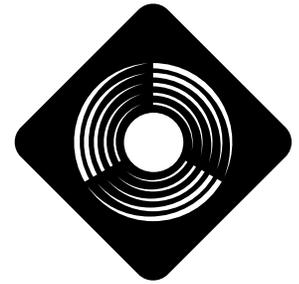


Roping the Texas Breezes



RENEWABLE ENERGY
THE INFINITE POWER
OF TEXAS

SECO FACT SHEET **NO. 14**

HIGHLIGHTS

- ◆ **Wind power has been used in Texas for more than a century**
- ◆ **The state's wind reserves are vast and largely untapped**
- ◆ **Texas wind farms are now producing electricity for the utility grid**



Roping the wind *Capturing a small portion of available wind power will contribute to Texas' electricity needs and will further rural economic development.*

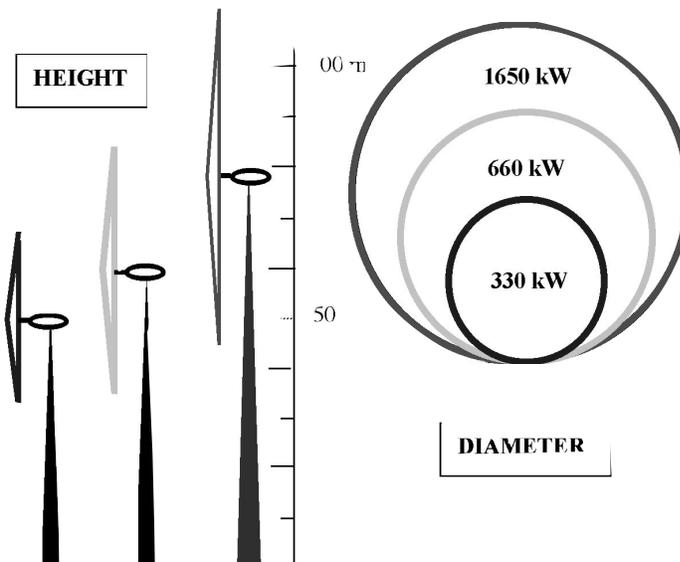
SUMMARY

More than 80,000 windmills are still in use in Texas. For decades, these simple, rugged machines have pumped water for residences and livestock. Over the coming years, wind power for electrical generation will become cheaper and more common. Large commercial wind turbines, rated at 500 kilowatts to over a megawatt, can generate electricity for as little as four to five cents per kilowatt hour. That's cheaper than electricity from new coal-fired power plants. And when costs like air pollution and greenhouse gases are factored in, wind power may be the cheapest source of electrical power available today.

WIND TURBINES

Wind chargers were common on farms and ranches prior to the rural electrification programs of the '30s and '40s. These small units were rated at 100 Watts to 1 kilowatt

(kW), with blades 1 to 3 meters in diameter. Today, new generation wind turbines are being installed in the windiest parts of the state. These massive wind turbines have blades that are 30 to 70 meters in diameter,

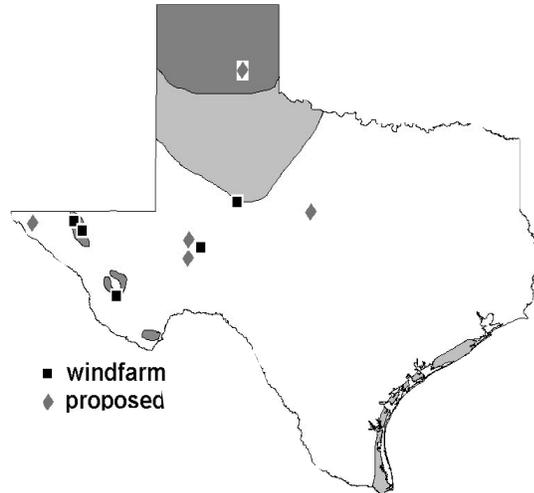


Relative size of wind turbines installed on Texas wind farms

The 1650 kW turbine is taller than the Statue of Liberty.



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■ windfarm
◆ proposed

can produce 300 kW to over a megawatt (MW) of power and are mounted atop towers 40 to 80 meters tall.

TEXAS-SIZE POTENTIAL

Texas has a large wind energy potential with the main regions being in West Texas, the High Plains, and along the coast from Mexico to Matagorda. Studies have shown that the annual capturable wind power is approximately 250,000 MW, which is around four times the state's current total electricity generating capacity. Lands suitable for wind power in Texas are buildable lands that have measured average wind speeds of 12 mph at 33 feet (class 3).

Utilities and wind farm developers are seeking out the windiest locations in Texas. The best locations – on top of mountains and mesas in West Texas and along ridges in the Panhandle – will be developed first. Future generations of wind machines will make it economically feasible to

Texas wind potential *Windy areas in Texas are indicated on the map as shaded areas (darker color represents stronger wind speeds). New projects are coming online in 2001.*

utilize a far greater portion of the Lone Star State's wind potential.

WIND-DRIVEN MEGAWATTS

From 1981 to 2000, the total capacity of wind turbines installed in the US jumped from 10 MW to 13,500 MW. Electric utilities are turning to wind power because of its attractive economics. Wind turbines are modular, can be installed rapidly and will produce electricity that is cheaper than new coal fired plants. Much of the recent growth in the domestic wind power industry has occurred in Texas.

In general the installed costs for wind farms are around \$1,000/kW. Wind turbines can generate electricity for \$0.04 to 0.05/kWh in the windiest sites with an average wind speed of 14 mph at 33 feet (class 5)

and above. Maintenance costs are less than \$0.01/kWh. With the production tax credit for wind, electricity can be generated for \$0.035 to 0.04/kWh. Wind farms are similar to the oil and gas business, as landowners receive payment for resource assessment on acres leased. The landowner can receive royalties of 2 to 4% on production of electricity from wind farms, which for a 50 MW wind farm can amount to \$100,000 or more per year. The long-term goal for wind turbines is to develop units that can produce electricity from \$0.025 to 0.03/kWh at class 3 wind sites.

WIND PROJECTS IN TEXAS

From 1995 to 2000, 187 Megawatts of wind turbines were installed in five Texas wind farms. The 187 MW provide enough electricity each year for approximately 40,000 homes. Another 500 MW in wind farms are being developed or are planned for 2001, and more will follow. Projects are located in or near the Delaware Mountains, Fort Davis, McCamey, King Mountain, Big Spring, Trent, and the Texas Panhandle. Electric utilities are turning to wind power because of its attractive economics.

The first large-scale wind farm was installed in the Delaware Mountains

Location	Megawatts
Delaware Mountains I	35
Delaware Mountains II	30
Big Spring I	34
Big Spring II	6.6
Fort Davis	6
McCamey (Southwest Mesa)	75
Under development or planned	
McCamey (King Mt I)	76
McCamey (King Mt II)	200
Trent Mesa	130
Panhandle	25
Hueco Mountains	1.3
TXU/LCRA	82.5
Other	48

in Culberson County in 1995. The 112 turbines provide electricity to the Lower Colorado River Authority. The original wind farm of 35 MW was developed on land leased from the state's Permanent School Fund. The project pays approximately \$100,000 per year in royalties to the fund, which helps to educate the youth of Texas. Since then an additional 30 MW wind farm has been installed on the site with 40, 750 kW units manufactured by Zond, now Enron Wind. The wind farm at Fort Davis is a six MW site for the wind turbine verification program, one of the research projects for utilities in the U.S. The wind turbines at Big Spring were installed in 1999. Eight of the units are 1,650 kW, so far the largest units installed in the U.S. The largest wind farm in Texas at 200 MW is now being planned by TXU and FPL Energy in McCamey.



SOURCE: ALTERNATIVE ENERGY INSTITUTE

Texas Wind Power In the Delaware Mountains, south of Guadalupe Mountains National Park, this wind farm's turbines are 330 kW.

FARMING & RANCHING WITH THE WIND

Although large utilities are getting the most attention for their move into wind power, Texas agricultural producers and rural residents continue the long-standing tradition. While some of the Aeromotors of the 1930s continue pumping water for cattle and crops, many are at the end of their lives. Some are being replaced with solar photovoltaic (PV) units, especially in the Trans Pecos region. New water pumping systems, which combine wind and PV, are now available as well. Rural Texans are also installing small-scale wind power systems as stand alone sources of isolated power from 300 W to 5 kW.

A WINDY FUTURE

New wind farms are being developed in response to one of the requirements of the state's electric industry

Large modern wind turbines In foreground is the 1.65 MW wind turbine at Big Spring; in the background are 660 kW units.

restructuring law signed by Gov. George W. Bush in 1999. The law sets a target for development of 2,000 MW of new renewable energy resources by 2009. Because of the economics, it is expected that most of this 2,000 MW will be from wind farms. These new wind farms will be a major factor for rural economic development in the state.



SOURCE: ALTERNATIVE ENERGY INSTITUTE

ORGANIZATIONS

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RESOURCES

FREE TEXAS RENEWABLE ENERGY INFORMATION

For more information on how you can put Texas' abundant renewable energy resources to use in your home or business, visit our website at www.InfinitePower.org or call us at 1-800-531-5441 ext 31796. Ask about our free lesson plans and videos available to teachers and home schoolers.

ON THE WORLD WIDE WEB:

U.S. Department of Agriculture. Wind and solar water pumping, wind/diesel, and units for blade tests. Located 12 miles west of Amarillo, Texas; site is available for tours.
www.cprl.ars.usda.gov

Trent Mesa Wind Farm: www.trentmesa.com

El Paso Electric: www.elpasoelectric.com/internetsite/www_epesite.nsf/homens

Lower Colorado River Authority: www.lcra.org/energy/windproj.html

McCamey Wind Farm: www.fpl.com/news/1999/contents/99067.shtml

Indian Mesa I: www.wind.enron.com/

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