TAKING THE RED TAPE OUT OF GREEN POWER

How to Overcome Permitting Obstacles to Small-Scale Distributed Renewable Energy

NNEC

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How to Overcome Permitting Obstacles to Small-Scale Distributed Renewable Energy

Prepared for the Network for New Energy Choices,
a program of GRACE

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The mission of the Network for New Energy Choices (NNEC) is to promote policies that ensure safe, clean, and environmentally responsible energy options. NNEC collaborates with all levels of government, planning agencies, public interest organizations, government and industry associations, professional societies, labor groups, businesses, and the public. NNEC, formed in 2006, is a program of GRACE.

For more information about NNEC, or for additional copies of this report, please visit www.NewEnergyChoices.org.

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"Taking the Red Tape Out of Green Power" has been endorsed by the following organizations and associations:

- The American Institute of Architects
- American Wind Energy Association
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- Florida Solar Energy Center
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- Pace Energy and Climate Center
- Sierra Club
- Solar Energy Industries Association
- Southern Alliance for Clean Energy
- The Vote Solar Initiative

Endorsing organizations recognize the report's value as an important resource to local municipalities and states, particularly in facilitating permitting of small-scale photovoltaic and wind energy systems.

DISCLAIMER: Organizations endorsing this report are in no way responsible for inaccuracies or omissions contained within.

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LIST OF ACRONYMS

APA .... American Planning Association
ASES .... American Solar Energy Society
AWEA .... American Wind Energy Association
CAI .... Community Associations Institute
CUP .... Conditional Use Permit
DG .... Distributed Generation
EESI .... Environmental and Energy Study Institute
FAA .... Federal Aviation Administration
FSEC .... Florida Solar Energy Center
IBEW .... International Brotherhood of Electrical Workers
ICMA .... International City/County Management Association
IEEE .... Institute of Electrical and Electronics Engineers
IREC .... Interstate Renewable Energy Council
ISPQ .... Institute for Sustainable Power Quality
LEED .... Leadership in Energy and Environmental Design
NABCEP .... North American Board of Certified Energy Practitioners
NEC .... National Electric Code
NFPA .... National Fire Protection Association
NJATC .... National Joint Apprenticeship & Training Committee
Northwest SEED .. Northwest Sustainable Energy for Economic Development
NYSERDA .... New York State Energy Research and Development Authority
PV .... Photovoltaic
RELI .... Renewable Energy Long Island
RETAP .... Renewable Energy Technology Analysis Project
SEIA .... Solar Energy Industries Association
Solar ABCs .... Solar America Board for Codes and Standards
SRCC .... Solar Rating and Certification Corporation
SWCC .... Small Wind Certification Council
UBC .... Uniform Building Code
UCAN .... Utility Consumers' Action Network
UL .... Underwriters Laboratory
VWEC .... Virginia Wind Energy Collaborative

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By Ingrid Kelley
Chair, Environment, Natural Resources and
Energy Division, American Planning Association

I am imagining the mayor of a small, suburban town as she presides over a jubilant city council which has just voted to become one of approximately 900 U.S. cities and towns to sign on to the U.S. Conference of Mayors Climate Protection Agreement.[1] This agreement, which originated with Seattle Mayor Greg Nichols in 2005, has become a major grassroots effort to reduce greenhouse gas emissions at the local level while pushing for a federal commitment to join in international agreements for action. The councilors are excited. "We'll have the greenest town in the state!" declares one. "All our new buildings will be LEED™ certified, and we'll install solar panels on city hall!" says another. Naturally, it is the sexy technology that first comes to mind. In the passion of this moment of community commitment to positive action, who would think of shouting, "And our renewable energy permitting process will be fast and fair and reasonably priced!"

As these newly motivated community leaders sharpen their pencils and roll up their sleeves, they will find that successfully meeting their ambitious new goals will require skills and experience that are more political than technical. "Taking the Red Tape Out of Green Power" underlines two fundamental facts about what will be needed for us to make the transition to clean energy in order to reduce greenhouse gas emissions. For one thing, transitioning to clean energy is not necessarily about funding expensive demonstrations of technology, or even about the technology itself. Second, this report makes a strong case that committed, informed leadership at the local level is absolutely vital to making it happen. Municipal officials across the country are facing public pressure to effectively address climate change issues on local turf, while dealing with tight municipal budgets and plenty of other priorities. Finding the courage to fully assess the challenge and then take a confident leadership role will require planners, local officials and community leaders to fully educate themselves by digging beneath the media hype about energy issues to discover what the truly effective strategies are. This report is a valuable contribution to that body of deeper knowledge.

In preparing "Taking the Red Tape Out of Green Power," renewable energy professionals from all over the country were interviewed, revealing that planning and permitting barriers all too frequently drive significant costs and delays in getting small PV and wind power systems installed. The report outlines challenges specific to each technology, but points out most definitely that it is not simply the expense of the equipment or the perceived novelty of the technology that prevents its wider adoption by interested homeowners. Unclear and inconsistent permitting requirements are discouraging people from generating their own clean power. Furthermore, homeowner associations in planned communities, which could be valuable allies in the effort to reduce carbon emissions, have often taken the opposite position by adopting unfriendly and sometimes illegal covenants regarding installation of renewable energy systems.

The author begins by reporting the variety of political viewpoints and priorities they found, as expressed through a wide spectrum of local rules. The very inconsistencies among permitting practices and fee schedules, even among neighboring jurisdictions, shows how local a movement renewable energy has been for the last forty years. For communities everywhere the lesson is clear: with regard to renewable energy as an important technological tool in addressing emissions reduction, the power of political will has yet to be fully harnessed. Luckily, "Taking the Red Tape Out of Green Power" also provides some creative ideas for doing just that, and on several different levels.

At the micro level, the report suggests that some existing rules and procedures could be tweaked to bring them up to date. Possibilities include standardizing technical reviews, or making permit fees consistent with the cost of providing the service, like other permitting procedures. Both wind and solar electricity technologies have come a long way since the 1970s when permitting authorities first needed to deal with them. Many local permitting processes reflect these origins in the days when generating one's own power was regarded as eccentric at best, and at worst, suspiciously antisocial. The technologies were unfamiliar, and the associated politics, unpopular. From what these researchers found, it is evident that before solar and wind power take their places in the national spotlight, many cities and towns need to dust off their attitudes and update their technological understanding.

The seven primary recommendations presented in this report will help guide planners and local officials toward graceful incorporation of renewable energy into their communities. They focus primarily on solar electric panels, (or photovoltaic panels, also called PV), and small wind turbines that are connected to the main electric grid. Solar and wind systems used to be associated with a self-sufficient and isolated lifestyle. These days, they are beginning to pay off as part of a new pattern called "distributed generation." These small systems work well for homes and small businesses, and because they could collectively contribute substantially to our clean electricity supply, cities and towns would do well to encourage their installation.

To smooth the installation process for solar electric panels, the author recommends municipalities revisit their requirements and fees for permitting, making things simpler and less expensive for contractors and their clients. Part of this will mean recognizing PV as the reliable technology it has become, thereby eliminating unnecessary engineering studies and reviews. The report points out that it is no longer necessary to inspect the equipment to be used in every PV installation because most established manufacturers have received approval for their products from a national testing laboratory. The quality of installation is not addressed specifically, but for those code officials still leery of poor workmanship in an unfamiliar trade, the North American Board of Certified Energy Practitioners (NABCEP)[2] certifies solar electric installers in a rigorous process that includes both system installation experience and a rigorous written exam. A similar certification is in the works for small wind system installers as well.

Even though solar thermal systems (for hot water and heat) were not part of this report, they can also contribute to reducing carbon emissions, and face similar left-over perceptions from the early days. NABCEP has recently begun certifying solar thermal installers as well. As for solar thermal equipment, the Solar Rating and Certification Corporation (SRCC)[3] is a nationally recognized organization that certifies solar thermal panels for consistent quality.

Another important group of recommendations addresses the incorporation of renewable energy into the comprehensive planning process, particularly with regard to wind energy. One recommendation involves establishment of renewable energy overlay zones that essentially give pre-approval for siting of renewable energy generation in designated geographical locations. Creating a renewable energy overlay zone offers the opportunity for a thorough assessment of available resources, and the impacts on natural and human inhabitants of the area. Creating an overlay zone can increase public participation and ownership, perhaps even leading to designating parcels well suited for solar subdivisions or planned communities. These are actually quite trendy in parts of California.

The author's recommendations fit into a broader concept of comprehensive community energy planning. Municipalities that have promised to meet certain carbon emissions reduction goals will need to take some sort of organized approach if they expect to meet those goals in a timely and affordable manner.

Community energy planning considers an assessment of the municipality's energy needs and resources, followed by an evaluation of available strategies for meeting the energy goals including how they integrate with existing programs and budgets.

If municipalities need another good reason to consider energy a community-level concern, they can think about its role in hazard mitigation, a booming new specialty in the planning profession. Small-scale renewable energy or "distributed generation" technologies, such as PV and wind turbines, can play an important role in providing secure local power during emergencies. Sandia National Laboratory in Albuquerque, NM has been working on what it calls Energy Surety Microgrids[4] for application on military bases, but the idea could be applied to cities and towns as well. Small generation systems are located close to vital facilities such as hospitals, fire and police stations, and water and sewage infrastructure. Renewable energy systems can be connected to the grid, adding power on a daily basis, offsetting the load. However, if power goes down during an emergency, these small systems are switched to operate independently, providing electricity to vital services in predetermined order of priority. The incorporation of renewable energy as an essential energy security strategy boosts its local presence in a number of ways, creating greater public awareness and providing a new market for energy services.

Now is the time for municipalities to support renewable energy in any way possible. By all means, the mayor and her city council should install PV panels on city hall—first hand experience in applying for a system permit may uncover some unpleasant truths about the user-friendliness of the local process. Never before has the general public been so interested in solar and wind energy, nor has the potential for political support ever been so high. "Taking the Red Tape Out of Green Power" doubtless will prove to be a valuable guide for local leadership determined to move their communities toward cleaner energy.

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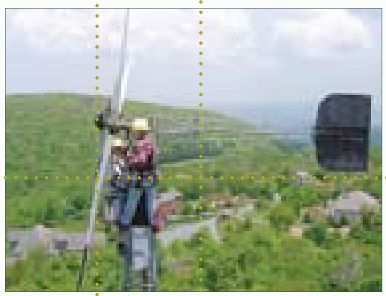
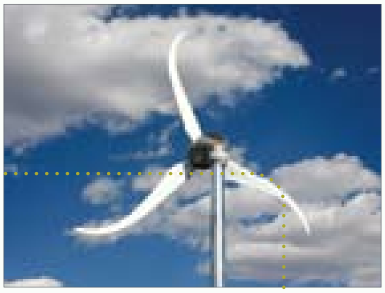
Ingrid Kelley is a former HVAC mechanical designer who has worked for over twenty years promoting renewable energy, energy efficiency, permaculture, alternative construction and sustainable community design. In 2001 she earned a master's degree in Community and Regional Planning from the University of New Mexico, and is a LEED Accredited Professional. She is currently a project manager at the Energy Center of Wisconsin. Ms. Kelley is one of the authors of the American Planning Association (APA) "Policy Guide on Energy," adopted in 2004, and served on the Steering Committee for the APA "Policy Guide on Planning and Climate Change," adopted in April 2008. Her book, "Energy in America: A Tour of Our Fossil Fuel Culture and Beyond," will be published by the University Press of New England in November 2008.



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EXECUTIVE SUMMARY

Over the last several years Americans have become increasingly aware of the importance of renewable resources in reducing our nation's dependence on foreign sources of energy and decreasing the emission of climate-changing greenhouse gases and other pollutants. As a result, renewable energy technologies, particularly solar and wind power, are the most rapidly growing sources of electricity in the U.S. Furthermore, environmental and security concerns have sparked increasing interest in small-scale, "distributed" sources of electricity generation to reduce our reliance on large-scale, centralized power plants; however, individual homeowners and small business owners looking to invest in these new sources of energy face multiple bureaucratic barriers to installing their own small-scale, distributed renewable energy systems.

The greatest barriers to the expanded use of distributed renewable energy systems in the United States stem not from technical obstacles, but from financial, political and social hurdles. System installers often face planners and building inspectors with little experience permitting renewable energy systems and with no formal education for certifying system safety and reliability. Complex permitting requirements and lengthy review processes delay installations and add significant costs to distributed renewable energy systems. Multiple permitting standards across jurisdictions create additional complications and inefficiencies for system installers. In many cases, these remaining bureaucratic hurdles stymie efforts by homeowners and business owners to install systems and hinder the development of a national market for distributed renewable energy systems.

The term "distributed renewable energy systems" is used to describe the distributed applications of clean renewable electricity that are the subject of this report. Distributed renewable energy systems can take many forms, including geothermal systems, micro-hydroelectric systems, and various solar and wind energy applications. While solar thermal systems, which use the sun for space or water heating, are an important form of clean renewable energy, the focus of this report is the unique set of issues facing electricity-generating systems, particularly those that are interconnected to the local electricity distribution grid. The term distributed generation (see Glossary in Appendix A) distinguishes these systems from the large, centralized generation facilities that provide the vast majority of the nation's power.

This report focuses specifically on solar photovoltaics (PV) (see Glossary) and small wind turbines, as these are the most common distributed renewable energy technologies and the ones with the greatest potential for expansion. The most significant municipal-level planning (see Glossary) and permitting obstacles to these distributed renewable energy systems are identified, and include:

- Complex and/or unclear local permitting requirements;
- Inspectors and permitting authorities that are inexperienced with renewable electricity systems;
- Permitting requirements that vary significantly across jurisdictions;
- Permit fees that vary across jurisdictions and are sometimes not consistent with municipal resources expended; and
- Unfair and often illegal enforcement of restrictive housing covenants.

"Taking the Red Tape Out of Green Power" also discusses ways to overcome these hurdles and identifies policies from states and municipalities that have successfully streamlined certification and permitting guidelines. From this analysis seven sets of recommendations were developed for overcoming the remaining hurdles to widespread deployment of distributed renewable energy systems. These recommendations cover local government policies for distributed PV, local government policies for small wind turbines and state policies for distributed renewable energy systems.

FINAL RECOMMENDATIONS

1: Remove barriers to PV systems from building and zoning codes.

2: Simplify PV permit application forms and review processes.

3: Adopt flat permit fees or fee waivers for PV and small wind systems.

4: Incorporate information about wind energy opportunities into municipal comprehensive planning.

5: Establish small wind turbines as permitted uses, with appropriate design guidelines, performance standards, and review processes.

6: Ease permitting processes by establishing statewide interconnection standards and educating building and electrical inspectors about proper installation procedures for distributed renewable energy systems.

7: Adopt legislation at the state level mandating consistent and appropriate permitting requirements for distributed renewable energy systems.

Additional sub-recommendations are described in Chapter 4 and are listed in Appendix B.

LOCAL GOVERNMENT POLICIES FOR DISTRIBUTED PV

This report's recommendations reflect actions that can be taken by municipalities (e.g., cities, towns, or counties) to ease permitting processes and remove barriers for distributed PV systems.

Perhaps the most obvious step that local governments can take in support of PV is to remove barriers that are inherent in their building or zoning codes, such as by exempting PV systems from building height limitations or building permit and design review requirements (see Glossary).

Many of these recommendations are intended to reduce the time, paperwork and unnecessary inconvenience associated with building and electrical permit (see Glossary) applications for PV installations. This includes creating simplified permit application processes and working with surrounding jurisdictions to develop standardized application procedures that support the increased use of PV systems across entire regions.

It is recommended that electrical permitting requirements be based on a common set of standards – Underwriters Laboratory (UL) 1741 and IEEE (formerly the Institute of Electrical and Electronics Engineers) 1547 – which ensure the safety and reliability of PV systems if they are installed according to the National Electric Code (NEC). This would streamline the electrical permitting process for grid-tied PV systems by allowing it to focus only on ensuring that the system has been installed properly and is ready for grid interconnection. Local governments could further reduce permitting delays by providing their building and electrical inspectors with the necessary training to understand and properly evaluate PV systems.

While this report focuses specifically on permitting issues for distributed renewable energy systems, the high cost of these technologies continues to be a major obstacle to their widespread use. The cost and permitting obstacles converge with the issue of permit fees. Flat permit fees are encouraged, as opposed to "valuation-based" fees that are based on project value and thus discourage investment in larger systems. Also, the approach taken by some municipalities to encourage PV and other distributed renewable energy systems by exempting them from permit fees and/or providing rebates or other types of financial incentives is recommended.

LOCAL GOVERNMENT POLICIES FOR SMALL WIND TURBINES

The greatest permitting obstacle to small wind turbines often is not the presence of overly burdensome permitting requirements for this technology, but rather a lack of applicable guidelines, which often leads to evaluation of small turbines using the same detailed permitting processes that are required for large wind turbines or other types of major energy infrastructure.

Local governments should identify areas in their jurisdictions where wind energy development may conflict with surrounding land uses. A number of factors should be considered when identifying these areas, including locations of endangered bird and bat habitat, density of existing or planned development, and the location of sensitive land uses. Small wind turbines should then be designated as conditional uses (see Glossary) in the areas of potential conflict and as permitted uses in all other areas of the jurisdiction. Designating small wind turbines as permitted uses does not mean that their potential impacts must be ignored. Appropriate design guidelines and performance standards can be established to mitigate the potential impacts for most proposed small wind turbines, allowing the more rigorous conditional use permit application and review process to be used only in areas where the potential impacts are greatest.

Local governments can further expedite the permitting process by adopting a list of pre-approved small wind turbine models and by providing local inspectors with the necessary training to properly evaluate proposed small wind installations.

STATE POLICIES FOR DISTRIBUTED RENEWABLE ENERGY

While this report focuses primarily on local government policies to remove planning and permitting barriers to distributed renewable energy systems, three ways in which state governments can help to overcome those barriers are identified.

First, states can ease distributed renewable energy permitting processes for their localities by establishing statewide standards for renewable energy equipment and providing statewide training and education to familiarize local building and electrical inspectors with distributed generation technologies. Such statewide programs would also help to mitigate the problem of inconsistent permitting requirements across jurisdictions.

Second, states can pass legislation to preempt home rule and require that local governments develop efficient permitting processes and reasonable review criteria for distributed renewable energy systems. This approach has been used with some success in both California and Wisconsin, among other states.

Third, states can pass laws banning private covenant restrictions that prohibit or restrict PV and other distributed renewable energy systems on aesthetic grounds. Several states have passed such laws already, but their effectiveness has been limited. Therefore, it is recommended that in addition to passing laws banning private covenant restrictions, states actively work to educate community associations about their obligations under the law and inform homeowners about their right to install distributed renewable systems with the proper government permits.

Most of these suggestions require only minor policy changes that could be implemented expeditiously by state and/or local officials. These minor changes could have a profound impact on the ability to safely and rapidly expand the use of on-site, renewable energy systems and may even help jump-start a robust domestic renewable energy market that benefits all Americans.

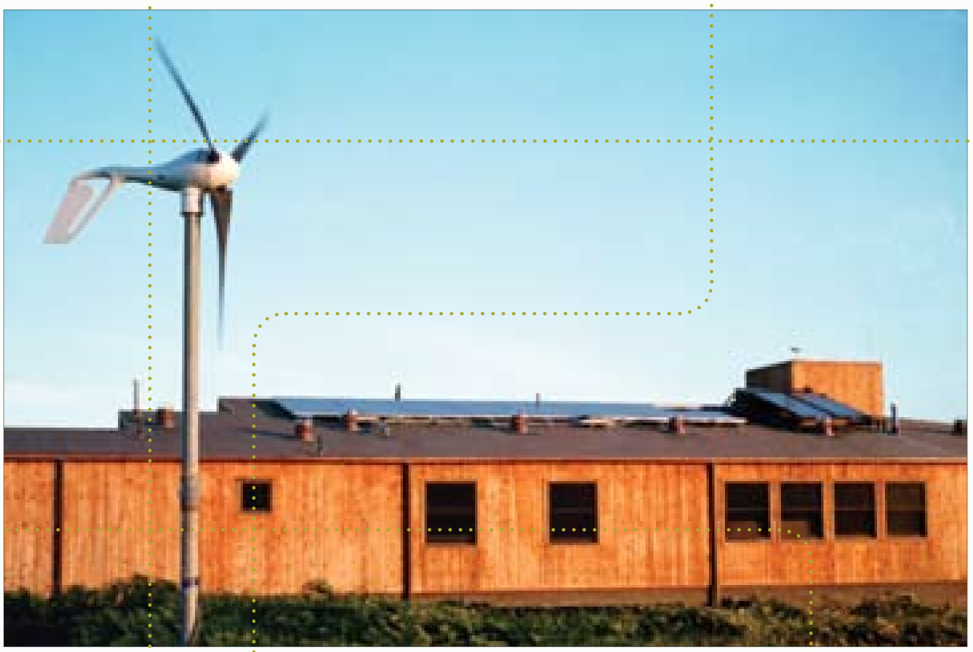


Image from National Renewable Energy Laboratory (NREL).

CHAPTER 1
INTRODUCTION

It's Not Easy Being Green

"I've been trying to put solar panels on my house for the last 5 months. And the regulatory process – you can't get through it. What's going on here? Why is there regulatory opposition to solar energy?"

—George Shultz, former Secretary of the U.S. State Department before the Society of Environmental Journalists, Sept. 5, 2007

When a former secretary of state is incapable, after five months, of installing a solar system on his home, something is amiss. Unfortunately George Shultz is not alone. While high up-front costs and other financial obstacles are likely the primary impediment to widespread adoption of distributed renewable energy technologies by homeowners and small businesses, these problems are exacerbated by a multitude of bureaucratic hurdles associated with the planning and permitting of these systems.

In fact, in 2007 former Vice President and famed clean energy advocate Al Gore was denied permission to install solar panels on the roof of his home in Belle Meade, Tenn., based on local zoning rules that required all power generating equipment to be placed at the ground level.[5] Mr. Gore was able to install the solar panels after the city changed these rules, but the new law still presents a significant barrier to solar power by requiring that the panels not be visible from the street.[6]

Similar bureaucratic obstacles occur in many states and localities across the nation. Many homeowners and small-business leaders, who struggle to navigate a sea of red tape when trying to generate their own electricity, end up frustrated and embittered, and no one knows how many of them give up entirely.

1.1 OPPORTUNITIES FOR LOCAL GOVERNMENTS

In recent years Americans have become increasingly concerned about the cost, security and environmental impacts of our energy supply. Many are now looking to renewable energy technologies, particularly solar and wind power, as sources of clean, safe and abundant electricity that can address these concerns.

Some local governments have pursued policies to encourage renewable energy since the late 1970s. Local government energy planning has increased dramatically in recent years, as hundreds of municipalities have begun efforts to mitigate the effects of global climate change by reducing greenhouse gas emissions in their communities. These efforts have resulted in a wide variety of policies to encourage energy efficiency and renewable energy use, including:

- Rebates and low- or zero-interest loan programs for energy efficient appliances, solar water heaters, and small-scale renewable energy systems;
- Power purchase agreements, property tax exemptions, and other mechanisms to encourage solar panels and other home energy systems;
- Green energy pricing, or allowing residents to pay a premium on their electricity bills to support renewable energy, offered either through municipal utilities, "green tags," or community aggregation of power purchases;
- Municipally-owned renewable energy facilities, including solar power systems, small wind turbines, and methane capture facilities at landfills and wastewater treatment plants; and
- "Brownfields to brightfields" programs, in which environmentally-degraded sites are converted into facilities to manufacture solar energy equipment, solar energy generating facilities (i.e., "solar farms"), or other new land uses that incorporate solar energy systems.

Substantial research has been conducted in recent years on the benefits of renewable energy and on state and federal level policies to support these technologies. Much of the research has focused on technological improvements and efforts to reduce the cost of these systems. This report focuses on an important issue that has received much less attention—local planning and permitting rules that inhibit the use of small-scale renewable energy systems in many communities.

1.2 THE NEED TO ADDRESS PLANNING AND PERMITTING BARRIERS

For several years now, renewable energy advocates and community planners have recognized the need to explore various ways of overcoming these planning and permitting barriers to distributed renewable energy installations. In April 2004, for example, the American Planning Association (APA) released its "Policy Guide on Energy." Two of the document's policy findings directly addressed the need for new and creative approaches to planning and permitting distributed renewable energy systems:

> "5. Fair share or other equitable approaches are needed for siting energy generation and distribution facilities, and land-use plans and policies need to provide flexibility and guidance for communities involved in development of new energy sources.
>
> 6. The way we plan urban areas significantly affects the energy usage of individual building sites. Appropriate site design standards and building codes can encourage energy conservation and the use of renewable energy technologies on site."[7]

In addition to these findings, APA's "Policy Guide on Energy" also includes a number of policy initiatives meant to promote reforms that will improve the planning and permitting process; however, despite APA's laudable intentions, its policy recommendations have been somewhat vague. Initiative 9.a. of the "Policy Guide on Energy," for example, addresses the need for improved planning and permitting of distributed renewable energy projects, but does not specify what processes would overcome the existing barriers it identifies:

> "Initiative 9: Support utilization of on-site, distributed generation technologies.
>
> a. APA encourages discussion with building code officials to ensure that local land-use standards proactively encourage the installation of renewable energy technologies."

The American Solar Energy Society (ASES) also has recognized local permitting as an obstacle to renewable energy development. In 2005, the ASES Policy Committee released a report entitled "Common Sense: Making the Transition to a Sustainable Energy Economy," which, among other things, described the need for state and local permitting reforms designed to encourage on-site renewable energy generation:

> "State and local governments should amend local building, permitting and zoning laws to accommodate, encourage and expedite the construction of renewable energy projects and distributed generation stations... In addition to modifying building codes to reflect the importance of energy efficient

designs and practices, other local laws, regulations and procedures should be developed and implemented... In reviewing local codes, ordinances and regulations, particular attention should be paid to changes that encourage the use of decentralized generating facilities."[8]

APA'S "POLICY GUIDE ON PLANNING AND CLIMATE CHANGE"

The American Planning Association recently adopted a new "Policy Guide on Planning and Climate Change." It includes the following policies for the removal of planning and permitting barriers to distributed renewable energy:

> "SPECIFIC POLICY #19.3: INTEGRATION OF RENEWABLE ENERGY INTO CODES Revise building codes and architectural design guidelines to allow for, encourage, or require integration of passive solar design, green roofs, active solar and other renewable energy sources.
>
> SPECIFIC POLICY #19.4: ELIMINATE REGULATORY BARRIERS TO THE USE OF RENEWABLE ENERGY SYSTEMS Examine existing zoning laws and development standards and revise or eliminate provisions that act as a barrier to the use of renewable energy systems."

However, as with the "Policy Guide on Energy," the APA's "Policy Guide on Planning and Climate Change" provides little detail on how building codes, zoning laws, or other planning regulations should be revised to support renewable energy sources.

The "Policy Guide on Planning and Climate Change" can be found on the APA's Web site at **http://www.planning.org/policyguides/pdf/climatechange.pdf.**

This report builds on the work of the APA, ASES and others by investigating specific planning and permitting reforms designed to encourage and expedite the installation of distributed renewable energy systems. While solar thermal systems, which use the sun for space or water heating, are an important form of clean renewable energy, this report focuses on the unique set of issues facing electricity-generating systems, particularly those that are connected to the local electricity distribution grid. The term Distributed Generation (DG) distinguishes these systems from the large, centralized generation facilities that provide the vast majority of the nation's power. Thus, the term "distributed renewable energy systems" is used to describe small-scale, decentralized applications of clean renewable electricity. While the capacity of these systems can vary, DG typically refers to projects with a generation capacity of up to 2000 kilowatts (kW), or two megawatts (MW) (see Glossary). This report focuses on grid-tied systems of up to 10 kW, sufficient to power a home, small apartment building, or small business. While a number of technologies could fit this definition, the two most common types of distributed renewable energy installations, Solar Photovoltaics (PV) and small wind turbines, are discussed.

Chapters 2 and 3 describe the planning and permitting issues facing home and small business owners wishing to install PV and small wind turbines on their property. A significant portion of the information for these chapters was gathered through interviews with small-scale solar and wind contractors who have directly faced these obstacles. Chapter 2 includes a discussion of private covenant restrictions. While these restrictions are not technically local government obstacles, they can contribute to the difficulties faced by homeowners that attempt to install distributed renewable energy systems, particularly PV systems. Chapter 4 recommends policy changes that may help to ease the approval process and encourage more wide-scale use of distributed renewable energy.

1.3 RESEARCH METHODOLOGY

Research for this report included a review of numerous prior studies on topics including electrical codes and permitting, private covenant restrictions, permit fees for PV systems, and land use and permitting issues for PV and small wind turbines. Approximately two dozen telephone interviews were conducted with a variety of academics, solar energy contractors, renewable energy advocates, and local government planners and building officials identified through the background research. Finally, a questionnaire was sent via e-mail to over 100 solar contractors identified from Solar Energy Industries Association chapter Web sites, Findsolar.com and Renewable Energy Long Island (RELI) (see Appendix C).

Approximately 20 solar contractors responded to the e-mail questionnaire. In order to increase response rates and encourage candor, these respondents were assured that their comments would remain anonymous. Therefore, quotes from these contractors are not credited in the endnotes. In most cases the state or region of the country where the respondent is located is identified in the text in order to illustrate geographical disparities in the perception of local planning and permitting processes.

The report was peer-reviewed by two separate teams of experts in the fields of energy policy, PV systems technology, small wind turbine technology, distributed energy permitting procedures and land use planning.

Most of the previous studies cited in this report are geographically specific, discussing, for example, technical issues in New York or building permit fees in California. This report is among the first to tackle the issue of planning and permitting obstacles to distributed renewable energy in a way that is national in scope.

Image from National Renewable Energy Laboratory (NREL).

CHAPTER 2

Local Government Planning and Permitting Barriers for Solar Photovoltaics (PV)

Because most PV systems are installed on the roof of a building, rather than as separate structures, it is rare that their installation will require zone changes or special use permits. While a simple zoning permit may be required to install PV as a retrofit to an existing home, rarely does this requirement represent a major burden for homeowners wishing to install off-the-shelf PV systems.

Obtaining building and electrical permits for such systems can be a major obstacle. Many solar installers are concerned that varying permitting requirements between jurisdictions can add costs to PV installations or generate safety risks in jurisdictions that do not adopt rigorous enough requirements.[9] Interviews with solar energy contractors in a number of different states revealed that a majority identified local permitting processes as a significant obstacle to small-scale solar installations.

There are three primary ways in which permitting processes are an obstacle for PV installation. Each of these examples has been described in previous studies and was noted by several of the contractors and solar energy advocates that were interviewed:

1. **Complex Permitting Processes**
   This category includes a number of different obstacles that together serve to lengthen the permitting process, which stymies the growth of distributed PV in many areas by raising costs for solar contractors and discouraging potential PV customers.

2. **Inconsistent Permitting Processes Across Jurisdictions**

Just as permit fee structures vary across jurisdictions, permitting requirements and processes are also inconsistent, which compounds many of the problems cited by the solar contractors interviewed. For example, the Energy Trust of Oregon found that inconsistent permit fees and processes across jurisdictions in Oregon add so much additional complexity that they have the potential to delay or deter projects altogether:

> "Jurisdictions were found to employ different permit fee assessment methods resulting in different documentation requirements as well as widely varying permit fees. Inconsistency makes it difficult to plan and bid projects across jurisdictions."[10]

3. **High Permit Fees**

Permit fees for PV systems create an additional expense for solar contractors and their customers. These fees vary greatly by jurisdiction, and in some cases may make an otherwise appealing PV project cost-prohibitive. In a 2007 white paper on solar permit fees, the Vote Solar Initiative documented how the added expense of municipal permitting fees, in some cases, may act as a deterrent to the expansion of PV:

> "[P]ermit fees, charged at the local level to ensure engineering and safety standards, also make a substantial difference in the price of home installation. And because there is only one local permitting authority per municipality, no competitive market forces influence solar permit fees."[11]

A MAJORITY OF SOLAR ENERGY CONTRACTORS IDENTIFIED LOCAL PERMITTING PROCESSES AS A SIGNIFICANT OBSTACLE TO SMALL-SCALE SOLAR INSTALLATIONS.

In the following section, general permitting processes and requirements for PV installations are discussed. Within this standard permitting framework each of the obstacles is mentioned in greater detail. The chapter ends with a discussion of a related obstacle for PV—covenant restrictions from private homeowner associations.

2.1 STANDARD PERMITS AND PROCEDURES

Installing a PV system generally requires, at minimum, an electrical permit from the local building department and an interconnection permit or agreement with the local utility. A building permit may also be required, particularly if the project will alter the building structure or if the solar installation will not be flush with the roof. In some cases a zoning, design review, or other type of planning permit may be required to approve the PV installation as a "use" on the property. The research for this report did not uncover any examples of special use permits, conditional use permits, or zone changes being required for PV, but that may be the case in some municipalities. If so, such a requirement would be more costly and time-consuming than even the design review process and would likely be prohibitive for most PV installations.

2.1.1 Electrical Permits

Most utilities require an electrical permit and possibly other applicable permits before they will issue the interconnection agreement that enables a distributed renewable energy system to be connected to their grid and participate in a state's net metering program (see Glossary; see Appendix D for illustration of a net metered PV system). In some cases, such as in California, states require an electrical permit before owners may receive state tax rebates. Electrical permits are designed to facilitate the inspection of DG systems to avoid potential safety hazards (such as fires, electrocution, or power surges) which could injure the homeowner or utility line workers or cause damage to the home or the electrical grid (see RETAPS Guidelines on page 51).[12] Specific requirements for both local government electrical permits and utility interconnection permits are typically derived from the following standards:

- The NEC, published by the National Fire Protection Association (NFPA), is the standard for installing wiring and equipment. The NEC contains Article 690, which is dedicated to PV systems.[13]

- IEEE Standard 1547 is the standard for interconnecting DG with electric power systems. The standards address the issues of performance, operation, testing, safety considerations, and maintenance for purposes of connecting to the grid.[14]

- UL 1741 standards are the set of requirements that cover inverters, converters, charge controllers, and interconnection system equipment used with grid-tied and non-grid-tied DG. The UL 1741 requirements supplement, and are used in conjunction with, IEEE 1547. The equipment covered is intended to be installed according to the NEC.[15]

Receiving an electrical permit is generally less onerous than obtaining a building permit, and is certainly easier than going through a design review, zoning, or other type of planning process. While some contractors interviewed complained about the time and/or cost involved in obtaining an electrical permit, others responded that the electrical permitting process is not particularly difficult for them. In Madison, Wis., for example, one building department official noted that the process for obtaining an electrical permit takes "less than a minute," once the proper paperwork is submitted by a licensed electrician, and the fee is only $10. The disagreement between contractors on the burden represented by electrical permitting processes highlights the wide disparity in requirements between jurisdictions.

2.1.2 Building Permits

Many municipalities only require building permits for PV systems that do not sit flat on the roof or that would alter the building structure in any way. In other municipalities, building permits are required for all PV systems, even those that are flush with the existing roof.

The purpose of the building permit requirement is to ensure that the building's roof can support the PV system and "that the PV system's rack and roof attachments are water tight and meet wind-load requirements."[16] These wind-load requirements are particularly important in tornado or hurricane-prone areas.[17] They can also add to the complexity of the permitting process. One Florida-based contractor, for example, identified wind-loading requirements as the single most difficult permitting issue in that state. It is important for localities in highly windy areas to establish wind-loading requirements that ensure the safety and the structural integrity of PV systems without imposing exceedingly complex or difficult-to-achieve requirements on potential PV customers.

2.1.3 Design Review

Some jurisdictions require more planning for a PV installation beyond the electrical and building permit applications. For example, some municipalities require a design review or a process to permit the system as a "use" under the area's given zoning designation. The design review process in urban planning evaluates the aesthetics of a proposed use—in this case, a PV system—and typically allows for public comments from neighbors and others who may object to the use as being visually unattractive or incompatible with the look of the surrounding neighborhood. Some California municipalities require such review processes even though state law protects consumers' rights to install PV on their property and prohibits the regulation of solar power based on aesthetic concerns.[18]

2.2 OBSTACLES STEMMING FROM COMPLEX PERMITTING PROCESSES

A 2007 report by SolarTech, a consortium of renewable energy businesses in California, discussed some of the obstacles to permitting distributed solar installations. SolarTech found that permitting and utility interconnection costs are a much higher proportion of the total cost of solar power projects in the U.S. than they are in Europe and Japan. The group attributed the disparity to the relatively uniform permitting and interconnection standards (see Glossary) found in other countries versus the inconsistent and/or duplicative requirements in the U.S. SolarTech concluded that the U.S. "must address and streamline permitting and utility interconnection standards if we are to lower our costs in these areas."[19]

The need for streamlined permitting processes was reiterated by many of the solar contractors interviewed for this report. One contractor from the San Francisco Bay area cited lengthy and difficult permitting processes as a major obstacle for the PV industry and estimated that obtaining the proper permits accounts for about one-third of the labor costs for each installation.

2.2.1 Excessive Permitting Requirements

Obtaining all of the required permits to install a legal PV system can be lengthy and time-consuming, which is discouraging to customers and costly to contractors. This is particularly true when the permit application requires unnecessarily complex paperwork that must be reviewed by multiple departments within the same jurisdiction. For example, some localities require permit applications to include detailed information about the roof structure, such as identifying the number of rafters, their spacing, and the material from which they were made.[20]

Santa Clara County, Calif., was identified as a municipality with lengthy and burdensome permitting requirements. In Santa Clara, the permit application must include plans, elevation drawings for the entire lot, and other paperwork. The application must be reviewed by multiple departments, and can take as long as eight weeks to be processed. Contractors also cited poor communication between the county and the project applicant(s) as a reason for project delays. For example, county officials must send all correspondence to the homeowner, rather than the contractor, which delays response times.[21]

> THE CAPABILITY OF A ROOF TO SUPPORT A PV SYSTEM CAN BE PROVEN WITHOUT REQUIRING THE CONTRACTOR TO DOCUMENT SUCH SPECIFIC DETAILS AS RAFTER SPACING AND MATERIAL.

Most of the contractors interviewed recommended less specific requirements, as the capability of a roof to support a PV system can be proven without requiring the contractor to document such specific details as rafter spacing and material. The city of San Jose, Calif., for example, streamlined its building permit process without compromising safety by requiring permits only if the system meets any of the following criteria:

1. Total panel weight (including frame) is greater than five pounds per square foot.
2. Maximum concentrated load at each point of support exceeds 40 pounds.
3. Maximum height above roof surface exceeds 18 inches.[22]

Most residential PV systems should easily meet San Jose's criteria. For this reason, some solar contractors argue that building permit requirements are unnecessary for the majority of PV installations. One contractor in the San Francisco Bay area, for example, noted that most homes built to post-1950s building code standards undoubtedly will be capable of supporting a typical residential-scale PV system. He suggested that jurisdictions could waive the building permit requirement for PV systems on homes that were built to meet modern building codes.

The design review process can also present an obstacle to PV systems. For example, in the Village of Bellerose, N.Y., Robert Syverson has spent more than a year trying to convince the Board of Architectural Review to allow him the right to install a PV system. While there is no official code banning solar panels in Bellerose, the board felt that the panels were not the "look of the town." The proposed system design places the panels on the back of his house, visible to only a few neighbors. In defending its decision, the board has cited that other homes in the village may become interested in PV if Syverson is successful with his installation. His remaining option is to challenge the board in court to change the way the review process deals with PV.[23] Syverson expressed his frustration with the permitting process as follows: "I will go as far as stating, within the next 10 years it will be so blatantly obvious that we are in trouble locally and globally that my current fight will seem absurd."[24]

One solar contractor in Oregon described the burden that design review processes can present to installers:

> "We are required to submit an application for a planning review for any residential system that projects more than twelve inches above the roof or any commercial system, period. The cost of the application is approximately $580 plus 1/2% of the project cost, and the review process takes four-to-six weeks. This is in addition to the normal building and electrical permits."

The situation faced by this contractor illustrates the tension that sometimes exists between the need to promote renewable energy and the need to ensure public involvement in local government decisions. The city of Ashland, Ore., for example, has long been a leader among small local governments in supporting renewable energy. In the early 1980s Ashland passed one of the nation's first solar access laws.[25] Ashland also has a robust system of incentives to encourage renewable energy in new home construction,[26] and has coordinated PV demonstration projects on several prominent buildings in the community. (See Chapter 4 and Appendix F for more information on these and other local government renewable energy incentives). However, the city's concern for careful and thorough land-use planning (much of which is required by state law), has, according to at least one local solar contractor, resulted in a tedious and unwieldy permitting process for retrofitting existing homes with simple PV systems.

2.2.2 Inexperienced Permitting Officials

In addition to the difficulties presented by electrical and building permitting, several of the contractors interviewed suggested that a lack of understanding about permitting rules and procedures, even among the local government staff that is enforcing those rules, is among the biggest obstacles to PV installation. Because PV is still an emerging technology, many planning or permitting officials have little if any experience in dealing with PV applications. One Florida-based contractor described the situation in his community:

> "Here, PV has been unheard of in the mainstream. Those very few of us that did off-grid systems were ignored by the authorities. Now that I am trying to install grid-tied systems that require permits, the local counties are clueless as to what to do with me. They do not have a permit category for solar electric, only solar hot water since that has been around for decades. So I am struggling my way through educating everybody in the process, and it is painful. The inspectors generally do not want to take the time to learn about PV (I don't blame them), as they are overstretched with other work. The permit offices have no idea how to even issue a permit for it."

A LACK OF UNDERSTANDING ABOUT PERMITTING RULES AND PROCEDURES IS AMONG THE BIGGEST OBSTACLES TO PV INSTALLATION.

Similarly, an updated 2008 Sierra Club study of permitting processes in 131 Northern California municipalities quotes solar contractor Tom McCalmont of REgrid Power:

> "Some building departments are unfamiliar with [PV systems] ... so they are ultra-cautious in their process. It's very clear from cities like San Jose and Palo Alto that [processing solar permits] can be done safely, dependably, with an over-the-counter permit."[27]

McCalmont also contends that many cities should prioritize their time on post-installation inspections, rather than spending too much time reviewing the pre-installation plans:

> "The cities would be better served by sending the inspectors to classes and getting them trained and familiar with solar so that they do the right thing when they come out and look."[28]

In addition, a 2007 study by the Santa Barbara Million Solar Roofs Partnership identified the lack of experience by local permitting authorities as a significant barrier to expediting permits for distributed solar installations in Santa Barbara County, Calif.:

> "Local permit agencies, including planning and building departments have historically not understood current solar technologies. This can lengthen the complexity and time required to process permit requests. In reality the majority of solar installations are standard systems containing consistent components approved by Underwriters Lab or the California Energy Commission, requiring only simple electrical and structural review prior to installation."[29]

A prerequisite to developing streamlined permit approval processes is having permit department staff that understand the basics of PV installations. Knowledgeable inspectors are critical to ensuring the safety of a solar installation.[30] But knowledgeable inspectors are also essential to any effort to decrease permitting delays and costs. Well-trained staff should be able to review standard residential PV system applications in a matter of minutes, thus allowing for "over-the-counter" permit processing. Similarly, well-trained inspectors can conduct an on-site inspection of an installed PV system in less than an hour, which should minimize costs to the local jurisdiction. In theory, streamlined PV permitting processes have the added benefit of allowing the jurisdictions to lower permit fees since each installation would require less staff time.

DEVELOPING STREAMLINED PERMIT APPROVAL PROCESSES REQUIRES UNDERSTANDING THE BASICS OF PV INSTALLATIONS.

2.2.3 Unpredictable Delays

The issue of unpredictable delays was mentioned repeatedly by the solar contractors interviewed, and is discussed at length in the Sierra Club permit fee study. These delays seem irrational to property owners, who believe they are performing a public good by investing in clean energy, and have the potential to create ill will between local permitting authorities and the citizens they serve.

For example, a 2006 white paper by the San Diego-based Utility Consumers' Action Network (UCAN) recounted the story of Lewis Fry, a utility customer in the city of Chula Vista, Calif., who applied in June 2006 for building and electrical permits to install a 2.4-kW solar electric system on his house. Though the city told him it would require seven to 21 days to review his plans, local officials had yet to permit his installation in November 2006, some five months after he had submitted the necessary paperwork.[31]

Unexpected delays can cause cash flow problems for solar contractors, who often must purchase equipment in advance, but cannot be paid by the client until the project is approved. This is frustrating to solar customers, who sometimes expect "instant gratification," and become frustrated when the permitting process does not move quickly enough.[32]

DELAYS HAVE THE POTENTIAL TO CREATE ILL WILL BETWEEN LOCAL PERMITTING AUTHORITIES AND THE CITIZENS THEY SERVE.

Scheduling site inspections is a major source of contention for some contractors. In most municipalities inspections are scheduled to take place within a four or eight-hour window, even though the inspection itself may last only 30 minutes. The large appointment window eats up significant time and prevents the contractor from doing other productive work. One contractor interviewed in this study complained:

> "Besides getting a permit (a process that sometimes takes months in certain jurisdictions), the inspection schedule is also problematic. The better cities (like San Jose) schedule the post-installation inspection by appointment, usually within a two-hour window. Other cities just specify a day and expect contractors to wait for an indeterminate amount of time.
>
> These are hassles for customers but it's also worth noting that such delays have a greater impact on the solar industry itself. Most solar companies are small: wasted man-hours spent waiting on permits and inspections is also wasted money."

Another contractor described the issue from the small business perspective:

> "We are businessmen, but we are not treated as such in the permit process. Business people set a meeting for a specific time. What kind of business sets its meetings to take place in a four-hour window?"

2.3 INCONSISTENT REQUIREMENTS ACROSS JURISDICTIONS

Most solar contractors that were interviewed agreed that the permitting requirements for renewable energy projects (including both permit fees and application processes) are more difficult in some municipalities than others. While the process generally boils down to a permit submittal and an inspection, the requirements under each permit and the length of each inspection vary widely among different cities, towns, and counties.[33]

Most local government building code requirements are based on the nationwide Uniform Building Code (UBC), as amended by the applicable state building code (such as the California Building Code, the Virginia Uniform Statewide Building Code, etc.). The electrical components of the state building codes are typically based on the NEC. However, in many cases the state and national codes are subject to the interpretation of local permitting authorities. SolarTech found that the variety of PV installation requirements among California municipalities "lack[s] consistency and transparency, which creates uncertainty and increases costs."[34]

One Oregon-based contractor agreed that local inspectors do not understand or are not aware of the NEC installation practices for PV. He noted how this lack of understanding causes the permitting and inspection procedures to vary considerably among jurisdictions. He described the effect of this inconsistency on solar contractors and noted that:

> "Part of the problem is that we have so many jurisdictions that interpret the NEC requirements differently that we need to change our permit application and installation habits for each jurisdiction."

Interconnection requirements from utilities can also vary somewhat, even though generally they are all based on the NEC, UL Standard 1741, and the IEEE Standards 1547 and 1547.1. Inconsistent interconnection requirements cause problems for contractors even in places, such as Texas, where there are few if any local government permitting obstacles. For example, because of deregulation of the electricity market in Texas, the Texas Solar Energy Society has lamented how the rules for accounting for grid-tied PV systems have become "fuzzy," leading to an "anything goes" approach which can delay or deter the installation of distributed renewable energy systems.[35]

2.4 PERMIT FEES

While permit fees almost always represent a small percentage of total project costs, the size of the fees and the manner in which they are assessed can vary greatly across municipalities. The Sierra Club PV permit fee study found that permit fees in the 131 municipalities studied ranged from $0 to $671, with an average fee of $224. The average fee was equal to 1.2% of the total post-rebate cost of $18,600 for a 3-kW peak output system.[36]

Inconsistent permit fees are a problem outside of California as well. One Arizona-based solar contractor interviewed described the incongruity of permit fees across neighboring jurisdictions:

> "Some [jurisdictions] allow mail-in applications that are pretty straightforward. Others are disorganized in regards to the permit fees. One time we paid $1,000 for a permit for a utility intertie system, and the next time

> we were charged $150 for a similar system. There is also variation in the documentation that the different jurisdictions require."

Fees are typically required as part of an electrical permit application, and if building or design review permits are required then additional fees often apply. While most are levied as a flat fee, some municipalities use a "valuation method" that calculates the fee as a percentage of the total cost of the system. The valuation method of assessing permit fees has the unintended consequence of discouraging homeowners from installing larger systems. As the Sierra Club study noted, under a valuation method, "The more a homeowner contributes to a city's renewable energy supply, the more that homeowner must sacrifice financially."[37]

The valuation method seems particularly unfair when one considers that the size of the system has little relation to the resources a city must devote to its inspection. The Sierra Club study quotes two electrical inspectors from San Francisco Bay Area cities who claim that large residential systems typically do not take longer to review or inspect than small ones. Therefore, the study recommends that all cities adopt a flat-fee method, which can cover the city's review and inspection costs while encouraging homeowners to invest in larger systems.[38]

> **THE HASSLE OF GETTING A PERMIT DISCOURAGES CUSTOMERS AND CONTRACTORS MORE THAN THE ACTUAL PERMIT COSTS.**

Even the highest permit fees represent a small portion of the overall cost of a residential-scale PV system, and most of the contractors interviewed agreed that the hassle of getting a permit discourages customers and contractors more than the actual permit costs; however, it is possible that in some cases these relatively small cost increases could impact homeowners' willingness to invest in PV installations by pushing payback periods out beyond a certain, undefined "tipping point," beyond which the cost of the system is deemed prohibitive.

2.5 COMMUNITY ASSOCIATIONS AND PRIVATE COVENANT RESTRICTIONS

Covenant restrictions enforced by private homeowner or "community" associations can also represent a barrier to distributed renewable energy systems. While not a local government planning and permitting barrier per se, covenant restrictions merit consideration in this report because they can add to the difficulties that homeowners experience when seeking approval to install PV or other distributed renewable energy systems on their homes. The APA addressed the problem of private covenant restrictions in its "Policy Guide on Energy":

> "b. The use of renewable energy equipment such as photovoltaic panels and solar water heaters is frequently discouraged in housing development covenants because people assume they will be unattractive."[39]

Most community associations appoint an Architectural Review Committee, which is responsible for enforcing the covenants, conditions and restrictions of the association. The U.S. Department of Energy's "Bringing Solar Energy to the Planned Community" describes how enforcement of these covenants can effectively prevent homeowners' from installing PV or other renewable energy systems for their homes:

> "Restrictive covenants are commonly used by planned communities to ensure that all units adhere to a common design theme, and to prevent activities deemed to be undesirable by the community at large... Restrictions on solar energy systems have become commonplace in many parts of the country.
>
> Unlike contracts, which bind only the actual parties to the agreement, restrictive covenants are said to "run with the land." This means that the benefits and burdens created by the restrictions are usually part of the deed or title to the property, and extend to all subsequent owners of the property.
>
> Absent an explicit agreement as to duration, courts will enforce restrictive covenants for a period of time that seems reasonable under the circumstances."[40]

ENFORCEMENT OF THESE COVENANTS CAN EFFECTIVELY PREVENT HOMEOWNERS FROM INSTALLING PV OR OTHER RENEWABLE ENERGY SYSTEMS FOR THEIR HOMES.

The restrictive covenants may in some cases explicitly prohibit the use of PV systems, but more commonly they indirectly affect the system by increasing costs or by impairing system efficiency. For example, the covenant may require that the system be located on a side or rear roof, so that it is not visible from the street. This requirement presents a problem if the south-facing roof surface (which receives the greatest amount of sunlight) faces the street. Or the covenant may require that the PV array be hidden with screening materials for aesthetic reasons. The need for screening increases the project cost and may reduce efficiency by casting a shadow on the PV array.[41]

PRIVATE COVENANT RESTRICTIONS

Community associations represent property owners within a planned community, condominium-complex, or cooperative and have the authority to regulate the appearance of individual homes, typically requiring "a uniform and consistent appearance within the development."[42] Among the tools used by community associations to enforce these requirements are private covenant restrictions.

Simply stated, covenants are promises that the buyer of property makes as a condition of purchasing the property. Generally, they are created when the developer files, with the property records, a declaration of covenants that restrict the use of the property for all subsequent owners. Because the covenants are filed with the property records in the jurisdiction where the property is located, and because they are referred to in the deed, some homeowners are not even required to be fully aware of the specifics of the restrictions when closing on their homes.

Over 42 million Americans were living under the authority of "community associations" in 1999. The number of these associations has grown tremendously over the past 30 years, from 10,000 in 1970 to over 200,000 in 2000. This trend is likely to continue. In fact, the Community Associations Institute projects that over half of all new developments in large metropolitan areas will be governed by community associations.[43]

Ten states have laws in place to prevent covenant restrictions that would prohibit or unreasonably affect solar energy use within planned communities: Arizona, California, Colorado, Florida, Hawaii, Iowa, Massachusetts, Nevada, Utah and Wisconsin; however these laws are routinely violated. Ironically, according to "Bringing Solar Energy to the Planned Community", private covenant restrictions on PV are most problematic in states (such as Arizona and Florida) where they are technically illegal, but in which laws banning those restrictions are not adequately enforced. Those parts of the country are where planned communities are most prevalent, and the community associations are often unaware that they cannot restrict renewable energy projects based on aesthetics. The responsibility falls to the homeowner to fight the restriction in court, something few homeowners are inclined to do.[44]

In Arizona, where planned communities are growing rapidly, state law is very specific in prohibiting associations from restricting solar energy:

> "Any covenant, restriction or condition contained in any deed, contract, security agreement or other instrument affecting the transfer or sale of, or any interest in, real property which effectively prohibits the installation or use of a solar energy device . . . is void and unenforceable."[45]

Nevertheless, one Arizona-based solar contractor that was interviewed reported that covenant restrictions are a significant barrier to PV in that state. Clearly, public education and outreach to community associations is essential, even in states that prohibit covenant restrictions.

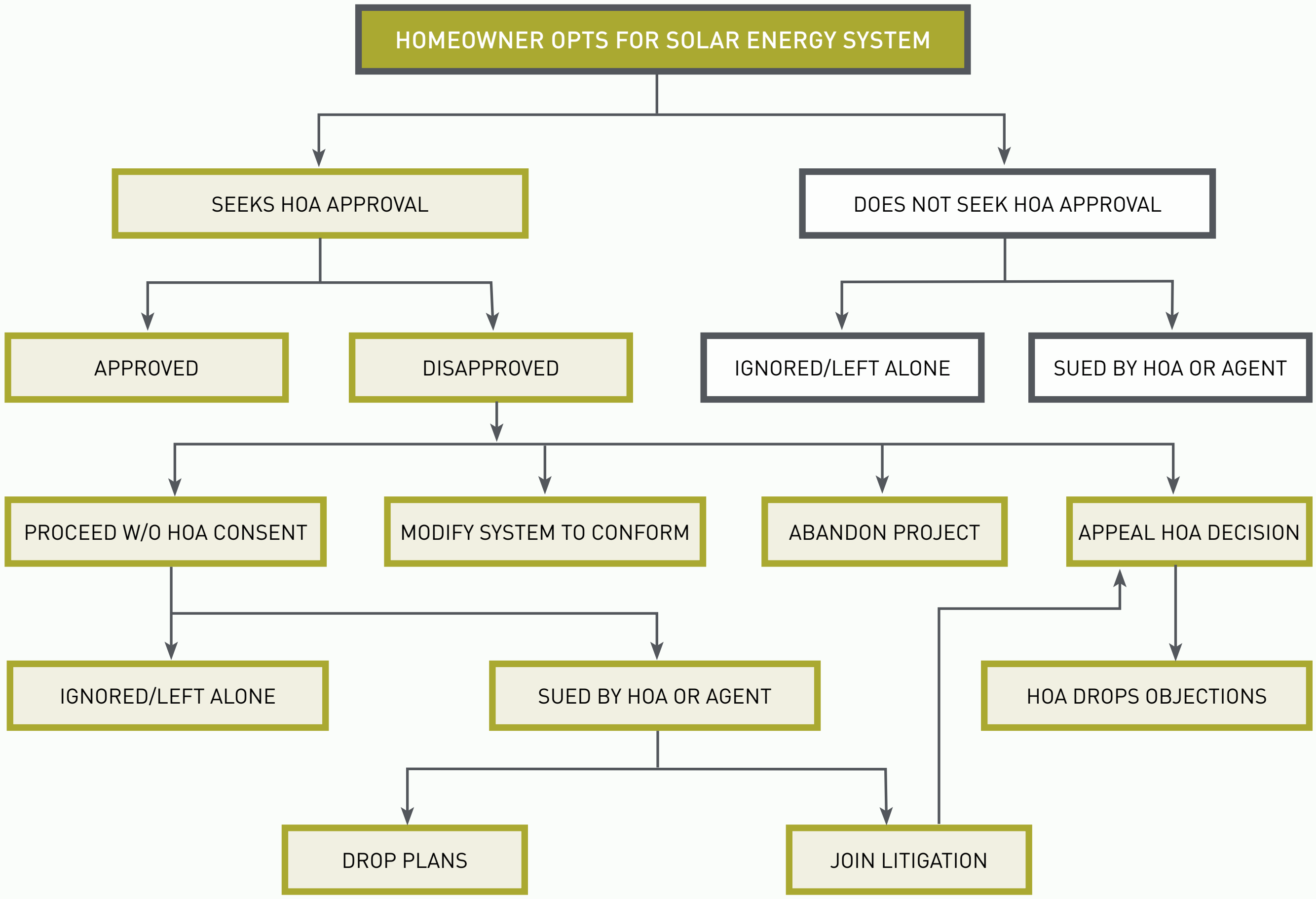
Johnny Weiss of Solar Energy International, a non-profit renewable energy advocacy group in Colorado, characterized community associations as "serious institutional barriers" to PV in parts of Colorado, even though the associations are prohibited by state law from restricting solar power. Weiss said that covenant restrictions are most common in newer subdivisions, due to aesthetic concerns and the perception that PV installations will reduce neighboring property values.[46] For example, a recent New York Times article recounted the case of a couple near Carbondale, Colo. whose plans to install a PV system on their home was vetoed by their homeowner's association on aesthetic grounds, despite state laws prohibiting such restrictions.[47]

As was demonstrated by the example in Carbondale, the design approval process is not necessarily a straight path. "Bringing Solar Energy to the Planned Community" includes a flowchart (see Figure 1) that illustrates the various options open to homeowners that face private covenant restrictions.[48] The flowchart provides several options and outcomes of negotiating the process of obtaining design approval.

2.6 SUMMARY: PLANNING AND PERMITTING OBSTACLES TO PV

The long-term viability of PV as a source of electricity in the U.S. will depend largely on bringing the cost per kWh of these systems to a level comparable to that of centralized, fossil-fuel based systems through a combination of technology improvements, government subsidies and economies of scale. Even if the costs can become comparable, it is unlikely that a majority of Americans will take the initiative to install residential PV systems if they perceive doing so to be a difficult, time-consuming process. The planning and permitting obstacles represent a significant hurdle to the long-term diffusion of distributed PV technology. In the short term, these obstacles discourage conservation-minded citizens who might otherwise be willing to make a long-term investment in solar energy systems and reinforce the false notion that distributed renewable energy is not a viable solution to our nation's energy crisis. Fortunately, a number of policy options are available to help overcome these hurdles, as shown in Chapter 4 of this report.

FIGURE 1 | Solar Energy System Options for Members of Homeowner Associations



Source: Starrs, Thomas, Les Nelson and Fred Zalcman. "Bringing Solar Energy to the Planned Community: A Handbook on Rooftop Solar Systems and Private Land Use Restrictions."

Image from National Renewable Energy Laboratory (NREL).

CHAPTER 3

Local Government Planning and Permitting Barriers for Small Wind Turbines

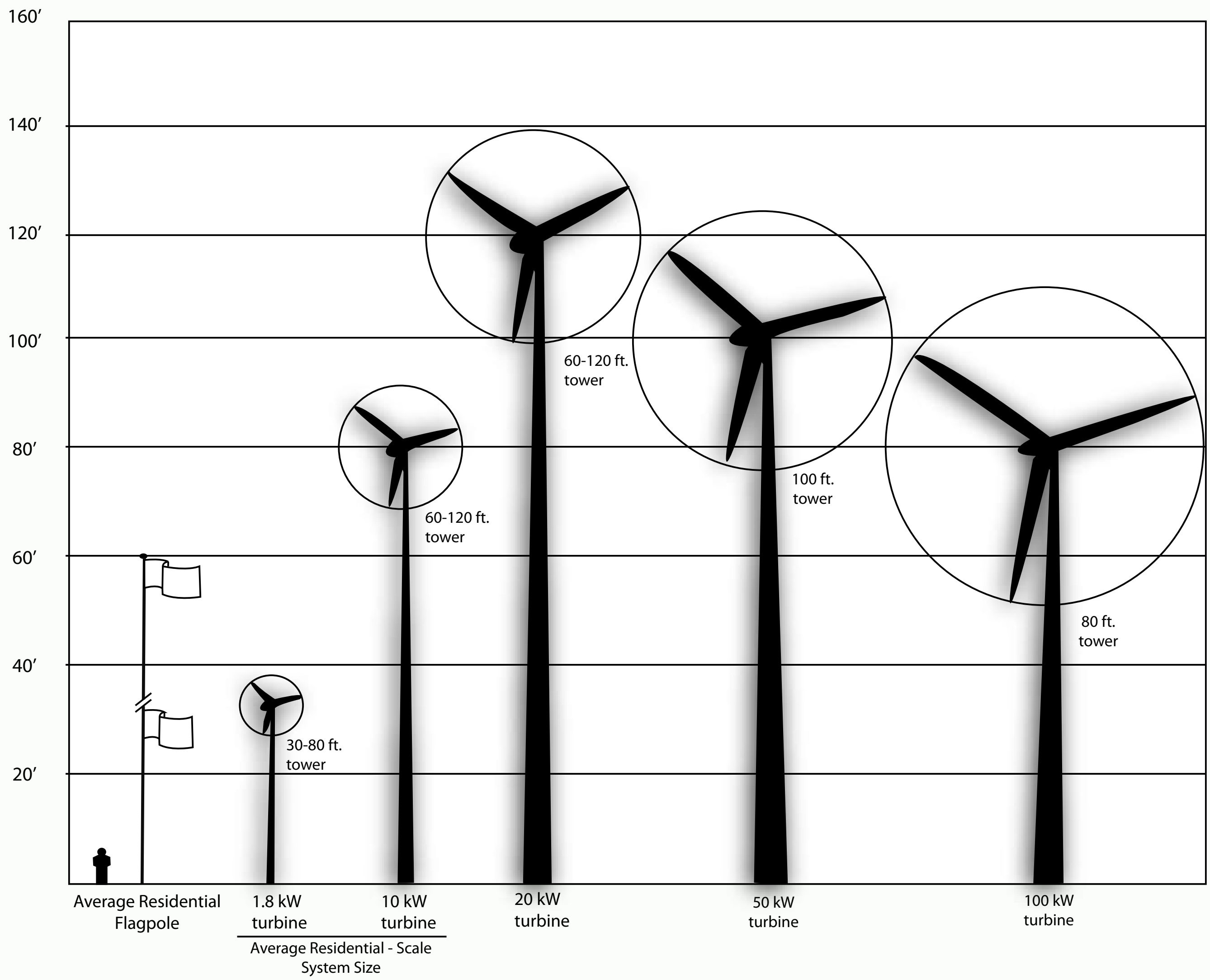
Wind turbines are among the fastest growing sources of electrical power for the United States. Less than 1% of the nation's electricity is currently supplied by wind power, and the vast majority of installed wind power capacity comes from "utility-scale" wind farms—projects involving anywhere from several dozen to several hundred wind turbines, each of which can be up to 300-500 feet tall and can generate 2-3 MW of electricity, enough to power hundreds of homes.

This report is concerned with much smaller wind turbines—those designed to serve a single residence, farm, or other small business. As illustrated in Figure 2, residential-scale turbines are significantly smaller than the utility-scale turbines. The American Wind Energy Association (AWEA) describes "small wind turbines," as follows:

> "A typical residential wind energy system includes a 10 kW turbine, with rotors measuring perhaps 23 feet in diameter, mounted on an 80-foot tower. Such a system is suitable for meeting the electricity needs of a household or small business. Turbines as small as 400 watts, with rotors only 46 inches in diameter, may be employed for specific purposes, such as pumping water (for stock or irrigation) or running lights and appliances in a remote cabin or recreational vehicle."[49]

The term "small wind turbines" is used to describe wind energy generating systems consisting of a single "small" turbine and the tower, guy wires, and inverter equipment needed to support the single turbine (See Figure 3).

FIGURE 2 | Size Comparison of Turbines of Various Capacities

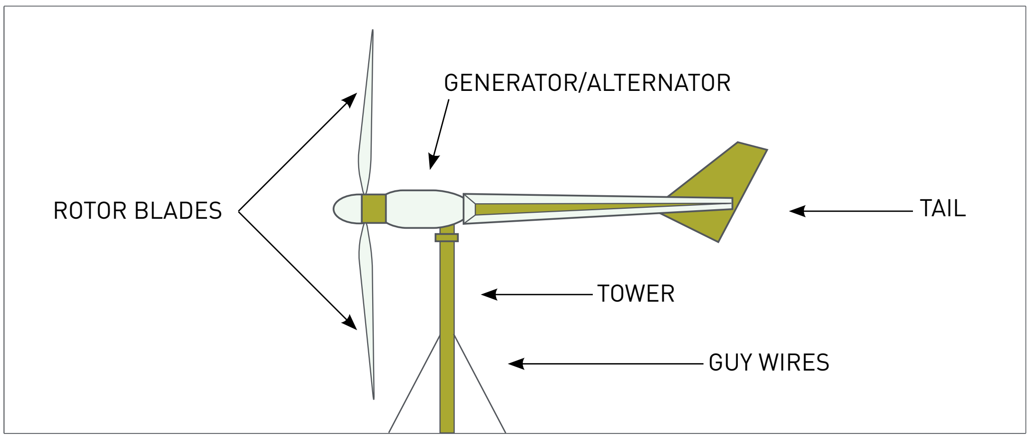


Source: American Wind Energy Association

Small wind turbines are subjected to many of the same local government permitting barriers as PV, particularly with respect to building and electrical permits. Small wind turbines have more potential impacts on the environment and nearby land uses than PV systems, and are therefore more likely to require planning and zoning permits. While some level of additional planning review is appropriate, excessive permitting requirements can present a significant deterrent to homeowners who wish to invest in small wind energy systems.

This chapter describes the planning and permitting processes that apply for most small wind projects and how these processes inhibit the expansion of wind power as a source of distributed renewable energy.

FIGURE 3 | Basic Components of a Small Wind Turbine



Source: American Wind Energy Association

3.1 APPLICABLE PLANNING AND PERMIT PROCESSES

Depending on the state and jurisdiction in which they are located, small wind turbines may be subject to several different planning and permitting procedures. For large energy facilities, including commercial-scale wind farms, some states have state level review processes that essentially circumvent local review; however, small wind projects typically require local government approval, including both planning permits (such as a conditional use permit) and building and electrical permits. Depending on the location of the project, additional permits may be necessary to ensure compliance with state and/or federal regulations.

3.1.1 Building and Electrical Permits

Most wind turbine projects must receive building and electrical permits.[50] The processes and requirements for obtaining these permits are similar to those for PV systems and are, therefore, not discussed in detail in this chapter. Many utilities will require additional inspections for grid-connected wind systems. In the state of New York, for example, the local utility that will receive a wind turbine's electricity is responsible for inspecting and approving the turbine equipment, collection system, substation, and interconnection.[51]

3.1.2 Local Planning and Zoning Requirements

Most local governments in the U.S. use zoning regulations to guide the growth of the community. In the state of New York, for example, about 78% of the state's municipalities use zoning.[52] Where no zoning rules are in place, approval of a small wind energy project would likely require only building and electrical permits. Where zoning is used, more stringent reviews are typically required to ensure that the project is compatible with surrounding land uses. The New York State Energy Research and Development Authority (NYSERDA) has described the following land use designations that may apply to small wind facilities in municipalities that use zoning:

- **APPROVED AS A PERMITTED USE.** This is most common in remote, rural areas where potential negative impacts to nearby properties are minimal. A permitted or "allowed" use can be approved "over-the-counter," without a public hearing, if applicable design standards are met;

- **APPROVED AS A "SPECIAL USE" (ALSO KNOWN AS A "CONDITIONAL USE PERMIT" OR CUP).** This process requires a more detailed application, which is the subject of a discretionary review process by the local planning board and usually requires a public hearing;

- **APPROVED PENDING A SITE PLAN REVIEW.** A review of the project site and nearby land uses and environmental conditions is generally required for approval as part of a special use permit application;

- **ALLOWED AS AN ACCESSORY USE.** If wind facilities are not listed as a permitted or allowed use within a certain zone, then the municipality can list them as an accessory use. This designation avoids the need for special use permits for future wind projects;

- **PERMITTED WITH A VARIANCE.** A variance can be used to waive or modify the zoning requirements (such as setbacks or height requirements) for a permitted use. Technically speaking, variances should only be issued in cases where zoning regulations impose an unreasonable burden on a property owner; however, many municipalities interpret this requirement broadly, and use variances to adjust building height requirements or other design standards on an ad-hoc basis. Variances are typically issued by the local planning authority through a quasi-judicial review process, and generally require a public hearing; and

- **ALLOWED IN AN OVERLAY ZONE.** An overlay zone (see Glossary) is used to provide new regulations that modify and/or supersede the rules of the existing "base" zone. For example, a wind energy overlay zone can establish expedited approval procedures in the parts of a jurisdiction that have been identified as appropriate for wind energy facilities.[53]

The simplest application process occurs when wind energy facilities are listed as an "approved" or "permitted" use according to the property's zoning designation. In this case the facility must be approved as long as it meets certain design standards, such as turbine height and setbacks, and other applicable requirements. For example, in Oregon, state law requires cities and counties to allow wind turbines on any land zoned for agricultural use, as long as the proposed project:

> "(a) . . . will not force a significant change in accepted farm or forest practices on surrounding lands devoted to farm or forest use; and (b) will not significantly increase the cost of accepted farm or forest practices on lands devoted to farm or forest use."[54]

The law also requires Oregon jurisdictions to list wind turbines as an allowed use on land zoned for Forest Uses, provided that the projects:

> "(a) . . . will not force a significant change in, or significantly increase the cost of, accepted farming or forest practices on agriculture or forest lands; (b) The proposed use will not significantly increase fire hazard or significantly increase fire suppression costs or significantly increase risks to fire suppression personnel; and (c) A written statement recorded with the deed or written contract with the county or its equivalent is obtained from the land owner which recognizes the rights of adjacent and nearby land owners to conduct forest operations consistent with the Forest Practices Act and Rules."[55]

The rules and procedures for obtaining approval for a wind turbine that is an allowed or "permitted outright" use will vary by state and jurisdiction, but typically involve an application showing that the proposed project would meet any applicable design standards or other requirements. If all applicable requirements are met, the project can often be approved "over-the-counter," without a public hearing. If the proposed facility is allowed by the applicable zoning, but would not meet one or more of the design standard requirements, then the applicant can seek a variance to have those standards waived. This may require a public hearing.

3.1.3 Conditional Use Permits

While some localities permit small wind turbines outright in certain zones, it is more common for small wind installations to be labeled as "conditional" or "special" uses. In these cases, a conditional or special use permit is required before the system can be constructed. This is a more rigorous review process, which typically involves a public hearing.

Northwest Sustainable Energy for Economic Development (SEED) has prepared a guidebook that describes the permitting processes for community-scale wind projects in Oregon. The guidebook describes the type of information that is generally needed in a CUP application for a medium to large-scale wind project. The CUP process, if necessary, would be similar for a small wind project.

The applications typically must include a detailed site plan, which provides a legal description of the subject property and identifies the location of the facility within the property as well as the location of nearby structures or natural features. The application must also include a written analysis describing environmental conditions on the subject property (and in the surrounding area) and analyzing the project's potential natural resource, cultural, and neighborhood impacts.[56] A decision to approve or deny the application is typically based on the following considerations:

- Public health and safety;
- Siting and installation;
- Setbacks from residences, roads, and property lines;
- Nuisance impacts, such as sound and electromagnetic/microwave interference;
- Environmental impacts, such as avian mortality and soil erosion; and
- Visual impacts.[57]

Often, planning commission staff members are asked to make a recommendation on the permit application, considering the aesthetic, environmental and economic impact of an installation. The Energy Trust of Oregon's "Community Wind: An Oregon Guidebook" describes this procedure as it exists for typical community-scale wind turbines:

> "If a city or county Conditional Use Permit or Zoning Variance is sought, there will be a public hearing of the county planning commission to present the project application and solicit public feedback. When such a decision-making body is involved, it is common for planning department staff to review the application first. Staff will then provide the decision-making body with a recommendation for whether to approve or reject your permit application and will suggest conditions for approval. This recommendation is based on local zoning and permitting ordinances, the details of the application, and the project's anticipated compliance."[58]

In the state of New York, wind facility applications may be reviewed by "a local enforcement officer, the planning board, the zoning board of appeals, the local legislative body, or some combination of these," depending on the size of the proposed facility and the municipality in which it is located. NYSERDA recommends that municipalities establish processes that minimize the number of different bodies that must review each application.[59]

3.1.4 Additional Agency Review

In some cases, a proposed wind energy project may also be reviewed by adjacent or surrounding jurisdictions. In the state of New York, for example, proposed special use permits or site plans must be referred to the applicable county or regional planning agency for input if the proposed facility would lie within 500 feet of a municipal boundary, a county or state park, road, stream, public building, or a farm operation located in an agricultural district. Such referral is also necessary if a municipality wishes to amend its comprehensive plan or zoning ordinance to accommodate wind projects.[60]

The local authorities may also have to seek input or approval from state and federal agencies, particularly when reviewing the environmental impacts of a proposed wind facility. This is most commonly required for large, commercial-scale wind facilities, such as in the case of a proposed wind farm near Mosier, Ore. that was required to modify the layout of its turbines to mitigate visual impacts within the nearby Columbia River Gorge National Scenic Area.[61]

However, state or federal review could be necessary for smaller projects under certain conditions, such as if they would adversely impact agricultural lands, water bodies, or designated wildlife habitat, or if they would be located near federal facilities or other important infrastructure. For example, the Federal Aviation Administration (FAA) must review all turbines that would be located near airports, military facilities, or aviation corridors.[62]

3.2 LOCAL GOVERNMENT PLANNING AND PERMITTING BARRIERS

The barriers to small wind installations presented by local government permitting processes include excessive zoning requirements, undefined approval processes, conditional use permit applications, and unsupportive regulatory boards.

3.2.1 Excessive Zoning Requirements

All of the wind energy experts interviewed agreed that local zoning ordinance requirements can be a significant barrier to the siting of small wind energy systems. Brian Antonich, a Minnesota-based wind energy consultant, identified a number of zoning-related obstacles to small wind installations, including excessive setback requirements and burdensome height restrictions.[63] In many cases, the latter is a by-product of outdated zoning ordinances. For example, Minnesota's height restriction originally was adopted to prevent structures from exceeding the maximum height that fire hoses could spray. According to Dr. Jonathan Miles, of the Virginia Wind Energy Collaborative (VWEC) at James Madison University, zoning-related height restrictions are particularly burdensome to small wind energy installations.[64] In Virginia, most county zoning ordinances have a 35-foot height restriction. Since most tower-mounted small wind installations require towers that are between 80 and 120 feet tall, owners must seek a variance to the local zoning ordinance in order to install most systems.[65]

Another problem is that some zoning ordinances require small wind installations to be approved by a state-certified engineer.[66] Because the costs of obtaining the approval are borne by the installer, this requirement can add several thousand dollars to the project cost. However, the requirement is often unnecessary because most small wind installations are purchased from established, nationwide firms that employ certified engineers to ensure their products' safety and effectiveness. A requirement that each system be inspected by a state-certified engineer adds significant cost while essentially duplicating work that the manufacturer has already done. At a minimum, these requirements should be modified so that this certification can be provided by the manufacturer or supplier, without the need for a site visit from an independent inspector.

REQUIRING A STATE-CERTIFIED ENGINEER INSPECTION ADDS SIGNIFICANT COST AND DUPLICATES WORK ALREADY DONE BY THE MANUFACTURER.

AWEA has identified additional types of excessive permitting requirements, including lighting requirements that exceed FAA rules, fencing requirements, requirements that all wind turbines "blend in with their environments" and mandatory security bonds for the removal of small wind turbines.[67] These security bonds makes sense for commercial systems (which are often installed on land leased from a farmer or property owner), but can be burdensome for landowners who wish to install a small system on property that they own.

3.2.2 Conditional Use Permit Requirements

Many wind energy advocates argue that small systems should be allowed as permitted uses, at least under certain conditions. For example, three counties in North Carolina recently approved ordinances identifying single-turbine small wind systems up to 20-kW capacity as permitted uses, as long as certain setback and height requirements are met (see Chapter 4 for more detail on these ordinances).[68] In contrast, the Town of Kill Devil Hills, N.C., recently adopted an ordinance identifying all wind turbines as conditional uses and establishing a maximum turbine height of 85 feet, thus effectively banning all but the smallest of wind energy systems.[69]

While some localities list small wind turbines as permitted uses, they are more commonly identified as conditional uses. Such a designation requires a much more time-consuming approval process, even without stringent height limits or other design standards such as those recently approved in Kill Devil Hills. Several of the small wind experts interviewed for this report noted that the time required to obtain a permit is the biggest obstacle presented by zoning requirements.

In addition, obtaining a conditional or special use permit typically requires a public hearing and a vote of the local planning commission and/or other governing body. Gaining approval thus becomes much more complicated than if the system were an allowed use subject only to an administrative review.

Public hearings for a conditional use permit also create an opportunity for citizen testimony against the project. Many proposed commercial-scale wind energy projects have met strong objection from citizens and community groups concerned about potential visual, sound, land use, safety, and environmental impacts. While these concerns are not without merit, the difference in scale between commercial wind energy projects and single-turbine small wind installations is substantial, and the potential impacts of the small systems are relatively minor if they are located in rural areas with sufficient setbacks from neighboring land uses.

AWEA has produced a series of publications intended to educate the public and dispel myths about the potential impacts of small wind installations. They address many of the concerns associated with wind energy projects and explain why those concerns should not apply to modern small wind systems. For example, some of the more common safety questions are addressed as follows:

- "Falling tower: Thousands of wind turbines are installed in the U.S., and their safety track record is excellent. Trees are much more likely to fall than a properly installed wind turbine, but no setbacks or minimum property sizes are required for trees.

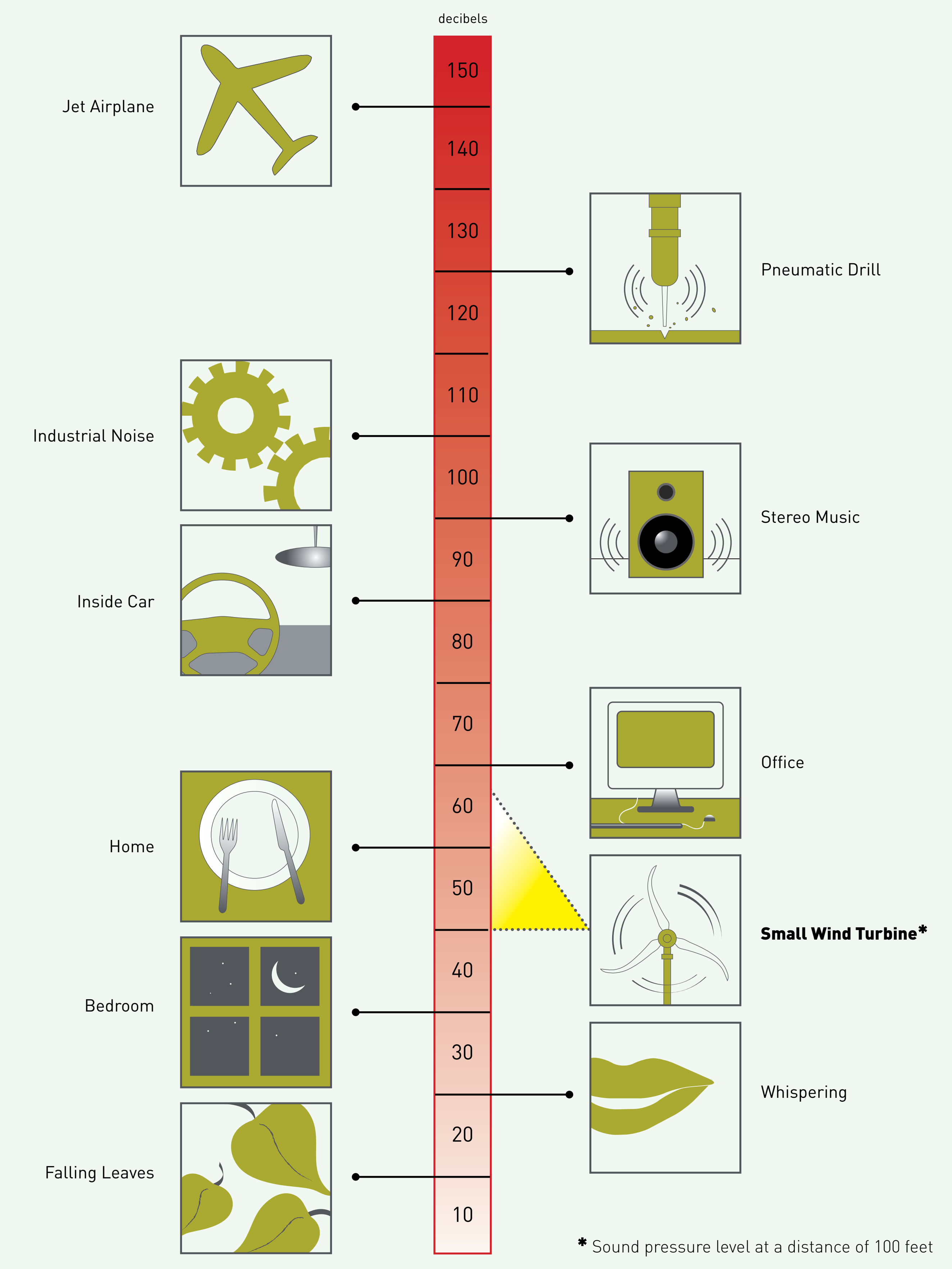
- Safety of utility repair personnel during a power outage: Small wind systems shut down automatically in the event of a power outage to protect utility workers, and will not energize a dead power line.

- Ice throw from rotor blades: Ice buildup makes wind turbine blades heavier and less aerodynamic, and therefore they turn more slowly. Typically, ice will drop to the base of the turbine tower instead of being thrown.

- Children climbing the tower and falling: Possible, but wind turbines should be treated no differently than other climbable structures such as water towers or amateur radio antennas."[70]

AWEA maintains that sound and visual impacts are negligible for most small wind installations. Much of the sound associated with utility-scale wind turbines actually comes from the high-speed transmission lines that receive their power output. Small wind installations do not connect to such transmission lines, and their only sound comes from the blades moving through the air. Studies have shown that the sound from a small wind system is negligible i.e., indistinguishable from background noise, (see Figure 4) at 300 feet or less.[71]

FIGURE 4 | Comparison of Wind Turbine Sound Levels to Other Common Sounds



Source: American Wind Energy Association

Visual impacts from small wind turbines are a matter of perception. To some, wind turbines are a visual blight that negatively impact the "character" of the surrounding community. To others they are an aesthetically pleasing symbol of progress and environmental responsibility. The visibility of a given small wind turbine depends on a number of factors, including tower height, setbacks from roads and nearby properties, and the surrounding topography. Fortunately, FAA rules only require lighting for towers that are at least 200 feet tall, and smaller wind turbines must only be lighted if they are located near airports or military bases.[72]

Potential bird and bat fatalities are another source of objection to proposed wind energy systems. Much of the concern about this issue is derived from the experience at Altamont Pass in California, one of the first commercial-scale wind farms in the U.S., which was built in a major flight path for golden eagles and other bird species and has resulted in significant bird fatalities. While potential bird and bat fatalities remain a very real concern for large, commercial-scale wind turbines, AWEA contends that this is much less of an issue for small wind installations. According to AWEA, birds are no more likely to hit a small wind turbine than any other structure, and far more birds are killed annually by domestic cats and by flying into sliding glass doors and windows.[73]

Because the potential negative impacts of small wind installations are so small, particularly when compared to those of commercial-scale wind farms, an administrative review procedure is appropriate for judging the merits of these systems. The longer, more rigorous conditional use permit review process is an unnecessary obstacle to the use of small wind turbines, and should only be required in places where potential conflicts with surrounding land uses have been specifically identified.

3.2.3 Undefined or Inconsistent Approval Processes

The consensus among the wind energy contractors interviewed is that the largest permitting obstacle in many municipalities is the lack of clearly defined processes for reviewing small wind installations. Even in municipalities where there is a defined approval process, it is rare that someone at the local government permitting authority understands the process and has experience dealing with wind project applications.[74]

Steve and Kathy Nelson, for example, live in San Joaquin County, Calif., an area with substantial experience with wind energy, and home to one of the world's largest wind turbine farms. The area is also subject to rules and rebates overseen by the California Energy Commission. Nevertheless, local permitting officials required two sets of plans for the Nelson's small wind installation: one from a civil engineer and one from a structural engineer. According to the Nelsons, local inspectors were often too busy to sign off quickly on the couple's plans and asked for revisions in an attempt to delay review. The Nelsons waited three months, for example, just for utility staff to approve the interconnection permit.[75]

Further obstacles to small wind installations are created when zoning ordinances do not distinguish between commercial and residential-scale systems. For example, in 2000, Dave and Jan Blittersdorf of Charlotte, Vt. sought approval for a 10-kW wind turbine (about the size to power one large home). Because no specific process for zoning and permitting small turbines was in place, the Blittersdorf's had to follow the same permitting process as required for large, commercial-size power plants, including approval from the state's Public Service Board. By the time the installation was approved, the process took 11 months and an estimated $9,500 in legal fees and personal time.[76]

Jennifer Grove of Northwest SEED, helped to develop a number of small, cooperatively-owned wind projects in Washington, Oregon, and Montana.[77] According to Grove, the permitting requirements for small wind projects varied greatly by municipality, and also by state. Montana, for example, had very few permitting requirements at the time (2003-2005) when the Northwest SEED projects were installed. The turbines were small enough that they did not trigger any land use or zoning laws, and electrical permits were easily obtained through the contractor who installed the systems.

In Washington, on the other hand, Northwest SEED experienced more difficult permitting processes.[78] Local permit approval there took longer and required greater detail, which increased the payback period for the installed system. Northwest SEED therefore had to seek additional financing support from local utilities Seattle City and Light and the Klickitat Public Utility District.[79]

These anecdotes indicate that poorly defined approval procedures can significantly slow the permitting process for homeowners and small businesses.

3.2.4 Unsupportive Regulatory Boards

In addition to the zoning regulations and related issues described above, small wind installations also encounter obstacles from the local permitting bodies themselves. Even if a proposal appears to meet all legal requirements, winning approval from the local planning commission, board of zoning appeals, or other applicable agencies may be difficult. This is due largely to a lack of understanding about the impacts of wind facilities and a general unwillingness to approve projects that are new or unfamiliar to the community.

Dr. Jonathan Miles of VWEC noted that wind energy projects in Virginia usually require the approval of the local board of supervisors (equivalent to a county commission in other states). As touched upon above, putting the decision in the hands of an elected body allows for greater discretionary decision-making than would be expected from a purely administrative review procedure. According to Miles, the boards in Virginia often defer to the objections of neighboring landowners rather than judge the applications strictly on the established permitting requirements. In many cases the neighboring landowners may object due to misconceptions about the impacts of small wind projects, or the belief that these projects have the same sound, aesthetic, and other impacts as large-scale wind farms.[80]

Miles recounted the story of two small wind projects that recently sought approval in Northumberland County, Va., which has adopted permitting language specific to small wind projects. The board of supervisors denied one applicant, but approved the second. According to Miles, the driving force behind the denial was the discomfort of a single neighboring landowner and a local developer, even though in the public hearing more people spoke in favor of the project than against it. The supervisors, while supportive of small wind in principle, may have acted out of an abundance of caution in an effort to avoid setting a controversial precedent. Miles noted that public education is essential to the expansion of small wind installations, especially if public hearings are required for local planning and permitting approval.[81]

PUBLIC EDUCATION IS ESSENTIAL TO THE EXPANSION OF SMALL WIND INSTALLATIONS, ESPECIALLY IF PUBLIC HEARINGS ARE REQUIRED FOR LOCAL PLANNING AND PERMITTING APPROVAL.

Wind energy consultant Brian Antonich reports that small wind projects face similar barriers in the upper Midwest, where local zoning boards can be fairly conservative. Like their Virginia counterparts, Midwest zoning officials do not want to change systems or processes that have worked in the past, and are hesitant to change planning or permitting rules for technologies whose success had not yet been demonstrated to them; however, Antonich suggests that this situation is changing as "more and more people are starting to see renewable energy as the way of the future."[82]

Demonstration projects, which allow community members to see small wind turbines and understand the relatively minor scale of their impacts, may be particularly effective at overcoming community objections. For example, Chesapeake Renewable Energy in Richmond, Va. set up a 1-kW system on public land in nearby Northumberland County, on property outside the county courthouse.[83] The demonstration provided local citizens and the county's board of supervisors with a working example of a small wind turbine and to allay concerns about visual impact and sound. Since people have been able to see the demonstration turbine, local contractors feel that residents and officials are warming to the concept of small wind.[84]

3.3 SUMMARY: PLANNING AND PERMITTING OBSTACLES TO SMALL WIND

Small wind installations can be a viable source of relatively cost-effective distributed renewable energy, particularly for rural areas. While there are valid concerns about the potential negative impacts of large, commercial-scale wind farms, those concerns are, for the most part, not applicable to small, single-turbine wind systems. Nevertheless, small wind installations often face the same permitting requirements as much larger, more impactful systems. These permitting requirements present a number of undue barriers to the use of small wind installations, particularly when the process includes public hearings and/or discretionary hearings before planning commissions or other local legislative bodies. Fortunately, a number of policy options are available to help overcome these barriers, as described in Chapter 4 of this report.

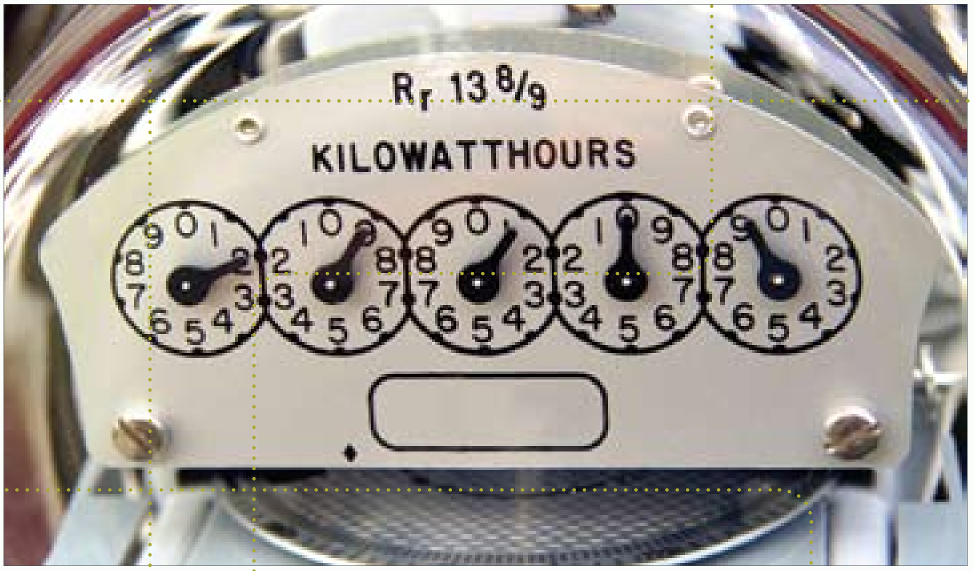


Image from iStockphoto

CHAPTER 4

Recommendations and Conclusions

This chapter includes three sections addressing the distributed renewable energy permitting obstacles described in the previous chapters. The first two sections offer recommendations on local government policies to ease permitting for PV and small wind systems. The third section offers recommendations for state level policies that would support local government recommendations and help to overcome existing permitting obstacles. The chapter concludes with a discussion of the need to inform and educate local governments about these obstacles, and ways in which those obstacles can be overcome.

4.1 LOCAL GOVERNMENT POLICIES FOR PV

The following recommendations reflect actions that can be taken by local governments (e.g., cities, towns, or counties) to facilitate permitting processes and remove barriers for installation of distributed solar photovoltaic (PV) systems.

RECOMMENDATION 1: REMOVE BARRIERS TO PV SYSTEMS FROM BUILDING AND ZONING CODES.

4.1.1 Removing Regulatory Barriers

Perhaps the most obvious step that local governments can take in support of PV systems is to remove barriers that may be built into their building or zoning codes, such as by exempting PV systems from building height limitations or building permit and design review requirements. The city of Los Angeles, Calif., for example, exempts solar energy devices (PV or solar water heaters) from building height limits, as long as the systems are sufficiently set back from the perimeter of the roof.[85]

RECOMMENDATION 1-A: EXEMPT ROOF-TOP PV SYSTEMS FROM BUILDING HEIGHT LIMITATIONS.

Ideally, building permits should not be required for most standardized, residential-scale PV systems. Electrical permits and inspections will always be necessary to ensure the safety and reliability of the installation, but separate building permits are arguably unnecessary for most systems. For example, the city of Santa Cruz, Calif. does not require building permits for solar energy systems that do not extend beyond 12 inches from the building roof or are not visible from a public thoroughfare.[86] Similarly, the city of San Jose, Calif. does not require building permits for roof-mounted systems that extend less than 18 inches above the roof surface, weigh less than 5 pounds per square foot, and do not exceed a maximum concentrated load of 40 pounds at any point of support. In San Jose, homeowners or solar contractors can apply for PV system electrical permits "over-the-counter," using a simple checklist. If the above criteria are met then the system can be approved after a brief follow-up inspection.

RECOMMENDATION 1-B: ALLOW "OVER-THE-COUNTER" BUILDING PERMITS FOR STANDARD ROOF-MOUNTED PV SYSTEMS THAT DO NOT EXCEED THE ROOF SUPPORT CAPABILITIES OF A STRUCTURE MEETING MINIMUM BUILDING CODE REQUIREMENTS.

If building permits are required, then proposed distributed PV systems should be judged strictly on their structural merits. Design review, which requires a homeowner to prove that planned improvements or home additions would not violate aesthetic guidelines set forth for the given neighborhood or zoning district, is required for PV systems in some jurisdictions. Such review may be appropriate under certain extreme conditions, such as in Historic Preservation districts, but for the most part roof-top PV systems should be exempted from such requirements or any other rules that could effectively prohibit such systems on aesthetic grounds. If a local government wishes to maintain design review requirements for PV then a self-certification procedure such as that used by the city of Oakland, Calif. is recommended.

RECOMMENDATION 1-C: DO NOT RESTRICT PV SYSTEMS ON AESTHETIC GROUNDS.

4.1.2 Streamlined Approval and Permitting Processes

The following recommendations are intended to support the wider utilization of distributed solar energy by reducing the time, paperwork and general inconvenience associated with building and electrical permit applications for PV installations.

4.1.2.1 Simplified Permit Applications

The contractors interviewed for this report described a wide range of application procedures for receiving a building or electrical permit. They universally recommended that permit application forms be as clear and simple as possible and that building permit applications, for example, should not require detailed site plans or elevation drawings for the entire property. If a building permit is necessary, the application should require a simple checklist on which the applicant can verify that the system would not exceed the load capabilities of the building's roof. The application review process should be, to the extent possible, limited to a single agency.

RECOMMENDATION 2: SIMPLIFY PV PERMIT APPLICATION FORMS AND REVIEW PROCESSES.

A related problem identified in this report is the wide discrepancy in permitting requirements often found among neighboring jurisdictions. The varying requirements prevent solar contractors from standardizing their application procedures and inhibit the use of PV systems across a region. It is recommended that local governments coordinate with neighboring jurisdictions to develop consistent permitting requirements for PV systems. This is perhaps best accomplished through regional councils of government. For example, the Maricopa County Council of Governments (including Phoenix, Ariz. and surrounding municipalities) developed standardized procedures for securing electrical and building permits for commercial and single-family residential PV systems. These procedures were then adopted by many cities in the region. Consistent permitting requirements can also be established at the state level, as described in section 4.3.2.

RECOMMENDATION 2-A: COORDINATE PV PERMITTING PROCEDURES WITH NEARBY JURISDICTIONS.

4.1.2.2 Electrical Permitting Standards

Standards are very important in the electrical industry to ensure the safe and reliable use of electricity. While the details of interconnection standards are beyond the scope of this report, it is important that PV equipment be tested by a nationally recognized testing laboratory. UL 1741 requirements set industry standards that work in conjunction with IEEE 1547 standards for interconnection and NEC installation requirements.

Streamlined application and inspection procedures should be established for installations using UL-listed equipment. UL 1741 lists specific makes and models of PV equipment that are safe and reliable if installed according to the NEC. Most states with interconnection standards specify that equipment used to connect to the grid must be UL 1741 listed and comply with the IEEE 1547 standards and the NEC to connect to the grid. The standards specify that the interconnection be tested according to IEEE 1547.1. Local governments should adopt these standards for connecting PV to the grid and ease the permitting and approval process for systems that meet these standards.

RECOMMENDATION 2-B: BASE PV ELECTRICAL PERMITTING REQUIREMENTS ON IEEE 1547 AND UL 1741.

In adopting these standards local governments can reference the PV permitting guidelines prepared by Brooks Engineering for the Pace University Law School Energy Project and those prepared by the Florida Solar Energy Center (FSEC) and the Southwest Technology Development Institute at New Mexico State University (see Appendix E for additional information on these standards).

4.1.2.3 Inspector Education

One of the more common criticisms shared by the contractors interviewed for this report was the local permitting authorities' lack of familiarity with current PV and small wind technologies, which typically delays review processes and adds cost to the homeowner and/or contractor. This includes both a lack of knowledge on the part of building and electrical inspectors and, in some cases, the lack of an identified set of requirements on which to evaluate the system. This lack of established requirements applies primarily to small wind systems.

Local governments should ensure that their building and electrical inspectors become familiar with distributed renewable energy systems as part of their standard training and continuing education requirements. If such training is not available through the standard building inspector certification bodies, then inspectors could attend training sessions offered to solar installers, such as the certification and continuing education programs offered by the North American Board of Certified Energy Practitioners. Inspectors with the city of San Jose, Calif., for example, actively participate in PV training programs held by a local chapter of the International Brotherhood of Electrical Workers (IBEW).[87] One city inspector reported having attended "six to eight" PV training sessions in approximately five years.[88]

RECOMMENDATION 2-C: PROVIDE TRAINING TO EDUCATE BUILDING AND ELECTRICAL INSPECTORS ABOUT PV TECHNOLOGY AND INSTALLATIONS.

Local governments can also take advantage of FSEC's "PV System Design Review and Approval" process and the "Inspector Guidelines for PV Systems" prepared by Brooks Engineering for the Pace University Law School Energy Project.[89] These guidelines are good examples of how to establish a uniform permitting process that follows a set of best practices that ensure public safety and provide a standard curriculum for helping inspectors become more prepared to review the installation of distributed PV systems.

RETAP'S INSPECTOR GUIDELINES FOR PV SYSTEMS REPORT

The "Inspector Guidelines for PV Systems" report was prepared by Brooks Engineering for the Renewable Energy Technology Analysis Project (RETAP) of the Pace University Law School Energy Project. The report, funded by the U.S. Department of Energy, was published in 2006. These guidelines were developed to provide a framework for permitting and inspection of PV systems, assist local building code officials in evaluating and inspecting PV systems, and clarify installation requirements for PV system installers. They offer a common set of informational requirements needed to demonstrate satisfaction of electrical and building code standards, and thus may help to reduce the time, cost and uncertainty of local permitting processes.

The guidelines were drawn from the first-hand experience of many PV installers and inspectors throughout California and the rest of the nation. California was used for much of the data gathering because the high number of PV systems in that state has resulted in a significant knowledge base among both PV installers and inspectors. The guidelines are divided into two sections to reflect the two stages of the permitting process: the plan check stage, in which the information is reviewed for accuracy and completeness; and the field inspection stage, in which the installation is reviewed for compliance with the approved plans.

The overall objective of the guidelines is to facilitate the installation of safe PV systems at a minimum of cost and effort for the inspector and the installer. According to these guidelines, all PV systems installed for residential or commercial use should include proper documentation, proper structural attachments and proper wiring methods. Those failing to meet these basic requirements are a detriment to the long-term health and safety of the PV industry. While some code variations may be appropriate to reflect local conditions, such as wind loading or seismic concerns, most of the guidelines are intended to be applicable for all local jurisdictions.

4.1.3 Flat Permit Fees and Fee Exemptions

While even the highest of permit fees still represent a small percentage of the overall cost of a PV installation, they can serve to discourage investment in these technologies. Of particular concern is the use of "valuation-based fees," which calculate the cost of the permit as a percentage of the pre-rebate cost of the system. This type of fee structure discourages homeowners and small businesses from investing in larger systems by increasing the cost of the fees charged for such systems. To a large extent, the size of the proposed installation does not affect the complexity or time required for the inspection (i.e., it is no more difficult to inspect a 10-kW system than a 1-kW system), so the extra permit fee for a larger PV system is not necessary. This report recommends a three-tiered fee structure involving a single, low-cost flat fee for PV systems on single-family homes and appropriately priced flat fees for multi-family and commercial PV systems. This fee structure should be sufficient to cover the variation in inspection costs associated with different-sized PV systems and would remove the disincentive for larger systems that comes with a valuation-based fee system. The use of certified PV equipment, standardized inspection criteria, and inspector training should further lower inspection costs for local permitting authorities, further justifying a flat-fee approach.

RECOMMENDATION 3: ADOPT FLAT PERMIT FEES OR FEE WAIVERS FOR PV AND SMALL WIND SYSTEMS.

Additionally, some localities have chosen to waive permit fees altogether for PV and other forms of distributed renewable energy. This sends a powerful symbolic message that the local government supports these technologies and the social and environmental benefits that they bring to the community. Some municipalities that have waived permit fees for PV installations include Tucson, Ariz., San Diego, Calif. and Fairfax, Calif.[90]

4.1.4 Financial Incentives for Developers and Homeowners

While not technically a tactic to address permitting barriers, it is worth mentioning here that a growing number of local governments are offering financial incentives to encourage the increased use of PV and other distributed renewable energy sources, including rebates (Austin, TX, among other municipalities), electricity generation credits (Montgomery County, Md.), property tax credits or exemptions, zero-interest loans and other measures to help reduce the up-front costs of distributed renewable energy systems. This is in addition to the wide range of tax credits, tax exemptions, and other financial incentives offered by the federal government, state governments, and utilities. Some municipalities also offer density bonuses or other incentives to encourage developers to include PV and/or energy efficient design in new construction. Many of these incentive programs are described in the "Database of State Incentives for Renewable Energy," a Web site maintained by the North Carolina Solar Center at North Carolina State University (see examples in Appendix F).

4.2 LOCAL GOVERNMENT POLICIES FOR SMALL WIND

Small wind energy systems face many of the same permitting obstacles that have been identified for PV, such as height limitations and other regulatory barriers, complex permitting procedures and a lack of familiarity with the technology on the part of building and electrical inspectors. The recommended approach to resolving these issues for small wind turbines is quite different, as they involve a much different set of impacts and a different permitting context. In many cases the greatest obstacle to small wind turbines is not overly burdensome permitting requirements, but rather the lack of any applicable planning and permitting guidelines. This lack of clear requirements means that proposed small wind turbines often face the same permitting process as would be applied to large, commercial-scale wind farms. Therefore, the recommendations focus on establishing guidelines that are appropriate to the scale of impacts associated with small wind energy systems.

The vast majority of small wind turbines are installed in rural areas, and the recommendations are therefore geared towards permitting these installations in a rural context (i.e., under the jurisdiction of a county or a rural town government). While there is increasing interest in developing small wind in urban areas, including roof-top systems, the technology for urban small wind energy systems is still evolving. The impacts of these systems are not fully understood, and therefore appropriate permitting procedures cannot yet be determined.

4.2.1 Comprehensive Planning for Small Wind

Most local governments maintain a comprehensive plan which describes existing conditions within the community as well as goals and objectives for the future of the community along with action items or strategies to achieve those goals. In some states, such as Oregon, these comprehensive plans carry the weight of law, and the jurisdiction must ensure that its day-to-day planning and permitting decisions are consistent with the comprehensive plan.

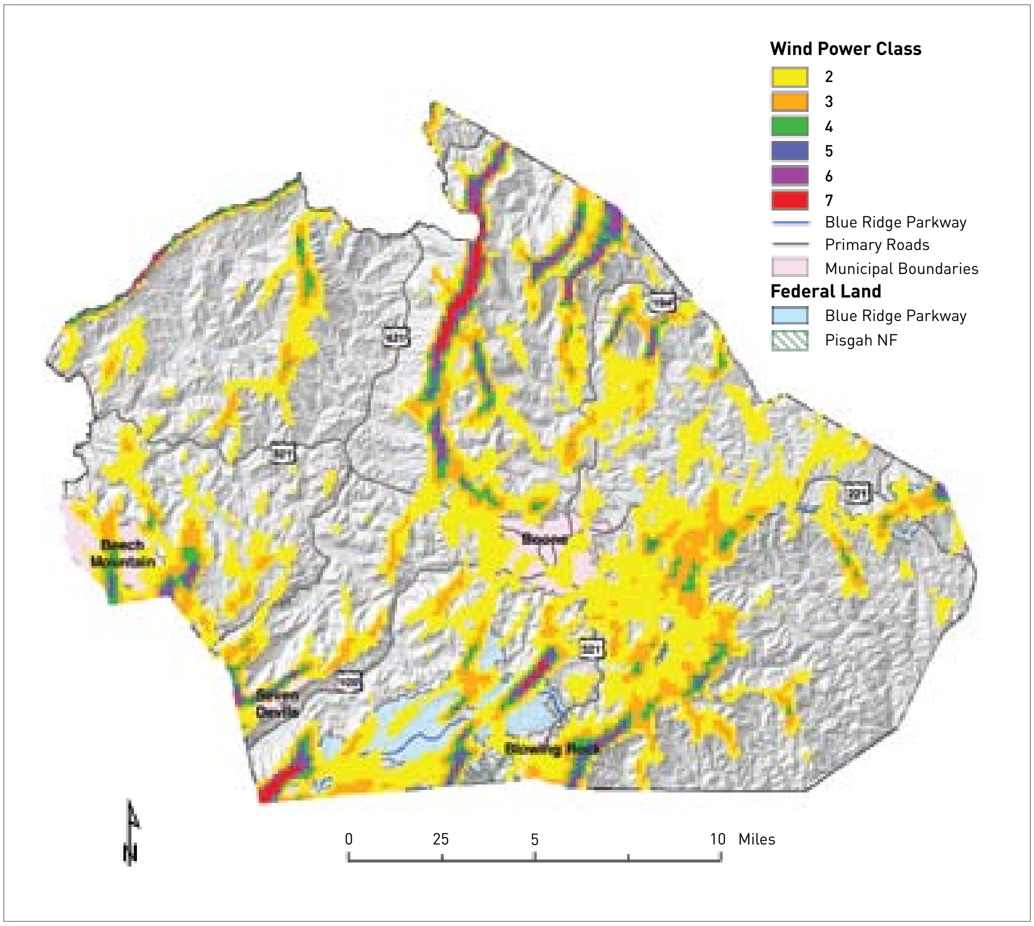
A local government can support wind energy by identifying it as a priority in the comprehensive plan. Ideally, the plan would describe the community's wind energy resources, discuss potential advantages and disadvantages of wind energy development and identify the areas within the jurisdiction that are best suited for wind energy systems as well as those in which wind energy development may conflict with surrounding land uses. This work paves the way for approval of small wind turbines as a permitted use and possible adoption of a Wind Energy Overlay Zone.

RECOMMENDATION 4: INCORPORATE INFORMATION ABOUT WIND ENERGY OPPORTUNITIES INTO THE COMPREHENSIVE PLAN.

Municipalities may be tempted to use publicly available wind resource maps, such as those produced by AWEA, to determine if there are appropriate areas for wind energy development in their jurisdictions; however, most large-scale maps do not provide the level of specificity needed for siting small wind turbines.

The quality of the wind resource must be measured on a case-by-case basis for small wind turbines, as a specific site can have a high quality resource even if the surrounding area is shown on these maps as having moderate or poor wind resources. In some cases, smaller-scale, localized wind resource maps may be available, such as that shown in Figure 5, which may be useful in identifying areas that are ideal for wind energy development.

FIGURE 5 | Wind Resource Map for Watauga County, N.C.



Source: North Carolina Energy Center Small Wind Initiative.

All of the wind energy experts interviewed for this report identified the lack of clearly defined standards or permitting requirements as a major obstacle for small wind turbines. Identifying these criteria is important so that local governments can establish consistent, streamlined methods for approving or rejecting proposed small wind turbines. Such methods are further described in the following sections.

4.2.2 Appropriate Review Processes and Defined Review Criteria

Local governments serving rural areas should establish small wind turbines as permitted uses, with clear permitting procedures and well-defined criteria by which proposed installations will be evaluated. This can be accomplished by revising the applicable sections of specific zoning designations (e.g., identifying small wind systems as an allowed use within a rural residential zone), or by adopting a stand-alone small wind ordinance.

RECOMMENDATION 5: ESTABLISH SMALL WIND TURBINES AS PERMITTED USES WITH APPROPRIATE DESIGN GUIDELINES, PERFORMANCE STANDARDS, AND REVIEW PROCESSES.

It is recommended that local governments identify areas in their jurisdictions that may not be appropriate for small wind turbines, bearing in mind that the potential impacts of these systems are much smaller than those associated with commercial-scale wind farms. Municipalities may consider a number of factors when identifying these areas, including locations of endangered bird and bat habitat, density of existing or planned development and the location of sensitive land uses. Small wind systems should be designated as conditional uses in those areas, allowing proposed systems to be evaluated on a case-by-case basis. These evaluations should be based upon information available in the comprehensive plan, and should not require property owners or small wind turbine developers to prepare site-specific wildlife assessments or other highly detailed impact studies.

RECOMMENDATION 5-A: IDENTIFY AREAS WITHIN JURISDICTIONS WHERE SMALL WIND TURBINES MAY CONFLICT WITH SURROUNDING LAND USES.

Once the areas of potential conflict have been identified, small wind turbines should be designated as permitted uses in all other areas of the jurisdiction. This would significantly ease the permitting process for small wind turbines by avoiding the time and cost obstacles associated with seeking a conditional use permit.

RECOMMENDATION 5-B: IDENTIFY SMALL WIND TURBINES AS CONDITIONAL OR SPECIAL USES IN AREAS OF POTENTIAL CONFLICT AND AS PERMITTED USES IN ALL OTHER AREAS OF THE JURISDICTION.

Designating small wind turbines as permitted uses does not mean that their potential impacts must be ignored. Appropriate design guidelines and performance standards can be established to mitigate potential impacts.

The NYSERDA Wind Energy Toolkit recommends that small wind ordinances or zoning regulations should address the following objectives: "ensuring public safety, identifying and minimizing on- and off-site impacts, promoting good land use practice, expressing local preferences, informing and involving the public and providing legal defensibility." This will establish a streamlined review process that is fair to wind developers, the public, and the local government.[91]

AWEA suggests that a well-designed zoning ordinance should define "small wind energy systems" and clearly spell out the relevant restrictions on:

- Maximum rated capacity;
- Height limits;
- Setbacks;
- Allowable noise levels; and
- Required compliance with various standards such as the UBC, NEC and FAA regulations.[92]

Restrictions on maximum rated capacity and turbine height are appropriate to ensure that small wind systems are indeed "small," but they should not be so restrictive as to disallow modern residential-scale systems. AWEA defines small wind systems as those that have a maximum rated capacity of 100 kW and that are intended to reduce on-site consumption of utility power. However, the average capacity of residential scale systems is much smaller, around 10 kW.

RECOMMENDATION 5-C: ESTABLISH LIMITATIONS ON MAXIMUM RATED CAPACITY AND TURBINE HEIGHT THAT ARE UNAMBIGUOUS AND ARE SUFFICIENT TO ALLOW MODERN RESIDENTIAL-SCALE SMALL WIND TURBINES.

When establishing height restrictions, it is important to note that turbine height has a direct impact on the generating capacity of the system, and thus its economic viability, as higher turbines can access more powerful and consistent winds. In addition, taller towers reduce sound impacts on surrounding properties.[93] A forthcoming AWEA report, "In the Public Interest: How and Why to Zone for Small Wind Systems," recommends that tower height should be constrained by sound and setback requirements rather than a specific height limitation. If a tower height limitation is to be used, AWEA recommends a maximum of 80 feet. (not including rotor blades) for properties of less than one acre and no height limitation for properties larger than one acre, except when FAA regulations apply.[94] An alternative would be to establish a maximum height of 120 feet for properties larger than one acre, as that is the greatest tower height typically associated with small systems. The NYSERDA recommendations include specifying "a minimum height for the blade tips above ground level," such as 15 to 30 feet, thus allowing most small wind turbines while maintaining the necessary safety precautions on the ground.[95]

Setback requirements can mitigate visual and sound impacts by establishing a minimum distance between the proposed turbine and nearby buildings, property lines, and roads. Setbacks for wind turbines are often defined in terms of the turbine height, such as a minimum distance of 1.5 times the turbine height. Currituck County, N.C., employs a combination of minimum setbacks from neighboring property lines (the height of the turbine), occupied structures on neighboring properties (1.5 times the turbine height), public or private rights-of-way (1.5 times the turbine height) and major highways (2.5 times the turbine height).[96]

RECOMMENDATION 5-D: ESTABLISH APPROPRIATE SETBACKS, MEASURED IN TERMS OF THE TURBINE HEIGHT AND DISTANCE FROM THE NEAREST PROPERTY LINE.

Setback requirements are necessary to ensure public safety, but to avoid confusion it is important to clarify if "turbine height" refers to the top of the tower or the tip of the rotor blades at their highest point. The NYSERDA Wind Energy Toolkit includes some recommendations for appropriate setback requirements:

- Allow for reduced setbacks when possible without jeopardizing aesthetic, noise or safety considerations.

- Measure noise impacts at property lines, rather than at the location of nearby uses, and establish setbacks accordingly to prevent unreasonable noise impacts for possible future uses on adjacent parcels.

- Balance the "intended protective effect" of setbacks with the economic needs of potential wind projects, as very large setbacks intended for maximum impact mitigation could render a site largely unusable for wind turbines.[97]

Sound impacts are perhaps best regulated with a performance-based approach, i.e., allowing systems that do not exceed a certain decibel level. AWEA recommends a sound limitation of 55 dBA in residential districts and 60 dBA in non-residential districts, measured at the property line.[98]

RECOMMENDATION 5-E: ESTABLISH PERFORMANCE-BASED SOUND STANDARDS BASED ON A MAXIMUM DECIBEL READING OF 55-60 DBA MEASURED AT THE NEAREST PROPERTY LINE.

Another approach to regulating small wind turbines would be to prepare a list of certified turbine models. There is no established certification body at this time, but the Small Wind Certification Council (SWCC) is working on a certification system to be in place by 2009. This system will certify small wind turbines that meet certain sound, reliability, performance and safety standards.[99] Once the SWCC program is in place, municipalities can establish streamlined requirements for certified models, as their safety and reliability can be more easily estimated, as well as their sound, visual and other impacts.

RECOMMENDATION 5-F: STREAMLINE PERMITTING REQUIREMENTS FOR SMALL WIND TURBINE EQUIPMENT MEETING SMALL WIND CERTIFICATION COUNCIL REQUIREMENTS.

While all of the recommendations described in this section would help to establish appropriate review procedures and design guidelines for small wind turbines, approving these systems may still be difficult if local building and electrical inspectors are unfamiliar with wind energy technology. Indeed, this lack of familiarity was cited by many of the experts on small wind energy systems interviewed for this report. Therefore, training local inspectors in these technologies is highly recommended.

RECOMMENDATION 5-G: PROVIDE TRAINING TO EDUCATE BUILDING AND ELECTRICAL INSPECTORS ABOUT SMALL WIND TECHNOLOGY AND INSTALLATIONS.

4.2.3 Model Small Wind Ordinances

A number of counties in California have adopted small wind permitting programs as required by State Law AB 1207, approved in 2001. However, these programs are for permitting small wind systems with a conditional use permit. The "Database of State Incentives for Renewable Energy" identifies a handful of counties that have adopted permitting regulations similar to those recommended in this report, with small wind systems identified as a permitted use with well-defined standards and regulations. The design and performance standards required for small wind turbines in these counties are shown in Figure 6, along with the standards recommended in the AWEA model ordinance.

Camden and Currituck Counties, two adjacent jurisdictions in the northeast corner of North Carolina, adopted similar small wind ordinances in late 2007 and early 2008, respectively. The Camden County ordinance allows small wind turbines as permitted uses in its Light Industrial (I-1), Heavy Industrial (I-2) and General Use (GUD) zones. The GUD zone allows very low-density residential development and agricultural uses. Small wind turbines require a special use permit (similar to a conditional use permit) to be placed in any of the county's three primary residential zones. The Currituck County ordinance is more generous, identifying small wind systems as permitted uses in all zoning districts.

FIGURE 6 | Small Wind Ordinance Design and Performance Standards

Ordinance	Maximum Height (tower or rotor)	Maximum Capacity	Setback	Sound	Minimum Parcel Size
Camden, N.C.	150 feet (tip of rotor blade)	20 kW	1-1.5 times turbine height	None	None
Currituck, N.C.	120 feet (tip of rotor blade)	25 kW	1-2.5 times turbine height	None	20,000 square feet
Watauga, N.C.	135 feet (tip of rotor blade)	20 kW	1-1.5 times turbine height	None	None
Rockingham, Va.	80 feet (tower), or no limit on parcels > 1 acre	None	1-1.5 times turbine height	60 dBA at nearest property line	0.5 acre
AWEA model	80 feet (tower)	100 kW	10 feet from property line (guy wires)	60 dBA at nearest inhabited dwelling	None

Sources: Database of State Incentives for Renewable Energy; American Wind Energy Association.

Watauga County, located in the mountainous western portion of the state, also allows small wind turbines as permitted uses throughout the county. All three ordinances (those adopted by Camden, Currituck and Watauga Counties) include a separate, more rigorous set of requirements for larger wind turbines. The Watauga County ordinance was prepared by the Appalachian State University Energy Center's Small Wind Initiative, which also is developing a model wind energy ordinance for counties across North Carolina, that identifies small wind turbines as a permitted use in all agricultural, residential, commercial, and industrial/manufacturing zones.[100]

The Virginia Wind Energy Collaborative (VWEC) has drafted small wind energy ordinances for several counties in that state. The first of these ordinances was adopted by Rockingham County in 2004. Dr. Jonathan Miles, of VWEC, reports that many Virginia counties have indicated they would prefer to use a conditional or special use permitting process for small wind energy systems.

Therefore the VWEC has developed a model ordinance that is a suitable alternative in those circumstances. The Rockingham County ordinance, for example, allows small wind systems in the county's agricultural zones, but requires a special use permit application and a public hearing before the Rockingham County Board of Supervisors.[101]

4.2.4 Wind Energy Overlay Zones

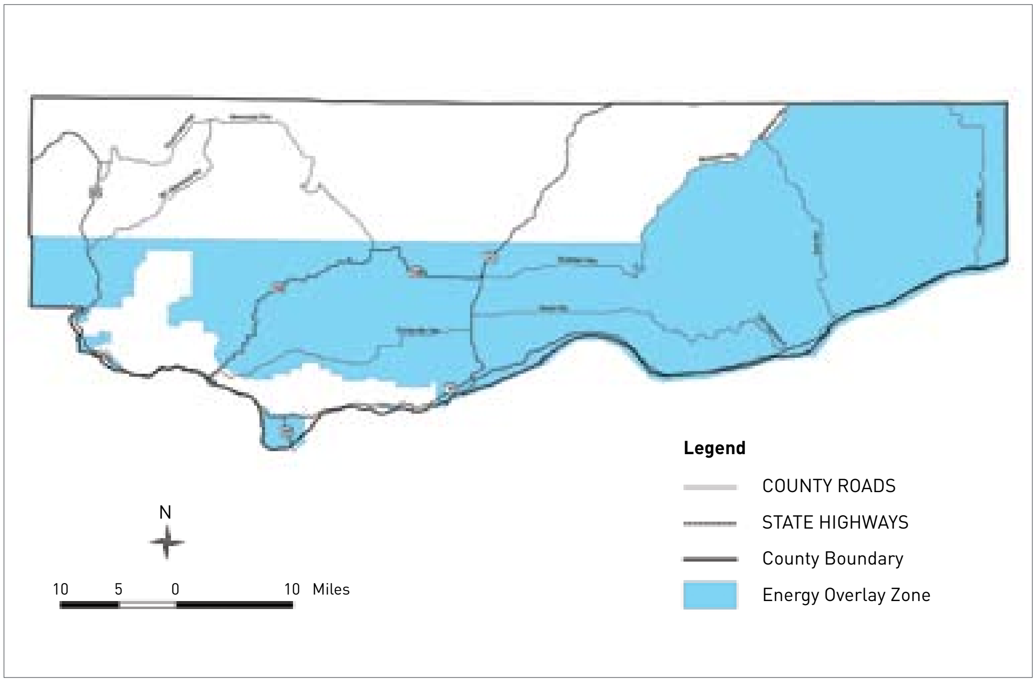
An alternative approach to removing permitting barriers for small wind energy systems is adoption of a wind energy overlay zone that establishes a streamlined review process for wind energy facilities in areas identified as suitable for wind energy development. The new requirements of the overlay zone would supersede those of the underlying "base" zone, as they apply to wind energy facilities, but the base zone requirements would remain in place for all other uses. Areas not in the overlay zone would retain the more stringent approval procedures identified in their base zoning requirements.

> **RECOMMENDATION 5-H:** AS AN ALTERNATIVE TO RECOMMENDATIONS 5-A AND 5-B, CONSIDER ADOPTING A WIND ENERGY OVERLAY ZONE THAT IDENTIFIES APPROPRIATE AREAS FOR WIND ENERGY USE, DESIGNATES SMALL WIND TURBINES AS PERMITTED USES, AND ESTABLISHES APPROPRIATE DESIGN GUIDELINES AND PERFORMANCE STANDARDS.

The overlay zone approach differs from the recommendations described above, as it establishes a streamlined permitting process only in designated areas. Therefore, it is important to note that an overlay zone, if not properly written, could have the unintended effect of preventing or discouraging small wind systems outside of the overlay zone. To prevent this unintended consequence the zone should cover a large area, including all parts of the jurisdiction that are appropriate for wind energy development. In addition, a CUP process or other mechanism should be maintained for approving small wind turbines outside of the overlay zone.

Klickitat County, Wash. has a Renewable Energy Overlay Zone illustrated in Figure 7 that permits small turbines outright and eases the permitting process for larger projects. County planners created the overlay zone by determining the most appropriate areas for wind energy development, taking into consideration the local wind resources, sound mitigation, avian corridors, visual impact, transportation, land values and other important impacts that are typically considered by zoning authorities. The resulting overlay zone covers the vast majority of the County, excluding primarily urbanized areas and land within the Columbia River Gorge National Scenic Area.

FIGURE 7 | Klickitat County Renewable Energy Overlay Zone



Source: Klickitat County Planning Department, April 2008.

Prior to County adoption of the overlay zone, all small wind projects were required to obtain a conditional use permit.[102] Small wind systems, defined by the County as turbines no taller than 120 feet and generating no more than 25 kW of power, are now permitted as an allowed use throughout the overlay zone. The overlay zone includes detailed mitigation requirements for commercial-scale wind systems. Although small wind turbines are exempted from those requirements, the county suggests that the mitigation measures listed for larger systems be used as a guide to reduce the impacts of small wind turbine installations.

4.3 STATE POLICIES FOR DISTRIBUTED RENEWABLE ENERGY

This report has primarily focused on local government planning and permitting barriers to distributed renewable energy systems and policies municipalities can adopt to remove those barriers. This final set of recommendations identifies three ways in which state governments can help to overcome those barriers.

4.3.1 Statewide Interconnection and Training Standards

States can ease distributed renewable energy permitting processes for their localities by establishing statewide interconnection standards for renewable energy equipment and by conducting training and certification programs to familiarize local building and electrical inspectors with those technologies. Such statewide standards and programs would also help to mitigate the problem of inconsistent permitting requirements and understandings of distributed renewable energy systems across jurisdictions, described primarily in Section 2.3.

RECOMMENDATION 6: EASE PERMITTING PROCESSES BY ESTABLISHING STATEWIDE INTERCONNECTION STANDARDS AND EDUCATING BUILDING AND ELECTRICAL INSPECTORS ABOUT PROPER INSTALLATION PROCEDURES FOR DISTRIBUTED RENEWABLE ENERGY SYSTEMS.

The FSEC provides one example of a statewide certification program. The FSEC has been mandated by state statute to set standards, conduct tests and evaluations, and certify solar energy systems and equipment manufactured or sold in the state of Florida.[103] The FSEC's "Standardized Procedures for Photovoltaic System Design Review and Approval" identify how PV systems are certified in Florida.

RECOMMENDATION 6-A: ESTABLISH STATEWIDE PV INTERCONNECTION STANDARDS THAT USE IEEE 1547, UL 1741, AND THE NEC.

In establishing training and certification programs, states should draw on existing institutions and other educational providers who offer renewable energy and code compliance courses. Ideally, the courses should be offered by any accredited university, college, community college, or vocational-technical institute; or offered by any joint apprenticeship and training committee, such as the National Joint Apprenticeship & Training Committee (NJATC) and IBEW; or approved by the state contractor licensing boards; or offered by a training program accredited by the Interstate Renewable Energy Council (IREC) to the Institute for Sustainable Power Quality (ISPQ) Standards or similar accrediting body. The course should include at least six hours of instruction and offer continuing education credits. Its purpose should be for the inspectors to better understand the NEC requirements for designing and installing PV systems. Participants should be provided with an intensive overview of the codes and standards that govern small-scale, solar electrical generation.

RECOMMENDATION 6-B: ESTABLISH STATEWIDE TRAINING AND EDUCATION PROGRAMS FOR BUILDING AND ELECTRICAL INSPECTORS ABOUT PV TECHNOLOGY AND INSTALLATIONS.

4.3.2 Preemption of Local Permitting Authority

Preemption, in the context of land use and planning, is when a higher legislative authority, such as a state legislature or federal government, overrides home rule in order to implement its preferred form of land use policy. Preemption from the state or federal level can force the hand of local governments to develop efficient

THE FLORIDA SOLAR ENERGY CENTER

The Florida Solar Energy Center (FSEC) at the University of Central Florida tests and evaluates all solar thermal and PV systems manufactured or sold in the state. State law requires FSEC to certify PV module power ratings and approve PV system designs that are manufactured or sold in the state. This helps those building and electrical inspectors who may not have sufficient training and experience in the specifics of PV systems, thus greatly expediting the permitting process.

In addition, the FSEC sponsors a technical design review program as a precursor to expedited permitting by building and electrical inspectors. This "Procedures for Photovoltaic System Design Review and Approval" program takes place prior to seeking formal permitting approval. It greatly facilitates the standard review processes for electrical and/or building permits, or in many cases may be used "in lieu" of standard permitting at local authorities' discretion. It primarily aids the electrical permitting process, but also aids the building permit process.

The success of FSEC's PV system design review and approval process in expediting permitting has motivated some counties in New Jersey to seek a design and review process similar to that of the FSEC, and some other states are considering adopting the program. The FSEC also provides training and workshops for PV system installers, inspectors and energy professionals several times a year. Additional information is available at www.fsec.ucf.edu under the heading "Testing and Certification Program."

permitting processes and reasonable review criteria for distributed renewable energy systems.

RECOMMENDATION 7: ADOPT LEGISLATION AT THE STATE LEVEL MANDATING CONSISTENT AND APPROPRIATE PERMITTING REQUIREMENTS FOR DISTRIBUTED RENEWABLE ENERGY SYSTEMS.

A precedent for federal preemption of local planning and permitting can be found in the Telecommunications Act of 1996, which included partial federal preemption of home rule by limiting the authority of local jurisdictions to regulate installation of cell phone antennas and towers. For example, the act precludes local restrictions that would have the effect of limiting wireless service and requires local authorities to act on applications for the siting of cell towers within a reasonable period of time.[104]

Several state governments have utilized the preemption option to prevent unreasonable restrictions on distributed renewable energy installations. In Wisconsin, for example, the state passed a preemption statute in 1993 protecting the rights of landowners to install solar and wind energy systems on their property. Wisconsin statute 66.0401 states:

> "No county, city, town or village may place any restriction, either directly or in effect, on the installation or use of a solar energy system…or a wind energy system…unless the restriction satisfies one of the following conditions:
>
> **(a)** Serves to preserve or protect public health or safety.
>
> **(b)** Does not significantly increase the cost of the system or significantly decrease its efficiency.
>
> **(c)** Allows for an alternative system of comparable cost and efficiency."[105]

RECOMMENDATION 7-A: ADOPT LEGISLATION REQUIRING LOCAL GOVERNMENTS TO ESTABLISH TIME-EFFICIENT PERMITTING PROCESSES AND REASONABLE REVIEW CRITERIA FOR DISTRIBUTED RENEWABLE ENERGY SYSTEMS.

One unique aspect of Wisconsin's statute is that it places the burden of proving that an installation presents health or safety concerns on the zoning authority rather than requiring that the applicant prove that such concerns do not exist, as is the case with most proposed distributed renewable energy systems in other states.

Another example of preemption comes from New Hampshire, which passed a law in 2008 prohibiting municipalities in that state from holding small wind turbines to the same building height standards that apply to buildings.[106]

In 2001, California passed law AB 1207 authorizing local zoning jurisdictions to establish processes to issue conditional use permits for small wind systems. The state law set specific limits to local regulation of property size, tower height, setback, sound, technical submissions and turbine certification. In the event that a local jurisdiction does not create such an ordinance, the state law established small wind systems as a permitted use by right as long as the installed systems are compliant with certain conditions enumerated in the statute.

The California law did not require the direct abdication of home rule. Rather it required local jurisdictions to exercise their authority to establish regulations (within certain parameters) specific to the jurisdictions and provided redress to landowners in the event that they did not. This "partial" preemption of home rule maintains some deference to local zoning authority while ensuring that the authority is used in a manner consistent with the public interest as determined by state law.

California has also exercised preemption to prevent unreasonable design review requirements for PV. The California Solar Rights Act of 2005 prohibits permitting authorities from restricting PV systems based on aesthetic considerations. As a result of this act California Government Code, Section 65850.5(a) now states:

> "It is the intent of the Legislature that local agencies not adopt ordinances that create unreasonable barriers to the installation of solar energy systems, including, but not limited to, design review for aesthetic purposes…"[107]

While it is likely that state or federal preemption for distributed renewable energy permitting would be met with strong political resistance, it is clear that this approach could help remove the local zoning and permitting obstacles facing distributed renewable energy systems.

4.3.3 Solar Rights Laws

As described in Section 2.5, 10 states have laws preventing homeowner or community associations from enforcing private covenant restrictions that prohibit or unreasonably restrict solar energy use within planned communities, including Arizona; California; Colorado; Florida; Hawaii; Iowa; Massachusetts; Nevada; Utah; and Wisconsin; however, these laws are routinely violated, as most community associations seem unaware that the restrictions are illegal and most homeowners are unwilling to defy community associations that reject installations on these grounds. In fact, the states in which these covenant restrictions are considered most problematic for PV (Arizona and Florida) are states in which such restrictions are against state law, but the laws are not adequately enforced.

RECOMMENDATION 7-B: ADOPT "SOLAR RIGHTS" LEGISLATION BANNING PRIVATE COVENANT RESTRICTIONS ON DISTRIBUTED RENEWABLE ENERGY SYSTEMS.

It is recommended that all states pass "solar rights" laws banning these private restrictions. States should develop monitoring and enforcement procedures to ensure the effectiveness of these laws, as well as penalties that can be applied to community associations that do not comply. They should also work closely with the Community Associations Institute (CAI) and its state, regional and local chapters to better educate community associations about their obligations under the law and about the many social and environmental benefits of distributed renewable energy.

> **RECOMMENDATION 7-C:** CREATE ENFORCEMENT PROCEDURES AND PENALTIES FOR NON-COMPLIANCE WITH SOLAR RIGHTS LAWS AND DEVELOP AN EDUCATION PROGRAM TO INFORM HOMEOWNERS OF THEIR RIGHTS AND COMMUNITY ASSOCIATIONS OF THEIR OBLIGATIONS UNDER THE LAW.

In the absence of state legislation, prohibitive covenant restrictions can be banned at the local government level. At least one community, Chapel Hill, N.C., has adopted a land use ordinance that prohibits "covenants or other conditions of sale that restrict or prohibit the use, installation or maintenance of solar energy collection devices."

4.4 CONCLUSIONS

This report describes a number of issues and concerns related to planning and permitting for distributed renewable energy systems, as identified by renewable energy installers, advocates, customers and professionals in the field. Combining the issues identified for solar and wind technologies, a common theme emerges: The lack of a clear understanding or awareness on the part of local governments about the impacts of distributed renewable energy systems, and the appropriate mechanisms for evaluating them, results in a large disparity in permitting requirements across jurisdictions and inhibits the use of these technologies from becoming more widespread.

> THE LACK OF A CLEAR UNDERSTANDING ON THE PART OF LOCAL GOVERNMENTS ABOUT THE IMPACTS OF DISTRIBUTED RENEWABLE ENERGY SYSTEMS RESULTS IN A LARGE DISPARITY IN PERMITTING REQUIREMENTS.

The PV permitting process can be as simple as an over-the-counter electrical permit application utilizing a one-page checklist form (e.g., San Jose, Calif.). In contrast, in other municipalities a similarly sized system would require separate applications for electrical, building, and design review permits, each requiring detailed site plans and other complicated paperwork. This variation in permitting processes reflects a lack of shared understanding about the safety, reliability, and aesthetics of PV systems.

Small wind energy systems also suffer from this lack of understanding or awareness, but for this technology the problem manifests itself in a different way. Because PV systems are most often integrated into a home or other building, their obstacles are, for the most part, limited to building and electrical permit requirements. As stand-alone structures, small wind systems must also be permitted as a separate "use" on the property. This brings additional permitting issues if small wind turbines are not explicitly identified as an allowed or permitted use in the applicable zoning district. In some cases small wind turbines are identified as conditional uses, and must go through a rigorous conditional use permit application, but in many cases the applicable permitting requirements are simply not defined.

This report recommends a number of ways in which local governments, and to a lesser extent, state governments, can remove planning and permitting barriers and facilitate more widespread use of distributed renewable energy technologies; however, these recommendations will not take hold if local governments remain unaware of the obstacles created by their existing requirements and the opportunities available to streamline and expedite their permitting of distributed renewable energy systems without compromising the public interest.

THESE RECOMMENDATIONS WILL NOT TAKE HOLD IF LOCAL GOVERNMENTS REMAIN UNAWARE OF THE OPPORTUNITIES AVAILABLE TO STREAMLINE AND EXPEDITE THEIR PERMITTING OF DISTRIBUTED RENEWABLE ENERGY SYSTEMS.

This report seeks to cast light on the issue, but there is much more work to be done. Organizations such as the APA and the International City/County Management Association (ICMA) have a variety of programs about sustainability and other environmental issues, but have not tackled in any meaningful way the issue of distributed renewable energy permitting. While APA has published a "Policy Guide on Energy" and a "Policy Guide on Planning and Climate Change," both of which are quoted as part of the justification for this report, much of the organization's emphasis seems to be on the energy implications of long-range land use decisions, as shown on the "Planning and Climate Change: Mitigation and Clean Energy Strategies" page of the APA Web site:

> "Planners can encourage efficient energy use, diversification of energy supply, and emissions reductions through their influence over the built and natural environments — including both where and how we build, and where and how we preserve open spaces."[108]

While the APA's objectives in this area are laudable, attention should also be given to the barriers that local government planning and permitting regulations can place on distributed renewable energy systems and the role that planners can have in removing these barriers and encouraging clean, renewable energy use for our nation's future. Publicizing this issue in a "Planners Advisory Service" report is recommended, and it is hoped that these concerns will be further studied in the APA's on-going research program with the Environmental and Energy Study Institute (EESI) on planning strategies for mitigating climate change and encouraging the use of clean energy.

Renewable energy industry organizations such as ASES, the Solar Energy Industries Association (SEIA) and AWEA, as well as advocacy groups such as The Vote Solar Initiative, have a role to play in addressing this issue. Both ASES and AWEA have published an array of reports and fact sheets about permitting issues, and the Solar America Board for Codes and Standards (Solar ABCs) is developing model codes for PV permitting, solar rights and wind loading requirements for PV systems. This report recommends that these and other renewable energy organizations work closely with APA, or directly with local governments (if they are not already), to advocate for the necessary changes to local permitting processes.

An important component to publicizing this issue is drawing attention to those municipalities that have already made great strides in removing planning and permitting barriers to distributed renewable energy. The city of San Jose, Calif., and other cities and towns that have developed streamlined permitting processes for PV systems, should be continually recognized by the APA, ASES and other organizations for their accomplishments. Similarly, the APA and AWEA should recognize the innovative approaches that Klickitat County Wash, Currituck County N.C. and other jurisdictions have taken to plan for small wind energy systems and develop appropriate processes for permitting them.

This report has identified the primary permitting barriers to small-scale PV and wind energy systems, and has described many actions that state and local governments can take to remove these barriers. Further work must be done to call attention to these issues and assist local and state governments in implementing these recommendations. This is one of the many important steps that must be taken to facilitate this nation's transition to a future that is powered by safe, secure and clean renewable energy.

ENDNOTES

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BUILDING PERMIT

An allowance provided by local authorities that permits new construction, changes and/or additions to existing physical structures within limits designed to protect public health, safety and general welfare.

CONDITIONAL USE

A land use that may be allowed under a given zoning designation if certain conditions are met. This differs from an "allowed" use, or a use that is "permitted outright" under a given zoning designation. A property owner or developer must receive a "conditional use permit" from the local zoning authority before constructing or implementing a conditionally allowed use. The Conditional Use Permitting (CUP) process varies between jurisdictions, but is generally the same within a jurisdiction regardless of the type of development that is proposed. While the CUP process for a medium-scale wind turbine project, for example, might be different between city A and city B, the process should be the same within city A whether developers are proposing a medium-sized wind project, a small-sized wind project, a barn, a liquor store, or any other conditionally allowed use.

DESIGN REVIEW

A planning process in which the proposed construction of a new structure or alteration of an existing structure is evaluated based on its aesthetics and appropriateness to the surrounding community.

DISTRIBUTED GENERATION (DG)

The use of small electricity generating systems rather than traditional large, centralized generation facilities. This includes many types of renewable energy systems such as small wind turbines and solar photovoltaics. Distributed generation facilities have a capacity of up to 2000 kilowatts (kW), or two megawatts (MW), but this report focuses on smaller systems (up to 10 kW) that are sufficient to power a home, small apartment building, or small business. While distributed generation can include off-grid generation systems, this report focuses on grid-tied systems.

ELECTRICAL PERMIT

An allowance provided by local authorities that permits changes and/or additions to the electrical wiring of a building or structure provided the changes/additions meet a set of national or international regulations and are designed to ensure that electrical wiring systems are safe and unlikely to risk electrocution, fire or damage to interconnected electrical systems.

INTERCONNECTION STANDARDS

A set of rules under which a customer-generator interfaces with the electricity grid. Each state regulates the process under which a generator can connect to the distribution grid. These standards seek to maintain grid stability as well as the safety of those who use and maintain it.

NET METERING

A billing arrangement that enables electricity consumers (e.g. residents, businesses, farms or municipalities) to use their own generation to offset their consumption over a billing period by allowing their electric meters to turn backwards when a system generates more electricity than the consumer uses. In effect, a system owner uses excess electricity generation to offset electricity consumption at another time during a billing cycle (or during a one-year period). With net metering, consumers receive the full retail rate – the same rate they pay the utility – for the electricity they generate, including any excess electricity.

OVERLAY ZONE

A zoning designation that is applied "on top of" the base zoning designation for a given area. Overlay zones are typically used to designate areas with particular environmental characteristics that influence their suitability for development, and they involve additional requirements or limitations on the types of uses that are allowed. For example, property lying within a 100-year floodplain may have a base zoning of Residential, Commercial, or Industrial, and also be part of a "Flood Hazard Overlay Zone" that applies additional restrictions appropriate for development within a floodplain (such as limiting the amount of impermeable surface). Typically the requirements of the overlay zone supersede those of the base zone in the event that the two conflict with one another.

PHOTOVOLTAICS (PV)

A generation system that utilizes the photovoltaic effect to convert sunlight into electricity. These systems are commonly referred to as "solar electric panels."

PLANNING

A branch of public policy which seeks the orderly disposition of land, resources, facilities and community services with a view to securing the physical, economic and social efficiency, health, and well-being of urban and rural communities at the macro level. At its most basic, planning involves predetermining the physical layout of communities through zoning, transportation infrastructure planning, urban design and development.

WATT

A unit of electrical power equal to one joule of energy per second, or one ampere of electrical current flowing at a pressure of one volt at unity power factor. One thousand watts is equal to a kilowatt (kW), and one million watts is equal to a megawatt (MW). Electrical energy is typically measured in terms of kilowatt-hours, equal to one kilowatt of power expended for one hour.

ZONING

A system of local regulations used to designate appropriate uses for land within a municipal jurisdiction. Euclidean zoning designations (such as Residential, Commercial, or Industrial) "allow" the types of land uses that are deemed appropriate in a given area and prohibit new development that would be incompatible with the allowed uses and thus might harm existing residents or businesses. ln addition to identifying the types of uses that are allowed in a given zone, zoning regulations often include detailed requirements on the size of structures and the amount of space that they may occupy, distances (known as "setbacks") between structures and property lines, and myriad other details about the scope of development allowed within a zone. Newer forms of "performance-based zoning" rely primarily on these restrictions, along with other requirements such as the amount of traffic that a land use would generate, without specifying the exact types of uses that are or are not allowed in a given area. A municipality's "zoning map" identifies the zoning designations for all land within its physical boundaries. The "zoning code" describes all of a jurisdiction's zoning designations, the regulations that apply to each designation and the procedures for granting variances from zoning regulations or changing the zoning designation on a parcel of land.

RECOMMENDATION 1: REMOVE BARRIERS TO PV SYSTEMS FROM BUILDING AND ZONING CODES.

RECOMMENDATION 1-A: Exempt roof-top PV systems from building height limitations.

RECOMMENDATION 1-B: Allow "over-the-counter" building permits for standard roof-mounted PV systems that do not exceed the roof support capabilities of a structure meeting minimum building code requirements.

RECOMMENDATION 1-C: Do not restrict PV systems on aesthetic grounds.

RECOMMENDATION 2: SIMPLIFY PV PERMIT APPLICATION FORMS AND REVIEW PROCESSES.

RECOMMENDATION 2-A: Coordinate PV permitting procedures with nearby jurisdictions.

RECOMMENDATION 2-B: Base PV electrical permitting requirements on IEEE 1547 and UL 1741.

RECOMMENDATION 2-C: Provide training to educate building and electrical inspectors about PV technology and installations.

RECOMMENDATION 3: ADOPT FLAT PERMIT FEES OR FEE WAIVERS FOR PV AND SMALL WIND SYSTEMS.

RECOMMENDATION 4: INCORPORATE INFORMATION ABOUT WIND ENERGY OPPORTUNITIES INTO MUNICIPAL COMPREHENSIVE PLANNING.

RECOMMENDATION 5: ESTABLISH SMALL WIND TURBINES AS PERMITTED USES, WITH APPROPRIATE DESIGN GUIDELINES, PERFORMANCE STANDARDS, AND REVIEW PROCESSES.

RECOMMENDATION 5-A: Identify areas within jurisdictions where small wind turbines may conflict with surrounding land uses.

RECOMMENDATION 5-B: Identify small wind turbines as conditional or special uses in areas of potential conflict and as permitted uses in all other areas of the jurisdiction.

RECOMMENDATION 5-C: Establish limitations on maximum rated capacity and turbine height that are unambiguous and are sufficient to allow modern residential-scale small wind turbines.

RECOMMENDATION 5-D: Establish appropriate setbacks, measured in terms of the turbine height and distance from the nearest property line.

RECOMMENDATION 5-E: Establish performance-based sound standards based on a maximum decibel reading of 55-60 dBA measured at the nearest property line.

RECOMMENDATION 5-F: Streamline permitting requirements for small wind turbine equipment meeting Small Wind Certification Council requirements.

RECOMMENDATION 5-G: Provide training to educate building and electrical inspectors about small wind technology and installations.

RECOMMENDATION 5-H: As an alternative to recommendations 5-A and 5-B, consider adopting a wind energy overlay zone that identifies appropriate areas for wind energy use, designates small wind turbines as permitted uses and establishes appropriate design guidelines and performance standards.

RECOMMENDATION 6: EASE PERMITTING PROCESSES BY ESTABLISHING STATEWIDE INTERCONNECTION STANDARDS AND EDUCATING BUILDING AND ELECTRICAL INSPECTORS ABOUT PROPER INSTALLATION PROCEDURES FOR DISTRIBUTED RENEWABLE ENERGY SYSTEMS.

RECOMMENDATION 6-A: Establish statewide PV interconnection standards that use IEEE 1547, UL 1741, and the NEC.

RECOMMENDATION 6-B: Establish statewide training and education programs for building and electrical inspectors about distributed renewable energy systems.

RECOMMENDATION 7: ADOPT LEGISLATION AT THE STATE LEVEL MANDATING CONSISTENT AND APPROPRIATE PERMITTING REQUIREMENTS FOR DISTRIBUTED RENEWABLE ENERGY SYSTEMS.

RECOMMENDATION 7-A: Adopt legislation requiring local governments to establish time-efficient permitting processes and reasonable review criteria for distributed renewable energy.

RECOMMENDATION 7-B: Adopt "solar rights" legislation banning private covenant restrictions on distributed renewable energy systems.

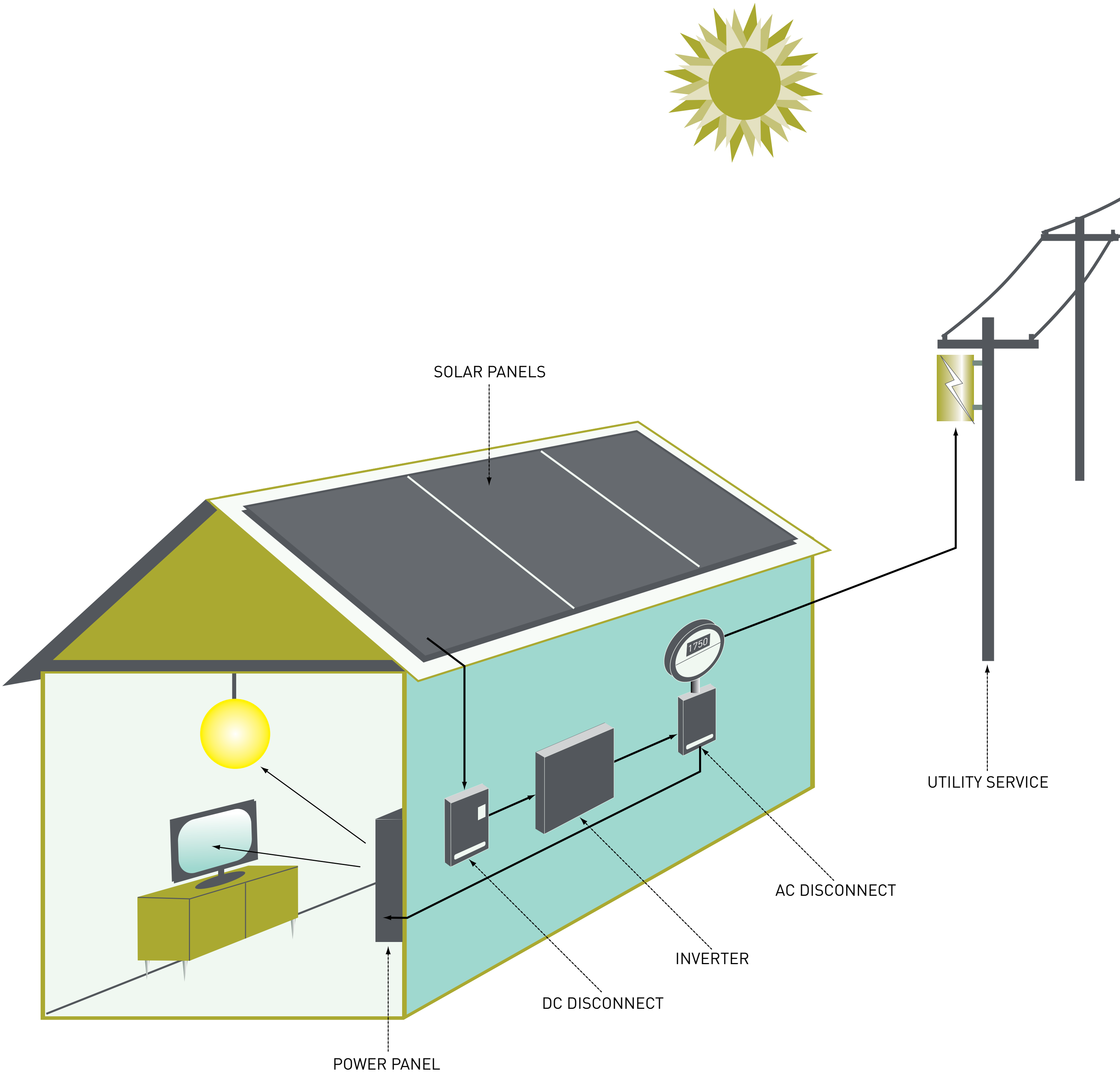
RECOMMENDATION 7-C: Create enforcement procedures and penalties for non-compliance with solar rights laws and develop an education program to inform homeowners of their rights and community associations of their obligations under the law.

The Network for New Energy Choices (www.newenergychoices.org) is preparing a report on local government obstacles to distributed renewable energy projects and methods to overcome those obstacles.

We obtained your contact information from the [name of solar energy industries association chapter] list of solar electric contractors in [state]. We would greatly appreciate it if you could share your thoughts on the following questions about local government permitting obstacles.

- In general, do you feel that local government permitting processes are a significant impediment to the development of small-scale, distributed renewable energy projects?
- What specific permitting requirements are the greatest obstacles to distributed renewable energy projects? (For example, are building permit fees the greatest obstacle, the time required to obtain a permit, or something else?)
- Does the difficulty of navigating the permitting process differ significantly by jurisdiction? If so, how?
- Are you familiar with any local government programs or incentives that have eased the permit process for distributed renewable energy projects?
- In your experience, are private codes or covenants (such as those that place restrictions on landscaping or renovations for homes in a subdivision) a significant barrier to renewable energy projects? If so, please explain.

Thank you very much for your assistance.



Residential grid-tied PV system capable of net metering. An inverter changes DC power from the solar panels into AC power that is required to run the home's appliances and is compatible with the grid. If the panels are producing more power than the house needs, the meter will spin backwards and feed clean energy to the grid.

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  http://www.aia.org/sustainability

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  http://www.aia.org/siteobjects/files/permitstudyfullreport.pdf

- **American Planning Association:**
  "Policy Guide on Energy"
  http://www.planning.org/policyguides/energy.htm

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  http://www.irecusa.org/fileadmin/user_upload/NationalOutreachPubs/InspectorGuidelines-Version2.1.pdf

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  "Photovoltaic Power Systems and the 2005 National Electric Code: Best Practices"
  http://www.nmsu.edu/~tdi/pdf-resources/pdf%20version%20divided%20PV:NEC/PV-NEC%201.8/PV-NEC-V-1.8-opt.pdf

- **Solar America Board for Codes and Standards:**
  Solar PV Standards and Local Codes Study Panel
  http://www.solarabcs.org/index.php?option=com_content&view=article&id=48&Itemid=27
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- **The Vote Solar Initiative:**
  "Vote Solar White Paper—Solar Permit Fees"
  http://votesolar.org/linked-docs/solar_permit_report.pdf

- **The Sierra Club (Loma Prieta Chapter):**
  "Solar Electric Permit Fees in the San Francisco Bay Area:
  A Comparative Study"
  http://lomaprieta.sierraclub.org/global_warming/pv_permit_study.htm

- **American Wind Energy Association:**
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  http://www.awea.org/smallwind/

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  Wind Energy Toolkit and Wind Energy Model Ordinance Options
  http://www.powernaturally.org/Programs/Wind/toolkit.asp
  http://www.powernaturally.org/Programs/Wind/toolkit/2_
  windenergymodel.pdf

- **Appalachian State University Energy Center:**
  Various Publications
  http://www.energy.appstate.edu/pubs.php

- **University of San Diego School of Law Energy Policy Initiatives Center:**
  Various Publications
  http://www.sandiego.edu/epic/publications/

- **States Advancing Solar:**
  Various Publications
  http://www.statesadvancingsolar.org/resources

- **U.S. Department of Energy**
  "Bringing Solar Energy to the Planned Community"
  http://sdenergy.org/uploads/Final_CC&R_Handbook_1_01.pdf.

- **Oakland, California:**
  Self-Certification for Renewable Energy Systems
  http://www.lgc.org/spire/oakland_renewable.html

- **San Jose, California:**
  Streamlined Permitting for Solar PV and Solar Water Heaters
  http://www.sanjoseca.gov/building/PDFHandouts/1-10Solar.pdf

- **Santa Monica, California:**
  Green Building and Solar Santa Monica Programs
  http://www.smgreen.org/requirements/index.html
  http://www.solarsantamonica.com/main/index.html

- **Aspen/Pitkin County, Colorado:**
  Renewable Energy Mitigation Program and Solar Pioneer Rebate Program
  http://www.aspencore.org/sitepages/pid31.php
  http://www.aspencore.org/sitepages/pid77.php

- **Boulder, Colorado:**
  Solar PV Sales Rebate and Solar Grants Funds
  http://www.bouldercolorado.gov/index.php?option=com_content&task=view&id=7700&Itemid=2845

- **Harford County, Maryland:**
  Property Tax Credit for Solar and Geothermal Devices
  http://www.dsireusa.org/documents/Incentives/MD24F.pdf

- **Epping, New Hampshire:**
  Energy Efficiency and Sustainable Design Requirement
  http://www.mgplanning.com/Epping/epping_energy.htm

- **Asheville, North Carolina:**
  Building Permit Fee Waiver
  http://www.ashevillenc.gov/uploadedFiles/Departments/Buidling_Safety/Sustainable%20Fee%20Rebate%20Form%20Dec%20%202007.pdf

- **Currituck County, North Carolina:**
  Small Wind Energy Ordinance
  http://dsireusa.org/library/includes/incentive2.cfm?Incentive_Code=NC14R&state=NC&CurrentPageID=1&RE=1&EE=0
  (See Chapter 3: Special Requirements)

- **Ashland, Oregon:**
  Density Bonus for Green Building
  http://www.ashland.or.us/Page.asp?NavID=1366

- **Austin, Texas:**
  Power Saver Solar PV Rebate Program
  http://www.austinenergy.com/Energy%20Efficiency/Programs/Rebates/Solar%20Rebates/index.htm

- **Klickitat County, Washington:**
  Renewable Energy Overlay Zone
  http://www.klickitatcounty.org/planning/filesHtml/200408-EOZ-EIS/05-00-EOZFinalDocs-All.pdf

- **Seattle, Washington:**
  Density Bonus for Green Building
  http://www.seattle.gov/dpd/GreenBuilding/OurProgram/PublicPolicyInitiatives/DevelopmentIncentives/default.asp

TAKING THE RED TAPE OUT OF GREEN POWER

How to Overcome Permitting Obstacles to Small-Scale Distributed Renewable Energy

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