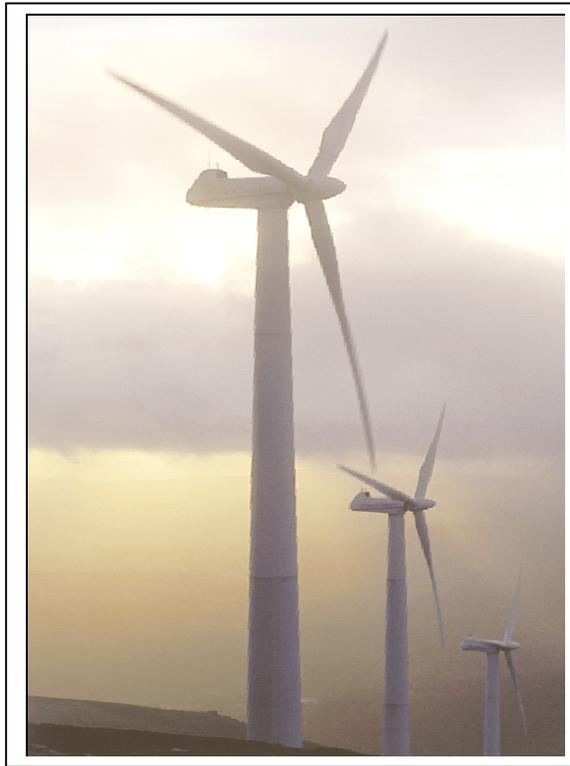


**WIND PERFORMANCE
REPORT SUMMARY
2002–2003**



STAFF REPORT

June 2006
CEC-500-2006-060



Arnold Schwarzenegger, Governor

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Abstract

This document is prepared pursuant to Wind Project Performance Reporting System regulations (California Administrative Code, Title 20, Chapter 2, Subchapter 3, Article 4) and to support California Energy Commission (Energy Commission) staff analyses.

The purpose of this report is to summarize the performance of wind energy projects in California in 2002 and 2003. Information on the number of turbines, nameplate capacity, energy production and location is provided in tables and maps. This information is compiled from reports furnished by California's wind project operators. This report shows recent trends and presents some historical information regarding wind energy generation in California.

Keywords

Altamont, capacity, capacity factor, turbine, Pacheco, San Geronio, Solano, Tehachapi, wind

EXECUTIVE SUMMARY

Wind energy capacity and production have grown gradually in the past few years. This capacity and production increase comes from new developments and re-powering of existing turbines. The actual number of turbines in California has increased by 595, or 5.1 percent, from 2001 to 2003. The total installed capacity in California as of 2003 is 2,122 megawatts, MW. This is comprised of 191 MW of installed municipal capacity, 1,824 MW of reported capacity by investor-owned utilities, and an estimated 107 MW of unreported capacity. The 1,824 MW of reported, installed capacity represents about 5 percent of the world's total wind generating capacity of 39,294 MW in 2003.

The purpose of this report is to summarize the performance of wind energy projects in California in 2002 and 2003. Information on the number of turbines, nameplate capacity, energy production, and location is provided in tables and maps. This information is compiled from reports furnished by California's wind project operations.

This document reports wind energy capacity and production in California by turbine size, location, and year to the wind energy industry in California and beyond.

As a result of this report, the renewable energy community will have more accurate information regarding California's wind energy production. In 2003, the California wind industry reported 3,714 million kilowatt hours, kWh of electricity output. This is electricity sufficient to power approximately 539,511 households for a year.

While this report is not intended to offer conclusions, it can be noted that:

- The uncertainty associated with renewal of the federal Production Tax Credit inserts ambiguity into wind turbine investment decisions.
- The Renewable Portfolio Standards goal is the driving force in encouraging renewable energy development, such as wind.
- Larger, more efficient turbines are gradually replacing older, smaller, lower capacity turbines, offering a increase in electricity generation from wind.
- The capacity factor of California's wind energy turbine fleet is remaining steady in the 24 percent to 26 percent range.

ACKNOWLEDGEMENTS

The WPRS report was developed by the California Energy Commission in conjunction with the state's wind industry, American Wind Energy Association, and the U.S. Department of Energy and is under the direction of Dora Yen Nakafuji, Technical Lead for Wind Energy Resources in the Public Interest Energy Research Renewable Research and Development Group.

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CHAPTER 1 INTRODUCTION

The purpose of this report is to summarize the performance of wind energy projects in California. Information on the number of turbines, nameplate capacity, energy production, and location is provided in tables and maps. This information is compiled from reports furnished by California's wind project operators. This report shows recent trends and presents some historical information regarding wind energy generation in California.

Wind energy capacity and production have grown gradually in the past few years. This capacity and production increase comes from new developments and re-powering of existing turbines. The actual number of turbines in the state has increased from 2001 to 2003 by 5.1 percent.

Year	Net Capacity (MW)	Output (MkWh)	Turbines
2000	1,482	3.176	11,463
2001	1,549	3.235	11,572
2002	1,552	3.515	11,574
2003	1,824	3.714	12,167

The total installed capacity in California is about 4.63 percent of the world's total wind generating capacity of 39,294 megawatts (MW) in 2003.

The delays in, and the short-term renewal of, the federal Production Tax Credit has contributed to slower growth in new turbines. The re-enactment of this credit should encourage growth in the absolute number of turbines again during the next few years. (The Production Tax Credit expired on December 31, 2003, and in September 2004 was extended retroactively from that date to December 31, 2005.)

As with other industries, wind energy projects undergo transformations in ownership. Many wind projects in the state have different owners than those who originally developed the projects. Similarly, turbine manufacturers are changing as a result of numerous mergers and acquisitions.

CHAPTER 2 BACKGROUND ON WIND PERFORMANCE REPORT SUMMARY

Wind Performance Report Summary Program Scope

California law requires the California Energy Commission to serve as a central repository in state government to collect and disseminate information on energy supplies.

Since January 1985, Wind Performance Report Summary (WPRS) regulations have required all California wind operators with projects rated at 100 kilowatts (kW) or more to provide quarterly wind performance reports. The WPRS reports filed by operators include information such as actual energy production and related project information. In addition, all California power purchasers are required to file quarterly reports documenting power purchases from wind operators. The Energy Commission compiles and evaluates these data and documents its findings in annual reports on wind industry performance in California. This report is one of the most comprehensive statewide databases of wind operator information. Wind energy related information and WPRS archived documents since 1996 may be found on the Energy Commission Web site at [www.energy.ca.gov/wind/documents/].

Reasons for Wind Performance Report Summary Regulations

The Energy Commission's wind program was initiated in 1977 and expanded in 1978 with the passage of California Assembly Bill (AB) 2976 authored by Assemblyman Henry Mello. The Mello bill required the Energy Commission to implement a state wind energy program to expedite the commercialization of utility-scale wind turbines. The Energy Commission became responsible for assessing wind resources throughout California, operating a public wind information center, testing wind turbine technologies, and conducting research to support development of large-scale prototype wind turbines.

With exponential growth in wind energy during 1981, the Energy Commission and the American Wind Energy Association (AWEA) recognized the need for turbine output performance and other technology-related information. Efforts by these two organizations led to adoption of Wind Project Performance Reporting System regulations in 1984.

WPRS regulations were instituted for many reasons. First, the industry, investors, financial community, and government agencies need actual performance data to better evaluate the status of wind technology and necessary improvements. In 1985, wind project financing was primarily venture capital from private investors willing to take a substantial risk on the technology due to available tax benefits.

Once the tax credits expired in 2003, projects then focused on revenues from power sales and placed greater reliance on conventional project financing from institutional lenders and foreign investors. The WPRS data were needed to establish performance credibility with these new sources of financing.

Second, wind performance data provide a better understanding of the role wind resources can play in meeting California's energy needs. Last, the WPRS provides the public with an open and objective source of information about wind energy technologies. California's WPRS report still remains the only statewide compilation of wind resources in the nation.

Information Provided by Wind Performance Report Summary Reports

The operator reports include the following information for wind projects in California, rated at 100 kW or more, that sell electricity to a power purchaser: turbine manufacturers, model numbers, rotor diameter, and kW ratings; the number of cumulative and new turbines installed; the output for each turbine model; and the output for the entire project.

The Energy Commission's report is compiled from monthly reports submitted by project operators and public utilities. The Energy Commission staff uses these data to analyze wind project performance and industry production and capacity trends. The annual report also contains data summary tables reflecting performance statewide and by resource area; turbine size, type, and origin; manufacturer; and project operator. Totals expressed in tables and figures may not equal 100 percent due to rounding.

Since 1985, the Energy Commission has collected, documented, and evaluated data submitted by operators and utilities to comply with WPRS regulations. Extensive empirical data collected and disseminated by the Energy Commission are used by numerous industry, utility, investor, manufacturer, government, and research and development (R&D) groups to evaluate the performance and relative benefits of wind technology.

Information Not Provided by Wind Performance Report Summary Reports

The wind operator reports do not provide information on every wind energy project in California. The absence of a project from WPRS reports typically indicates that the project is not selling any power or is rated less than 100 kW. Non-operating wind projects are not required to report to the Energy Commission. Other unreported capacity includes turbines that do not produce electricity for sale, such as turbines installed by utilities, government organizations, and research facilities. Additional unreported capacity results when operators fail to file. Installed capacity for these operators cannot be confirmed, and only kilowatt hour (kWh) production verified from utility reports is included in WPRS reports. In addition, the wind operators' reports cannot account for the impact turbine age has on performance because turbines are often reported in groups combining old and new machines.

Considerations and Limitations Using Wind Performance Report Summary Data

Although many valuable observations about California's wind industry can be drawn from WPRS data, it is important to recognize some major limitations:

1. While the Energy Commission collects and reports WPRS data in its annual report, the wind industry cannot be evaluated without considering the collective data from several years because the available wind resources vary from year to year depending on weather conditions.
2. The data reported by qualifying facilities and utilities and/or other sources may not compare directly because the wind industry still does not employ a standardized turbine rating system. Turbines are tested under different conditions and rated at widely varying miles-per-hour specifications. Whenever standard formulation is used to compute values, the equations and inputs are described.
3. Operator or manufacturer performance may not be accurately represented in the report when old and new turbine data are grouped together. The analysis of wind data reported since 1985 confirms that newer equipment typically performs more efficiently and reliably than older equipment.
4. Performance data contained in WPRS reports does not reflect other important variables that should be considered. These variables include cost per kilowatt, operation and maintenance costs, durability of the system, and quality of the site's wind resource.

CHAPTER 3 WPRS DATA COMPILATION ISSUES

The Energy Commission has continued to collect WPRS data quarterly since 1985 and has published annual WPRS reports from 1985–1995. With restructuring and resource demands, the Public Interest Energy Research (PIER) renewables research and development group (R&D) assumed responsibility and resumed compiling and evaluating the WPRS data in 1999. The 1996–1999 summary report was produced in 2000. The *Wind Performance Report Summary 2000–2001* was produced in December 2002.

This report provides a summary for years 2002 and 2003. The most updated information available on operational wind projects, operators, manufacturers, and contacts is provided in this report. The R&D staff will continue its efforts to compile WPRS data, and future WPRS reports will resume annually. The WPRS reports are accessible via the Energy Commission's website¹. An interactive web-based archive of WPRS data for years 1996 and onward is available on the University of California, Davis, Web site².

Validation

Originally, R&D staff intended to use quarterly summary reports from the utilities to validate each operator or qualifying facility's (QF) quarterly data for capacity in kilowatts (kW) and electricity production in kilowatt-hour (kWh). However, numerous inconsistencies appeared in the data from these sources, making it difficult to reconcile utility and QF reports. Discrepancies often existed between utility and QF data for installed capacity and reported production. Upon further investigation, the R&D staff determined that the utilities provided capacity data for only those operators with power sales agreements. Figures in this report are based on the reported contracted maximum capacity, which may not have been updated by the operator. In addition, some sites failed to file quarterly data.

Thus, discrepancies exist between QF site installed capacity reports and utility summary reports. In some cases, a direct comparison of individual QF production numbers was not possible because data for more than one project were combined under a single utility contract, making it difficult to verify and track individual project

¹ [<http://www.energy.ca.gov/wind/documents>].

² [<http://wprs.ucdavis.edu/query.html>].

output figures. Whenever possible, individual QF site data are used since the data have proven to be more consistent and traceable.

Failed to File

Utility quarterly reports inform the Energy Commission staff of all wind farm operators with projects rated at 100 kW or more that sell power to utilities. These operators are required to submit monthly data reports for the WPRS. For this 2002–2003 WPRS report, 16 wind operators failed to file in 2002, and 8 failed to file in 2003. They or their managing facility operators were individually contacted, and a request to update their information was made. Operators who sold power and were contacted but did not submit reports are noted as “Failed to File” in the charts and tables.

Reports with Missing Data

Some project operators filed incomplete WPRS reports or reports that did not follow prescribed formats. The predominant missing data item was projected quarterly output per turbine. Some wind operators reported only annual output estimates or combined data for several projects into one report. The Energy Commission has requested that project operators update their reporting format. The Energy Commission staff continues to work with and assist project operators by simplifying the reporting process to ensure data consistency and completeness.

Changes to WPRS Reporting

The majority of project operators have converted to electronic reports that conform to the most recent WPRS monthly reporting format (Appendix C). For 2003, operators were asked to identify their resource area location as either Altamont, Pacheco, San Geronio, Solano, Tehachapi, or other.

CHAPTER 4 CALIFORNIA WIND RESOURCES AREAS AND SITES

The wind resource and sites maps in the following pages include small wind turbine sites, typical small wind turbine models, the geographical location of major wind development areas, and typical large wind turbines.

Small Wind Generation

Steady growth in small wind generation is expected. AB 1207 (Chapter 562 of the laws of 2001) authorized local agencies to provide by ordinance for the installation of small wind energy systems. The baseline data provided here will provide some measure of growth in the years to come. Small wind turbine resources generally comprise small turbine facilities of operations below 100 kW. Because private small turbine owners are not required to report under WPRS regulations, the data are available only for grid-connected small turbines and are compiled from a variety of sources including California's Emerging Renewables Program, AWEA's small turbine case studies, and manufacturers' Web sites. Small wind turbine generation accounted for approximately 1,058 kW³ in 2003 and is spread across 37 counties in California.

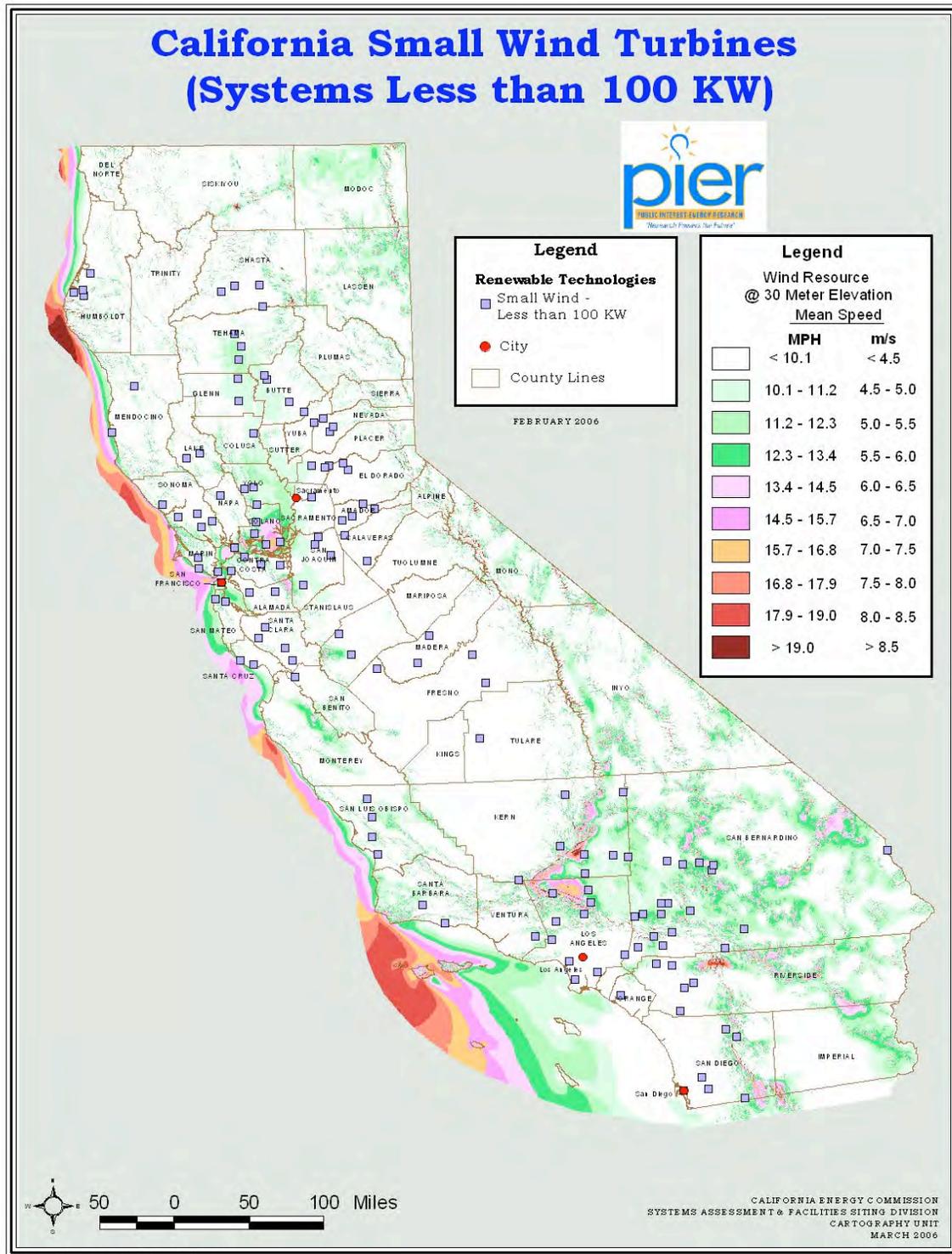
Large Wind Generation

For the 2002–2003 reporting period, wind performance data were received from large wind operators with projects located in, but not limited to, the following resource areas:

- Altamont Pass
- Pacheco Pass
- San Geronio Pass
- Tehachapi Pass
- Solano (Solano County)

³ Capacity numbers taken from Emerging Renewables Program database.

California Small Wind Turbines (Systems Less than 100 kW)⁴



⁴ Source: California Energy Commission, [www.energy.ca.gov].

SMALL WIND TURBINES

Range 1–10 kW Turbine Sizes

Turbine Model	SouthWest Windpower
Turbine Size	400 W
Rotor Diameter	3.8 ft
Number of Blades	3
Tower Height	14 m (45 ft)



Turbine Model	SouthWest Windpower
Turbine Size	900 W
Rotor Diameter	7 ft
Number of Blades	3
Tower Height:	14 m (45 ft)



Turbine Model	SouthWest Windpower
Turbine Size	1 kW
Rotor Diameter	10 ft
Number of Blades	3
Tower Height	9 m–24 m (30–80 ft)



Turbine Model	SouthWest Windpower
Turbine Size	3.2 kW
Rotor Diameter	15 ft
Number of Blades	3
Tower Height	9 m–24 m (30–80 ft)



Turbine Model	Bergey
Turbine Size	10 kW
Rotor Diameter	23 ft
Number of Blades	3
Tower Height	30 m (100 ft)



Range 11–30 kW Turbine Sizes

Turbine Model	Boreas
Turbine Size	20 kW, 30 kW
Rotor Diameter	46 ft
Number of Blades	2
Tower Height	40 m–70 m (130 ft—230 ft)



Turbine Model	Jacobs 23	Jacobs 26
Turbine Size	12 kW	15 kW
Rotor Diameter	23 ft	26 ft
Number of Blades	3/wood	3/wood
Tower Height	24 m–36 m (80–120 ft)	24 m–36 m (80–120 ft)



Range 40–50 kW Turbine Sizes

Turbine Model	AOC 15/50
Turbine Size	50 kW
Rotor Diameter	49.2 ft
Number of Blades	3
Tower Height	24 m (80 ft)

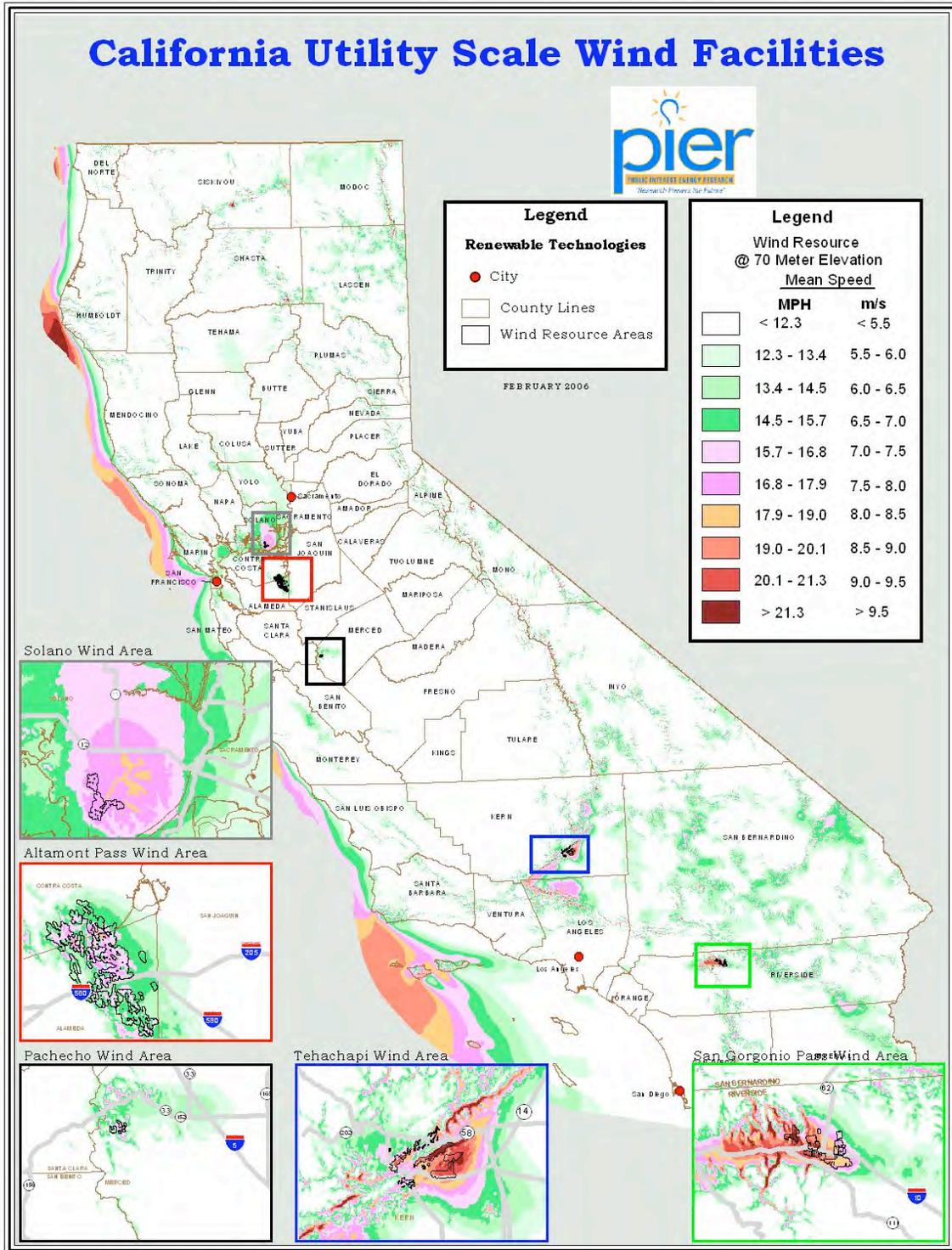


Range 60–70 kW Turbine Sizes

Turbine Model	Windmatic
Turbine Size	65 kW
Rotor Diameter	34 ft
Number of Blades	3
Tower Height	25 m (84 ft)



California Utility Scale Wind Facilities⁵



⁵ Source: California Energy Commission, [www.energy.ca.gov/].

LARGE WIND TURBINES

Range 1–49 kW Turbine Sizes

Turbine Model	Carter
Turbine Size	25 kW
Rotor swept area	75 m ²
Number of Blades	3
Tower Height	50 m (164 ft)



Turbine Model	Enertech (ETK)
Turbine Size	40 kW
Rotor swept area	140 m ²
Number of Blades	3
Tower Height	26 m (84 ft)



Range 50–99 kW Turbine Sizes

Turbine Model	Windmatic
Turbine Size	65kW
Rotor swept area	154 m ²
Number of Blades	3
Tower Height	26 m (84 ft)



Turbine Model	Windmatic
Turbine Size	95kW
Rotor swept area	227 m ²
Number of Blades	3
Tower Height	28 m (92 ft)



Range 100–199 kW Turbine Sizes

Turbine Model	Kenetech KCS-56
Turbine Size	100 kW
Rotor swept area	247 m ²
Number of Blades	3
Tower Height	24 m, 36 m (80 ft, 120 ft)



Turbine Model	Nordtank
Turbine Size	150 kW
Rotor swept area	330 m ²
Number of Blades	3
Tower Height	26 m (85 ft)



Range 200–499 kW Turbine Sizes

Turbine Model	Vestas V-27
Turbine Size	225 kW
Rotor swept area	573 m ²
Number of Blades	3
Tower Height	38 m (124 ft)

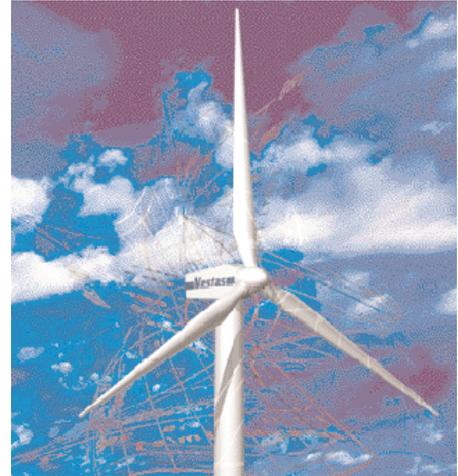


Range 500–699 kW Turbine Sizes

Turbine Model	Mitsubishi (600)
Turbine Size	600 kW
Rotor swept area	1590 m ²
Number of Blades	3
Tower Height	45 m (148 ft)



Turbine Model	Vestas V-47
Turbine Size	660 kW
Rotor swept area	1195 m ²
Number of Blades	3
Tower Height	40 m–55 m (130 ft–180 ft)



Range 700–750 kW Turbine Sizes

Turbine Model	EW-750
Turbine Size	750 kW
Rotor swept area	2304 m ²
Number of Blades	3
Tower Height	55 m–65 m (180 ft–213 ft)



Range 1000+ kW Turbine Sizes

Turbine Model	NEG-MICON
Turbine Size	1000 kW
Rotor swept area	756 m ²
Number of Blades	3
Tower Height	70 m–79 m (230 ft–260 ft)



CHAPTER 5 DATA SUMMARY

Industry Performance

In this section, graphs refer to industry performance tables for 2002 and 2003, which are summarized in Chapter 6. These tables are based on individual operator’s qualifying facility (QF) data reported to the Energy Commission. In some cases, the data presented may not correspond directly to numbers provided by the utility data summaries for reasons described in Chapter 3.

Total Capacity

During the fourth quarter of year 2003, the QFs reported 1,824 MW as operational, as shown in Figure 5.1. In accounting for those facility operators who “failed to file” within the given period, the Energy Commission estimated their operational capacity would bring the total to 1,931 MW for 2003. From 1997 to 2003, operational capacity based on operator data showed a general increase. This trend was due to new project development as well as to performance improvements on new turbines. Moderate growth in wind generation throughout 2002 and 2003 was due partly to re-powering efforts that began before the energy crisis, and partly to various state incentive programs supporting renewable energy development. Specifically, funding from the Energy Commission’s Renewable Energy Program supports existing and new renewable energy projects.

Figure 5-1 Total Operational Capacity (MW) from 1995–2003

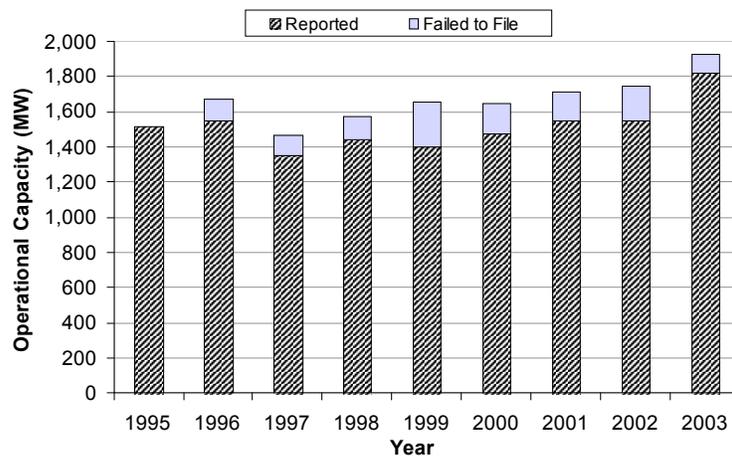


Table 5-1 shows how the wind energy capacity changed from 1995–2003 in the state. Since 1997, installed capacity has increased annually. Re-powering activities accounted for much of the capacity changes in the late 1990s, but despite the instability in the California electricity market, new developments were still underway in 2003. In 2003, about 162 MW of new capacity was installed at Florida Power and Light Energy Services' (FPLE) High Winds Energy Center, which began generation in the end of the second quarter. It is difficult to discriminate between re-powering and new capacity unless the facility is a newly added facility (that is, other than the standard offer, long-term contracts).

**Table 5-1
Wind Energy Capacity Change from 1995–2003**

Year	Capacity Change (MW)
1995	1
1996	-28
1997	-164
1998	201
1999	65
2000	1
2001	68
2002	0.26
2003	200

In general and in the context of this report, re-powering refers to the physical replacement of old turbines with new, more efficient turbines. This definition differs from the traditional definition, which refers to refurbishing existing turbines with new blades, generators, or other components to increase the capacity and output. Now, turbines are generally replaced rather than refurbished.

Electricity Output

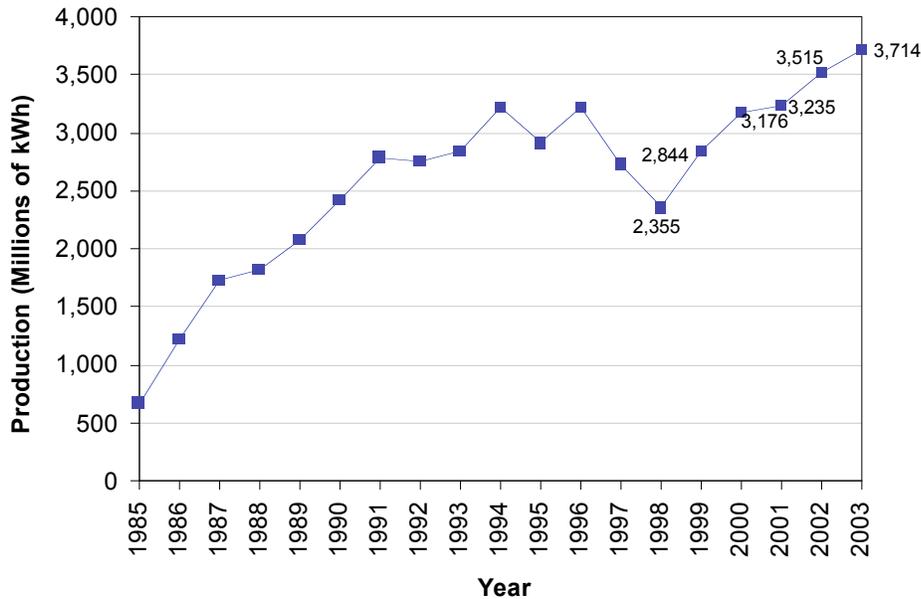
In 2003, the California wind industry reported 3,714 million kWh of electricity output, as depicted in Figure 5-2. This is approximately 1.7 percent of the total in-state electricity production of 214,801 million kWh. Combining the numbers from those that “failed to file,” the industry output exceeded 3,800 million kWh. With household electricity use by Californians estimated at 6,884 kWh⁶ (as of 2003), 3,714 million

⁶ *California Energy Demand 2006-2016*, staff energy demand forecast, revised September 2005, Publication # CEC-400-2005-034-SF-ED2.

kWh of wind generation provides electricity sufficient to power approximately 539,511 households for a year.

The 2003 reported electricity output increased only 198.7 million kWh over 2002. To a large extent, this was due to the ambiguity in the extension of the federal Production Tax Credit.

Figure 5-2 Statewide Wind Energy Production for 1985–2003 in millions of kWh



Capacity Factor

The capacity factor (CF) is a measure of efficiency, which is typically defined as the ratio of actual energy output to the amount of energy a project would produce if the project operated at full rated power for 24 hours per day for a year. Although variations exist with wind turbine ratings based on widely differing test conditions, procedures, and non-standardized miles-per-hour specifications, the capacity factor is still considered a strong indicator of wind project performance. Voluntary standards for testing wind turbines have been developed by the American Wind Energy Association.

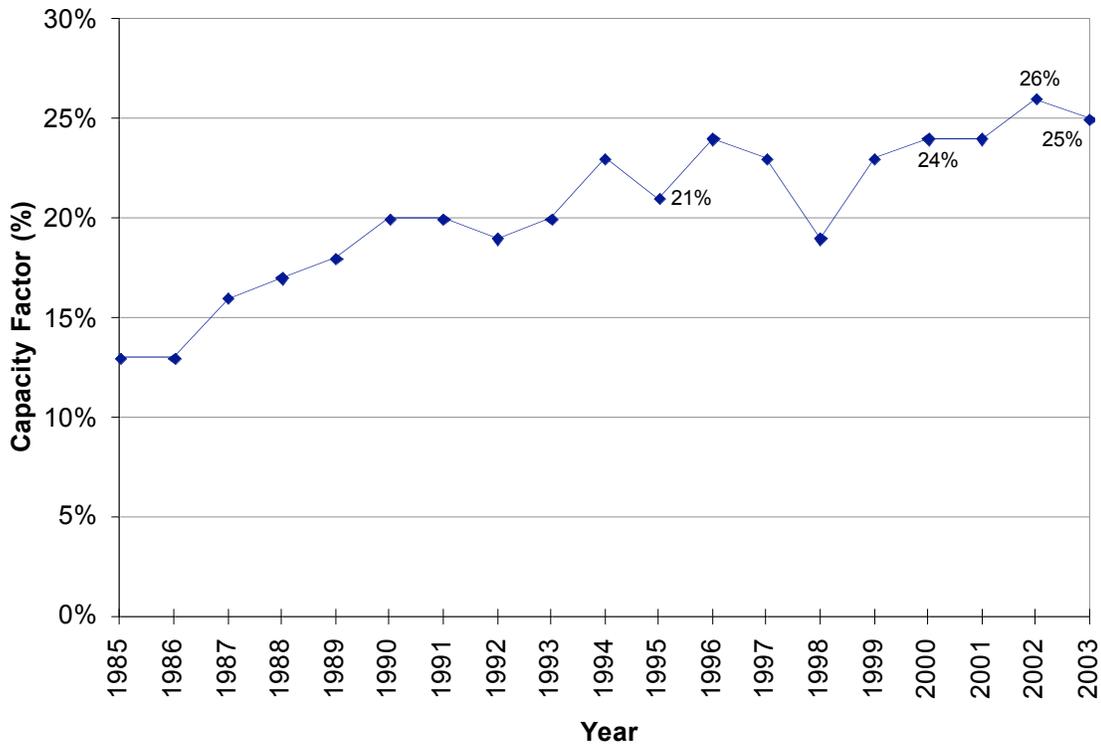
The annual CF is typically computed based on annual production figures and turbine capacity for the year, or the CF can be computed as the average of quarterly capacity factors calculated for each group of turbines reported in that

quarter. With the WPRS quarterly data available from operators, only operating turbines are used to calculate the CF so that performance results are not skewed by non-operational capacity. Although new turbines are not likely to operate for the entire quarter in which they are installed, this method provides the most consistent method for calculating CF without randomly interpreting when new turbines are operational or non-operational.

As shown in Figure 5-3, the resulting statewide annual CF is holding strong, averaging more than 20 percent. Despite the turbulent industry restructuring and shakeout period throughout 2000 to 2001, a 4 percent increase in CF from 1995 to 2003 is a good indicator that overall efficiency is steadily improving. The slight decrease in capacity factor in 2003 may be due to turbine outage for maintenance, the lower production resulting from start-up of the 162 MW High Winds Project in the Solano Wind Resource Area at the end of second quarter, and the variability of wind resources. It is anticipated that the annual CF will increase in future years.

Based on the data summarized in the tables in Chapter 6 for the state and for individual resource areas, the CF improved overall in 2002. The CF achieved by many California wind projects continues to exceed 30 percent during the high wind seasons (second and third quarters).

Figure 5-3 Statewide Capacity Factors from 1985–2003

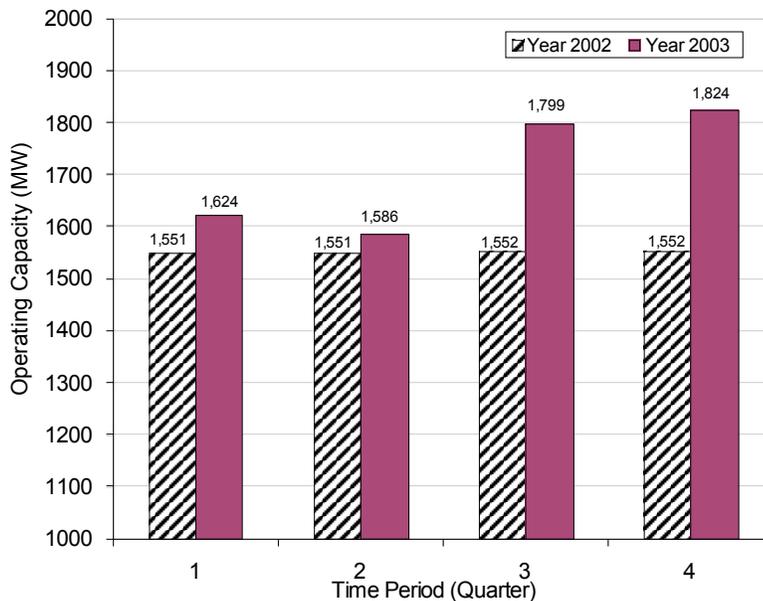


Production and Capacity Trends

Statewide

In 2003, 200 MW of new capacity was installed in California, a significant increase compared to the 0.26 MW in 2002. Nearly 162 MW of new capacity were installed in the Solano Wind Resource Area. Figure 5-4 depicts the trends in capacity from 2002 to 2003 by quarter. Although facilities that “failed to file” were not included, the increasing trend in capacity throughout 2003 contrasts with the steady decreases from 1995 to 1997.

Figure 5-4 Statewide Capacity from 2002–2003 by Quarters



Note: Values do not include “failed to file” facilities.

New developments and limited re-powering efforts with larger capacity and more efficient turbines occurred throughout the late 1990s and early into the new millennium, resulting in net capacity increase.

Figure 5-5 depicts the gain in both turbines and capacity in 2002 and 2003 and demonstrates the increasing capacity of individual turbines.

The 2001 California Turbine Fleet Ratio was 133 kW, and the 2003 California Turbine Fleet Ratio increased by 12.8 percent to 150 kW if the California Turbine Fleet Ratio is defined as follows:

$$\text{California Turbine Fleet Ratio} = \frac{\text{total WPRS reported capacity}}{\text{total WPRS reported turbines}}$$

Figure 5-5 Change in Number of Turbines and Capacity in MW from 1996–2003

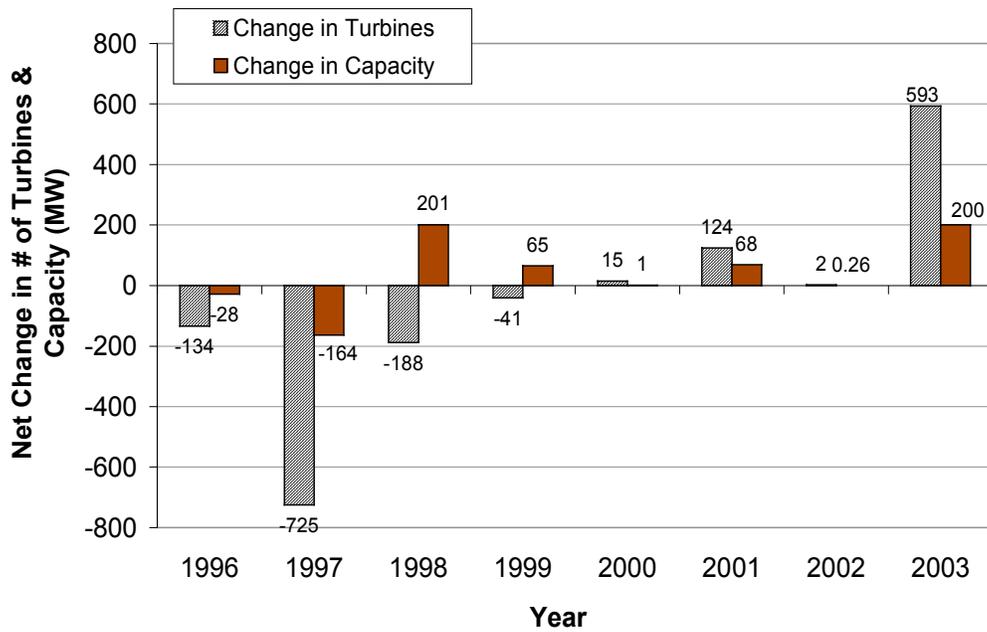


Figure 5-6 Breakdown of Statewide Wind Energy Production by Quarters

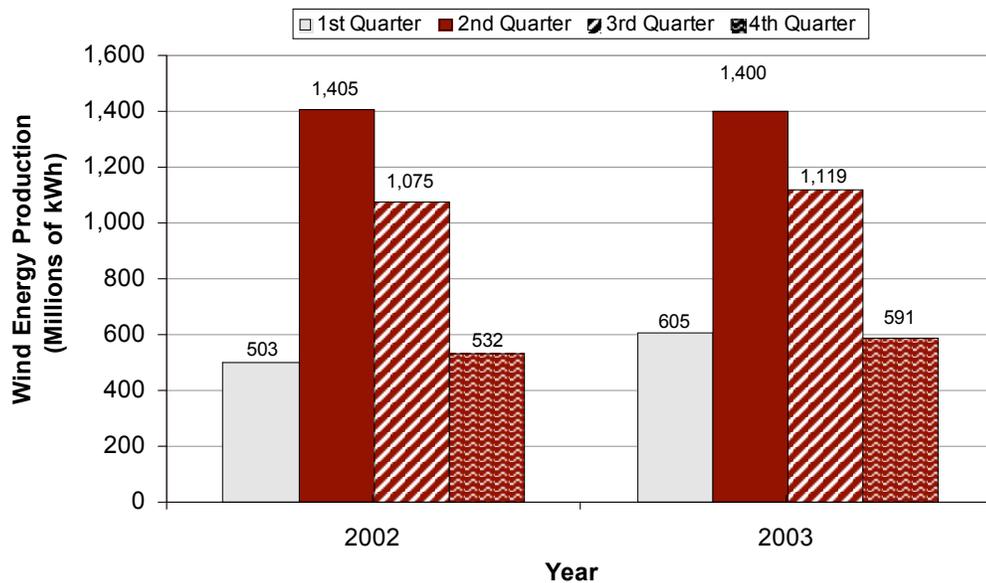
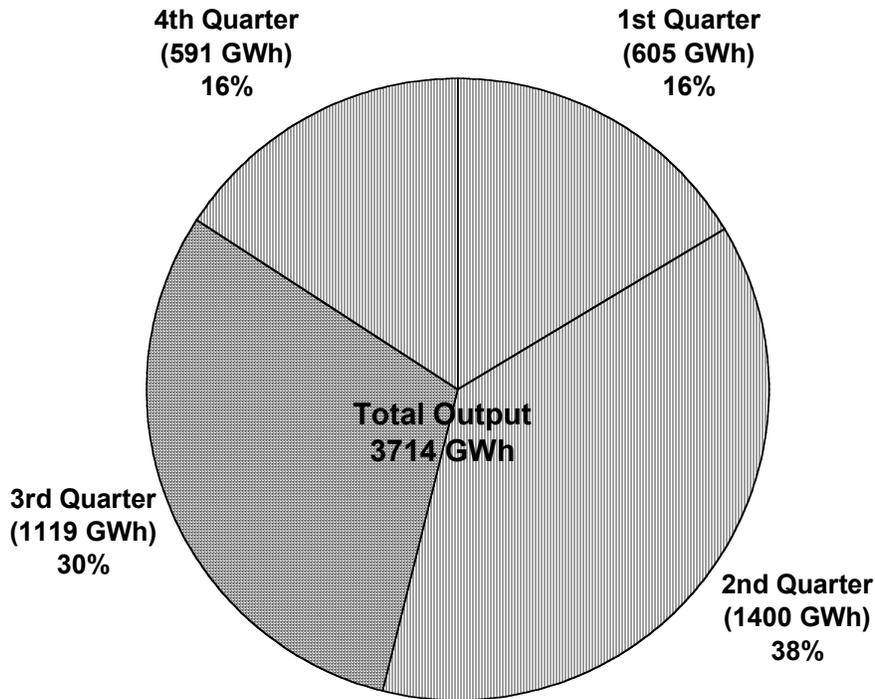


Figure 5-6 shows quarterly wind output trends from 2002–2003. These trends were consistent with the typical California wind resource profiles: low winds at the beginning and end of the year and high winds during spring and summer when the warmer seasons create a natural draw of cool coastal air into hot inland valleys and deserts. The data indicated that 68 percent of all annual output was produced in the second and third quarters of 2003 (Figure 5-7). This figure corresponds well with California’s peak demand for electricity during the summer months. Quarterly capacity factor was consistent with the previous California wind resource reports. The statewide capacity factors for 2003 were 16 percent, 38 percent, 30 percent, and 16 percent respectively for the first, second, third, and fourth quarters.

Figure 5-7 Statewide Wind Energy Production per Quarter in 2003 (GWh or millions of kWh)

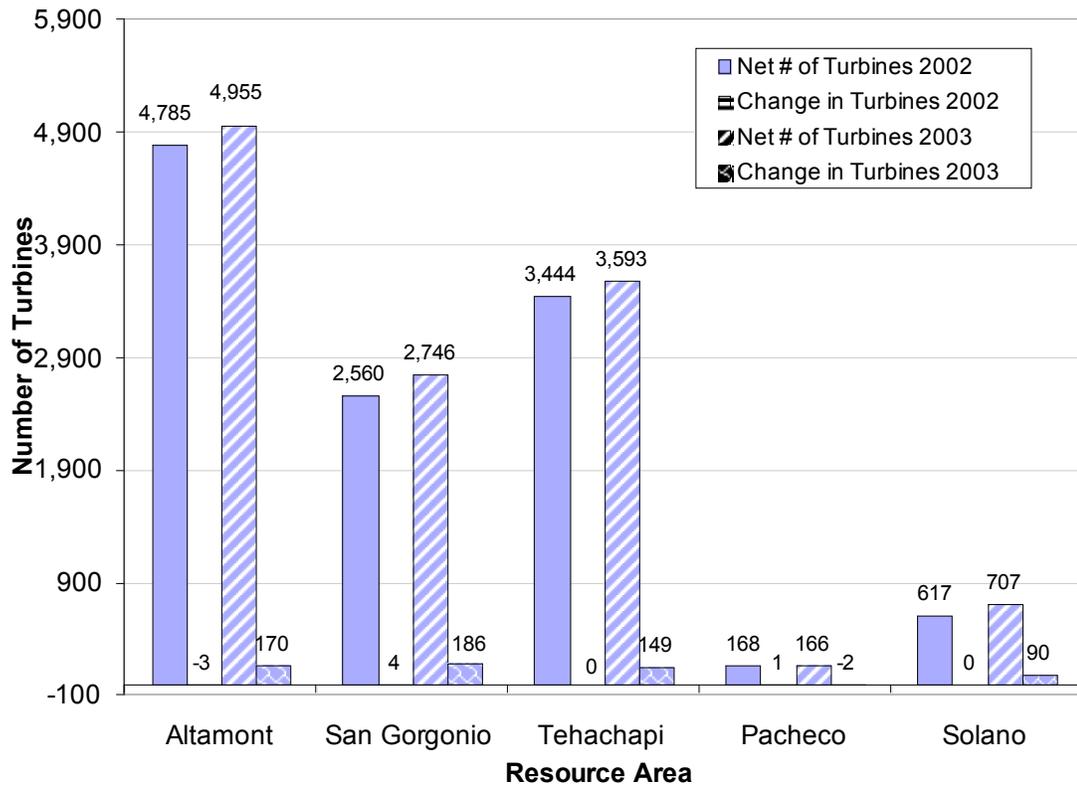


Resource Area

Although wind project operators from five different resources areas in California reported to WPRS, three primary regions account for 11,294 turbines, almost 93 percent of California’s wind turbines. These regions are Altamont Pass (east of San Francisco), Tehachapi (southeast of Bakersfield), and San Gorgonio (east of Los Angeles), as shown in Figure 5-8. The topography of the primary wind resource areas in California consists of narrow mountain passes leading into hot valleys or

desert regions. These three regions account for nearly 91 percent of all of California’s wind generation. The total installed capacity in California was about 5 percent of the world’s total wind generating capacity of 39,294 MW in 2003. Figure 5-9 shows the number of turbines by size by resource area. This figure graphically demonstrates that the bulk of the California turbine fleet remains in the 100–199 kW capacity.

Figure 5-8 Number of Turbines and the Change by Resource Area for 2002–2003



In 2003, among the five regions identified, the Tehachapi area accounts for 36 percent of all capacity, Altamont for 27 percent, San Gorgonio for 23 percent, Pacheco for 1 percent, and Solano for 12 percent (Figure 5-10a). The quarterly production output trends for each region are compared in Figure 5-10b for 2003. Figure 5-11 shows the change in energy density or generation potential, per rotor swept area, for each resource area in 2002 and 2003. Figure 5-12 compares the annual capacity factor for all regions. Overall, wind generation output increased in 2003 when compared to year 2002, due to increase in capacity from 1,552 MW to 1,824 MW. The 10 to 20 percent variations in annual production are not unusual and are typically due to wind variations each year.

Figure 5-9 Number of Turbines by Size by Resource Area for 2003

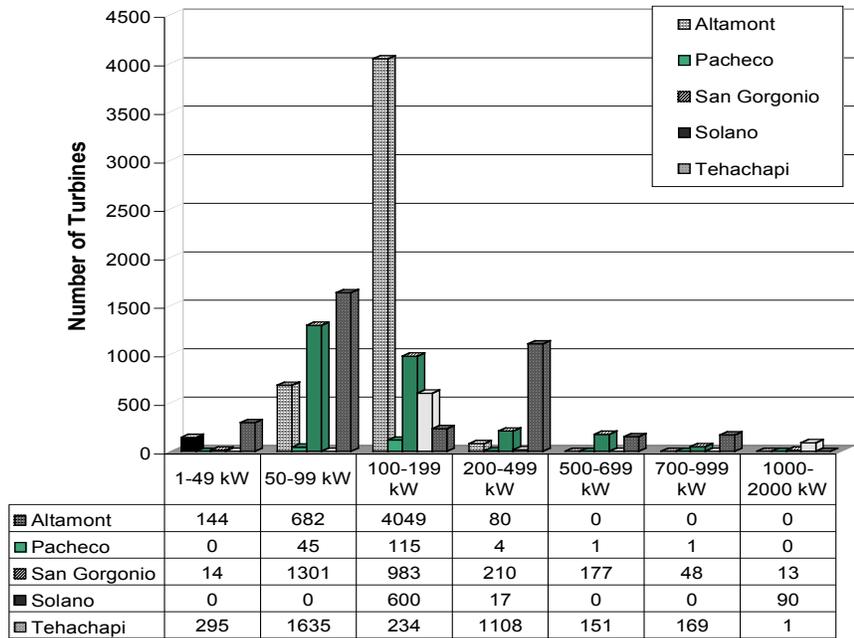


Figure 5-10a Statewide Capacity and the Change by Resource Area for 2002–2003

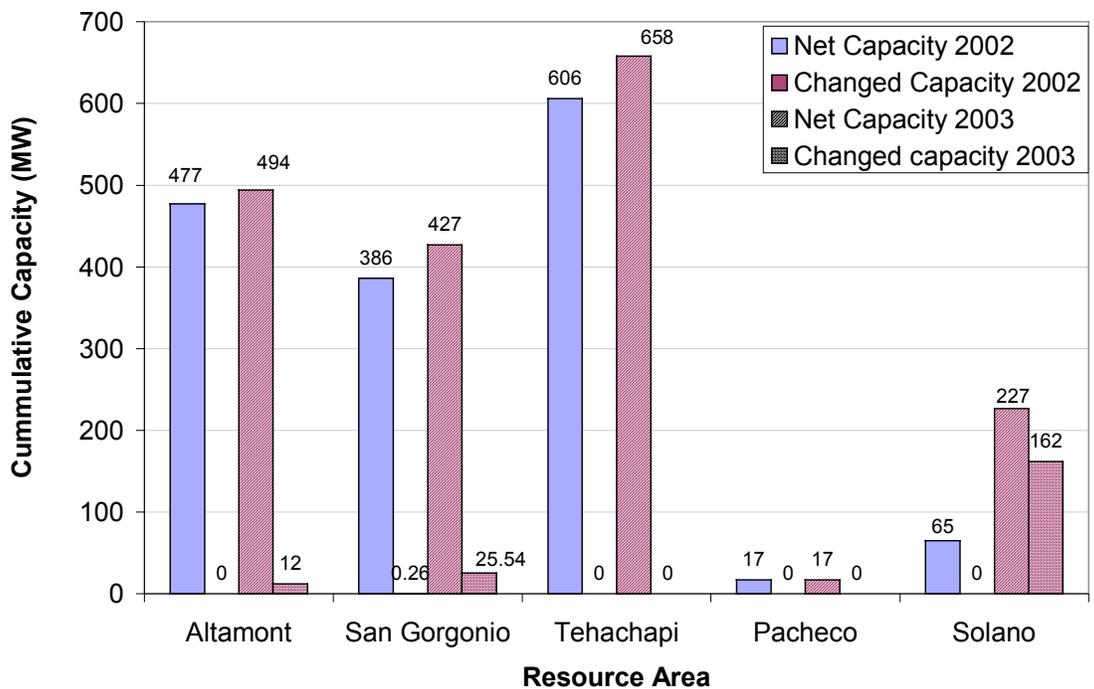


Figure 5-10b Electricity Production by Resource Area For 2002–2003

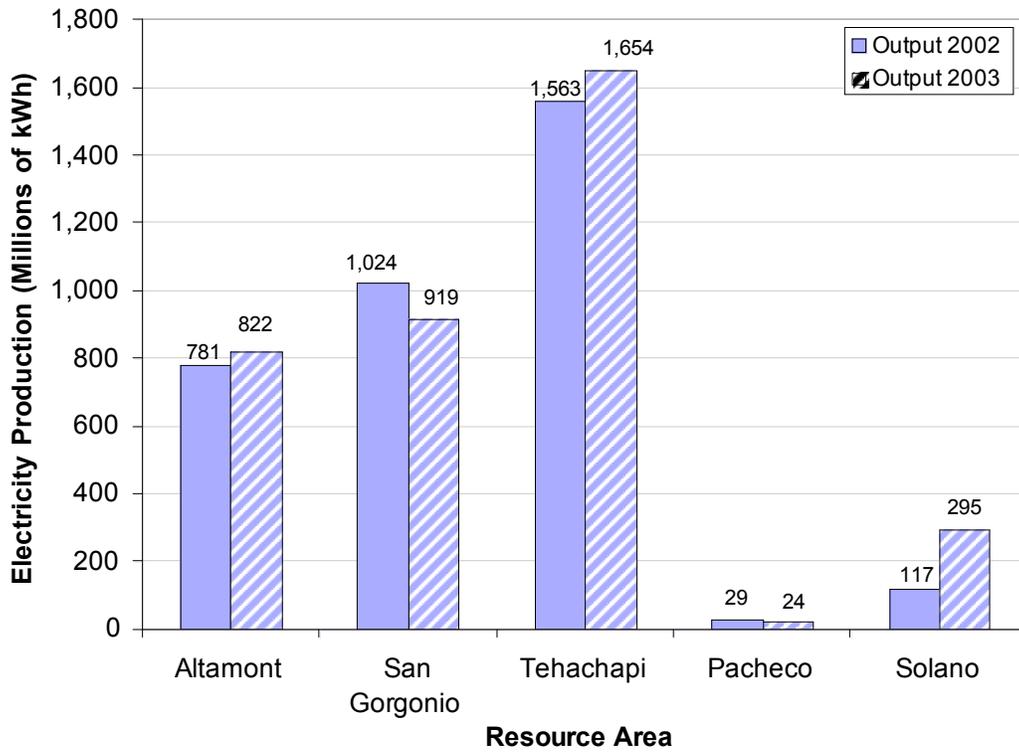


Figure 5-11 Wind Energy Density by Resource Area for 2002–2003

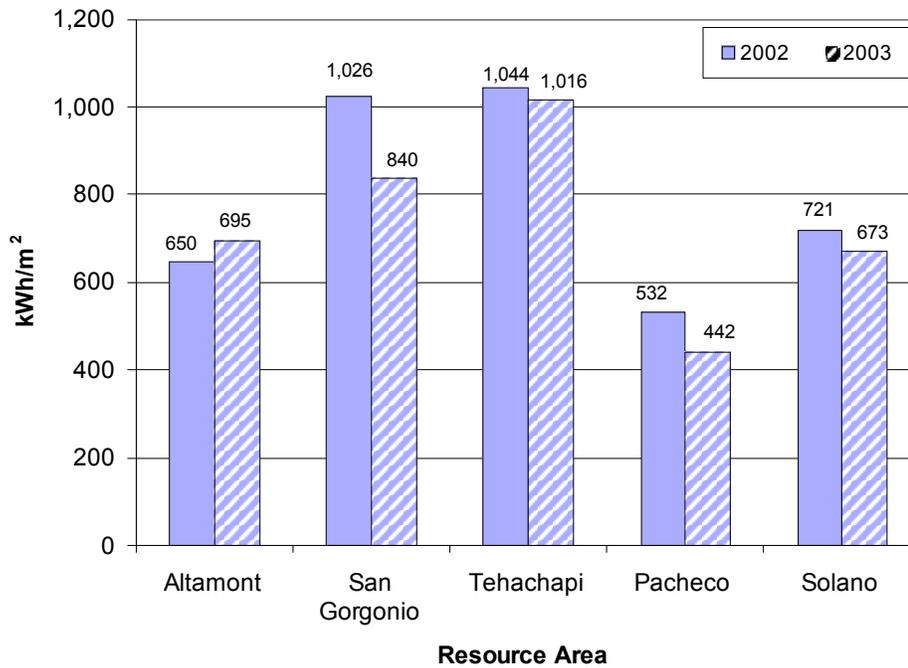
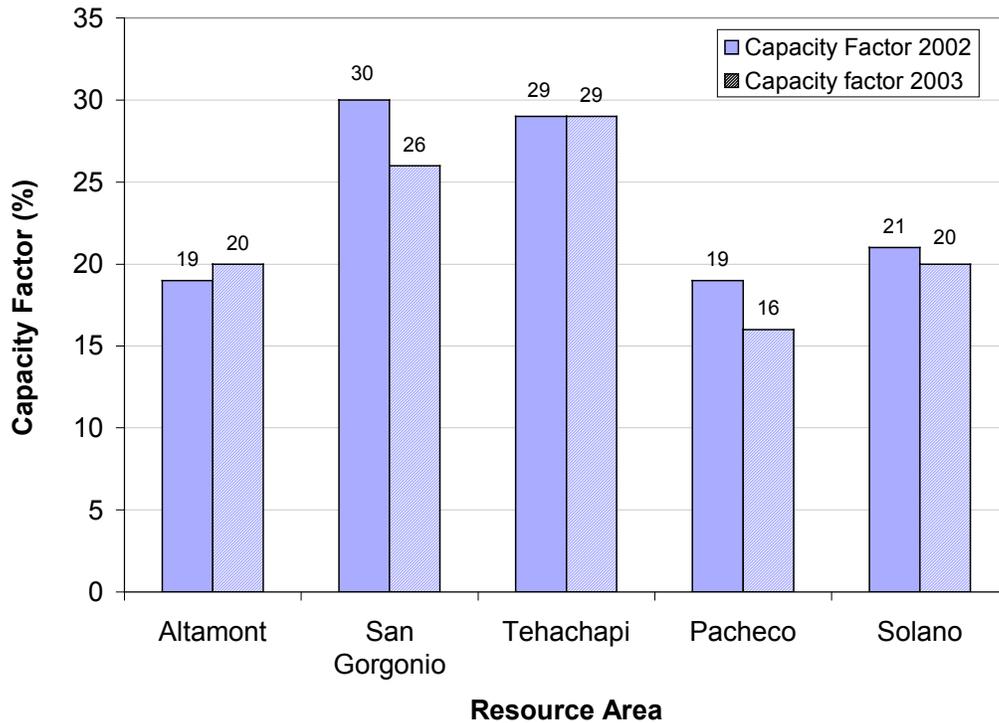


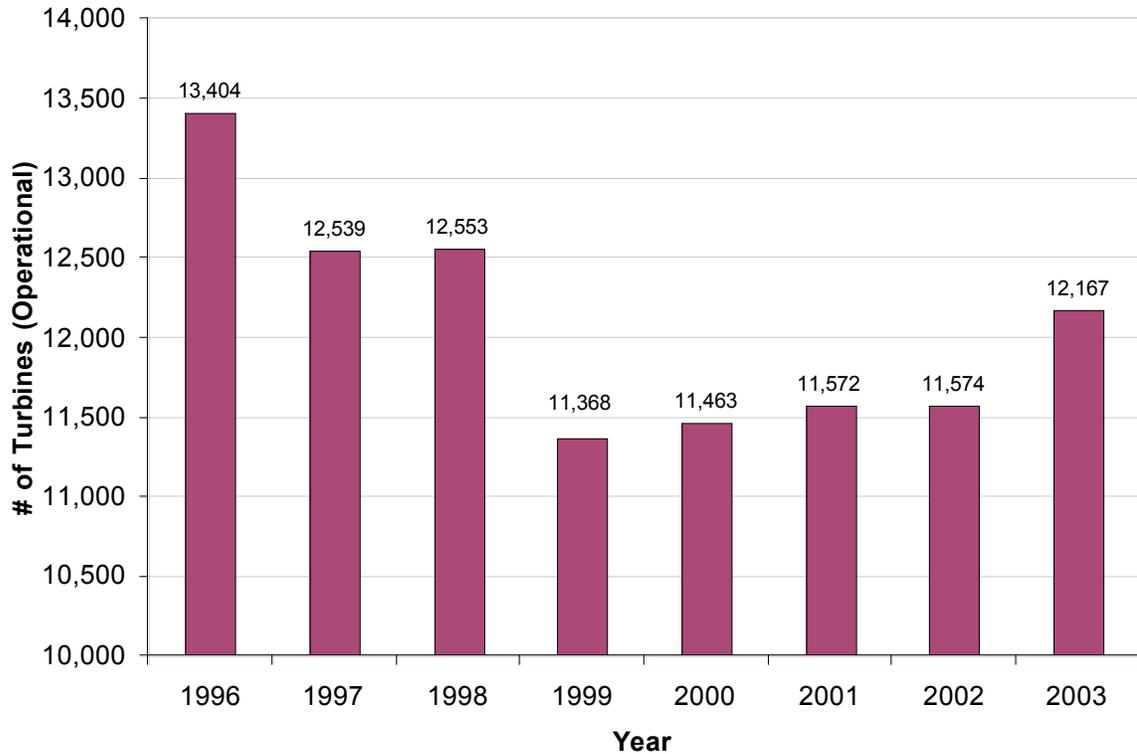
Figure 5-12 Capacity Factor by Resource Area from 2002–2003



Turbine Size and Type

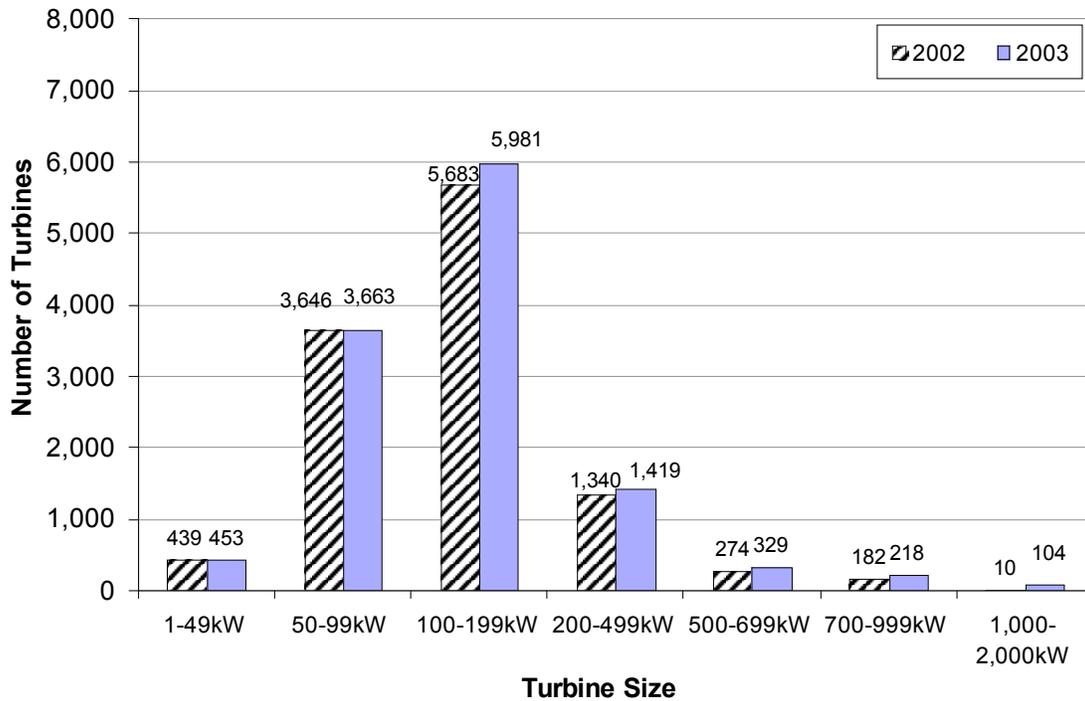
In early reports, the WPRS performance results were tracked by horizontal- and vertical-axis utility-scale turbines. Since 1999, vertical-axis machines were not reported in the operating inventory although some still remain intact in the Altamont region. Nearly all new and re-powered capacity comes from three-bladed, upwind, horizontal-axis turbines, which are manufactured outside the United States. With consolidations and restructuring of the California wind industry throughout the 1990s, operators have steadily cannibalized older turbines for parts and re-powered with new turbines whenever possible, resulting in a general decline in the total number of turbines. In 1996, 13,404 turbines were reported in operation, and at the end of 2003, approximately 12,167 turbines were operating (Figure 5-13). This reduction in the number of turbines does not indicate a souring market. In fact, replacing older turbines with newer and fewer turbines is helping to revitalize California's aging turbine fleet. Capacity factor is on the rise, and generation numbers are gradually increasing.

Figure 5-13 Total Number of Turbines in Operation from 1996–2003



As shown in Figure 5-13, there has been an overall decrease in the number of turbines from 1996 to 2003, but the number of turbines increased 7 percent from 1999 to 2003. Smaller turbines, such as the Kenetech 100 kW, still dominate the California wind park landscape. In 2003, nearly 83 percent of the total number of turbines were less than 200 kW. Larger, more advanced turbines are slowly replacing these smaller machines, as evident in the 2003 figures (see Figure 5-9). Turbines less than 100 kW have been declining, and turbines greater than or equal to 500 kW gained by 38 percent over 2002 numbers.

Figure 5-14 Number of Turbines by Size from 2002–2003



The decline in the number of turbines since 1996 does not translate to a decline in wind electricity production or efficiency. Figures 5-14 through 5-16 summarize the number of turbines, capacity, and production in the state by turbine size for 2002 and 2003. Figure 5-15 most clearly demonstrates that the predominant increase in the number of turbines is among those greater than 500 kW. This trend of higher capacity, more efficient turbines replacing smaller capacity turbines is likely to continue in the future.

Figure 5-17 summarizes the capacity factors by turbine size for 2002 and 2003. Merely counting turbines does not give a good indication of wind performance trends. In fact, the total number of turbines is likely to decline as newer, more efficient, and larger capacity turbines replace older, smaller capacity, and less efficient turbines. The result should be a steady increase in annual energy output at an increasing capacity factor.

Figure 5-15 Turbine Capacity by Turbine Size from 2002–2003

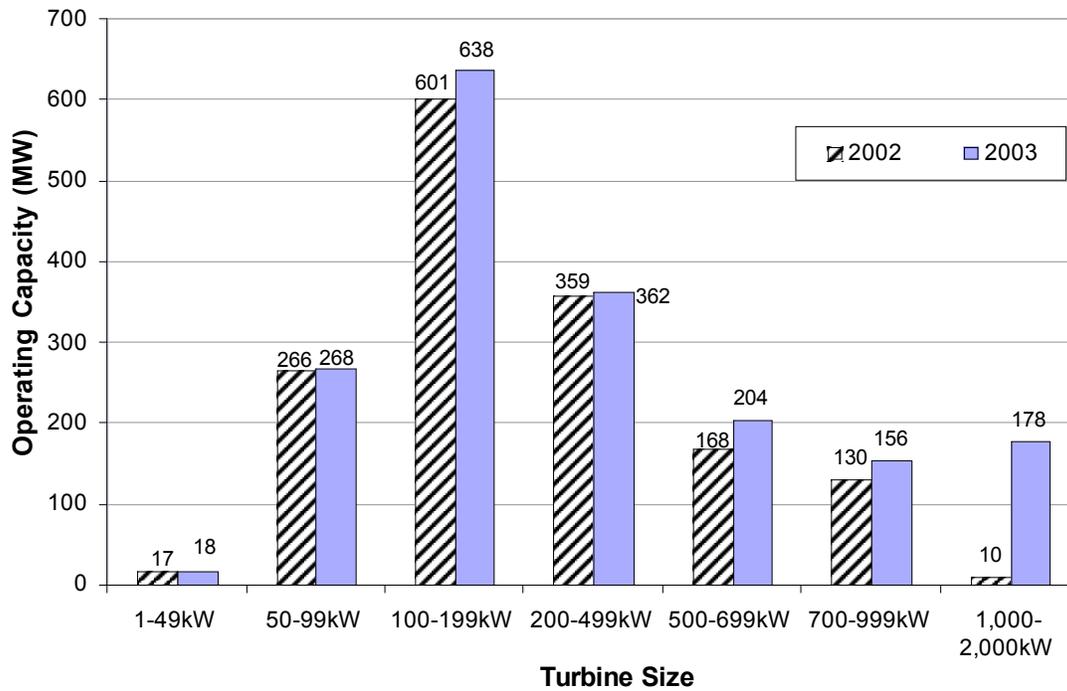


Figure 5-16 Electricity Production by Turbine Size from 2002–2003

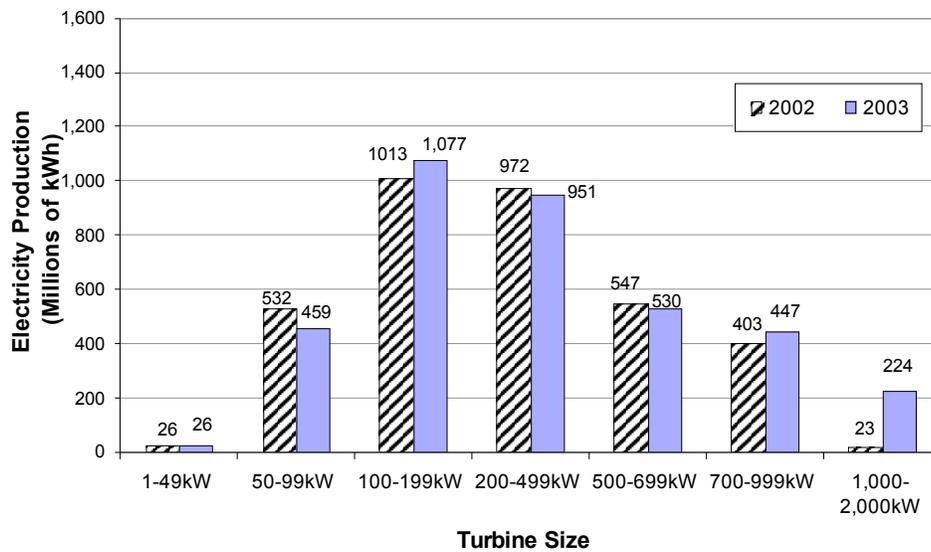
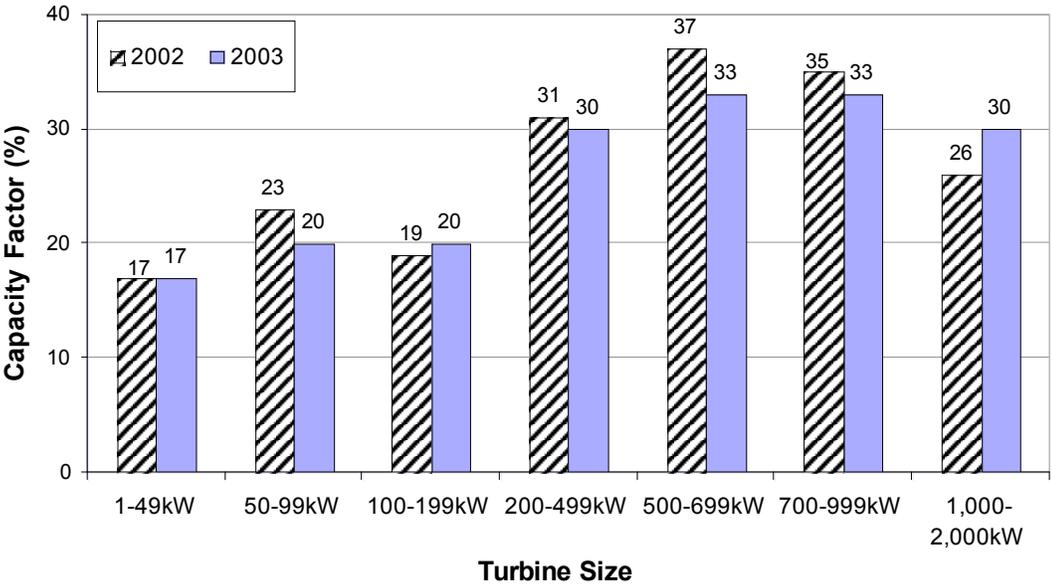


Figure 5-17 Capacity Factor by Turbine Size from 2002–2003



Turbine Manufacturers

Figure 5-18 shows the largest wind turbine manufacturers. They account for more than 87 percent of wind generation capacity in California in 2003. Figure 5-19 shows their generating capacity factor, and Figure 5-20 shows performance by energy per rotor swept area (kWh/m²). As a result of major business changes in the industry, not all of the original manufacturers exist today under the same name as when they entered the market.

Figure 5-18 Operating Capacity for Major Turbine Manufacturers in 2002–2003

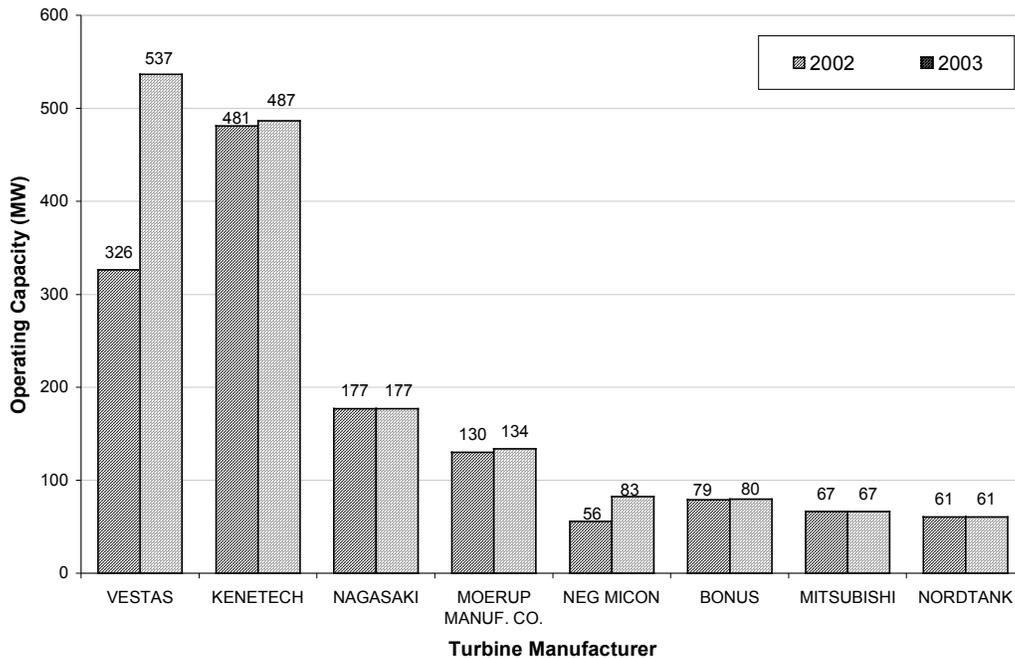


Figure 5-19 Capacity Factor (percent) for Major Turbine Manufacturers in 2002–2003

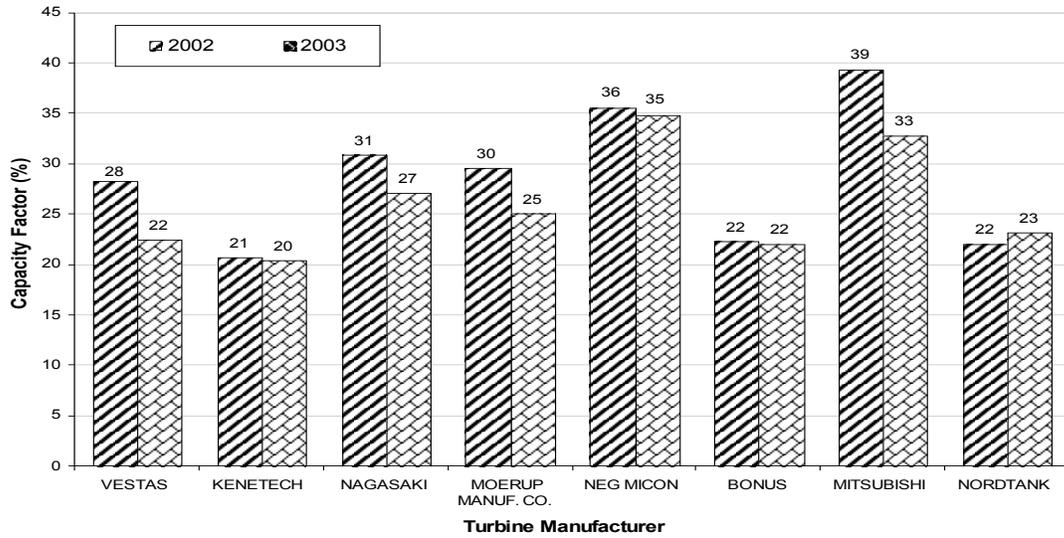
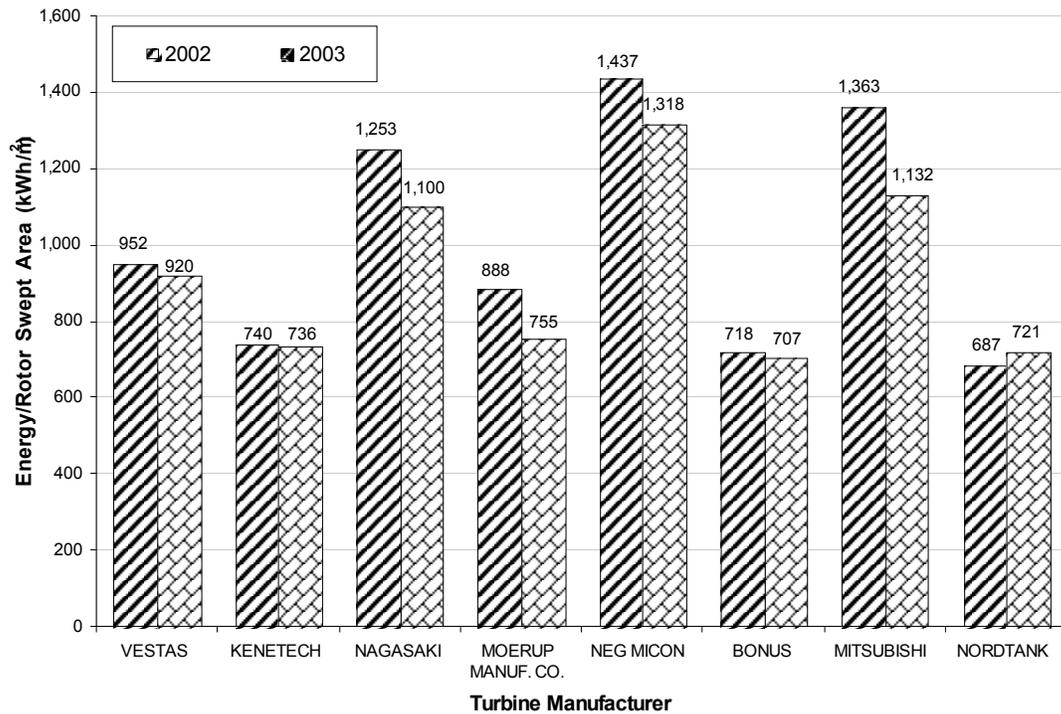


Figure 5-20 Energy/Rotor Swept Area for Major Turbine Manufacturers in 2002–2003



Wind Project Operators

Figures 5-21 through 5-25 present the results for the larger wind project operators. The major operators for year 2003 include Florida Power & Light Energy Services Inc. (FPLE), Green Ridge, Enron, SeaWest Energy Group and enXco (formerly Difwind). In 2003, FPLE acquired Windpower Partners.

There have been many changes among the operators of these major facilities over the years. By 1998, Enron Corporation had purchased Zond, Green Ridge had taken over operations at the Kenetech and Flowind facilities in Altamont, and FPLE had taken over the Cannon and Cameron Ridge operations.

Figure 5-21 shows the operating capacity by operator. Figure 5-22 summarizes the capacity factor for these operators from 2002 and 2003. The capacity factor is comparable and remained steady in the mid- to high 20 percent range. Figure 5-23 presents performance in terms of rotor swept area.

Figure 5-21 Operating Capacity (MW) for Top Wind Facility Operators in 2002–2003

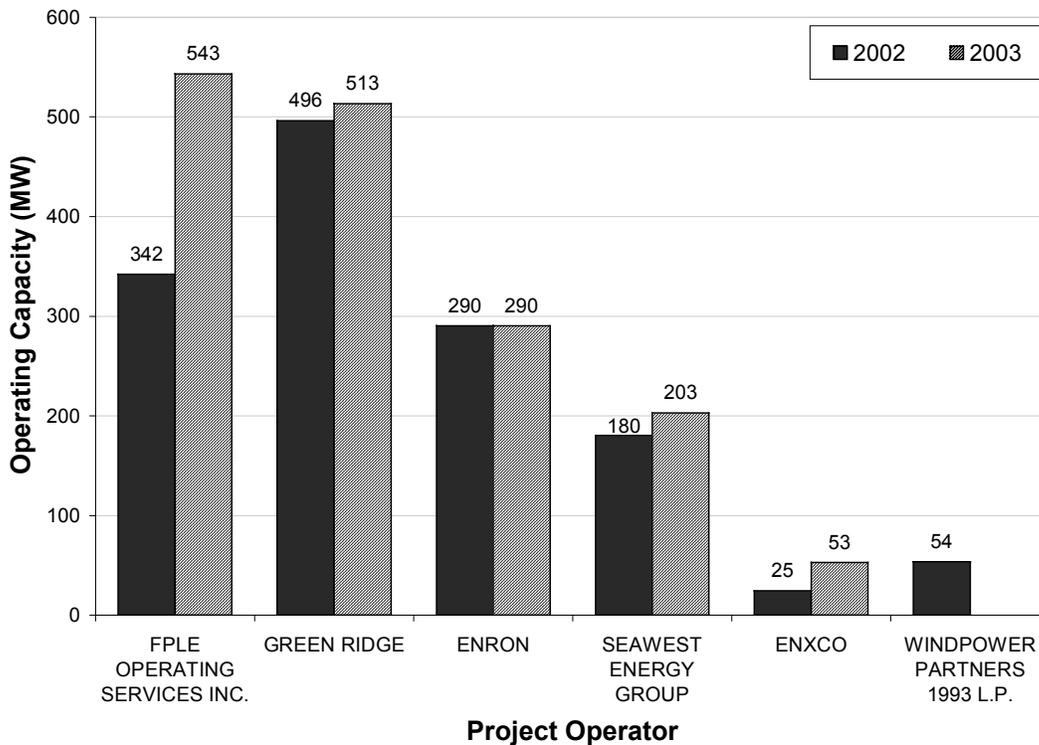


Figure 5-22 Capacity Factors for Top Wind Facility Operators in 2002–2003

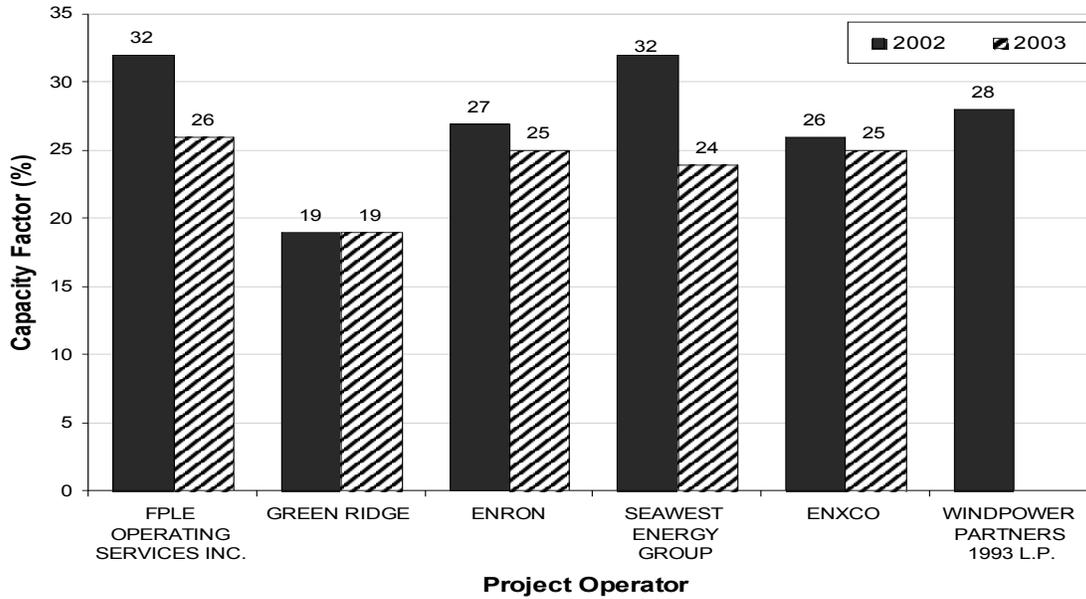
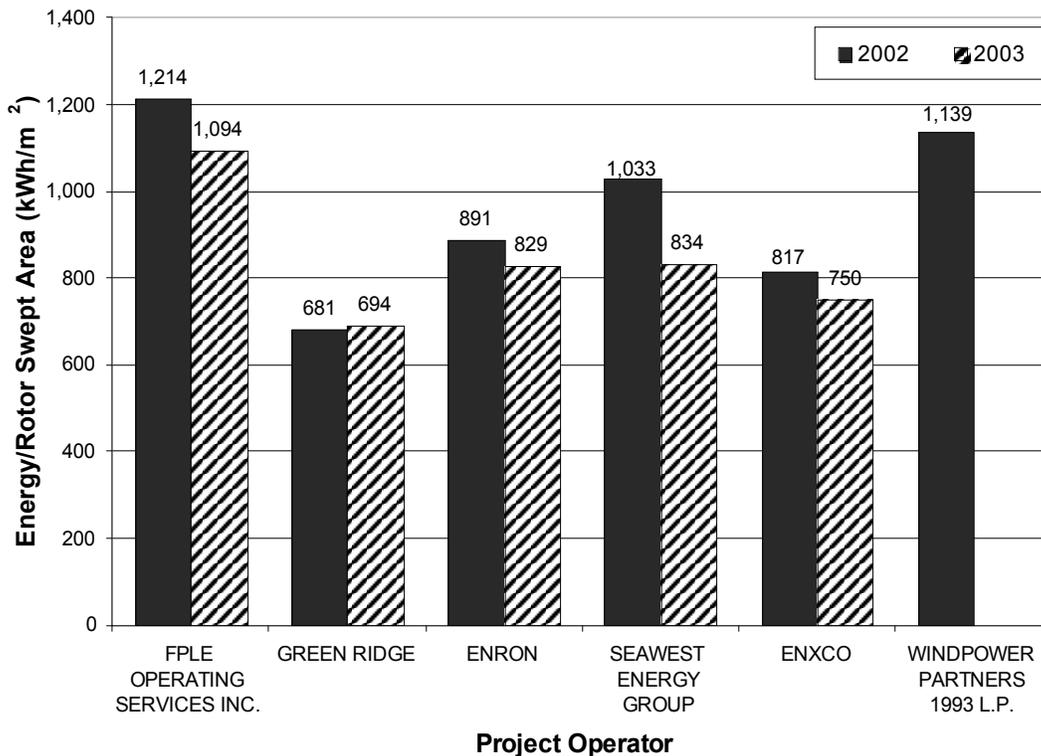


Figure 5-23 Energy/Rotor Swept Area (kWh/m²) for Top Wind Facility Operators in 2002–2003



Foreign and Domestic

Figure 5-24 compares domestic and foreign turbine markets in 1985 and 2003. Domestic turbines accounted for 67 percent of the total installed capacity in 1985 as compared to only 33 percent in 2003 (Table 5-2). With nearly all U.S. wind turbine manufacturers out of business by the early 1990s, approximately 35 percent of turbines produced in the U.S. during the 1980s to 1990s remain in operation.

Figure 5-24 Comparison of Capacity by Turbine Origin between 1985 and 2003

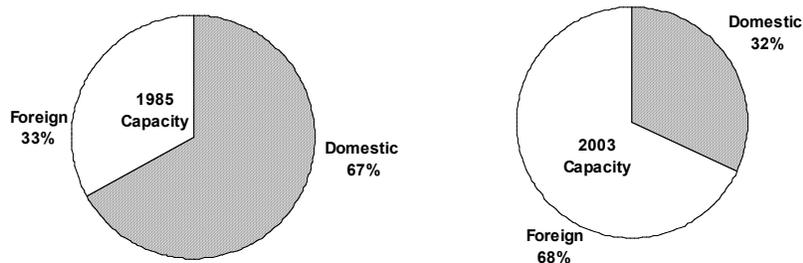


Table 5-2 summarizes the results from 1985–2003, based on percentage of total capacity and percentage capacity change based on added capacity.

**Table 5-2
Comparison of Domestic and Foreign Capacity Percentage Change
(1985–2003)**

Year	Domestic Capacity (percent)	Foreign Capacity (percent)	Year	Domestic Capacity (percent)	Foreign Capacity (percent)
1985	67	33	1996	45	55
1986	55	45	1997	47	57
1987	56	44	1998	38	62
1988	58	42	1999	35	65
1989	52	48	2000	40	60
1990	53	47	2001	37	63
1991	46	54	2002	37	63
1992	47	53	2003	33	67
1993	45	55			
1994	46	54			
1995	43	57			

CHAPTER 6 SUMMARY TABLES

On the following pages, summary tables include data for all wind projects from 2002 and 2003 quarterly reports to the Energy Commission as part of the WPRS program. Summary tables are extracted from project operator quarterly reports compiled in Chapter 7 for years 2002 and 2003. Projects that “failed to file” for this period are also summarized. The data include information about specific resource areas, turbine sizes, turbine types, turbine manufacturers, turbine operators, and turbine origins. The tables are listed in the following order from 2003 to 2002:

- Statewide and Resource Area Summary
- Turbine Size Summary
- Turbine Manufacturer Summary
- Wind Operator Summary

Although the staff has been working continuously with facilities to standardize reporting formats, some operators still have not complied with the new standard formats. Reports are still filed with combined totals for multiple wind facilities, making it difficult to track individual facilities. In addition, some operators have failed to file reports, resulting in missing data. These result in discrepancies with utility-reported totals.

Note that the cumulative turbine capacity reported includes new and re-powered turbines beginning the quarter that they came on-line. Because new turbine capacity did not represent a significant percentage of cumulative capacities, the impact on annualized totals was considered minimal.

Tables 6-1 and 6-2 present capacity and production numbers for facilities that failed to file in the reporting timeframe. The data are obtained from utility reports and are not included in WPRS summary data tables in the sections following. To estimate statewide capacity and production numbers, the facility operators who failed to report their numbers (capacity or production) will need to be added to the summary data.

Table 6-1
Facilities that Failed to File in 2003
(Data listed are from utility summary reports)

<i>QFID</i>	<i>Project Name</i>	<i>Cummulative Capacity (MW)</i>	<i>Total Output (kWh)</i>	<i>Location</i>	<i>Source Utility</i>
16W009	Altamont-Midway, Ltd.	12.50	16,517,666.40	Altamont Pass	PG&E
01W001	Buena Vista Energy, LLC	37.55	18,523,605.30	Altamont Pass	PG&E
01W119	Donald R. Chenoweth	0.01	5,036.80	Livermore	PG&E
01W129	L.P. Reinhard	0.01	421.20	Hayward	PG&E
16W028	Patterson Pass Wind Farm LLC	22.00	41,645,303.70	Altamont Pass	PG&E
01W094	Tres Vaqueros Wind Farms, LLC	28.00	30,449,067.60	Altamont Pass	PG&E
6006	Mogul Energy Partnership I	4.00	12,078,091.00	Tehachapi	SCE
6061	Windridge Incorporated	2.73	2,689,050.00	Tehachapi	SCE
Total:		106.80	121,908,242.00		

Table 6-2
Facilities that Failed to File in 2002
(Data listed are from utility summary reports)

<i>QFID</i>	<i>Project Name</i>	<i>Cummulative Capacity (MW)</i>	<i>Total Output (kWh)</i>	<i>Location</i>	<i>Source Utility</i>
16W009	Altamont-Midway, Ltd.	12.50	17,460,579.60	Altamont Pass	PG&E
01W001	Buena Vista Energy, LLC	37.55	17,682,371.80	Altamont Pass	PG&E
01W119	Donald R. Chenoweth	0.01	17,066.80	Livermore	PG&E
01W129	L.P. Reinhard	0.01	390.10	Hayward	PG&E
06W090	Michael W. Stephens	0.01	31.40	Dixon	PG&E
16W019	Altamont Energy Corp	16.80	0.00	Altamont Pass	PG&E
16W028	Patterson Pass Wind Farm LLC	22.00	43,761,612.20	Altamont Pass	PG&E
01W094	Tres Vaqueros Wind Farms, LLC	28.00	32,968,210.20	Altamont Pass	PG&E
6006	Mogul Energy Corporation	4.00	11,719,715.00	Tehachapi	SCE
6011	Boxcar I Power Purchase Contract Trust	5.22	12,006,788.00	Tehachapi	SCE
6012	Windsong Energy	2.40	5,656,871.00	Tehachapi	SCE
6019	Zephyr Park, LTD	3.50	9,346,447.00	Tehachapi	SCE
6061	Windridge Incorporated	2.73	2,971,804.00	Tehachapi	SCE
6097	Boxcar II Power Purchase Contract Trst	7.78	16,378,412.00	Tehachapi	SCE
6090	Alta Mesa Pwr. Purch. Contract Trust	28.17	81,409,264.00	San Gorgonio	SCE
6234	Oak Creek Energy Systems Inc.	27.92	90,143,882.00	Tehachapi	SCE
Total:		198.59	341,523,445.10		

**Table 6-3
2003 Statewide Data Summary Table**

Data Category	Net Capacity (MW)	New Capacity (MW)	Output (kWh)	Actual Capacity Factor (%)	kWh/m ²	Number of Turbines	Change in Turbines
STATEWIDE							
1st Quarter	1,624	0	605,135,242.72	17%	145.62	11,926	352
2nd Quarter	1,586	-38	1,399,643,369.55	40%	342.76	11,549	-377
3rd Quarter	1,799	213	1,118,542,090.20	28%	240.94	12,112	563
4th Quarter	1,824	25	590,653,063.58	15%	123.95	12,167	55
2003 Totals	1,824	200	3,713,973,766.05	25%	853.27	12,167	593
RESOURCE AREA							
Altamont							
1st Quarter	482.09	0	72,097,652.92	7%	59.40	4,835	50
2nd Quarter	444.39	-37.7	351,816,652.75	36%	313.92	4,458	-377
3rd Quarter	491.99	47.6	316,788,893.70	29%	255.83	4,934	476
4th Quarter	494.09	2.1	81,624,056.38	8%	65.64	4,955	21
2003 Totals	494.09	12	822,327,255.75	20%	694.79	4,955	170
San Geronio							
1st Quarter	401.94	0	146,521,171.80	17%	135.20	2,715	155
2nd Quarter	401.94	0	417,486,559.80	47%	385.23	2,715	0
3rd Quarter	405.04	3.1	219,112,021.30	25%	200.66	2,712	-3
4th Quarter	427.48	22.44	135,934,854.40	15%	118.86	2,746	34
2003 Totals	427.48	25.54	919,054,607.30	26%	839.95	2,746	186
Tehachapi							
1st Quarter	657.82	0	378,972,294.00	26%	232.88	3,593	149
2nd Quarter	657.82	0	582,342,648.00	40%	357.85	3,593	0
3rd Quarter	657.82	0	383,919,464.20	27%	235.92	3,593	0
4th Quarter	657.82	0	308,492,713.80	21%	189.57	3,593	0
2003 Totals	657.82	0	1,653,727,120.00	29%	1016.22	3,593	149
Pacheco							
1st Quarter	17.13	0	2,077,302.00	6%	37.95	166	-2
2nd Quarter	17.13	0	10,658,455.00	28%	194.72	166	0
3rd Quarter	17.13	0	9,104,497.00	24%	166.33	166	0
4th Quarter	17.13	0	2,330,933.00	6%	42.58	166	0
2003 Totals	17.13	0	24,171,187.00	16%	441.58	166	-2
Solano							
1st Quarter	65.1	0	5,466,822.00	4%	33.59	617	0
2nd Quarter	65.1	0	37,339,054.00	26%	229.45	617	0
3rd Quarter	227.1	162	189,617,214.00	38%	308.24	707	90
4th Quarter	227.1	0	62,270,506.00	13%	101.23	707	0
2003 Totals	227.1	162	294,693,596.00	20%	672.51	707	90

Table 6-4
2002 Statewide Data Summary Table

Data Category	Net Capacity (MW)	New Capacity (MW)	Output (kWh)	Actual Capacity Factor (%)	kWh/m ²	Number of Turbines	Change in Turbines
STATEWIDE							
1st Quarter	1,551	0	503,412,056.57	15%	128.59	11,570	-2
2nd Quarter	1,551	0	1,404,934,790.50	41%	358.88	11,570	0
3rd Quarter	1,552	0.26	1,075,282,746.57	32%	274.62	11,574	4
4th Quarter	1,552	0	531,599,483.77	16%	135.11	11,574	0
2002 Totals	1,552	0.26	3,515,229,077.41	26%	897.20	11,574	2
RESOURCE AREA							
Altamont							
1st Quarter	477.09	0	43,768,078.30	4%	36.43	4,785	-3
2nd Quarter	477.09	0	340,554,240.79	33%	283.45	4,785	0
3rd Quarter	477.09	0	313,706,067.10	30%	261.10	4,785	0
4th Quarter	477.09	0	83,442,271.81	8%	69.45	4,785	0
2002 Totals	477.09	0	781,470,658.00	19%	650.43	4,785	-3
San Geronio							
1st Quarter	385.66	0	146,537,662.25	17%	146.86	2,556	0
2nd Quarter	385.66	0	421,914,849.72	50%	422.83	2,556	0
3rd Quarter	385.92	0.26	283,216,698.46	34%	283.63	2,560	4
4th Quarter	385.92	0	172,022,991.96	20%	172.27	2,560	0
2002 Totals	385.92	0.26	1,023,692,202.39	30%	1025.59	2,560	4
Tehachapi							
1st Quarter	606.33	0	280,857,514.02	21%	187.62	3,444	0
2nd Quarter	606.33	0	592,433,025.99	45%	395.76	3,444	0
3rd Quarter	606.33	0	425,197,515.01	32%	284.04	3,444	0
4th Quarter	606.33	0	264,764,716.00	20%	176.87	3,444	0
2002 Totals	606.33	0	1,563,252,771.02	29%	1044.29	3,444	0
Pacheco							
1st Quarter	17.31	0	2,346,793.00	6%	42.44	168	1
2nd Quarter	17.31	0	12,586,377.00	33%	227.63	168	0
3rd Quarter	17.31	0	10,983,605.00	29%	198.65	168	0
4th Quarter	17.31	0	3,508,879.00	9%	63.46	168	0
2002 Totals	17.31	0	29,425,654.00	19%	532.18	168	1
Solano							
1st Quarter	65.10	0	29,902,009.00	21%	183.75	617	0
2nd Quarter	65.10	0	37,446,297.00	26%	230.11	617	0
3rd Quarter	65.10	0	42,178,861.00	30%	259.19	617	0
4th Quarter	65.10	0	7,860,625.00	6%	48.30	617	0
2002 Totals	65.10	0	117,387,792.00	21%	721.35	617	0

**Table 6-5
2003 Turbine Data Summary**

Data Category	Net Capacity (MW)	New Capacity (MW)	Output (kWh)	Actual Capacity Factor (%)	kWh/m ²	Number of Turbines	Change in Turbines
TURBINE SIZE							
1-49 kW							
1st Quarter	17.87	0.00	4,614,568.50	12%	77.70	453	0
2nd Quarter	17.87	0.00	10,365,334.40	26%	174.54	453	0
3rd Quarter	17.87	0.00	8,059,733.50	21%	135.72	453	0
4th Quarter	17.87	0.00	3,339,644.50	9%	56.24	453	0
2003 Totals	17.87	0	26,379,280.90	17%	444.20	453	0
50-99 kW							
1st Quarter	268.12	0	95,423,177.60	16%	126.65	3666	0
2nd Quarter	268.12	0.00	178,841,404.80	30%	237.36	3666	0
3rd Quarter	267.93	-0.20	115,825,107.20	20%	153.85	3663	-3
4th Quarter	267.93	0.00	68,500,213.40	12%	90.99	3663	0
2003 Totals	267.93	-0.2	458,589,903.00	20%	608.85	3663	-3
100-199 kW							
1st Quarter	626.49	0	112,588,130.38	8%	71.96	5861	0
2nd Quarter	588.79	-37.70	464,055,928.90	36%	315.36	5484	-377
3rd Quarter	636.39	47.60	372,850,527.37	27%	234.63	5960	476
4th Quarter	638.49	2.10	127,538,515.49	9%	80	5981	21
2003 Totals	638.49	12	1,077,033,102.14	20%	701.95	5981	120
200-499 kW							
1st Quarter	363.37	0	200,027,251.24	25%	229.7	1422	0
2nd Quarter	363.37	0.00	349,772,130.45	44%	401.67	1422	0
3rd Quarter	362.17	-1.20	234,097,514.73	30%	269.67	1419	-3
4th Quarter	362.17	0.00	167,451,213.89	21%	192.9	1419	0
2003 Totals	362.17	-1.2	951,348,110.31	30%	1093.94	1419	-3
500-699 kW							
1st Quarter	181.17	0	94,925,106.00	24%	208.40	295	0
2nd Quarter	181.17	0.00	215,602,898.00	54%	473.33	295	0
3rd Quarter	181.17	0.00	126,727,565.70	32%	278.22	295	0
4th Quarter	203.61	22.44	92,757,514.60	21%	182.89	329	34
2003 Totals	203.61	22.44	530,013,084.30	33%	1,142.84	329	34
700-999 kW							
1st Quarter	155.75	0	93,354,726.00	27%	226.79	218	0
2nd Quarter	155.75	0.00	168,249,773.00	49%	408.73	218	0
3rd Quarter	155.75	0.00	111,573,621.70	33%	271.05	218	0
4th Quarter	155.75	0.00	73,346,463.70	22%	178.18	218	0
2003 Totals	155.75	0	446,524,584.40	33%	1,084.75	218	0
1000-2000 kW							
1st Quarter	11.30	0	4,202,283.00	17%	155.80	11	0
2nd Quarter	11.30	0.00	12,755,900.00	52%	472.93	11	0
3rd Quarter	177.80	166.50	149,408,020.00	38%	304.33	104	93
4th Quarter	177.80	0.00	57,719,498.00	15%	117.57	104	0
2003 Totals	177.80	166.5	224,085,701.00	30%	1,050.63	104	93

**Table 6-6
2002 Turbine Data Summary Table**

Data Category	Net Capacity (MW)	New Capacity (MW)	Output (kWh)	Actual Capacity Factor (%)	kWh/m²	Number of Turbines	Change in Turbines
TURBINE SIZE							
1–49 kW							
1st Quarter	17.30	0	3,082,789.40	8%	55.64	439	0
2nd Quarter	17.30	0	11,231,657.10	30%	202.73	439	0
3rd Quarter	17.30	0	8,055,668.00	21%	145.40	439	0
4th Quarter	17.30	0	3,277,029.20	9%	59.15	439	0
2002 Totals	17.30	0	25,647,143.70	17%	462.92	439	0
50–99 kW							
1st Quarter	266.10	0	93,795,479.73	16%	125.66	3,642	0
2nd Quarter	266.10	0	206,313,812.05	35%	276.40	3,642	0
3rd Quarter	266.36	0.26	141,200,437.41	24%	188.98	3,646	4
4th Quarter	266.36	0	90,618,222.42	16%	121.28	3,646	0
2002 Totals	266.36	0.26	531,927,951.61	23%	712.32	3,646	4
100–199 kW							
1st Quarter	601.45	0	72,272,385.46	5%	48.61	5,683	0
2nd Quarter	601.45	0	439,725,438.37	33%	295.73	5,683	0
3rd Quarter	601.45	0	382,732,731.17	29%	257.40	5,683	0
4th Quarter	601.45	0	117,845,782.27	9%	79.26	5,683	0
2002 Totals	601.45	0	1,012,576,337.27	19%	681.00	5,683	0
200–499 kW							
1st Quarter	358.50	0	186,275,223.97	24%	224.67	1,340	0
2nd Quarter	358.50	0	370,920,496.98	47%	447.38	1,340	0
3rd Quarter	358.50	0	261,140,043.99	33%	314.97	1,340	0
4th Quarter	358.50	0	153,838,734.90	20%	185.55	1,340	0
2002 Totals	358.50	0	972,174,499.84	31%	1,172.57	1,340	0
500–699 kW							
1st Quarter	167.89	0	80,057,707.00	22%	186.99	274	0
2nd Quarter	167.89	0	212,952,855.00	58%	497.40	274	0
3rd Quarter	167.89	0	162,213,852.00	44%	378.89	274	0
4th Quarter	167.89	0	91,590,080.00	25%	213.93	274	0
2002 Totals	167.89	0	546,814,494.00	37%	1,277.21	274	0
700–999 kW							
1st Quarter	130.25	0	64,900,286.01	23%	187.90	182	0
2nd Quarter	130.25	0	156,032,525.00	55%	451.74	182	0
3rd Quarter	130.25	0	112,810,915.01	40%	326.61	182	0
4th Quarter	130.25	0	69,714,197.99	24%	201.83	182	0
2002 Totals	130.25	0	403,457,924.01	35%	1,168.08	182	0
1000–2000 kW							
1st Quarter	10.00	0	3,028,185.00	14%	132.24	10	0
2nd Quarter	10.00	0	7,758,006.00	35%	338.78	10	0
3rd Quarter	10.00	0	7,129,098.99	33%	311.31	10	0
4th Quarter	10.00	0	4,715,436.99	22%	205.91	10	0
2002 Totals	10.00	0	22,630,726.98	26%	988.24	10	0

**Table 6-7
2003 Turbine Manufacturer Data Summary Table**

Data Category	Country of Origin	Net Capacity (MW)	Change in Capacity (MW)	Output (kWh)	Actual Capacity Factor (%)	kWh/m ²	Number of Turbines	Change in # of Turbines
Turbine Manufacturer								
ALASKA APPLIED SCIENCES	U.S.A	0.30	0.00	497,422.60	19%	732.58	14	0
AMERICAN M.A.N	GERMANY	11.24	0.00	14,564,717.00	15%	421.40	281	0
BONUS	DENMARK	79.86	0.00	154,171,834.80	22%	707.06	815	0
DANWIN	DENMARK	32.83	0.00	75,985,178.10	26%	839.36	213	0
DELTA	UNKNOWN	0.75	0.00	374,408.00	6%	247.95	5	0
ENERGY SCIENCES INC.	U.S.A	1.10	0.00	1,393,466.00	14%	300.19	22	0
ENERTECH	U.S.A	5.76	0.00	7,340,258.00	15%	364.10	144	0
ENRON	U.S.A	39.75	0.00	100,621,952.00	29%	824.01	53	0
FLOWIND	U.S.A	18.91	0.00	2,400,321.00	1%	74.54	118	0
GE	U.S.A	4.50	4.50	5,592,888.00	14%	968.97	3	3
KENETECH	U.S.A	486.80	12.00	869,026,972.05	20%	735.61	4,522	120
MITSUBISHI	JAPAN	66.60	0.00	191,020,009.00	33%	1,132.17	111	0
MOERUP MANUF. CO.	DENMARK	134.14	-0.20	294,409,454.90	25%	755.10	1,043	-3
NAGASAKI	JAPAN	177.15	0.00	421,104,419.00	27%	1,100.09	626	0
NEDWIND	NETHERLANDS	9.42	0.00	14,582,092.00	18%	560.85	20	0
NEG MICON	DENMARK	82.80	0.00	252,858,071.40	35%	1,317.61	117	0
NORDEX	GERMANY	10.00	0.00	18,772,155.00	21%	819.74	10	0
NORDTANK	DENMARK	60.81	0.00	123,337,282.70	23%	721.49	763	0
OAK CREEK	U.S.A	2.72	0.00	9,606,852.30	40%	840.94	39	0
VANGUARD	U.S.A	7.80	0.00	6,579,711.00	10%	727.84	40	0
VESTAS	DENMARK	536.64	184.44	1,056,446,237.00	22%	919.85	2,761	124
WINCON	U.S.A	22.02	0.00	31,799,848.20	16%	480.38	206	0
WIND ENERGY GROUP	ENGLAND	5.00	0.00	11,065,258.00	25%	1,126.81	20	0
WINDANE	DENMARK	12.40	-1.20	32,770,680.00	30%	1,110.49	31	-3
WINDMATIC	DENMARK	14.33	0.00	17,652,278.00	14%	481.87	190	0

**Table 6-8
2002 Turbine Manufacturer Data Summary Table**

Data Category	Country of Origin	Net Capacity (MW)	Change in Capacity (MW)	Output (kWh)	Actual Capacity Factor (%)	kWh/m ²	Number of Turbines	Change in # of Turbines
Turbine Manufacturer								
ALASKA APPLIED SCIENCES	U.S.A	0.30	0.00	758,988.70	29%	1,117.80	14	0
AMERICAN M.A.N	GERMANY	11.24	0.00	16,691,301.00	17%	482.92	281	0
BONUS	DENMARK	79.25	0.26	154,936,609.18	22%	718.22	809	4
DANWIN	DENMARK	14.11	0.00	27,597,632.00	22%	971.75	96	0
DELTA	UNKNOWN	0.75	0.00	744,895.98	11%	493.31	5	0
ENERGY SCIENCES INC.	U.S.A	1.10	0.00	1,255,340.00	13%	270.43	22	0
ENERTECH	U.S.A	5.76	0.00	8,196,854.00	16%	406.59	144	0
ENRON	U.S.A	39.75	0.00	112,250,876.01	32%	919.25	53	0
FLOWIND	U.S.A	18.91	0.00	7,972,104.00	5%	247.58	118	0
KENETECH	U.S.A	481.30	0.00	872,265,298.90	21%	739.97	4,352	0
MITSUBISHI	JAPAN	66.60	0.00	229,883,240.00	39%	1,362.51	111	0
MOERUP MANUF. CO.	DENMARK	130.07	0.00	336,790,946.04	30%	887.79	1,038	0
NAGASAKI	JAPAN	177.15	0.00	479,627,933.00	31%	1,252.97	626	0
NEDWIND	NETHERLANDS	9.42	0.00	21,396,882.00	26%	822.96	20	0
NEG MICON	DENMARK	56.00	0.00	174,744,106.00	36%	1,437.04	80	0
NORDEX	GERMANY	10.00	0.00	22,630,726.98	26%	988.24	10	0
NORDTANK	DENMARK	60.81	0.00	117,507,868.30	22%	687.39	763	0
VANGUARD	U.S.A	7.80	0.00	3,722,096.50	5%	411.74	40	0
VESTAS	DENMARK	326.48	0.00	810,190,788.02	28%	952.05	2,542	0
WINCON	U.S.A	22.02	0.00	38,948,870.30	20%	588.38	206	0
WIND ENERGY GROUP	ENGLAND	5.00	0.00	13,106,056.00	30%	1,334.63	20	0
WINDANE	DENMARK	13.60	0.00	39,357,360.00	33%	1,274.86	34	0
WINDMATIC	DENMARK	14.33	0.00	24,652,304.50	20%	672.95	190	0

**Table 6-9
2003 Operator Summary Table**

Data Category	Net Capacity (MW)	Change in Capacity (MW)	Output (kWh)	Actual Capacity Factor (%)	kWh/m ²	Number of Turbines	Change in # of Turbines
PROJECT OPERATOR							
AB ENERGY	6.98	0.00	20,058,243.00	33%	1,129.21	31	0
CALWIND RESOURCES, INC.	31.14	0.00	65,901,948.00	24%	772.75	360	0
CORAM	11.24	0.00	14,564,717.00	15%	421.40	281	0
ENRON	290.31	0.00	641,184,570.00	25%	828.58	2,412	0
ENXCO	52.85	0.00	115,673,709.10	25%	749.66	403	0
EUI MANAGEMENT	25.45	0.00	42,867,589.80	19%	683.30	167	0
FPLE OPERATING SERVICES INC.	543.24	162.00	1,219,296,385.30	26%	1,094.47	1,531	90
GREEN RIDGE	513.26	12.00	849,456,453.75	19%	693.52	4,821	120
INTERNATIONAL TURBINE RESEARCH	17.13	0.00	24,171,187.00	16%	441.58	166	0
NORTHWIND	12.09	0.00	17,287,373.00	16%	462.40	186	0
OAK CREEK	33.72	0.00	107,242,155.00	36%	1,160.99	83	0
SAN GORGONIO FARMS, INC.	35.77	3.11	84,194,152.00	27%	963.61	221	-3
SEAWEST ENERGY GROUP	202.84	22.44	421,895,660.00	24%	833.65	993	34
SOUTHERN CALIFORNIA SUNBELT	11.02	0.00	14,156,047.00	15%	491.89	139	0
WESTWIND ASSOCIATION	16.96	0.00	28,123,224.00	19%	596.58	179	0
WINDLAND, INC.	12.16	0.00	28,520,469.00	27%	936.14	63	0
WINTEC	7.50	0.00	19,379,883.10	30%	802.31	131	0

**Table 6-10
2002 Operator Summary Table**

Data Category	Net Capacity (MW)	Change in Capacity (MW)	Output (kWh)	Actual Capacity Factor (%)	kWh/m ²	Number of Turbines	Change in # of Turbines
PROJECT OPERATOR							
AB ENERGY	6.98	0.00	19,767,669.00	32%	1,112.86	31	0
CALWIND RESOURCES, INC.	22.82	0.00	41,342,160.00	21%	585.99	351	0
CORAM	11.24	0.00	16,691,301.00	17%	482.92	281	0
ENRON	290.31	0.00	689,272,917.03	27%	890.73	2,412	0
ENXCO	24.68	0.00	55,651,992.00	26%	817.10	244	0
EUI MANAGEMENT	25.71	0.26	51,812,319.48	23%	821.14	171	4
FPLE OPERATING SERVICES INC.	341.94	0.00	945,993,077.00	32%	1,213.59	1,257	0
GREENRIDGE	496.26	0.00	832,758,239.00	19%	681.32	4,651	0
INTERNATIONAL TURBINE RESEARCH	17.31	0.00	29,425,654.00	19%	532.19	168	0
NORTHWIND	12.09	0.00	17,996,542.00	17%	481.37	186	0
SAN GORGONIO FARMS, INC.	33.06	0.00	98,544,937.00	34%	1,179.40	224	0
SEAWEST ENERGY GROUP	180.40	0.00	509,251,006.00	32%	1,032.62	959	0
SOUTHERN CALIFORNIA SUNBELT	11.02	0.00	17,536,224.00	18%	609.34	139	0
WESTWIND ASSOCIATION	16.96	0.00	33,860,318.00	23%	718.28	179	0
WINDPOWER PARTNERS 1993 L.P.	53.50	0.00	131,536,534.90	28%	1,138.84	190	0
WINTEC	7.50	0.00	23,788,187.00	36%	984.81	131	0

CHAPTER 7 OPERATOR DATA

List of Wind Project Facilities

The following list includes the names and addresses of California wind projects reported in 2003 to the WPRS program. The list is ordered by qualifying facility numbers assigned by the Pacific Gas and Electric (PG&E) and Southern California Edison (SCE) utilities.

**Table 7-1
2003 Wind Project Facilities Listing**

QFID	Utility	Reported Project Name	Address	City	State	Zip
01W006	PG&E	SEAWEST WINDFARMS	1455 FRAZEE ROAD, SUITE 900	SAN DIEGO	CA	92108
01W006	PG&E	DYER ROAD - SWAP	1455 FRAZEE ROAD, SUITE 900	SAN DIEGO	CA	92108
01W007	PG&E	VENTURE PACIFIC/ESI/DR	1455 FRAZEE ROAD, SUITE 900	SAN DIEGO	CA	92108
01W011	PG&E	VENTURE PACIFIC - ALTECH	1455 FRAZEE ROAD, SUITE 900	SAN DIEGO	CA	92108
01W012	PG&E	VENTURE WINDS	1455 FRAZEE ROAD, SUITE 900	SAN DIEGO	CA	92108
01W014	PG&E	VENTURE PACIFIC - VIKING 83/DR	1455 FRAZEE ROAD, SUITE 900	SAN DIEGO	CA	92108
01W015	PG&E	TAXVEST	1455 FRAZEE ROAD, SUITE 900	SAN DIEGO	CA	92108
01W017	PG&E	ZOND WINDSYSTEM PARTNERS, SERIES 1985C	13000 JAMESON ROAD	TEHACHAPI	CA	93561
01W095	PG&E	NORTHWIND VAQUERO-SOUZA WINDPARK	1090 N PALM CANYON DRIVE, SUITE A	PALM SPRINGS	CA	92262
25W105	PG&E	PACHECO PASS	P.O. BOX 96	HOLLISTER	CA	95024
N/A	PG&E	MONTEZUMA HILLS WIND PLANT_GREEN RIDGE	6185 INDUSTRIAL WAY	LIVERMORE	CA	94550
N/A	PG&E	SAN GORGONIO WIND PLANT_GREEN RIDGE	6185 INDUSTRIAL WAY	LIVERMORE	CA	94550
N/A	PG&E	ALTAMONT PASS_GREEN RIDGE	6185 INDUSTRIAL WAY	LIVERMORE	CA	94550
N/A	PG&E	ALTAMONT POWER_FLOWIND II (ELWORTHY)	6185 INDUSTRIAL WAY	LIVERMORE	CA	94550
N/A	PG&E	MONTEZUMA HILLS WIND PLANT_GREEN RIDGE	6185 INDUSTRIAL WAY	LIVERMORE	CA	94550
N/A	PG&E	ALTAMONT POWER_FLOWIND I (DYER ROAD)	6185 INDUSTRIAL WAY	LIVERMORE	CA	94550
N/A	PG&E	ALTAMONT POWER_BONUS MARK II H23	6185 INDUSTRIAL WAY	LIVERMORE	CA	94550
N/A	PG&E	ALTAMONT PASS_GREEN RIDGE	6185 INDUSTRIAL WAY	LIVERMORE	CA	94550
N/A	PG&E	SAN GORGONIO WIND PLANT_GREEN RIDGE	6185 INDUSTRIAL WAY	LIVERMORE	CA	94550
N/A	PG&E	ALTAMONT POWER_FLOWIND I (DYER ROAD)	6185 INDUSTRIAL WAY	LIVERMORE	CA	94550
N/A	PG&E	ALTAMONT POWER_BONUS MARK III H24	6185 INDUSTRIAL WAY	LIVERMORE	CA	94550
6004	SCE	CABAZON	13000 JAMESON ROAD	TEHACHAPI	CA	93561
6007	SCE	ZOND PANAERO WIND SYSTEMS PART I & II	13000 JAMESON ROAD	TEHACHAPI	CA	93561
6009	SCE	SAN GORGONIO WIND FARMS INC I	21515 HAWTHORNE BLVD. SUITE 1059	TORRANCE	CA	90503
6011	SCE	BOXCAR I	10480 GARVERDALE CT. SUITE 804A	BOISE	ID	83704
6012	SCE	WINDSONG PROJECT	14633 WILLOW SPRINGS ROAD	MOJAVE	CA	93501
6019	SCE	ZEPHYR PARK, LTD	14633 WILLOW SPRINGS ROAD	MOJAVE	CA	93501
6024	SCE	RIDGETOP ENERGY, LLC (I)	10315 OAK CREEK ROAD	MOJAVE	CA	93501
6029	SCE	CORAM TAXVEST WIND FARMS	14961 BALLOU CIRCLE	WESTMINSTER	CA	92683
6029	SCE	CORAM ENERGY GROUP, LTD	14961 BALLOU CIRCLE	WESTMINSTER	CA	92683
6030	SCE	WIND POWER PARTNERS 1993 L.P	10315 OAK CREEK ROAD	MOJAVE	CA	93501
6031	SCE	MOUNTAIN PASS '85 LTD	6600 ROE ST.	BOISE	ID	83703
6035	SCE	WIND POWER PARTNERS 1993 L.P	10315 OAK CREEK ROAD	MOJAVE	CA	93501
6037	SCE	TEHACHAPI POWER PURCHASE TRUST	10315 OAK CREEK ROAD	MOJAVE	CA	93501
6039	SCE	1983 POOLS VO2, ZO1 & ZO2, 1984 POOL VO4	13000 JAMESON ROAD	TEHACHAPI	CA	93561
6040	SCE	1984 POOL VO4, 1985 POOL VZ1	13000 JAMESON ROAD	TEHACHAPI	CA	93561
6041	SCE	1984 POOL V6	13000 JAMESON ROAD	TEHACHAPI	CA	93561
6041	SCE	'84 POOL VO4, VO5, '85 POOL VO7, '85 VZ1	13000 JAMESON ROAD	TEHACHAPI	CA	93561
6042	SCE	ZOND 1984 POOL VO4, 1985 POOL VO7	13000 JAMESON ROAD	TEHACHAPI	CA	93561
6042	SCE	'85 POOL V22,'86 POOL V25, '87 POOL V26	13000 JAMESON ROAD	TEHACHAPI	CA	93561
6043	SCE	1985 POOL V13	13000 JAMESON ROAD	TEHACHAPI	CA	93561
6043	SCE	ZOND WINDSYSTEM PARTNERS SERIES 85A & B	13000 JAMESON ROAD	TEHACHAPI	CA	93561
6044	SCE	ZOND WINDSYSTEM PARTNERS SERIES 85A & B	13000 JAMESON ROAD	TEHACHAPI	CA	93561
6051	SCE	WESTWINDS II - PHOENIX	1455 FRAZEE ROAD, SUITE 900	SAN DIEGO	CA	92108
6051	SCE	DIFWIND FARMS LTD. V. SECTION 20	P.O. BOX 581043	NORTH PALM SPRINGS	CA	92258
6052	SCE	EAST WINDS	1455 FRAZEE ROAD, SUITE 900	SAN DIEGO	CA	92108
6053	SCE	DIFWIND FARMS LTD. V	P.O. BOX 581043	NORTH PALM SPRINGS	CA	92258
6055	SCE	CORAM TAXVEST FARMS	14961 BALLOU CIRCLE	WESTMINSTER	CA	92683
6056	SCE	PALM SPRINGS WIND PARK	3230 EAST IMPERIAL HWY., #200	BREA	CA	92821
6057	SCE	CAMERON RIDGE LLC (III)	10315 OAK CREEK ROAD	MOJAVE	CA	93501
6058	SCE	WESTWINDS II - WINDUSTRIES	1455 FRAZEE ROAD, SUITE 900	SAN DIEGO	CA	92108
6060	SCE	RESOURCE I	2659 TOWNSGATE ROAD SUITE 122	WESTLAKE VILLAGE	CA	91361
6062	SCE	ENERGY DEVELOPMENT & CONSTRUCTION CORP.	21515 HAWTHORNE BLVD. SUITE 1059	TORRANCE	CA	90503

**Table 7-1
2003 Wind Project Facilities Listing (continued)**

6063	SCE	DESERTWINDS I PPC TRUST ESI ENERGY INC.	10315 OAK CREEK ROAD	MOJAVE	CA	93501
6064	SCE	SECTION 7 TRUST	21515 HAWTHORNE BLVD. SUITE 1059	TORRANCE	CA	90503
6065	SCE	SKY RIVER	13000 JAMESON ROAD	TEHACHAPI	CA	93561
6066	SCE	SKY RIVER	13000 JAMESON ROAD	TEHACHAPI	CA	93561
6067	SCE	SKY RIVER	13000 JAMESON ROAD	TEHACHAPI	CA	93561
6087	SCE	VPI ENTERPRISES-ALTECH (III) SECTION 16-29 TRUST	1455 FRAZEE ROAD, SUITE 900	SAN DIEGO	CA	92108
6087	SCE	WESTWINDS II-ALTECH III	1455 FRAZEE ROAD, SUITE 900	SAN DIEGO	CA	92108
6087	SCE	ALTECH III/VPI ENTERPRISES	1455 FRAZEE ROAD, SUITE 900	SAN DIEGO	CA	92108
6088	SCE	DIFWIND PARTNERS	P.O. BOX 581043	NORTH PALM SPRINGS	CA	92258
6089	SCE	CORAM TAXVEST WIND FARMS	14961 BALLOU CIRCLE	WESTMINSTER	CA	92683
6089	SCE	AB ENERGY	3805 SHADY MEADOW DR	GRAPEVINE	TX	76051
6090	SCE	ALTA MESA POWER PARTNERS	P.O. BOX 581043	NORTH PALM SPRINGS	CA	92258
6091	SCE	CAMERON RIDGE LLC (IV)	10315 OAK CREEK ROAD	MOJAVE	CA	93501
6092	SCE	RIDGETOP ENERGY, LLC (II)	10315 OAK CREEK ROAD	MOJAVE	CA	93501
6094	SCE	WESTWINDS II - SAN JACINTO	1455 FRAZEE ROAD, SUITE 900	SAN DIEGO	CA	92108
6094	SCE	SAN JACINTO POWER	1455 FRAZEE ROAD, SUITE 900	SAN DIEGO	CA	92108
6095	SCE	DUTCH ENERGY	1455 FRAZEE ROAD, SUITE 900	SAN DIEGO	CA	92108
6096	SCE	WESTWIND ASSOCIATION WINDPARK	1090 N PALM CANYON DRIVE, SUITE A	PALM SPRINGS	CA	92262
6097	SCE	BOXCAR II	10480 GARVERDALE CT. SUITE 804A	BOISE	ID	83704
6098	SCE	WIND POWER PARTNERS 1993 L.P	10315 OAK CREEK ROAD	MOJAVE	CA	93501
6102	SCE	VICTORY GARDEN PHASE IV	13000 JAMESON ROAD	TEHACHAPI	CA	93561
6103	SCE	VICTORY GARDEN PHASE IV	13000 JAMESON ROAD	TEHACHAPI	CA	93561
6104	SCE	VICTORY GARDEN PHASE IV	13000 JAMESON ROAD	TEHACHAPI	CA	93561
6105	SCE	ZOND 1987, POOL V26	13000 JAMESON ROAD	TEHACHAPI	CA	93561
6106	SCE	ZOND 1987, POOL V26	13000 JAMESON ROAD	TEHACHAPI	CA	93561
6106	SCE	ZOND 1987-POOL V26, H&S 20 - POOL V27	13000 JAMESON ROAD	TEHACHAPI	CA	93561
6107	SCE	ZOND 1987, POOL V26	13000 JAMESON ROAD	TEHACHAPI	CA	93561
6107	SCE	VICTORY GARDEN PHASE IV	13000 JAMESON ROAD	TEHACHAPI	CA	93561
6108	SCE	ZOND 1987, POOL V26	13000 JAMESON ROAD	TEHACHAPI	CA	93561
6111	SCE	1987, POOL V26	13000 JAMESON ROAD	TEHACHAPI	CA	93561
6111	SCE	1985 POOL V19, V21, AND V26	13000 JAMESON ROAD	TEHACHAPI	CA	93561
6111	SCE	POOL V14, V18, & V20	13000 JAMESON ROAD	TEHACHAPI	CA	93561
6112	SCE	PAINTED HILLS "B", 1985	13000 JAMESON ROAD	TEHACHAPI	CA	93561
6112	SCE	PAINTED HILLS "C", 1985, POOLS V12 & V17	13000 JAMESON ROAD	TEHACHAPI	CA	93561
6113	SCE	DESERTWINDS II POWER PURCHASE TRUST- MOJAVE 3/5 & 4	10315 OAK CREEK ROAD	MOJAVE	CA	93501
6114	SCE	DESERTWINDS III PPC TRUST, MOJAVE 16/17/18 LLC	10315 OAK CREEK ROAD	MOJAVE	CA	93501
6114	SCE	DESERTWINDS III PPC TRUST, MOJAVE 16/17/18 LLC	10315 OAK CREEK ROAD	MOJAVE	CA	93501
6118	SCE	WIND POWER PARTNERS 1993 L.P	10315 OAK CREEK ROAD	MOJAVE	CA	93501
6213	SCE	WINTEC PALM WINDPARK	1090 N PALM CANYON DRIVE, SUITE A	PALM SPRINGS	CA	92262
6213	SCE	WIND POWER PARTNERS 1993 L.P	10315 OAK CREEK ROAD	MOJAVE	CA	93501
6213	SCE	WINTEC I (171) WINDPARK	1090 N PALM CANYON DRIVE, SUITE A	PALM SPRINGS	CA	92262
6234	SCE	OAK CREEK ENERGY SYSTEMS	14633 WILLOW SPRINGS ROAD	MOJAVE	CA	93501
6236	SCE	PAJUELA PEAK	2659 TOWNSGATE ROAD SUITE 122	WESTLAKE VILLAGE	CA	91361
C2011	CDW	MOUNTAIN VIEW I	1455 FRAZEE ROAD, SUITE 900	SAN DIEGO	CA	92108
C2012	CDW	MOUNTAIN VIEW II	1455 FRAZEE ROAD, SUITE 900	SAN DIEGO	CA	92108
C3031	SDG&E	MOUNTAIN VIEW III	1455 FRAZEE ROAD, SUITE 900	SAN DIEGO	CA	92108
C4032	PPM ENERGY INC.	HIGH WINDS ENERGY CENTER	10315 OAK CREEK ROAD	MOJAVE	CA	93501

Performance Data by Wind Projects

This section contains performance data, as submitted by California wind project operators, for the four quarters in 2002 and 2003. The data are listed alphabetically by operator name. Under each operator, reporting projects are identified along with qualifying facility identification numbers (QFID), capacities, wind turbine models, number of turbines, and production figures for particular year. As of 2000, the

Energy Commission assigned identification numbers (CECID) to new facilities that come on line under the Energy Commission's New Renewable Facilities Program. These facilities will not have the traditional QFIDs and will use the CECIDs for future reference. The Energy Commission's ID numbers track the year in which the facility came on-line and the utility service area and are followed by a number indicating their sequence during the year (for example: CECID = C2001; C = Energy Commission ID; 1, 2 or 3 = PG&E, SCE or other utility service area; YY = year facility came on line, Seq # = facility sequence number the year it begins generation.)

The data contained in this report represent performance results from 2002 to 2003. The details for both years are presented. Because of the market volatility during this period, the data from any one year should not be used as the sole basis for evaluating overall wind project performance in the state.

Section Notes

These notes describe how the WPRS data are reported and calculated. Points of clarification and limitations of the data are also discussed. The definitions for most wind data categories in this section are contained in WPRS regulations (Appendix D).

Data missing Some operators submitted incomplete reporting forms. Items not completed are designated by "N/A" or dashes (---) to distinguish missing data from values of "0." Note that operators who submit reports with missing data are in violation of WPRS regulations.

Failed to file The Energy Commission staff identified wind project operators who did not submit performance data but according to utility reports should have participated in the WPRS program. Subsequently, the staff notified non-reporting operators by mail of the WPRS requirements. Non-reporting operators who were notified but did not respond were noted as "failed to file."

Electricity produced Individual turbine model outputs, submitted by wind operators, are included for each month along with monthly and annual total. An annual total for the entire project follows. Individual turbine model outputs may not always equal the total project output because individual turbine production is usually read from meters owned by project operators, while total project output is measured from utility substation meters. Line losses and calibration differences between meters account for some of these differences.

Other participant(s) In some cases, participants other than the listed project operator may be involved in a project. These participants could include project managers, joint venture partners, wind developers using another developer's site, or others.

Rotor (m^2) The diameter of the rotor-swept area for each wind turbine allows different wind systems to be compared independently of wind resource area. In theory, the power available for any wind turbine is proportional to the square of the diameter of the rotor-swept area. Thus, doubling the size of the rotor diameter should increase the power output by a factor of four.

Size (kW) For each turbine model listed, the kW size rating is followed by a miles per hour (mph) specification. Because a standardized rating method does not exist, these mph specifications vary widely for different turbine models.

**Table 7-2
2003 Wind Project Performance Reporting Data (continued)**

Project Name	QFID	Net Cap Committed (MW)	Models	# of Turbines				Wind Speed	Energy Produced in (kWh)				Annual Energy Produced
				Q1	Q2	Q3	Q4		Q1	Q2	Q3	Q4	
1983 Pools V02, Z01 & Z02, 1984 Pool V04	6039	4.62	Vestas V-15	71	71	71	71	71	747,806.00	999,297.00	517,727.00	347,887.00	2,612,517.00
1984 Pool V04, 1985 Pool VZ1	6040	5.72	Vestas V-15	88	88	88	88	88	2,030,622.00	2,846,734.00	1,548,533.00	1,404,629.00	7,890,518.00
84 Pool V04, V05, 85 Pool V07, 85 VZ1	6041	4.75	Vestas V-15	73	73	73	73	73	1,634,066.00	2,198,704.00	1,172,627.00	793,084.00	5,798,501.00
1984 Pool V6	6042	0.27	Vestas V-17	3	3	3	3	3	121,069.00	146,405.00	89,656.00	64,315.00	421,465.00
Zond, 1984 pool V04, 1985 pool V07	6043	2.80	Vestas V-15	43	43	43	43	43	1,168,578.00	1,572,889.00	942,193.00	567,106.00	4,250,766.00
85 pool VZ2, 86 pool V25, 87 pool V26	6042	2.97	Vestas V-17	33	33	33	33	33	1,440,639.00	1,923,356.00	1,164,089.00	869,943.00	5,398,037.00
enxco													641,184,570.00
EHJ Management PH Inc.													
Alta Mesa Power Partners	6090	18.72	Danwin 160 kW	117	117	117	117	117	7,903,913.00	17,702,894.30	8,306,678.10	7,731,535.70	41,644,721.10
Dikwind Partners	6088	12.53	Micon 65 kW	116	116	116	116	116	2,596,138.00	13,111,795.00	5,540,528.00	2,695,409.00	23,943,870.00
Dikwind Farms Ltd. V	6063	7.88	Micon 108 kW	73	73	73	73	73	3,365,924.00	7,592,950.00	2,872,653.00	1,425,916.00	13,277,443.00
Dikwind Farms Ltd. V, Section 20	6051	1.73	Micon 108 kW	16	16	16	16	16	852,217.00	2,238,195.00	1,158,915.00	585,186.00	4,634,514.00
Alta Mesa Power Partners	6090	9.45	Vestas V-27	42	42	42	42	42	5,752,794.00	11,602,373.00	6,116,220.00	5,092,607.00	28,563,994.00
Dikwind Partners	6088	2.54	Micon 65 kW	39	39	39	39	39	339,496.00	2,140,415.00	746,238.00	363,018.00	3,609,167.00
FPLE Operating Services Inc.													
Mountain Pass 85 LTD	6031	2.81	Micon 108	26	26	26	26	26	619,490.00	1,593,160.00	1,051,415.00	862,426.00	4,126,491.00
Mountain Pass 85 LTD	6031	3.97	Bonus 65	61	61	61	61	61	1,046,158.00	3,691,860.00	1,464,619.00	1,051,087.00	7,153,724.00
Mountain Pass 85 LTD	6031	0.25	Bonus 250	1	1	1	1	1	0.00	0.00	0.00	0.00	82,572.00
Mountain Pass 85 LTD	6031	0.75	Della 150	5	5	5	5	5	101,920.00	175,794.00	56,340.00	38,364.00	374,408.00
Mountain Pass 85 LTD	6031	7.68	Bonus 120	64	64	64	64	64	1,947,055.40	6,197,596.00	2,329,119.90	1,864,467.50	12,368,239.80
Mountain Pass 85 LTD	6031	10.00	Nordex 1000	10	10	10	10	10	3,549,556.00	7,575,739.00	4,368,571.00	3,398,293.00	16,772,155.00
FPLE Operating Services Inc.													
Cameron Ridge LLC (II)	6057	44.10	NEG MICON 700	63	63	63	63	63	32,848,771.30	47,449,233.00	30,235,539.00	25,569,573.10	136,103,116.40
High Winds Energy Center	N/A	162.00	Vestas V-80	0	90	90	90	90	0.00	2,640,075.00	141,211,355.00	62,178,140.00	196,029,571.00
Tehachapi Power Purchase Trust	6037	16.20	MHI 600	29	29	29	29	29	8,851,063.00	18,853,950.00	9,266,671.00	8,603,868.00	45,747,152.00
Cameron Ridge LLC (IV)	6091	11.36	Danwin 160	71	71	71	71	71	8,148,175.00	10,773,704.00	11,107,534.00	4,310,352.00	34,340,305.00
Cameron Ridge LLC (V)	6091	0.76	Micon 108 kW	7	7	7	7	7	301,813.00	467,883.00	203,758.00	216,161.00	1,189,615.00
Desertwinds III PPC Trust, Mojave 16/17/18 LLC	6114	11.90	NEG MICON 700	17	17	17	17	17	8,492,456.20	12,999,931.00	8,078,329.00	6,254,381.70	35,825,097.90
Desertwinds III PPC Trust, Mojave 16/17/18 LLC	6114	15.60	MHI 600	26	26	26	26	26	7,531,546.00	13,680,699.00	10,074,149.00	6,443,952.00	37,630,346.00
Desertwinds III PPC Trust, Mojave 16/17/18 LLC	6114	21.25	MHI 250	85	85	85	85	85	7,845,178.00	15,889,109.23	10,047,123.00	6,552,667.00	40,394,077.23
Desertwinds II Power Purchase Trust/Mojave 3/5	6113	75.00	MHI 250	300	300	300	300	300	40,312,452.00	75,180,141.00	56,860,661.00	35,111,679.00	207,264,933.00
Desertwinds I Power Purchase Trust/ESI Energy Inc.	6053	2.40	MHI 600	4	4	4	4	4	1,165,811.00	2,186,032.00	1,343,445.00	1,120,726.00	6,416,014.00
Cameron Ridge LLC (III)	6057	3.67	Micon 108 kW	34	34	34	34	34	1,524,045.00	2,565,218.00	1,343,080.00	1,189,411.00	6,621,754.00
Windpower Partners 1993 LP	6118	6.40	KVS-33	16	16	16	16	16	2,997,713.00	7,319,892.00	3,976,726.00	2,641,767.00	16,935,898.00
Ridgetop Energy, LLC (II)	6092	14.52	V47	22	22	22	22	22	11,152,611.00	17,632,801.00	10,721,825.00	7,893,899.23	47,401,142.23
Wind Power Partners 1993 LP	6030	18.00	KVS-33	45	45	45	45	45	6,826,170.00	16,934,797.00	9,031,585.00	5,762,063.00	40,576,615.00
Windpower Partners 1993 LP	6213	11.60	KVS-33	29	29	29	29	29	4,031,040.00	10,196,880.00	5,500,487.00	3,453,840.00	23,182,047.00
Windpower Partners 1991 LP	6098	7.50	Kemetech 56-100	75	75	75	75	75	1,617,291.00	4,090,043.00	2,428,866.10	1,224,480.00	9,360,881.20
Windpower Partners 1991 LP	6098	45.50	MHI 250	182	182	182	182	182	15,737,994.00	31,078,053.79	23,244,689.00	13,651,160.00	83,711,896.79
Windpower Partners 1993 LP	6036	7.60	KVS-33	19	19	19	19	19	3,269,384.00	8,017,467.00	3,939,225.00	3,513,665.00	18,759,741.00
Ridgetop Energy, LLC (I)	6092	12.60	Vestas V-39	28	28	28	28	28	9,718,460.00	14,199,969.00	8,664,653.00	7,365,124.00	40,168,226.00
Ridgetop Energy, LLC (I)	6024	15.00	Nordtank 150 kW	100	100	100	100	100	6,970,239.20	9,964,331.40	5,566,066.30	5,027,154.90	27,547,810.80
Ridgetop Energy, LLC (I)	6024	17.10	Nordtank 75	228	228	228	228	228	7,648,069.00	13,141,909.00	7,026,014.00	6,221,774.00	34,037,766.00
Ridgetop Energy, LLC (I)	6024	0.32	Micon 108 kW	3	3	3	3	3	241,262.60	331,198.00	177,511.50	190,696.80	940,928.90
Ridgetop Energy, LLC (I)	6024	0.25	Micon 250 kW	1	1	1	1	1	128,135.50	200,636.10	113,437.10	141,833.60	564,244.30
Ridgetop Energy, LLC (I)	6024	32.34	V47	49	49	49	49	49	24,912,043.00	37,335,249.00	23,437,235.00	19,145,370.06	104,829,887.06

**Table 7-2
2003 Wind Project Performance Reporting Data (continued)**

Project Name	Net Cap Committed (MM)	Models	Wind Speed	# of Turbines				Energy Produced in (kWh) Q1	Energy Produced in (kWh) Q2	Energy Produced in (kWh) Q3	Energy Produced in (kWh) Q4	Annual Energy Produced
				Q1	Q2	Q3	Q4					
Ridgetop Energy, LLC (I)	0.86	Micon 108 KW	108kW@33 MPH	8	8	8	8	476,887.00	712,388.00	444,227.00	368,497.00	2,001,999.00
Windpower Partners 1993 L.P.	2.40	KYS-33	400kW@35 MPH	6	6	6	6	745,831.50	2,032,368.70	1,141,721.90	862,662.00	4,582,574.10
Greenridge												1,202,123,446.93
San Geronimo Wind Plant, GreenRidge	N/A	0.25 Bonus	250kW@32 MPH	1	1	1	1	100,252.00	188,492.00	69,705.00	63,709.00	402,158.00
Allamont Pass, GreenRidge	N/A	360.00 KCS-56	100kW@29 MPH	3480	3103	3579	3600	51,904,075.18	275,636,833.00	231,236,272.87	58,866,952.49	617,444,133.54
Allamont Power, Flowind I (Dyer Road)	N/A	14.16 F-17	143kW@44 MPH	99	99	99	99	177,123.00	1,074,597.00	687,720.00	206,565.00	2,146,025.00
Allamont Power, Flowind II (Elworthy)	N/A	4.75 F-19	250kW@38 MPH	19	19	19	19	5,803.00	109,006.00	119,498.00	19,989.00	254,296.00
Allamont Power, Bonus Mark II H23	N/A	2.75 D-110	110kW@30 MPH	25	25	25	25	152.00	0.00	0.00	0.00	152.00
Allamont Power, Bonus Mark II H24	N/A	26.55 B-120	225kW@33 MPH	225	225	225	225	4,434,060.00	18,961,958.00	23,312,132.00	6,389,616.00	53,087,666.00
Allamont Pass, GreenRidge	N/A	15.00 B-150	150kW@29 MPH	100	100	100	100	2,123,543.00	9,598,961.00	11,638,504.00	3,500,475.00	26,861,493.00
Montezuma Hills Wind Plant, GreenRidge	N/A	5.00 WEG-250	250kW@33 MPH	20	20	20	20	2,252,232.00	4,456,274.00	4,067,665.00	1,289,067.00	11,065,258.00
Montezuma Hills Wind Plant, GreenRidge	N/A	60.00 KCS-56	100kW@29 MPH	600	600	600	600	4,237,454.00	24,980,633.00	36,831,847.00	6,610,329.00	71,680,263.00
San Geronimo Wind Plant, GreenRidge	N/A	5.10 KYS-33	300kW@30 MPH	17	17	17	17	1,229,368.00	9,718,345.00	12,574,012.00	3,482,037.00	27,003,762.00
Allamont Pass, GreenRidge	N/A	7.40 KCS-56	100kW@29 MPH	74	74	74	74	2,408,303.00	2,412,246.00	2,320,820.00	2,024,011.00	9,165,380.00
Allamont Pass, GreenRidge	N/A	12.30 KYS-33	300kW@30 MPH	41	41	41	41	4,159,129.74	10,672,399.75	12,022,951.83	3,501,395.89	30,355,877.21
International Turbine Research 1999												849,456,453.75
Pacheco Pass	25W105	1.63 Nordtank NKT165	65kW@31 MPH	25	25	25	25	236,200.00	1,333,600.00	1,311,200.00	319,200.00	3,200,200.00
Pacheco Pass	25W105	0.50 Nordtank 500	500kW@29 MPH	1	1	1	1	113,850.00	454,241.00	439,136.00	129,286.00	1,136,523.00
Pacheco Pass	25W105	1.80 Vestas V17	90kW@33 MPH	20	20	20	20	172,400.00	870,000.00	666,000.00	144,000.00	1,852,400.00
Pacheco Pass	25W105	2.00 Vestas V17E	100kW@33 MPH	20	20	20	20	258,934.00	1,231,016.00	1,167,486.00	293,909.00	2,951,345.00
Pacheco Pass	25W105	9.50 Wincon W39XT	100kW@27 MPH	95	95	95	95	978,329.00	5,472,119.00	4,394,334.00	1,096,988.00	11,941,750.00
Pacheco Pass	25W105	0.80 Wincon 200	200kW@29 MPH	4	4	4	4	127,661.00	590,267.00	485,537.00	132,783.00	1,336,248.00
Pacheco Pass	25W105	0.90 Micon 900	900kW@27 MPH	1	1	1	1	189,928.00	707,212.00	640,804.00	214,777.00	1,752,721.00
Northwind Energy, Inc.												24,171,187.00
Northwind Vaquero-Souza Windpark	D1M095	12.08 Nordtank 65kW	64kW@34 MPH	186	186	186	186	1,711,870.00	6,454,862.00	7,170,587.00	1,950,044.00	17,287,373.00
Oak Creek												17,287,373.00
Oak Creek Energy Systems	6234	0.80 NM800/54	800kW@27 MPH	1	1	1	1	643,653.80	1,026,471.20	796,051.50	542,036.70	3,008,123.20
Oak Creek Energy Systems	6234	0.36 PO Oak 9	45kW@20 MPH	8	8	8	8	586,322.00	1,221,005.00	1,017,482.80	554,497.50	3,379,307.30
Windsong Project	8012	0.14 PO Oak 9S	118kW@30 MPH	3	3	3	3	112,384.00	188,430.00	118,779.00	71,434.00	491,027.00
Windsong Project	8012	1.98 PO Oak 9F	198kW@30 MPH	22	22	22	22	1,236,795.00	2,008,024.00	1,174,401.00	752,918.00	5,172,138.00
Windsong Project	8012	0.08 PO Oak 7S	108kW@30 MPH	3	3	3	3	39,306.00	26,510.00	16,684.00	24,049.00	106,549.00
Windsong Project	8012	0.17 PO Oak 7F	135kW@30 MPH	3	3	3	3	27,132.00	200,594.00	139,162.00	90,943.00	457,831.00
Zephyr Park, LTD	6019	3.50 NM700/48	700kW@33 MPH	5	5	5	5	2,073,513.00	3,325,296.00	2,266,906.00	1,324,708.00	8,989,423.00
Oak Creek Energy Systems	6234	4.20 Micon 1500	600kW@31 MPH	7	7	7	7	3,186,268.00	4,832,794.70	3,416,036.70	2,271,334.60	13,705,444.60
Oak Creek Energy Systems	6234	19.60 NM700/48	700kW@33 MPH	28	28	28	28	14,108,273.50	21,174,605.20	14,545,466.10	9,544,533.20	59,372,878.00
Oak Creek Energy Systems	6234	1.60 NM800/52	800kW@31 MPH	2	2	2	2	1,405,726.50	1,937,777.00	1,474,471.00	1,050,368.70	5,868,343.20
Oak Creek Energy Systems	6234	1.30 NM72C	1300kW@26 MPH	1	1	1	1	652,725.80	1,566,744.40	945,525.90	536,990.20	3,691,086.10
												104,242,150.40

**Table 7-2
2003 Wind Project Performance Reporting Data (continued)**

San Geronimo Farms													
Project Name	QFID	Net Cap Committed (MW)	Models	Wind Speed	# of Turbines	# of Turbines	# of Turbines	# of Turbines	Energy Produced in (kWh) Q1	Energy Produced in (kWh) Q2	Energy Produced in (kWh) Q3	Energy Produced in (kWh) Q4	Annual Energy Produced
					G1	G2	G3	G4	(kWh) Q1	(kWh) Q2	(kWh) Q3	(kWh) Q4	(kWh)
San Geronimo Wind Farms Inc I	6009	2.75 Bonus 65 kW	65kW@33 MPH	42	42	42	42	42	939,950.00	3,063,140.00	1,346,020.00	991,530.00	6,342,640.00
Energy Development & Construction Corp	6062	3.36 GE 1.5 MW	1500kW@28 MPH	0	3	3	3	0	0.00	983,346.00	2,942,468.00	1,867,074.00	5,692,868.00
Energy Development & Construction Corp	6063	3.00 Vestas V-39 500 kW	500kW@30 MPH	6	6	6	6	6	1,100,043.00	3,575,039.00	1,417,534.00	1,021,843.00	7,114,459.00
Section 7 Trust	6064	2.50 Vestas V-39	500kW@30 MPH	5	5	5	5	5	980,880.00	2,897,320.00	1,283,760.00	968,800.00	6,130,760.00
Section 7 Trust	6064	12.40 DWT Windane 34	400kW@30 MPH	31	31	31	31	31	5,207,520.00	14,620,920.00	7,822,200.00	5,120,240.00	32,770,880.00
Section 7 Trust	6064	5.60 Bonus 120 kW	100kW@28 MPH	56	56	56	56	56	2,205,530.00	7,439,940.00	2,970,830.00	2,222,930.00	14,839,230.00
Section 7 Trust	6064	2.28 Micon 65 kW	65kW@33 MPH	35	35	35	35	35	738,150.00	2,626,660.00	1,016,914.00	673,151.00	5,054,875.00
Section 7 Trust	6064	2.41 Micon 65 kW	65kW@33 MPH	37	37	37	37	37	730,320.00	2,728,790.00	1,035,330.00	778,220.00	5,272,660.00
San Geronimo Wind Farms Inc I	6009	0.36 Micon 60 kW	60kW@33 MPH	6	6	6	6	6	176,450.00	508,600.00	237,160.00	153,560.00	1,075,960.00
SeaWest Energy Group													
84,194,152.00													
Southern California Sunbelt Developers, Inc.													
Project Name	QFID	Net Cap Committed (MW)	Models	Wind Speed	# of Turbines	# of Turbines	# of Turbines	# of Turbines	Energy Produced in (kWh) Q1	Energy Produced in (kWh) Q2	Energy Produced in (kWh) Q3	Energy Produced in (kWh) Q4	Annual Energy Produced
					G1	G2	G3	G4	(kWh) Q1	(kWh) Q2	(kWh) Q3	(kWh) Q4	(kWh)
Venture Pacific - Viking 83/0R	01W014	1.56 Micon 65/73	60kW@30 MPH	26	26	26	26	26	207,055.02	895,011.17	1,132,286.15	216,839.91	2,451,202.25
TaxVest	01W015	11.64 Micon 65/73	60kW@30 MPH	194	194	194	194	194	66,371.86	294,941.19	419,126.41	88,625.24	869,064.70
Mountain View III	N/A	22.44 Vestas V47	600kW@30 MPH	0	0	0	0	0	0.00	0.00	0.00	0.00	2,184,803.00
Westwinds II - Windustries	6058	9.80 Micon 700	631kW@30 MPH	14	14	14	14	14	3,968,040.00	13,004,760.00	7,121,412.00	3,310,392.00	27,404,604.00
VPI Enterprises-Altech (III) Section 16-29 Trust	6067	21.71 Micon 108	108kW@30 MPH	201	201	201	201	201	4,791,565.30	24,612,979.20	10,555,039.32	4,974,968.01	44,934,541.83
Altech III/VPI Enterprises	6067	3.90 Micon 65/73	60kW@30 MPH	65	65	65	65	65	0.00	0.00	0.00	0.00	0.00
Westwinds II-Altech III	6067	8.83 Micon 700	631kW@30 MPH	14	14	14	14	14	3,110,770.70	12,667,660.80	6,892,192.68	3,324,145.98	25,994,770.17
San Jacinto Power	6094	7.80 Vangrid 95T	195kW@30 MPH	40	40	40	40	40	742,878.26	3,739,646.18	1,374,230.86	722,965.71	6,579,711.01
San Jacinto Power	6094	0.65 Windmatic 15S	195kW@30 MPH	13	13	13	13	13	0.00	0.00	0.00	0.00	0.00
Westwinds II - San Jacinto	6094	12.60 Micon 700	664kW@30 MPH	18	18	18	18	18	4,248,245.74	15,830,563.42	8,159,445.14	4,205,024.29	32,443,269.99
Dutch Energy	6095	9.42 Nedwind 40	471kW@30 MPH	20	20	20	20	20	2,224,417.00	8,920,892.00	1,631,708.00	1,805,075.00	14,582,092.00
Westwinds II - Phoenix	6051	11.20 Micon 700	631kW@30 MPH	16	16	16	16	16	5,117,995.09	15,592,193.01	9,483,753.30	4,941,152.02	35,135,053.42
Venture Winds	01W012	2.47 Windmatic	65kW@35 MPH	38	38	38	38	38	248,728.74	1,393,429.74	1,541,492.03	312,578.89	3,496,229.40
East Winds	6052	4.20 Micon 600	570kW@30 MPH	7	7	7	7	7	1,224,108.00	4,767,528.00	2,403,312.00	2,515,755.40	10,910,703.40
Mountain View II	C2012	22.20 MWT-600	600kW@30 MPH	37	37	37	37	37	8,528,600.00	28,421,339.00	15,783,950.36	9,791,074.66	62,524,864.04
Dyer Road - SWAP	01W006	0.06 Micon 65/73	60kW@30 MPH	1	1	1	1	1	10,221.07	22,010.60	21,331.78	12,677.60	66,241.05
Venture Pacific - Altech	01W011	5.76 ETK 44/40	40kW@30 MPH	144	144	144	144	144	183,548.42	2,821,149.42	3,611,221.17	724,338.66	7,340,257.67
Venture Pacific/ESI/DR	01W007	1.10 EnerTech 60	50kW@30 MPH	22	22	22	22	22	74,426.86	595,101.89	608,563.28	115,373.47	1,383,465.52
SeaWest Windfarms	01W006	0.90 Micon 65/73	50kW@30 MPH	15	15	15	15	15	1,041,865.41	6,000,449.86	6,611,703.43	1,435,602.34	15,089,641.05
Mountain View I	C2011	44.40 MWT-600	600kW@30 MPH	74	74	74	74	74	18,242,200.00	56,254,093.00	33,310,330.29	20,688,521.96	128,495,145.25
Southern California Sunbelt Developers, Inc.													
421,896,666.76													
Westwind Association													
Project Name	QFID	Net Cap Committed (MW)	Models	Wind Speed	# of Turbines	# of Turbines	# of Turbines	# of Turbines	Energy Produced in (kWh) Q1	Energy Produced in (kWh) Q2	Energy Produced in (kWh) Q3	Energy Produced in (kWh) Q4	Annual Energy Produced
					G1	G2	G3	G4	(kWh) Q1	(kWh) Q2	(kWh) Q3	(kWh) Q4	(kWh)
Westwind Association Windpark	6096	0.85 Nordtank 65kW	65kW@34 MPH	13	13	13	13	13	296,951.40	909,616.30	368,294.40	249,991.70	1,854,863.80
Westwind Association Windpark	6096	2.46 Wincon 108kW	108kW@33 MPH	23	23	23	23	23	432,427.80	1,505,636.60	619,337.70	336,564.20	2,893,966.50
Westwind Association Windpark	6096	9.24 Wincon XT 110kW	110kW@33 MPH	84	84	84	84	84	2,514,740.90	7,852,747.30	3,225,044.90	2,035,330.60	15,627,863.70
Westwind Association Windpark	6096	1.40 Micon 108kW	108kW@33 MPH	13	13	13	13	13	278,300.30	994,341.20	369,063.80	240,734.00	1,902,439.30
Westwind Association Windpark	6096	2.99 Micon 65kW	65kW@33 MPH	46	46	46	46	46	908,161.80	2,876,346.40	1,264,699.20	794,863.50	5,844,070.70
28,123,224.00													

**Table 7-2
2003 Wind Project Performance Reporting Data (continued)**

Windland Boxcar I PCT												
Project Name	Net Cap Committed (MW)	Models	Wind Speed	# of Turbines Q1	# of Turbines Q2	# of Turbines Q3	# of Turbines Q4	Energy Produced in (kWh) Q1	Energy Produced in (kWh) Q2	Energy Produced in (kWh) Q3	Energy Produced in (kWh) Q4	Annual Energy Produced
Boxcar I	0.40	Vestas V-25		2	2	2	2	151,730.00	252,670.00	158,260.00	137,970.00	700,650.00
Boxcar I	2.70	Vestas V-27	225kW@35 MPH	12	12	12	12	1,593,480.00	2,500,300.00	1,431,500.00	1,307,440.00	6,832,720.00
Boxcar I	0.50	Vestas V-39	500kW@30 MPH	1	1	1	1	213,285.00	196,162.00	267,029.00	233,459.00	909,935.00
Boxcar I	1.32	Bonus 120	120kW@29 MPH	11	11	11	11	613,783.00	1,005,503.00	538,913.00	466,132.00	2,624,331.00
Boxcar I	0.26	Bonus 65	65kW@33 MPH	4	4	4	4	113,243.00	163,452.00	70,541.00	64,165.00	411,401.00
Windland Boxcar II PCT												
Boxcar II	3.60	Vestas V-25		18	18	18	18	2,367,402.00	2,913,165.00	1,724,240.00	1,794,665.00	8,819,472.00
Boxcar II	3.36	Vestas V-27	225kW@35 MPH	15	15	15	15	1,902,640.00	3,097,780.00	1,710,440.00	1,511,100.00	8,221,960.00
Wintec												
Wintec I (I71) WindPark	1.27	Micon 55kW		23	23	23	23	528,796.60	1,627,131.10	713,964.60	507,192.20	3,377,104.50
Wintec Cahulla Windpark	4.66	Nordtank 65kW	65kW@34 MPH	72	72	72	72	1,786,775.00	5,976,352.70	2,993,048.90	1,725,470.70	12,481,647.30
Wintec Palm WindPark	0.99	Micon 55kW	65kW@34 MPH	18	18	18	18	332,178.30	1,233,269.20	569,016.60	333,237.00	2,467,701.10
Wintec I (I71) WindPark	0.26	AASI 20kW	20kW@26 MPH	13	13	13	13	82,319.00	251,872.10	66,437.90	43,181.00	443,810.00
Wintec I (I71) WindPark	0.04	AASI 40kW	40kW@30 MPH	1	1	1	1	13,546.50	30,511.30	9,554.80	0.00	53,612.60
Wintec Palm WindPark	0.26	Nordtank 65kW	65kW@34 MPH	4	4	4	4	70,206.70	290,942.10	128,978.50	66,880.30	556,007.60
FAIL TO FILE												
Altamont-Midway, Ltd.												19,379,883.10
Buena Vista Energy, LLC												
Donald R. Chenoweth												
L.P. Reinhard												
Patterson Pass Wind Farm, LLC												
Tres Vaqueros Wind Farms, LLC												
Mogul Energy Partnership I												
Windridge Inc.												

Table 7-3

2002 Wind Project Performance Reporting Data (continued)

Project Name	QFID	Net Cap Committed (MW)	Models	Wind Speed	# of Turbines				Energy Produced in (kWh)				Annual Energy Produced
					Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Zond 1984 pool V04, 1985 pool V07	6042	2.80	Vestas V-15	65kW@35 MPH	43	43	43	43	1,018,350.00	1,745,840.01	803,415.00	738,570.00	4,306,175.01
85 pool V22, 96 pool V25, 87 pool V26	6042	2.97	Vestas V-17	90kW@35 MPH	33	33	33	33	942,930.00	2,041,719.99	915,300.00	784,749.99	4,684,689.98
1985 Pool V13	6043	0.52	Vestas V-15	65kW@35 MPH	8	8	8	8	115,920.00	305,930.01	179,390.01	119,670.00	720,910.02
Zond Windsystem Partners, Series 85A & B	6043	14.58	Vestas V-17	90kW@35 MPH	162	162	162	162	4,114,659.99	8,620,860.00	5,564,484.99	3,731,940.00	22,031,944.98
Zond Windsystem Partners Series 85A & B	6044	20.88	Vestas V-17	90kW@35 MPH	232	232	232	232	6,346,230.00	11,945,460.00	6,462,549.99	5,584,040.01	30,338,280.00
enXco													686,656,461.10
EUI Management PH Inc.													
Project Name	QFID	Net Cap Committed (MW)	Models	Wind Speed	# of Turbines				Energy Produced in (kWh)				Annual Energy Produced
					Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Mountain Pass 86 LTD	6031	0.75	Delta 150	150kW@40 MPH	5	5	5	5	125,854.98	255,717.00	232,422.00	130,902.00	744,895.98
Mountain Pass 85 LTD	6031	2.81	Micon 108	108kW@32 MPH	26	26	26	26	876,281.40	2,309,866.98	1,341,961.98	771,913.98	5,300,024.34
Mountain Pass 86 LTD	6031	10.00	Nordex 1000	1000kW@30 MPH	10	10	10	10	3,028,186.00	7,768,006.00	7,129,086.99	4,715,436.99	22,630,726.98
Mountain Pass 85 LTD	6031	4.10	Bonus 65	65kW@40 MPH	61	61	65	65	1,253,763.00	3,565,975.98	2,136,577.80	1,364,026.90	6,340,343.68
Mountain Pass 85 LTD	6031	7.68	Bonus 120	120kW@40 MPH	64	64	64	64	2,178,133.98	6,336,379.99	3,711,121.29	2,366,015.29	14,660,660.55
Mountain Pass 85 LTD	6031	0.25	Bonus 250	250kW@32 MPH	1	1	1	1	57,895.98	86,754.98	71,016.99	0.00	215,677.95
FPLE Operating Services Inc.													51,812,319.46
Project Name	QFID	Net Cap Committed (MW)	Models	Wind Speed	# of Turbines				Energy Produced in (kWh)				Annual Energy Produced
					Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Ridgetop Energy, LLC (I)	6092	14.52	V47	660kW@33 MPH	22	22	22	22	7,700,258.00	18,539,111.00	13,937,478.00	8,293,076.00	48,469,923.00
Tehachapi Power Purchase Trust	6037	17.40	MHI 600	600kW@33 MPH	29	29	29	29	8,113,068.00	19,416,826.00	17,045,604.00	9,210,198.00	53,785,686.00
Cameron Ridge LLC (IV)	6091	0.76	Micon 108 kW	108kW@33 MPH	7	7	7	7	122,259.00	621,966.00	387,501.00	195,635.00	1,327,281.00
Cameron Ridge LLC (IV)	6091	11.90	NEG MICON 700	700kW@33 MPH	17	17	17	17	6,109,889.00	13,532,057.00	10,545,687.00	6,274,977.00	36,462,610.00
Desertwinds III PPC Trust, Mojave 16/17/18 LLC	6114	15.60	MHI 600	600kW@33 MPH	26	26	26	26	6,755,477.00	16,687,768.00	11,962,402.00	7,267,845.00	42,673,493.00
Desertwinds III PPC Trust, Mojave 16/17/18 LLC	6114	21.25	MHI 250	250kW@33 MPH	85	85	85	85	5,964,832.00	19,379,730.00	11,725,495.00	6,180,348.00	43,250,405.00
Desertwinds II Power Purchase Trust-Mojave 3/5 & 4	6113	75.00	MHI 250	250kW@33 MPH	300	300	300	300	34,996,619.00	92,074,014.00	72,016,129.00	36,115,817.00	235,202,579.00
Desertwinds I PPC Trust ESI Energy Inc.	6063	2.40	MHI 600	600kW@33 MPH	4	4	4	4	1,186,816.00	2,338,828.00	2,474,399.00	1,238,276.00	7,238,319.00
Desertwinds I PPC Trust ESI Energy Inc.	6063	45.50	MHI 250	250kW@33 MPH	182	182	182	182	14,045,393.00	42,275,161.00	29,386,437.00	12,768,431.00	97,477,422.00
Cameron Ridge LLC (III)	6057	44.10	NEG MICON 700	700kW@33 MPH	63	63	63	63	24,683,647.00	50,190,300.00	39,737,874.00	23,669,675.00	138,281,496.00
Ridgetop Energy, LLC (I)	6092	12.60	Vestas V39	450kW@30 MPH	28	28	28	28	7,186,889.00	14,884,829.00	10,203,034.00	7,105,527.00	39,380,279.00
Ridgetop Energy, LLC (I)	6092	0.86	Micon 108 kW	108kW@33 MPH	8	8	8	8	228,056.00	915,231.00	693,970.00	337,561.00	2,174,816.00
Ridgetop Energy, LLC (I)	6024	32.34	V47	660kW@33 MPH	49	49	49	49	17,875,967.00	38,612,200.00	29,472,125.00	17,484,124.00	103,444,416.00
Ridgetop Energy, LLC (I)	6024	0.25	Micon 250 kW	250kW@33 MPH	1	1	1	1	96,334.00	156,739.00	191,795.00	89,745.00	534,613.00
Ridgetop Energy, LLC (I)	6024	0.32	Micon 108 kW	108kW@33 MPH	3	3	3	3	168,245.00	429,522.00	311,089.00	163,785.00	1,072,641.00
Ridgetop Energy, LLC (I)	6024	17.10	Nordtank 75	75kW@42 MPH	228	228	228	228	5,139,252.00	14,043,616.00	9,805,260.00	4,108,441.00	32,096,569.00
Ridgetop Energy, LLC (I)	6024	15.00	Nordtank 150 kW	150kW@42 MPH	100	100	100	100	5,108,363.00	12,211,811.00	7,401,073.00	4,086,750.00	28,807,997.00
Tehachapi Power Purchase Trust	6037	11.36	Darwin 160	160kW@33 MPH	71	71	71	71	3,672,817.00	11,253,795.00	8,431,773.00	3,980,643.00	27,339,028.00
Cameron Ridge LLC (III)	6057	3.67	Micon 108 kW	108kW@33 MPH	34	34	34	34	919,251.00	2,972,331.00	2,020,966.00	1,060,925.00	6,973,473.00

**Table 7-3
2002 Wind Project Performance Reporting Data (continued)**

SeaWest Energy Group													
Project Name	QFID	Net Cap Committed (MW)	Models	Wind Speed	# of Turbines Q1	# of Turbines Q2	# of Turbines Q3	# of Turbines Q4	Energy Produced in (kWh) Q1	Energy Produced in (kWh) Q2	Energy Produced in (kWh) Q3	Energy Produced in (kWh) Q4	Annual Energy Produced
Mountain View II	C2012	22.20	MWT-600	60kW@30 MPH	37	37	37	37	9,702,910.00	31,025,210.00	23,466,990.00	12,622,980.00	76,818,090.00
Dyer Road - SWAP	01W006	0.06	Micon 65/13	60kW@30 MPH	1	1	1	1	7,503.00	23,069.00	18,405.00	6,559.00	56,566.00
SeaWest Windfarms	01W006	0.90	Micon 65/13	50kW@30 MPH	15	15	15	15	837,767.00	7,488,533.00	6,012,690.00	1,726,779.00	16,045,769.00
VPI Enterprises-Altech (III) Section 16-29 Trust	6087	21.71	Micon 108	108kW@30 MPH	201	201	201	201	6,207,439.00	22,442,530.00	13,511,715.00	7,175,436.00	49,337,120.00
Venture Pacific/FES/DR	01W007	1.10	EnerTech 60	50kW@30 MPH	22	22	22	22	8,100.00	606,859.00	538,309.00	102,072.00	1,255,340.00
Venture Pacific - Altech	01W011	5.76	ETK 44/40	40kW@30 MPH	144	144	144	144	45,810.00	3,935,406.00	3,421,488.00	794,150.00	8,196,854.00
Venture Winds	01W012	2.47	Windmatic	65kW@35 MPH	38	38	38	38	166,968.00	1,736,462.00	1,247,752.00	242,802.00	3,393,984.00
TaxVest	01W015	11.64	Micon 65/13	60kW@30 MPH	194	194	194	194	107,436.00	1,090,909.00	741,782.00	326,422.00	2,206,549.00
Mountain View I	C2011	44.40	MWT-600	60kW@30 MPH	74	74	74	74	20,159,890.00	60,354,500.00	46,609,420.00	25,941,260.00	153,065,150.00
Venture Pacific - Viking 83/DR	01W014	1.56	Micon 65/13	60kW@30 MPH	26	26	26	26	121,288.00	1,196,579.00	945,318.00	210,119.00	2,473,304.00
Westwinds II - San Jacinto	6094	12.60	Micon 700	664kW@30 MPH	18	18	18	18	5,255,470.00	16,473,226.00	10,900,913.00	6,311,946.00	36,941,555.00
San Jacinto Power	6094	7.80	Vangrd 95T	195kW@30 MPH	13	13	13	13	454,063.00	1,670,197.00	1,063,689.50	534,147.00	3,722,096.50
Altech III/VPI Enterprises	6087	3.90	Micon 65/13	60kW@30 MPH	65	65	65	65	1,095,431.00	3,960,446.00	2,384,421.00	1,266,253.00	8,706,551.00
Westwinds II-Altech III	6087	8.83	Micon 700	631kW@30 MPH	14	14	14	14	4,191,641.00	13,612,414.00	9,178,921.00	5,036,037.00	32,019,013.00
Westwinds II - Windustries	6058	9.80	Micon 700	631kW@30 MPH	14	14	14	14	4,798,566.00	13,605,168.00	9,667,296.00	5,675,892.00	33,746,922.00
East Winds	6052	4.20	Micon 600	570kW@30 MPH	7	7	7	7	1,579,041.00	5,049,909.00	3,271,158.00	1,887,066.00	11,787,174.00
Westwinds II - Phoenix	6051	11.20	Micon 700	631kW@30 MPH	16	16	16	16	5,579,796.00	17,144,757.00	12,868,640.00	6,977,798.00	42,360,990.00
Dutch Energy	6095	9.42	Nedwind 40	471kW@30 MPH	20	20	20	20	2,825,365.00	10,145,968.00	5,496,135.00	2,929,414.00	21,396,882.00
Southern California Sunbelt Developers, Inc.													
Project Name	QFID	Net Cap Committed (MW)	Models	Wind Speed	# of Turbines Q1	# of Turbines Q2	# of Turbines Q3	# of Turbines Q4	Energy Produced in (kWh) Q1	Energy Produced in (kWh) Q2	Energy Produced in (kWh) Q3	Energy Produced in (kWh) Q4	Annual Energy Produced
Palm Springs Wind Park	6056	6.27	Windmatic 17's	95kW@34 MPH	66	66	66	66	1,327,773.00	4,480,331.00	2,134,901.00	1,379,629.00	9,322,634.00
Palm Springs Wind Park	6056	4.75	Windmatic 15's	65kW@31 MPH	73	73	73	73	1,125,355.00	3,940,897.00	1,902,831.00	1,244,707.00	8,213,590.00
Westwind Association													
Project Name	QFID	Net Cap Committed (MW)	Models	Wind Speed	# of Turbines Q1	# of Turbines Q2	# of Turbines Q3	# of Turbines Q4	Energy Produced in (kWh) Q1	Energy Produced in (kWh) Q2	Energy Produced in (kWh) Q3	Energy Produced in (kWh) Q4	Annual Energy Produced
Westwind Association Windpark	6096	1.40	Micon 108kW	108kW@33 MPH	13	13	13	13	363,641.30	1,073,760.00	557,862.50	370,593.80	2,365,877.60
Westwind Association Windpark	6096	2.99	Micon 65kW	65kW@33 MPH	46	46	46	46	1,114,931.40	3,039,110.60	1,767,786.20	1,214,609.50	7,136,436.70
Westwind Association Windpark	6096	9.24	Wincon XT 110kW	110kW@33 MPH	84	84	84	84	2,948,771.90	8,086,296.40	4,543,948.40	3,083,680.60	18,661,697.30
Westwind Association Windpark	6096	2.48	Wincon 106kW	106kW@33 MPH	23	23	23	23	523,137.90	1,548,789.00	851,419.50	559,788.60	3,483,135.00
Westwind Association Windpark	6096	0.85	Nordtank 65kW	65kW@34 MPH	13	13	13	13	348,275.50	933,460.00	557,092.40	374,343.50	2,213,171.40
Windpower Partners 1993 L.P.													
Project Name	QFID	Net Cap Committed (MW)	Models	Wind Speed	# of Turbines Q1	# of Turbines Q2	# of Turbines Q3	# of Turbines Q4	Energy Produced in (kWh) Q1	Energy Produced in (kWh) Q2	Energy Produced in (kWh) Q3	Energy Produced in (kWh) Q4	Annual Energy Produced
Carter/Triad Substation	6213	11.60	KYS-33	400kW@35 MPH	29	29	29	29	4,395,924.00	11,979,948.00	6,757,336.00	3,497,763.90	26,630,973.90
Buck Substation	6030	18.00	KYS-33	400kW@35 MPH	45	45	45	45	6,450,701.00	17,439,127.00	13,602,188.00	7,909,270.00	45,401,286.00
Whitewater Substation	6035	7.60	KYS-33	400kW@35 MPH	19	19	19	19	3,589,291.00	8,596,409.00	5,691,306.00	3,409,694.00	21,186,700.00
Aldrich Substation	6098	2.40	KYS-33	400kW@35 MPH	6	6	6	6	2,153,202.00	6,587,786.00	1,912,705.00	2,589,793.00	13,243,486.00
Aldrich Substation	6098	7.50	KenerTech 56-100	100kW@29 MPH	75	75	75	75	761,022.00	2,334,797.00	744,345.00	1,051,598.00	4,891,762.00
Riverview Substation	6118	6.40	KYS-33	400kW@35 MPH	16	16	16	16	3,069,353.00	8,029,173.00	5,936,711.00	3,167,090.00	20,202,327.00
													131,556,534.90

**Table 7-3
2002 Wind Project Performance Reporting Data (continued)**

Wintec	Project Name	GFID	Net Cap Committed (MW)	Models	Wind Speed	# of Turbines Q1	# of Turbines Q2	# of Turbines Q3	# of Turbines Q4	Energy Produced in (kWh) Q1	Energy Produced in (kWh) Q2	Energy Produced in (kWh) Q3	Energy Produced in (kWh) Q4	Annual Energy Produced
	Wintec I (171) WindPark	6213	0.04 AASI 40kW	40kW@30 MPH	1	1	1	1	1	9,760.10	17,779.70	10,128.60	1,742.80	39,411.20
	Wintec I (171) WindPark	6213	0.26 AASI 20kW	20kW@26 MPH	13	13	13	13	13	95,067.30	314,955.40	199,257.40	110,297.40	719,577.50
	Wintec I (171) WindPark	6213	1.27 Micon 55kW	65kW@34 MPH	23	23	23	23	23	580,864.56	1,756,387.59	1,131,103.87	661,510.22	4,119,866.24
	Wintec Palm WindPark	6213	0.98 Micon 55kW	65kW@34 MPH	18	18	18	18	18	454,589.64	1,374,564.21	885,211.73	509,877.58	3,224,243.16
	Wintec Palm WindPark	6213	0.26 Nordtank 65kW	65kW@34 MPH	4	4	4	4	4	1,117.26	3,426.37	2,340.31	1,371.36	8,255.30
	Wintec Cahulla Windpark	6213	4.88 Nordtank 65kW	65kW@34 MPH	72	72	72	72	72	2,121,684.04	6,506,674.53	4,444,249.49	2,604,225.54	15,676,633.60
	FAIL TO FILE													23,786,187.00
	Altamont-Mokway, Ltd													
	Buena Vista Energy, LLC													
	Donald R. Chenoweth LP Reinhard													
	Michael W. Stephens													
	Altamont Energy Corp													
	Patterson Pass Wind Farm LLC													
	Tres Vaqueros Wind Farms, LLC													
	Mogul Energy Corporation													
	Boxcar I Power Purchase Contract Trust													
	Windsong Energy													
	Zephyr Park, LTD													
	Windridge Incorporated													
	Boxcar II Power Purchase Contract Trst													
	Alta Mesa Pwr. Purch. Contract Trust													
	Oak Creek Energy Systems Inc.													

APPENDICES

Appendix A contains a list of turbine manufacturers and references to wind facilities using their model of turbines (referenced by QF numbers and CECID numbers).

Appendix B identifies sources of wind energy technical assistance available to California project proponents.

Appendix C contains the current WPRS data reporting template used by operators. This section will also be reserved for comments made by wind operators detailing maintenance and operation issues through the year.

Appendix D contains WPRS regulations that provide definitions for most wind categories used in this report.

APPENDIX A TURBINE MANUFACTURERS AND FACILITIES

**Table A-1
Turbine Manufacturers and Facilities**

Turbine Manufacturer	Country of Origin	Turbine Model	Project Operator Name	Qualifying Facility ID
ALASKA APPLIED	USA	AASI 40KW	WINTEC	6213
ALASKA APPLIED	USA	AASI 20KW	WINTEC	6213
AMERICAN M.A.N	GERMANY	AEROMAN	CORAM	6029
AMERICAN M.A.N	GERMANY	AEROMAN	CORAM	6055
AMERICAN M.A.N	GERMANY	AEROMAN	CORAM	6089
AMERICAN M.A.N	GERMANY	AEROMAN	CORAM	6029
BONUS	DENMARK	BONUS 65 KW	WINDLAND, INC.	6011
BONUS	DENMARK	BONUS 120	WINDLAND, INC.	6011
BONUS	DENMARK	BONUS 65 KW	EUI MANAGEMENT	6031
BONUS	DENMARK	BONUS 120	EUI MANAGEMENT	6031
BONUS	DENMARK	BONUS 250	EUI MANAGEMENT	6031
BONUS	DENMARK	BONUS 120	SAN GORGONIO FARMS, INC.	6064
BONUS	DENMARK	B-120	GREEN RIDGE	N/A
BONUS	DENMARK	BONUS 65 KW	SAN GORGONIO FARMS, INC.	6064
BONUS	DENMARK	BONUS 65 KW	SAN GORGONIO FARMS, INC.	6009
BONUS	DENMARK	BONUS 65/13	CALWIND ROSOURCES, INC.	6236
BONUS	DENMARK	BONUS 250	GREEN RIDGE	N/A
BONUS	DENMARK	BONUS 450	SAN GORGONIO FARMS, INC.	6064
BONUS	DENMARK	B-150	GREEN RIDGE	N/A
DANWIN	DENMARK	DANWIN 160 KW	ENXCO	6090
DANWIN	DENMARK	D-110	GREEN RIDGE	N/A
DANWIN	DENMARK	DANWIN 160	FPLE OPERATING SERVICES	6037
DELTA	UNKNOWN	DELTA 150	EUI MANAGEMENT	6031
ENERGY SCIENCES INC.	USA	ENERTECH 60	SEAWEST ENERGY GROUP	01W007
ENERTECH	USA	ETK 44/40	SEAWEST ENERGY GROUP	01W011
ENRON	USA	EW-750	ENRON	6004
FLOWIND	USA	F-17	GREEN RIDGE	N/A
FLOWIND	USA	F-19	GREEN RIDGE	N/A
GE	USA	GE 1.5 MW	SAN GORGONIO FARMS, INC.	6062
KENETECH	USA	KVS-33	FPLE OPERATING SERVICES	6098
KENETECH	USA	KVS-33	FPLE OPERATING SERVICES	6118
KENETECH	USA	KENETECH 56-100	FPLE OPERATING SERVICES	6098
KENETECH	USA	KVS-33	FPLE OPERATING SERVICES	6030
KENETECH	USA	KVS-33	FPLE OPERATING SERVICES	6213
KENETECH	USA	KCS-56	GREEN RIDGE	N/A
KENETECH	USA	KVS-33	GREEN RIDGE	N/A
KENETECH	USA	KVS-33	FPLE OPERATING SERVICES	6035
KENETECH	USA	KCS-56	GREEN RIDGE	N/A
KENETECH	USA	KVS-33	GREEN RIDGE	N/A
KENETECH	USA	KCS-56	GREEN RIDGE	N/A
mitsubishi	JAPAN	MWT-600	SEAWEST ENERGY GROUP	C2011
mitsubishi	JAPAN	MWT-600	SEAWEST ENERGY GROUP	C2012

Turbine Manufacturers and Facilities (continued)

Turbine Manufacturer	Country of Origin	Turbine Model	Project Operator Name	Qualifying Facility ID
MOERUP MANUF. CO.	DENMARK	MICON 65 KW	SEAWEST ENERGY GROUP	01W006
MOERUP MANUF. CO.	DENMARK	MICON 55KW	WINTEC	6213
MOERUP MANUF. CO.	DENMARK	MICON 65 KW	SAN GORGONIO FARMS, INC.	6064
MOERUP MANUF. CO.	DENMARK	MICON 108	FPLE OPERATING SERVICES	6057
MOERUP MANUF. CO.	DENMARK	MICON 55KW	WINTEC	6213
MOERUP MANUF. CO.	DENMARK	MICON 65 KW	WESTWIND ASSOCIATION	6096
MOERUP MANUF. CO.	DENMARK	MICON 108 KW	WESTWIND ASSOCIATION	6096
MOERUP MANUF. CO.	DENMARK	MICON 1500	OAK CREEK	6234
MOERUP MANUF. CO.	DENMARK	MICON 108	FPLE OPERATING SERVICES	6092
MOERUP MANUF. CO.	DENMARK	MICON 60 KW	SAN GORGONIO FARMS, INC.	6009
MOERUP MANUF. CO.	DENMARK	MICON 108 KW	FPLE OPERATING SERVICES	6024
MOERUP MANUF. CO.	DENMARK	MICON 250 KW	FPLE OPERATING SERVICES	6024
MOERUP MANUF. CO.	DENMARK	MICON 65 KW	ENXCO	6088
MOERUP MANUF. CO.	DENMARK	MICON 108 KW	ENXCO	6088
MOERUP MANUF. CO.	DENMARK	MICON 108 KW	ENXCO	6053
MOERUP MANUF. CO.	DENMARK	MICON 108 KW	ENXCO	6051
MOERUP MANUF. CO.	DENMARK	MICON 108 KW	FPLE OPERATING SERVICES	6091
MOERUP MANUF. CO.	DENMARK	MICON 108 KW	EUI MANAGEMENT	6031
MOERUP MANUF. CO.	DENMARK	MICON 65 KW	SEAWEST ENERGY GROUP	01W015
MOERUP MANUF. CO.	DENMARK	MICON 65 KW	SEAWEST ENERGY GROUP	01W014
MOERUP MANUF. CO.	DENMARK	MICON 900	INTERNATIONAL TURBINE	25W105
MOERUP MANUF. CO.	DENMARK	MICON 700	SEAWEST ENERGY GROUP	6058
MOERUP MANUF. CO.	DENMARK	MICON 600	SEAWEST ENERGY GROUP	6052
MOERUP MANUF. CO.	DENMARK	MICON 700	SEAWEST ENERGY GROUP	6094
MOERUP MANUF. CO.	DENMARK	MICON 108	SEAWEST ENERGY GROUP	6087
MOERUP MANUF. CO.	DENMARK	MICON 65 KW	SEAWEST ENERGY GROUP	6087
MOERUP MANUF. CO.	DENMARK	MICON 700	SEAWEST ENERGY GROUP	6087
MOERUP MANUF. CO.	DENMARK	MICON 700	SEAWEST ENERGY GROUP	6051
MOERUP MANUF. CO.	DENMARK	MICON 65 KW	SEAWEST ENERGY GROUP	01W006
NAGASAKI	JAPAN	MHI 250	FPLE OPERATING SERVICES	6114
NAGASAKI	JAPAN	MHI 600	FPLE OPERATING SERVICES	6114
NAGASAKI	JAPAN	MHI 250	FPLE OPERATING SERVICES	6063
NAGASAKI	JAPAN	MHI 600	FPLE OPERATING SERVICES	6037
NAGASAKI	JAPAN	MHI 250	FPLE OPERATING SERVICES	6113
NAGASAKI	JAPAN	MHI 600	FPLE OPERATING SERVICES	6063
NEDWIND	NETHERLAND	NEDWIND 40	SEAWEST ENERGY GROUP	6095
NEG MICON	DENMARK	NM72C	OAK CREEK	6234
NEG MICON	DENMARK	NM700/48	OAK CREEK	6019
NEG MICON	DENMARK	NEG MICON 700	FPLE OPERATING SERVICES	6057
NEG MICON	DENMARK	NEG MICON 700	FPLE OPERATING SERVICES	6091
NEG MICON	DENMARK	NM700/48	OAK CREEK	6234
NEG MICON	DENMARK	NM800/54	OAK CREEK	6234
NEG MICON	DENMARK	NM800/52	OAK CREEK	6234
NORDEX	GERMANY	NORDEX 1000	EUI MANAGEMENT	6031
NORDTANK	DENMARK	NORDTANK 75	FPLE OPERATING SERVICES	6024
NORDTANK	DENMARK	NORDTANK 65/13	CALWIND ROSOURCES, INC.	6060
NORDTANK	DENMARK	NORDTANK 150 KW	FPLE OPERATING SERVICES	6024
NORDTANK	DENMARK	NORDTANK 65KW	NORTHWIND	01W095
NORDTANK	DENMARK	NORDTANK 65KW	WINTEC	6213
NORDTANK	DENMARK	NORDTANK 65KW	WINTEC	6213
NORDTANK	DENMARK	NORDTANK 65KW	WESTWIND ASSOCIATION	6096
NORDTANK	DENMARK	NORDTANK 65KW	INTERNATIONAL TURBINE	25W105
NORDTANK	DENMARK	NORDTANK 500	INTERNATIONAL TURBINE	25W105

Turbine Manufacturers and Facilities (continued)

Turbine Manufacturer	Country of Origin	Turbine Model	Project Operator Name	Qualifying Facility ID
OAK CREEK	USA	P0 OAK 7F	OAK CREEK	6012
OAK CREEK	USA	P0 OAK 9S	OAK CREEK	6012
OAK CREEK	USA	P0 OAK 9F	OAK CREEK	6012
OAK CREEK	USA	P0 OAK 9	OAK CREEK	6234
OAK CREEK	USA	P0 OAK 7S	OAK CREEK	6012
VANGUARD	USA	VANGRD 95T	SEAWEST ENERGY GROUP	6094
VESTAS	DENMARK	VESTAS V-17	ENRON	6105
VESTAS	DENMARK	VESTAS V-15	ENRON	6043
VESTAS	DENMARK	VESTAS V-17	ENRON	6044
VESTAS	DENMARK	VESTAS V-27	ENRON	6102
VESTAS	DENMARK	VESTAS V-27	ENRON	6103
VESTAS	DENMARK	VESTAS V-27	ENRON	6104
VESTAS	DENMARK	VESTAS V-17E	ENRON	6107
VESTAS	DENMARK	VESTAS V-17	ENRON	6043
VESTAS	DENMARK	VESTAS V-17	ENRON	6106
VESTAS	DENMARK	VESTAS V-25	WINDLAND, INC.	6011
VESTAS	DENMARK	VESTAS V-15	ENRON	6106
VESTAS	DENMARK	VESTAS V-15	ENRON	6107
VESTAS	DENMARK	VESTAS V-15	ENRON	6042
VESTAS	DENMARK	VESTAS V-17	ENRON	6042
VESTAS	DENMARK	VESTAS V-15	ENRON	6041
VESTAS	DENMARK	VESTAS V-17	ENRON	6041
VESTAS	DENMARK	VESTAS V-17	ENRON	6107
VESTAS	DENMARK	VESTAS V-15	ENRON	6039
VESTAS	DENMARK	VESTAS V-17E	ENRON	6111
VESTAS	DENMARK	VESTAS V-27	ENXCO	6090
VESTAS	DENMARK	VESTAS V-17	ENRON	01W017
VESTAS	DENMARK	VESTAS V-47	CALWIND ROSOURCES, INC.	6236
VESTAS	DENMARK	VESTAS V-25	WINDLAND, INC.	6097
VESTAS	DENMARK	VESTAS V-27	WINDLAND, INC.	6097
VESTAS	DENMARK	VESTAS V-15	ENRON	6040
VESTAS	DENMARK	VESTAS V-17	INTERNATIONAL TURBINE	25W105
VESTAS	DENMARK	VESTAS V-27	AB ENERGY	6089
VESTAS	DENMARK	VESTAS V-47	SEAWEST ENERGY GROUP	C3031
VESTAS	DENMARK	VESTAS V-39	FPLE OPERATING SERVICES	6092
VESTAS	DENMARK	VESTAS V-47	FPLE OPERATING SERVICES	6092
VESTAS	DENMARK	VESTAS V-39	SAN GORGONIO FARMS, INC.	6062
VESTAS	DENMARK	VESTAS V-39	SAN GORGONIO FARMS, INC.	6064
VESTAS	DENMARK	VESTAS V-15	ENRON	6111
VESTAS	DENMARK	VESTAS V-47	FPLE OPERATING SERVICES	6024
VESTAS	DENMARK	VESTAS V-27	ENRON	6107
VESTAS	DENMARK	VESTAS V-27	WINDLAND, INC.	6011
VESTAS	DENMARK	VESTAS V-15	ENRON	6112
VESTAS	DENMARK	VESTAS V-17	ENRON	6108
VESTAS	DENMARK	VESTAS V-17E	INTERNATIONAL TURBINE	25W105
VESTAS	DENMARK	VESTAS V-17	ENRON	6111
VESTAS	DENMARK	VESTAS V-80	FPLE OPERATING SERVICES	C4032
VESTAS	DENMARK	VESTAS V-17	ENRON	6112
VESTAS	DENMARK	VESTAS V-15	ENRON	6007
VESTAS	DENMARK	VESTAS V-27	ENRON	6065
VESTAS	DENMARK	VESTAS V-27	ENRON	6066
VESTAS	DENMARK	VESTAS V-27	ENRON	6067
VESTAS	DENMARK	VESTAS V-30	WINDLAND, INC.	6011

Turbine Manufacturers and Facilities (continued)

Turbine Manufacturer	Country of Origin	Turbine Model	Project Operator Name	Qualifying Facility ID
WINCON	USA	WINCON 200	INTERNATIONAL TURBINE	25W105
WINCON	USA	WINCON XT 110KW	WESTWIND ASSOCIATION	6096
WINCON	USA	WINCON W99XT	INTERNATIONAL TURBINE	25W105
WINCON	USA	WINCON 108KW	WESTWIND ASSOCIATION	6096
WIND ENERGY GROUP	ENGLAND	WEG-250	GREEN RIDGE	N/A
WINDANE	DENMARK	DWT WINDANE 34	SAN GORGONIO FARMS, INC.	6064
WINDMATIC	DENMARK	WINDMATIC	SEAWEST ENERGY GROUP	01W012
WINDMATIC	DENMARK	WINDMATIC 15S	SOUTHERN CALIFORNIA	6056
WINDMATIC	DENMARK	WINDMATIC 17S	SOUTHERN CALIFORNIA	6056
WINDMATIC	DENMARK	WINDMATIC 15S	SEAWEST ENERGY GROUP	6094

APPENDIX B SOURCES OF WIND ENERGY TECHNICAL ASSISTANCE/INFORMATION

California Energy Commission:

Elaine Sison-Lebrilla
PIER Renewables Program Manager
Research & Development
1516 Ninth St., MS-43
Sacramento, CA 95814
(916) 653-0363

Tim Olson
International Program Manger
Energy Technology Export Program
1516 Ninth St., MS-45
Sacramento, CA 95814
(916) 654-4528

Rick York
Biological & Cultural Resources Unit
1516 Ninth St., MS-40
Sacramento, CA 95814
(916) 654-3945

News media, please contact:
Claudia Chandler
Assistant Executive Director
Media and Public Communications Office
(916) 654-4989
[\[www.energy.ca.gov\]](http://www.energy.ca.gov)

National Resources:

Electric Power Research Institute
(EPRI)
Wind Power Integration
3412 Hillview Avenue
Palo Alto, CA 94304
(650) 855-2121
[\[www.epri.com\]](http://www.epri.com)

American Wind Energy Association
(AWEA)
122 C Street, NW, 4th Floor
Washington, DC 20001
Main: (202) 383-2500
[\[www.awea.org\]](http://www.awea.org)

U.S. Department of Energy
(DOE)
1000 Independence Ave., SW
Washington, DC 20585
(202) 586-1995
[\[www.eren.doe.gov/wind\]](http://www.eren.doe.gov/wind)

Sandia National Laboratories
(SNL)
P.O. Box 5800, MS-0708
Albuquerque, NM 87185-0708
(505) 844-5253
[\[www.sandia.gov\]](http://www.sandia.gov)

California Wind Energy Collaborative
(CWEC)
Cornelis van Dam
University of California at Davis
One Shields Avenue
Davis, CA 95616
(530) 752-7741
[\[cwec.ucdavis.edu\]](http://cwec.ucdavis.edu)

APPENDIX D WPRS REGULATIONS

REGULATIONS
CALIFORNIA ADMINISTRATIVE CODE
TITLE 20, CHAPTER 2, SUBCHAPTER 3, ARTICLE 4

WIND PROJECT PERFORMANCE REPORTING SYSTEM

Adopted
November 28, 1984

1381 Title and Purpose

The purpose of this article is to specify performance reporting requirements for operators of specified wind energy projects and for entities which purchase electricity from the projects and to identify requirements for the Energy Commission to publish the information.

Authority cited: Sections 25213 and 25218 (e), Public Resources Code Reference: Sections 25216.5 (d), 25601 (c), and 25605, Public Resources Code.

1382 Definitions

For the purposes of this article, the following definitions shall apply unless the Energy Commission has clearly indicated otherwise in these regulations:

- (a) “Contingency Costs”: costs which may be paid by investors after the initial investment, but which are not paid out of project revenues. Contingency costs may include such costs as turbine repairs or annual insurance fees paid during the reporting year.
- (b) “Cumulative Number of Turbines Installed”: cumulative total number of turbines of a given model installed by the end of the reporting period.
- (c) “Electricity Produced (kWh)”: total kilowatt hours actually produced by all of the turbines of a particular turbine model contained within the wind project where the electricity is delivered to a wind power purchaser for sale during the reporting period.

- (d) “Name of Wind Project”: name used for the project in any prospectus, offering memorandum, or sales literature.
- (e) “Number of Turbines Installed During Reporting Period”: number of additional turbines installed during the calendar quarter of the reporting period.

[Projected information currently not tracked. Items (f)-(h) do not apply for current report]

- (f) *“Project Cost”: total cost of the turbines installed during the reporting period. Project cost includes all debt and equity investment in the project (including non-recourse notes) and should be comparable to the project cost shown in the offering memorandum, prospectus or sales literature published by the developer.*
- (g) *“Projected Annual Production Per Turbine (kWh)”: annual average kWh production, by model, predicted by the developer in its prospectus, offering memorandum, or sales literature. This figure may be revised annually prior to the first reporting quarter of each year and shall be based upon average site specific wind distributions and the wind turbine power curves.*
- (h) *“Projected Quarterly Production Per Turbines (kWh)”: the quarterly breakdown of the Projected Annual Production Per Turbine.*
- (i) “Rotor (M²)”: rotor swept area in square meters for each turbine model.
- (j) “Size (kW)”: the turbine manufacturer’s published power rating in kW for a given wind speed in mile per hour (mph).
- (k) “Turbine Model”: manufacturer’s name or commonly used term for the model of a specific rotor (M²) and size (kW).
- (l) “Wind Power Purchaser”: any electricity utility or other entity that purchases electricity from a wind project, as defined in this section.
- (m) “Wind Project”: one or more wind turbine generators installed in California with a combined rated capacity of 100 kW or more, the electricity from which is sold to another party.
- (n) “Wind Project Operator”: any developer or operator who directly receives payments for electricity from the wind power purchaser.

Authority cited: Sections 25213 and 25218 (e), Public Resources Code Reference: Sections 25216.5 (d), 25601 (c), and 25605, Public Resources Code.

1383 Reporting Period

For the purpose of this article, and unless otherwise indicated, the reporting period shall be *each calendar quarter*, beginning with the first quarter following the effective date of this article. Quarterly reports filed pursuant to this article shall be submitted not later than the *forty-fifth day* following the close of each reporting period. Reports shall be deemed submitted as of the date of postmark, provided that the report is properly and legibly completed.

Authority cited: Sections 25213 and 25218 (e), Public Resources Code Reference: Sections 25216.5 (d), 25601 (c), and 25605, Public Resources Code.

1384 Requirements to File

The information required by this article shall be submitted to the Energy Commission by wind project operators and wind power purchasers. Reports shall be made on forms prescribed by order of the Energy Commission and according to instructions accompanying the forms. A copy of the wind project prospectus, offering memorandum, and other sales literature shall accompany the initial report. All reports must be verified by a responsible official of the firm filing the report. Requests for confidentiality may be filed pursuant to 20 Cal. Admin. Code Section 2501 et. seq.

Authority cited: Sections 25213 and 25218 (e), Public Resources Code Reference: Sections 25216.5 (d), 25601 (c), and 25605, Public Resources Code.

1385 Information Requirements: Wind Project Operators

Each operator firm submitting information pursuant to the provisions of the article shall include the following:

- (1) Name of wind project
- (2) Name and address of operator
- (3) Name and phone number of contact person at operator's firm
- (4) Operator's name as shown on power purchase contract (if different than 2 above)
- (5) Name of wind power purchaser
- (6) Purchase contract number
- (7) Resource area and county
- (8) Dates of reporting period
- (9) Turbine model
- (10) Cumulative number of turbines installed
- (11) Number of turbines installed during reporting period
- (12) Rotor (M²)
- (13) Size (kW) at stated wind speed

- (14) Project cost
- (15) Additional project contingency costs for which investors may be responsible
- (16) Projected quarterly production per turbine (kWh)
- (17) Projected annual production per turbine (kWh)
- (18) Electricity produced (kWh)
- (19) Turbine manufacturer's name and address
- (20) Operator comments, if any

Authority cited: Sections 25213 and 25218 (e), Public Resources Code Reference: Sections 25216.5 (d), 25601 (c), and 25605, Public Resources Code.

1386 Information Requirement: Wind Power Purchase

Each wind power purchaser submitting information pursuant to the provisions of this article shall include the following:

- (1) Name of purchaser's firm
- (2) Name and phone number of contact person at purchaser's firm
- (3) Date of report
- (4) Name of wind project operator
- (5) Number of contract with wind project operator
- (6) kWh produced during reporting period
- (7) Dates of reporting period
- (8) The maximum MW which the operator can deliver to the purchaser as specified in the power sales agreement
- (9) Purchaser comments, if any

Authority cited: Sections 25213 and 25218 (e), Public Resources Code Reference: Sections 25216.5 (d), 25601 (c), and 25605, Public Resources Code.

1387 Publication of Data

The Energy Commission staff shall compile and distribute, on a quarterly basis, the information reported by wind project operators and purchasers. Cost data will be published by the Energy Commission in an aggregated form to the extent necessary to assure confidentiality. The final publication of each year shall combine the performance data for that year. The publication shall designate the name of any wind project operator from whom performance data is not received.

Authority cited: Sections 25213 and 25218 (e), Public Resources Code Reference: Sections 25216.5 (d), 25601 (c), and 25605, Public Resources Code.

1388 Failure to Provide Information

The Energy Commission may, after notifying any person of the failure to provide information pursuant to this article, take such action to secure the information as is authorized by any provision of law, including, but not limited to, Public Resources Code section 25900.

Authority cited: Sections 25213 and 25218 (e), Public Resources Code Reference: Sections 25216.5 (d), 25601 (c), and 25605 (e), and 25900, Public Resources Code.

1389 Exemptions

Operators of wind projects of less than 100 kW rated capacity or operators who do not offer electricity for sale are exempt from this article.

Authority cited: Sections 25213 and 25218 (e), Public Resources Code Reference: Sections 25216.5 (d), 25601 (c), and 25605, Public Resources Code