

The Opportunity of Wind



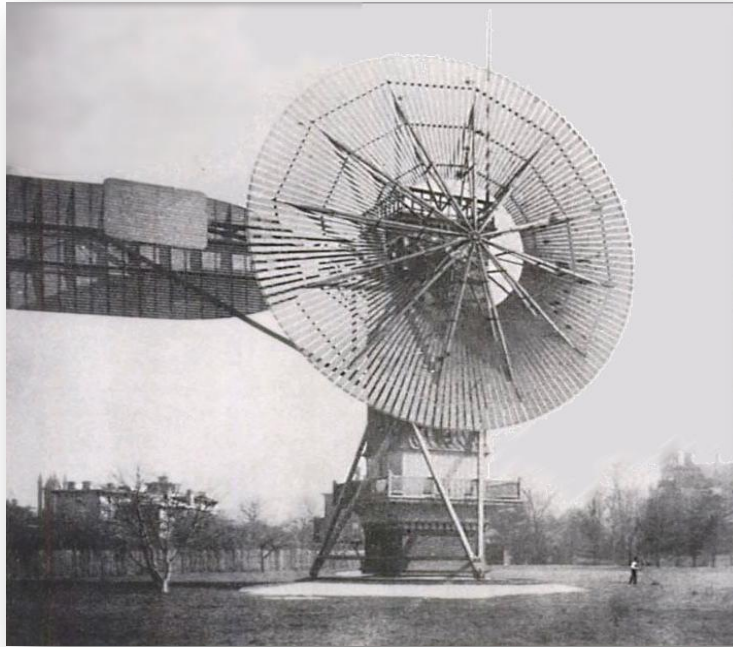
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Ed Weston, Director

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Wind Turbines: An American Invention



Charles Brush Cleveland, OH
12 Kilowatts 1888



NASA Oahu, HI
3.2 Megawatts 1980



GLWN.....*Call us Global*

- ◆ **Membership-based, Non-Profit**
- ◆ **International Supply Chain Advisory Group**
- ◆ **1500 companies across 35 States + Canada**
- ◆ **Supplier Headhunters for the Wind Industry**
- ◆ ***Resource* for Suppliers and Service Providers**
- ◆ **Mission:**
 - Localize New Business Opportunities*
 - Increase the Domestic Content of North America's Wind Turbines*

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The Players



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NA Mfgs Operating Today

Wind Turbine OEMs

- ◆ General Electric
- ◆ Gamesa
- ◆ Clipper Windpower
- ◆ Acciona
- ◆ DeWind
- ◆ Northern Power
- ◆ Vestas
- ◆ Nordex
- ◆ Siemens



What's Exciting? New Assembly Plants

Siemens,

Kansas, 600 turbines/yr

Vestas,

Colorado, 1,400 turbines/yr

Nordex

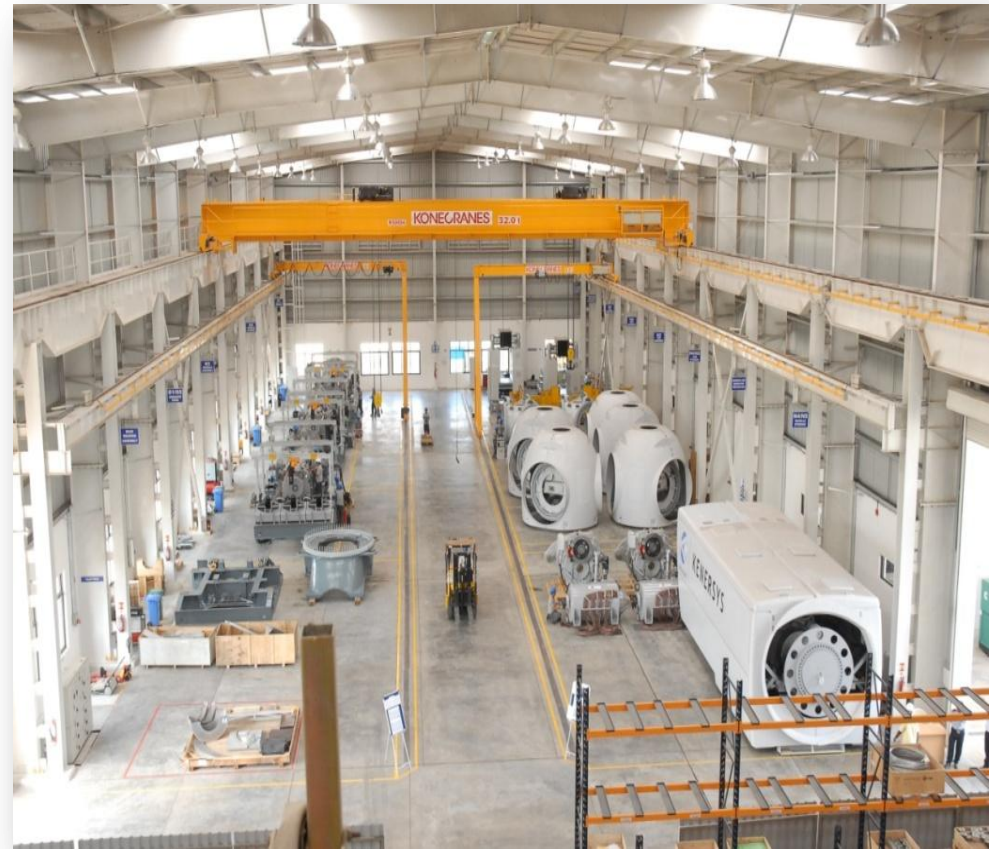
Arkansas, 300 turbines/yr

Aeronautica

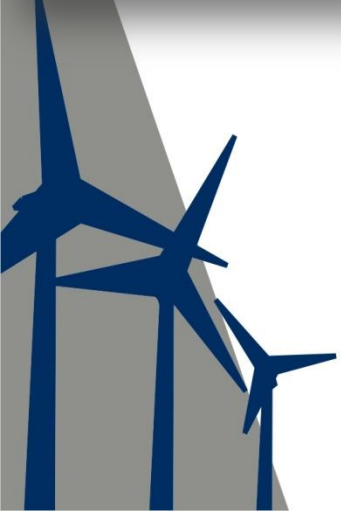
New Hampshire, 200/ yr

Alstom

Texas, 300 turbines/yr



The Parts



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Turbine Components

There are over 8000 components in a turbine, including:

Towers:

- ◆ Towers
- ◆ Ladders
- ◆ Lifts

Rotor:

- ◆ Hub
- ◆ Nose Cone
- ◆ Blades
- ◆ - Composites
- ◆ - Blade Core
- ◆ Pitch Mechanisms
- ◆ Drives
- ◆ Brakes
- ◆ Rotary Union

Nacelle:

- Nacelle Cover
- Nacelle Base
- Heat exchanger
- Controllers
- Generator
- Power Electronics
- Lubricants
- Filtration
- Insulation
- Gearbox
- Pump
- Drivetrain
- Ceramics
- Shaft

Foundation:

- Rebar
- Concrete
- Casings

Other:

- Transformers
- Bolts/Fasteners
- Wire
- Paints and Coatings
- Lighting
- Lightning Protection
- Steel Working/Machining
- Communication Devices
- Control and Condition Monitoring Equip.
- Electrical Interface and Connections
- Batteries
- Bearings
- Brakes

Courtesy - AWEA



Towers



Wind Farm Construction





The Benefit

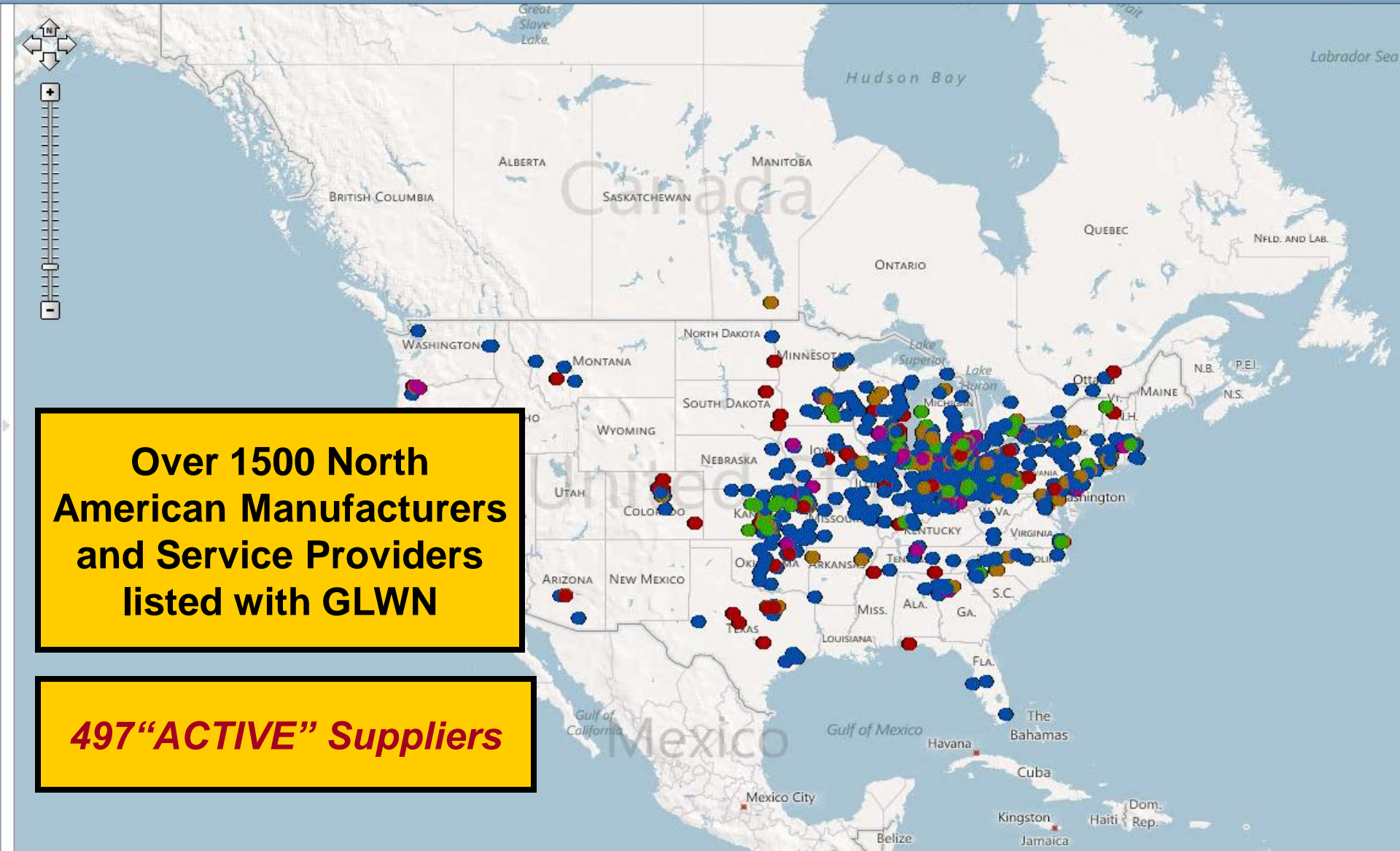


How much is 10 Gigawatt\$?

- ◆ 10,000 MW or 10,000,000 kW **2.5 million homes**
- ◆ OE Parts for 5,500 Turbines **\$7,000,000,000**
 - New Towers **\$1,650,000,000**
 - Gears, Shafts **\$ 235,000,000**
 - Fabricated Frames **\$ 106,000,000**
 - Roll-threaded studs **\$ 34,000,000**
- ◆ Balance of Plant
 - Cubic Yds Concrete **980,000**
 - Pounds of Rebar **190,000,000**



GLWN Wind Supply Chain



Over 1500 North American Manufacturers and Service Providers listed with GLWN

497 "ACTIVE" Suppliers



Medium Intensity
Obstruction Lighting

FTS 370i

The VANGUARD LED Series
The Next Generation in LED Lighting

Application

The Vanguard LED series by Flash Technology is the most advanced lighting system on the market today.

The Vanguard series provides improvements over all lighting features from previous generations utilizing the latest LED technology. With more intelligent features to ensure longer life and provide easier installation, the Vanguard 370i is a clear leader in wind obstruction lighting.

Features/Benefits

- By-pass circuitry & monitoring that allows the loss of individual LED's to the 25% limit in FAA Engineering Brief 67 ensuring product life and preventing string failures from the loss of a single LED.
- New Patent Pending Photodiode Control: Drastically decreases the variation in mode change time by allowing the same amount of light into the detector regardless of nacelle orientation relative to the sun. The photodiode reduces calibration drift that was possible in the resistive photocell used in previous generations.
- Superior performance against lightning, power surges, and transient voltages. Tested to 10 times the IEC 61000-4-5 specifications standard, up to 20 kA.



Patent Pending

- Improved synchronization capability to address noise, RF, and electrostatic interference
- Intelligent beacon that can be configured for a global wind marking solution
- ETL/FAA, CSA, DGAC, and CE certification pending

Specifications

- Watts: 7
- Input Voltage : 90-264 VAC
- Frequency: 47-63 Hz
- Dimensions: 15.75" dia. x 7.31" (8.69" top of GPS)
- Weight: 26.3 lbs.(11.92 kg)
- Protection Rating: IP65, NEMA 4X
- DC Alarms: Yes

➤ Flash Technology

Sustained Growth and US Jobs : Depend on National Policies

Energy:

Extending the Grid
Incenting
Renewables, too

Manufacturing:

Offsetting Subsidized
Competitors





Thank You

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