Proposed Ocotillo Wind Mill Project

I am an a Aerospace Quality Control Engineer Responsible for developing Quality Control inspection programs to inspect aircraft flight hardware.

I'm not a Meteorologist but my findings are In-Line with Patterns ERI report data → 8.8 mph - 10.7 mph

In my wind study I have always said that the wind speeds in Ocotillo are NOT suitable for wind turbine generators.

Based on my findings, I see the average wind speeds to be around 8.9 mph, this was published by IV Press at a Jack Terrazas town meeting in Ocotillo back in Sept of 2011.
http://www.ivpressonline.com/news/ivp-news-ocotillo-residents-sound-off-on-wind-energy-project-20110918,0,2748542.story

Ocotillo Wind

Fact Sheet / March 2012

Location	Ocotillo, Imperial County, California
Number of Turbines	112
Project Capacity	Approximately 300 MW
Power Equivalent	140,000 homes
Target Construction Start	May 2012
Target Operation Start	December 2012
Permanent Jobs	Approximately 20
Construction Jobs	Up to 350
Construction Contractor	Blattner Energy
Estimated Tax Revenue	Approximately $5 million per year

The electricity produced annually by the Ocotillo wind project will offset more than 400,000 tons of carbon dioxide, equal to the annual emissions of 65,000 cars, and conserve more than 147,000,000 gallons of water each year, enough to supply 4,500 people with freshwater each day. - *Source: AWEA*

Pattern is proud to become part of the Imperial Valley. Our Ocotillo Wind project is an investment in the region that will create many economic benefits, including the creation of construction and ongoing permanent employment positions, substantial growth in the property tax base, and the economic ripple effect resulting from the project.

Pattern is focused on being a responsible community partner by respecting the land, its resources and the people of the Imperial Valley. We have made contributions to the IV Desert Museum, IV Food Bank, Westside School, Ocotillo Community Park and Ocotillo Optimists' Club, and we will continue to partner on causes important to the community.

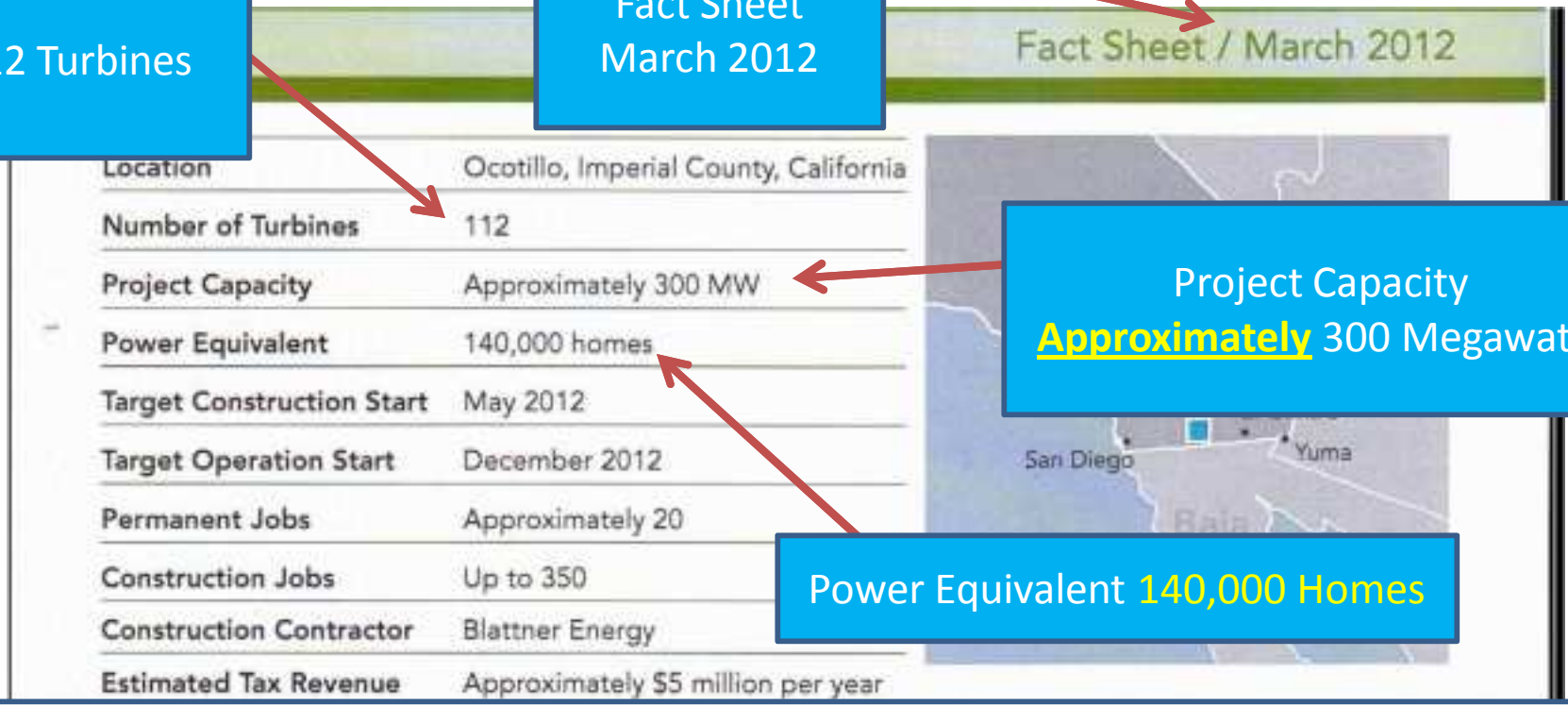
The Ocotillo Wind project will be located on 12,436 acres of public lands administered by the BLM, with a small portion on lands under the jurisdiction of Imperial County. Once complete, the permanent footprint will be approximately 120 acres, or less than 1% of the total project area, preserving the overwhelming majority of the land in its natural state and allowing the project infrastructure to be sited in areas that do not directly impact cultural resources.

The development phase of the Ocotillo Wind project is nearing completion and the permit is expected to be before the Imperial County Planning Commission and the Board of Supervisors as early as March. With your support, Pattern's Ocotillo Wind project will be the first of its kind in the Imperial Valley and begin harnessing the wind by the end of 2012.

Pattern

112 Turbines

Fact Sheet
March 2012



Project Capacity
Approximately 300 Megawatts

Power Equivalent 140,000 Homes

Simple Math:

300mw divided by 112 Turbines = 2.67mw per Turbine

This would require approximately 28 mph constant wind speeds in order to produce 300 Megawatts with 112 Turbines

In order to Power 140,000 homes would require constant wind at 28 mph 24/7

The Fact is, Average Winds Speed in Ocotillo are approx. 10 mph

112 Turbines

Fact Sheet
March 2012

Project Capacity
Approximately 300 Megawatts

Homes

MISLEADING
INFORMATION!

300 ... s = ... mw per Turbine

This would ... e approximately 28 mph constant wind speeds in order to produce 300 Megawatts with 112 Turbines

In order to Power 140,000 homes would require constant wind at 28 mph 24/7

The Fact is, Average Winds Speed in Ocotillo are approx.10 mph

Pattern told us this was the Wind Turbine Model number they were going to use

Siemens Wind Turbine SWT-2.3-101

- Description
- Technical Specification
- Design

This Model produces ***up to*** 2.3 mw

High availability

Currently, the Siemens fleet of 2.3 MW wind turbines sets the industry standard for availability. The SWT-2.3-101 will build on the reputation for reliability that the market has come to expect from a Siemens turbine.

Harvest more energy from sites with low and medium wind speeds

The Siemens SWT-2.3-101 turbine delivers unparalleled performance and reliability, making it especially suited to areas with low to medium wind speeds.

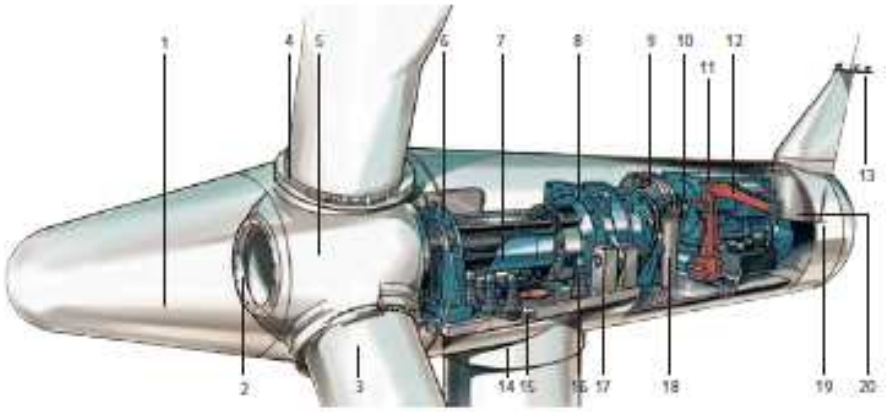
The best-in-class turbine offers low energy production costs, as availability of Siemens' 2.3 product family is among the highest in the industry. The 101 meter rotor is specifically designed to optimize the energy returns in areas with limited wind speeds. The turbine is also ideal for all types of grid connections, as it offers the best support for grid connections in all major markets.

Designed to last

The SWT-2.3-101 is designed to last. The robust and reliable design offers a high yield with low maintenance costs. The turbine is backed by advanced condition monitoring and diagnostics, which constantly examine the turbine. Any change in a turbine's performance is dealt with immediately by an experienced after-sales service team.

Source: http://www.energy.siemens.com/br/en/power-generation/renewables/wind-power/wind-turbines/swt-2-3101.htm

Technical specifications

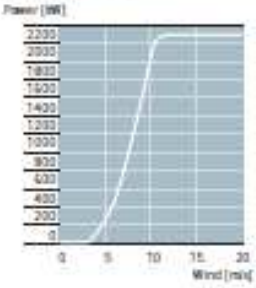


Rotor	
Diameter	101 m
Swept area	8,000 m2
Rotor speed	6-16 rpm
Power regulation	Pitch regulation with variable speed
Blades	
Type	B49
Length	49 m
Aerodynamic brake	
Type	Full-span pitching
Activation	Active, hydraulic
Transmission system	
Gearbox type	3-stage planetary/helical
Gearbox ratio	1:91
Gearbox oil filtering	Inline and offline
Gearbox cooling	Separate oil cooler
Oil volume	Approximately 400 l
Mechanical brake	
Type	Hydraulic disc brake
Generator	
Type	Asynchronous
Nominal power	2,300 kW
Voltage	690 V
Cooling system	Integrated heat exchanger

Yaw system	
Type	Active
Monitoring system	
SCADA system	WebWPS
Remote control	Full turbine control
Tower	
Type	Cylindrical and/or tapered tubular
Hub height	80 m or site-specific
Operational data	
Cut-in wind speed	3-4 m/s
Rated power at	12-13 m/s
Cut-out wind speed	25 m/s
Maximum 3 s gust	55 m/s (standard version) 60 m/s (IEC version)
Weights	
Rotor	62 tons
Nacelle	82 tons
Tower for 80-m hub height	162 tons

Sales power curve

The calculated power curve data are valid for standard conditions of 15 degrees Celsius air temperature, 1013 hPa air pressure and 1.225 kg/m³ air density, clean rotor blades and horizontal, undisturbed air flow. The calculated curve data are preliminary.



Nacelle arrangement

1. Spinner
2. Spinner bracket
3. Blade
4. Pitch bearing
5. Rotor hub
6. Main bearing
7. Main shaft
8. Gearbox
9. Brake disc
10. Coupling
11. Generator
12. Service crane
13. Meteorological sensors
14. Tower
15. Yaw ring
16. Yaw gear
17. Nacelle baseplate
18. Oil filter
19. Canopy
20. Generator fan

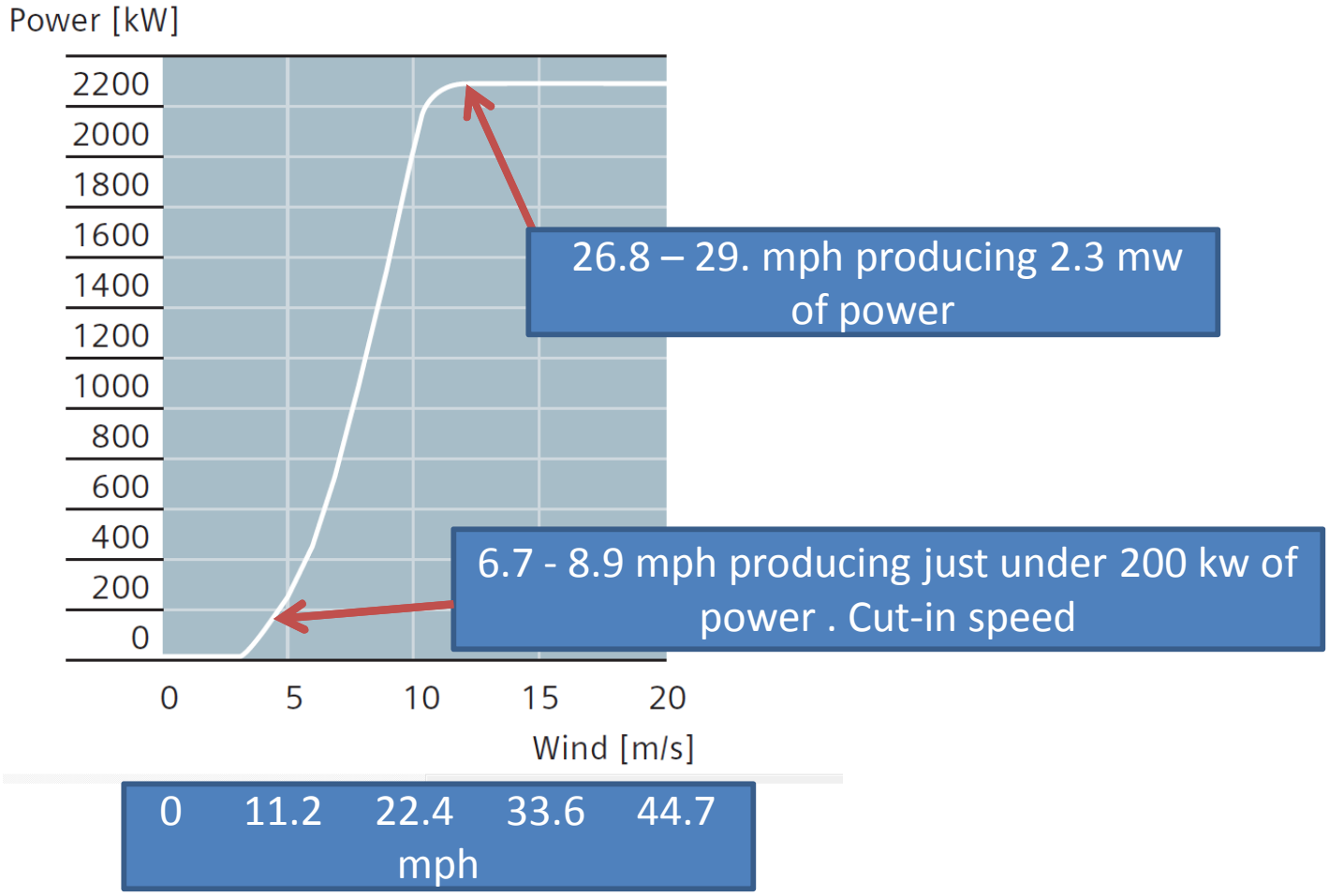
http://www.energy.siemens.com/hq/pool/hq/power-generation/wind-power/E50001-W310-A121-X-4A00_WS_SWT-2.3-101_US_1009.pdf

Siemens SWT-2.3-101 Specification data

Operational data	
Cut-in wind speed	3-4 m/s
Rated power at	12-13 m/s
Cut-out wind speed	25 m/s
Maximum 3 s gust	55 m/s (standard version) 60 m/s (IEC version)

←6.7 - 8.9 mph

← 26.8 - 29.1 mph



Pattern says they have wind speed data from the MET towers for the last 2 years

I asked Pattern if I could get a copy of the Wind Speed data and Pattern told me no, it's **COMPETION SENSITIVE** and the only way they could let me see the data was if I signed a **confidentiality agreement**

With out having Pattern's data, I did my wind study based on the data from a weather station located in Ocotillo which is located on a existing power tower just south of S2 at 695 feet of elevation:

Website:
http://www.wunderground.com/weatherstation/WXDailyHistory.asp?ID=MIMPSD


09/06/2011

Pattern's reply to my Wind Speed Study

The weather station relied on by the commenter is located on a large lattice-tower type transmission pole. It appears the anemometer is placed approximately 5 feet from the supporting structure, and is located on the east/northeast side of the tower, and is thus downwind of the tower itself. It has been demonstrated through research and recommended by the International Electrotechnical Commission that anemometers must be placed at least 5 – 7 tower diameters away from the supporting structure to prevent significant wind flow distortion, and should be oriented so the instruments are not downwind of the tower. This deployment criterion is a standard in the wind energy business and ensures proper free stream wind measurements used in financeable wind resource reports.

Additionally, it appears the anemometer is no more than 20 feet above the ground level. The turbines proposed at the wind farm would be approximately 260 feet at hub height, and over 400 feet at blade tip. Due to the fact that wind generally increases with increasing height due to less frictional effects from the ground, the wind speeds reported in the comment are biased low compared to the hub height wind data used for wind energy production projections.

Lastly, the weather station data collected and analyzed by the commenter is from a station located less than 2/3 mile northeast of Sugarloaf Mountain. Because winds in this area are predominantly from the southwest, the presence of this large topographic feature upwind of the weather station may distort the wind flow during certain times by creating a wind break, thus causing lower winds speeds on its downwind side, where the weather station relied on by the commenter is located.

Basically Pattern has discredited my data for the following 3 reasons

1) The distance relationship of anemometers to the tower
2) The height of the anemometer to ground level
3) Sugarloaf mountain distorting the wind or causing a wind break

The weather station relied on by the commenter is located on a large lattice-tower type transmission pole. It appears the anemometer is placed approximately 5 feet from the supporting structure, and is located on the east/northeast side of the tower, and is thus downwind of the tower itself. It has been demonstrated through research and recommended by the International Electrotechnical Commission that anemometers must be placed at least 5 – 7 tower diameters away from the supporting structure to prevent significant wind flow distortion, and should be oriented so the instruments are not downwind of the tower. This deployment criterion is a standard in the wind energy business and ensures proper free stream wind measurements used in financeable wind resource reports. 1

Additionally, it appears the anemometer is no more than 20 feet above the ground level. The turbines proposed at the wind farm would be approximately 260 feet at hub height, and over 400 feet at blade tip. Due to the fact that wind generally increases with increasing height due to less frictional effects from the ground, the wind speeds reported in the comment are biased low compared to the hub height wind data used for wind energy production projections. 2

Lastly, the weather station data collected and analyzed by the commenter is from a station located less than 2/3 mile northeast of Sugarloaf Mountain. Because winds in this area are predominantly from the southwest, the presence of this large topographic feature upwind of the weather station may distort the wind flow during certain times by creating a wind break, thus causing lower winds speeds on its downwind side, where the weather station relied on by the commenter is located. 3

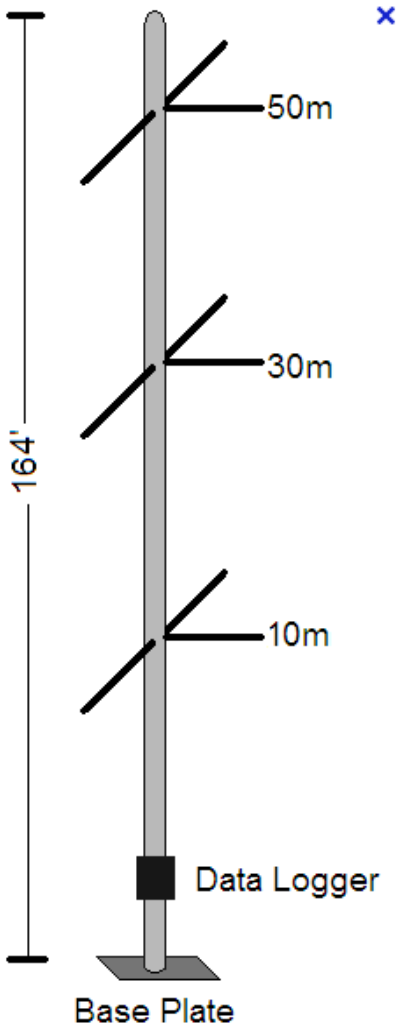
Pattern indicates that the height of the weather station I used was not high enough (20 feet) above ground level
based on the fact that the hub of the WIND TURBINE GENERATORs would be 260 feet above ground level

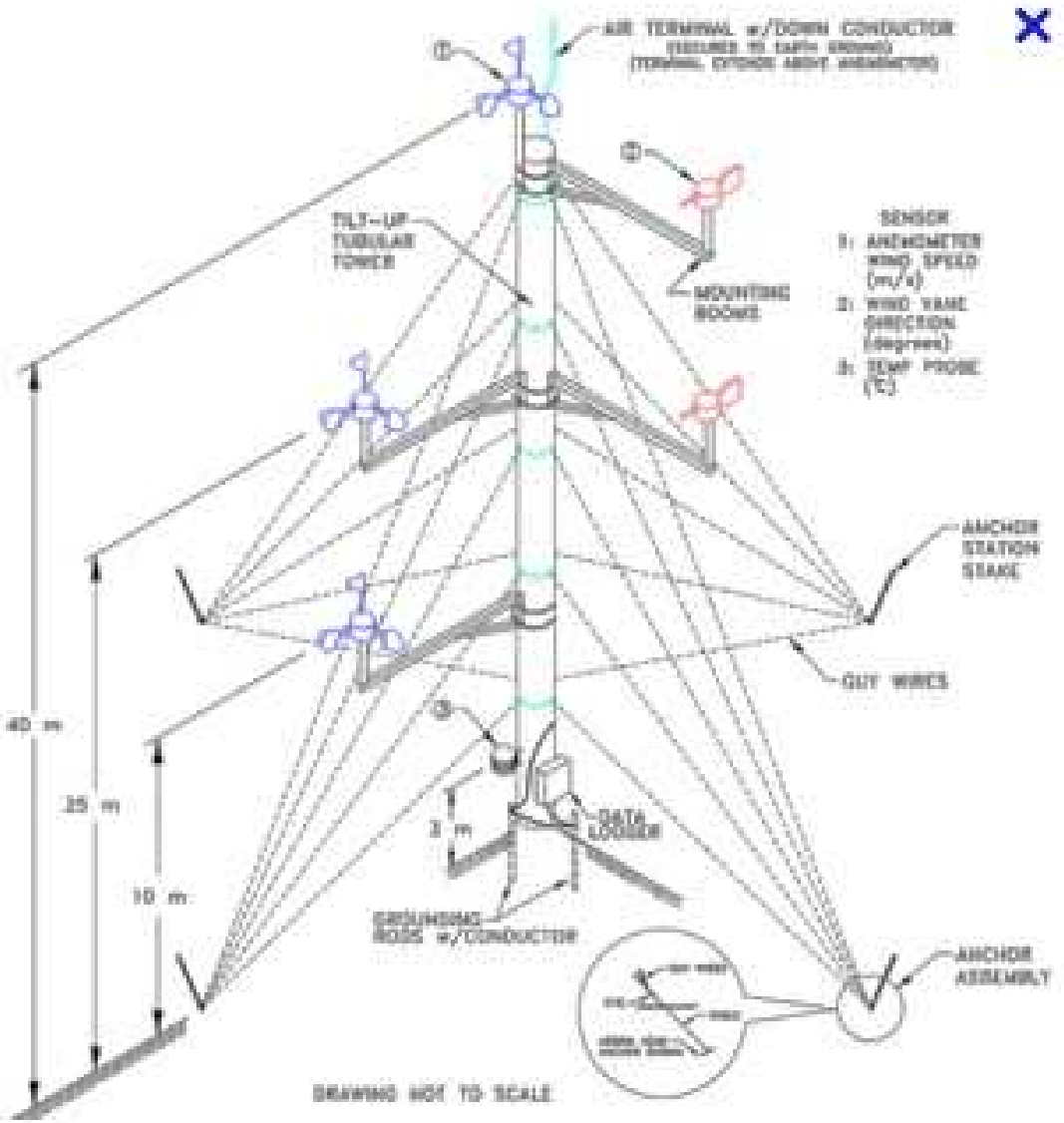
tower diameters away from the supporting structure to prevent significant wind flow distortion, and should be oriented so the instruments are not downwind of the tower. This deployment criterion is a standard in the wind energy business and ensures proper free stream wind measurements used in financeable wind resource reports.

Additionally, it appears the anemometer is no more than 20 feet above the ground level. The turbines proposed at the wind farm would be approximately 260 feet at hub height, and over 400 feet at blade tip. Due to the fact that wind generally increases with increasing height due to less frictional effects from the ground, the wind speeds reported in the comment are biased low compared to the hub height wind data used for wind energy production projections.

Pattern states that their wind speeds are measured at 10 meters in height which is equal to 32 feet above ground level. Additionally as they have stated that it's 260 feet to the hub height and over 400 feet to the blade tip, their wind data is NOT anywhere near the blade sweep area in which they have discredited my data for this very issue.

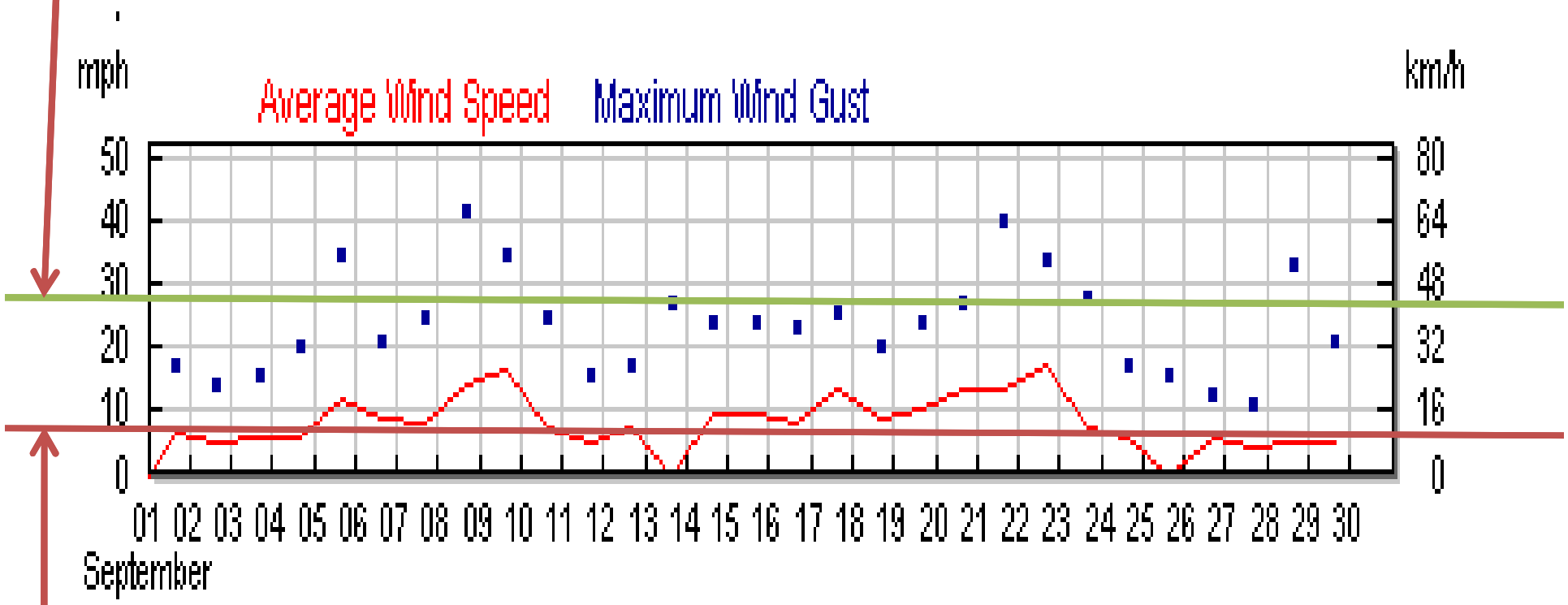
wind speed of 10.7 miles per hour at a 10-meter height and that the wind direction frequency for winds from the southwest and west southwest occur approximately half of the time.


164'
50m
30m
10m
Data Logger
Base Plate


AIR TERMINAL w/DOWN CONDUCTOR
TILT-UP TUBULAR TOWER
MOUNTING BOOMS
SENSOR
1: ANEMOMETER WIND SPEED (m/s)
2: WIND VANE DIRECTION (degrees)
3: TEMP PROBE (°C)
ANCHOR STATION STAKE
GUY WIRES
40 m
35 m
10 m
3 m
DATA LOGGER
GROUNDING BOSS w/CONDUCTOR
ANCHOR ASSEMBLY
DRAWING NOT TO SCALE

Max Capacity
23,000,000 Watts at 28mph wind speed
(2.3mw)

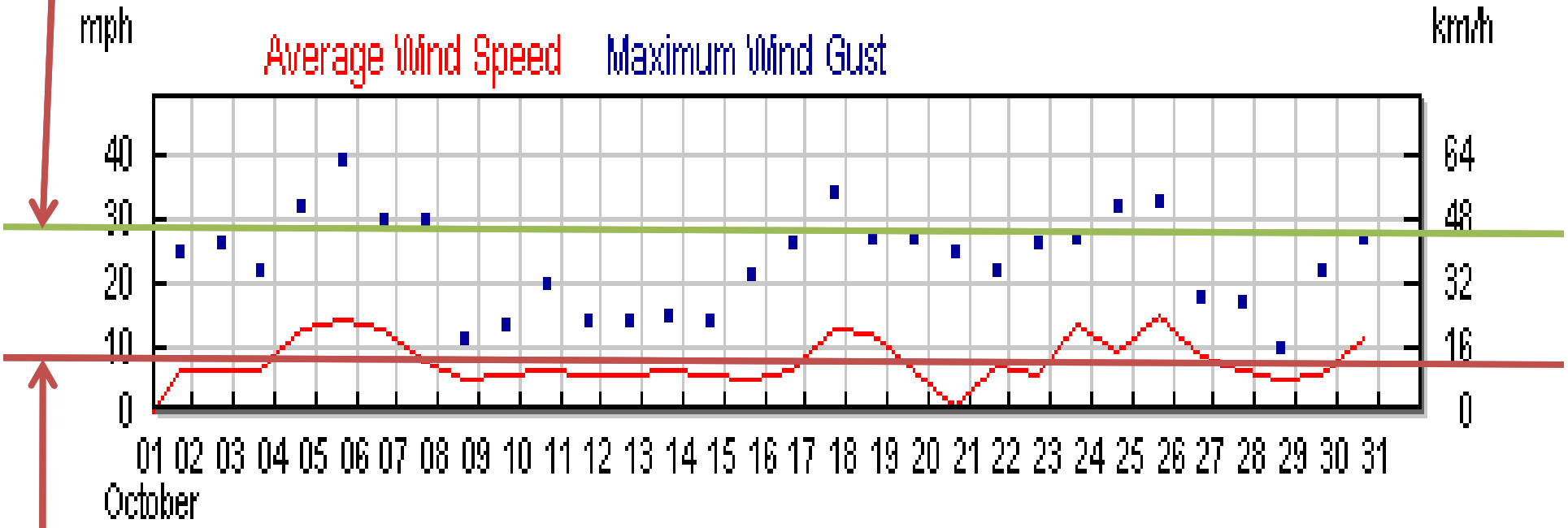
Average Wind Speed for Sept. 2010
7.9 mph



200,000 Watts at 6.7 - 8.9 mph wind speed.
Cut-in speed (200kw)

Max Capacity
23,000,000 Watts at 28mph wind speed
(2.3mw)

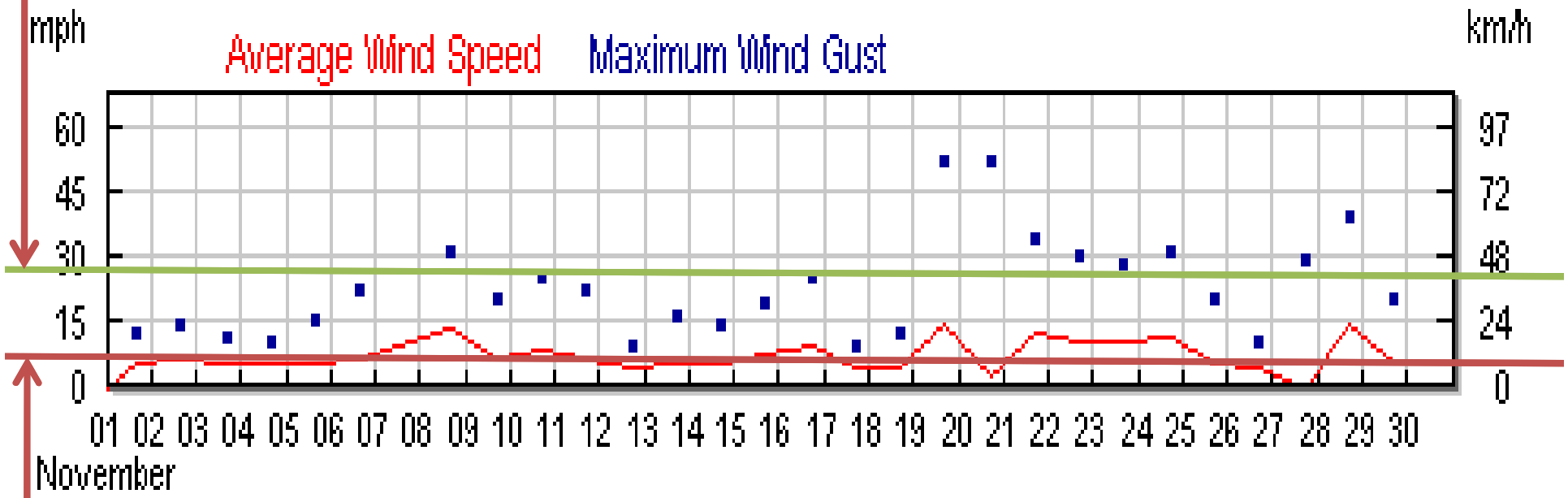
Average Wind Speed for Oct. 2010
7.6 mph



200,000 Watts at 6.7 - 8.9 mph wind speed
Cut-in speed (200kw)

Max Capacity
23,000,000 Watts at 28mph wind speed
(2.3mw)

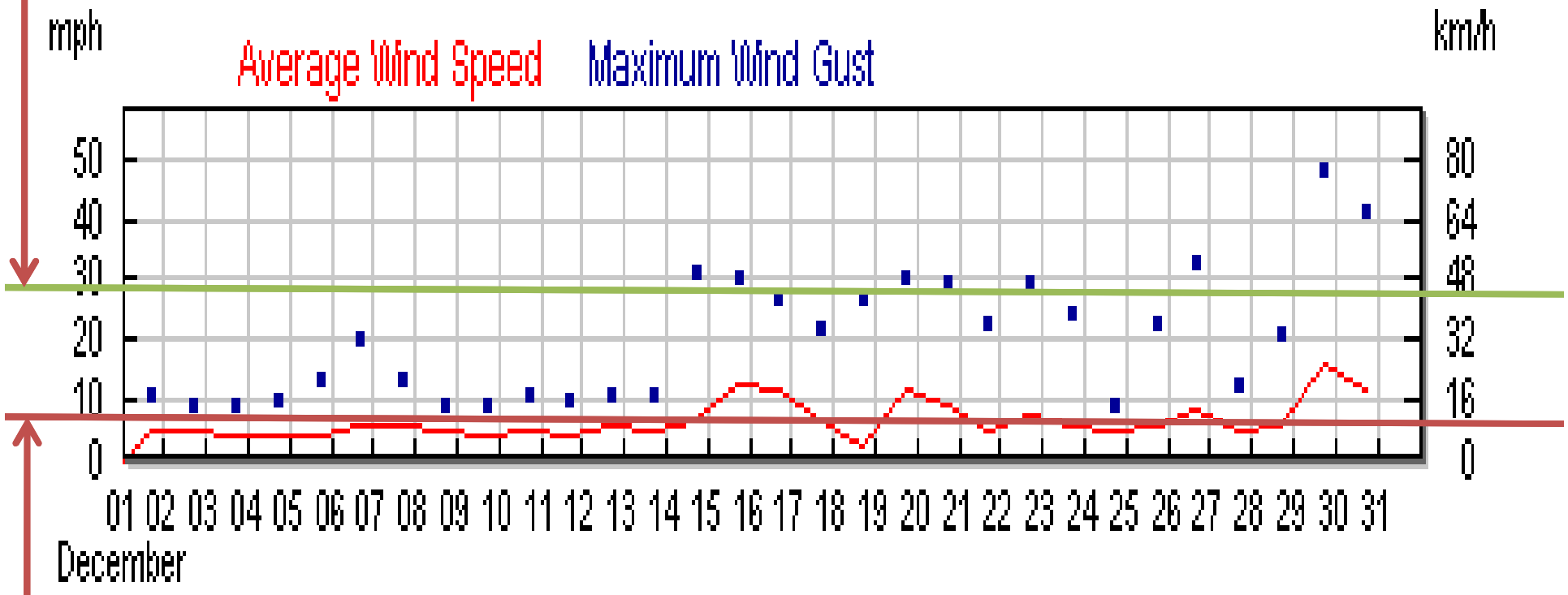
Average Wind Speed for Nov. 2010
7.3 mph



200,000 Watts at 6.7 - 8.9 mph wind speed
Cut-in speed (200kw)

Max Capacity
23,000,000 Watts at 28mph wind speed
(2.3mw)

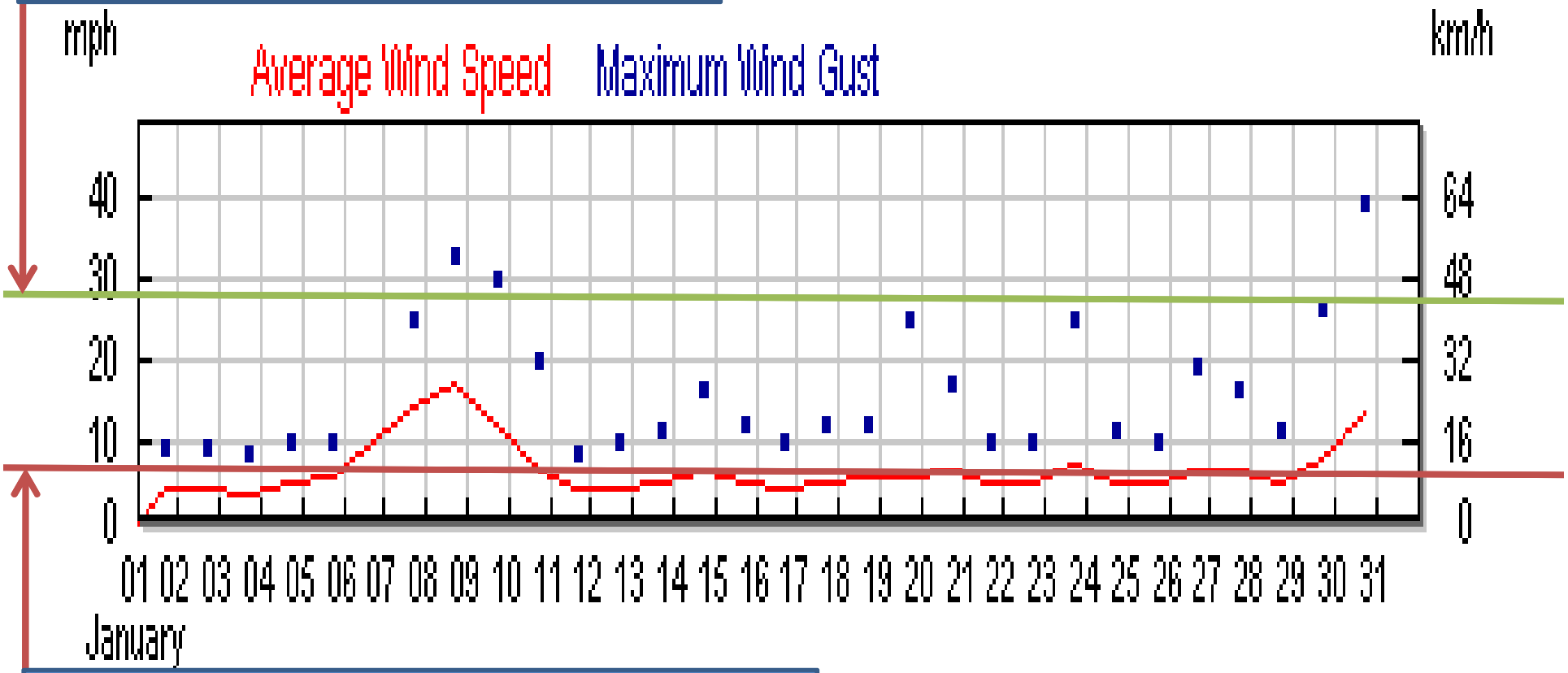
Average Wind Speed for Dec. 2010
6.4 mph



200,000 Watts at 6.7 - 8.9 mph wind speed
Cut-in speed (200kw)

Max Capacity
23,000,000 Watts at 28mph wind speed
(2.3mw)

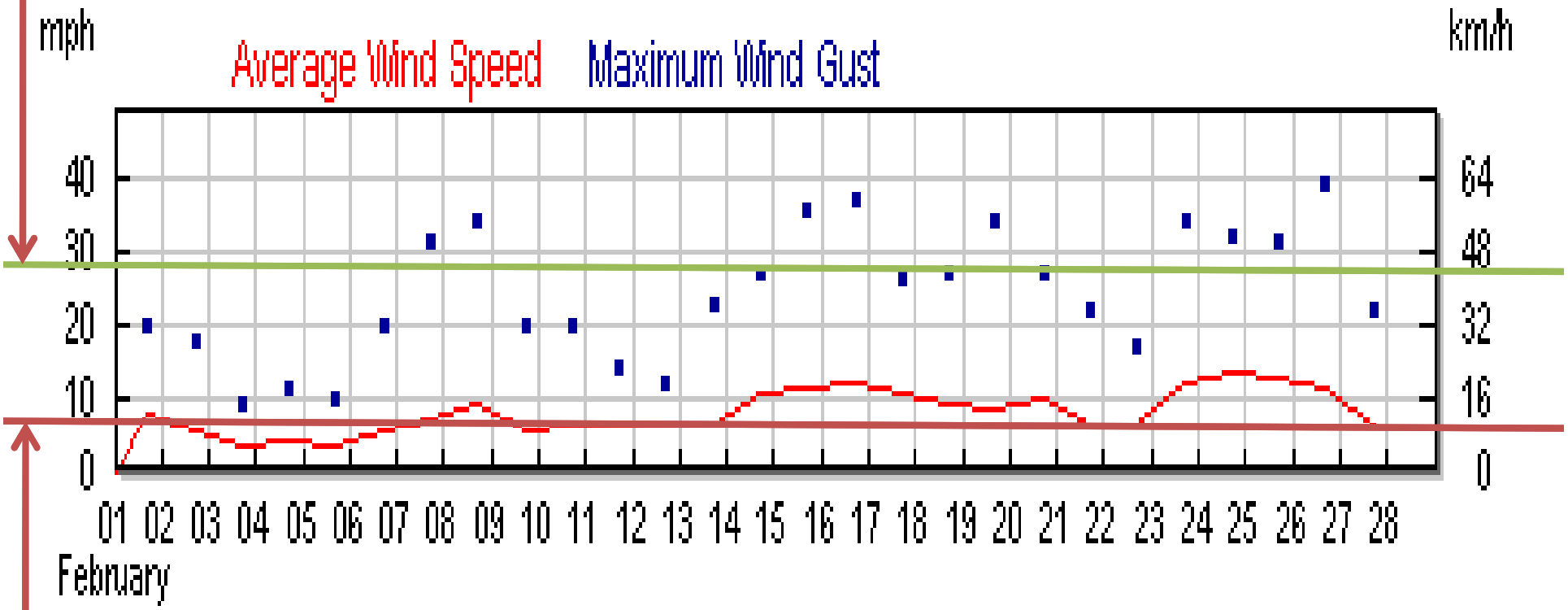
Average Wind Speed for Jan. 2011
6.4 mph



200,000 Watts at 6.7 - 8.9 mph wind speed
Cut-in speed (200kw)

Max Capacity
23,000,000 Watts at 28mph wind speed
(2.3mw)

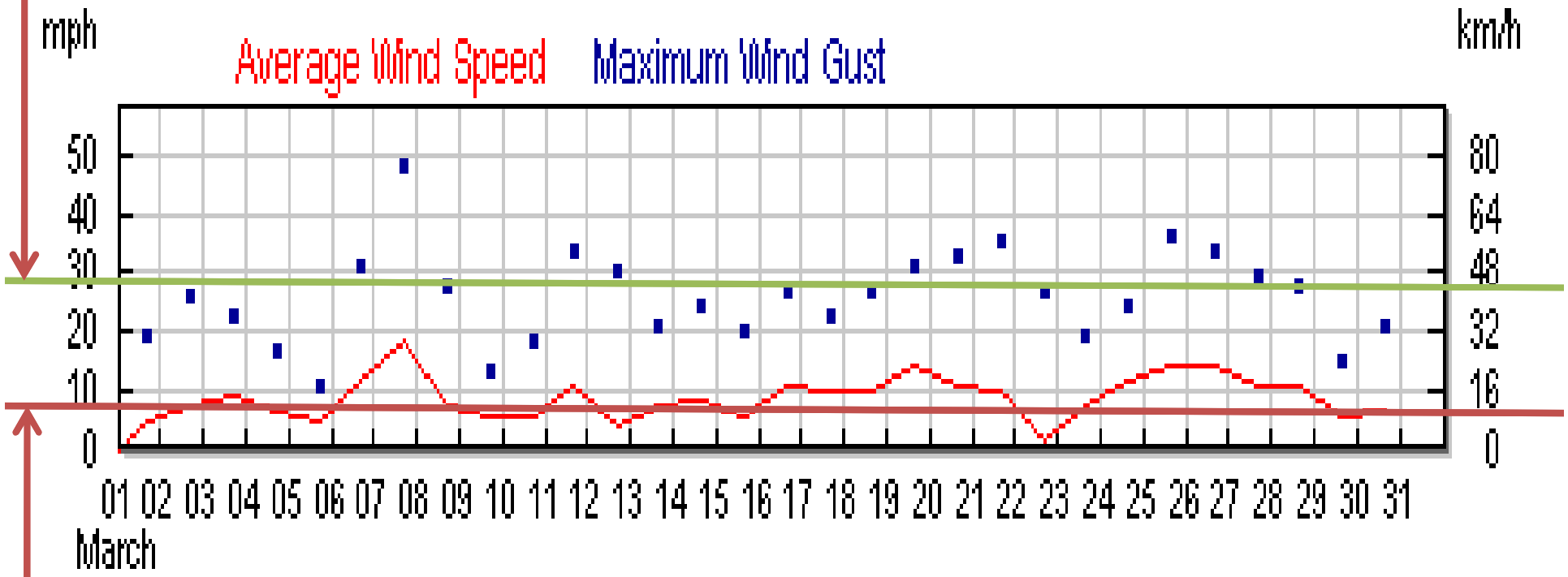
Average Wind Speed for Feb. 2011
7.7 mph



200,000 Watts at 6.7 - 8.9 mph wind speed
Cut-in speed (200kw)

Max Capacity
23,000,000 Watts at 28mph wind speed
(2.3mw)

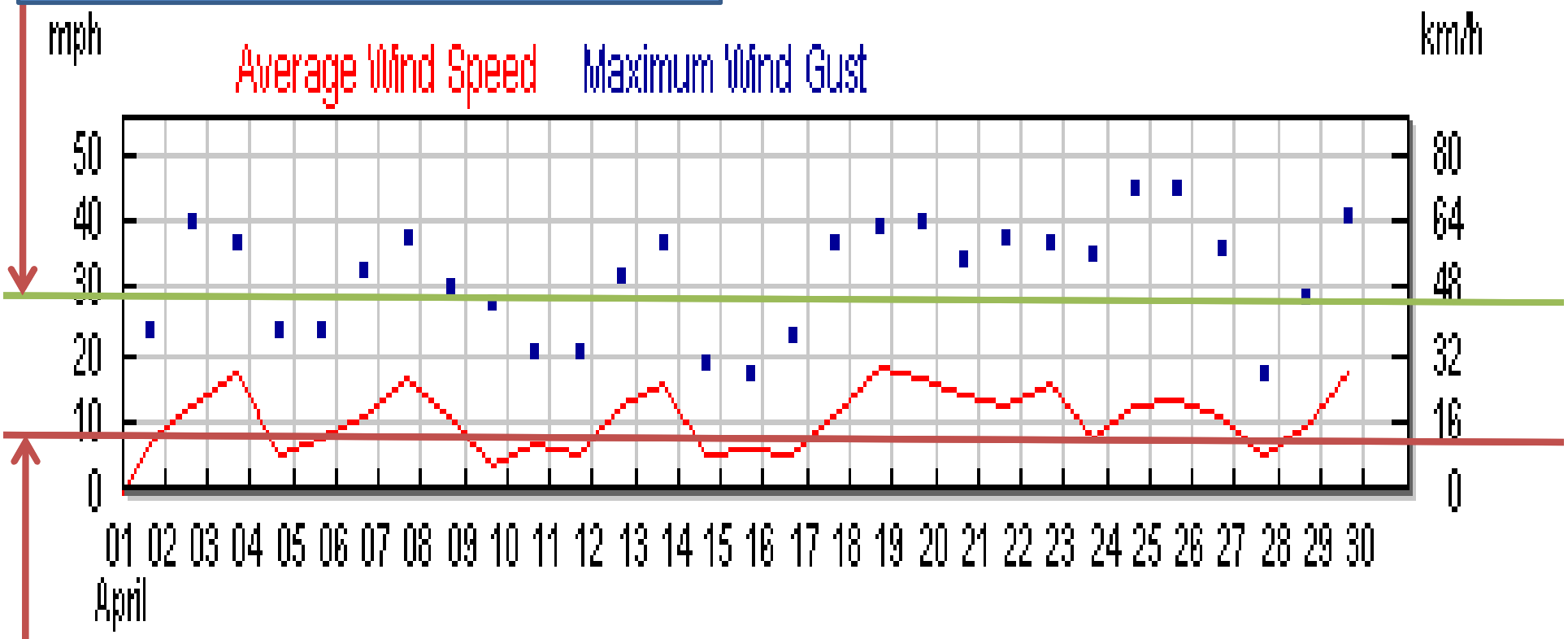
Average Wind Speed for Mar. 2011
8.6 mph



200,000 Watts at 6.7 - 8.9 mph wind speed
Cut-in speed (200kw)

Max Capacity
23,000,000 Watts at 28mph wind speed
(2.3mw)

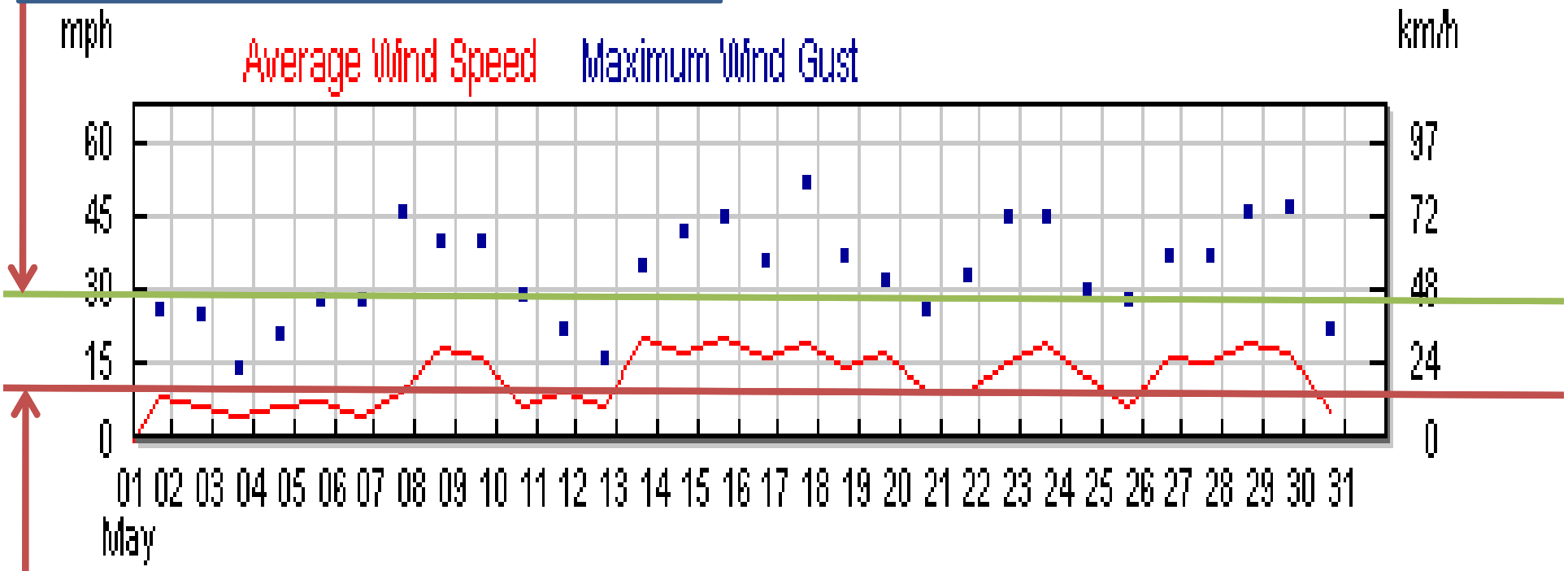
Average Wind Speed for Apr. 2011
10.8 mph



200,000 Watts at 6.7 - 8.9 mph wind speed
Cut-in speed (200kw)

Max Capacity
23,000,000 Watts at 28mph wind speed
(2.3mw)

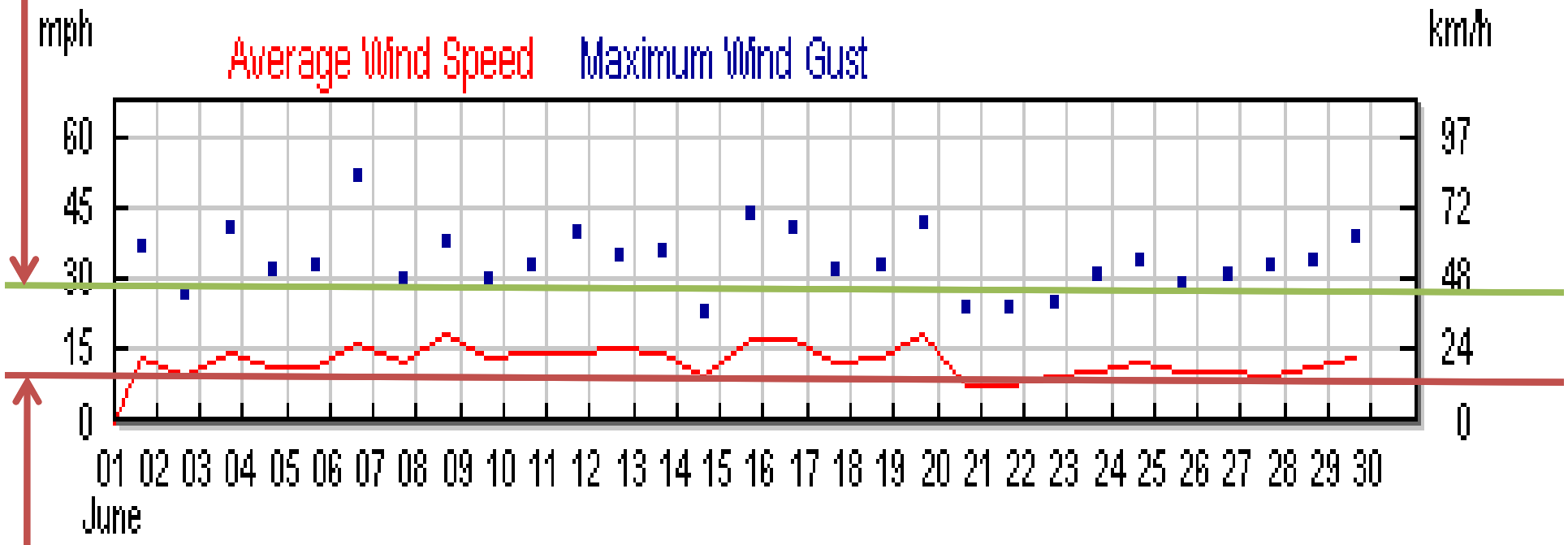
Average Wind Speed for May. 2011
12.2 mph



200,000 Watts at 6.7 - 8.9 mph wind speed
Cut-in speed (200kw)

Max Capacity
23,000,000 Watts at 28mph wind speed
(2.3mw)

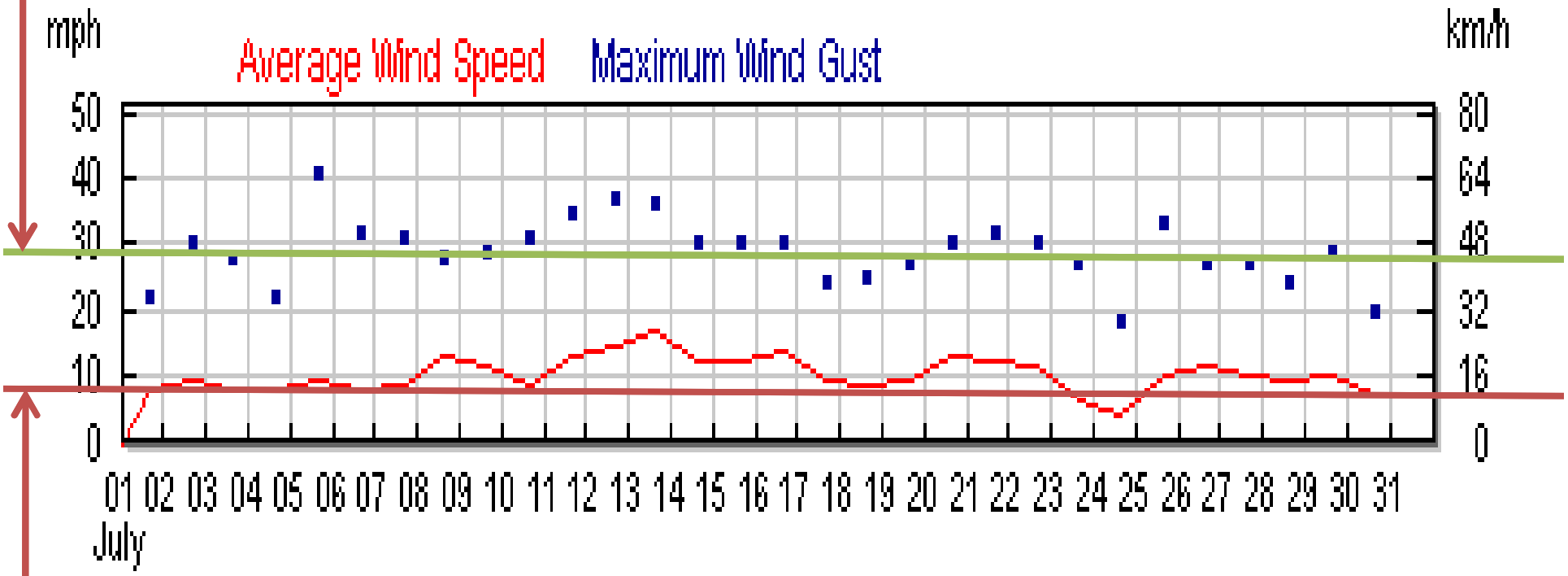
Average Wind Speed for Jun. 2011
12.4 mph



200,000 Watts at 6.7 - 8.9 mph wind speed
Cut-in speed (200kw)

Max Capacity
23,000,000 Watts at 28mph wind speed
(2.3mw)

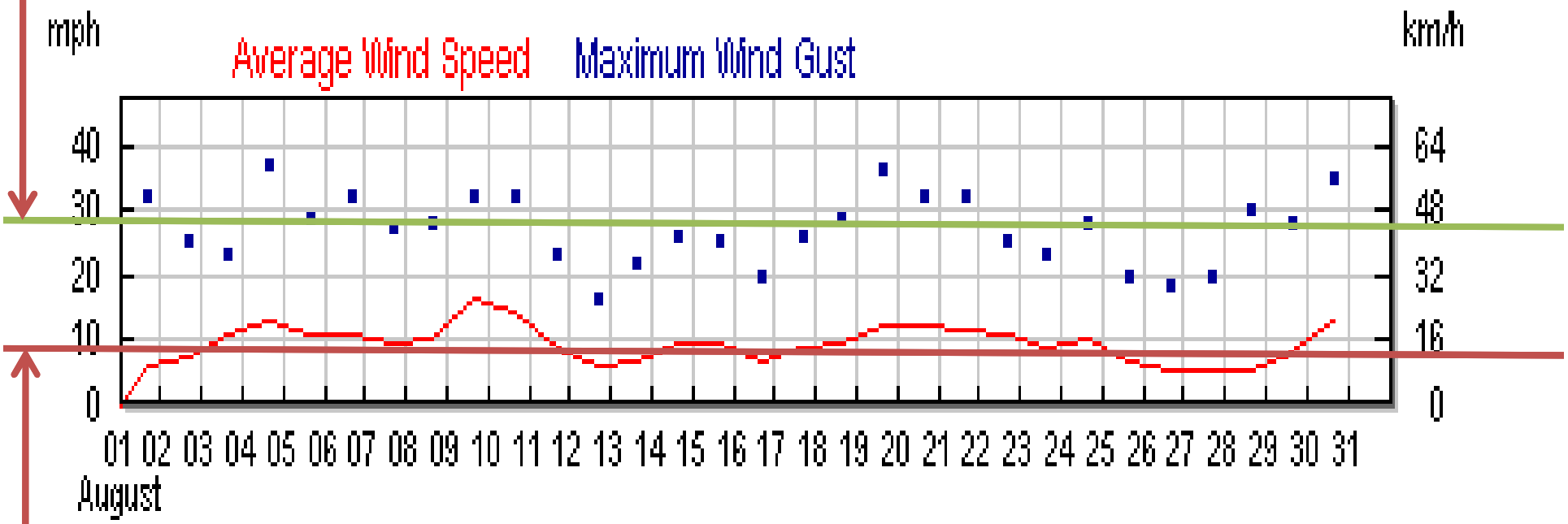
Average Wind Speed for Jul. 2011
10.2 mph



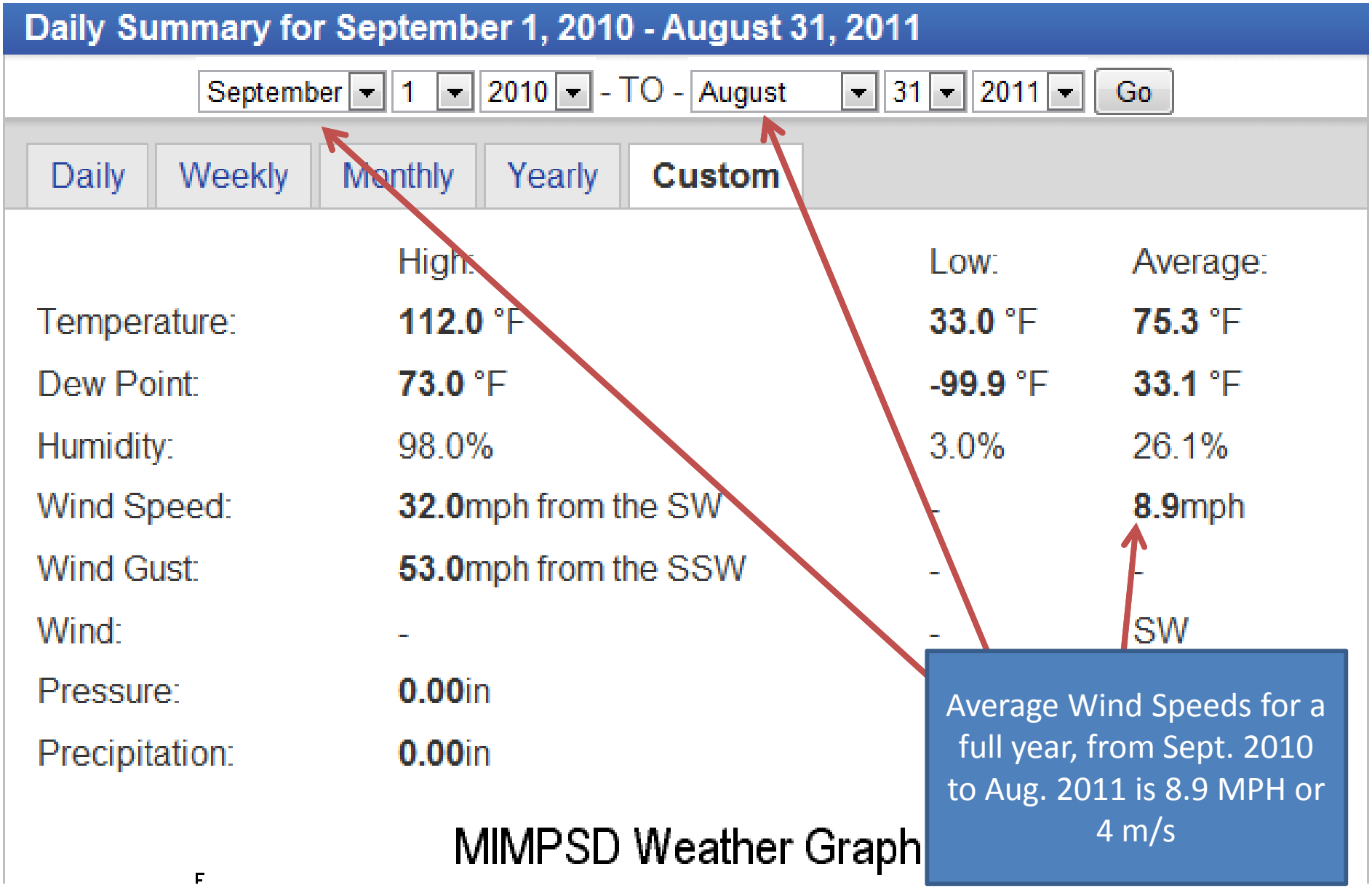
200,000 Watts at 6.7 - 8.9 mph wind speed
Cut-in speed (200kw)

Max Capacity
23,000,000 Watts at 28mph wind speed
(2.3mw)

Average Wind Speed for Aug. 2011
9.3 mph

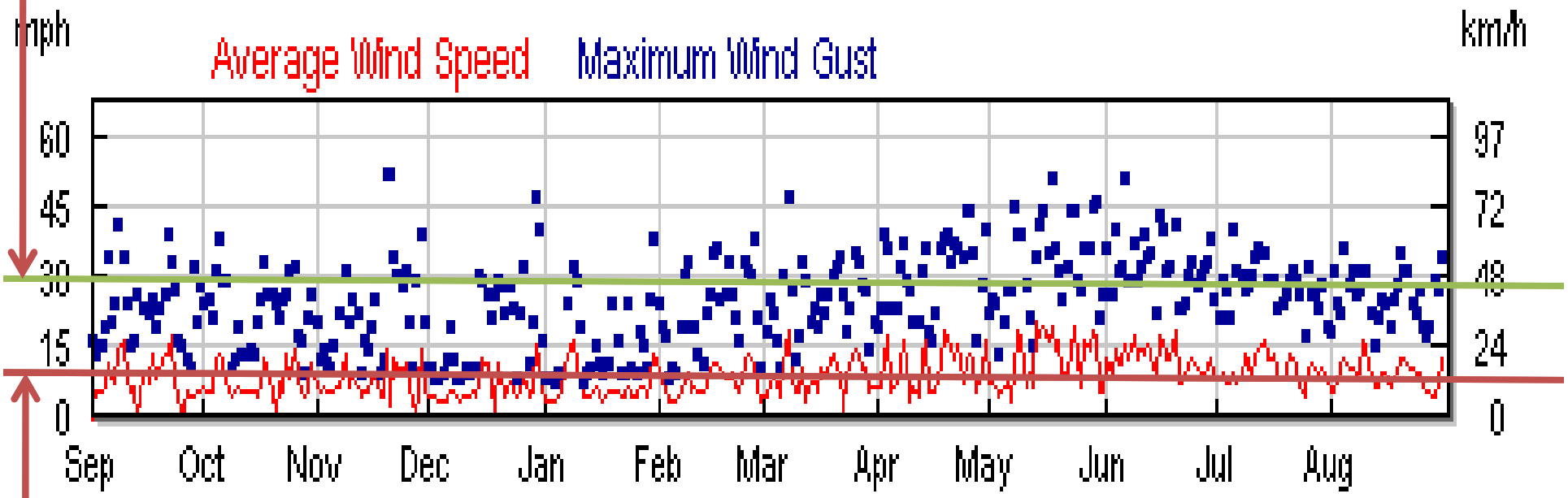


200,000 Watts at 6.7 - 8.9 mph wind speed
Cut-in speed (200kw)


Daily Summary for September 1, 2010 - August 31, 2011
September 1 2010 - TO - August 31 2011 Go
Daily Weekly Monthly Yearly Custom
High: Low: Average:
Temperature: 112.0 °F 33.0 °F 75.3 °F
Dew Point: 73.0 °F -99.9 °F 33.1 °F
Humidity: 98.0% 3.0% 26.1%
Wind Speed: 32.0mph from the SW - 8.9mph
Wind Gust: 53.0mph from the SSW - -
Wind: - - SW
Pressure: 0.00in
Precipitation: 0.00in
MIMPSD Weather Graph
Average Wind Speeds for a full year, from Sept. 2010 to Aug. 2011 is 8.9 MPH or 4 m/s

Max Capacity
23,000,000 Watts at 28mph wind speed
(2.3mw)

Average Wind Speed for
Sep. 2010 to Aug. 2011
8.9 mph



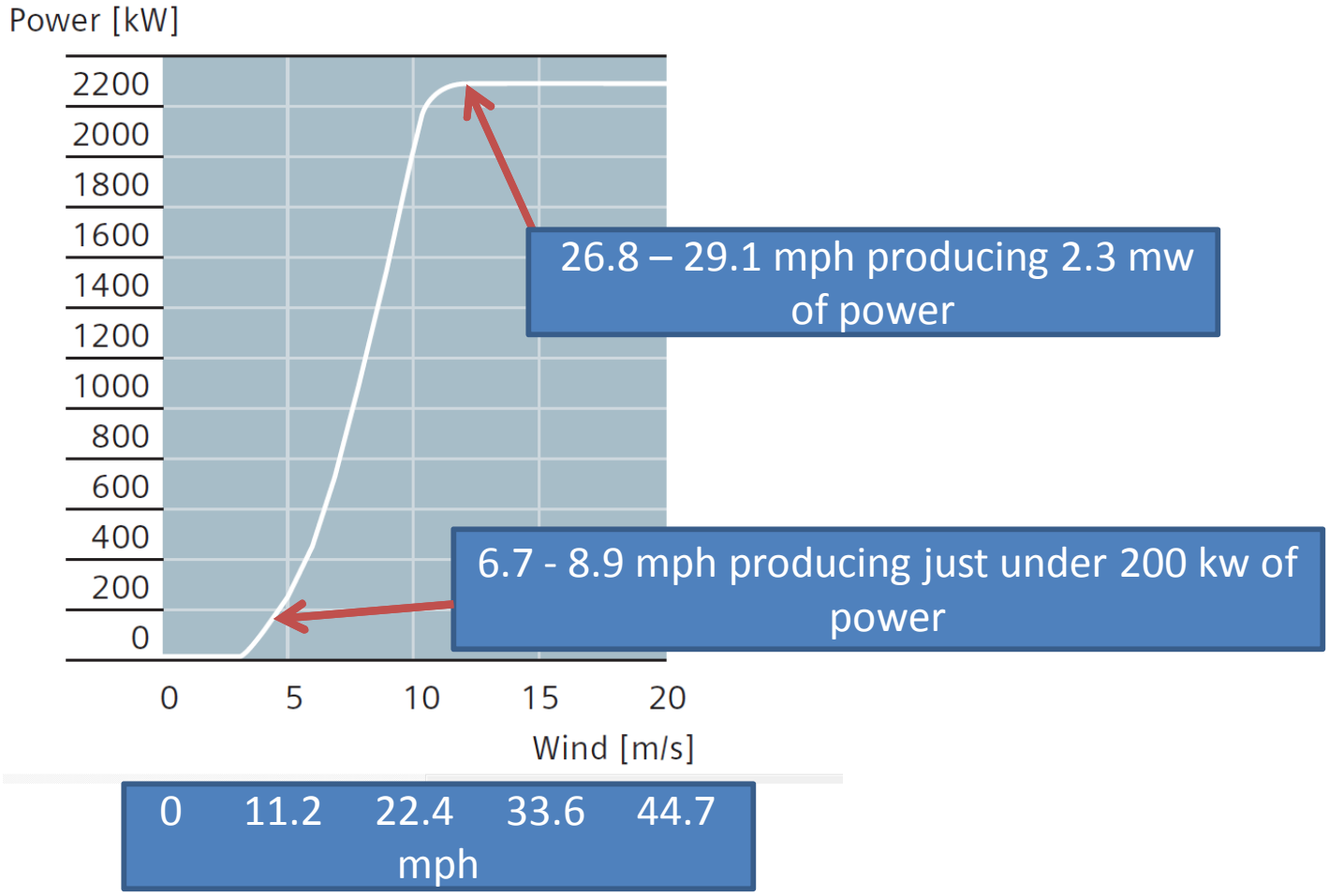
200,000 Watts at 6.7 - 8.9 mph wind speed
Cut-in speed (200kw)

Siemens SWT-2.3-101 Specification data

Operational data	
Cut-in wind speed	3-4 m/s
Rated power at	12-13 m/s
Cut-out wind speed	25 m/s
Maximum 3 s gust	55 m/s (standard version) 60 m/s (IEC version)

←6.7 - 8.9 mph

← 26.8 - 29.1 mph



Wind Speed Results

My wind speed study

Average Wind Speed for
Sep. 2010 to Aug. 2011
8.9 mph

Pattern's Wind speed study

The project site area, as would be expected for a wind energy project site, is characterized by predominant and strong winds from the southwest and west southwest. Winds from these two directions, as determined by data from Boulevard, located 10 miles west southwest of the project site, occur approximately 53 percent of the time with the average hourly wind speeds of 8.8 miles per hour and 9.1 miles per hour from each direction, respectively (WRCC, 2011). The Applicant also provided over 7,700 hours of wind data collected in 2010 from a monitoring tower at the project site that indicates a median

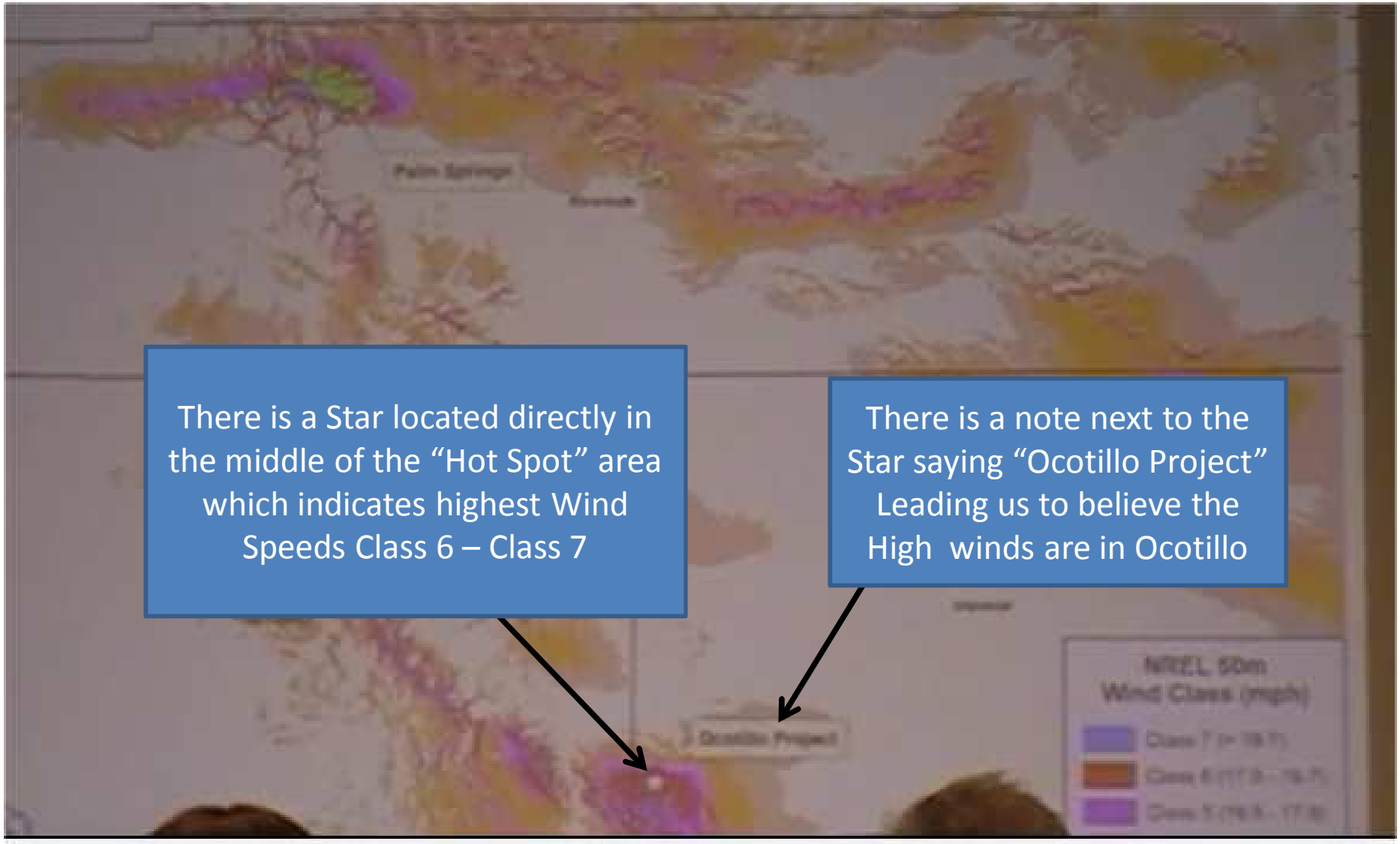
wind speed of 10.7 miles per hour at a 10-meter height and that the wind direction frequency for winds from the southwest and west southwest occur approximately half of the time.

Pattern Energy's Presentation

At the first part of Pattern Energy's Presentation Pattern says: "Everyone wants to know why we are we putting a Wind Energy Project in Ocotillo, Why here?"

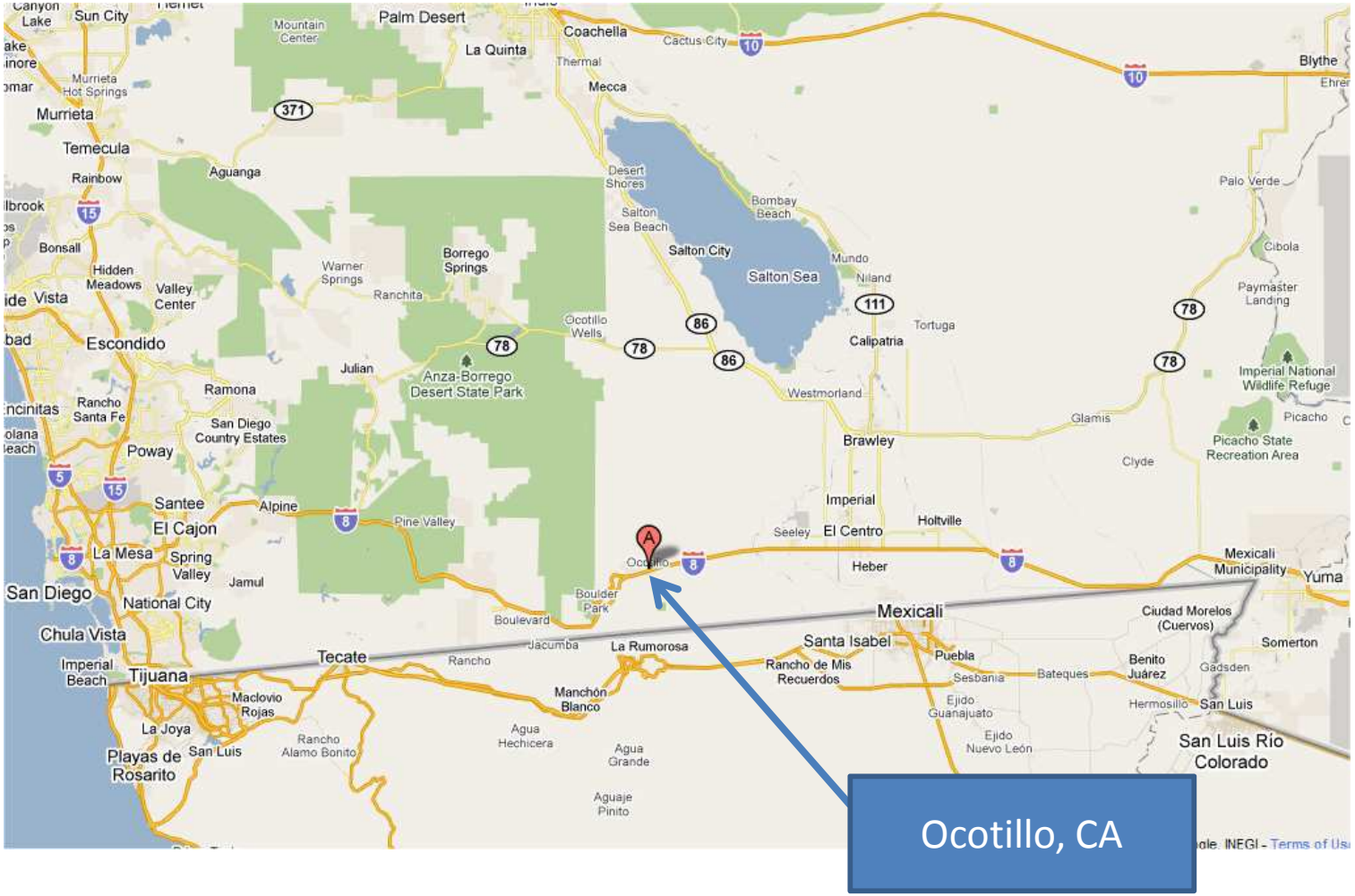
Then Pattern energy points to this wind speed map from a distance and says: “It’s right there, that red spot is the Hot-Spot, Class 7 Wind Speeds” Leading everyone to believe the Hot-Spot is in Ocotillo.

The fact is, this Hot-Spot is not in Ocotillo,
It’s in Boulder Park near the
Rock Tower at over 3,000 feet of elevation.

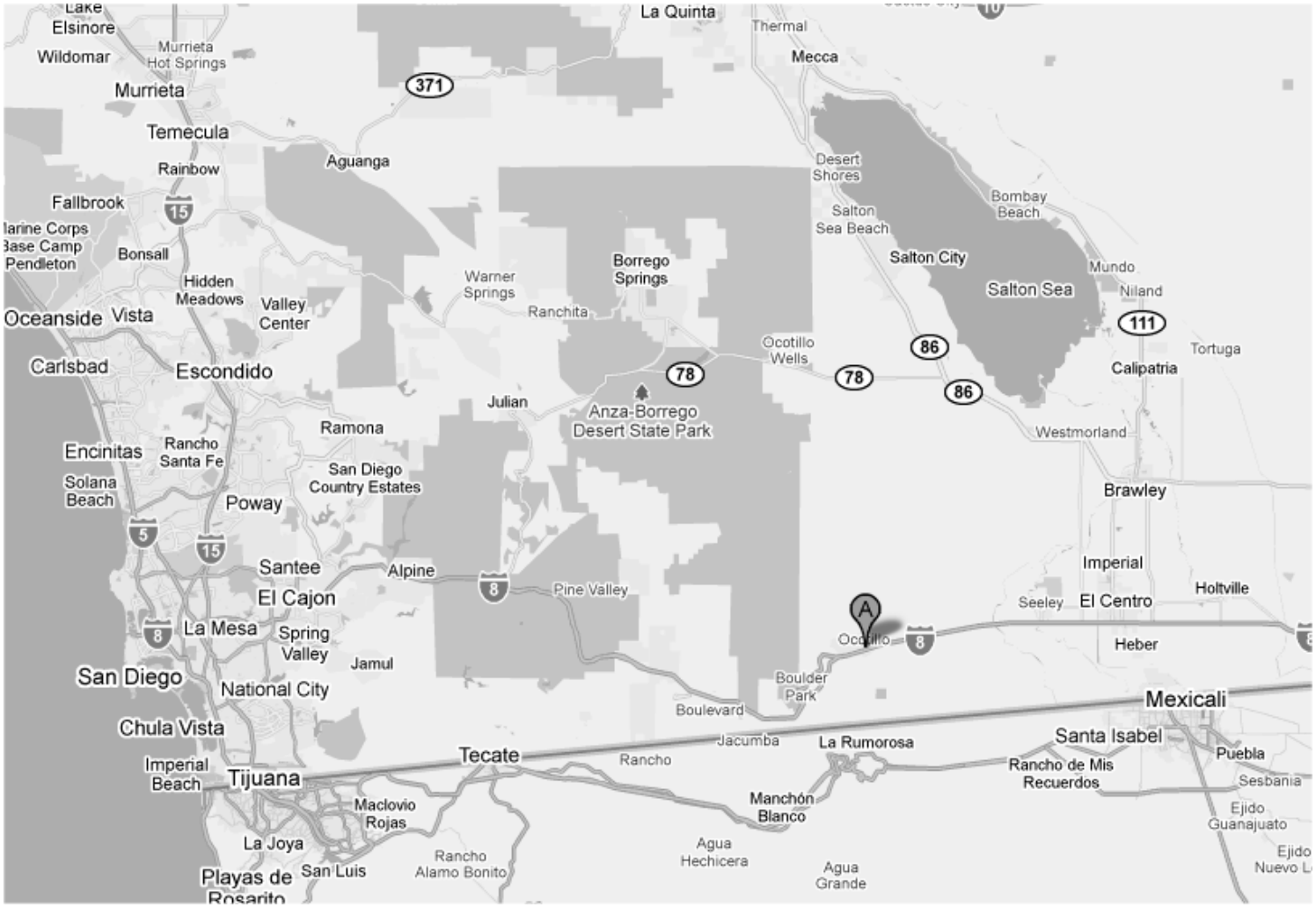


This is Wind Speed Map is from Pattern’s Presentation

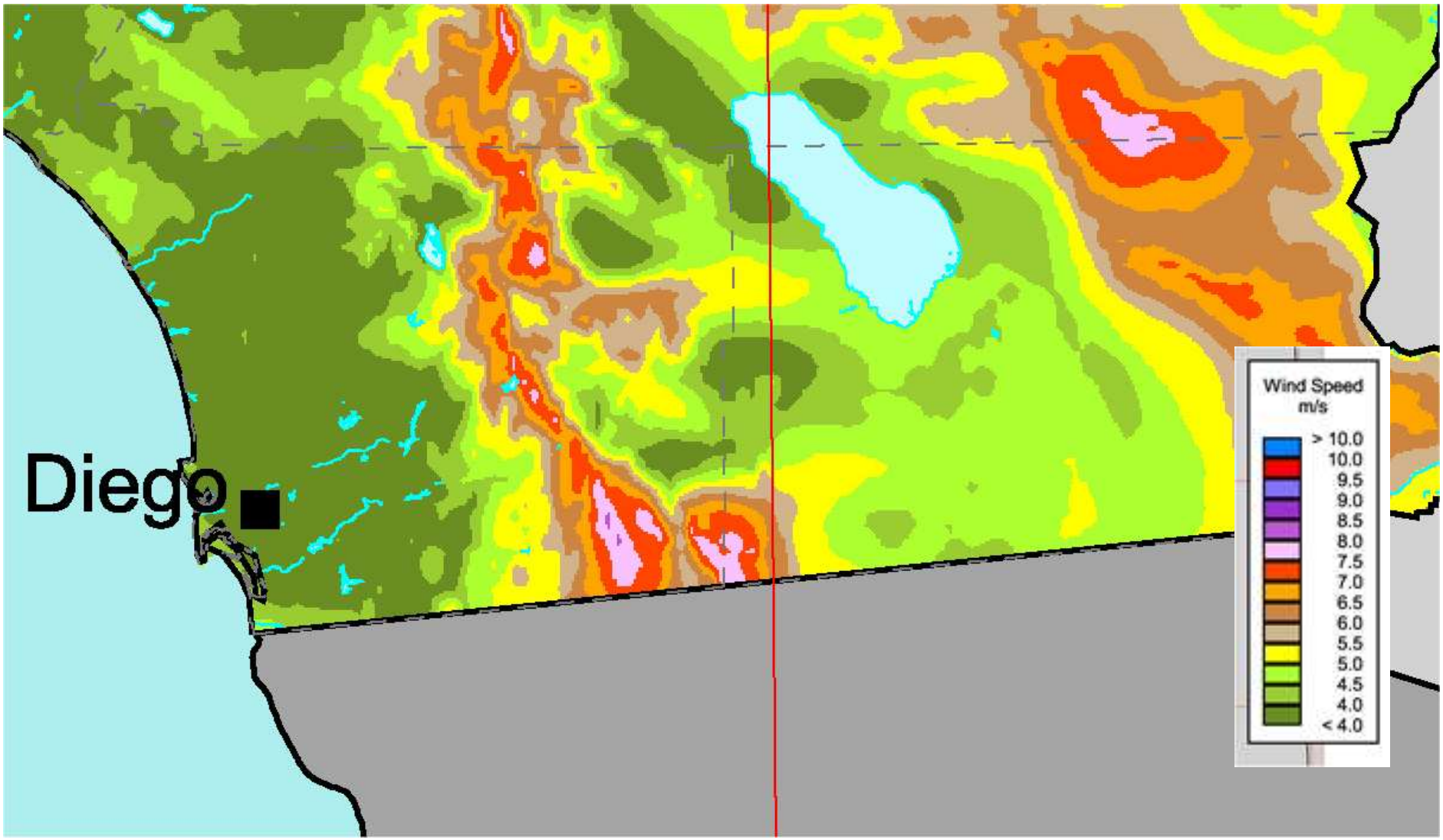
I decided to research this; I used Google Maps to look at this area to see if there was some way I could locate exactly where this Wind “Hot- Spot” was located in relation to Ocotillo based on the wind speed Map.



I printed out the Google Map onto a clear Transparency

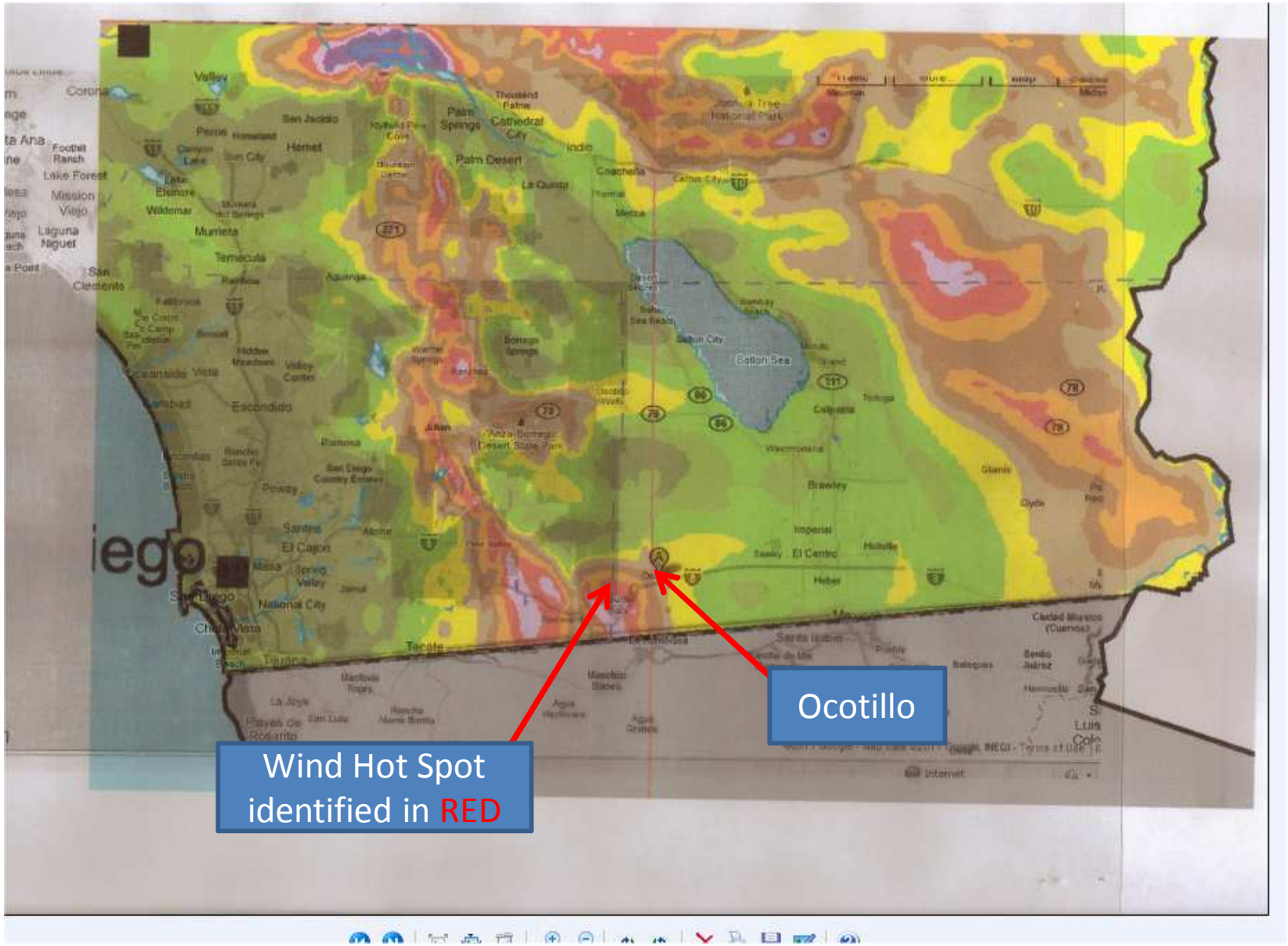


I also printed out the Wind Speed map with a color printer

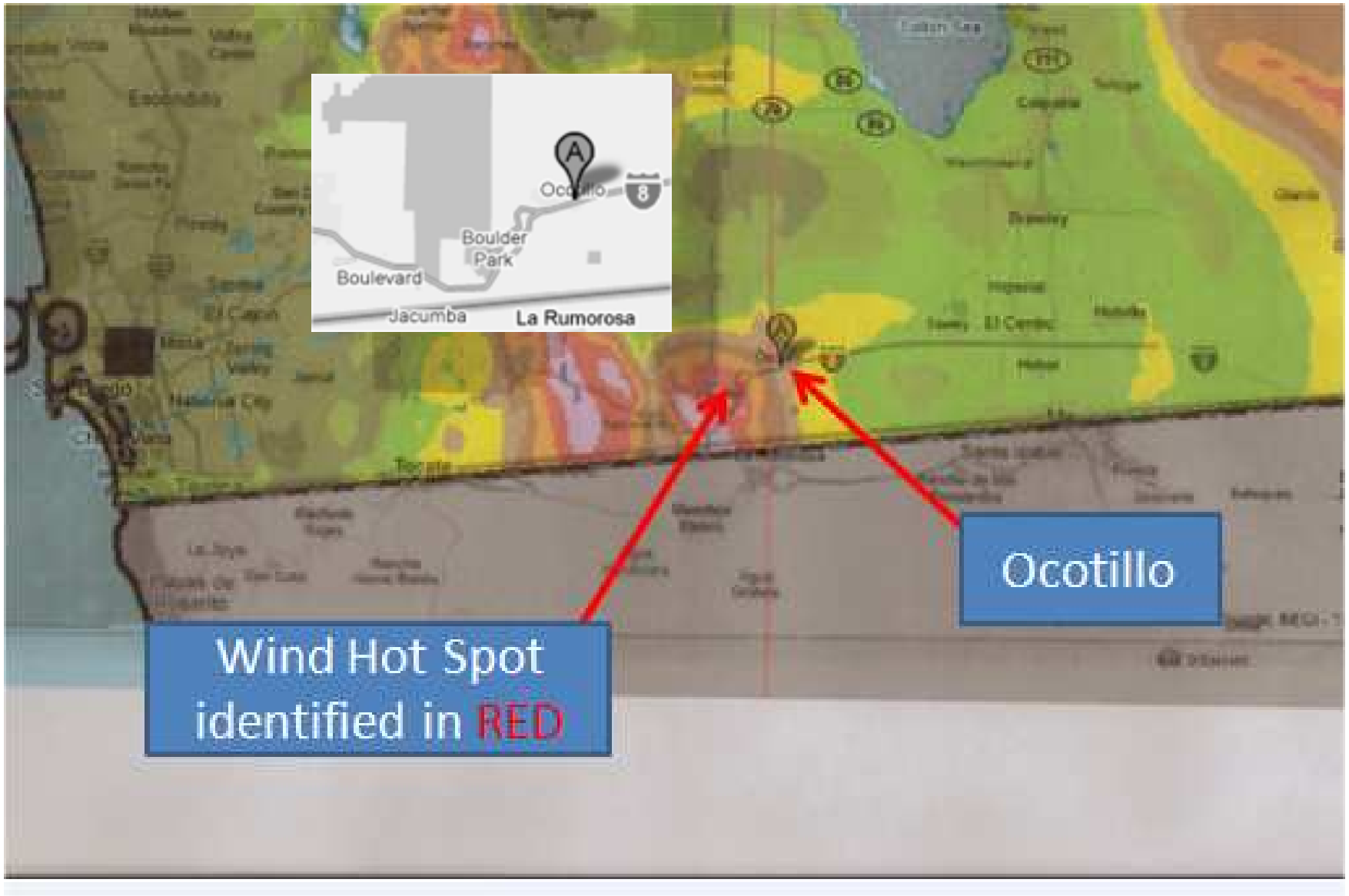


SOURCE: http://www.windpoweringamerica.gov/images/windmaps/ca_80m.jpg

I overlaid the Google Map clear transparency onto the wind speed map using the Salton Sea and the Mexico boarder line to align both maps so that they would be in the same reference frame.

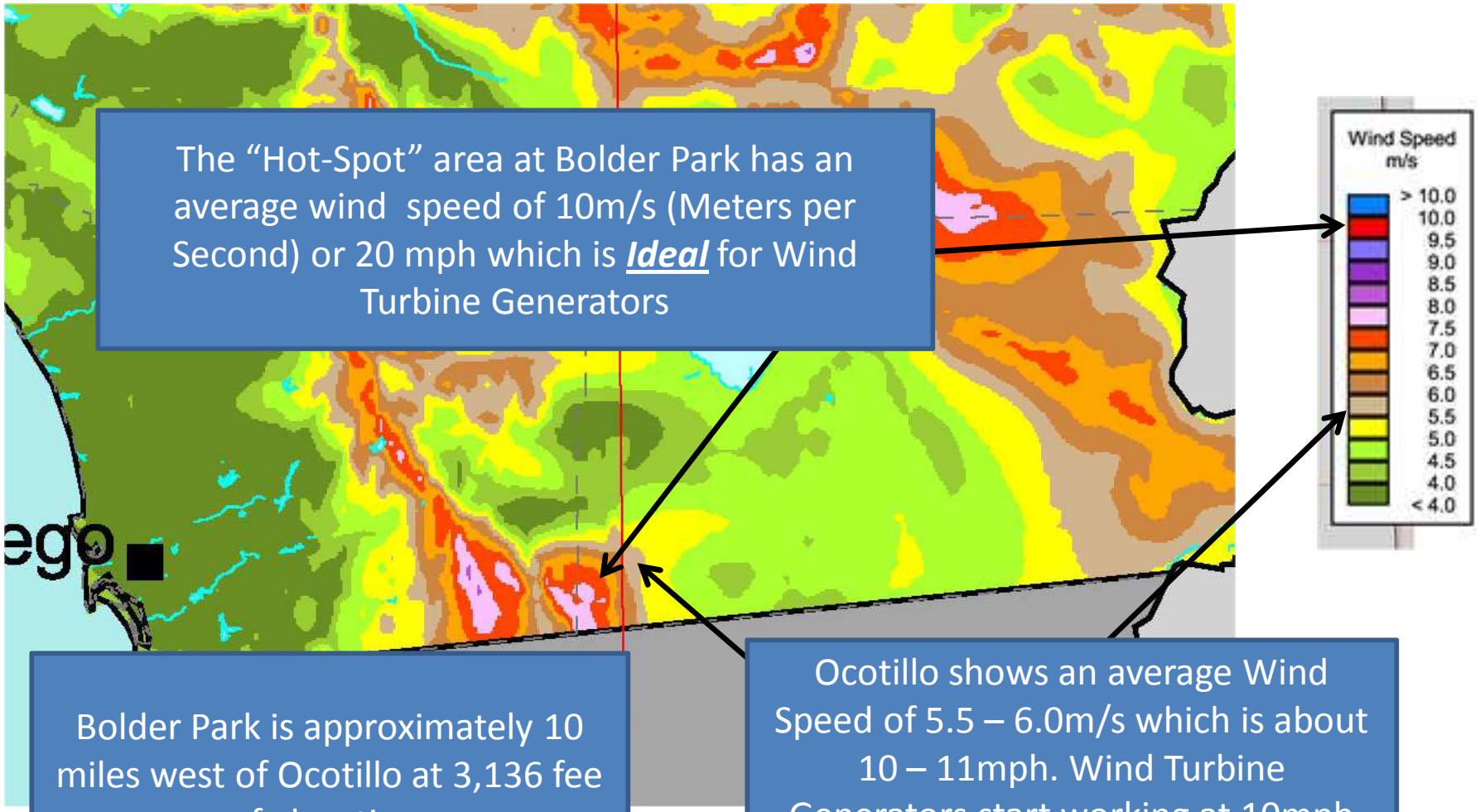


When I zoomed in on the maps I noticed that the "Hot-Spot" (RED AREA) is actually at Boulder Park and *NOT* at Ocotillo as Pattern has lead everyone to believe.



Why is this significant?

http://www.windpoweringamerica.gov/images/windmaps/ca_80m.jpg



The "Hot-Spot" area at Bolder Park has an average wind speed of 10m/s (Meters per Second) or 20 mph which is ***Ideal*** for Wind Turbine Generators

Bolder Park is approximately 10 miles west of Ocotillo at 3,136 fee of elevation.

Ocotillo Elevation = 377 ft
Bolder Park Elevation = ***3,136***

Ocotillo shows an average Wind Speed of 5.5 – 6.0m/s which is about 10 – 11mph. Wind Turbine Generators start working at 10mph which means on the average, they will be running on the **Extreme low end of the Duty Cycle Most of the time.**

Wrong Technology
Wrong Place

Bottom Line

Ocotillo **does not** have winds suitable to Wind Turbine Generators

Thank you.