Latest progress of China's low carbon technology development and the role of technology transfer

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- Technology Progress and the Role of Technology Transfer in China
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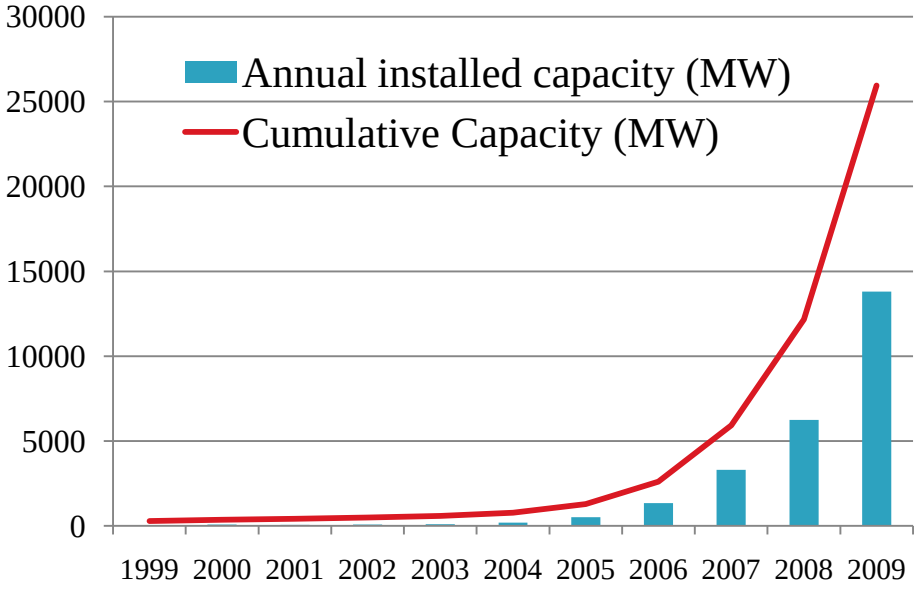
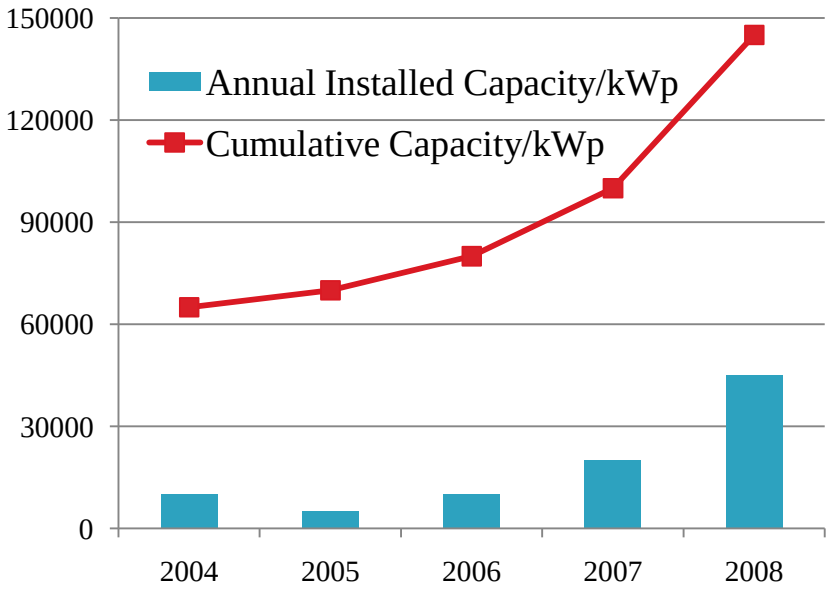
Renewable Energies

- China has made great progress in promoting renewable energies, especially in following areas:
  - Wind power: on-land & off-land
  - Solar PV



Wind Power Capacity in China (1999 - 2009)

Source: Chinese Wind Energy Association (CWEA), 2010



Solar PV Capacity in China (2004 - 2008)

Source: China Solar PV Report, 2009

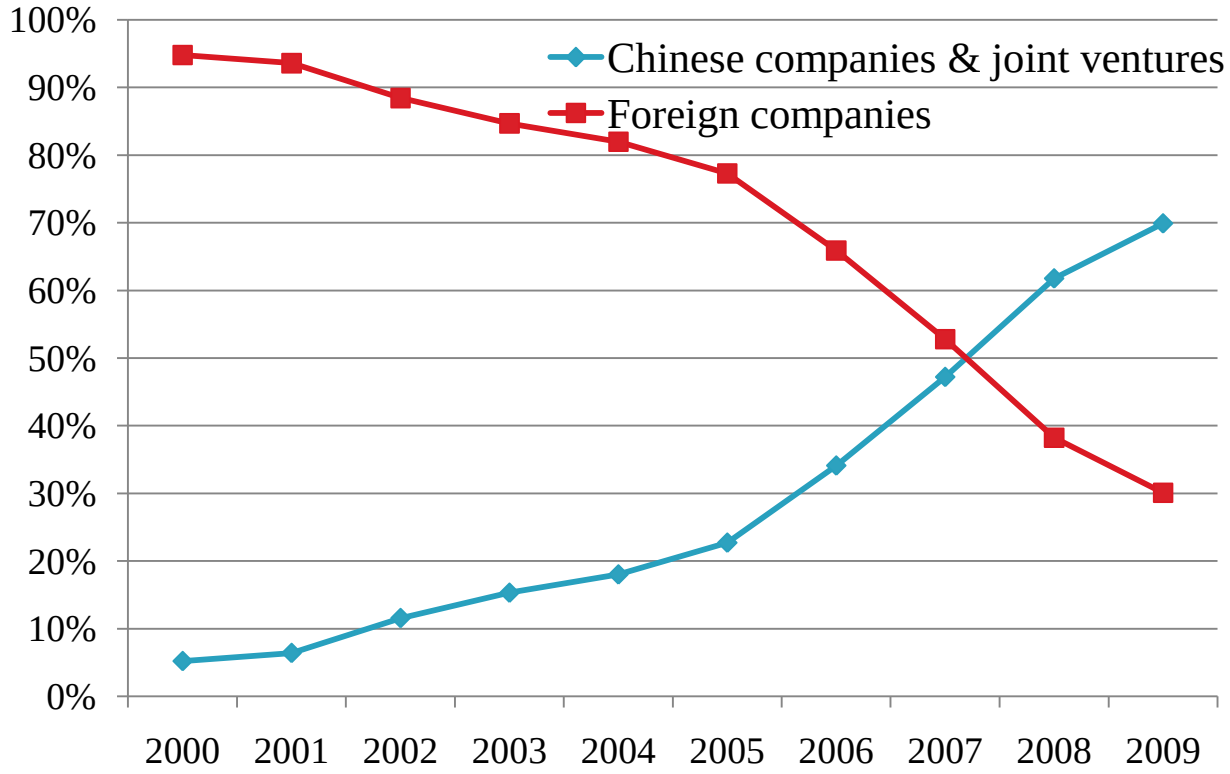
China has set an ambitious goal of renewable energy development

Year	Hydropower	Biomass	Solar PV	Solar Thermal (million m^2)	Proportion in total energy consumption
2010	190,000	5,000	300	150	10%
2020	300,000	30,000	1,800	300	20%

Source: National Middle and Long Term Program of Renewable Energy Development

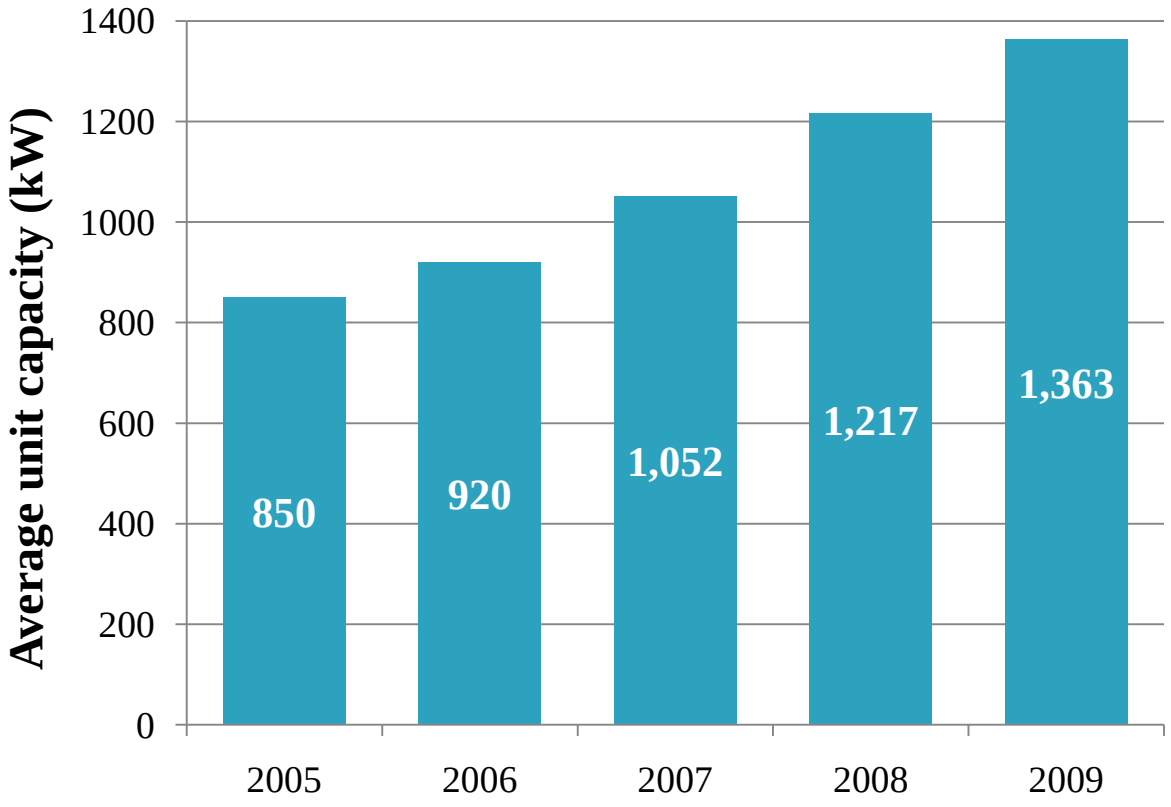
RE market growth has led to technology progress in China

Market Share Growth of Chinese wind Turbine Manufacturers



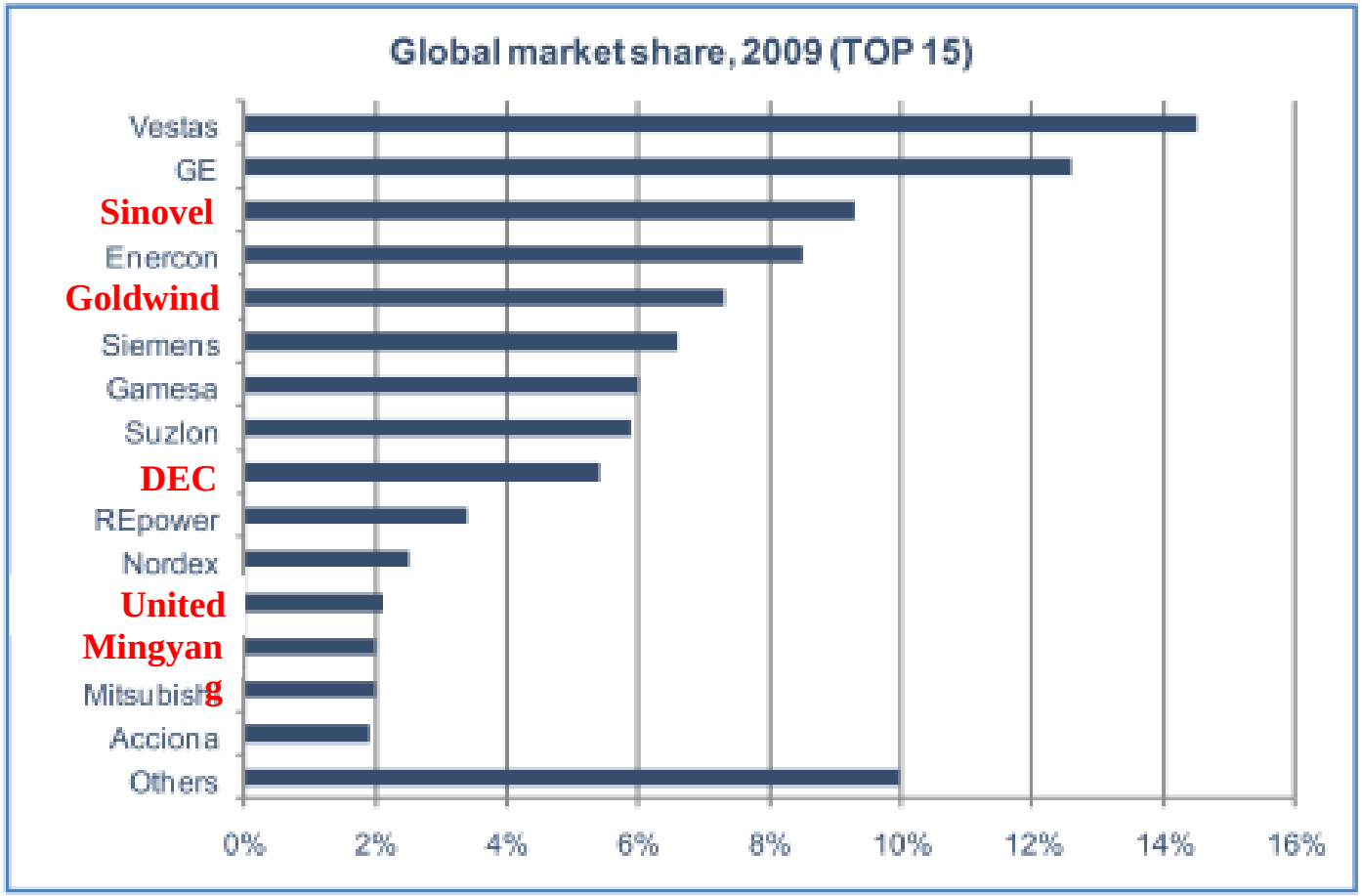
Source: CWEA, 2010

Average unit capacity of wind turbine keeps growing in China



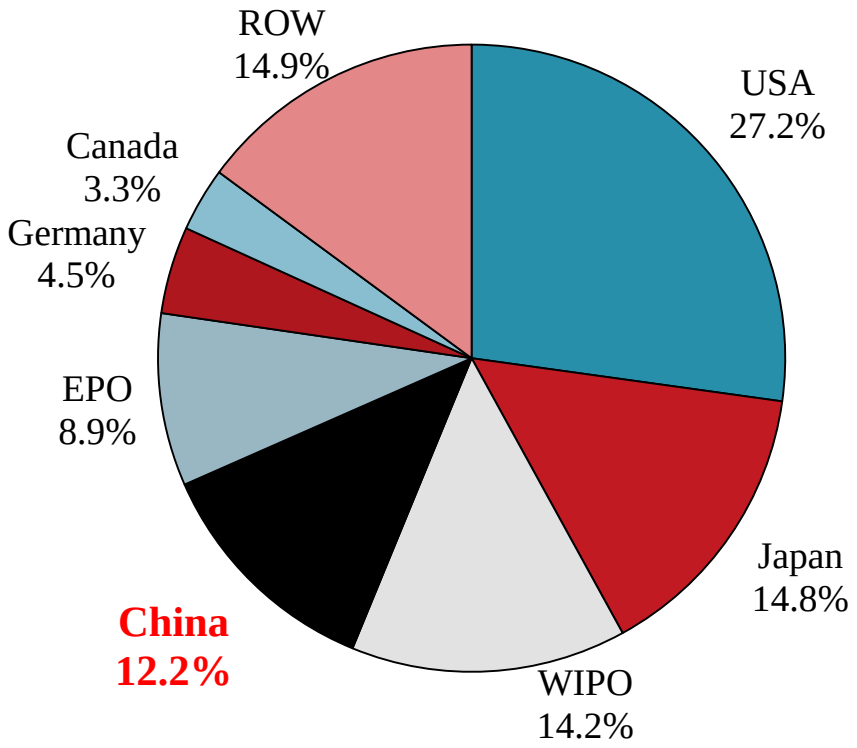
Source: CWEA, 2010

China has two enterprises in top 5 and five in top 15 in global market



Source: Global Wind Energy Council (GWEC), 2010

An increasing number of wind turbine patents is registered in China



Number of wind turbine patents registered in different countries

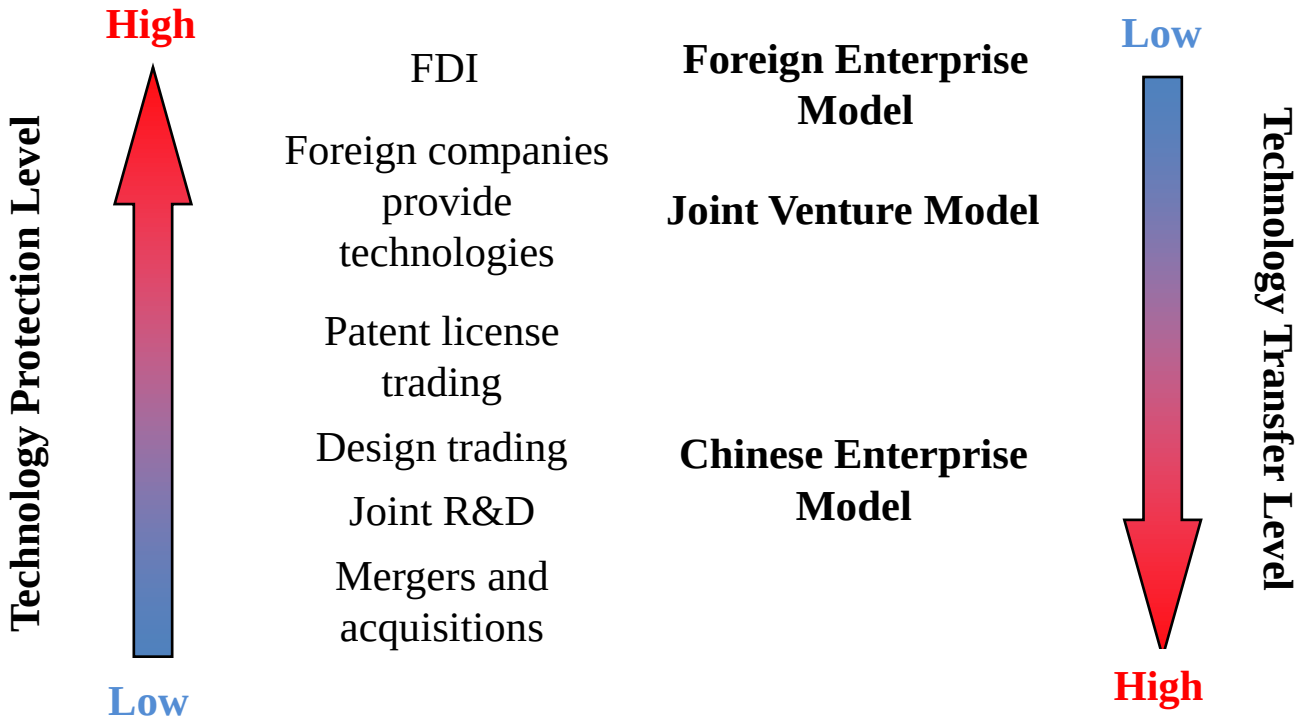
Source: Chatham House, 2009

Pathways of wind turbine manufacturing technology transfer in China

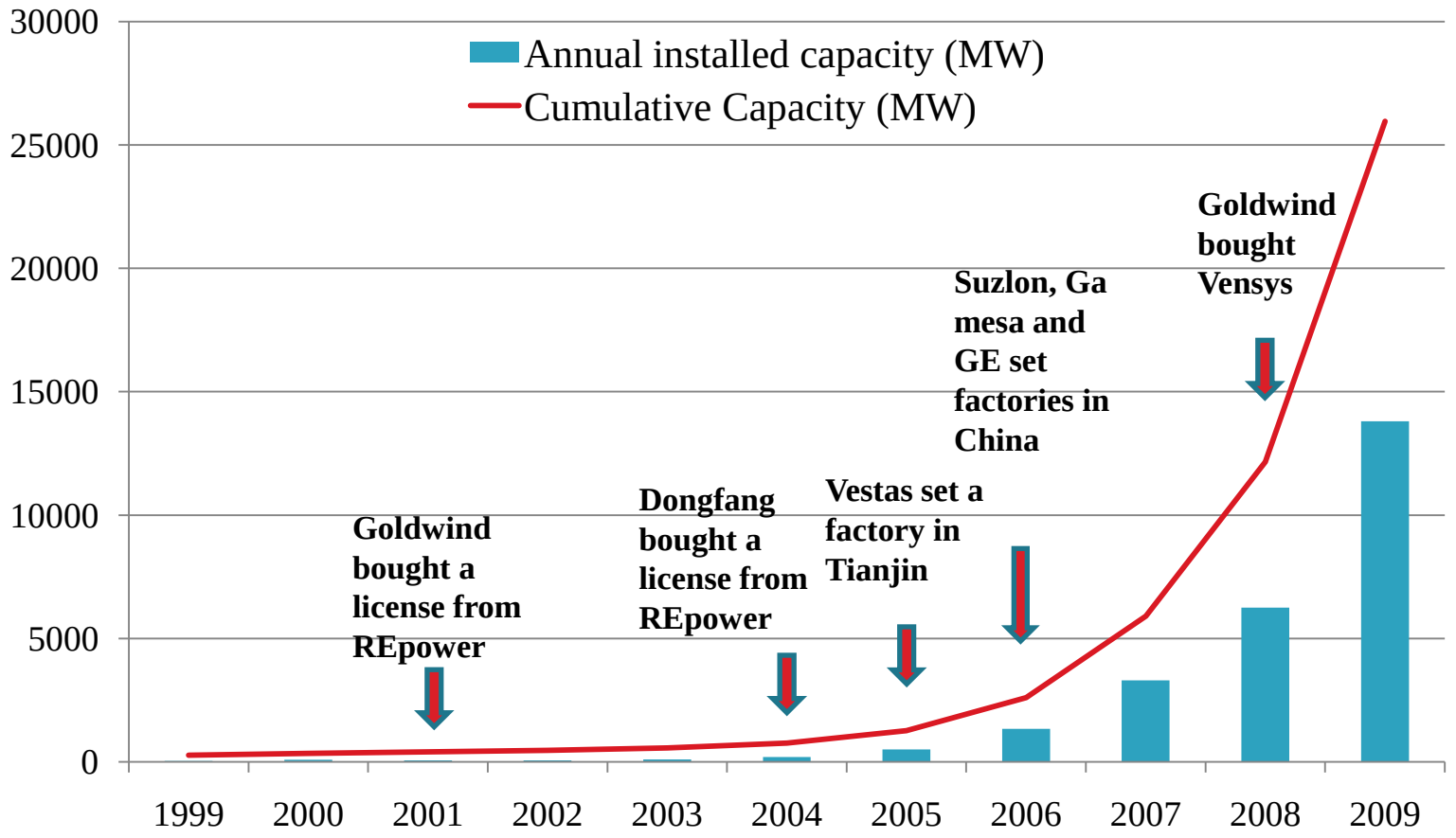
Technology Transfer Pathway	Technology Supplier	Technology Recipient
Technology transfer within multinational companies	Foreign wind turbine companies	Foreign companies in China
Foreign companies provide technologies	Foreign wind turbine companies	Joint ventures
Patent license trading	Foreign wind turbine companies	Chinese companies
Design trading	Foreign consulting companies	Chinese companies
Joint R&D	Foreign consulting companies and wind turbine companies	Chinese companies
Mergers and acquisitions	Foreign consulting companies and wind turbine companies	Chinese companies

Main ways

- Categorize different ways of technology transfer into three models



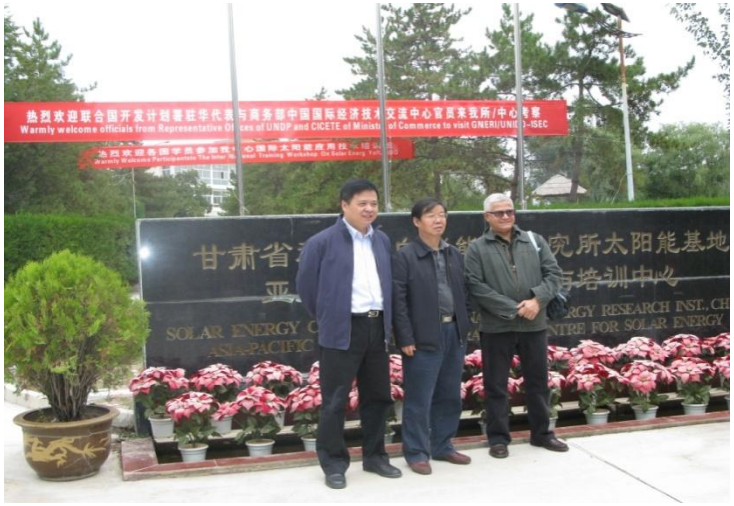
TT has played an important role in promoting technology development in China



Source: CWEA, 2010

At the same time, international organizations like UNDP have made great contribution

- **Priorities:** to increase the pace of commercialization of renewable energy technologies and their use in various sectors of the economy.
- **Key Focuses**
  - Establishment of model commercial operations for solar water heating production, solar and wind rural energy production systems, and large-scale biomass energy production systems.
  - Design and launch of a new Rural Energy Strategy in China to establish a vision for future energy provision towards 2020 to achieve both energy security and social development goals.



Gansu Provincial Solar Energy Research Base, Established in 1989 under support by UNDP China

Solar Comprehensive Experiment Building, Established under supports by UNDP China

Photovoltaic Laboratory, Established under supports by UNDP China

Solar Energy Technologies developed by the Solar Energy Research Base

The Effectiveness of Technology Transfer

- Current Technology Transfer Mechanism is not sufficient
- Technology progress lags behind market development in China
- China has not become the innovation hub of the world

- 0 Chinese company in top 10 wind turbine patent owners in the world
- only 2 Chinese companies in top 10 patent owners in China

Top 10 wind turbine patent owners in the world

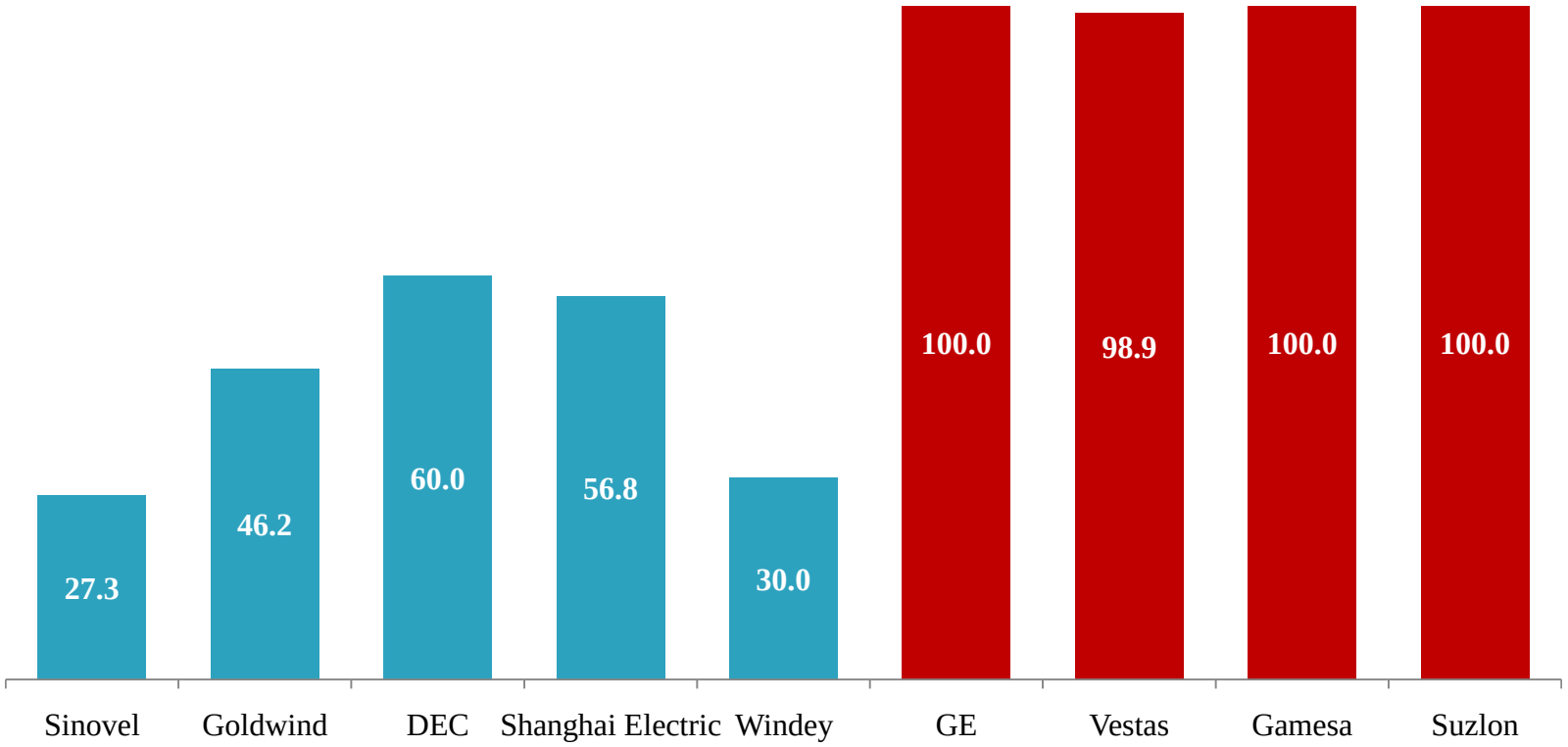
Name of Patent Owners	Number of Patents	Nationality
General Electric CO	493	USA
Vestas Wind Systems AS	286	Danmark
Mitsubishi Jukogyo KK	207	Japan
Siemens AG	154	Germany
Wobben A	136	Germany
Repower Systems AG	124	Germany
Nordex Energy GMBH	90	Germany
Mitsubishi Heavy IND CO LTD	79	Japan
LM Glasifiber AS	75	Danmark
Unvi Voron Tech	73	Russia

Top 10 wind turbine patent owners in China

Name of Patent Owners	Number of Patents	•Nationality
General Electric CO	268	Foreign
Vestas Wind Systems AS	93	Foreign
Siemens AG	72	Foreign
Wobben A	51	Foreign
Gamesa	46	Foreign
Shanghai Electric	44	**China**
Huang Jinlun	37	**China**
Mitsubishi Heavy IND	34	Foreign
REpower	33	Foreign
Nordex Energy	32	Foreign

Source: Derwent Innovations Index, 2010

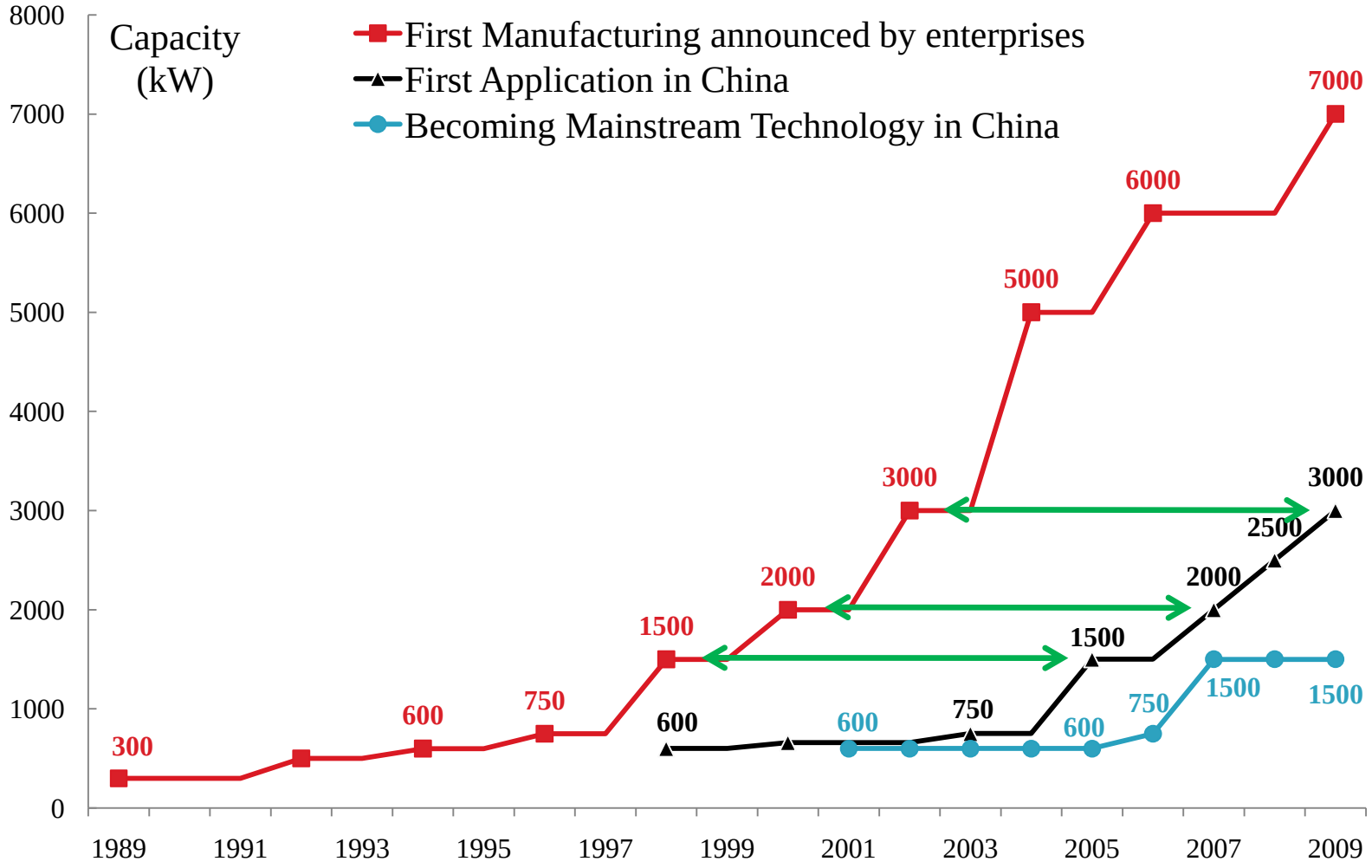
- Chinese companies have a lower proportion of innovation patents than foreign companies



Proportion of innovation patent of both foreign and Chinese companies

Source: Database of the State Intellectual Property Office of the People's Republic of China, 2010

China's wind power technology lags behind the world advanced level in about 5-7 years



Source: CWEA, 2010; GWEC, 2010

Major sorts and evidences of barriers for D&T of ESTs: sources

- IPCC (2001): Special Report on Development and Transfer of Technologies
- Sussex Energy Group(2007). UK–India collaboration to identify the barriers to the transfer of low carbon energy technology
- GEF(2008). Transfer of environmentally sound Technologies: The GEF experience
- Others

PECE's Studies on Barriers of TT

- Initial Identification of the barriers base on our case study：
  - Supplier of technologies： Political willingness and trust; monopoly tendency and IP restrictions; high desire for profit (e.g., via expensive IP fees)
  - Recipient of technologies： lack of financial resources, infrastructure, and human capital; institutional and policy barriers

Lessons learned and Recommendations

- Innovative international technology transfer mechanism is required
  - Institutional arrangement inside and outside UNFCCC
  - Financial mechanism: Fund – size and sources, uses, and governance? Means and ways? How to share – responsibilities and commitments?
  - Performance assessment
  - Mechanism to overcome the barriers of technology transfer
  - IPR issues

What international community should focus on to address challenges and advance technology development in developing countries

- Focusing on the deployment of exiting technologies
- Help to overcome relevant barriers of technology transfer especially finance, information sharing and capacity building
- Adding the performance indicators when assessing the effectiveness of their projects combing with other sustainable development indicators

Thank you for your attention

Any comments, please Contact

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