

# 4<sup>th</sup> annual Renewable Energy Finance Forum China

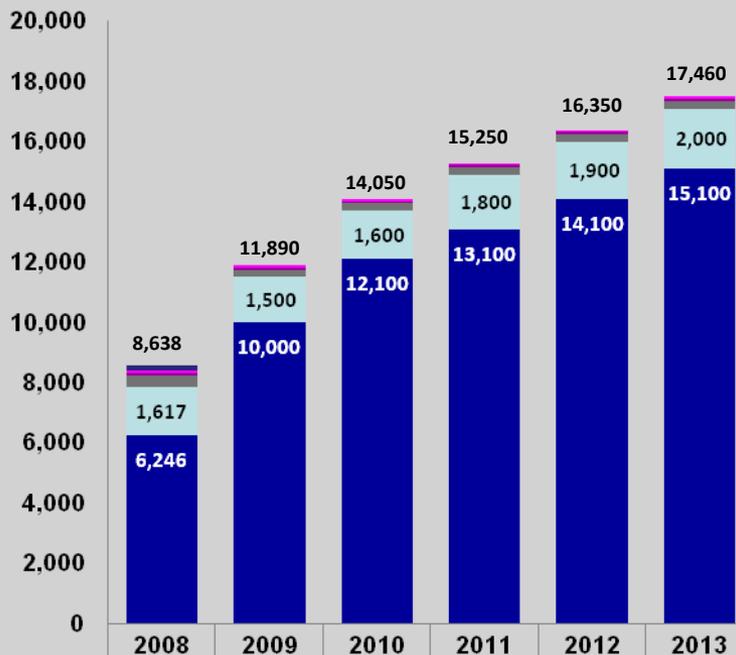
## State of the wind industry in China – Patterns of growth

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Beijing  
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### EER Market Forecast 2009-13 Total [MW]



■ RoA	186					
■ Taiwan	100	70	90	70	65	65
■ South Korea	76	60	60	70	75	80
■ Japan	356	250	250	250	250	250
■ India	1,617	1,500	1,600	1,800	1,900	2,000
■ China	6,246	10,000	12,100	13,100	14,100	15,100

### Analysis

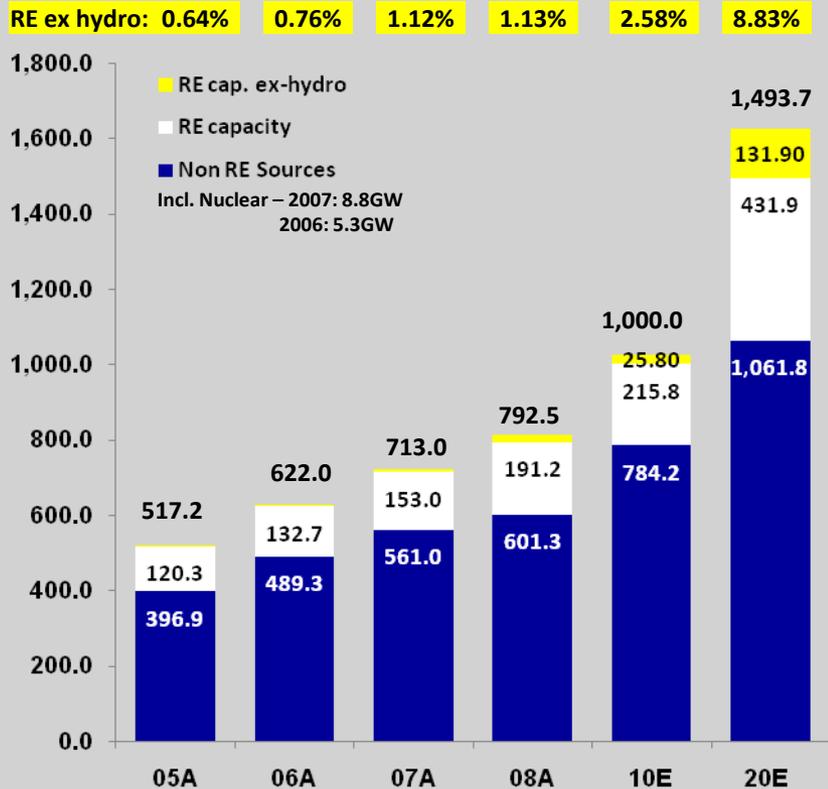
- China (app 85%) will be the most important market in the East Asian region. All other countries combines will account for only 15% of the total additions; and the majority of which from India
- Development in Countries such as Philippines (especially), Vietnam and Thailand is starting to accelerate; however level of development of the grid, weather conditions (typhoon area in Vietnam and Philippines and lack of wind in Thailand), project bankability; might affect market potential.

China will be the backbone of the development of Wind Business in the East Asia region; however, competition has become very developed, rapid growth of the local companies and preferred policies toward local companies

# Power Capacity Development

## Actual 2008 x Target in 2010 and 2020

### Installed capacity growth Actual x Target

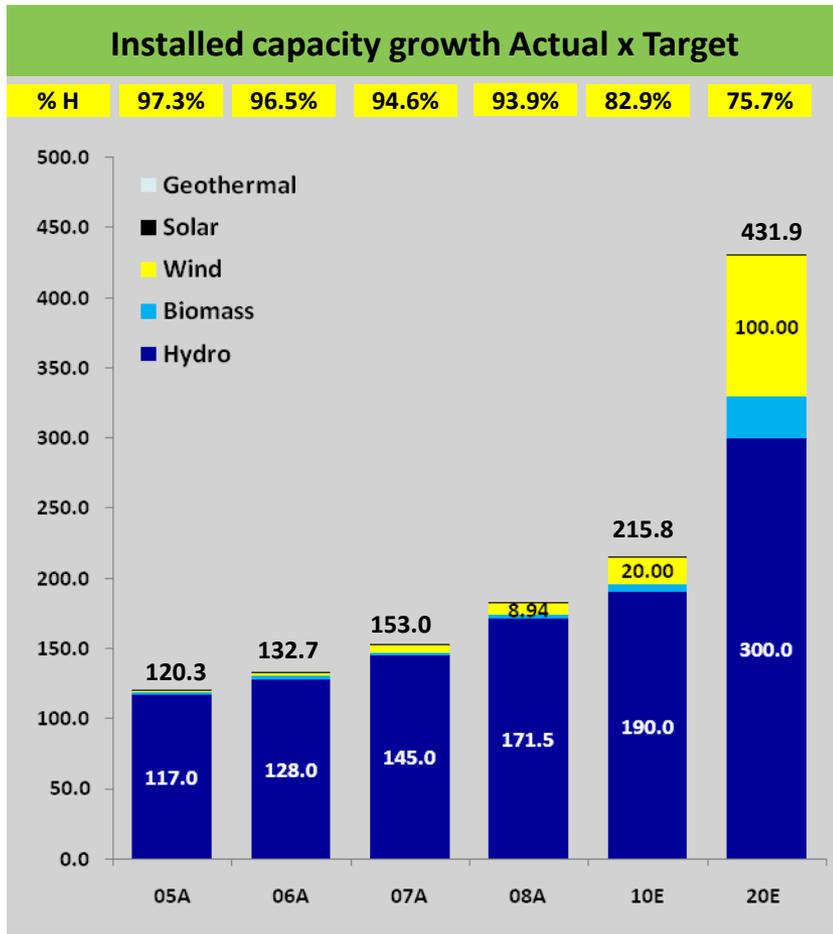


### Analysis

Period	Power Generation TWh   %					Total
	Thermal	Hydro	Nuclear	Wind	Others	
2007	2,698.0	486.7	62.6	5.6	3.0	3,255.9
	82.86%	14.95%	1.92%	0.17%	0.09%	100.0%
2008	2,779.3	563.3	68.4	12.8	9.6	3,443.4
	80.9%	16.4%	2.00%	0.4%	0.3%	100.0%

Power Generation 2008 (grid connected)	Installed capacity 2008		Installed capacity Total	
	GW	[%]	GW	[%]
Thermal	65.75	72.6%	601.3	75.87%
Hydro	20.10	22.2%	171.5	21.64%
Nuclear	-	0.0%	8,850	1.12%
Wind	4.66	5.1%	8.940	1.13%
Others	-	0.0%	1,900	0.24%
<b>Total</b>	<b>90.51</b>	<b>72.6%</b>	<b>792.5</b>	<b>100.00%</b>

The RE Industry (excluding Hydro) is growing at fast pace; however, considering the development of installed capacity of other sources of electricity, Wind is, in the overall context, still negligible.



### Analysis

- If we analyze the breakdown of the different Renewable Energy sources and its development forecast, we will clearly see that Large Hydro will be the main player, attracting the bulk of the investments.
- The breakdown figures (in GW) for hydro is as follows:

Hydro Capacity	2006A	2007A	2008A	2010F	2020F
Large Hydro	72.0	NA		140.0	225.0
Pumped Storage	7.0	NA		NA	NA
Small Hydro	38.0	NA		50.0	75.0
<b>Total</b>	<b>117.0</b>	<b>145.0</b>	<b>171.5</b>	<b>190.0</b>	<b>300.0</b>

- Renewable Energy sources not derived from Large Hydro schemes should have development priority in order to avoid the repetition of the 2007 situation, when droughts in the south pushed the consumption of electricity generated by coal fired thermo power plants

### Renewable Portfolio Standard Guidelines

Language directing the mechanism for a Renewables Portfolio Standard (RPS) was published in “Mid & Long-term RE Implementation Plan (Jul 07). The formulation includes two sets of requirements - one being generation & grid based, the other being a capacity-based requirement levied on power producers. The requirements are listed below:

▪ **The share of non-hydro Renewables should reach 1% of total power generation by 2010 and 3% by 2020 for regions served by centralized power grids.**

▪ **Any power producer with cap > 5GW must increase its actual ownership of power capacity from non-hydro Renewables to 3% by 2010 and 8% by 2020**

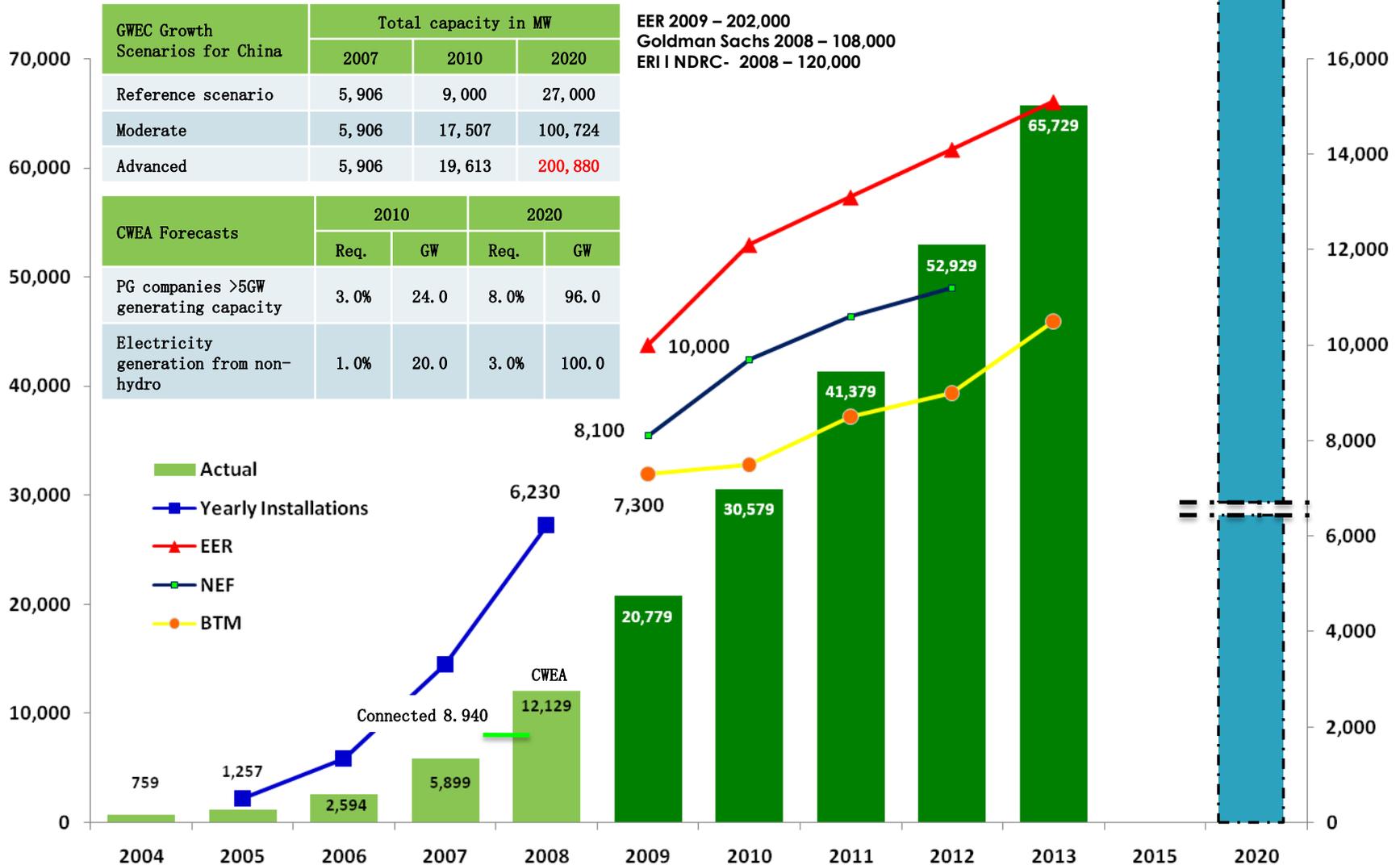
First of all, the requirements apply to non-hydro Renewables. This exclusion of small hydro means that the RPS effectively applies only to wind, biomass, and solar generation and capacity. Of these technologies, wind will be the predominant means of meeting requirements for reasons of scale and cost.

- **Power generation companies establishing aggressive targets for wind, in-line with RPS requirements, and actively developing pipelines (2010 targets and pipelines sum to over 16GW, and the new national capacity targets sum to 15.5GW (10GW wind, 5.5GW biomass thermal) of “non-hydro” renewable power generation capacity.**
- **National concession and policy-directed projects now totaling 7.9GW of which 6.7 GW for the benefit of Local Chinese Companies.**
- **Within the 35GW of incremental near-term development, we find that SOE companies represent some 75% of pipeline and 88% of the ordered portion. Domestic private and international interests remain a small but potentially growing customer base.**

**Existing wind pipeline identified suggests that most companies are reasonably well positioned already, in terms of development pipeline to meet both the 2010 and 2020 requirements.**

# Market Development in China

## Growth Forecast [MW]



Source: Azure International /CWEA statistics / EER / New Energy Finance

# Market Development China

## Market Share – 2004 to 2008

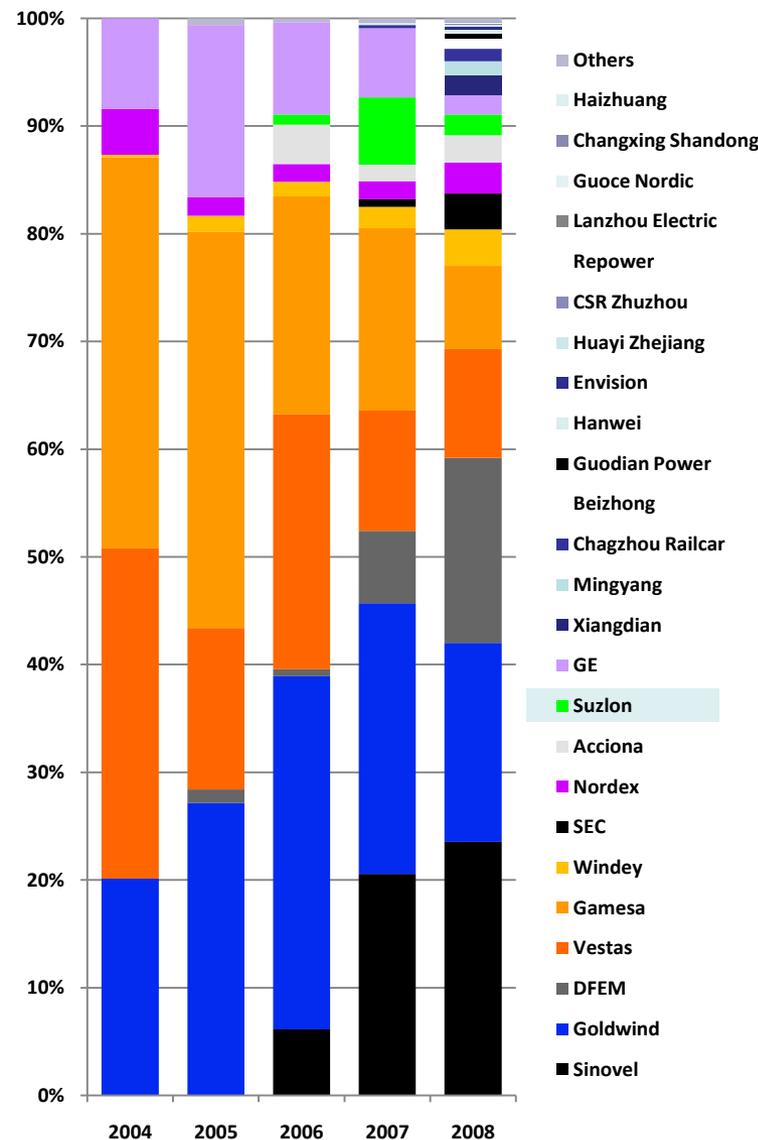
Suppliers	2004		2005		2006		2007		2008 (Azure)		Total 04-08	
	MW	%	MW	%	MW	%	MW	%	MW	%	MW	%
Sinovel	0	0.0%	0	0.0%	83	6.1%	680	20.6%	1,398	23.6%	2,160	19.2%
Goldwind	40	20.1%	132	27.2%	441	32.8%	830	25.1%	1,097	18.5%	2,540	22.5%
DFEM	0	0.0%	6	1.2%	9	0.7%	222	6.7%	1,019	17.2%	1,256	11.1%
Vestas	60	30.7%	73	15.0%	318	23.6%	369	11.2%	600	10.1%	1,420	12.6%
Gamesa	71	36.3%	179	36.8%	273	20.3%	560	17.0%	459	7.7%	1,543	13.7%
Windey	1	0.3%	7	1.5%	18	1.3%	65	2.0%	201	3.4%	292	2.6%
SEC	0	0.0%	0	0.0%	0	0.0%	23	0.7%	198	3.3%	220	2.0%
Nordex	8	4.3%	8	1.7%	22	1.6%	56	1.7%	171	2.9%	265	2.4%
Acciona	0	0.0%	0	0.0%	50	3.7%	51	1.5%	150	2.5%	251	2.2%
Suzlon	0	0.0%	0	0.0%	13	0.9%	206	6.2%	115	1.9%	333	3.0%
GE	17	8.4%	78	16.0%	116	8.6%	213	6.4%	108	1.8%	531	4.7%
Xiangdian									106	1.8%	106	0.9%
Mingyang									80	1.3%	80	0.7%
Chagzhou Railcar	0	0.0%	0	0.0%	0	0.0%	9	0.3%	68	1.1%	77	0.7%
Beizhong									60	1.0%	60	0.5%
Guodian Power									24	0.4%	24	0.2%
Hanwei									24	0.4%	24	0.2%
Envision									14	0.2%	14	0.1%
Huayi Zhejiang									12	0.2%	12	0.1%
CSR Zhuzhou									8	0.1%	8	0.1%
Others	0	0.0%	3	0.6%	5	0.4%	15	0.5%	20	0.3%	42	0.4%
<b>Total</b>	<b>197</b>	<b>100%</b>	<b>488</b>	<b>100%</b>	<b>1,347</b>	<b>100%</b>	<b>3,303</b>	<b>100%</b>	<b>5,935</b>	<b>100%</b>	<b>11,269</b>	<b>100%</b>

Suppliers	2004		2005		2006		2007		2008		Total 04-08	
	MW	%	MW	%	MW	%	MW	%	MW	%	MW	%
Foreigners	157	80%	339	70%	791	59%	1,454	44%	1,602	27%	4,339	39%
Locals	40	20%	149	30%	556	41%	1,849	56%	4,333	73%	6,930	61%
<b>Total</b>	<b>197</b>	<b>100%</b>	<b>488</b>	<b>100%</b>	<b>1,347</b>	<b>100%</b>	<b>3,303</b>	<b>100%</b>	<b>5,935</b>	<b>100%</b>	<b>10,924</b>	<b>100%</b>

Remarks

Suzlon numbers are installed machines. Total deliveries are 177MW

Source: Azure International

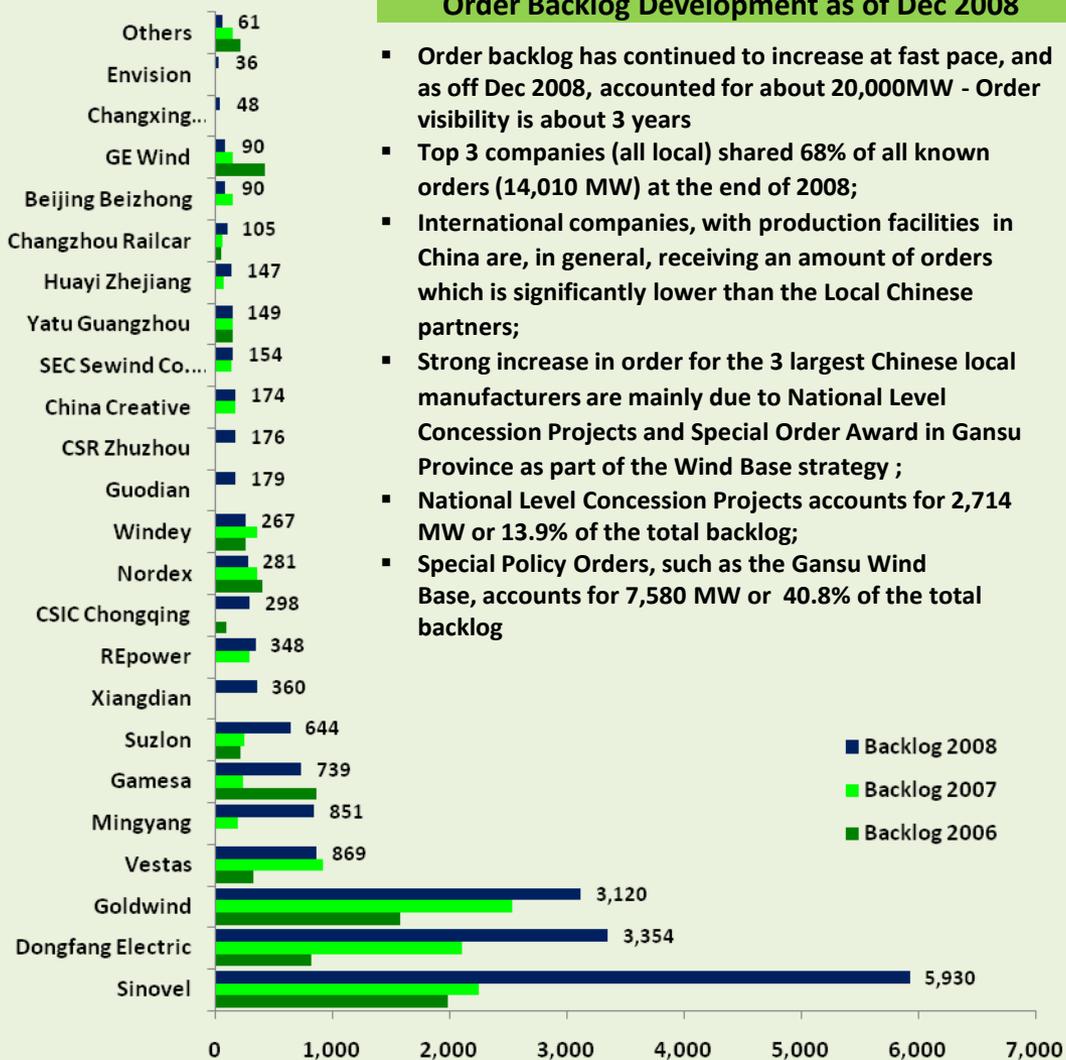


# Market Development in China

## Orders Backlog Development 2008

### Order Backlog Development as of Dec 2008

- Order backlog has continued to increase at fast pace, and as off Dec 2008, accounted for about 20,000MW - Order visibility is about 3 years
- Top 3 companies (all local) shared 68% of all known orders (14,010 MW) at the end of 2008;
- International companies, with production facilities in China are, in general, receiving an amount of orders which is significantly lower than the Local Chinese partners;
- Strong increase in order for the 3 largest Chinese local manufacturers are mainly due to National Level Concession Projects and Special Order Award in Gansu Province as part of the Wind Base strategy ;
- National Level Concession Projects accounts for 2,714 MW or 13.9% of the total backlog;
- Special Policy Orders, such as the Gansu Wind Base, accounts for 7,580 MW or 40.8% of the total backlog



WTG Manufacturer Backlog	2008 Year End		Excl. NDRC	
	MW	%	MW	%
1 Sinovel	5,930	32.1%	2,264	20.6%
2 Dongfang Electric	3,354	18.2%	1,319	12.0%
3 Goldwind	3,120	16.9%	1,595	14.5%
4 Vestas	869	4.7%	869	7.9%
5 Mingyang	851	4.6%	851	7.7%
6 Gamesa	739	4.0%	696	6.3%
7 Suzlon	644	3.5%	644	5.9%
8 Xiangdian	360	1.9%	360	3.3%
9 REpower	348	1.9%	348	3.2%
10 CSIC Chongqing	298	1.6%	248	2.3%
11 Nordex	281	1.5%	281	2.6%
12 Windey	267	1.4%	109	1.0%
13 Guodian	179	1.0%	179	1.6%
14 CSR Zhuzhou	176	1.0%	176	1.6%
15 China Creative	174	0.9%	174	1.6%
16 SEC Sewind Co. Ltd.	154	0.8%	154	1.4%
17 Yatu Guangzhou	149	0.8%	149	1.4%
18 Huayi Zhejiang	147	0.8%	147	1.3%
19 Changzhou Railcar	105	0.6%	105	1.0%
20 Beijing Beizhong	90	0.5%	90	0.8%
21 GE Wind	90	0.5%	90	0.8%
22 Changxing Shandong	48	0.3%	48	0.4%
23 Envision	36	0.2%	36	0.3%
Others	61	0.3%	61	0.6%
<b>TOTAL</b>	<b>18,470</b>	<b>100.0</b>	<b>10,991</b>	<b>100.0</b>

# Market Development China

## National Level Concession Projects

Project	PPA RMB/kWh	Developer	WTG Supplier	Planned Capacity (MW)	Installed Capacity (MW)					
					2006	%	2007	%	2008	%
<b>2004 and before</b>	<b>0.489</b>			<b>802.8</b>	<b>316.2</b>	<b>39.4%</b>	<b>526.8</b>	<b>65.6%</b>	<b>765.3</b>	<b>95.3%</b>
Huilai Shibeishan	0.50	Guandong Power	Goldwind	100.2	100.0	99.8%	100.2	100.0%	100.2	100.0%
Rudong I	0.44	Huarui	Vestas	100.0	30.0	30.0%	100.0	100.0%	100.0	100.0%
Rudong II	0.52	Longyuan	GE	100.5	87.0	86.6%	100.5	100.0%	100.5	100.0%
Tongyu	0.51	Huaneng	Sinovel	201.0	22.5	11.2%	27.0	13.4%	163.5	81.3%
Tongyu	0.51	Longyuan	Gamesa	200.6	20.4	10.2%	98.6	49.2%	200.6	100.0%
Huitengxile	0.43	Beijing New Energy	Goldwind	100.5	56.3	56.0%	100.5	100.0%	100.5	100.0%
<b>2005</b>	<b>0.503</b>			<b>601.7</b>	<b>0.0</b>	<b>0.0%</b>	<b>133.5</b>	<b>22.2%</b>	<b>245.3</b>	<b>40.8%</b>
Dafeng	0.49	CPI	Goldwind	200.2	0.0	0.0%	0.0	0.0%	68.3	34.1%
Anxi	0.46	CPI	Goldwind	100.5	0.0	0.0%	100.5	100.0%	100.5	100.0%
Dongtai	0.49	Guohua Energy	Sinovel	201.0	0.0	0.0%	33.0	16.4%	76.5	38.1%
Jimo	0.6	Huadian Int.	Sinovel	100.0	0.0	0.0%	0.0	0.0%	0.0	0.0%
<b>2006</b>	<b>0.443</b>			<b>1,001.0</b>	<b>0.0</b>	<b>0.0%</b>	<b>0.0</b>	<b>0.0%</b>	<b>310.5</b>	<b>31.0%</b>
Baotou Bayin	0.47	Longyuan/Hero Asia	Goldwind	201.0	0.0	0.0%	0.0	0.0%	120.0	59.7%
Danjing	0.5	CECIC/HKC	Windey	200.0	0.0	0.0%	0.0	0.0%	42.0	21.0%
Huitengliang I	0.41	Guandong Nuclear	Dongfang	300.0	0.0	0.0%	0.0	0.0%	100.5	33.5%
Huitengliang II	0.42	North Union	Sinovel	300.0	0.0	0.0%	0.0	0.0%	48.0	16.0%
<b>2007</b>	<b>0.509</b>			<b>951.0</b>	<b>0.0</b>	<b>0.0%</b>	<b>0.0</b>	<b>0.0%</b>	<b>0.0</b>	<b>0.0%</b>
Wulangyiligeng	0.47	Beijing Jingneng	Goldwind	300.0	0.0	0.0%	0.0	0.0%	0.0	0.0%
Tongliao Beiqinghe	0.52	Huadian Int.	Sinovel	300.0	0.0	0.0%	0.0	0.0%	0.0	0.0%
Chengde Yodaokou	0.55	Hebei Const.	Sinovel	150.0	0.0	0.0%	0.0	0.0%	0.0	0.0%
Yumen Changma	0.52	CECIC/HKC	Dongfang	201.0	0.0	0.0%	0.0	0.0%	0.0	0.0%
<b>Total</b>	<b>0.492</b>			<b>3256.0</b>	<b>316.2</b>	<b>9.4%</b>	<b>660.3</b>	<b>19.67%</b>	<b>1321.1</b>	<b>39.4%</b>

- Low bidding with focus on acquiring pipeline ahead of profitability has been a noted problem with national level concession projects until 2007. This has happened despite the fact that selection criteria have officially shifted to lower weighting on price.
- In 2005 concessions, the grid price was weighted at 40% of the full evaluation criteria, and for 2006 this was reduced to 25%. In 2007, the criteria was to select that tariff closest to the average
- All projects awarded before 2007 had a 3 year window for construction, and the projects awarded in 2007, has a 4 year construction window.

- In early May, the NDRC approved ‘Gansu Jiuquan 10 GW Wind Base Plan’ and the pre-feasibility study for the first 3.8GW slated for development. By May 19 the NDRC approved “11th Five-Year Construction Plan of Gansu Jiuquan Wind Base (DR Energy [2008]1135)” but the document has not been publicly released. On May 22 Gansu Provincial Government held a press conference in Beijing in which the wind base was presented for the benefit of interested WTG manufacturers.
- The 3.8GW first phase project consist of twenty adjacent 100-200MW projects to be developed by 2010. If successfully built and operating this should be the world’s largest “wind farm.”

### Features of Gansu Jiuquan wind base development:

1. The wind farm developers were not chosen through open public bidding.
2. No mention of wind resource measurement data available for WTG selection and micro-siting.
3. With one exception, no other private or non state or provincial government owned companies will participate in development.
4. A single feed-in tariff, set at RMB 0.5206 per kWh has been applied as per the latest Gansu National Concession project. Other basic conditions per the Gansu Yumen Changma
5. The Gansu provincial DRC organized this development. On 16 March, the Gansu Provincial Government forbade lower-level governments from participating in or approving wind farm developments signaling the province’s intention to manage its wind resource with a strong centralized approach.
6. At the press conference, the Jiuquan Governor stated that turbine manufacturers with production in Gansu will be preferred as equipment suppliers. On 19 May, Jiuquan government signed an agreement with Sinovel to establish a manufacturing facility in Jiuquan. Goldwind already signed a similar contract in 2007 and already started constructing an assembly facility early this year to be completed by year-end. Several other companies including Huiteng (blades), Sany (WTG), Dongjia, Huayi, are planning to locate in the vicinity according to the Jiuquan Government press release.

- **WTG bidding information for a new round of concession projects was published on 9 March 2009**
- **Information for 25 projects (5,250MW) located in Inner Mongolia and Hebei was released.**
- **Project size is 150-300MW located in 4 main areas (Wulate, Tongliao, Baotou, Chengde)**
- **Bidding deadline was 20 April 2009 and 256 valid bids were opened.**

### Features of the Wind Auction in Inner Mongolia and Hebei wind base development:

1. **The wind farm developers were not chosen through open public bidding.**
2. **No mention of wind resource measurement data available for WTG selection and micrositing.**
3. **23 out of 25 projects had requirement for exactly 1.5 to 2.0MW turbine type;**
4. **16 projects (3,200MW) are located in class 1 or bordering class 1 (Baotou and Wulate).**
5. **Requirement to have 50 units produced and installed and one unit passed test operation (>240 hours) within the borders of China.**
6. **Payment terms are more adverse to Seller than usual businesses standard terms. Basically 90% payment after delivery is the general standard.**
7. **Low tariff around 0.5 Yuan/kWh (\$0.07) leads to severe price pressure.**

# Order from Special NDRC Policies

## Gansu Jiuqquan 10 GW Wind Base and Wind Projects Auction 2009

Turbine supplier	Technology	Equipment	Bids	Awards	Average RMB/KW	Lowest RMB/KW	Highest RMB/KW	Variation Gansu Wind base 2008
Gamesa	Own	G87 2.0MW	4		6,906	6,894	6,923	
NCWA	Own	AW77-1500 C2LT	1		6,992	6,992	6,992	
GE	Own	GE SLE 1.5MW	1		7,672	---	---	
Nordex	Own	S77-1500 1.5MW	4		5,990	5,990	5,990	
Repower	Own	MM 82 2.0MW	2		7,137	7,137	7,137	
Vestas	Own	V90 2.0MW	2		6,934	6,880	6,987	-14.06%
<b>Average</b>					<b>6,938</b>	<b>6,779</b>	<b>6,806</b>	

Beizhong	DeWind	FD80 2000A 2MW	1		6,081	---	---	-6.33%
Changzhou	U Erlangen	FD77-150/3 1.5MW	8		5,573	5,443	5,617	-17.22%
China Creative	Own	CCWE1500/77	4		5,471	---	---	
Dongfang	REpower	FD77B 1.5MW	25		5,337	5,150	5,670	-13.60%
GD United	Aerodyn	UP77/82-1500kW	4		5,700	5,500	5,900	-15.76%
Goldwind	Vensys	GW77-1500	23		5,416	5,396	5,499	-15.36%
Haizhuang	Aerodyn	HZ 2.0MW	14		5,658	5,522	5,723	-12.28%
Huayi	Aerodyn	HW82-1500/77	4		5,760	5,670	5,850	-7.08%
Mingyang	Aerodyn	MY 1.5 SE/82/77/65	23		5,491	5,480	5,500	-10.88%
Sewind	DeWind	W1250C-64-65	3		5,562	5,550	5,586	-6.68%
	Aerodyn	W2000C-93-80	20		5,808	5,800	5,810	-6.68%
Sharpower	Own	SPT15A 1.5MW	3		5,793	5,760	5,859	
Sinovel	Fuhrländer	SL 1500 LT	25		5,400	5,388	5,558	-8.47%
Windey	Own	WD77/82 1.5MW	16		5,158	5,032	5,336	-20.00%
Xiangdian	Zephyrus	XE82-2000 2MW	22		5,339	5,307	5,366	-22.03%
Zelri	Windtec	Wt 1650-82 LT	5		5,374	5,326	5,406	-10.93%
<b>Average</b>					<b>5,465</b>	<b>5,293</b>	<b>5,637</b>	<b>-13.28%</b>

In absolute terms (RMB/kW), prices of those turbines offered by Chinese were very competitive; however, this do not mean that they were cheap. Investments analysis cannot be made based only on turbine prices, but also in performance, quality and wind availability in that specific region, etc. Those prices, while competitive, does not really tell the whole story of those projects.

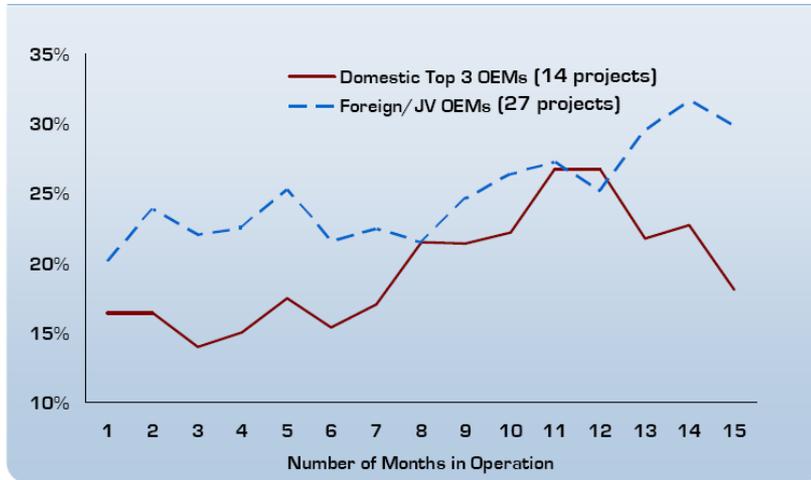
1. None of the turbines offered by Chinese suppliers are fully certified by any reputable international certification body (GL, DNV, etc) and all of the licensed turbines have no valid certificate, as key components have been changed due to cost reasons (certification should be according to IEC standards);

2. In almost all cases, there are no measured power curves, but only theoretical ones;

3. Performance of Wind Turbines manufactured by local companies have a significant lower performance than that of international companies

### New Energy Finance

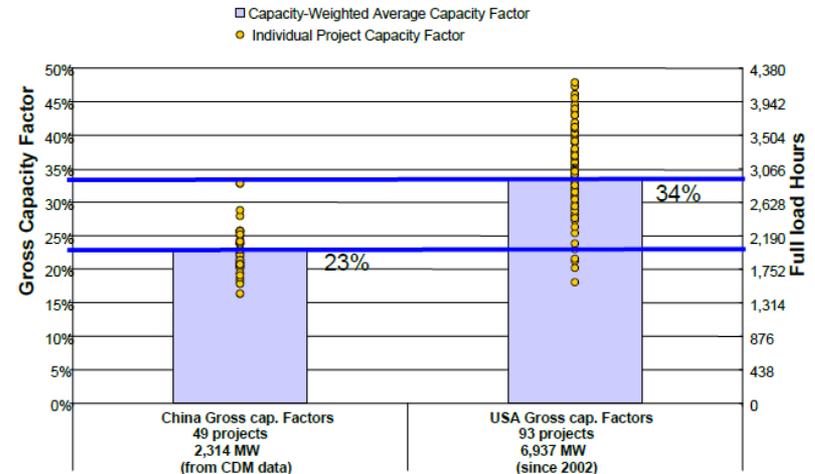
Project performance by manufacturer type: %



Note: Includes operational data of 41 wind projects in China with at least 7 months of operation data available. Sources: New Energy Finance, UNFCCC

### Azure International

China net capacity utilization (CDM) - Likely

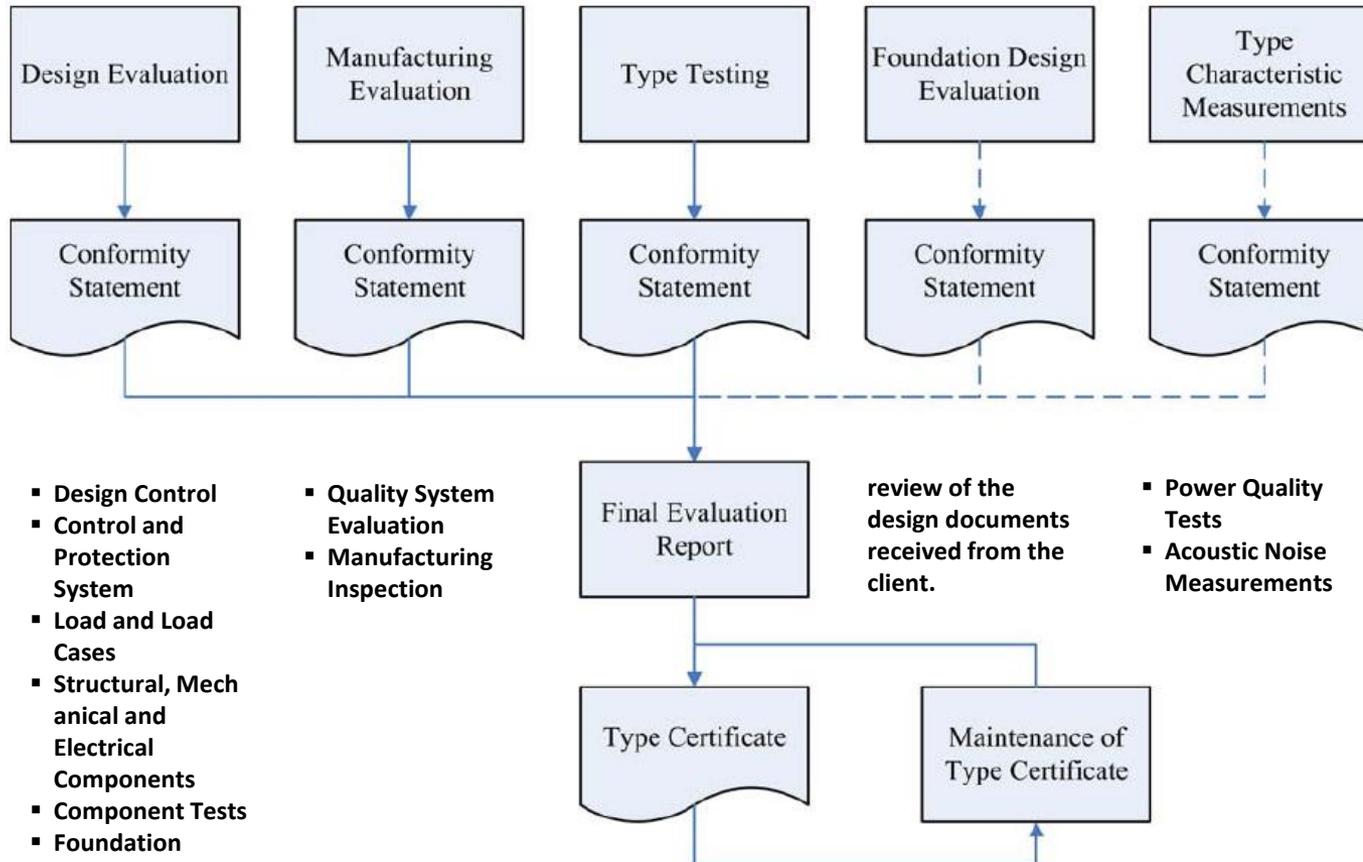


The focus on low tariff - instead of total IRR over the entire life span of 20-25 years of a project - forces developers to focus on initial price instead of the long-term suitability and quality of the turbine products. This is one of the main reasons behind the low turbine capacity factor of domestic made turbines compared with the capacity factors of turbines produced by foreign companies, as illustrated in the graph above. The low capacity factor is a major threat to the development of the entire Chinese wind power industry.

Projects awarded on policy orders, be it National Level Concession Projects or Wind Base projects do not have enough information, such as WIND DATA, to allow for a proper calculation of the projects IRRs, thus creating a fictitious impression of low cost. In reality, we do not even now for sure, whether those projects will be economically feasible even with wind theoretical low cost turbines from Chinese local suppliers

# Turbine Performance and Turbine Selection

## Turbine certification



- Design Control
- Control and Protection System
- Load and Load Cases
- Structural, Mechanical and Electrical Components
- Component Tests
- Foundation Design Req.
- Manufacturing Installation, Maintenance Plan
- Personnel Safety.

- Quality System Evaluation
- Manufacturing Inspection

review of the design documents received from the client.

- Power Quality Tests
- Acoustic Noise Measurements

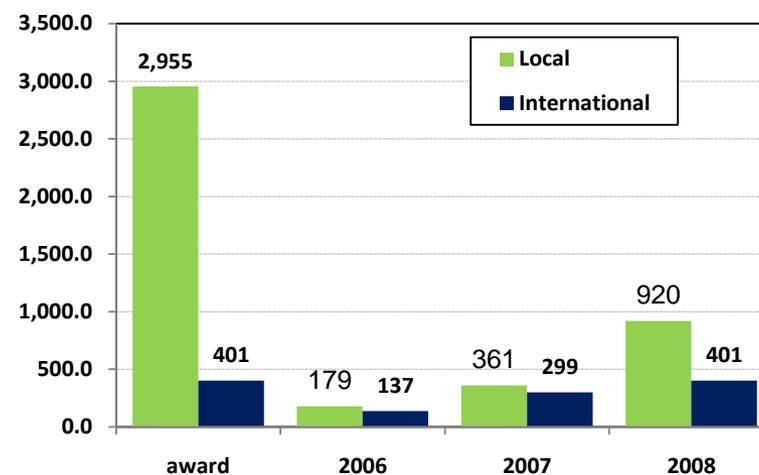
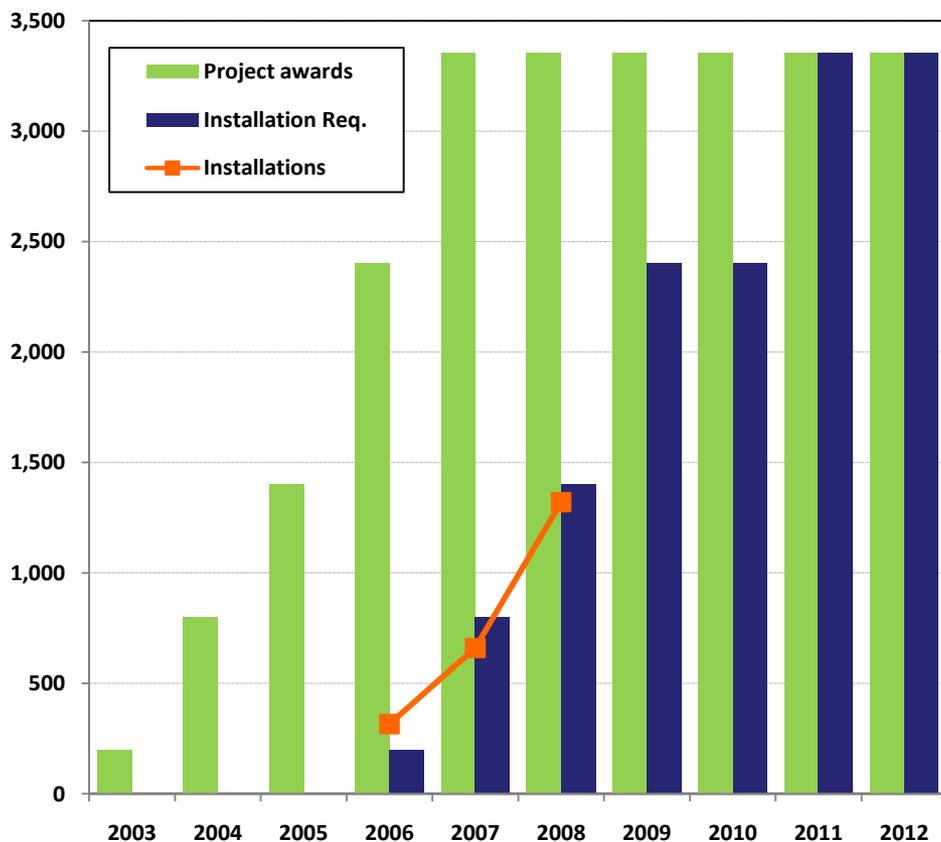
- Safety and Function Tests
- Load Measurements
- Power Performance Measurements
- Blade Tests, Static and Fatigue
- Other Tests

The Type Testing elements shall be carried out by accredited testing laboratories. DNV will verify that the testing is carried out according to IEC/ISO 17020 or IEC/ISO 17025, as Applicable. DNV will witness the Safety and Function Tests. In connection with this test the wind turbine will be inspected for compliance with design drawings and specifications.

Certification of turbines are a very important part of any suppliers, development, as it verifies not only aspects related to the turbine design itself, but also manufacturing evaluations, as well as foundations, type testing and type characteristic measurements. This certification also supports the improvement of the quality in component suppliers, as key components are integral part of the certification process.

# Market Development China

## National Level Concession Projects – Installation Progress



Distribution	Awards	2006		2007		2008		% Total	% Req
		Inst	Req	Inst	Req	Inst	Req		
International	401	137	100	299	401	401	401	100.0	100.0
Local	2,955	179	100	361	401	920	1,003	31.1	91.7
Goldwind	1,002	156	100	301	201	489	501	48.8	97.6
Sinovel	1,252	23	0	60	201	288	502	23.0	57.4
Windey	200	0	0	0	0	42	0	21.0	NA
DEC	501	0	0	0	0	101	0	20.1	NA
<b>Total</b>	<b>3,356</b>	<b>316</b>	<b>200</b>	<b>660.3</b>	<b>803</b>	<b>1,321</b>	<b>1,404</b>	<b>39.4</b>	<b>94.1</b>

Development	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Awards	200	803	1,405	2,406	3,357	3,357	3,357	3,357	3,357	3,357
Installation Req.	0	0	0	200	803	1,405	2,406	2,406	3,357	3,357
Installations				316	660	1,321				
Variation				58.1%	-17.7%	-5.8%				

**While International companies established in China have delivered according to its contractual obligation, the same does not apply to local companies**

Source: Azure International / Suzlon market research

# Order from Special NDRC Policies

## The Wind Base Concept and its potential implications

The 'wind base' concept is meaningful in the scheme of continued Chinese wind project development. The concept of large 'wind bases' in regions with solid resources and planned grid interconnection has appeared in key pieces of legislation related to the roll-out of wind in China.

- The 'Mid and Long-term RE Implementation Plan' from Jun 07, 07 planned for 3 x 1-GW wind bases in Jiangsu, Hebei and IMAR by 2010. By 2020, 6 x 1-GW wind bases are planned to be constructed in Xinjiang Dabancheng, Gansu Yumen, Jiangsu-Shanghai coast, IMAR Huitengxile, Hebei Zhangbei and Jilin Baicheng, and other areas of proven wind resources.
- More recently, the '11th Five-year RE Development Plan' (Mar 03, 08) adjusted the 2010 wind target to 10GW mentioning 5 x 1-GW wind bases in Hebei, IMAR, Gansu, Jilin and Liaoning.

### Implications for Project Developers

- For non-SOE project wind project developers, this development sets a negative precedent. A similar approach may be adopted in the future development of Hebei, Liaoning, Jilin and IMAR which are also slated to have 'wind bases'. By extension further wind bases could also adopt conditions set via national concession projects.
- The 'wind base' mechanism does not appear to be a policy tool for provincial DRCs to catch-up planning targets. Gansu was on the way to achieve its 1GW target before the 'wind base' plan emerged. After publishing a 1GW by 2010 target in 2006, 376.6MW had been installed by year-end 2007, with a further 669 MW of non wind-base 'near term' pipeline existing.

### Implications for WTG manufacturers

- For WTG manufacturers, the wind bases will likely bring pressure to localize regionally. Governments in key wind provinces will all eye local manufacturing investment and jobs as a benefit not to be missed. Domestic WTG manufacturers are responding with de-centralized assembly. For example, Goldwind is in the process or has already established manufacturing bases in Beijing, Hebei Chengde, Guangdong Huilai, Gansu Jiuquan (under construction), Xinjiang (under construction), IMAR Baotou (under construction), and Ningxia – closely following future likely wind base developments.

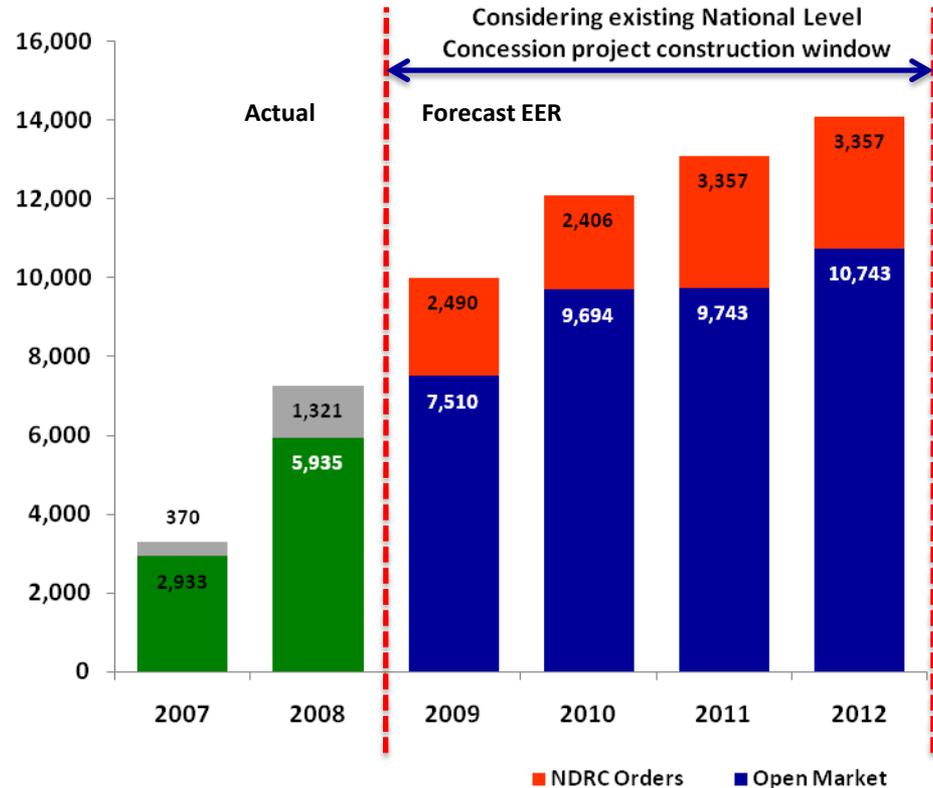
# Market Development China

## Addressable Market – NDRC Concession Projects and Special Policy Orders

- The addressable market for International Turbine suppliers established in China is significantly smaller than that of the existing forecast, since those companies do not have fair access to all orders in the Market.
- If the construction window of the National Level concession projects and Special Policy Orders (such as Wind Bases) is respected, we can assume that the following Installations will need to be made:

Addressable Market	2008A	2009	2010	2011	2012
2008 + EER Forecast	5,935	10,000	12,100	13,100	14,100
National Concession Projects (slide 13)	1,321	2,490	2,406	3,357	3,357
Addressable Market	4,614	7,510	9,694	9,743	10,743
Market volume (%)	77.7%	75.1%	80.1%	74.4%	76.2%

- All the figures suggests that in future , most likely, no International company established in China will be able to reach 20% market share level, since a significant amount of the installations will be made of orders already placed by the government to Local suppliers;
- According to our estimates, no more than 70% of the total market will be addressable to international companies producing in in China ,and from this total, Local companies with local brands, will still play an important role.

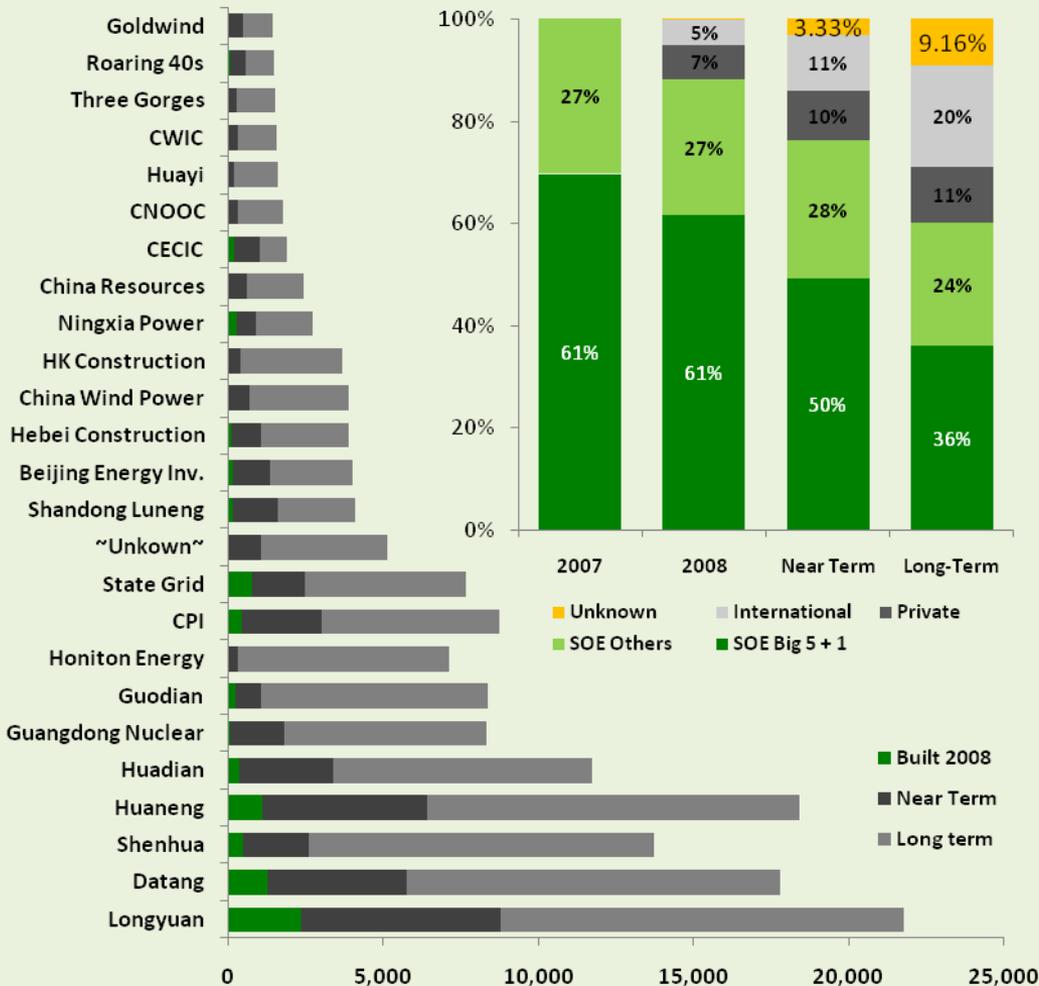


**Remarks:**

1. For 2009, we considered also "left over" from 2008 (84MW – see slide 13)

**We can say, based on the data available and according to the developments of the Industry, that the market available to International companies established in China will be less than 50% of the total Market**

### MW Installed Ownership - Pipeline Development

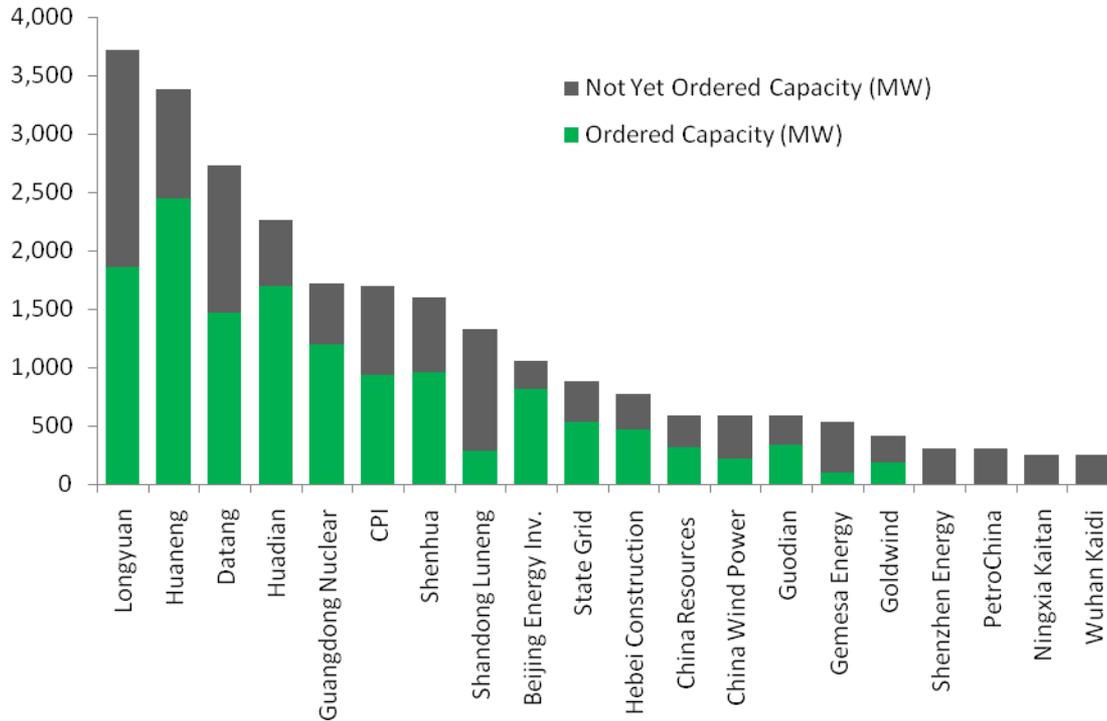


- There are about 200 players currently operating as developers in the wind business in China
- The top 25 companies in China have a total of 5,382 MW installed capacity, which represents 91% of the total Installations. They are responsible for 76.4% of the Near Term development (32,478 MW of 42,490 MW), and 73.1% of the Long Term Development (107,586 MW of 147,139 MW)
- Among the top 25 developers there is an current order backlog of about 16,594 MW; however, 15,8840 MW worth of installations on a near term basis are still to be ordered!
- Government agencies / utilities will continue to be the biggest customer base but their domination will subside

Traditional Players will still be the dominant force in the development of the windbusiness in China; however, there is a increasing number of Foreigner players actively looking for options to participate in the market!

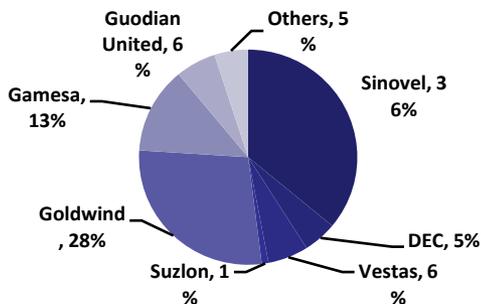
# Market Development

## Likely Future Orders and Supplier Shares of Existing Orders

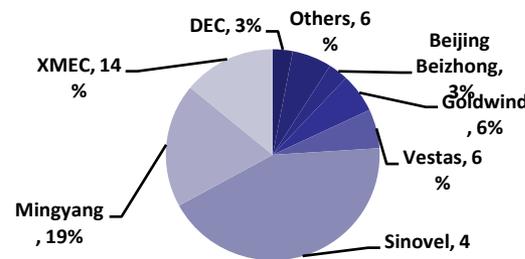


- The chart lists top 20 wind farm developers out of 79, representing 65% of potential total orders, which is 18 GW in the next 2-3 yrs. Data was compiled as of Dec 31, 08 by Azure
- Near Term not yet order capacity: this is equity weighted potential order capacity for next 2-3 years
- Ordered Capacity: again this is equity weighted ordered capacity of the last 2-3 years. The orders were already placed with the suppliers

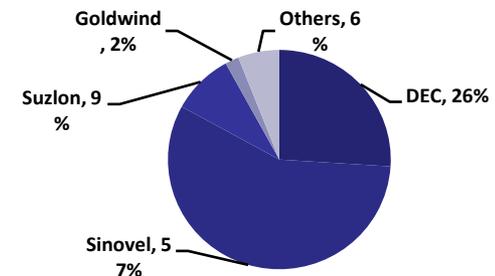
Longyuan Orders by Manufacturer (Total of 1,853MW)



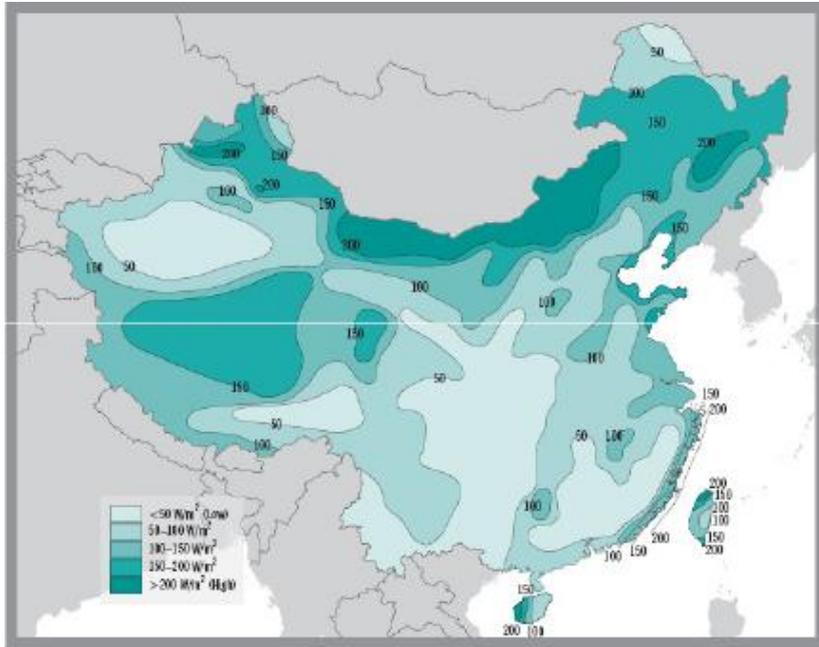
Datang Orders by Manufacturers (Total of 1,468MW)



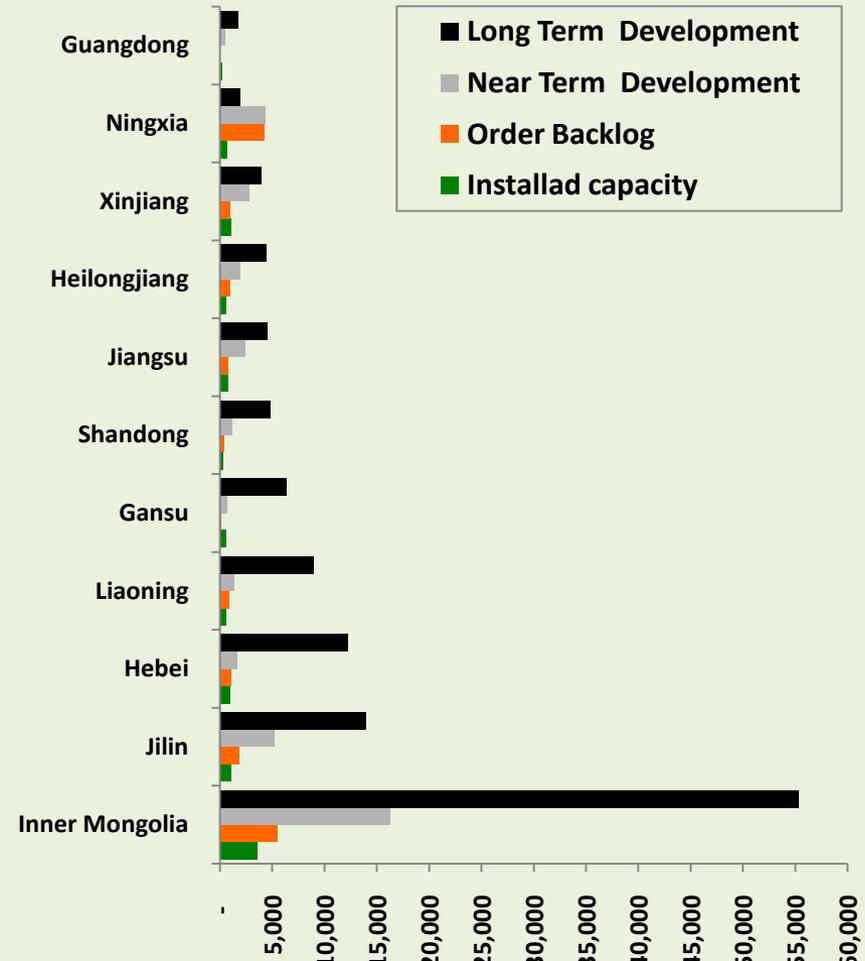
Huaneng Orders by Manufacturers (Total of 2,446MW)



# China Wind Power Development footprint



## Wind Farm development footprint / province [MW]



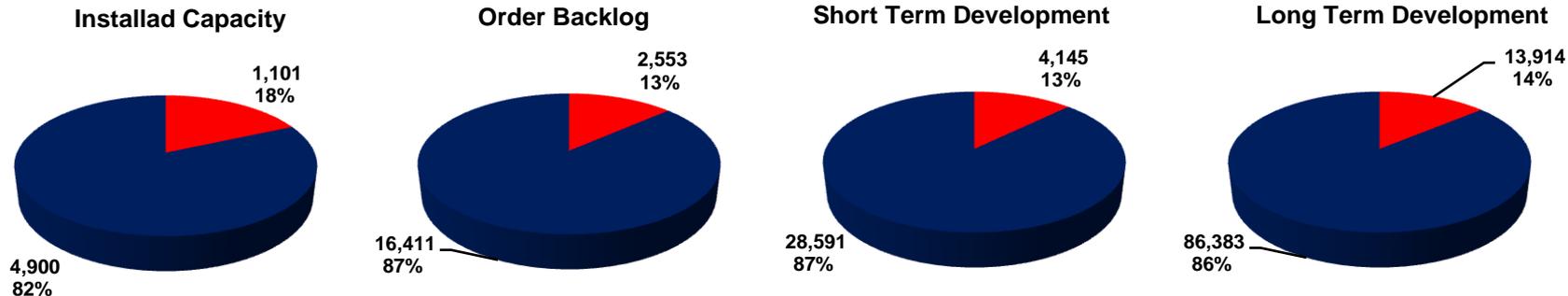
The top 11 provinces in China in terms of Windpower development account for 93% of all installations and 98% of the future pipeline; however:

- Inner Mongolia accounts for 43% of all future developments;
- The top three provinces (Inner Mongolia, Jilin and Hebei, where Beijing and Tianjin are located) accounts for 68% of the future project developments;
- Balance between Low and Standard temperature machines will become more difficult as STV areas represents only 14% of long term developments.

# China Wind Power Development footprint

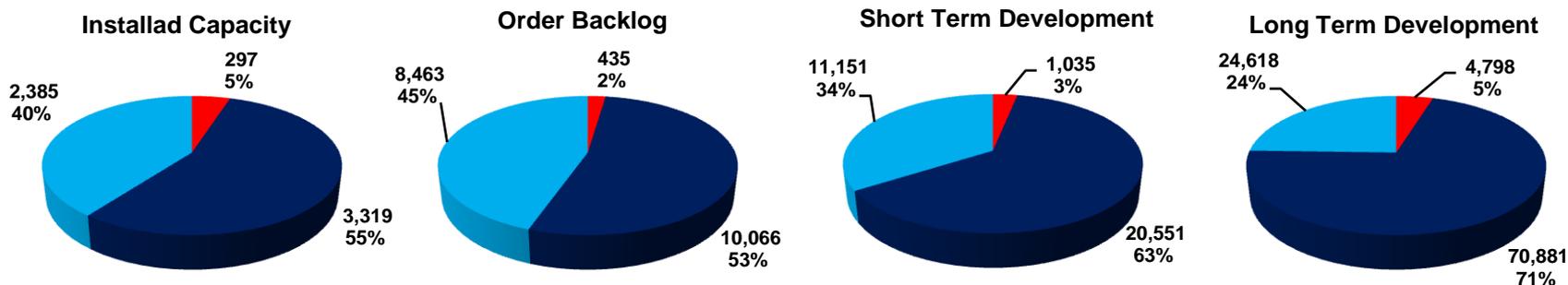
## Wind Farm development – Temperature [LTV/STV] - MW

Standard Temperature Low Temperature



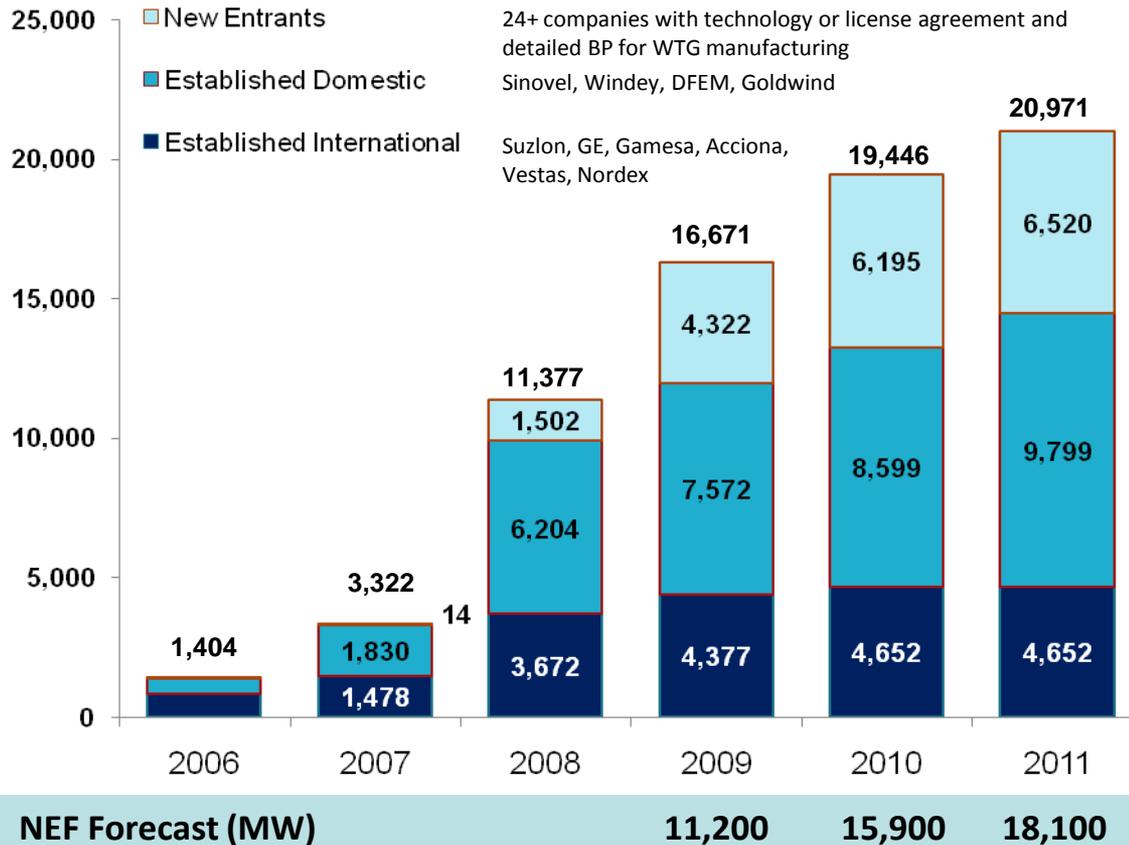
## Wind Farm development – Wind Class [I / II / III] - MW

Class I Class II Class III



The Chinese Wind power business is clearly a Class II/III LTV predominant Market, and the future tendency shows an increased importance in LTV/Class II, for what we will need larger and more competitive machines in terms RMB/MWh. Our current product portfolio is not sustainable on a medium/long term, and action must be taken immediately

# Competition: Manufacturing Buildup – Industry Plans



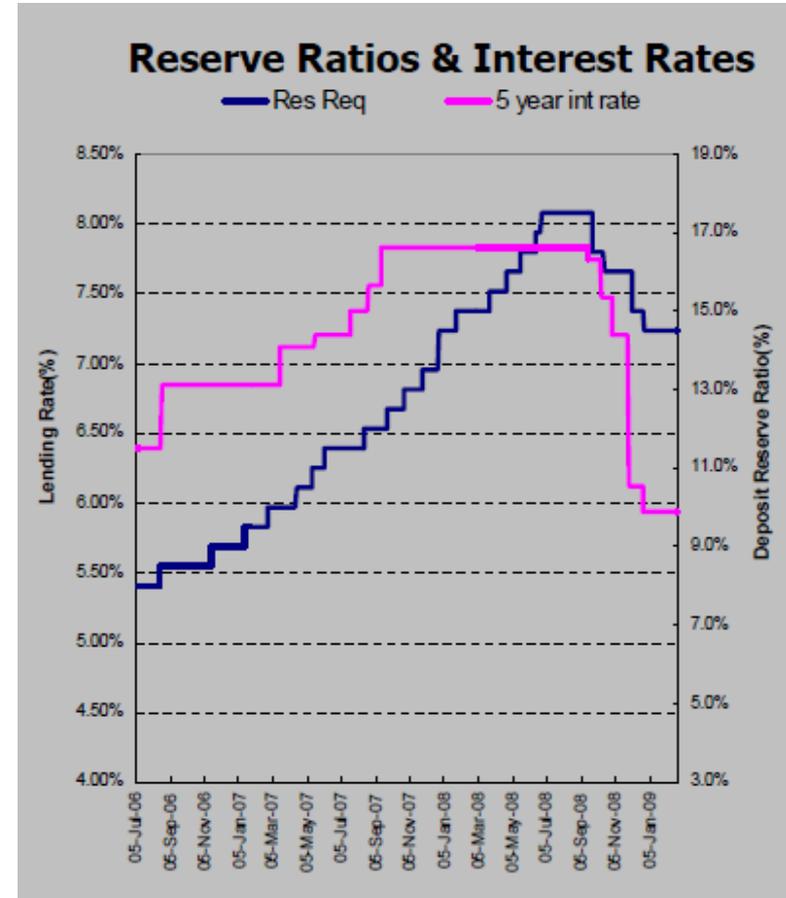
## Analysis

- There is a significant mismatch between capacity build-up and market forecast
- If plans are fully implemented, local companies will be able, alone, to handle the market
- Foreigner players will face a very stiff price competition and will need to develop export plans
- Capacity is supposed to be even higher, if smaller players are considered

**Of late, there has been a trend of Large Chinese Power getting into Wind turbine manufacturing. This may take away significant volume from the open market and further intensifies the competition**

# Macro Economic Conditions

- Stimulus RMB 4trn (USD ½ trn but only ¼ is central budget & new) boosts lending, up 18% y-o-y in Dec. (vs. 5% for 1Q08) bringing full year loans granted to RMB 5trn for 2008, up 35%
- 0.5% decrease in loan reserve rate (now 14.5% as at 5 Dec) will tie-up a further RMB 150Bn
- Stimulus affirms banking sector to continue & step up lending to wind
- Most wind projects (SOE) financed up to 80% by on balance sheet debt
- Compared to thermal power, wind projects are more sensitive to long-term interest rates
- Some regional subsidiaries of State-owned Commercial Banks were prevented from disbursing approved loans in '08...wait and see for '09



## New guidelines have been introduced for the approval process

- Detailed project review process is in place, linking the disbursements to specific projects. This eliminates flexibility for the developers to use the funding for other projects.
- Banks take greater responsibility for the due diligence

## Investment Considerations

- Only Chinese majority owned JV is entitled for CDM registration
- 51% Chinese shareholding critical for CER revenues

## Debt/Equity ratio

- Chinese companies 80:20
- Foreign companies maximum 2:1

## Foreign developers to be adversely effected

- Regulations restrict carbon credit revenues

### Case Study: Huaneng Fuxin Gaoshanzhi

Project Name:	Huaneng Fuxin Gaoshanzhi I
Capacity:	100MW
Location:	Liaoning
Borrower:	Huaneng New Energy
Debt Provider:	China Development Bank
Equity Provider:	Huaneng Group (Parent)
Data of Financing Closure:	Mar 2008
Total Project Cost:	USD 145 .0 million
Total Debt	USD 115.9 million
Total Equity:	USD 29.1 million
Gearing:	80% (as % total project cost)
Debt Interest:	6.84 % per year
Loan Term:	N/A
Project Lifetime:	21 years

Description: Huaneng is building a 100.5 MW windfarm in Lioaning province due for completion in Sep 2008. The 1.5MW WTGs will be supplied by Sinovel. The project is applying for CDM and it is expected to achieve an IRR of 8.85% with CDM credits

- **The Financial Crisis we are facing at the moment has benefited infra-structure projects, especially those related to Renewable Energy. However:**
  - ▶ **Financial support is directed to SOE, with clear favorable treatment to those companies**
  - ▶ **Rules about how the stimulus package will be implemented are unclear, and large part of it is under control of the provinces, which tends to increase lack of oversight and fair competition**
  - ▶ **Despite massive investments foreseen for the improvement of the grid infrastructure; there are doubts about the grid capability to cope with the high targets for wind power. Additionally, slowdown in the economy and its potential long term effect, may put pressure on grid companies to rationalize wind power generation by different producers; where the fragmented grid is unable to transit the extra power to regions where the demand is needed. As a matter of fact, Inner Mongolia is requiring Project Developers to allow grid companies the right to limit the amount of wind power they can sell to the grid within their PPA contracts. Other provinces may follow suit, even though this is a clear violation of the National Renewable Energy Law of 2006 <sup>(1)</sup>**
- **Furthermore:**
  - ▶ **All indications shows that there will be overcapacity in manufacturing of wind turbines; however current financial environment may delay expansion plan from small players;**
  - ▶ **Price pressure has increased significantly, specially for the international suppliers (due to low PPAs, competition from local players, and overcapacity);**
  - ▶ **International project developers and turbine suppliers established in China must be granted access to compete on equal terms with local players on National Level Concession Projects and NDRC special policy projects (such as the Wind base scheme);**
  - ▶ **Intention of local project developers to produce its own WTG**
  - ▶ **Establishment of a “Chinese certification requirement”, when there is an already existing and worldwide recognized certification in place.**

# Suzlon Manufacturing Facilities

# Suzlon Manufacturing Facility – Tianjin

## Aerial View

**Total Area:** 250,000 m<sup>2</sup>  
**Total Built Area:** 58,500 m<sup>2</sup>





**Weihai Rongcheng Wind Farm – Guohua I R40s**  
**Shandong Province**  
**39 x S66 1.25 MW**

## Suzlon Energy Tianjin Ltd

### Beijing Office

**Employees : 125**

**Sales, PM, Site installation and OMS, Financial Services**

### Tianjin Factory:

**Employees: 924**

#### **Manufacturing Capabilities**

- **Rotor Blade Unit (RBU)**
- **Nacelle Cover Unit (NCU)**
- **Wind Turbine Generator Unit (WTG)**
- **Control Panel Unit (CPU)**
- **Generator Unit**
- **Support Infrastructure and facilities**
- **Center for Research& Development**
- **Training Center**

# Thank you

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