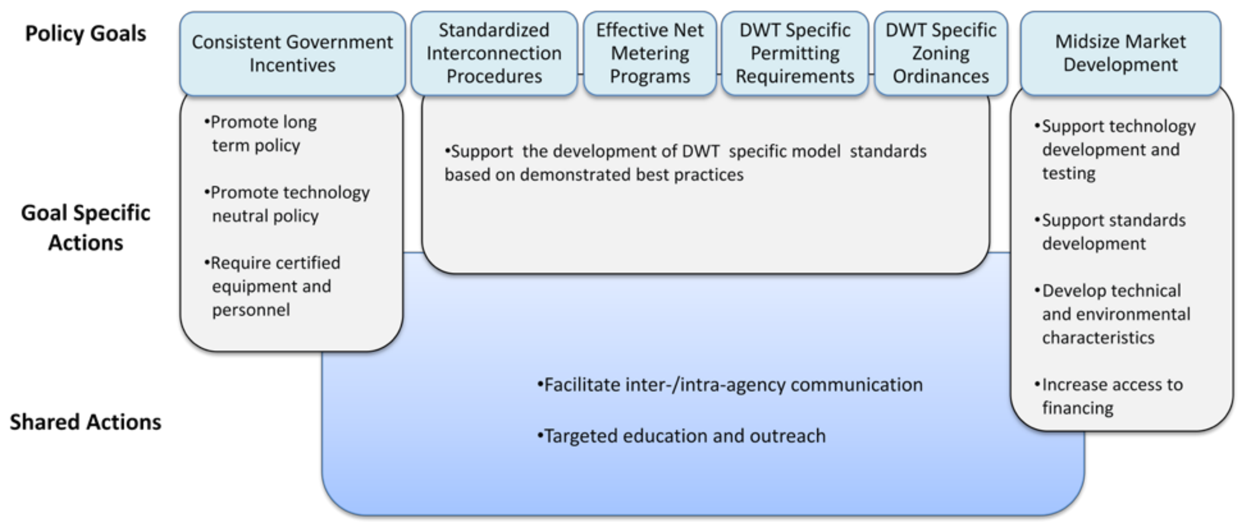
DOE maintains a strong interest in reducing the barriers to distributed wind energy deployment, and conducted a workshop to examine policy barriers and the federal government's role in addressing those barriers. Results from the October, 2010 workshop indicate that policy framework inefficiencies are delaying projects, driving up costs, and, in some cases, preventing deployment.

At all levels of government, the existing policy frameworks that regulate and incentivize the deployment of distributed wind technology range in degree of sophistication and quality. Workshop participants' discussions illustrated the interconnectedness of policy-related deployment barriers and the ability of those barriers to negatively influence the viability of project economics. Delays from unwarranted interconnection procedures, lack of zoning ordinances for distributed wind technology, and burdensome permitting requirements can drive up balance of station and project development costs, negatively impacting the economic viability of projects. Further problems arise as uncertainty increases related to inconsistent government incentives, which limit project financing structures. A lack of mutually beneficial net metering program policy hinders a project's ability to be adequately compensated for excess generation lengthening return on investment.

Any effort to accelerate the deployment of distributed wind technology will benefit from identification and replication of policies from around the country that have demonstrated success in efficient deployment of distributed projects. However, replication of successful policies alone is not enough. Efforts must be taken to create opportunities for the development of innovative policy models and the delivery of accurate information to consumers, local, state and federal rule makers. This effort will require outreach to local authorities and public power entities, collaboration between advocates and industry, coordination between DOE renewable energy programs, and interagency communication at the federal and state level.

Figure 2 shows a set of policy-related goals that correspond to the major policy barriers identified in the workshop, as well as actions that can be taken to achieve these goals. The actions are separated into two groups: "Goal Specific Actions" relate directly to achieving one or more of the individual goals, and "Shared Actions" relate to the achievement of all goals.

Figure 2. Future Strategy



4 Policy Recommendations

The following policy recommendations, referred to in section 2, were developed by workshop participants and provide more information on potential recommendations for reducing deployment barriers to distributed wind technology.

Table 1. Distributed Generation Language for Renewable Electricity Standard

Recommendation	Adopt a **Renewable Electricity Standard** (RES) that applies to all Retail Electricity Suppliers, including investor owned utilities (IOUs), rural electric cooperatives (RECs), and municipal electric utilities (MUNIs). Or, a RES with a 10% carve-out for distributed renewable energy systems.
Justification	According to the Waxman-Markey Bill, the term "retail electric supplier" means, "for any given year, an electric utility that sold not less than 4,000,000 megawatt hours of electric energy to electric consumers for purposes other than resale during the preceding calendar year." Defining 'retail electric suppliers' as electric utilities selling no less than 4,000,000 megawatts hours annually excludes the majority of the retail electricity suppliers capable of adding distributed generation projects from contributing to the RES. Specifically, RECs own more than 2.4 million miles of distribution lines amounting to 43% of the nation's total, and optimizing the available capacity on distribution lines with renewable distributed generation projects has great potential to help the nation meet it's near term clean energy goals. The majority of RECs are located in a region stretching from North Dakota to Texas, also known as the nation's land based "wind corridor". If retail electricity suppliers, such as RECs are exempt from the RES, the market for renewable distributed generation projects will struggle to meet its potential.
Barriers Addressed	Inconsistent Government Incentives and Underdeveloped Midsize Market

Table 2. Feed-in Tariff for Distributed Generation

Recommendation	Establish a **feed-in tariff (FIT)** (with a project capacity ceiling) designed to encourage rapid adoption of and long term stability for renewable distributed generation. Four key elements of a FIT that would accelerate and simplify deployment of distributed renewable generation projects include: **1)** guaranteed interconnection through a standardized process (IREC Model Interconnection Procedures) for any renewable energy project designed within the definitions of the FIT program; **2)** a standard 'must-take' contract between renewable energy producers and distributors (IREC Model Net Metering Rules); **3)** a fixed energy price over many years (typically 20) for producers of renewable energy to sell back to distributors; and **4)** a methodology for determining appropriate technology-specific fixed rates that takes into account the value of environmental benefits and unchanging rates.
Justification	The purpose of the above mentioned FIT is to rapidly accelerate distributed generation deployment in order to help reduce the cost of distributed wind energy to a level competitive with other sources of generation, as well as provide long term stability for renewable energy markets. Fundamentally, a feed-in tariff sets long term fixed prices for renewable energy production, eliminating rate uncertainty and providing project owners and financers with confidence in their return on investment. Another potential benefit of long term fixed rates is their ability to hedge against cost increases in other areas of the generation system.
Barriers Addressed	Interconnection, Net Metering, Inconsistent Government Incentives, and Underdeveloped Midsize Market

Table 3. Residential and Business Renewable Energy Investment Tax Credit/1603 Treasury Grants

Recommendation	Extend the **Residential** and **Business Renewable Energy Investment Tax Credit/1603 Treasury Grants** through 2030 with the addition of qualification requirements for **certified small wind turbine equipment and installation personnel**.
Justification	The cost of energy for renewable distributed generation products is not yet competitive with generation from fossil fuels. In order to increase the speed and scale of deployment and establish the market, long term investment incentives are needed assist consumers with the initial capital cost of project development. The incentive scheme will be strengthened through requirement of certified equipment, installers, and site assessors. Such certifications are now being developed through joint efforts between stake holder and government experts for the purpose of qualifying tax credit applicants. Incentives based on such certifications ensure reliable equipment is safely installed in quality wind resources.
Barriers Addressed	Inconsistent Government Incentives

Table 4. Consistent Renewable Energy Production Incentive for Distributed Generation

Recommendation	Establish a long term, consistently funded **Renewable Energy Production Incentives (REPI)** program.
Justification	The REPI is intended to provide production incentives, or economic benefits, to tax exempt utilities (RECs and MUNIs), much like the production tax credit does for investor owned utilities. However, the current REPI is subject to annual congressional appropriations. Historically, REPI has not been consistently funded, and therefore is not predictable over any period of time. As a result, RECs and MUNIs have a low degree of incentive to invest in renewable energy relative to IOUs, which can take advantage of production tax credits.
Barriers Addressed	Inconsistent Government Incentives and Underdeveloped Midsize Market

Table 5. FHA/HUD PowerSaver Loan Program Eligibility Standards for Small Wind Turbine Equipment

Recommendation	Modify the **FHA/HUD PowerSaver** loan program to maintain the inclusion of small wind turbine technology and require certification of equipment and installation personnel. (Note: Per this proposal, the Wind and Water Power Program Manager sent a memo to the Federal Housing Administration on December 8, 2010 requesting that the "Notice of FHA PowerSaver Home Energy Retrofit Loan Pilot Program" language related to "Residential Wind Turbine" be appropriately amended. This memo is included in Appendix 6.2 of this document.)
Justification	The standards of the FHA/HUD PowerSaver loan program, which will launch in 2011, stated that any small wind system less than 100 kW is an eligible energy retrofit upgrade. By requiring that the small wind turbine equipment purchased with PowerSaver Program support be certified to the AWEA Small Wind Turbine Performance and Safety Standard and that installation personnel have the NABCEP Small Wind Installer credential, both PowerSaver program mangers and consumers are assured that equipment and personnel meet performance and safety standards. Access to capital is one of the top deployment constraints for small wind turbines, and the industry would benefit greatly from inclusion in the PowerSaver program.
Barriers Addressed	Inconsistent Government Incentives

Table 6. Federal Funding for Utilities Tied to IREC Interconnection and Net Metering Protocol

Recommendation	Require that in order to receive **federal grants and loans**, retail electricity distribution organizations (IOUs, MUNIs, and RECs) implement a set of demonstrated **best practice interconnection standards and net metering policies**. FERC, with guidance from the Interstate Renewable Energy Council (IREC), would establish these best practices and promulgate policy rules. All federal programs with funding available for retail electricity suppliers would be impacted.
Justification	The linkage of federal funding to demonstrated best practices will enable additional distributed wind generation to be deployed through simplifying interconnection procedures and enforcing mutually beneficial net metering policies. The implementation of best practices has the potential to reduce balance of station and project development costs, and accelerate return on investment.
Barriers Addressed	Interconnection, Net Metering, and Underdeveloped Midsize Market

Table 7. FERC Amendment to Public Utility Regulatory Policies Act

Recommendation	Initiate a collaborative effort between the **Interstate Renewable Energy Council** and **FERC to amend the Public Utility Regulatory Policies Act (PURPA)** to require utilities to adopt demonstrated best practices standards for interconnection and net metering.
Justification	Currently, PURPA requires utilities to consider, but not necessarily adopt, standards for interconnection and net metering. Amending PURPA to require demonstrated best practices for interconnection and net metering has the potential to simplify the installation process, reduce balance of station and project development costs, and accelerate return on investment.
Barriers Addressed	Interconnection, Net Metering, and Underdeveloped Midsize Market

Table 8. Federal Pre-emption to Modify Local Zoning Ordinances and Permitting Requirements

Recommendation	Establish a **federal pre-emption** to modify **local zoning ordinances and permitting requirements** with state specific demonstrated best practices for distributed wind projects.
Justification	A federal pre-emption will reconcile the differences between state policies and local jurisdictions by simplifying the permitting process for consumers of distributed wind systems and modifying prohibitive zoning ordinances that are based on the incorrect information regarding technical characteristics of distributed wind technology. Currently, the combination of a lack of standardized permitting practices and restrictive regulations are delaying projects, driving up costs, and discouraging customer interests and investments in distributed generation.
Barriers Addressed	Zoning, Permitting, and Underdeveloped Midsize Market

Table 9. Simplified Application Process for USDA Rural Energy for America Program (REAP)

Recommendation	Maintain funding for and establish a simplified open cycle application process for the USDA **Rural Energy for America Program (REAP)**
Justification	Maintaining funding for REAP would provide meaningful financial support to entities that otherwise might not be financially capable of purchasing a distributed renewable energy system. Establishing a simplified open cycle application process for REAP would be better suited to the typically longer project development cycles for renewable distributed generation projects would enable greater program participation. As with all government incentive programs at any level, REAP should be tied to quality assurance requirements for small wind systems, such as product and personnel certification.
Barriers Addressed	Underdeveloped Midsize Market

Table 10. Elimination or Capping of Contractual "All Source" Requirement Among Public Power Entities

Recommendation	Eliminate or cap contractual **"all source" requirements** among public power entities.
Justification	Increased deployment of distributed wind projects relies, in part, on the ability of the project owner to sign a contract with a utility that allows the project owner to sell back or receive credited for excess electricity produced. "All source" requirements, however, contractually obligate distribution co-ops to purchase electricity exclusively from the wholesale electricity provider with which they are under contract. Because "all source" requirements can prohibit distribution co-ops from purchasing electricity from distributed generators, such requirements may limit the opportunity for interconnection (and therefore the economic viability for deployment) of distributed generation projects.
Barriers Addressed	Underdeveloped Midsize Market

5 References

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6 Appendix

6.1 Workshop Participants

The individuals listed below attended the DOE Deployment Barriers to Distributed Wind Energy workshop.

Jim	Ahlgrimm	U.S. DOE
Ruth	Baranowski	NREL
Ian	Baring-Gould	NREL
Bret	Barker	New West Technologies
Mike	Bergey	Bergey Wind Power Company
Henriette	Boom	Harvest the Wind Network
Roy	Butler	Four Winds Renewable Energy, LLC
Christopher	Charlton	Greenway Renewable Energy
Sanjeev	Choudhary	Northern Power Systems
Beverly	Cisneros	NREL
John	Covert	Colorado Harvesting Energy Network
Lisa	Daniels	Windustry
Lisa	DiFrancisco	North Coast Energy Systems
John	Dunlop	American Wind Energy Association
Daniel	Epstein	Renewegy
Haley	Estes	Harvest the Wind Network
Larry	Flowers	AWEA
Trudy	Forsyth	NREL
Ronald	Fox	Southwest WindPower, Inc.
Chris	Fry	SRA International
Bob	Gough	Intertribal Coup
Brian	Gregory	Interkek - ETL SEMCO
Kay	Hefley	H2O Farms and Baca Green Energy
Jenny	Heinzen	Lakeshore Technical College
Jay	Hermanson	WHPacific
Adam	Holman	West Texas A&M University
Jennifer	Jenkins	Distributed Wind Energy Association
Tony	Jimenez	NREL
Rich	Krauze	EWT Americas
Andy	Kruse	Southwest WindPower, Inc.
Brian	Kuhn	Aeronautica Windpower
Rebecca	Meadows	NREL
Terrance	Meyer	Cascade Community Wind
Paul	Migliore	Anemergonics, LLC
Byron	Neal	USDA Agricultural Research Service
Tomothee	Neron-Bancel	North American Board of Certified Energy Practitioners
Mona	Newton	Colorado Governor's Energy Office

Nini	Nguyen	Advanced Energy Systems
Tim	Olsen	Advanced Energy Systems
Alice	Orrell	Pacific Northwest National Laboratory
Frank	Oteri	NREL
Brett	Pingree	Northern Power Systems
Heather	Roads-Weaver	eFormative Options LLC
Joe	Rogers	
Mick	Sagrillo	Sagrillo Power & Light
Larry	Sherwood	Small Wind Certification Council
Kevin	Shulte	Sustainable Energy Developments, Inc.
Karin	Sinclair	NREL
Steven	Smiley	Heron Wind Management
Joseph	Spossey	Interkek - Energy Services
Rhyno	Stinchfield	GreenWorld Partners
Carol	Tombari	NREL
Andrew	Trapanese	Harvest the Wind Network
Clayton	Wood	Small Wind Company
Paul	Woodin	Community Renewable Energy Association (CREA)
James	Yockey	Seventh Generation Energy Sytems
Robert	Youngberg	Sustainable Development / International

6.2 Workshop Agenda

Wind and Water Power Program staff provided the following agenda to participants of the October, 2010 Deployment Barriers workshop.

Agenda | Deployment Barriers to Distributed Wind Energy

Thursday, October 28, 2010 at the Renaissance Hotel in Denver, CO, USA

8:00 am **Breakfast**

8:30 am **Opening remarks and overview of DOE Wind Program efforts in DWT**
Jim Ahlgrimm, Technology Acceptance Team Lead for DOE Wind Power Program

8:40 am **Workshop and Breakout Session Instructions**
Ian Baring-Gould, Technical Director, Wind Powering America

- *Small wind brainstorming group facilitated by Ian Baring-Gould*
- *Midsize wind brainstorming group facilitated by Larry Flowers*

8:45 am **Discussion of Barriers** - **Attendees join breakout groups**

- *Breakout groups have the opportunity to identify high priority deployment barriers that were not included in the agenda*

9:00 am **Breakout session - Zoning and Permitting**

- *What can be done to reconcile the differences between federal/state policies and local jurisdictions to empower users of distributed wind systems?*
- *How do we educate local officials on distributed wind technology and applications?*
- *How do we address aesthetic concerns such as tower height? How do convert people from NIMBY to IMBY?*
- *Should zoning officials require wet stamps for engineering requirements when evaluating a project?*
- *Should a home owner or community need general liability insurance for a permit?*

10:30 am **Break**

10:45 am **Breakout session - Installation and Site Assessment (small wind) or Standards (midsize wind)**
Small Wind Questions:

- *Should a site assessment certification be required for site assessors?*
- *How do we accelerate the use of educated site assessor and installers for publicly funded projects, communities, and home owners?*
- *How can we use certification for installers and site assessors to streamline the zoning and permitting?*
- *Should there be a standardized national template for site assessment?*
- *Can the site assessor and installer be the same person?*
- *How do we motivate manufactures to encourage site assessors or installers to become certified?*
- *How can incentives be used to motive DWT consumers to use certified site assessors and installers?*

Midsize Wind Questions:

- *Should there be an IEC Midsize Turbine Design and Safety Standard?*
- *Should the SWCC expand its scope to become the Distributed Wind Certification Council (DWCC) in order to accommodate midsize turbine technology?*

- *Could midsize turbine certification be a useful tool for policy makers, regulators, local organizations, and consumers?*
- *What other deployment barriers are there for midsize turbine technology?*
- *What are other federal policy actions that would help remove midsize turbine technology barriers?*
- *What types of outreach and education are needed to help remove midsize turbine deployment barriers?*

12:15 pm **Lunch**

1:15 pm **Breakout session - Interconnection and Net Metering**

- *How do you breakdown net metering barriers in RECs?*
- *How do you develop a business model for RECs to succeed with net metering?*
- *RECs receive federal loans from USDA, should there be policies or requirements for renewable distributed generation in place for RECs to receive loans?*
- *How can you use RECs policies regarding distributed wind to influence zoning policy?*
- *What would the Federal model for interconnection and net metering look like?*
- *Is there any difference between solar and small wind with regard to interconnection and net metering?*
- *What information (deliverable) could be provided to the utilities (RECs and otherwise) that outlines standard practices?*
- *How does DWT help meet RPS goals?*
- *What net metering policy helps the midsize turbine market expand the most?*

2:45 pm **Break**

3:00 pm **Consolidation of results/Networking**
Facilitator, note taker, and DOE and National Lab personnel will review notes and prepare key finding to present to the larger workshop audience. Attendees have the opportunity to network and catch up on email

4:00 pm **Presentation of brainstorm findings**
Each group's facilitator has 30 minutes to present their major findings, including Q&A.

5:00 pm **Conclusion and wrap-up**
Ian Baring-Gould

5:05 pm **Adjourn**

6.3 Memorandum Re: Notice of FHA PowerSaver Home Energy Retrofit Loan Pilot Program

The following memorandum was sent by the DOE Wind and Water Power Program Manager to staff at the Federal Housing Administration, and precipitated the amendment of language related to "Residential Wind Turbine" in the Notice of FHA PowerSaver Home Energy Retrofit Loan Pilot Program.

Comments Prepared by the Wind and Water Power Program in the Office of Energy Efficiency & Renewable Energy

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M E M O R A N D U M

To: Stockton S. Williams | Senior Policy Advisor, Sustainable Communities

From: Jacques Beaudry-Losique | Program Manager, Wind and Water Power Program

Date: 12/08/2010

Re: Notice of FHA PowerSaver Home Energy Retrofit Loan Pilot Program [Docket No. FR-5450-n-01]

I. Proposal

The Department of Energy's Wind and Water Program respectfully recommends the following with regard to the language of the "Notice of FHA PowerSaver Home Energy Retrofit Loan Pilot Program":

1. Maintain the inclusion of " Residential Wind Turbine" in "Appendix B: Eligible Improvements Under Retrofit Pilot Program", and
2. Amend the standards to state that "Residential Wind Turbines" must:
   - Have a nameplate capacity of no more than 100 kilowatts;
   - Have certification to the IEC standard from an accredited product certification body, or certification to the AWEA standard from the Small Wind Certification Council (SWCC) or a Nationally Recognized Testing Laboratory (NRTL); and
   - Be installed by an installer with North American Board of Certified Energy Practitioners (NABCEP) Small Wind Installer Certification.

II. Background

The unprecedented global increase in demand for small wind turbines (<100 kW) during the last 5 years has caused a flood of new small wind turbine products into the U.S. market from both domestic and foreign manufactures. This recent growth is not without its growing pains. For example, according to the *2010 American Wind Energy Association (AWEA) Small Wind Turbine Global Market Study*, approximately 250 companies worldwide manufacture small wind turbines and less than half of their products have been tested. The small wind power industry faces four key barriers that are needed to ensure healthy market segment growth and widespread consumer adoption. These barriers include the following:

1. The lack of standardized performance specifications to eliminate overly optimistic and inconsistent manufacturer reports (also, a system for verifying manufacturer claims regarding product performance per these specification).
2. The lack of user-friendly tools to compare small wind turbines or accurately estimate energy performance.
3. The lack of safety and reliability assurance for consumers and agencies providing incentive to justify their investments.
4. The lack of requirements for the assessment and credentialing of small wind turbine installers to ensure the safety and quality of installations.

In order to remove these barriers, DOE supports the development of turbine safety and product performance standards, best practices for turbine testing, and product and installation personnel certification. These quality control tools provide consumers, lenders, and policymakers with transparent and credible information about the safety, performance, and reliability of small wind turbine technologies.

Both DOE and the small wind industry have made progress toward improving the industry's quality control as shown in the timeline below.

- December, 2009 – AWEA finalized a technical standard for voluntarily use to test small wind systems against performance and safety criteria.
- Spring, 2010 – The Small Wind Certification Council (SWCC), an independent product certification body, began the process of certifying small wind turbines that meet or exceed the requirements of the AWEA *Small Wind Turbine Performance and Safety Standard*.
- September, 2010 – the North American Board of Certified Energy Practitioners (NABCEP) held its first small wind installers certifying exam.

With support from the DOE, industry now has the tools in place to give consumers and regulators creditable information regarding the performance, reliability, and safety of small wind turbines.

II. Issue(s)

With regard to the SWCC, since opening their doors for business in early 2010 they have received more than 18 Notices of Intent from manufacturers to submit applications for certification. The SWCC anticipates issuing a minimum of 6 certifications by the close of calendar year 2011 with hopes of having a near complete list by the close of 2012. In addition the SWCC anticipates obtaining their A2LA accreditation for product certification bodies by the close of 2011.

Regarding the NABCEP Small Wind Installer Certification, as a new credential it too will likely take a few years to be completely accepted across the network of US installers.

III. Purpose of New/Modified Authority

The purpose of this modification is to require recipients of federal incentives for residential wind turbines to use certified equipment and installers thereby ensuring performance, safety, and reliability and accelerating the widespread adoption of equipment and personnel certification.

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