



Education with Skystream 3.7

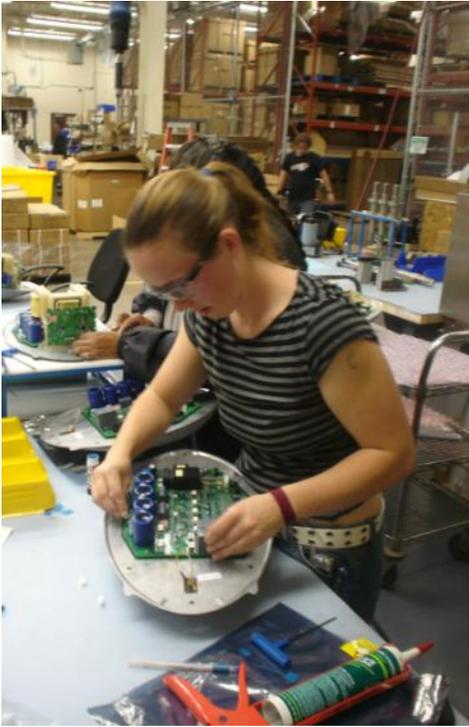
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About Southwest Windpower



- Largest Small Wind manufacturer
- 20 years in small wind business
- Manufacturers of Air, Whisper and Skystream 3.7
- Over 100,000 units sold worldwide
- Large dealer network with training
- Dedication to education

Why Skystream 3.7?

Skystream is an innovative new small wind generator designed in partnership with the U.S. Department of Energy's National Renewable Energy Laboratory (NREL) to efficiently, quietly and conveniently reduce or eliminate a consumer's electric bill.



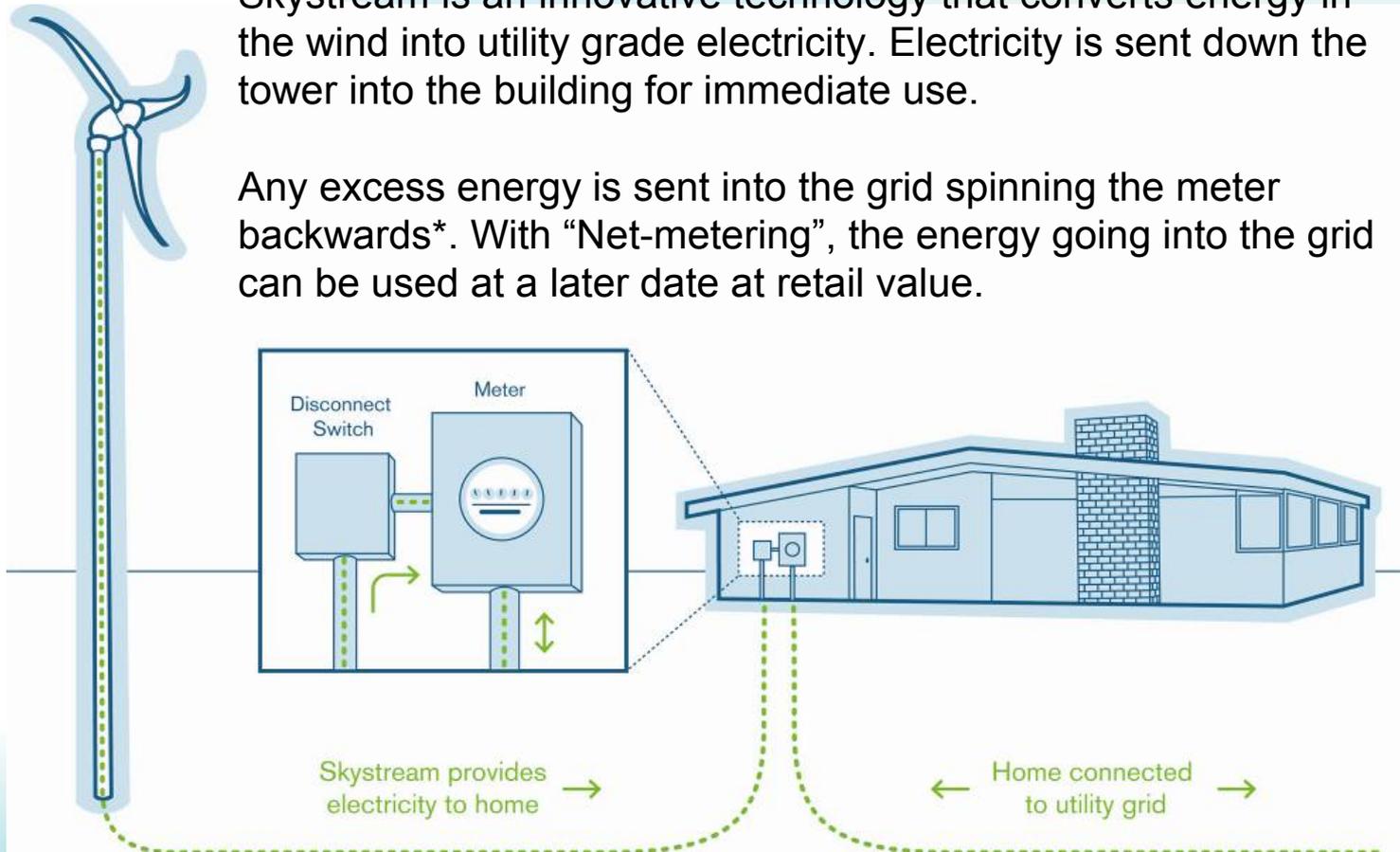
Why Skystream 3.7?

- Small wind systems are tangible and alive
- Active renewable energy for students to see
- Simple installation
- Aesthetic design
- Cost effective
- No batteries
- Monitoring data systems to aid with curriculum

How Skystream Works

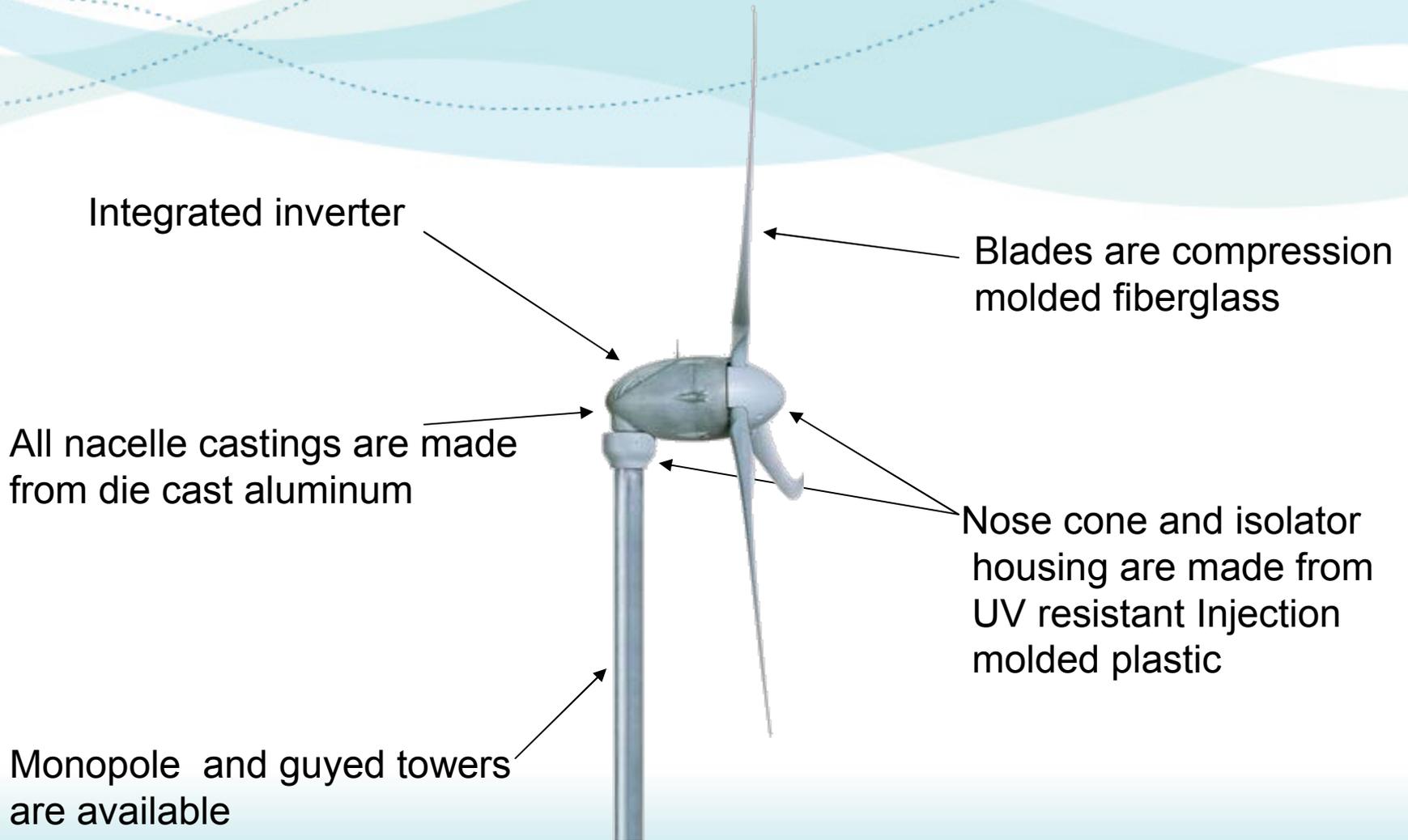
Skystream is an innovative technology that converts energy in the wind into utility grade electricity. Electricity is sent down the tower into the building for immediate use.

Any excess energy is sent into the grid spinning the meter backwards*. With “Net-metering”, the energy going into the grid can be used at a later date at retail value.

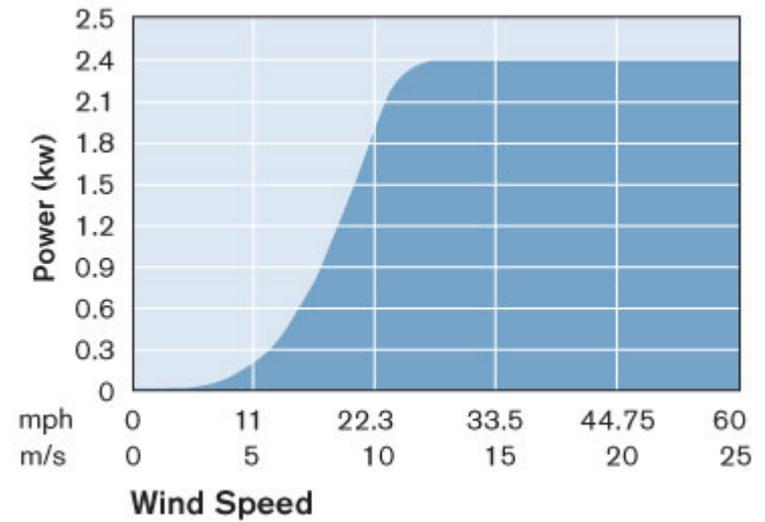
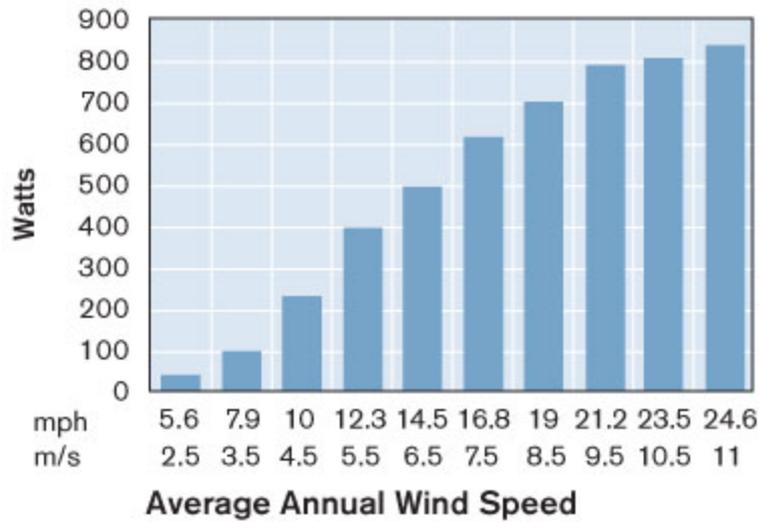




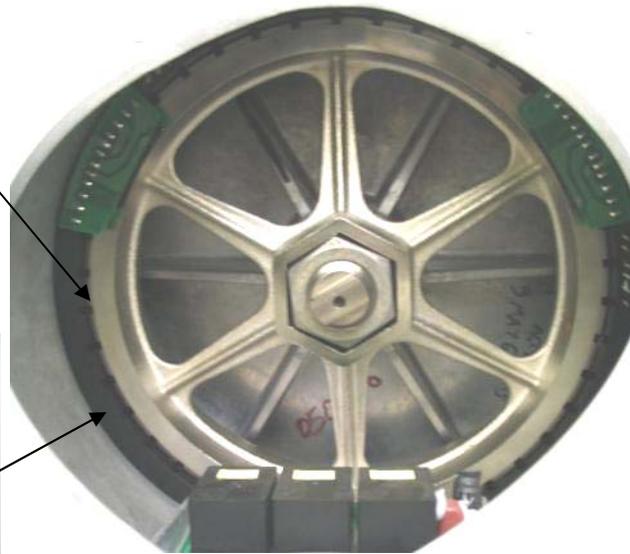
Design Overview



Performance: Energy



Alternator

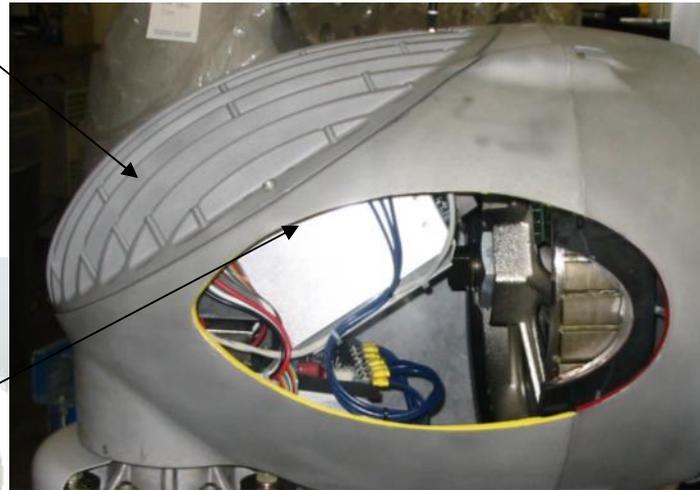
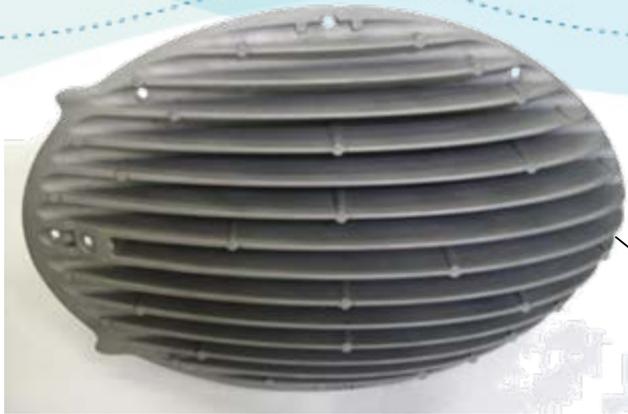


Alternator Features:

- Direct Drive gearless (No transmission)
- High Torque and low cogging – This is ideal for low wind areas
- “Slot-less” for minimizing any sound from machine
- Brushless neodymium design for minimal maintenance
- 42 Poles

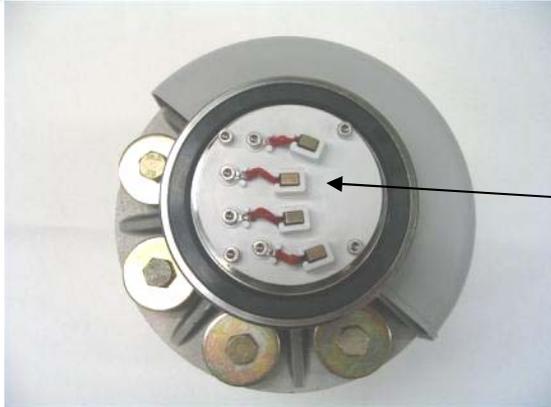
Inverter

The cooling fins are designed to minimize heat build-up on the inverter board. This eliminates the need for a fan.



The inverter is integrated into the design to reduce cost and simplify the installation process

Yaw Shaft



Top View: The Slip-ring brushes are rated for 25 amps and have a 20 year design life



Bottom View: Through a wire strain relief, the power wires are run through the hole and connected to terminals



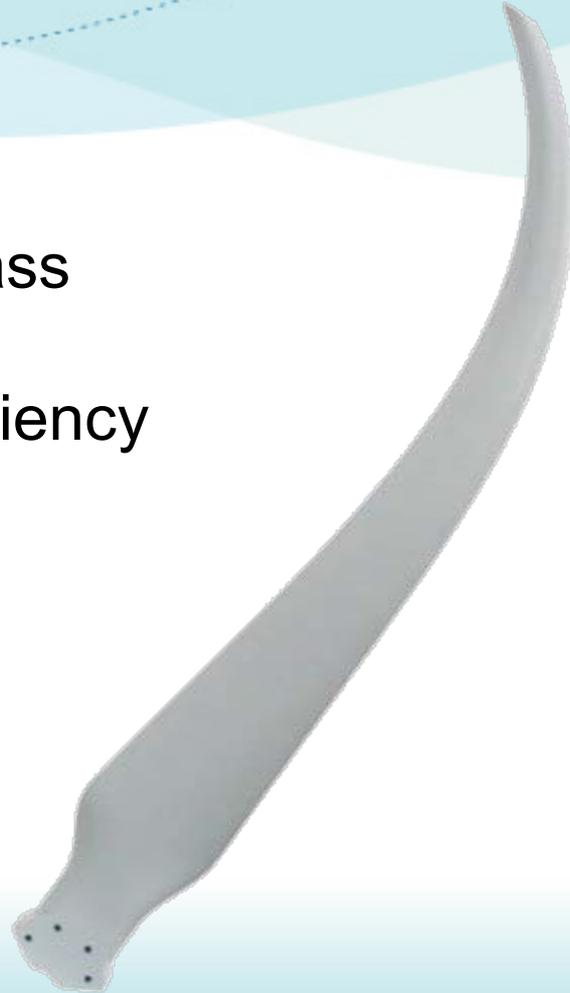
The yaw assembly (shown here with an optional tower interface) has sound isolators to minimize any vibration from being transmitted down the tower. A plastic cover is used to protect the neoprene isolators from the sun.



Blades

Compression molded fiberglass

Blade designed for quiet efficiency



Safety Features

- Double Redundancy Braking – several braking features to ensure system safety and site safety
- When installed on monopole tower – no guy wires
- Certifications ensure quality and reliability standards are met

Certification & Reliability

Skystream is the result of a five-year co-development project between Southwest Windpower and the U.S. Department of Energy's National Renewable Energy Lab (NREL). Skystream was designed in accordance to national and international testing and safety standards.

- ✓ CE certified
- ✓ ROHS Compliant – Lead and other hazardous material free
- ✓ UL-1741 and IEEE 1547 (2007 standard) recognized inverter
- ✓ Conforms to all NEC installation codes for electrical wiring
- ✓ Certified to IEC-61400-2-B (conducted by Germanischer Lloyd)



Southwest Windpower is a ISO-9000 Platinum Certified Company

Sound

What makes Skystream so quiet

- Airfoils specifically designed for low noise
- Very low max RPM – about 320
- Slot-less alternator technology
- Electronic stall regulation prevents loud sound in high wind
- Swept blade design reduces tower shadow induced sound



The sound a Skystream makes is somewhere between a bedroom and a quiet office area

Skystream emits just 45 db - 55db at 50 feet from the base of the tower



Education – Remote Display

- Wireless remote
- Connect to PC
- Real time Data

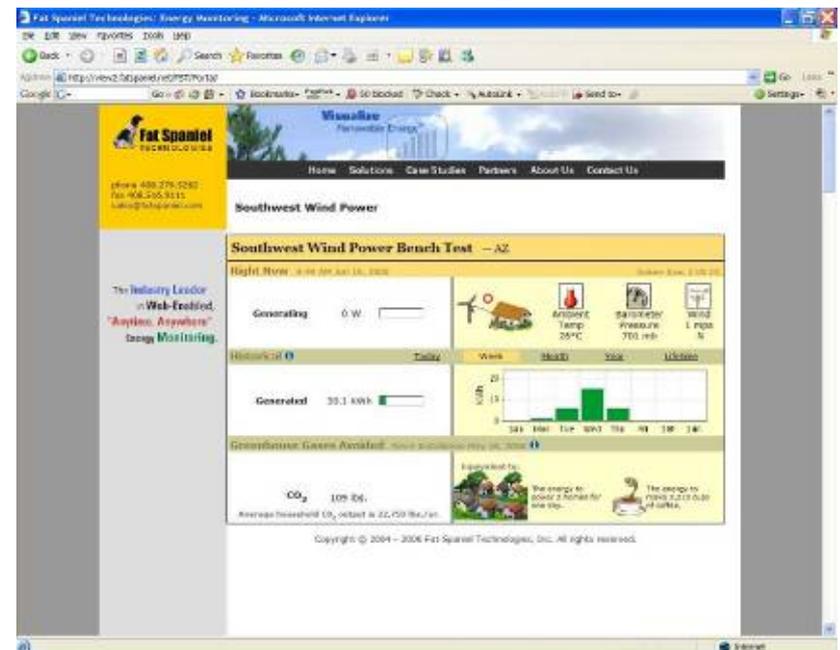


A Separate USB converter to download data to a PC



Education – Web Based Monitoring

- Remote monitoring to assure operation
- Educational program to display system performance
- System uses internet to transmit data
- Fat Spaniel, CSS, Meteocontrol

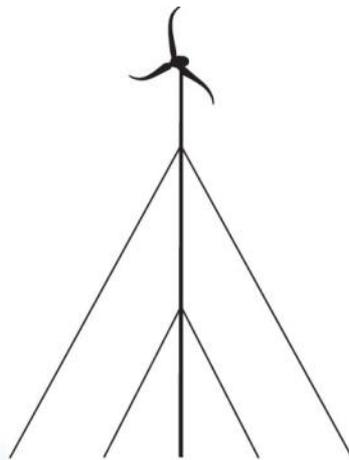


Present design requires additional hardware that monitors and transmits data



Towers

- Several types of towers are available. The one you choose should meet the load specifications determined by Southwest Windpower
- The guyleless monopole is the most desired tower type



guyed tower



monopole

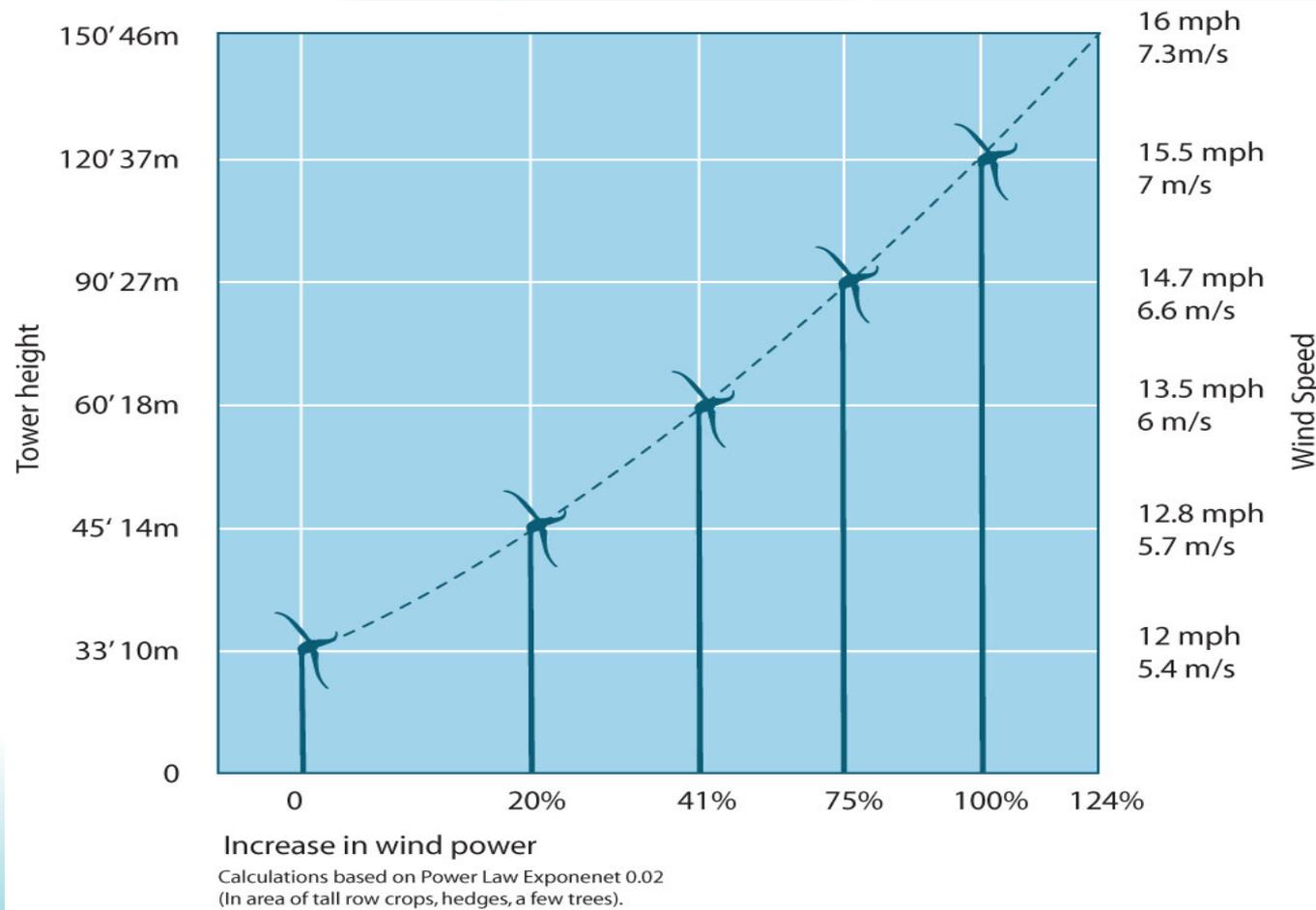


lattice tower



Tower Height

Wind speed and wind power are both affected by height



Skystream 3.7 Towers

Mono Pole

33'

45'

60'

Guyed

70'

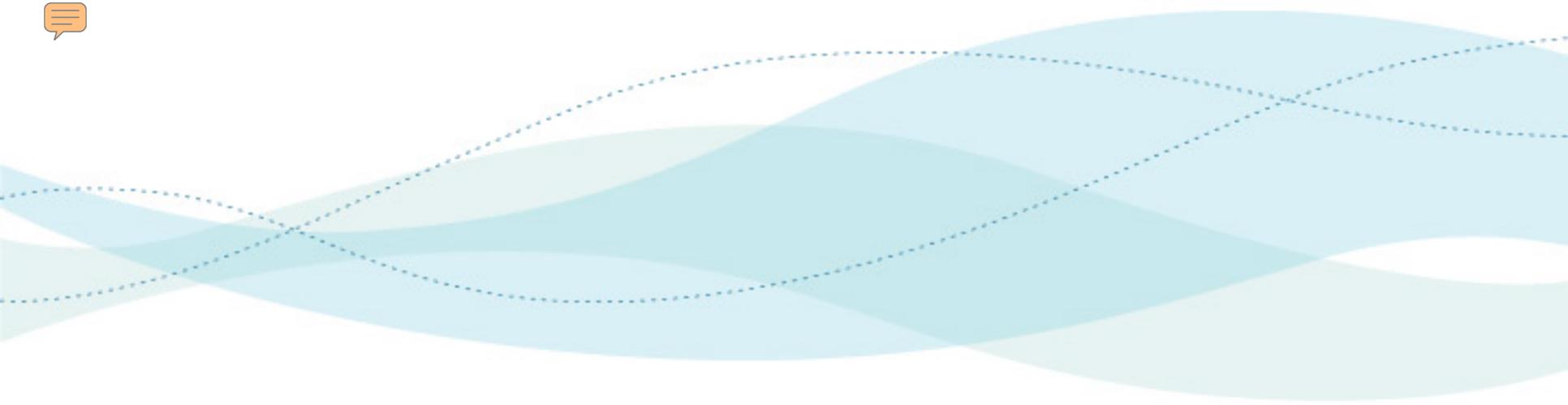
40'

30'

5" Tower Adaptor
(for guyed towers)



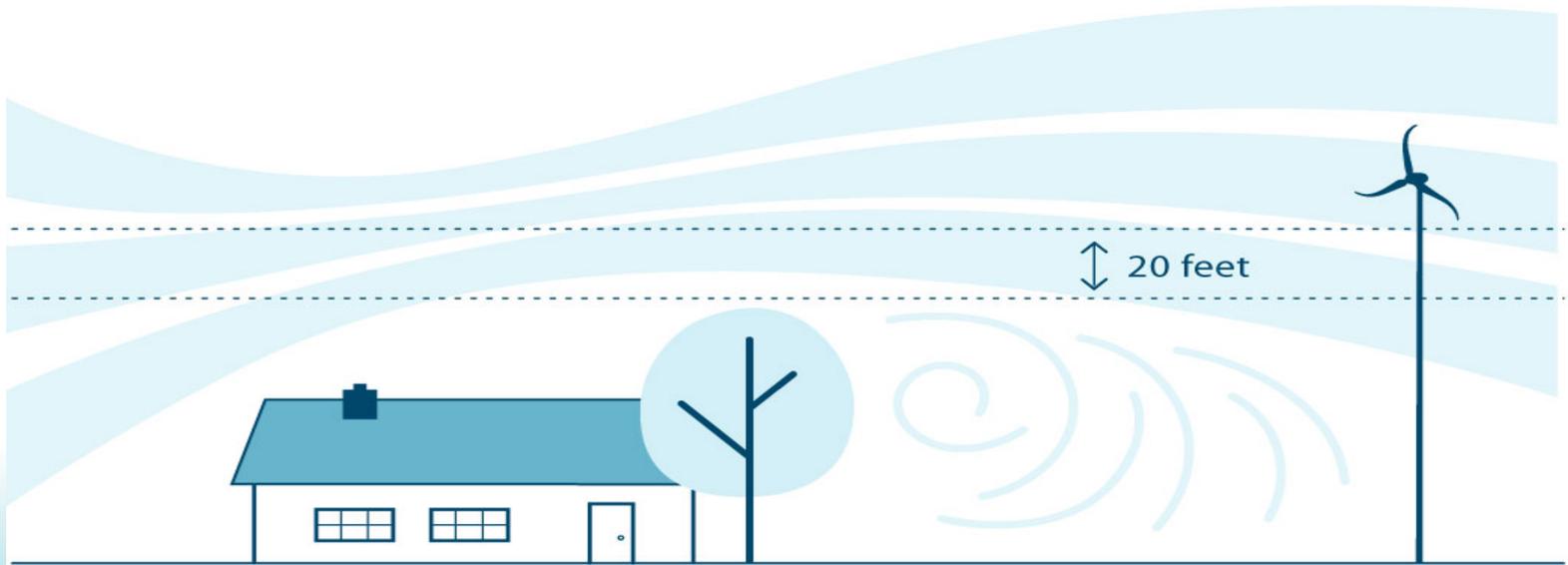
All towers supported by Southwest Windpower are PE engineered and are certified to IBC Standards. Skystream can be installed on any tower of any height provided it is properly engineered.



Siting Considerations

Location

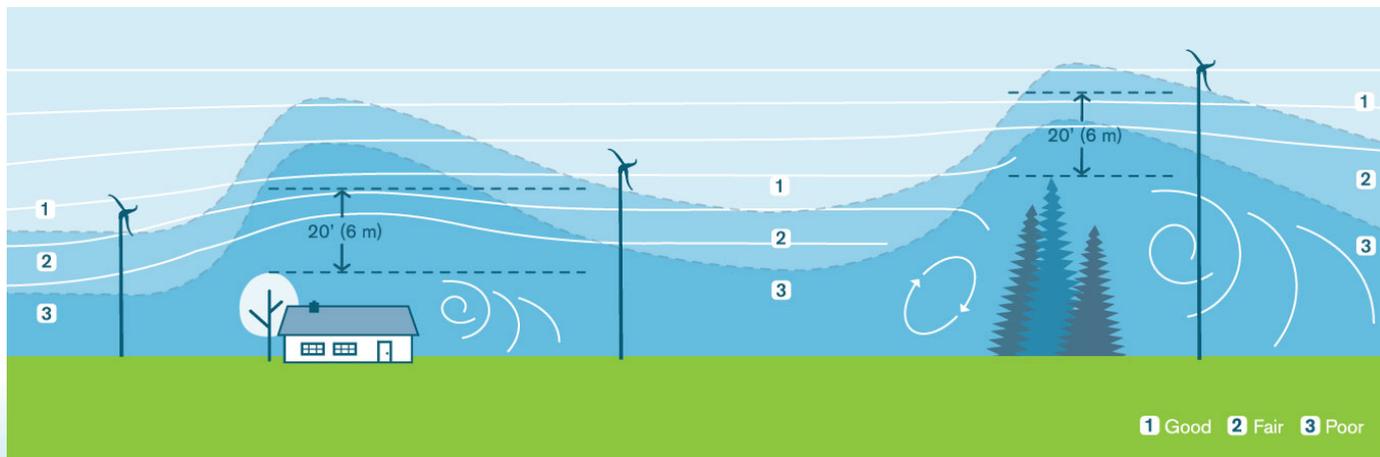
Each installation is likely to be different, keep in mind the siting information when helping your client determine the best location on his/her property





Site Selection and Wind Theory

- The most important factor in wind turbine performance is proper site selection
- Things to consider



Determining your Wind Resources

- Wind maps
- Climatic and meteorological data
- Griggs-Putnam Index
- Anemometer and Data Logger



Climatic and Meteorological Data

- Data are collected at weather observation stations such as NOAA stations as well as airports
- Data is in “raw” form i.e. speed in ave. and max. measurements, direction and duration

Anemometer and Data Logger



- For collecting wind data



Griggs-Putnam Index

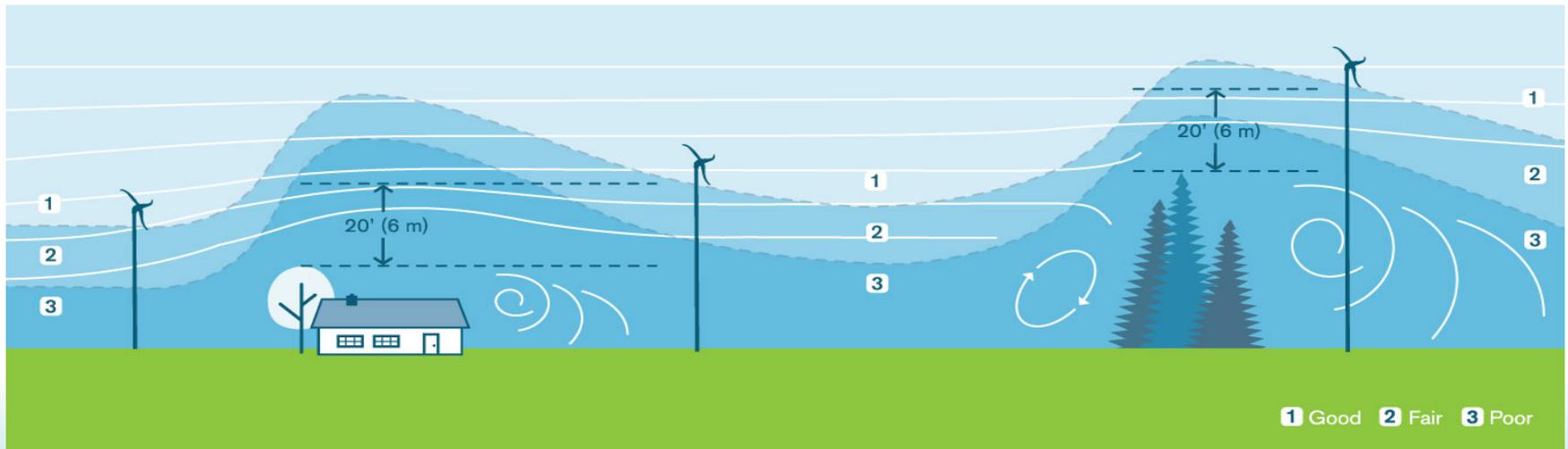


Estimating Wind with no vegetation

- Drifting Smoke Indicates Wind Direction
 - .5 mph – 3.5 mph
- Wind Felt on Face and Wind Vanes Change Direction
 - 3.6 mph – 7.5 mph
- Light Flags Extend
 - 7.6 mph – 12 mph
- Leaves and Light Papers Move
 - 12.1 mph – 17.7 mph

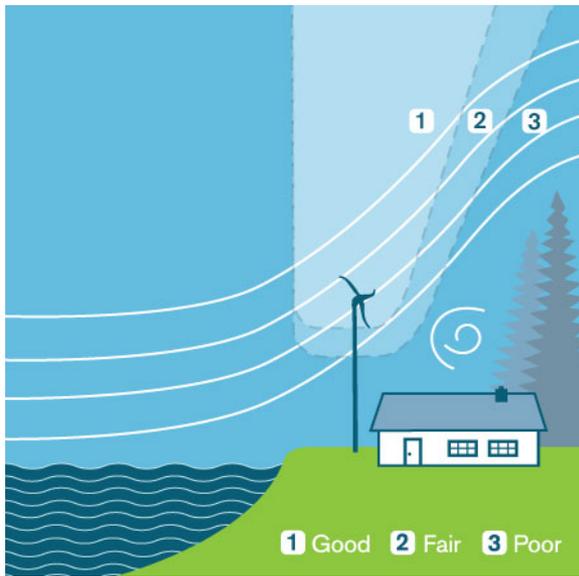
Turbine/Tower placement

- Open space with prevailing wind
- Turbulence
- Features—trees, buildings landscape
- 20/250 rule (place generator 20 feet above any obstacle within 250 feet)

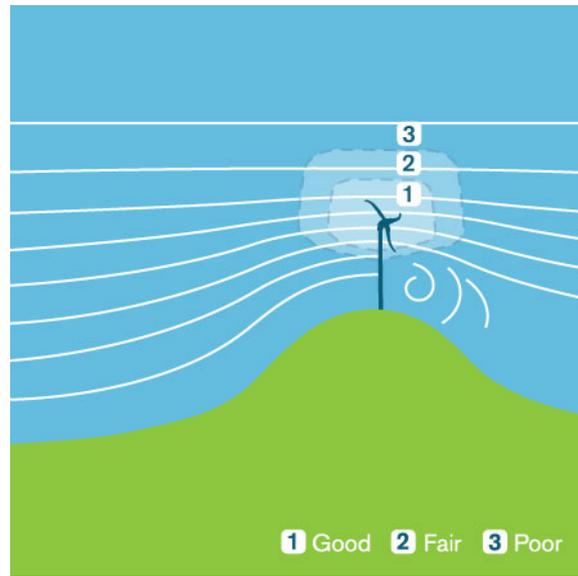




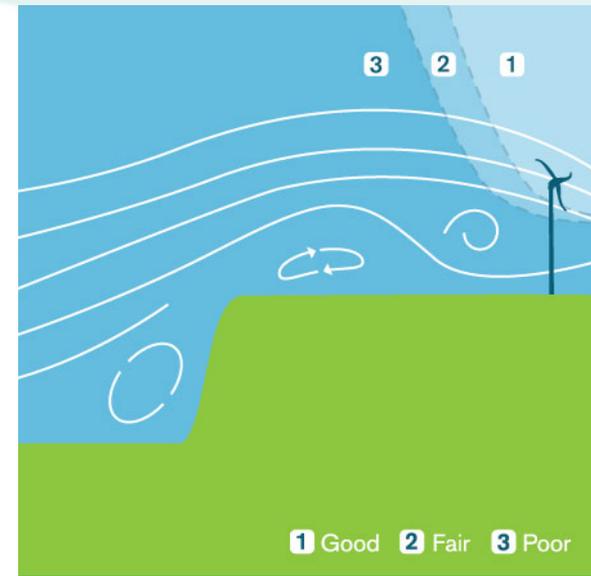
Natural Features



Coast or Lakeside



Ridge top



Mesa



Maintenance and Service

- Designed for 20 year life
- 5 Year Warranty with proper installation
- Upgrades through remote software
- Technical Support for all systems





Southwest Windpower Support

Dealer Network
Community Outreach
Governmental Contacts
Service



Skystream School Installs

Pennsylvania

- North Strabane Intermediate School
- Warrior Run School
- Bayfront Center for Maritime Studies
- St. Mary's School
- Lake Land School

Utah

- Milford High School, Milford

Nevada

- Parumph Middle School, Parumph





Thank you

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