

California Energy Commission
STAFF REPORT

Implementation of Small Wind System Ordinances by California Counties

California Energy Commission

Edmond G. Brown Jr., Governor

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ABSTRACT

Assembly Bill 45 (Blakeslee, Chapter 404, Statutes of 2009) authorized counties to adopt ordinances for the installation of small wind generating systems by January 1, 2011, with counties adopting ordinances after that date prohibited from imposing conditions on small wind energy systems that are more restrictive than those specified in the bill. The *Implementation of Small Wind Ordinances by California Counties* report analyzes county ordinances adopted since January 1, 2011, provides a cross section of small wind installations, includes a snapshot of current small wind siting practices, and makes recommendations regarding the continuation, modification, or termination of the AB 45 provisions.

Keywords: Assembly Bill 45, small wind, distributed generation, ordinance, county, market barriers, incentive programs

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EXECUTIVE SUMMARY

The California Energy Commission is required by Assembly Bill (AB) 45 (Blakeslee, Chapter 404, Statutes of 2009) to produce a report by January 1, 2016 describing small wind permitting activity in California counties that adopted ordinances after January 1, 2011, for the installation of small wind energy systems. Any such ordinances adopted prior to January 1, 2011 are exempt from the provisions of AB 45.

For AB 45, a small wind energy system is defined as a wind turbine, a tower, and associated control or conversion electronics that has a rated capacity of up to 50 kilowatts (kW). Small wind energy systems are designed to be installed at homes, farms, and small businesses to offset utility power and reduce electric bills. Wind turbines are classified by size: small (less than 50 kW), intermediate (50 to 500 kW), and large (above 500 kW).

Small and intermediate wind turbines make up the bulk of the older installed wind turbine base, with new turbines installed since the late 1990s generally 600 kW and larger. In contrast to utility-scale wind, which has seen robust growth in recent years due to falling costs and state policies to support renewable energy, California's small wind market contributes only about 5 megawatts to the state's 6,000 megawatts of total installed wind capacity.

For a variety of reasons, deployment of small wind energy systems is constrained and will likely remain so in the foreseeable future. These reasons include high installation costs, the need for large parcels of land, the quality of wind resources at different sites, and local permitting practices. AB 45 focused on the latter issue and was intended to promote and encourage the use of distributed small wind energy systems and limit obstacles to use by creating more statewide uniformity in permitting and building code requirements for these systems.

AB 45 authorizes California counties to impose conditions on the installation of small wind energy systems but prohibits counties from imposing more restrictive conditions relating to certain aspects of these systems than those identified in the statute. AB 45 authorizes counties that did not adopt ordinances for installation of small wind energy systems by January 1, 2011, to adopt ordinances at a later date but requires those ordinances to comply with specific provisions in AB 45. Ordinances approved before January 1, 2011, are exempted from these provisions, which address public notice of installation, tower height, setback, noise levels, visual aesthetics, turbine approval, tower diagrams, and engineering analysis.

For example, AB 45 states that a county cannot impose height restrictions on turbine towers that are more stringent than those identified in the bill, which include not more than 80 feet on 1- to 5-acre parcels and not more than 100 feet for parcels larger than 5 acres. This means that a county cannot implement an ordinance that restricts tower

heights to less than 80 feet for 1- to 5-acre parcels or less than 100 feet for larger parcels.

In addition to the provisions governing small wind energy ordinances in California, AB 45 directed the Energy Commission to prepare a report that includes:

- The number of applications to install small wind energy systems received by those counties on or after January 1, 2011.
- The number of applications to install small wind energy systems approved by those counties on or after January 1, 2011.
- The tower heights, system heights, parcel sizes, and generating capacities of the small wind energy systems approved by those counties on or after January 1, 2011.
- Recommendations for the continuation, modification, or termination of the AB 45 provisions.

The Energy Commission contacted each California county for information on small wind energy system activity on or after January 1, 2011, for the items listed above. Based on the data collected, the only counties that reported adopting ordinances after January 1, 2011, were San Diego and Kern. These two counties complied with most of the AB 45 provisions, including turbine certification, setback distances, and system placement in relation to ridge lines. However, there was some variation in tower height restrictions.

San Diego County limits tower heights to 80 feet regardless of parcel size, which is more restrictive than AB 45 provision requiring that tower heights up to 100 feet be allowed on parcels greater than 5 acres. This height restriction could prevent wind turbine placement within a productive operating range and could hamper a small wind project from clearing obstacles to ensure smooth wind flow to enhance system output. San Diego received and approved 13 applications for small wind systems after January 1, 2011, with generating capacities between 1 kW and 9.6 kW, with a median value of 2.4 kW. San Diego did not report tower heights or parcel size.

Kern County limits tower height to 120 feet regardless of parcel size, which is in accordance with the statute since its requirements are not more restrictive. Although Kern County's ordinance is less restrictive than the provisions in AB 45, tower heights are still limited by Federal Aviation Administration limits. There are also project zone limits mandated by military review requirements, but system owners may otherwise properly site their generators. Based on reported data, Kern had one small wind application already in process before January 1, 2011; received two additional applications after January 1, 2011; and approved all three. Kern submitted data from two of the approved systems, which, respectively, had tower heights of 21.1 feet and 80 feet, system heights of 31.7 feet and 93.25 feet, and generating capacities of 5.5 kilowatt (kW) and 10 kW. Kern County also did not report parcel size.

Based on its research and evaluation of submitted information and data, Energy Commission staff concluded that California counties have complied with the provisions in AB 45 with the exception of San Diego County, where part of its small wind energy code was more restrictive than AB 45 (as described in Chapter 3). Energy Commission staff also offers the following recommendations to foster growth in the small wind energy market:

- The state should consider conducting studies to provide a clear picture of California's small wind market, including barriers and long-term potential.
- The state should consider requiring that local government entities consider only the actual pad on which the small wind energy system tower will sit and the access road when permitting the footprint for a small wind system, since neither of those will affect prime agricultural land uses.
- The provisions in AB 45 remain in effect until January 1, 2017, unless extended. The state should consider extending this article beyond January 1, 2017, to prevent counties from adopting future ordinances that may unreasonably restrict the permitting of small wind systems.

CHAPTER 1

Introduction

Background

Assembly Bill (AB) 45 (Blakeslee, Chapter 404, Statutes of 2009) declares that the policy of the state is to promote and encourage the use of distributed renewable energy systems and to limit obstacles to use, including small wind energy systems. AB 45 is the successor to Assembly Bill 1207 (Longville, Chapter 562, Statutes of 2001), which was adopted to encourage implementation of small wind energy systems. In an effort to reduce commonplace permitting and ordinance restrictions, AB 1207 established provisions that enable counties a more uniform, streamlined approach. The expiration of AB 1207 provisions in July 2005 resulted in a lapse in the permitting provisions it mandated, as well as created a possible opening for the recurrence of more restrictive permitting practices.

AB 45 continued the effort to provide a consistent statewide permitting approach by authorizing counties to adopt ordinances providing for the installation of small wind generating systems and specifying that ordinances adopted by counties after January 1, 2011, cannot be more restrictive than specified provisions in the bill. Counties that adopted ordinances before January 1, 2011, are exempt from AB 45 provisions.

AB 45 also requires the California Energy Commission to submit a report to the Assembly Committee on Local Government, the Senate Committee on Local Government, and the Assembly Committee on Utilities and Commerce that contains:

- The number of ordinances adopted on or after January 1, 2011, by counties under Section 65895.
- The number of applications to install small wind energy systems received by those counties on or after January 1, 2011.
- The number of applications to install small wind energy systems approved by those counties on or after January 1, 2011.
- The tower heights, system heights, parcel sizes, and generating capacities of the small wind energy systems approved by those counties on or after January 1, 2011.
- Any recommendations to the Legislature by the Energy Commission for the continuation, modification, or termination of this article.

AB 45 Provisions

AB 45 authorized California counties to adopt ordinances providing for the installation of small wind energy systems within their jurisdictions. For counties that passed ordinances after January 1, 2011, the bill authorized the imposition of certain

conditions on the installation of these systems, including notice, tower height, setback, noise level, visual effects, turbine approval, tower drawings, engineering analysis, and line drawings, provided that the conditions are no more restrictive than the provisions of the bill.

The complete text of AB 45 provisions is provided in Appendix A.

CHAPTER 2

Small Wind Systems in California

Distributed generation generally refers to energy generated at the point of consumption and includes renewable resources such as rooftop solar photovoltaic (PV) systems and small wind energy systems. Renewable distributed generation helps the state achieve its renewable energy and greenhouse gas emission reduction goals. Although the number of rooftop solar PV installations has increased dramatically in the state since passage of the California Solar Initiative in 2006, California's small wind market contributes only about 5 megawatts to the state's electricity capacity total.

Small Wind Implementation in California

Wind turbines are classified by size or rated capacity: small (less than 50 kW), intermediate (50 to 500 kW), and large (above 500 kW).¹ AB 45 focuses on small wind energy distributed generation and defines small wind systems as those with a rated capacity of 50 kW or less. Small wind turbines are designed to be installed at homes, farms, and small businesses to offset utility power and reduce electric bills.

In California, the small wind market has not experienced the robust growth seen in the utility-scale wind market, which was the result of decreasing costs, federal tax incentives, and state policies such as the Renewables Portfolio Standard calling for increased renewable energy resources. The small wind market comprises only about 5 MW² of California's 6,000 MW of total installed wind capacity.³

While small wind generating systems make up only a small portion of the total installed wind capacity, it is a viable technology that can provide additional energy generation in California, due to the state's abundant wind resources. Small wind generation systems can provide economic savings for rural utility ratepayers, particularly for California's agricultural communities that rely on electricity for irrigation systems. For example, a 2-10 kilowatt (kW) capacity system can generate enough electricity to power a home or average-sized farm.⁴

1 From: <http://www.energy.ca.gov/wind/overview.html>.

2 See Table 1.

3 California Energy Commission, Tracking Progress December 2015, Found at http://www.energy.ca.gov/renewables/tracking_progress/documents/renewable.pdf.

4 Napier, Ashley. "FAQ for Small Wind Systems" American Wind Energy Association. Found at <http://www.aweablog.org/faq-for-small-wind-systems/>.

Incentive Programs for Distributed Generation

While small wind systems may reduce customers' energy bills, the upfront system cost is significant, with project costs that can vary from \$4,000-\$70,000.⁵ To promote distributed generation projects, including small wind projects, the Legislature passed bills to create monetary incentives to reduce the cost for potential system owners. The two most prominent programs were the Emerging Renewables Program⁶ (ERP), administered by the Energy Commission, and the Self-Generation Incentive Program⁷ (SGIP), administered by California's major investor owned utilities and overseen by the California Public Utilities Commission (CPUC).

Table 1: ERP and SGIP Installed Wind Energy Systems (50kW or less)⁸

| ERP (1999 – 2013)⁹ | SGIP (2009 – October 26, 2015)¹⁰ |
|---------------------------------------|--|
| Incentives Paid: \$10,673,837 | Incentives Paid: \$76,986 |
| Installed Capacity (kW): 4,395 | Installed Capacity (kW): 53 |
| Wind Systems Installed 668 | Wind Systems Installed 2 |

Source: ERP data from California Energy Commission, Emerging Renewable Program, Activities, Completed Systems (1998 to June 30, 2011).

Source: SGIP data from California Public Utilities Commission, SGIP Weekly Project Report, "Weekly Statistical Report (9-28-2015)."

From 1998 until 2012, the ERP provided incentives for small residential, commercial, and agricultural renewable projects with less than 50 kW¹¹ of generating capacity. The program was designed to provide financial assistance to potential owners of qualifying distributed generation systems, including qualifying fuel cells using renewable energy sources, solar photovoltaic, solar thermal, and small wind technologies. A desired outcome from the ERP was the cost reduction of distributed generation technologies through stimulating demand and sales, which in turn would encourage manufacturers, sellers, and installers to expand their operations while reducing their per unit costs. Another desired outcome was the creation of the Small Wind Turbine Eligibility List, which required the listed equipment be certified by either the Small Wind Certification Council or a nationally recognized testing laboratory as being tested in accordance with the International Electrotechnical Commission 61400-2 (IEC 61400-2) standard or the

5 Napier, Ashley, "FAQs for Small Wind Systems," American Wind Energy Association., July 9, 2012. Found at <http://www.aweablog.org/faq-for-small-wind-systems/>.

6 California Energy Commission. *Emerging Renewables Program*.

Found at http://www.energy.ca.gov/renewables/emerging_renewables/more_info.html.

7 California Public Utilities Commission. *Self-Generation Incentive Program*.

Found at <http://www.cpuc.ca.gov/PUC/energy/DistGen/sgip/aboutsgip.htm>

8 ERP limited eligibility to wind energy systems with capacity ratings of no more than 50 kW. However, SGIP provides incentives for systems up to 3 megawatts (MW). The two SGIP systems are rated at 53 kW, slightly higher than the 50 kW.

9 From http://www.energy.ca.gov/renewables/emerging_renewables/index.html, Account Activities, Completed Systems (1998 to June 30, 2011).

10 From www.cpuc.ca.gov/PUC/energy/DistGen/sgip/, SGIP Weekly Project Report, "Weekly Statistical Report (9-28-2015)."

11 While the maximum system size for a wind system under ERP was 50 kW, incentives were capped at 30 kW.

American Wind Energy Association 9.1-2009 (AWEA 9.1-2009) standard.¹² This list was used for the entire ERP program, which concluded in 2013.

The SGIP complemented the ERP by offering incentives for larger distributed generation systems, including wind energy systems. The SGIP is active and has expanded to include advanced energy storage technologies and fuel cell technologies (combined heat and power or electric only).¹³ Other program changes include augmentation of the incentive levels for different technologies, as well as implementation of operational requirements to ensure achieved reductions in greenhouse gas emissions and criteria pollutants.

Net Energy Metering

Through California's net energy metering program, distributed generation systems that send excess power back to the electric grid receive net surplus compensation (NSC). On a month-to-month basis, bill credits for the excess generation are applied to a customer's bill at the same retail rate that the customer would have paid for energy consumption. At the end of a customer's 12-month billing period, any balance of surplus electricity is trued-up at a separate fair market value as NSC. The NSC rate is based on a 12-month average of the market rate for energy, or roughly \$0.04 to \$0.05 per kilowatt hour (kWh). This kind of a net metering structure helps adjust for the fluctuation in wind-powered generation due to the intermittency of wind resources.¹⁴

Established Best Practices for Small Wind Siting and Installation

To ensure the effectiveness of a new small wind energy system, the industry has established a set of best practices for siting and installation, which include:

- **Wind resource assessment:** A wind resource assessment is the first consideration in determining the viability of a proposed system, as systems typically require an average wind speed of 9-12 mph to be effective. Wind speeds can be determined by using an anemometer in conjunction with related instruments. In addition, a wind resource map (categorized by tower height) is another useful information source; generalized maps can be obtained through the Energy Commission's website or other online sources.¹⁵ For more accurate results, Energy Commission staff suggests that one year of wind resource data be collected at the hub height (the position of

12 From http://www.gosolarcalifornia.org/equipment/documents/Wind_Eligibility_Procedure.pdf.

13 While the SGIP originally included solar PV systems, incentives for these projects were moved to the California Solar Initiative (CSI).

14 California Public Utilities Commission. *Net Energy Metering (NEM)*.

Found at <http://www.cpuc.ca.gov/PUC/energy/DistGen/netmetering.htm>.

15 California Energy Commission. *California Wind Resource Maps*.

Found at <http://www.energy.ca.gov/maps/renewable/wind.html>.

the turbine on top of the system tower) of the proposed system to get an accurate measurement of the wind resource. Proper wind speed data can help prospective owners maximize the effectiveness of their system while providing a rough estimate of potential power generation.

- **Site evaluation:** A prospective system owner must determine where to site the new system, which requires sufficient space to install the tower to the proper height. The height of a system is important for potential generation. One reason is that the turbine needs to be mounted high enough to clear obstacles that will affect wind speed.¹⁶ In addition to assessing the annual wind speeds, it is important to determine the prevailing directions of the wind at the site. If the site has complex terrain, care should be taken in selecting the installation site. For example, if the wind turbine is sited on top of or on the windy side of a hill, there will be more access to prevailing winds than in a gully or on the sheltered side of a hill on the same property. In addition to geologic formations, siting considerations should account for existing obstacles such as trees, houses, and sheds. Given these recommendations, small wind systems are often easier to site in rural communities.
- **Pairing system tower and turbine:** After siting considerations, the system tower must be matched with an appropriate turbine. A typical tower height of small wind system can range from 30 to 140 feet and can be even higher, depending on the project. Wind speed increases with height, and power generation increases as the cube of the wind speed, $P = 1/2A\rho v^3$ (where P is power, A is the cross-sectional area swept by the rotation of the turbine blades, ρ is air density, and v is the wind speed).¹⁷ The relationship between tower height and power/productivity is shown in **Figure 1**, and the relationship between wind speed and power is shown in **Figure 2**. Wind turbines with taller towers normally have access to greater wind speeds, resulting in systems that produce more energy and can offer better economics. Knowledge of these relationships is critical and motivates prospective owners to adequately control system design (and predicted output) by installing a turbine at the optimum height, based on project economics. To estimate electricity loads, the system owner must first determine energy consumption.¹⁸

16 Sagrillo, Mick and Woofenden, Ian. "Is Wind Electricity Right for You?" *Home Power*.

Found at <http://www.homepower.com/articles/wind-power/design-installation/wind-electricity-right-you?v=print>.

American Wind Energy Association. *FAQs for Small Wind Systems*.

Found at <http://www.awea.org/Issues/Content.aspx?ItemNumber=4638&navItemNumber=727>.

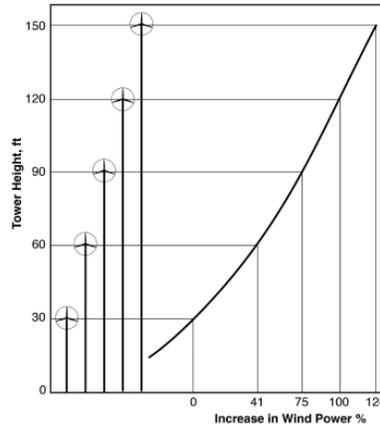
17 A cubic rate of increase follows the form x^3 . For example, when wind speed doubles, the power generation increases by about a factor of 8.

Found at <http://web.mit.edu/windenergy/windweek/Presentations/Wind%20Energy%20101.pdf>.

18 Danish Wind Industry Association. *The Power of The Wind: Cube of Wind Speed*.

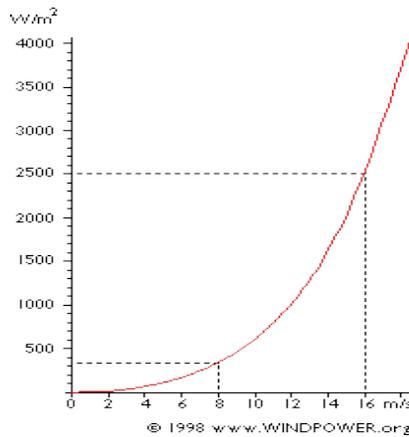
Found at <http://xn--drmsttre-64ad.dk/wp-content/wind/miller/windpower%20web/en/tour/wres/enrspeed.htm>.

Figure 1: Tower Height vs. Wind Power



Source: United States Coast Guard, found at http://www.uscg.mil/d1/SFOSouthwestHarbor/innovation/wind/wind_101.asp.

Figure 2: Wind Speed vs. Wind Power



Source: John Hingtgen, California Energy Commission and Danish Wind Industry Association, Found at <http://xn--drmstre-64ad.dk/wp-content/wind/miller/windpower%20web/en/tour/wres/enrspeed.htm>.

- **Zoning and permitting:** When installing a small wind system, local ordinances require a building permit. The building permit must be obtained before any related wind turbine installation begins. Building permits are obtained from the planning office for the city or county with jurisdiction over the small wind site. There will be specific permit application procedures and fees for different parts of the permitting process; it also varies from one county or jurisdiction to another. Submitting an application typically involves submitting a plot plan, a description of the components of the wind system, and structural analysis of the tower.
- **Maintenance:** After siting and installation, maintenance is the final step to ensure effective operation throughout the system life span, which can last 20-30 years. The installer or manufacturer usually performs annual maintenance, which, if carried out

routinely, will ensure safety and generation reliability by preventing premature structural failure.¹⁹

Differences Between Large- and Small-Scale Wind Generation

The primary differences between small- and large-scale wind generators are tower height, operating speeds, and generating capacity.

- **Tower Height:** The most recognizable difference between utility-scale and small wind systems is size. Typically, small wind system tower heights fall within a range of 30-140 feet, whereas utility-scale system tower heights can exceed 260 feet.²⁰
- **Operating Speeds:** Small systems rotate faster using shorter propeller like blades, resulting in a smaller swept area. The swept area, the cross-sectional area swept out by rotation of the wind turbine blades, contributes to generating capacity.
- **Generating Capacity:** Small-scale systems generally have capacity outputs of less than 50 kW, which are suitable for powering homes and farms. They are often constructed as single units but may be paired with another system, depending on needs of the project.²¹ Utility-scale wind turbines have outputs greater than 500 kW and are typically constructed in groups called wind farms, which are directly connected to the electric grid. In contrast to smaller systems, a single utility-scale turbine can power hundreds or thousands of homes, depending on the output rating.²²

Market Barriers to Small Wind Generation

To promote small wind system growth, market barriers that have negatively affected small wind projects within California must be overcome.²³ A fundamental shift has occurred in the market for large utility-scale wind turbines and wind farms. Due to the high tower heights and large generation capacities, both maximize energy economics when a system or wind farm is placed in a strategic area with desirable wind resources. Small wind systems, on the other hand, are not as able to capture the quality of wind resources as utility-scale systems, due to lower system heights and geographical limitations.

19 Sebrillo, Mick and Woofenden, Ian. "Is Wind Electricity Right For You?". *Home Power*. Found at <http://www.homepower.com/articles/wind-power/design-installation/wind-electricity-right-you?v=print>.

20 American Wind Energy Association. *FAQs For Small Wind Systems*. <http://www.awea.org/Issues/Content.aspx?ItemNumber=4638&navItemNumber=727>.

21 Aldeman, Matt. "What Is the Difference Between Large, Community and Small Scale Wind Energy." Center for Renewable Energy. Illinois State University: 2011 PDF file.

22 Ibid.

23 KEMA. *Emerging Renewables Program Small Wind Incentives Study*, CEC-300-2009-003, July 2009. Found at <http://www.energy.ca.gov/2009publications/CEC-300-2009-003/CEC-300-2009-003.PDF>.

Furthermore, the California *Small Wind Permitting Handbook*, published in 2003 in response to AB 1207, identified permitting and siting as potential challenges for new wind generation systems. Despite the provisions stipulated within the statute, the handbook found that there were continued permitting discrepancies between counties, which were thought to stem from the unfamiliarity of some counties with the rationale behind those provisions.

In 2008, the Energy Commission's technical support contractor KEMA assessed the market infrastructure, economics, and market barriers to the small wind market in California.²⁴ While the KEMA assessment reported amenable permitting practices in some counties, small wind retailers and contractors reported many instances where counties had excessively restrictive permitting requirements, charged expensive fees (up to \$1,600), or prohibited installations altogether. The variation of permitting requirements among counties and, in some cases, within a county posed a formidable barrier for the small wind market. The costs associated with permitting affect the overall cost of the installed system. Furthermore, high system costs affect sales and ultimately manufacturing, which the Energy Commission and CPUC sought to address through the ERP and SGIP.

²⁴ Ibid.

CHAPTER 3

Analysis of County Ordinances

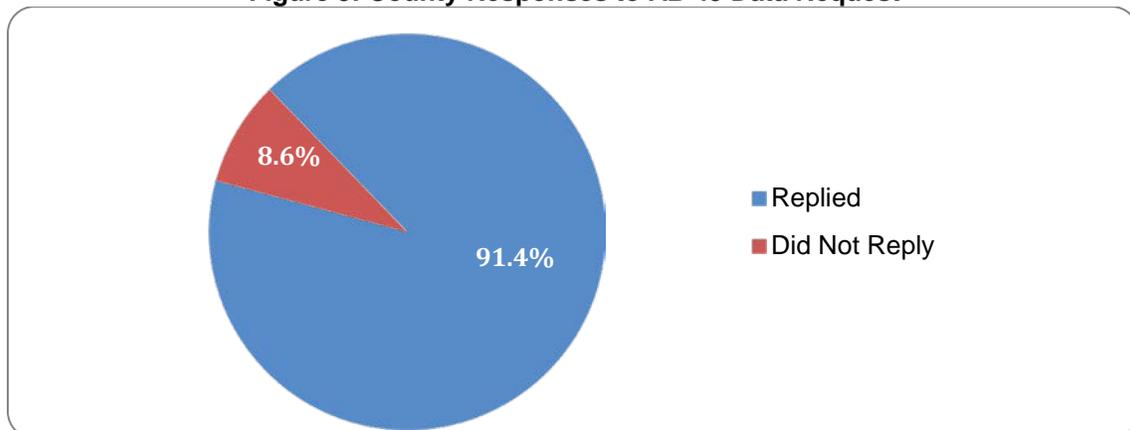
The intent of AB 45 was to ensure that local county ordinances for small wind system permitting do not present undue barriers. To ascertain whether county ordinances are consistent with AB 45 requirements, Energy Commission staff initially requested data from counties via electronic mail starting in May 2015 and followed up several times with those counties that were unresponsive. Energy Commission staff subsequently followed up with an October 2015 letter to the 17 counties that either had not responded or submitted data in response to the original requests. Detailed information on the data request, including raw data collected, is in Appendix B.

The following sections analyze the data received from the responding counties and draw comparisons with small wind system data obtained through the ERP and SGIP.

Data Overview

The percentage of counties responding to the AB 45 request is illustrated in **Figure 3**. Out of the 58 California counties, 53 (roughly 91 percent) responded to the Energy Commission’s data request, and 5 (roughly 9 percent) did not. According to ERP and SGIP data, all of the nonresponding counties had at least one small wind energy system installed over the course of the programs.

Figure 3: County Responses to AB 45 Data Request



Source: California Energy Commission, derived from AB 45 respondent data, Energy Commission survey, May-October 2015

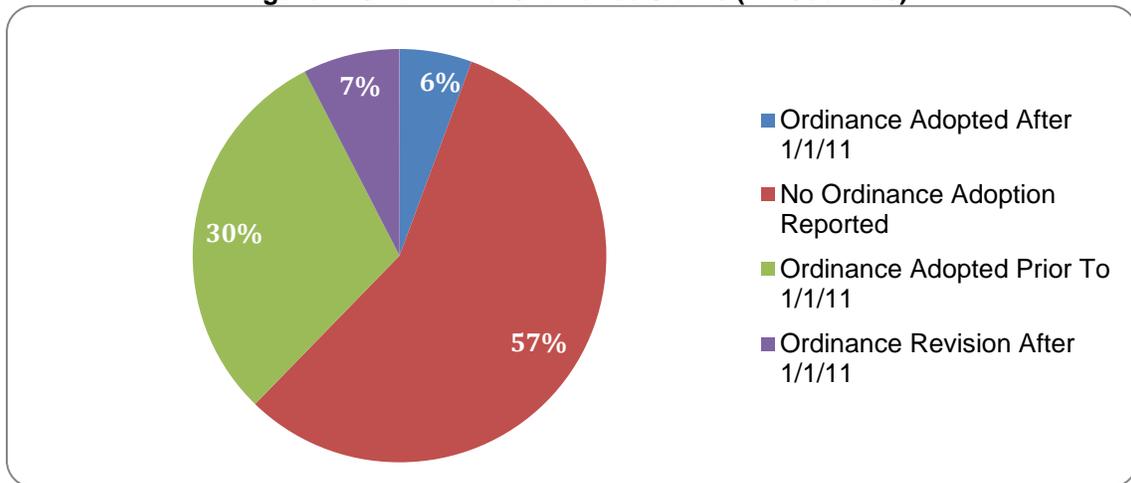
Energy Commission staff found inconsistencies in the small wind data received from many county jurisdictions. The most apparent discrepancies occurred when counties reported no knowledge of system installations within their jurisdictions, whereas ERP and/or SGIP data indicated prior installed projects. Additional discrepancies included counties providing limited and/or inconsistent project data. For example, some counties

provided system heights but not capacity specifications (or vice versa), and many counties did not provide manufacturer data.

Respondents to AB 45 Data Request

The ordinance status of the 53 counties that responded to the Energy Commission’s data request can be broadly separated into four categories: (1) adopted after January 1, 2011, (thus subject to the provisions of AB 45); (2) no adoption reported; (3) adopted prior to January 1, 2011, (thus exempted from the provisions of AB 45); and, (4) adopted prior to January 1, 2011, since but revised (or in the revision process), which are also exempted. **Figure 4** shows the percentage of AB 45 respondents in each category, and **Figure 5** on the following page shows which counties are in each of the four categories.

Figure 4: Small Wind Ordinance Status (All Counties)



Source: California Energy Commission, derived from AB 45 respondent data, Energy Commission survey, May-October 2015

Counties That Reported Ordinances Adopted After January 1, 2011

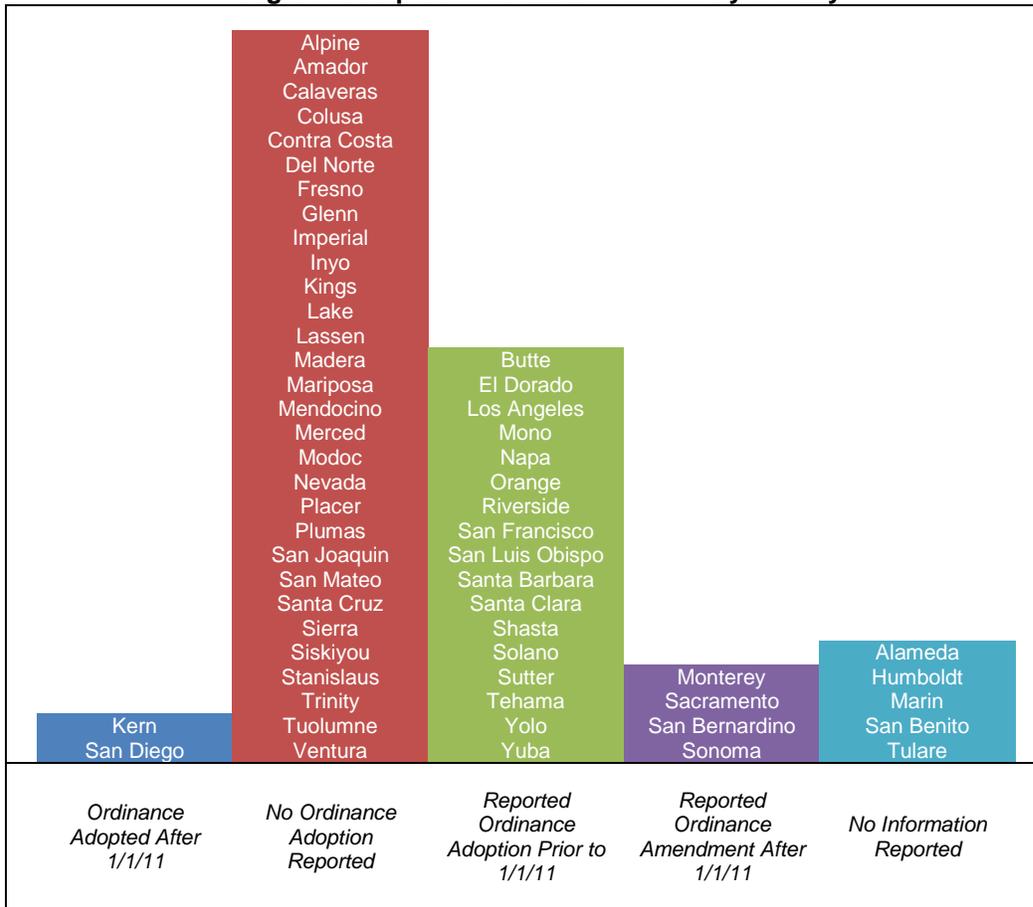
Of the 53 counties that responded, only Kern County and San Diego County reported the passage of ordinances after the January 1, 2011, deadline. As a result, these two counties were subject to the permitting provisions mandated by AB 45. Combined, the counties represent a little over 25 percent of the small wind systems reported by respondents that were installed after 2011. These two counties have more than 100 systems installed through ERP.

Counties That Reported No Ordinance Adoption

Thirty-one respondents stated that no ordinances for small wind energy systems had been adopted after the January 1, 2011, deadline. However, counties were not required to report whether ordinances had been passed before January 1, 2011, so it is possible that some of these counties had adopted ordinances prior to the deadline. Both Nevada and Glenn Counties reported no ordinance adoption but also reported approving applications for small wind systems after the 2011 ordinance adoption deadline. Of the

31 counties that reported no ordinance adoption, 16 installed a total of 146 small wind energy systems through the ERP.

Figure 5: Reported Ordinance Status by County



Source: California Energy Commission, derived from AB 45 respondent data, Energy Commission survey, May-October 2015

Counties That Reported Ordinances Adopted Before January 1, 2011

Seventeen counties self-reported that ordinances for small wind energy systems had been adopted before the January 1, 2011, deadline, which are exempt from the AB 45 provisions. The counties of Napa and Orange stated that their 2010 ordinance adoption was under AB 45. Similarly, Santa Clara County reported that its ordinance, adopted in 2003, was amended in 2010 under AB 45. Of the 17 counties that reported ordinance passage prior to 2011, 9 counties (El Dorado, Los Angeles, Napa, Santa Clara, Shasta, Solano, Sutter, Tehama, and Yolo) received a total of 14 applications for small wind systems between January 2011 and December 2014. Based on ERP and SGIP data, these nine counties have installed a total of 125 small wind projects (less than 50 kW capacity).

Counties That Reported Amending Ordinances After January 1, 2011

In addition to the 17 counties that reported ordinance passage before 2011, three counties (Sacramento, San Bernardino, and Sonoma) reported revisions after January 1, 2011, to ordinances adopted before the deadline. Monterey also reported that it is amending its ordinance. Butte County adopted ordinances before January 1, 2011, and recodified existing ordinances after that date. Because these counties adopted ordinances before January 1, 2011, the ordinances are exempt from the AB 45 provisions. Of these counties, only San Bernardino reported system installations since 2011. San Bernardino County also has more than 250 small wind systems installed through the ERP.

Counties That Did Not Report

Although five counties did not respond to the Energy Commission's AB 45 data request, Energy Commission staff reviewed published information on each county's website. No evidence was found of ordinance adoption after January 1, 2011, for the counties of Alameda, Humboldt, San Benito, and Tulare. Energy Commission staff noted that only Marin adopted an ordinance before January 1, 2011.

Ordinance Analysis

This section analyzes the adopted ordinances of the two reporting counties subject to AB 45, San Diego and Kern. This section also briefly discusses exempt ordinances adopted by counties before January 1, 2011.

Reporting Counties Subject to AB 45 Provisions

Of the two reporting counties subject to the mandates of AB 45, both San Diego and Kern complied with most of provisions of the bill (for example, turbine certification, setback distances, and system placement relative to ridge lines); however, the tower height restrictions varied.

San Diego County²⁵ limited tower height to 80 feet regardless of parcel size. While 80 feet is in accordance with the statute on parcels up to 5 acres, it is more restrictive than the provision requiring that tower heights up to 100 feet be allowed on parcels greater than 5 acres and therefore doesn't comply with Section 65896 (b) (2) of AB 45.

Kern County²⁶ limited tower height to 120 feet regardless of parcel size, which is less restrictive than the provisions of the statute; therefore, it complies with AB 45. However, tower heights are still limited by FAA regulations. In addition, some projects may be located in zones subject to mandatory military review. Within these zones, system

²⁵ San Diego County Code: *Ordinance 10261*. 2013.

Found at <http://www.sandiegocounty.gov/content/dam/sdc/cob/ordinances/ord10261.pdf>.

²⁶ Kern County Zoning Ordinance: *Chapter 19.08.415*. 2012.

Found at <http://www.co.kern.ca.us/planning/pdfs/KCZOJun15.pdf>.

owners can site projects to achieve maximum output as long as they comply with the military zoning limits.

In both counties, the height restrictions allow turbine placement within a productive operating range. However, San Diego County's limitation of towers to a maximum of 80 feet may hamper the ability of a small wind project to clear obstacles, which is necessary to ensure smooth wind flow and enhance system output.²⁷

San Diego and Kern were both in accordance with most of AB 45 provisions, excepting differences regarding tower heights. Despite the differences, both San Diego County and Kern County ordinances fulfilled most of the purpose of AB 45 by providing amenable permitting standards for small wind system installations. Slight differences between county ordinances and AB 45 provisions may be due to a misinterpretation of the AB 45 provisions.

Counties With Ordinances Exempt From AB 45 Provisions

For responding counties that adopted ordinances before January 1, 2011, there were some discrepancies relative to the industry's established best practices that AB 45 addressed. Most of the discrepancies concerned tower height restrictions. Multiple ordinances limited tower heights to 80 feet regardless of parcel size, which may negatively impact system performance. If a system does not generate optimum output, the diminished performance will ultimately affect cost-effectiveness.

Ordinance provisions pertaining to noise, turbine certification, and engineering requirements were all in accordance with the established industry standards, in addition to the AB 45 provisions. Some ordinances even added beneficial provisions to protect consumers, such as warranty standards for turbines and minimum requirements on how long turbine manufacturers have been in business.²⁸ Counties also took measures to reduce avian and bat mortality by controlling wind turbine placement and design to minimize nesting attraction. Other ordinance provisions included requirements for turbine certification.

Despite some discrepancies in tower height restrictions, the revisions to small wind ordinances passed before 2011 were an effort to reduce restrictive regulations and cost to promote implementation.

27 California Energy Commission. *Permitting Small Wind Turbines: A Handbook, Learning From the California Experience*. 2003. Found at <http://www.reapgrants.com/articles/PERMITTINGGUIDEREVIEW.pdf>.

28 Los Angeles County Code: *Chapter 22.52 - Part 15*. 2002.

Found at

https://www.municode.com/library/ca/los_angeles_county/codes/code_of_ordinances?nodeId=TIT22PLZO_DIV1PLZO_CH22.52GERE_PT15NMMWIENCOSYTEMETO.

Shasta County Code: *Chapter 17.88.035*. 2002.

Found at http://www.co.shasta.ca.us/docs/Resource_Management/zoning-plan/1788.pdf.

Sutter County Zoning Code: *Division 93*. 1998. https://www.co.sutter.ca.us/pdf/cs/ps/zoning_code.pdf.

Yolo County Code: *Title 8 - Chapter 2*. 2009. <http://www.yolocounty.org/home/showdocument?id=1897>.

System Data

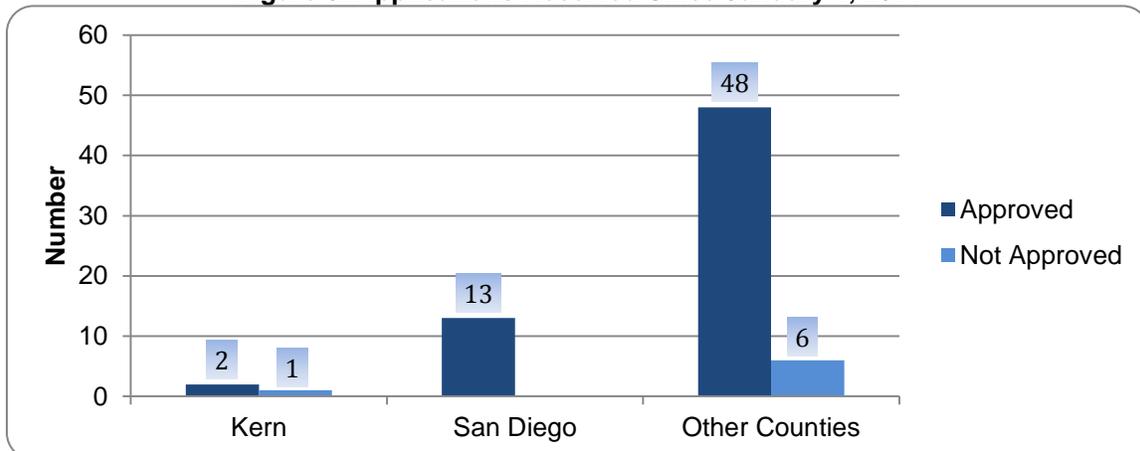
As mentioned above, of the counties that responded to the AB 45 data request, only two counties were subject to the provisions of AB 45. To provide a more complete picture of small wind energy system deployment, the discussion and figures in this section include *all* respondent data for systems approved after January 1, 2011.

Number of Applications Received and Approved Since January 1, 2011

Thirteen counties (El Dorado, Glenn, Kern, Los Angeles, Napa, Nevada, San Bernardino, San Diego, Shasta, Solano, Sutter, Tehama, and Yolo) reported approving applications for small wind energy systems since January 1, 2011. Santa Clara also reported receipt of one application that was ultimately not approved.

Figure 6 shows the reported number of permit applications received and approved by counties since January 1, 2011. For the counties subject to the AB 45 provisions, Kern County approved 2 out of 3 received applications, and San Diego County reported 13 approved applications. For the remaining counties that submitted data, 54 applications were submitted, of which 48 were approved. This total includes one application approved by Nevada County but eventually was voided, and the system was never built. The system data for this application are excluded from the subsequent analysis.

Figure 6: Applications Received Since January 1, 2011

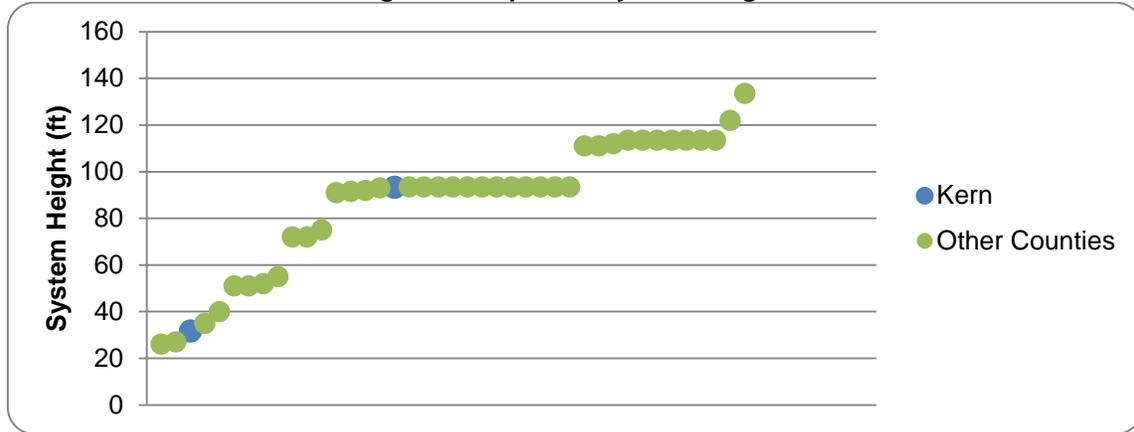


Source: California Energy Commission, derived from AB 45 respondent data, Energy Commission survey, May-October 2015

System Heights

Figure 7 shows the distribution of reported system heights, or the height of the system measured to the top of the blade at the highest point of the system extended above grade, for counties with available data. The reported heights of the two systems in Kern County were 31.7 feet and 93.3 feet, respectively. San Diego County did not report project height for any systems. Among all counties, the maximum reported system height was 133.5 feet, and the minimum was 26 feet. The median value was 93.5 feet.

Figure 7: Reported System Heights



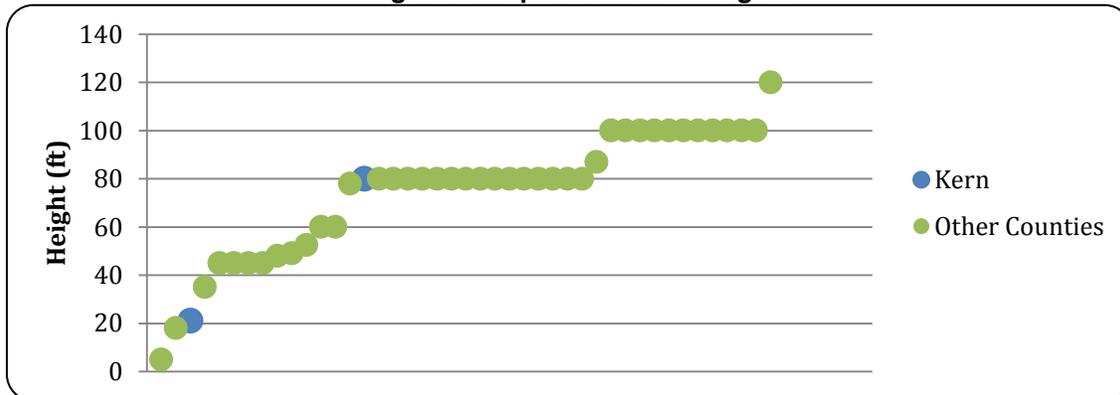
Source: California Energy Commission, derived from AB 45 respondent data, Energy Commission survey, May-October 2015

Tower Heights

Figure 8 shows reported tower heights, or the height above grade of the fixed portion of the tower, excluding the wind turbine, among all counties where data were available. Counties that reported system heights did not necessarily record information on tower heights (and vice versa); however, system height and tower height correspond to similar measurements, so the values are not expected to differ significantly between the two.

The two systems in Kern County had tower heights of 21.1 feet and 80 feet, respectively. The lower tower height is below the industry’s recommended minimum tower height of 30 feet. San Diego County did not report tower heights for any systems.

Figure 8: Reported Tower Heights

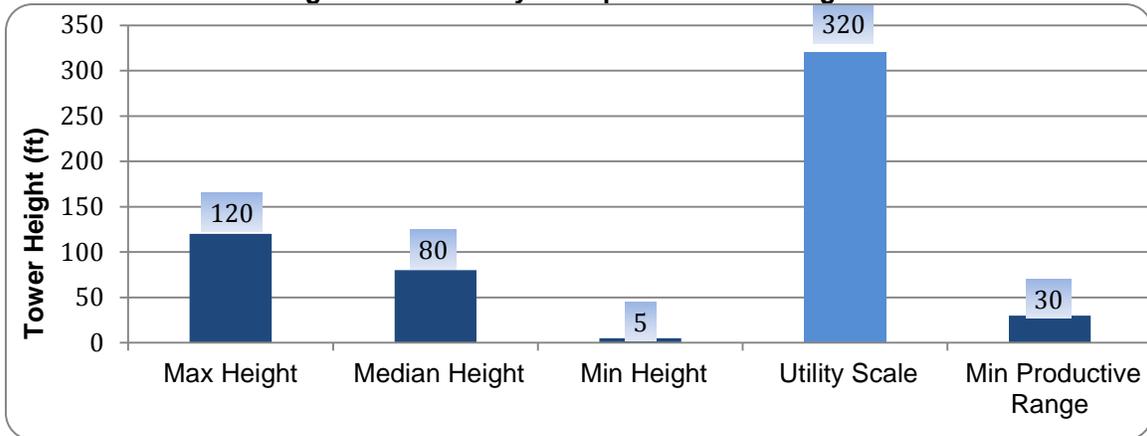


Source: California Energy Commission, Derived from AB 45 Respondent Data, Energy Commission survey, May-October 2015

Figure 9 summarizes results of reported tower heights from all counties (maximum, average, minimum) alongside the industry’s minimum suggested height and a utility-scale system height. Of the 43 systems for which tower height was reported, 3 (including the system in Kern County) had tower heights below the industry’s

recommended minimum of 30 feet. Lower tower heights often reduce installation costs but generally result in lower productivity for the life of the system.

Figure 9: Summary of Reported Tower Heights

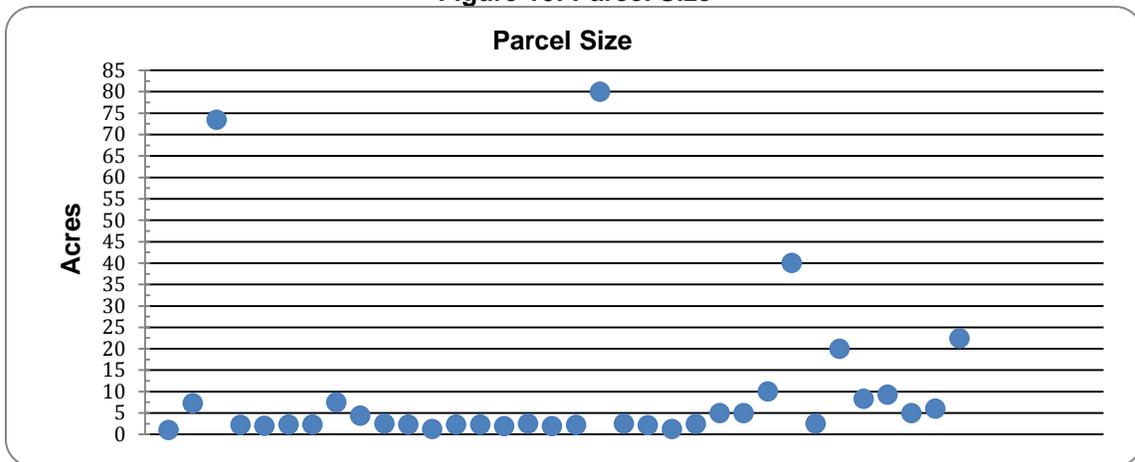


Source: California Energy Commission, derived from AB 45 respondent data, Energy Commission survey, May-October 2015

Parcel Size

Figure 10 shows a chart of AB 45 reported parcel sizes for installed small wind systems. Parcel sizes were reported for 33 sites. The largest site reported was 80 acres, and the smallest was 1.2 acres. The typical size parcel reported ranged between 2 and 10 acres.

Figure 10: Parcel Size

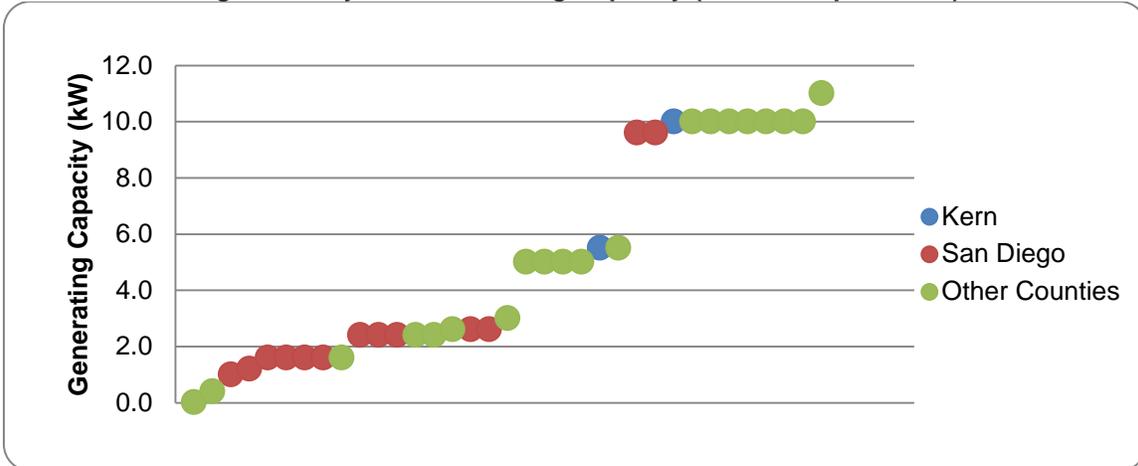


Source: California Energy Commission, derived from AB 45 respondent data, Energy Commission survey, May-October 2015

Generating Capacities

Figure 11 shows reported generating capacities for systems for which data were available. The two systems in Kern County had generating capacities of 5.5 kW and 10 kW, respectively. The 13 systems in San Diego County had generating capacities between 1 kW and 9.6 kW, with a median value of 2.4 kW.

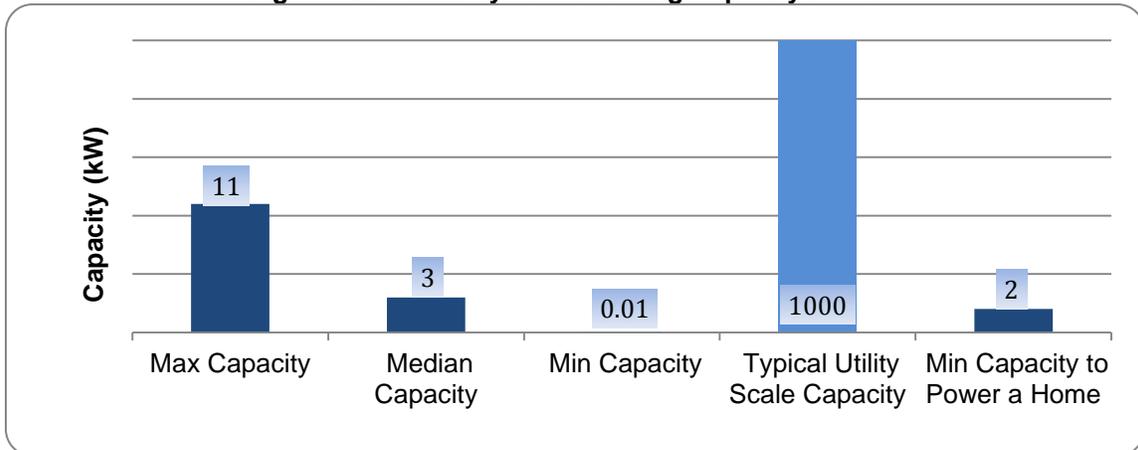
Figure 11: System Generating Capacity (AB 45 Respondents)



Source: California Energy Commission, derived from AB 45 respondent data, Energy Commission survey, May-October 2015

The AB 45 respondents reported generating capacities for only 35 systems. San Bernardino, which approved 27 applications for small wind energy systems, reported capacity for only 1 system. A chart of AB 45 reported system capacities (kW), with the representation of a utility-scale system included for comparison shown in Figure 12. Of the 35 systems, 9 had reported capacities below the typical capacities for small wind applications (2-10 kW) for homes and average-sized farms, and 1 system had a greater reported capacity.

Figure 12: Summary of Generating Capacity Results



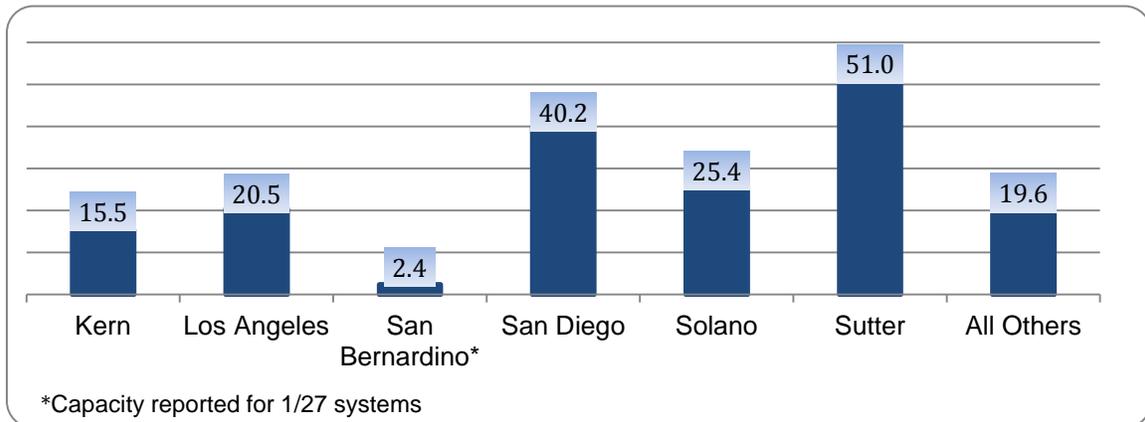
Source: California Energy Commission, derived from AB 45 respondent data, Energy Commission survey, May-October 2015

Capacity Totals

The generating totals discussed in this section include both the AB 45 respondent data and data obtained through ERP and SGIP for small wind energy systems (maximum capacity rating of 50 kW). Unit power totals are an approximation of typical capacities used to power homes (2 kW) and average farms (10 kW).

Figure 13: displays reported capacity totals from AB 45 respondents. Although some respondents did not provide capacity information for all systems installed within their jurisdiction,²⁹ about 175 kW was reported as installed. This generating capacity is estimated to power about 87 homes or 17 average-sized farms.

Figure 13: Installed Capacity (kW) of AB 45 Respondents



Source: California Energy Commission, derived from AB 45 respondent data, Energy Commission survey, May-October 2015

Due to the limited data the Energy Commission received, staff also compared results with ERP and SGIP data to provide a more complete picture of small wind installations during the past decade and a half.

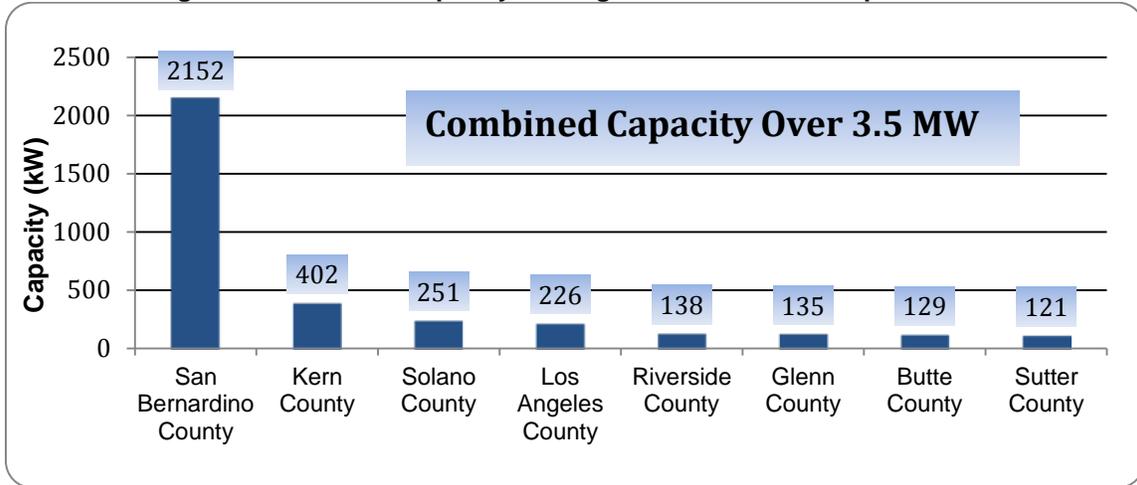
Figure 14 shows the top eight counties with the greatest capacity installed based on ERP and SGIP data. These eight counties have installed a total of 3.5 MW of generating capacity, which is equivalent to powering thousands of homes or hundreds of farms. San Bernardino alone accounts for more than half of this total; the county has more than 2 MW installed.

The counties with the highest number of installations based on SGIP and ERP data are not necessarily the same when considering AB 45 respondent data.³⁰ This may be due to both differences in the periods considered, as well as the previously discussed incomplete capacity reporting in AB 45 data.

²⁹ San Bernardino, which reported the highest number of approved applications for small wind energy systems (27) among AB 45 respondents, provided capacity information for only one system.

³⁰ Butte County has more than 100 kW installed through the ERP but did not submit any data in response to the AB 45 request.

Figure 14: Installed Capacity Through ERP and SGIP: Top Counties



Source: California Energy Commission. Derived from ERP and SGIP Data.

CHAPTER 4

Recommendations

While it is unlikely that small wind energy systems in California will ever see the growth that solar is experiencing in the distributed energy market, the benefits derived from these systems are similar in that they both provide clean, zero-carbon energy to homes, farms, and businesses. It is reasonable, therefore, that the state and local governments continue to encourage or at least not hinder expansion of this market.

Energy Commission staff offers the following recommendations to help foster growth in the small wind energy market:

1) The state should consider conducting studies to provide a clear picture of California’s small wind market, including barriers and long-term potential.

During the research conducted for this study, staff determined that a lack of small wind data exists. While data were collected from the state’s two distributed energy incentive programs (SGIP and ERP), a negligible amount of data exists for small wind systems that were installed without state incentives. Furthermore, data that were submitted to the Energy Commission from counties revealed significant inconsistencies and were sometimes nonexistent.

As a result, the state should consider conducting studies to collect and analyze data on the state’s small wind market. Developing more robust data on the number of small wind systems, the operational performance (output, reliability, and so forth), environmental impacts and cost-effectiveness would provide policy makers with a clearer picture on the status of the market. In addition, it appears the state is doing little to identify and address barriers to small wind systems. While many of the constraints associated with the development of small wind systems are well known (large parcel requirements, adequate wind resource, noise, high cost, and others), other concerns affecting decisions on whether to install a wind turbine may not be well understood.

Analyses should also be conducted to determine the long-term potential of the small wind market in California. Given the population density in many of California’s communities and the design of wind turbines, most residents will not be good candidates for small wind systems. However, consumers and businesses in rural areas with strong winds and relatively high energy bills may reap benefits from small wind systems. Furthermore, additional research is needed of smaller and more modular systems to help determine cost-effectiveness and fit in various urban environments.

2) When permitting the footprint of a small wind energy system, local government should consider only the actual pad on which the system will reside and an access road to minimize impacts to developments and prime agricultural lands.

Staff recommends local government entities, when approving the footprint of small wind energy systems, require for consideration only the actual pad on which the system will sit and a small access road, neither of which affects prime agricultural land use.³¹

3) The state should consider extending key provisions of this statute.

AB 45 mandates that county ordinances adopted after January 1, 2011, cannot be more restrictive than the AB 45 provisions provided. AB 45 provides a framework to align county ordinances with minimum provisions to meet industry standards while continuing to allow counties to adopt ordinances according to their needs. In particular, policies and ordinances that maximize tower height will benefit the market. Therefore, the state should consider continuing the provisions in AB 45 that limit ordinance restrictions for small wind systems.

Conclusion

AB 45 provides a framework for counties to adopt ordinances relating to small wind systems and prevents the ordinances from being excessively restrictive and burdensome. The Energy Commission's efforts to collect data from California's 58 counties show that modest activity continues in the small wind energy market and, with the exception of San Diego County's height restriction, the other counties comply with AB 45.

Although the installation of utility-scale wind has grown very rapidly in both California and the United States, small wind energy systems are being installed at a very slow pace. Unlike distributed solar generation, where falling prices, the ability to use existing roof structures, and excellent solar resources found around the state are driving rapid growth in both the residential and commercial building markets, the expansion of small wind energy systems is constrained by a variety of factors.

Finally, the state should consider further studies to better understand the small wind energy market and its potential. Due to the modular nature of wind energy systems, future innovations in turbine technology may foster improvements in the efficiency and the affordability of small wind generation. These improvements, coupled with more consistent California county codes, and reasonable permitting practices will encourage modest expansion of the small wind energy industry.

31 "Navigating California's Williamson Act," <http://www.chadbourne.com/files/Publication/ea4c664d-1579-4090-b0b6-3f82082956ac/Presentation/PublicationAttachment/0b126f21-80c9-4230-99e0-4a572e689dc4/Nesburn%20NAW%20reprint%2010%2010.pdf>.

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<http://www.homepower.com/articles/wind-power/design-installation/wind-electricity-right-you>, June/July 2011

List of County Ordinances Reviewed

Butte County Zoning Ordinance: *Article 25, Section 24-157*. 2012.

Kern County Zoning Ordinance: *Chapter 19.08.415*. 2012

Los Angeles County Code: *Chapter 22.52 - Part 15*. 2002

San Diego County Code: *Ordinance 10261*. 2013

Shasta County Code: *Chapter 17.88.035*. 2002

Sutter County Zoning Code: *Division 93*. 1998

Yolo County Code: *Title 8 - Chapter 2*. 2009

APPENDIX A:

Text of Assembly Bill No. 45

The People of the State of California do enact as follows:

SECTION 1. The heading of Article 2.11 (commencing with Section 65892.13) of Chapter 4 of Division 1 of Title 7 of the Government Code is repealed.

SEC. 2. Article 2.11 (commencing with Section 65893) is added to Chapter 4 of Division 1 of Title 7 of the Government Code, to read:

Article 2.11. Wind Energy

65893. (a) The Legislature finds and declares all of the following:

- (1) Wind energy is an abundant, renewable, and nonpolluting energy resource.
- (2) Wind energy, when converted to electricity, reduces our dependence on nonrenewable energy resources, reduces air and water pollution that result from conventional sources burning fossil fuels, and reduces emissions of greenhouse gases.
- (3) Distributed generation small wind energy systems also enhance the reliability and quality of electricity delivered by the electrical grid, reduce peak power demands, increase in-state electricity generation, diversify the state's energy supply portfolio, and make the electricity supply market more competitive by promoting consumer choice.
- (4) Small wind energy systems designed for onsite home, farm, and small commercial use are recognized by the Legislature and the State Energy Resources Conservation and Development Commission as an excellent technology to help achieve the goals of increased in-state electricity generation, reduced demand on the state electrical grid, increased consumer energy independence, and nonpolluting electricity generation.
- (5) It is the intent of the Legislature to encourage local agencies to support the state's ambitious renewable energy procurement requirements by developing and adopting ordinances that facilitate the installation of small wind energy systems and do not unreasonably restrict the ability of homeowners, farms, and small businesses to install small wind energy systems in zones in which they are authorized by local ordinance.
- (6) It is the intent of the Legislature to facilitate the implementation of consistent statewide standards to achieve the timely and cost-effective installation of small wind energy systems.

65894. For purposes of this article, the following terms shall have the following meanings:

(1) “Energy Commission” means the State Energy Resources Conservation and Development Commission.

(2) “Small wind energy system” means a wind energy conversion system consisting of a wind turbine, a tower, and associated control or conversion electronics that has a rated capacity of not more than 50 kilowatts per customer site, consistent with the requirements of paragraph (3) of subdivision (b) of Section 25744 of the Public Resources Code, and that will be used primarily to reduce onsite consumption of utility power.

(3) “System height” means the higher of either the height of the tower and the system measured to the top of the blade at the highest point of the system extended above the existing grade when being operated.

(4) “Tower height” means the height above grade of the fixed portion of the tower, excluding the wind turbine.

(5) “Urbanized area” means either of the following:

(A) An urbanized area as defined in paragraph (2) of subdivision (d) of Section 65944.

(B) A city as defined in Section 56023.

65895. (a) A county that has not adopted an ordinance providing for the installation of small wind energy systems located outside an urbanized area, but within the county’s jurisdiction, by January 1, 2011, may adopt such an ordinance at a later date, but the ordinance shall be in accordance with Section 65896. Ordinances adopted prior to January 1, 2011, are exempt from this article.

(b) A county may establish a process for the issuance of conditional use permits for small wind energy systems located outside an urbanized area, subject to all of the following conditions:

(1) A county shall review an application for a small wind energy system pursuant to the timelines established in the Permit Streamlining Act (Chapter 4.5 (commencing with Section 65920)).

(2) Fees charged by a county to review an application for a small wind energy system shall be determined in accordance with Sections 66014 and 66016.

(3) An application for the installation of a small wind energy system submitted between January 1, 2011, and the date of the county’s adoption of an ordinance that meets the requirements and conditions of subdivision (b) of Section 65896 shall be approved

through a ministerial permit by the county meeting the requirements and conditions of subdivision (b) of Section 65896.

65896. (a) A county may adopt an ordinance that provides for the installation of small wind energy systems outside an urbanized area, but within the county's jurisdiction.

(b) The ordinance may impose conditions on the installation of small wind energy systems that include, but are not limited to, notice, tower height, setback, view protection, aesthetics, aviation, and design-safety requirements. However, the ordinance shall not require conditions on notice, tower height, setback, noise level, visual effects, turbine approval, tower drawings, and engineering analysis, or line drawings that are more restrictive than the following requirements and conditions:

(1) The parcel where the system is located shall be at least one acre in size and located outside an urbanized area.

(2) Tower heights of not more than 80 feet shall be allowed on parcels between one and five acres. Tower heights of not more than 100 feet shall be allowed on parcels above five acres. All tower heights shall not exceed the applicable limits established by the Federal Aviation Administration. An application shall include evidence that the proposed height of a tower does not exceed the height recommended by the manufacturer or distributor of the system.

(3) Minimum setbacks for the system tower shall be no farther from the property line than the system height, unless a greater setback is needed to comply with applicable fire setback requirements set forth in Section 4290 of the Public Resources Code.

(4) Decibel levels for the system shall not exceed the lesser of 60 decibels (dBA), or any existing maximum noise levels applied pursuant to the noise element of a general plan for the applicable zoning classification in a jurisdiction or applicable noise regulations, as measured at the nearest property line, except during short-term events, such as utility outages and severe windstorms.

(5) Notice of an application for installation of a small wind energy system shall be provided to property owners within 300 feet of the property on which the system is to be located, except that the county may, if it deems it necessary due to circumstances specific to the proposed installation, require the applicant to provide notice by placing a display advertisement of at least one-eighth of a page in at least one newspaper of general circulation within the county in which the installation is proposed.

(6) The system shall not substantially obstruct views of adjacent property owners and shall be placed or constructed below any major ridgeline when visible from any scenic highway corridor designated pursuant to Article 2.5 (commencing with Section 260) of

Chapter 2 of Division 1 of the Streets and Highways Code or any scenic highway corridor designated by a county in its general plan.

(7) The system shall use a wind turbine that has been approved by the Energy Commission as qualifying under its Emerging Renewables Program pursuant to Section 25744 of the Public Resources Code or has been certified by a national program recognized and approved by the commission.

(8) The application shall include standard drawings and an engineering analysis of the system's tower, showing compliance with the current version of the California Building Standards Code and certification by a professional mechanical, structural, or civil engineer licensed by this state. A wet stamp, however, shall not be required if the application demonstrates that the system is designed to meet the most stringent wind requirements (Uniform Building Code wind exposure D), the requirements for the worst seismic class (Seismic 4), and the weakest soil class, with a soil strength of not more than 1,000 pounds per square foot, or other relevant conditions normally required by a county.

(9) The system shall comply with all applicable Federal Aviation Administration requirements, including Subpart B (commencing with Section 77.11) of Part 77 of Title 14 of the Code of Federal Regulations regarding installations close to airports, and the State Aeronautics Act (Part 1 (commencing with Section 21001) of Division 9 of the Public Utilities Code). A system that complies with this subdivision shall be deemed to meet the applicable health and safety requirements regarding civil aviation.

(10) The application shall include a line drawing of the electrical components of the system in sufficient detail to allow for a determination that the manner of installation conforms to the National Electric Code.

(11) If required by the county, the applicant shall provide information demonstrating the system will be used primarily to reduce onsite consumption of electricity. The county may also require the application to include evidence, unless the applicant does not plan to connect the system to the electricity grid, that the electric utility service provider that serves the proposed site has been informed of the applicant's intent to install an interconnected customer-owned electricity generator.

(12) If a county receives an application to install a small wind energy system on a site that is within 1,000 feet of a military installation, within special use airspace, or beneath a low-level flight path as defined by Section 21098 of the Public Resources Code, then the county shall promptly comply with Section 65944. If the governing authority of any military installation, special use airspace, or low-level flight path provides written

comments regarding that application, the county shall consider those comments before acting on the application.

(13) If a small wind energy system is proposed to be sited in an agricultural area that may have aircraft operating at low altitudes, the county shall take reasonable steps, concurrent with other notices issued pursuant to this subdivision, to notify pest control aircraft pilots registered to operate in the county pursuant to Section 11921 of the Food and Agricultural Code.

(14) Tower structure lighting shall be prohibited unless otherwise required by another provision of law or pursuant to paragraph (13).

(15) No climbing apparatus attached to the system shall be located less than 12 feet above the ground, and the system shall be designed to prevent climbing within the first 12 feet.

(16) No sign shall be attached to the system if visible from a public road, except for signs that identify the manufacturer, installer, or owner of the system, or public health and safety signs applicable to the installed system, but the signs shall neither be larger than four square feet, unless approved by the county, nor located at the base of the system within 10 feet of the ground surface.

(17) A small wind energy system shall not be allowed where otherwise prohibited by any of the following:

(A) A local coastal program and any implementing regulations adopted pursuant to the California Coastal Act (Division 20 (commencing with Section 30000) of the Public Resources Code).

(B) The California Coastal Commission, pursuant to the California Coastal Act (Division 20 (commencing with Section 30000) of the Public Resources Code).

(C) The regional plan and any implementing regulations adopted by the Tahoe Regional Planning Agency pursuant to the Tahoe Regional Planning Compact (Title 7.4 (commencing with Section 66800)).

(D) The San Francisco Bay Plan and any implementing regulations adopted by the San Francisco Bay Conservation and Development Commission pursuant to the McAteer-Petris Act (Title 7.2 (commencing with Section 66600)).

(E) A comprehensive land use plan and any implementing regulations adopted by an airport land use commission pursuant to Article 3.5 (commencing with Section 21670) of Chapter 4 of Division 9 of Part 1 of the Public Utilities Code.

(F) The Alquist-Priolo Earthquake Fault Zoning Act (Chapter 7.5 (commencing with Section 2621) of Division 2 of the Public Resources Code).

(G) A local ordinance to protect the scenic appearance of the scenic highway corridor designated pursuant to Article 2.5 (commencing with Section 260) of Chapter 2 of Division 1 of the Streets and Highways Code or pursuant to scenic highways designated in the local general plan.

(H) The terms of a conservation easement entered into pursuant to Chapter 4 (commencing with Section 815) of Division 2 of Part 2 of the Civil Code.

(I) The terms of an open-space easement entered into pursuant to the Open-Space Easement Act of 1974 (Chapter 6.6 (commencing with Section 51070) of Division 1 of Title 5).

(J) The terms of an agricultural conservation easement entered into pursuant to the California Farmland Conservancy Program Act (Division 10.2 (commencing with Section 10200) of the Public Resources Code).

(K) The terms of a contract entered into pursuant to the Williamson Act (Chapter 7 (commencing with Section 51200) of Division 1 of Title 5).

(L) The listing of the proposed site in the National Register of Historic Places or the California Register of Historical Resources pursuant to Section 5024.1 of the Public Resources Code.

(c) A county may impose, as a condition of approval, a requirement that a small wind energy system be removed if it remains inoperable for 12 consecutive months, and at that time the small wind energy system shall be subject to nuisance codes and code enforcement action.

(d) (1) Nothing in this article interferes with or prevents the exercise of authority by a county to carry out its programs, projects, or responsibilities.

(2) Nothing in this article affects requirements imposed under any other law.

65897. It is the policy of the state to promote and encourage the use of distributed renewable energy systems and to limit obstacles to their use, and it is the intent of the Legislature that local agencies encourage the installation of distributed renewable energy systems by removing obstacles to, and minimizing costs of, permitting distributed renewable energy systems.

65898. On or before January 1, 2016, the State Energy Resources Conservation and Development Commission shall submit to the Assembly Committee on Local Government, the Senate Committee on Local Government, and the Assembly Committee on Utilities and Commerce a report that contains all of the following:

(a) The number of ordinances adopted on or after January 1, 2011, by counties pursuant to Section 65895.

(b) The number of applications to install small wind energy systems received by those counties on or after January 1, 2011.

(c) The number of applications to install small wind energy systems approved by those counties on or after January 1, 2011.

(d) The tower heights, system heights, parcel sizes, and generating capacities of the small wind energy systems approved by those counties on or after January 1, 2011.

(e) Any recommendations to the Legislature by the State Energy Resources Conservation and Development Commission for the continuation, modification, or termination of this article.

65899. This article shall remain in effect only until January 1, 2017, and as of that date is repealed, unless a later enacted statute, that is enacted before January 1, 2017, deletes or extends that date.

APPENDIX B: COLLECTION OF DATA

California Energy Commission staff requested data from the 58 California counties via electronic mail in May 2015. Energy Commission staff subsequently followed up with an October 2015 letter to 17 counties that either had not responded or submitted data in response to the original requests. Direct phone contacting and electronic mail were the main mode of information and data collection. Detailed information on the data requested, including raw data collected, is found below:

Table B-1: Reported Ordinance Status (AB 45 Respondents)

| County | Status | County | Status |
|---------------------|---------------------------------------|------------------------|---------------------------------------|
| Alameda | No Information Submitted | Orange County | Ordinance Adoption Prior to 2011 |
| Alpine | No Ordinance Adoption Reported | Placer | No Ordinance Adoption Reported |
| Amador | No Ordinance Adoption Reported | Plumas | No Ordinance Adoption Reported |
| Butte | Ordinance Adoption Prior to 2011 | Riverside | Ordinance Adoption Prior to 2011 |
| Calaveras | No Ordinance Adoption Reported | Sacramento | Ordinance Revision After 2011 |
| Colusa | No Ordinance Adoption Reported | San Benito | No Information Submitted |
| Contra Costa | No Ordinance Adoption Reported | San Bernardino | Ordinance Revision After 2011 |
| Del Norte | No Ordinance Adoption Reported | San Diego | Ordinance Adopted After 2011 Reported |
| El Dorado | Ordinance Adoption Prior to 2011 | San Francisco | Ordinance Adoption Prior to 2011 |
| Fresno | No Ordinance Adoption Reported | San Joaquin | No Ordinance Adoption Reported |
| Glenn | No Ordinance Adoption Reported | San Luis Obispo | Ordinance Adoption Prior to 2011 |
| Humboldt | No Information Submitted | San Mateo | No Ordinance Adoption Reported |
| Imperial | No Ordinance Adoption Reported | Santa Barbara | Ordinance Adoption Prior to 2011 |
| Inyo | No Ordinance Adoption Reported | Santa Clara | Ordinance Adoption Prior to 2011 |
| Kern | Ordinance Adopted After 2011 Reported | Santa Cruz | No Ordinance Adoption Reported |
| Kings | No Ordinance Adoption Reported | Shasta | Ordinance Adoption Prior to 2011 |
| Lake | No Ordinance Adoption Reported | Sierra | No Ordinance Adoption Reported |
| Lassen | No Ordinance Adoption Reported | Siskiyou | No Ordinance Adoption Reported |
| Los Angeles | Ordinance Adoption Prior to 2011 | Solano | Ordinance Adoption Prior to 2011 |
| Madera | No Ordinance Adoption Reported | Sonoma | Ordinance Revision After 2011 |
| Marin | No Information Submitted | Stanislaus | No Ordinance Adoption Reported |
| Mariposa | No Ordinance Adoption Reported | Sutter | Ordinance Adoption Prior to 2011 |
| Mendocino | No Ordinance Adoption Reported | Tehama | Ordinance Adoption Prior to 2011 |
| Merced | No Ordinance Adoption Reported | Trinity | No Ordinance Adoption Reported |
| Modoc | No Ordinance Adoption Reported | Tulare | No Information Submitted |
| Mono | Ordinance Adoption Prior to 2011 | Tuolumne | No Ordinance Adoption Reported |
| Monterey | Ordinance Revision After 2011 | Ventura | No Ordinance Adoption Reported |
| Napa | Ordinance Adoption Prior to 2011 | Yolo | Ordinance Adoption Prior to 2011 |
| Nevada | No Ordinance Adoption Reported | Yuba | Ordinance Adoption Prior to 2011 |

Source: California Energy Commission, Derived from Respondent Data, Energy Commission survey, May-October 2015

Table B-2: Reported Post 2011 Installations (AB 45 Respondents)

| County | Year | Manufacturer | Tower Height (ft.) | System Height (ft.) | Parcel Size (Ac) (P=Tower Pad) | Generating Capacity (kW) |
|------------------|------|------------------|--------------------|---------------------|--------------------------------|--------------------------|
| El Dorado | 2011 | DyoCore | 5.00 | NA | Roof Mount | 1.60 |
| El Dorado | 2013 | NA | NA | NA | Roof Mount | NA |
| Glenn | 2011 | Honeywell Aurora | 45.00 | 52.00 | NA | 5.00 |
| Kern | 2011 | Falcon | 21.10 | 31.70 | NA | 5.50 |
| Kern | 2011 | Bergey | 80.00 | 93.25 | NA | 10.00 |
| Los Angeles | NA | NA | 18.00 | 35.00 | NA | 5.50 |
| Los Angeles | NA | NA | NA | 26.00 | NA | 5.00 |
| Los Angeles | NA | NA | 80.00 | 93.00 | NA | 10.00 |
| Napa | 2011 | Skystream | 45' (T) | 51' | 99.86 | 2.6 |
| Nevada* | 2012 | NA | 100.00 | 106.00 | 100.00 | 5.00 |
| San Bernardino | NA | NA | 80.00 | 93.50 | 316,681 sq. ft. (P) | NA |
| San Bernardino | NA | NA | 120.00 | 133.50 | 3,199,482 sq. ft. (P) | NA |
| San Bernardino | NA | NA | 80.00 | 93.50 | 97,138 sq. ft. (P) | NA |
| San Bernardino | NA | NA | 80.00 | 93.50 | 87,555 sq. ft.(P) | NA |
| San Bernardino | NA | NA | 78.00 | NA | 100,188 sq. ft.(P) | NA |
| San Bernardino | NA | NA | 80.00 | 93.50 | 101,494 sq. ft.(P) | NA |
| San Bernardino | NA | NA | 100.00 | 113.50 | 327,135 sq. ft. (P) | NA |
| San Bernardino | NA | NA | 100.00 | 113.50 | 189,486 sq. ft. (P) | NA |
| San Bernardino | NA | NA | 80.00 | 93.50 | 110,206 sq. ft.(P) | NA |
| San Bernardino | NA | NA | 80.00 | 93.50 | 98,445 sq. ft.(P) | NA |
| San Bernardino | NA | NA | 35.00 | NA | 53,143 sq. ft. (P) | NA |
| San Bernardino | NA | NA | 49.00 | NA | 100,623 sq. ft. (P) | NA |
| San Bernardino | NA | NA | 100.00 | 113.50 | 100,623 sq. ft. (P) | NA |
| San Bernardino | NA | NA | NA | 91.60 | 84,506 sq. ft. (P) | NA |
| San Bernardino | NA | NA | 80.00 | 93.50 | 108,900 sq. ft. (P) | NA |
| San Bernardino | NA | NA | 80.00 | 93.50 | 83,199 sq. ft. (P) | NA |
| San Bernardino | NA | NA | 80.00 | 93.50 | 96,267 sq. ft. (P) | NA |
| San Bernardino** | NA | NA | NA | 340.00 | 3,484,800 sq. ft. (P) | NA |
| San Bernardino | NA | NA | 80.00 | 93.50 | 108,900 sq. ft. (P) | NA |
| San Bernardino | NA | NA | 80.00 | 93.50 | 94,089 sq. ft. (P) | NA |
| San Bernardino | NA | NA | 45.00 | 51.00 | 54,450 sq. ft. (P) | 2.40 |
| San Bernardino | NA | NA | 80.00 | 91.00 | 108,028 sq. ft. (P) | NA |
| San Bernardino | NA | NA | 100.00 | 113.50 | 217,800 sq. ft. (P) | NA |
| San Bernardino | NA | NA | 100.00 | 113.50 | 217,800 sq. ft. (P) | NA |
| San Bernardino | NA | NA | 100.00 | 113.50 | 435,600 sq. ft. (P) | NA |

| County | Year | Manufacturer | Tower Height (ft.) | System Height (ft.) | Parcel Size (Ac) (P=Tower Pad) | Generating Capacity (kW) |
|----------------|------|---------------------|--------------------|---------------------|--------------------------------|--------------------------|
| San Bernardino | NA | NA | 100.00 | 113.50 | 1,742,400 sq. ft. (P) | NA |
| San Bernardino | NA | NA | 80.00 | 93.50 | 108,900 sq. ft. (P) | NA |
| San Bernardino | NA | NA | NA | 75.00 | 871,200 sq. ft. (P) | NA |
| San Diego | 2011 | NA | NA | NA | NA | 1.20 |
| San Diego | 2011 | NA | NA | NA | NA | 2.40 |
| San Diego | 2011 | NA | NA | NA | NA | 1.60 |
| San Diego | 2011 | NA | NA | NA | NA | 1.60 |
| San Diego | 2011 | NA | NA | NA | NA | 1.60 |
| San Diego | 2011 | NA | NA | NA | NA | 1.60 |
| San Diego | 2011 | NA | NA | NA | NA | 9.60 |
| San Diego | 2011 | NA | NA | NA | NA | 9.60 |
| San Diego | 2011 | NA | NA | NA | NA | 2.60 |
| San Diego | 2011 | NA | NA | NA | NA | 2.40 |
| San Diego | 2012 | NA | NA | NA | NA | 2.60 |
| San Diego | 2012 | NA | NA | NA | NA | 2.40 |
| San Diego | 2014 | NA | NA | NA | NA | 1.00 |
| Shasta | NA | NA | 45.00 | 55.00 | 8.29 Ac | 5.00 |
| Solano | 2011 | Skystream | 48.00 | NA | 9.27 Ac | 2.40 |
| Solano | 2011 | API HAWT | NA | 40.00 | 5.00 Ac | 3.00 |
| Solano | 2011 | Bergey | 100.00 | 111.00 | 6.00 Ac | 10.00 |
| Solano** | 2012 | Mitsubishi | 226.37 | 282.00 | 40.00 Ac | 1000.00 |
| Solano | 2013 | Bergey | 100.00 | 111.00 | 22.45 Ac | 10.00 |
| Sutter | 2011 | NA | 100.00 | 112.00 | NA | 10.00 |
| Sutter | 2011 | NA | 80.00 | 92.00 | NA | 10.00 |
| Sutter | 2011 | NA | 60.00 | 72.00 | NA | 10.00 |
| Sutter | 2011 | NA | 60.00 | 72.00 | NA | 10.00 |
| Sutter | 2012 | NA | 100.00 | 122.00 | NA | 11.00 |
| Tehama | 2011 | NA | 87.00 | NA | NA | 5.00 |
| Tehama | 2011 | NA | 52.50 | NA | NA | 0.01 |
| Yolo | 2011 | Southwest Windpower | NA | 27.00 | NA | 0.40 |

*Application approved but later voided - not counted in height, parcel size, or capacity data.

**Utility/Community Scale -Not counted in respondent data.

Source: California Energy Commission, Derived from Respondent Data, Energy Commission survey, May-October 2015

Table B-3: Installed Generation Totals

| AB 45 Small Wind System Installation Generation Totals: Respondents | |
|---|---------------------------------|
| County | Generation Capacity (kW) |
| El Dorado | 1.6 |
| Glenn | 5.0 |
| Kern | 15.5 |
| Los Angeles | 20.5 |
| Napa | 2.6 |
| San Bernardino* | 2.4 |
| San Diego | 40.2 |
| Shasta | 5.0 |
| Solano | 25.4 |
| Sutter | 51 |
| Tehama | 5.0 |
| Yolo | 0.4 |
| All Others | 19.6 |
| Total | 174.6 |
| Homes Powered Approx. | 87 |
| Farms Powered Approx. | 17 |
| ERP Small Wind System Installation Generation Totals: Top Counties | |
| County | Generation Capacity (kW) |
| San Bernardino County | 2151.6 |
| Kern County | 401.9 |
| Solano County | 251.2 |
| Los Angeles County | 226.3 |
| Riverside County | 138.2 |
| Glenn County | 135.4 |
| Butte County | 128.9 |
| Sutter County | 120.7 |
| Total (Top Counties) | 3554.2 |
| Homes Powered Approx. | 1777 |
| Farms Powered Approx. | 355 |
| SGIP Small Wind (<50 kW) System Installation Generation Totals (as of 10/26/15) | |
| County | Generation Capacity (kW) |
| Los Angeles | 44 |
| Solano | 9.0 |
| Total | 53.0 |
| Homes Powered Approx. | 27 |
| Farms Powered Approx. | 5 |

Source: California Energy Commission, Derived from Respondent Data, Energy Commission survey, May-October 2015, ERP Data, and SGIP Data