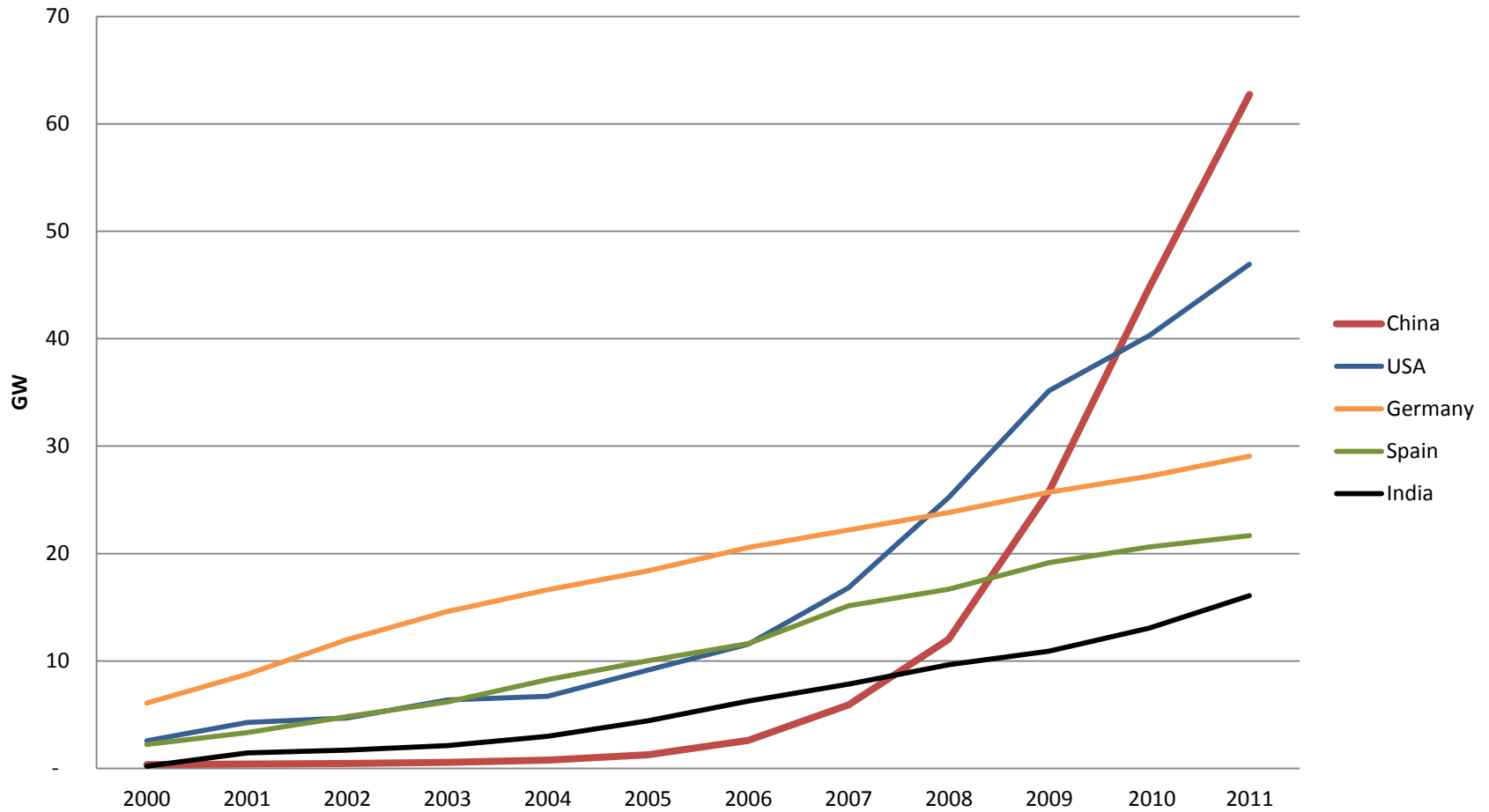
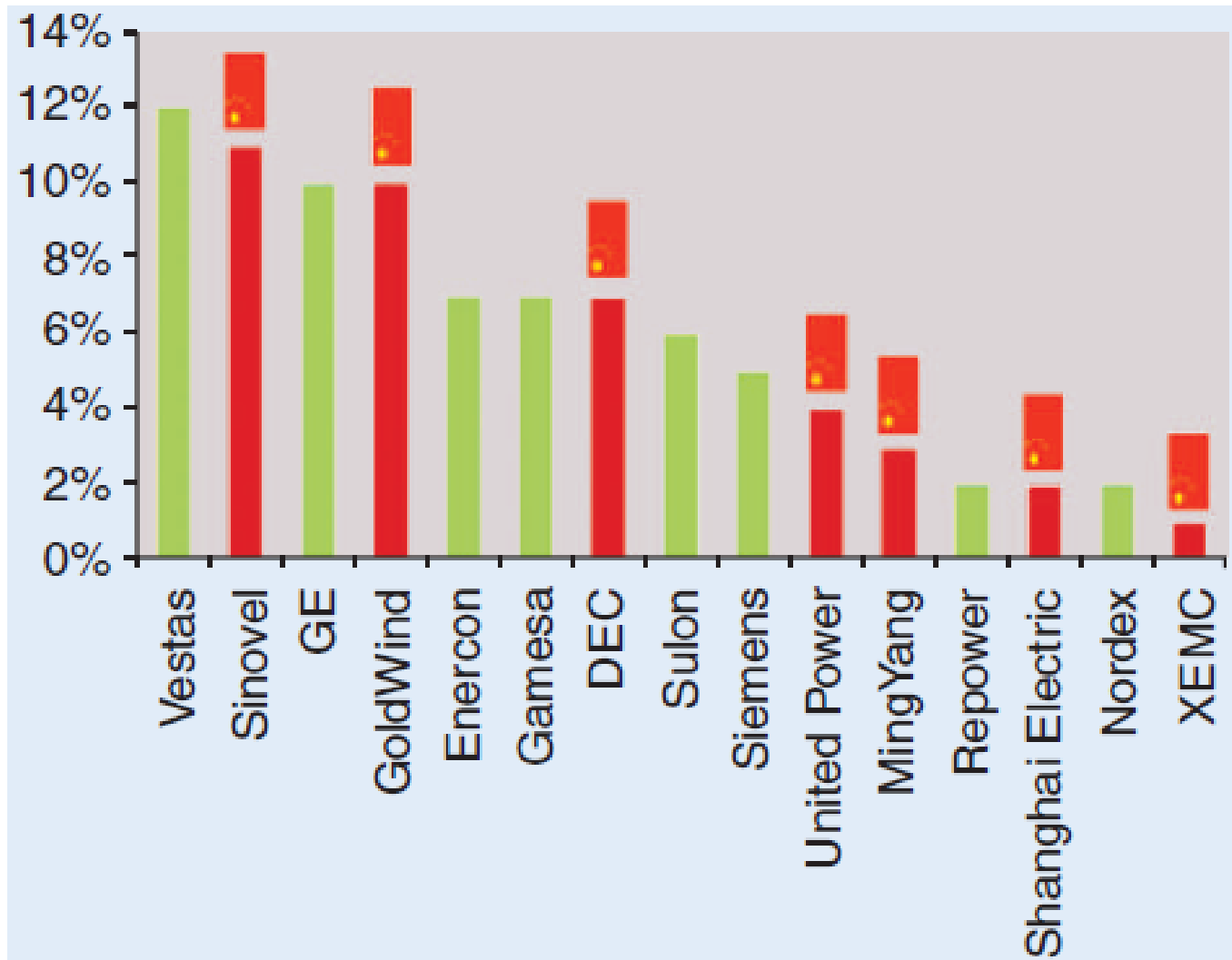


Institutions and wind energy decisions in China and Norway

Installed capacity of wind power in China, 2000 - 2011



The 15 biggest wind turbine manufacturers globally, and market share in 2010



Wind in China and Norway, 2011

	China	Norway
Installed capacity	63,000 MW	525 MW
Annual generation	70 TWh	1,3 TWh
Resource potential	2,580 GW (ca. 2860 TWh)	1243 TWh (ca. 500 GW)
% of total domestic electricity	1,5 %	1 %

- Large difference in capacity factor: Annual generation in China is ca. 1110h and in Norway ca. 2475h
- China: Industry – Norway: Electricity

Three keys to China's wind industry growth

- Institutional innovation and flexibility
- Local knowledge
 - Spillovers from other industries + absorption
- International cooperation and investment
 - Today: this goes in to and out of China

Theoretical approach

- Technological regimes: evolutionary perspective. Explains "path dependency" and potentially "lock-in"
- Institutions: what structures human behaviour
- Sociotechnical regimes: Evolution as a 'selection and retention mechanism' accounting for stability

China



China understands renewables, but do we understand China?

Expert comments:

- “China is a maze of intricacies, complexities and contradictions” Tony Saich (2011: 4)
- “For those who follow China, the country appears to be a mass of contradictions that defy logic” Scott Kennedy (2011: 3)

Structural challenges—«carbon lock-in»

One example: Investments and subsidies to renewable energy and fossil fuels in 2010, million US\$

	Investments		Subsidies	
	Fossil fuel	Renewable energy	Fossil fuel	Renewable energy
Global	157,000	187,000	409,000	66,000
China	?	49,000	21,000	ca. 500*

*This is an estimate made by the author and is not based on official sources

Two important concepts

- Fragmented authoritarianism – a «problem»
 - Fragmentation between various ministries and local-national
- Policy-experimentation – a «solution»
 - E.g. Shenzhen, Special Economic Zone
 - Scaling up

The growth of the wind industry

- 1980 – 2002: Import
 - no local industry – fragmented

- 2002 – 2011: Coordination

1. Renewable Energy Law

- State Owned energy companies mandated to produce renewable energy (MMS)
- Grid companies mandated to purchase (PPA)
- Shared costs (Surplus charge on all electricity)

2. Experimentation

- Concession rounds, with 50-70% local content requirements → foundation for FiT in 2009
- Local governments develop large wind farms + the seven «wind bases»

3. Coordination between industry and trade departments

- E.g. policy on 2,5 MW turbines

Legitimacy

- Large conglomerates with political influence
 - E.g. XEMC with political influence in Hunan
- The success of wind industry: increased respect in administration
- State support is important because of the political implications: It opens doors



Norway

- Norwegian energy system characterised by petro-industrial “lock-in”
- Low cost of hydro power has been hard to compete with

Wind

- Self-sufficient with electricity
- Slow concession process: 3-7 years
- Lack of long-term policy engagement
- Support mechanisms have been inadequate and unstable
- Local resistance
- Large influence of embedded actors
 - Statoil, Statkraft and Ministry of Petroleum and Energy (MPE)

Conclusion

where there is will power
there is wind power