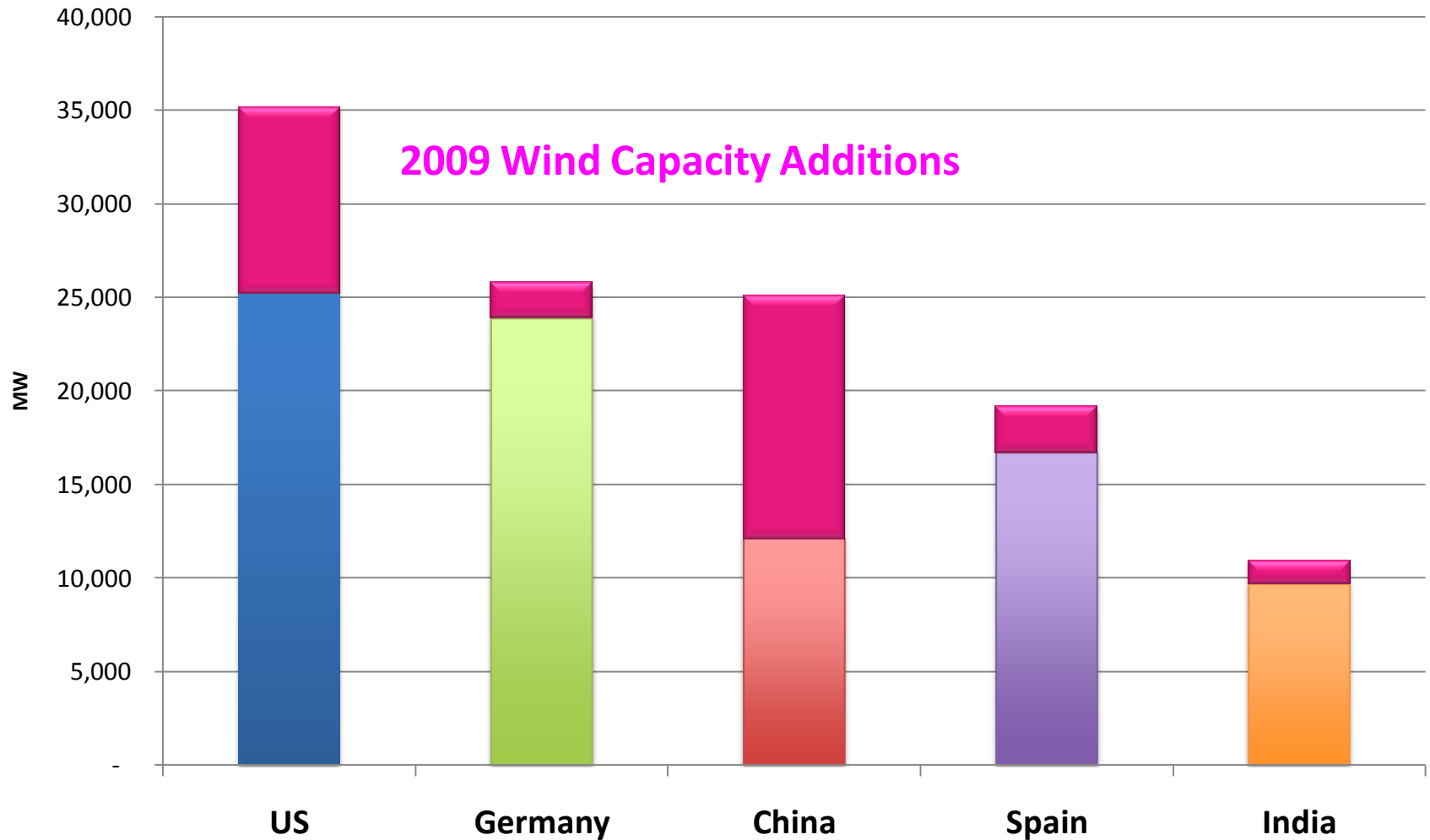


Renewable Energy Development Trends in China

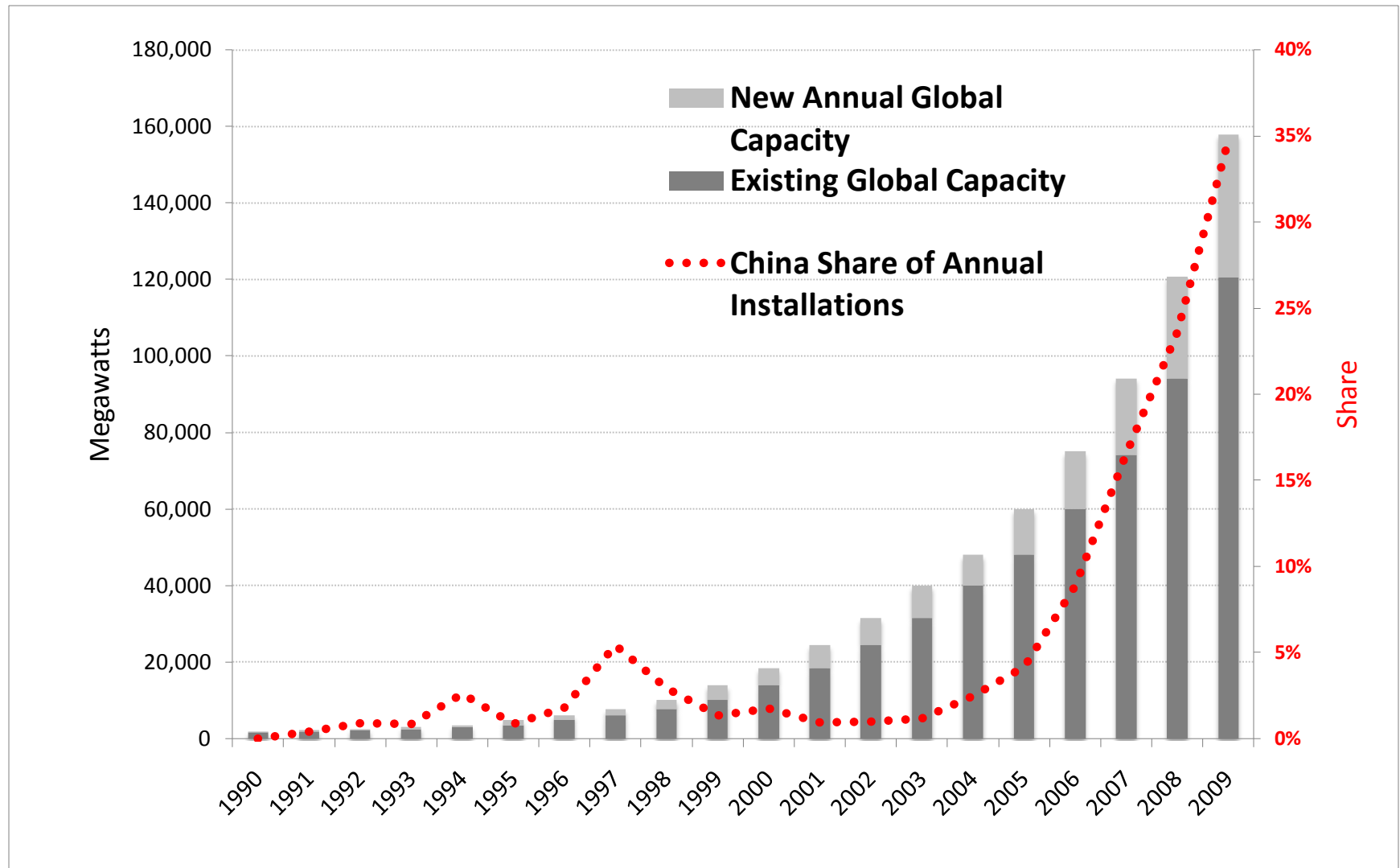


Joanna Lewis
Georgetown University
Presented at the NRDC Side Event in
Tianjin on October 6, 2010

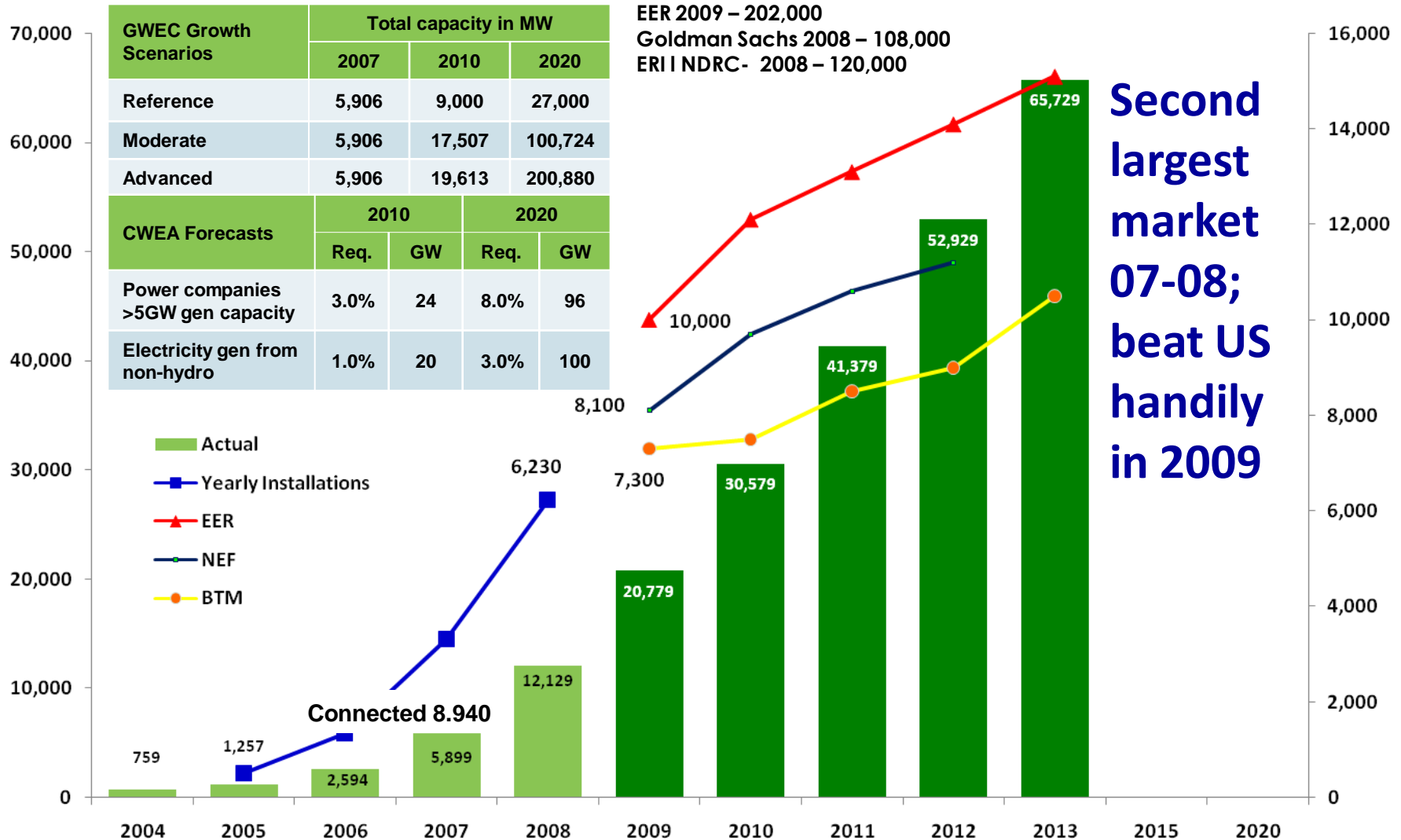
Top 5 Countries for Wind Power Capacity



China's Role in Global Wind Power Additions



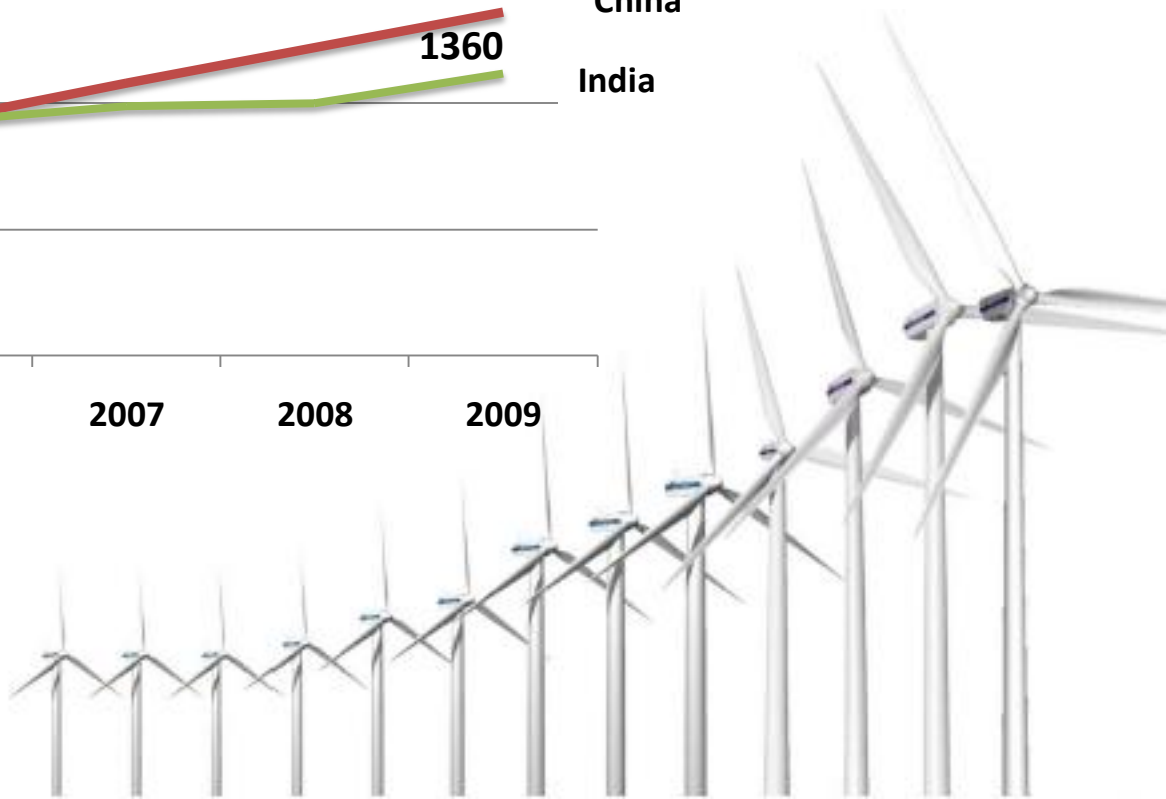
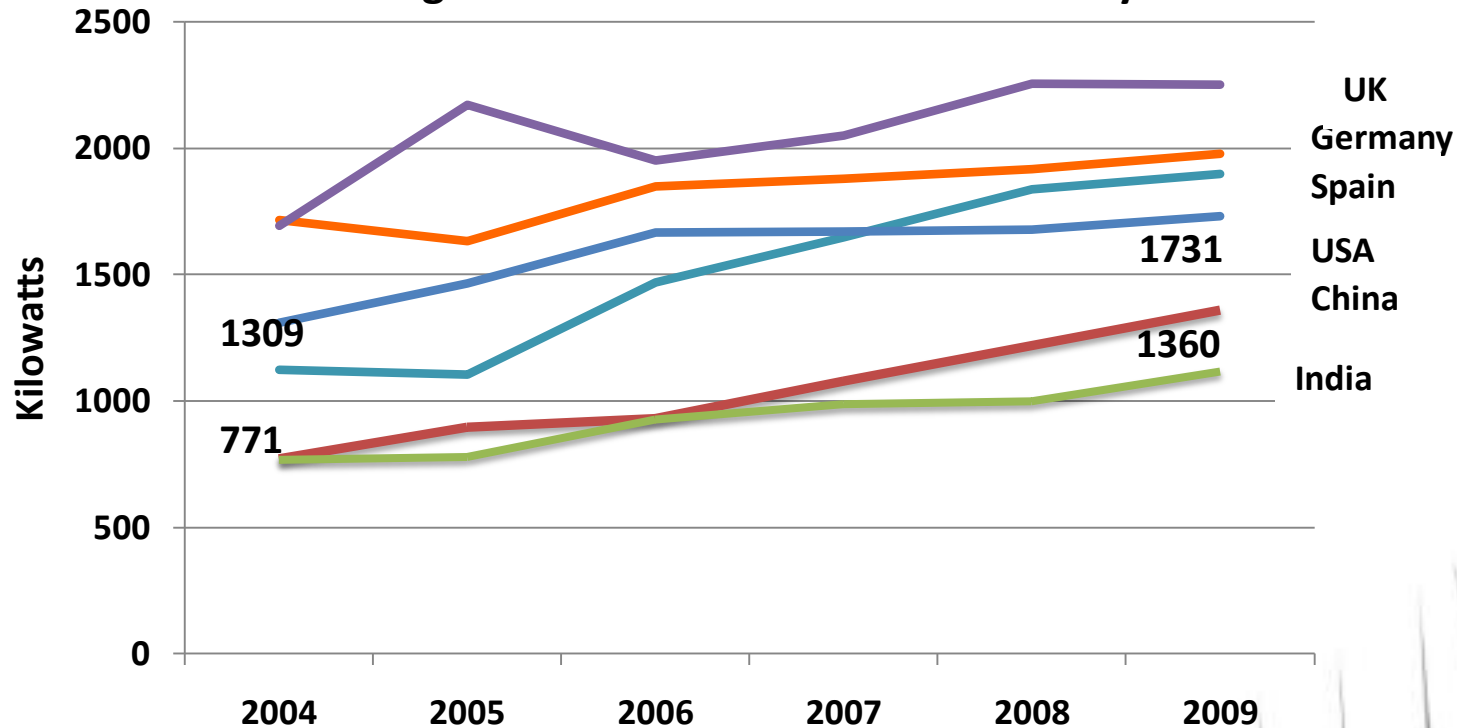
Projected Wind Power Growth



Source: Suzlon / Azure / CWEA / EER / New Energy Finance / BTM / GWEC

Wind Technology Leaders and Followers

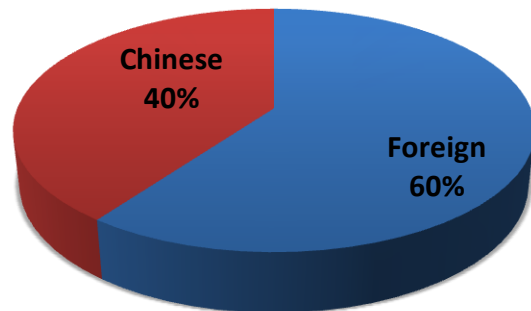
Average size wind turbine installed each year



Wind Turbine Sales by Manufacturer in China

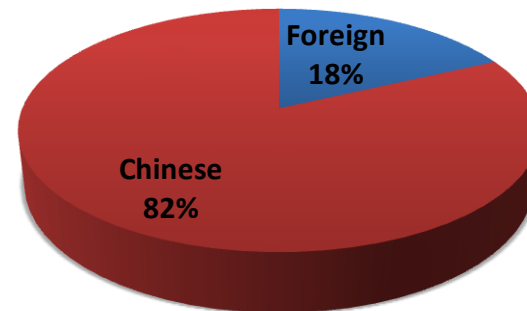
Chinese Market Shares 2006

1,337 MW total

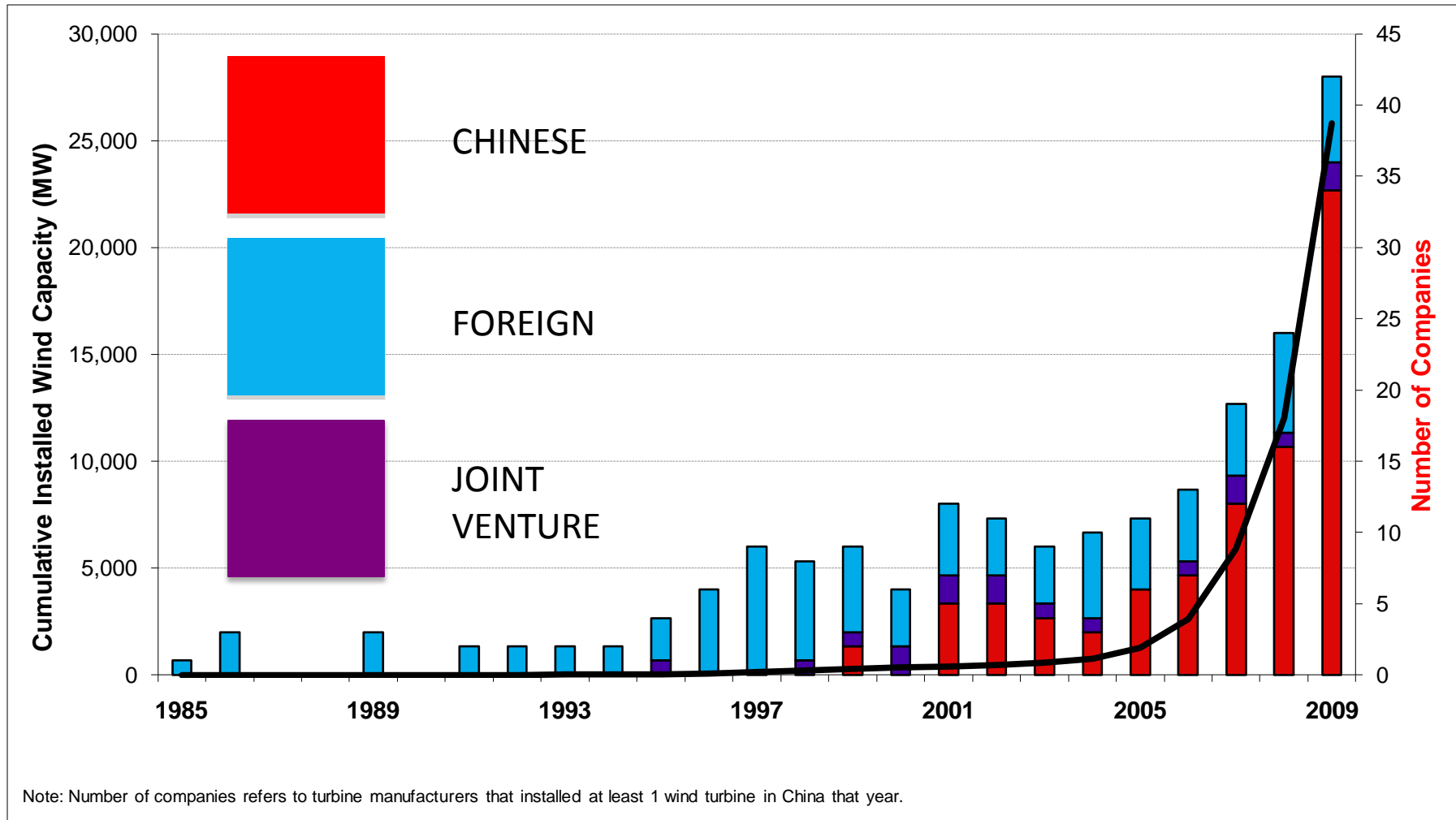


Chinese Market Shares 2009

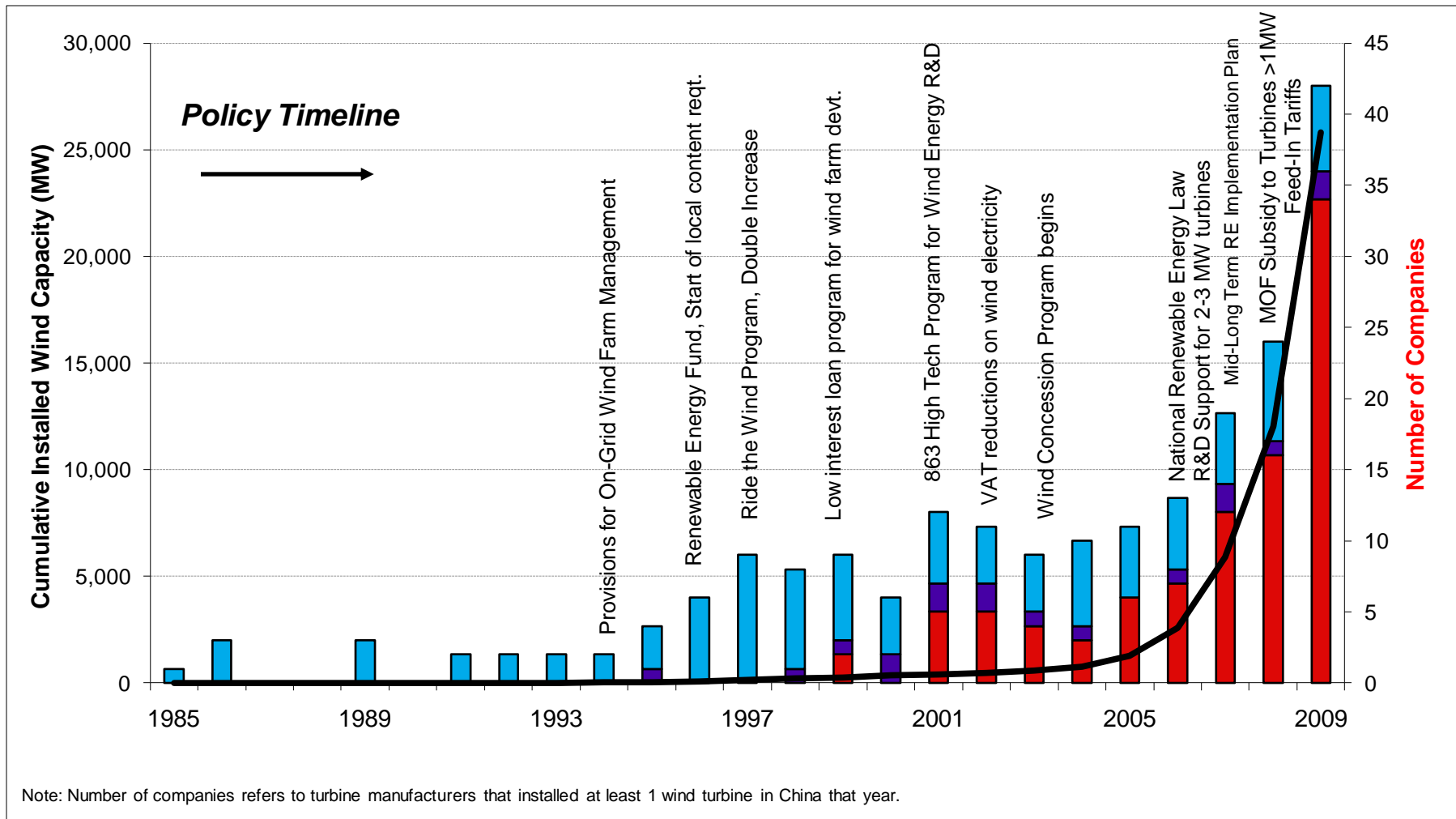
13,800 MW total



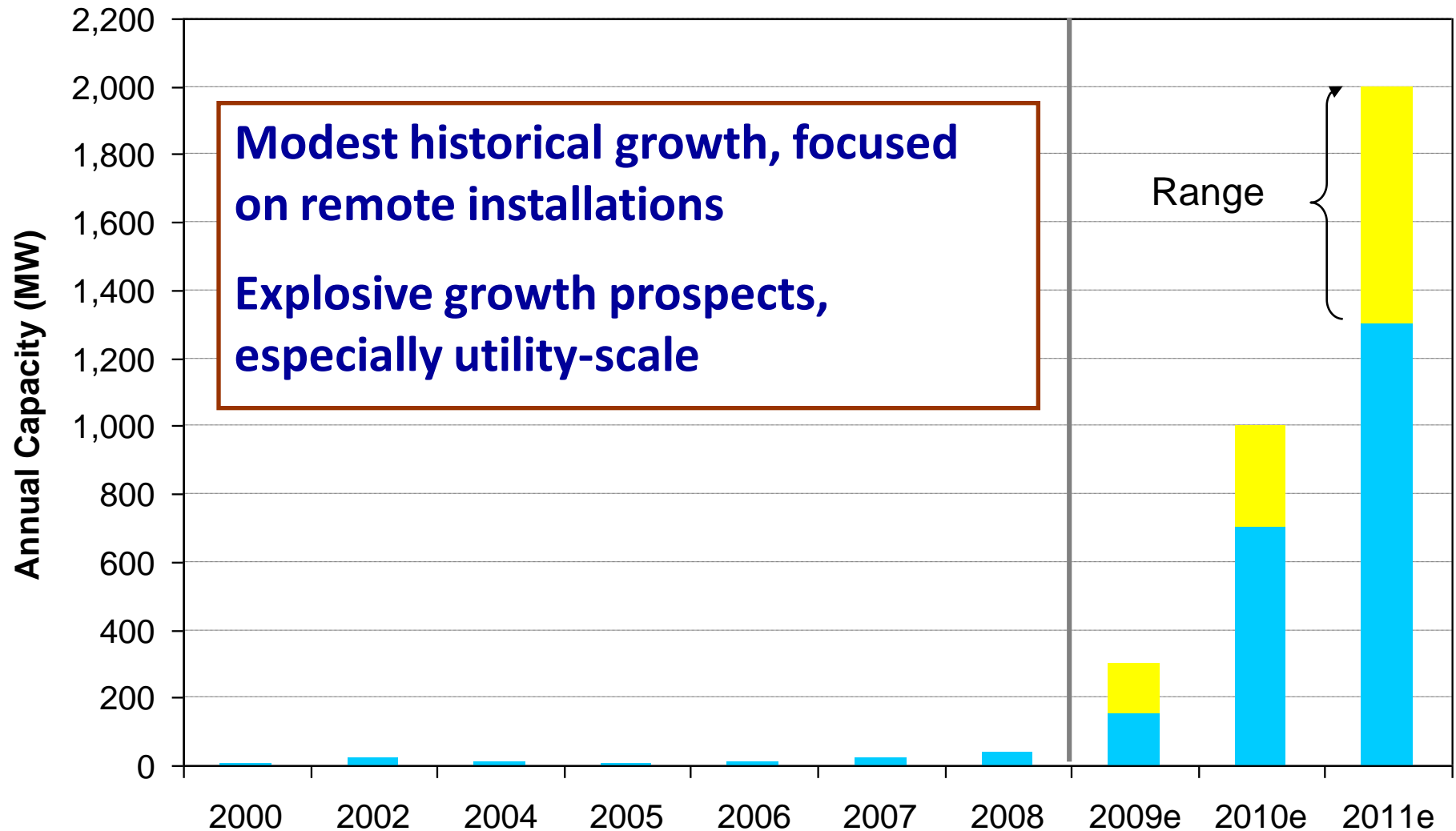
Companies in the Chinese Wind Market



Companies in the Chinese Wind Market



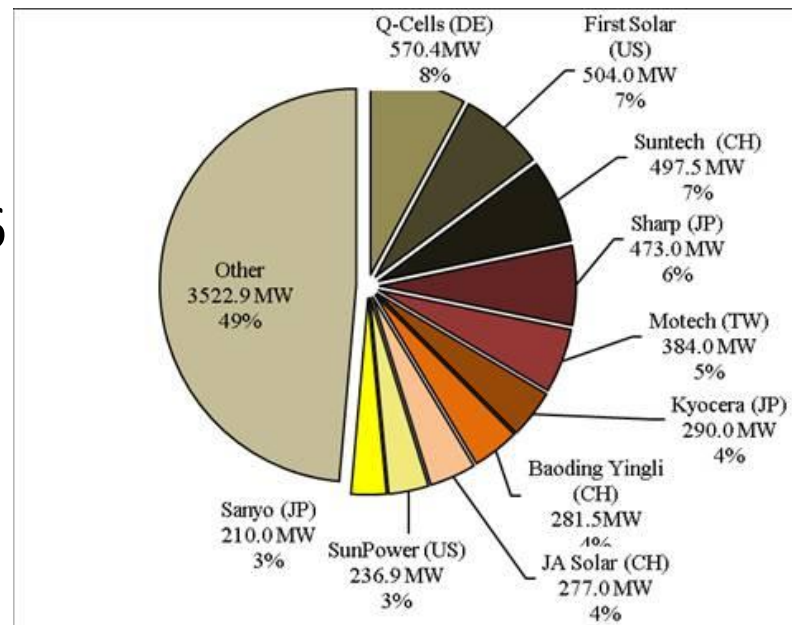
Growth in Photovoltaic Power Deployment



Source: Projections from New Energy Finance

Growth in Photovoltaic Manufacturing

- **China is #1 in cell/module manufacturing:** 1 GW of cell production in 2007; 2 GW in 2008, 1.96 GW exported; ramping to 5 GW by 2010
- **Significant source of silicon:** 20% of worldwide production likely in '09
- **Struggle to survive:** ASPs of C-Si from Chinese companies plummets from \$4/W to \$2/W in 9 months; ~50% of aspiring PV companies exit
- **International manufacturers:** Some likely to migrate to Chinese production to lower cost, access local market



Policy Framework for Renewables

- **National RE Law: January 1, 2006**
- National RE targets
- National pricing regs
- Tax incentives / CDM
- National cost sharing
- RE + trans. planning

More-aggressive solar/wind targets for 2020 on the way?

- Wind: 100-150 GW
- PV: 20 GW

Bio. to be reduced?

National Targets	2005 (Actual)	2010 (Target)	2020 (Target)
Proportion of RE in national energy mix (%)	8%	10%	15%
Hydropower (GW)	120	190	300
Wind power (GW)	1.3	10	30
Biomass power (GW)	2	5.5	30
Photovoltaic power (GW)	0.07	0.3	1.8
Non-hydro RE capacity to be owned by large (> 5 GW) generators (%)	n/a	3%	8%
Grid-company non-hydro RE purchase requirement (%)	na	1%	3%

Renewable Energy Policies: Recent Developments

Wind Power

- August 2009: feed-in tariff offers clarity; differentiated by 4 zones, 0.51-0.61 RMB/kWh (\$75-89/MWh); eliminates developer bidding
- Six 10+ GW wind bases to be developed by 2020, coordinated grid; turbine bidding has begun, favoring domestic manufacturers

Solar Power

- March 2009: Rooftop PV, max 20 RMB/kW incentives, >50kW
- June 2009: 10 MW Dunhuang bidding, 1.09 RMB/kWh
- July 2009: Golden Sun Program, 50-70% subsidy for projects >300kW, 500 MW target by 2011
- Major provincial/city plans for solar (e.g., Jiangsu target & feed-in)
- >5 GW PV announced; 2 GW CSP announcement
- Possible national PV feed-in tariff s in the future

2009 Renewable Energy Law Amendments

- Larger role for higher-level government bodies in implementing national and local RE goals
- Greater specificity in renewable energy planning and government responsibilities, and in need for transmission planning
- Minimum RE procurement requirement likely, and and greater clarity on grid interconnection requirements
- Greater clarity on sources and use of renewable energy development fund

Remaining Policy and Market Needs

- **More-aggressive RE sector and technology targets**
- **Policy focused on power production, not installation**
 - Capacity factor of wind in China (avg. 23%) < US (avg. 34%)
- **Transparent, standardized pricing for large-scale PV**
 - Will foster competition among domestic and foreign firms
- **Trans. infrastructure to move wind/solar to market**
 - End of 2008: ~3 GW installed but not connected
 - More-firmly establish purchase obligation on grid companies
 - Large-scale, proactive transmission planning needed

Remaining Policy and Market Needs


Power markets that can manage increased variability

- Wind/solar output forecasting
- Strong grid codes
- Standardized interconnection rules
- Flexible fossil generating units

Support local industry, but open mkt to intern'l firms

- Virtually all developers are local; manufacturers increasingly so; likely to continue with dominance of large gov't projects
- Sig. gap in avg. capacity factors of wind projects relying on foreign/domestic turbines; domestic mostly not IEC certified
- Growing risk of trade retaliation and/or WTO challenges

Contact Information



Joanna Lewis, Ph.D.
Assistant Professor | Science, Technology and International Affairs
Edmund A. Walsh School of Foreign Service
Georgetown University | ICC 305-Q
37th & O Streets NW, Washington, DC 20057
Tel. +1.202.687.7284 | Fax. +1.202.687.1431 | Email: jil9@georgetown.edu
Web: <http://explore.georgetown.edu/people/jil9/>