



Wind Industry Global Markets and Export Potential

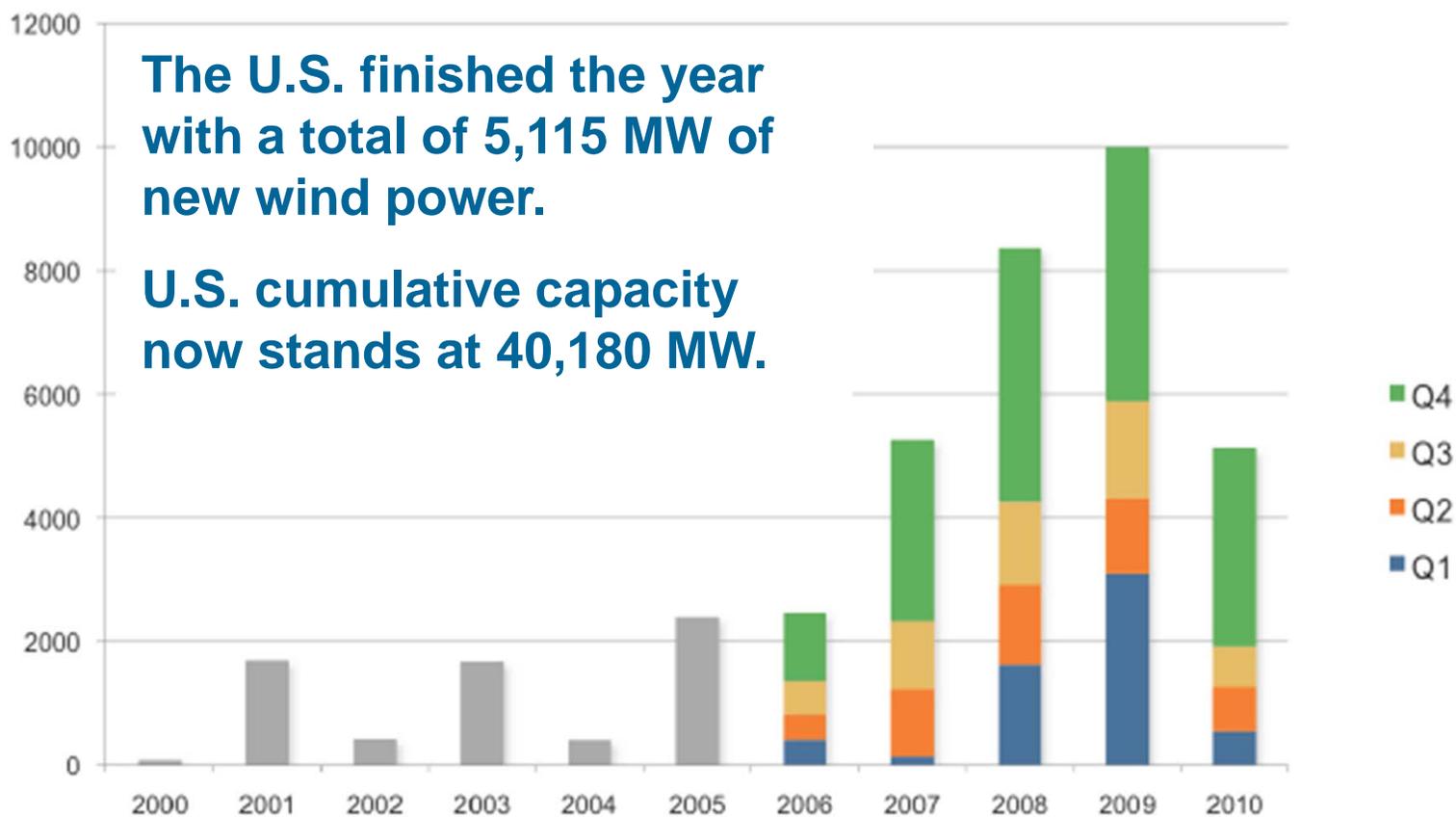




US Market and Manufacturing

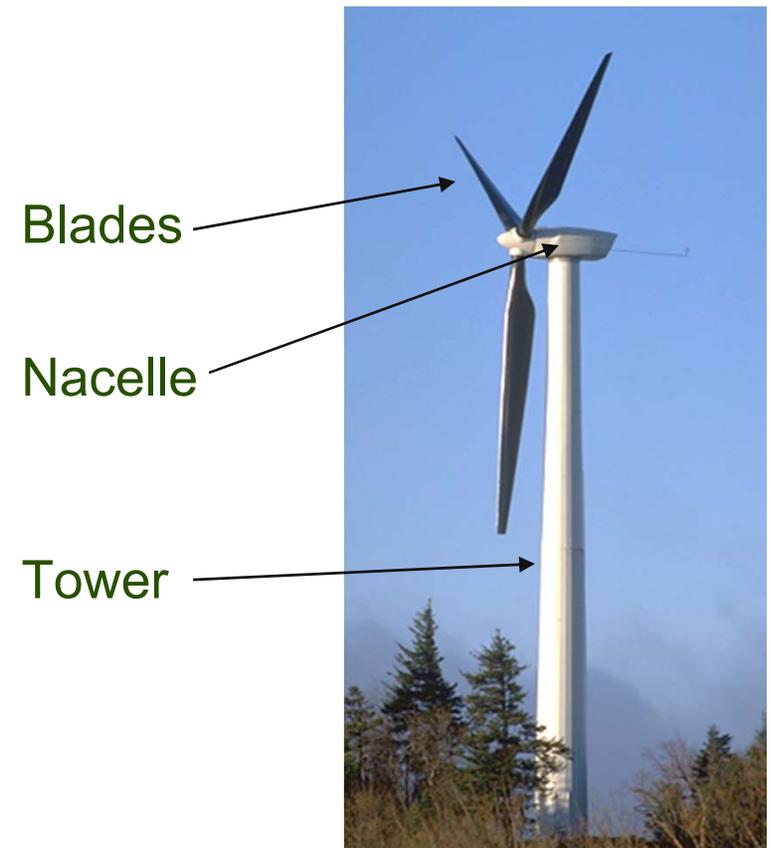


U.S. Wind Capacity Installations



Fundamentals of Wind Power

- A rotor, or blades, which convert the wind's energy into rotational shaft energy
- A nacelle containing a drive train, usually including a gearbox and a generator
- A tower, to support the rotor and drive train; and electronic equipment such as controls, electrical cables, ground support equipment, and interconnection equipment.



Turbine Components

There are over 8,000 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
Lighting Protection
Steel Working/Machining
Communication Devices
Control and Condition Monitoring Equipment
Electrical Interface and Electrical Connection
Batteries
Bearings
Brakes

US Current Production

Towers: Majority made in US

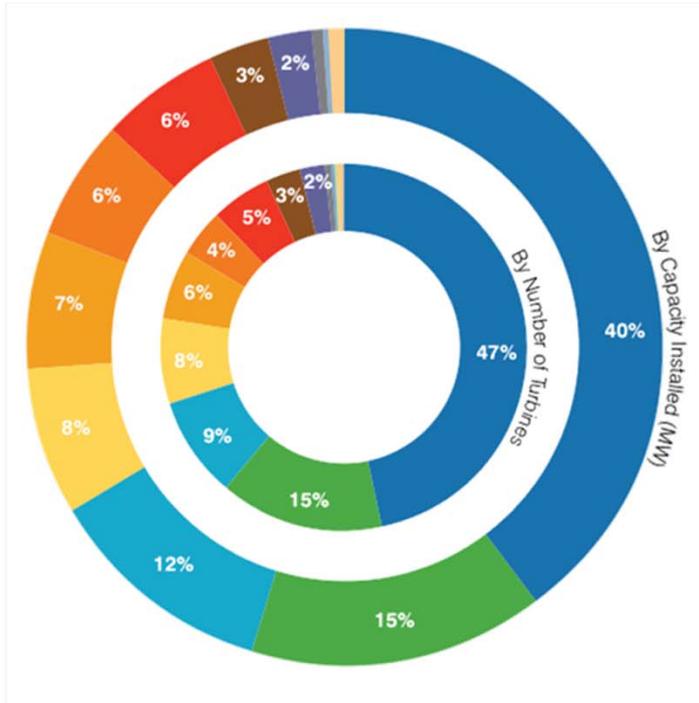
Blades: Majority made in US

Assembled Nacelles: Rapid, recent growth in US

Components: Some made in US

Services: Many mature service providers

OEM Nacelle Assembly in the US

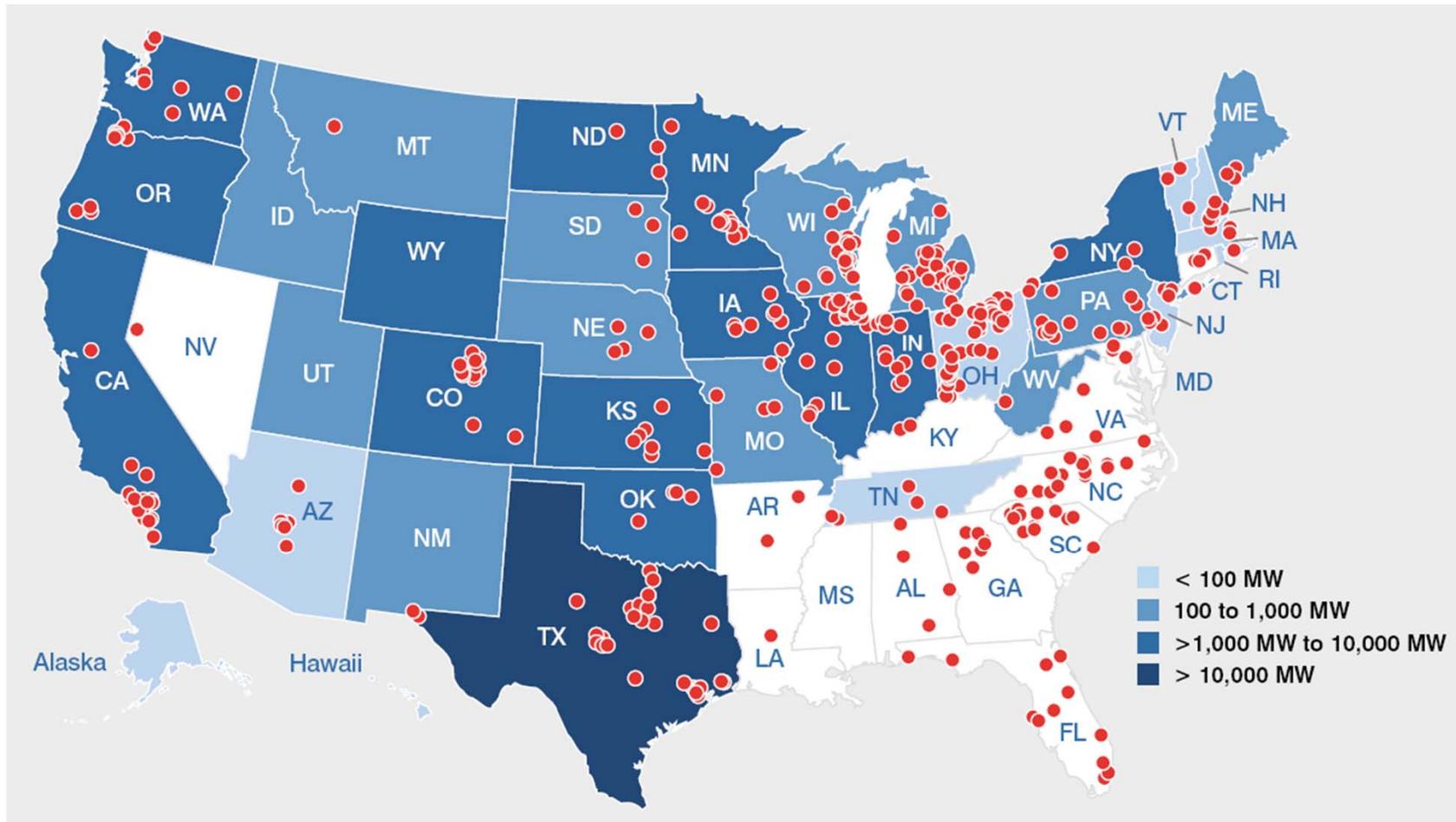


Company	# of Turbines	MW Capacity
GE Energy	2663	3995
Vestas	830	1488
Siemens	505	1162
Mitsubishi	428	751
Suzlon*	344	702
Clipper	242	605
Gamesa	300	600
REpower*	165	330
Acciona Windpower	136	204
Nordex	25	63
AAER	4	6
DeWind	3	6
Goldwind	3	5
Northern Power Systems	32	3
Fuhrlander	2	3
unknown	20	74
Total (Utility-Scale)	5702	9996

88% of the 2009 market (by MW) was captured by OEMs with announced or online US manufacturing facilities

Manufacturing Facilities

Over 400 facilities in the US manufacture for the wind industry





Export Opportunities and Global Markets



Fundamentals of the Wind Industry

Large national markets with some long-term market signal will attract domestic manufacturing of the largest components in order of towers, blades, nacelles. Large markets may also localize manufacturing of many sub-components.

The US has high potential to export turnkey projects, assembled nacelles, blades and services to growing, immature markets that lack domestic manufacturing. Tower export potential will be small but possible.

- Level of industrialization in target market plays role in degree of exported components

The US has potential to export subcomponents and services into large, mature markets that have localized manufacturing

Areas where US develops unique IP allows exports into variety of markets. The US needs a strong domestic market to be a leader in IP and commercialization of exportable new technologies.

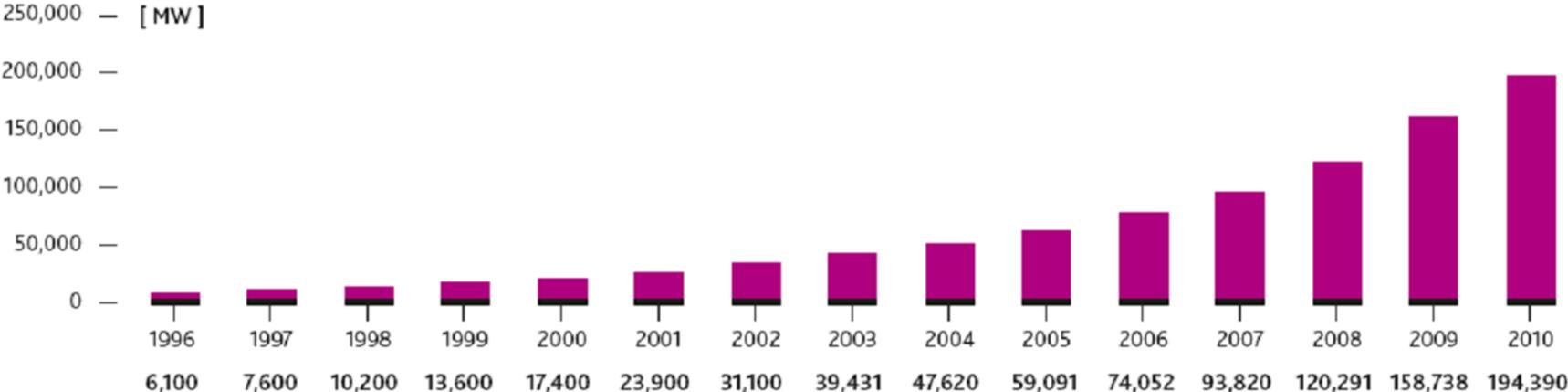
Who's the competition for exports?

Western Europe: traditional manufacturing and services hub for the wind industry

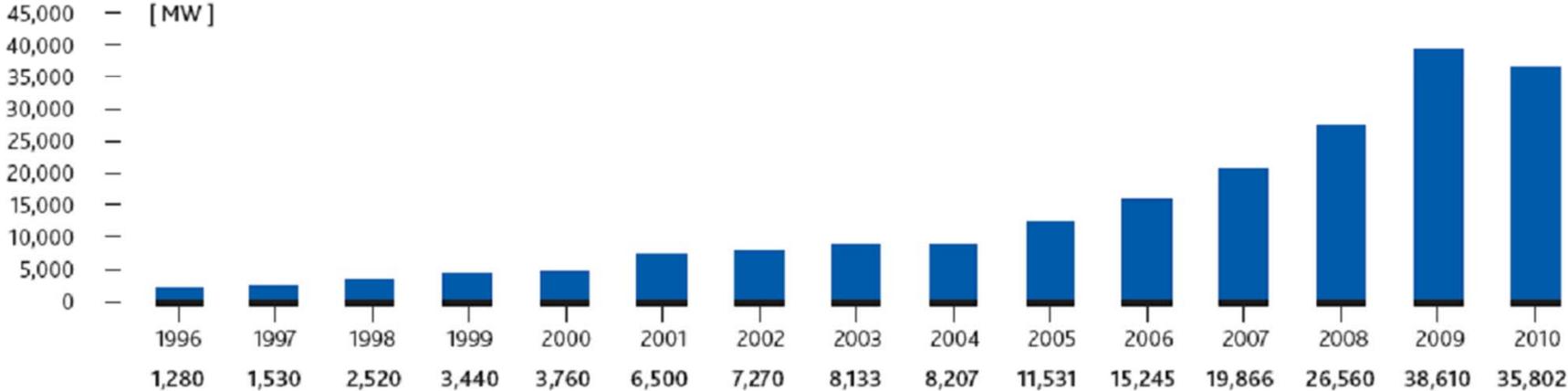
China/Asia: major new market has created regional manufacturing and services

Global Wind Market

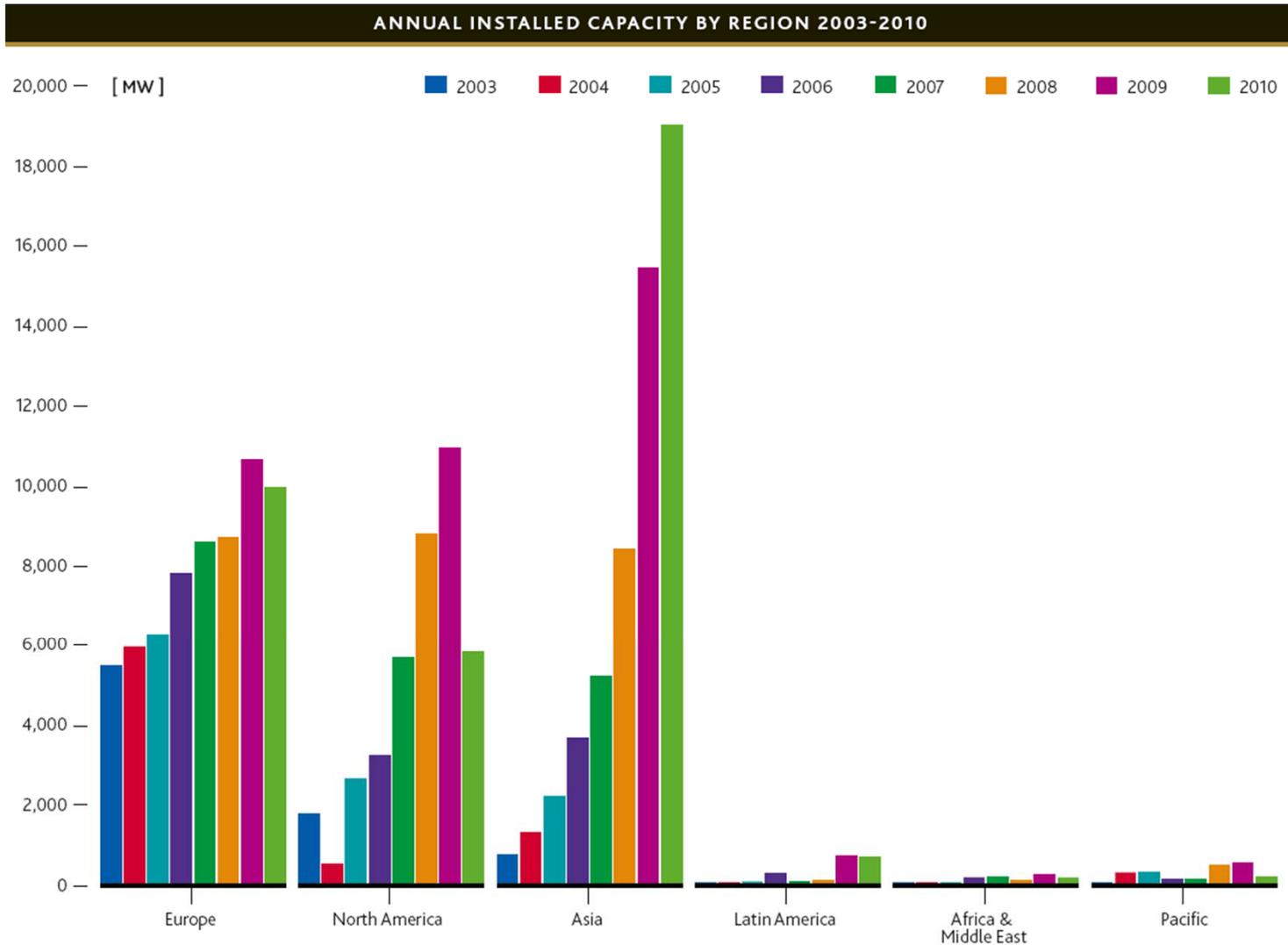
GLOBAL CUMULATIVE INSTALLED WIND CAPACITY 1996-2010



GLOBAL ANNUAL INSTALLED WIND CAPACITY 1996-2010



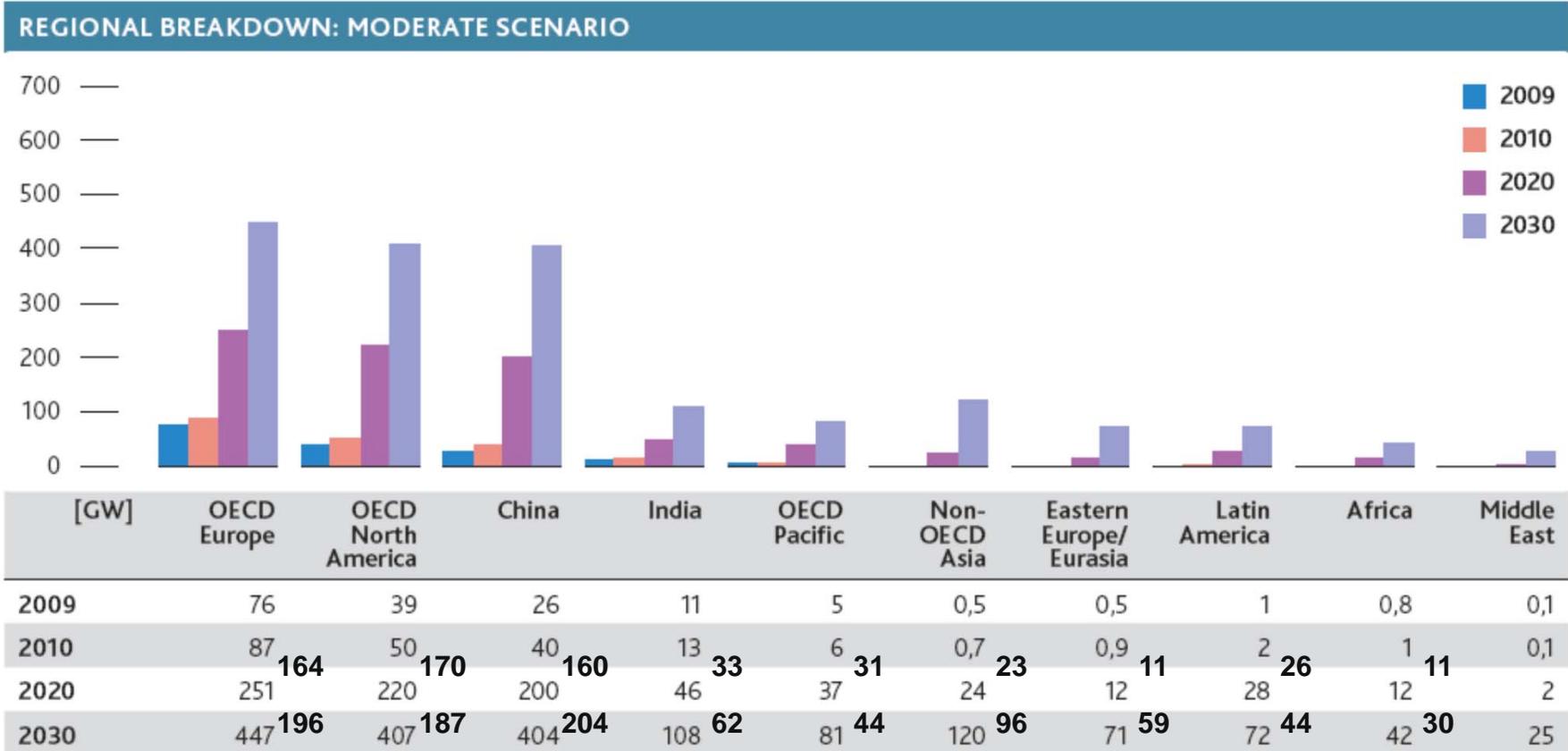
Regional Wind Markets 2003-2010



2010 Largest National Markets

Country	MW	%
China	16,500	46.1
USA	5,115	14.3
India	2,139	6.0
Spain	1,516	4.2
Germany	1,493	4.2
France	1,086	3.0
UK	962	2.7
Italy	948	2.6
Canada	690	1.9
Sweden	603	1.7
Rest of the world	4,750	13.3
Total TOP 10	31,052	86.3
World Total	35,802	100

Moderate Regional Growth Scenarios



Global installed capacity as of 4Q 2010: 195 GW

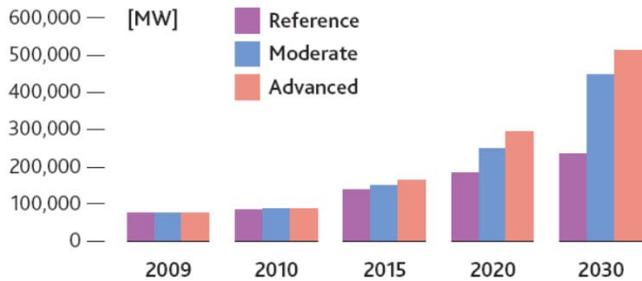
Over 600 GW of global added capacity between 2010-2020 (200 GW in low case, 900 GW in high case)

Over 900 GW of global added capacity between 2020-2030 (150 GW in low case, 1300 GW in high case)

OECD Pacific includes Japan, South Korea, Australia

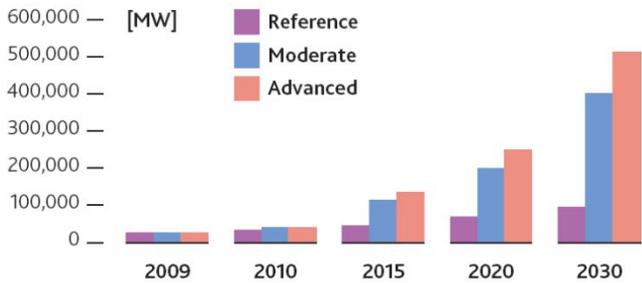
Non-OECD Pacific includes Thailand, Vietnam, Philippines, Indonesia, etc

OECD EUROPE: CUMULATIVE WIND POWER CAPACITY 2009-2030



Year	Reference	Moderate	Advanced
2009	75,565	75,565	75,565
2010	85,696	86,175	87,140
2015	138,596	150,049	163,109
2020	183,996	250,824	293,963
2030	233,796	447,432	514,806

CHINA: CUMULATIVE WIND POWER CAPACITY 2009-2030



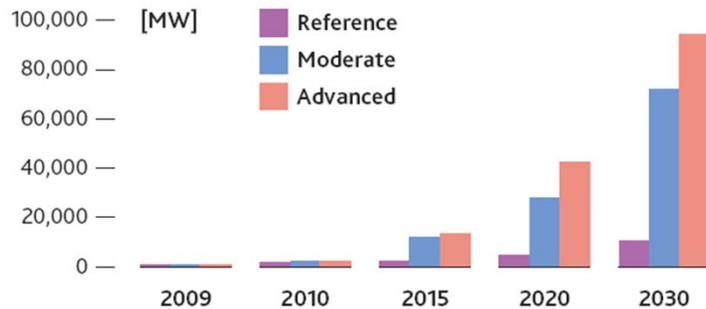
Year	Reference	Moderate	Advanced
2009	25,805	25,805	25,805
2010	32,805	39,608	41,030
2015	45,305	115,088	134,712
2020	70,305	200,026	250,397
2030	95,305	403,741	513,246

Target Markets: OECD Europe and China

- OECD Europe and China markets likely the largest markets outside of North America (around half of total global growth)
- Both have significant local supply of goods and services, but given market size low penetration can still yield positive outcomes
- US will be most competitive in exporting subcomponents for turbines assembled locally and services into Europe
- The role US companies can play in China varies but much of it is likely to be localized

Target Markets: Central/South America

LATIN AMERICA: CUMULATIVE WIND POWER CAPACITY 2009-2030



Year	Reference	Moderate	Advanced
2009	1,072	1,072	1,072
2010	1,522	1,956	2,082
2015	2,522	11,932	13,329
2020	4,772	28,004	42,224
2030	10,522	72,044	93,347

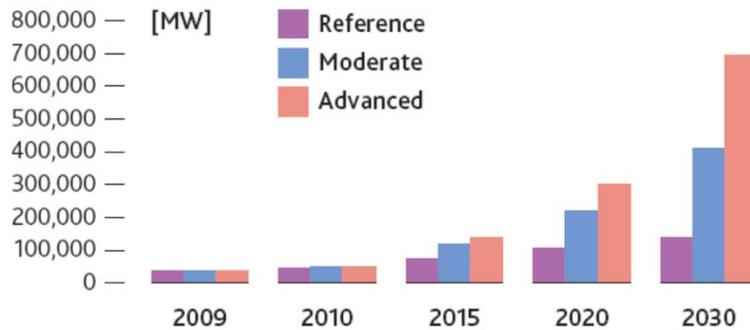
- Currently small but expected to show significant growth
- US has competitive export advantage over other major export markets due to proximity
- Brazil is most mature market, with 930 installed MW. Brazil likely to be the largest near-term market, US can be competitive in providing nacelles, sub-components and services. LCR conditions will affect.

- Existing installations in Chile, Costa Rica, Argentina and others. Non-Brazil Latin American markets offer varied opportunities, including turnkey projects, full turbine exports (potentially including towers and blades) and services

EXPORT SUCCESS: 51 2-MW Gamesa turbines, manufactured in PA, exported to Honduras in 2010 (with Ex-Im Financing).

Target Markets: Mexico/Canada

OECD NORTH AMERICA: CUMULATIVE WIND POWER CAPACITY 2009-2030



Year	Reference	Moderate	Advanced
2009	38,585	38,585	38,585
2010	45,085	49,329	49,648
2015	75,585	119,190	140,440
2020	106,085	220,041	303,328
2030	141,085	410,971	693,958

- Mexican and Canadian markets are smaller than US but growing
- Canada market segmented by provinces with some domestic supply; LCR concerns. Without LCR, potential for exports of major components, sub-components and services.
- Mexican manufacturing less developed, potential for exports of turnkey projects, turbines, major components and services
- US has competitive advantage due to proximity

EXPORT SUCCESS: 27 2.5-MW Clipper turbines, manufactured in IA, exported to Oaxaca, Mexico in 2010 (with Ex-Im Financing).

Target Markets: India, non-China Asia/Pacific, Eastern Europe, Africa

- Moderate sized, developing markets with varying degrees of industrialization/domestic supply. Moderate scenario adds 109 GW between 2010-2020.
- US has competitive disadvantage due to distance compared to other major export markets (China, Western Europe)
- Given various markets, export potential ranges from turnkey projects, full turbine exports, nacelle exports, sub-component exports and services
- Additional opportunities may exist to supply sub-components for foreign assemblers who are exporting into other foreign markets

Export Interest Guidance: International Buyer Program (IBP)

- AWEA will host the IBP at WINDPOWER 2011 in May in Anaheim
- IBP can help us identify US companies interested in exporting, will develop “Export Interest Directory” as part of IBP
- IBP can help us identify foreign markets interested in US goods and services. Current delegations include Latin America (6), Europe (5), Asia (4), Middle East (2), Africa (2) and Canada and Mexico



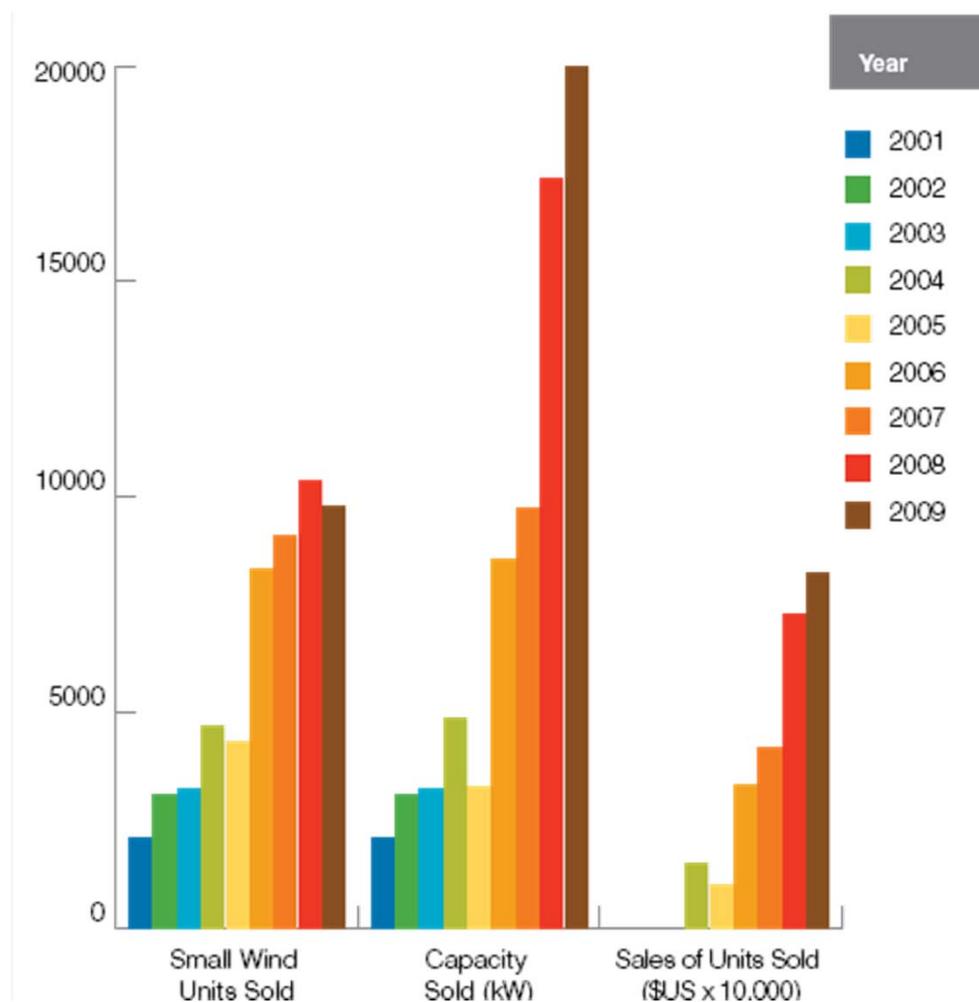
Distributed Wind Systems



Growth of U.S. Distributed Wind Market

Despite an economic downturn, the U.S. market for small wind turbines – those with rated capacities of 100 kW and less – grew 15% in 2009 with 20 MW of new capacity.

This growth equates to nearly 10,000 new units and pushes the total installed capacity in the U.S. to 100 MW.



Global Distributed Wind Market

Fig. 9: U.S. GLOBAL MARKET SHARE (kW)

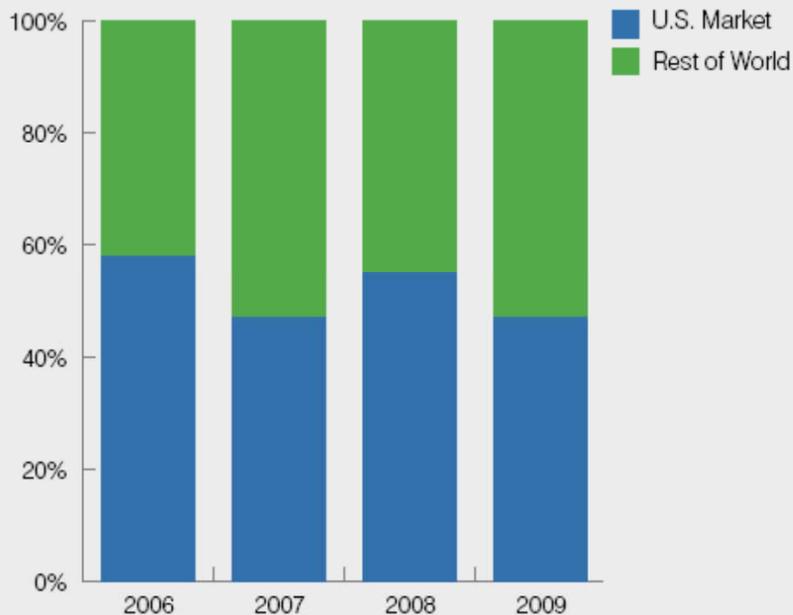
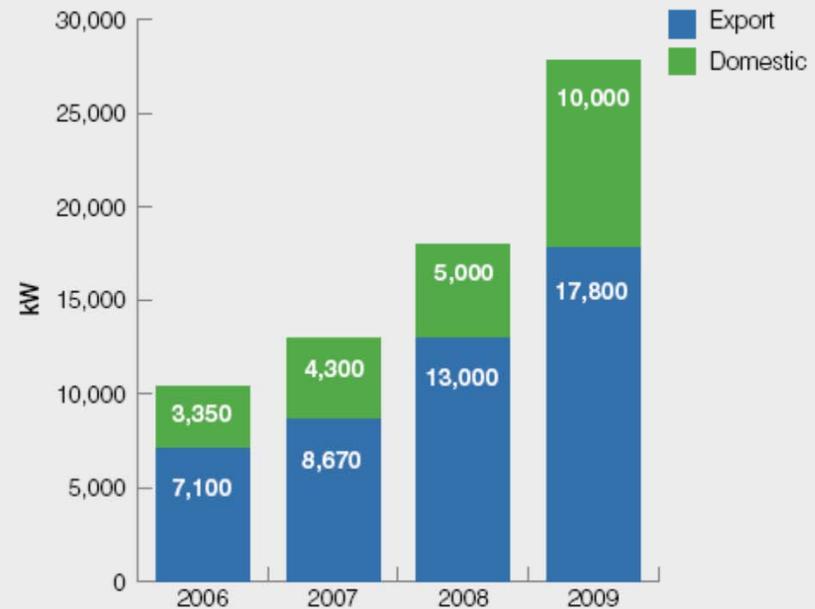


Fig. 10: U.S. MANUFACTURERS' EXPORTS (kW)



Distributed Wind Power (Small Systems)

- The number of identified manufacturers in the U.S. climbed from 66 to 95 last year. The vast majority are in start-up phases.
- Roughly half the world market share is held by fewer than 10 U.S. manufacturers.

Five Largest Manufacturers in 2009, in kW Sold

Company	Country	kW Sold
Southwest Windpower	U.S. (AZ)	11,700
Northern Power Systems	U.S. (VT)	9,200
Proven Energy	U.K. (Scotland)	3,700
Wind Energy Solutions	Netherlands	3,700
Bergey WindPower Co.	U.S. (OK)	2,100

