Review of Wind Energy Development in China

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Chinese Wind Energy Association
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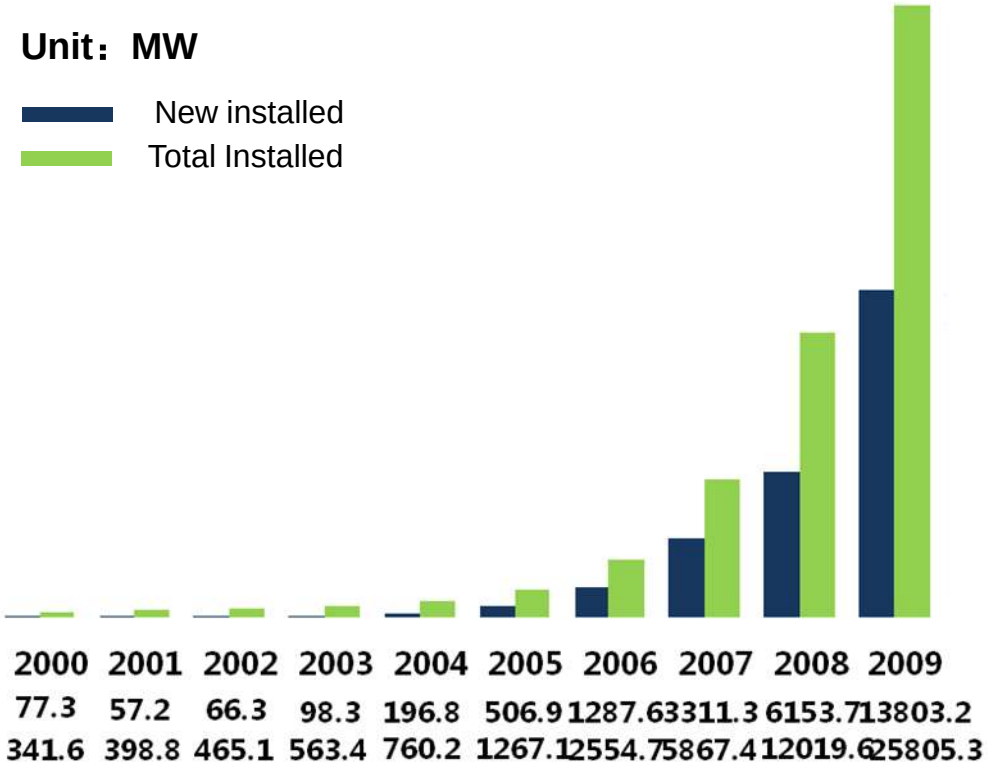
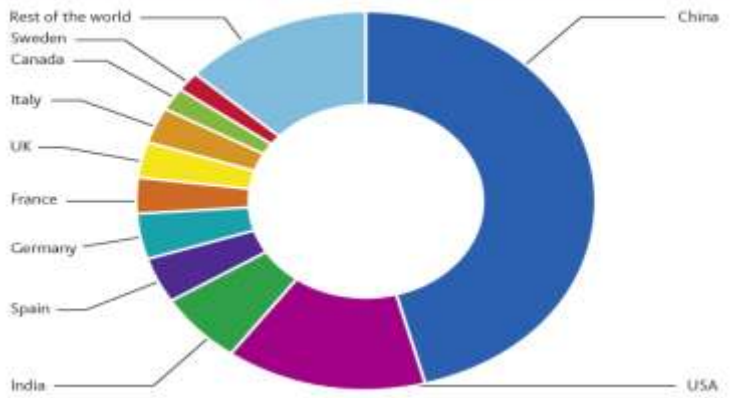
Wind Energy Development in China

Wind Power Installed Capacity in China



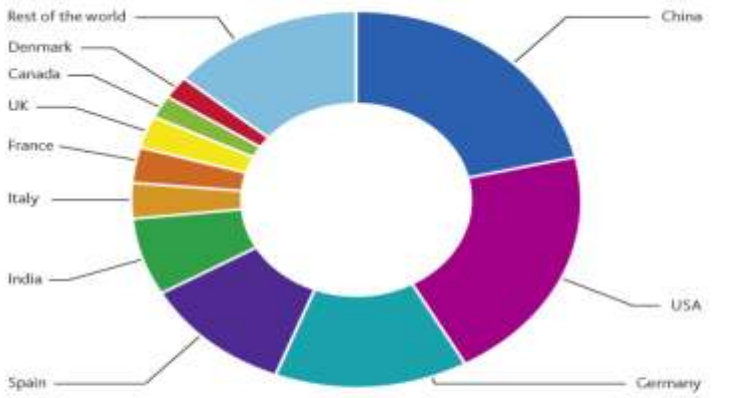
Wind Energy Development in China

TOP 10 NEW INSTALLED CAPACITY JAN-DEC 2010



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**

TOP 10 CUMULATIVE CAPACITY DEC 2010



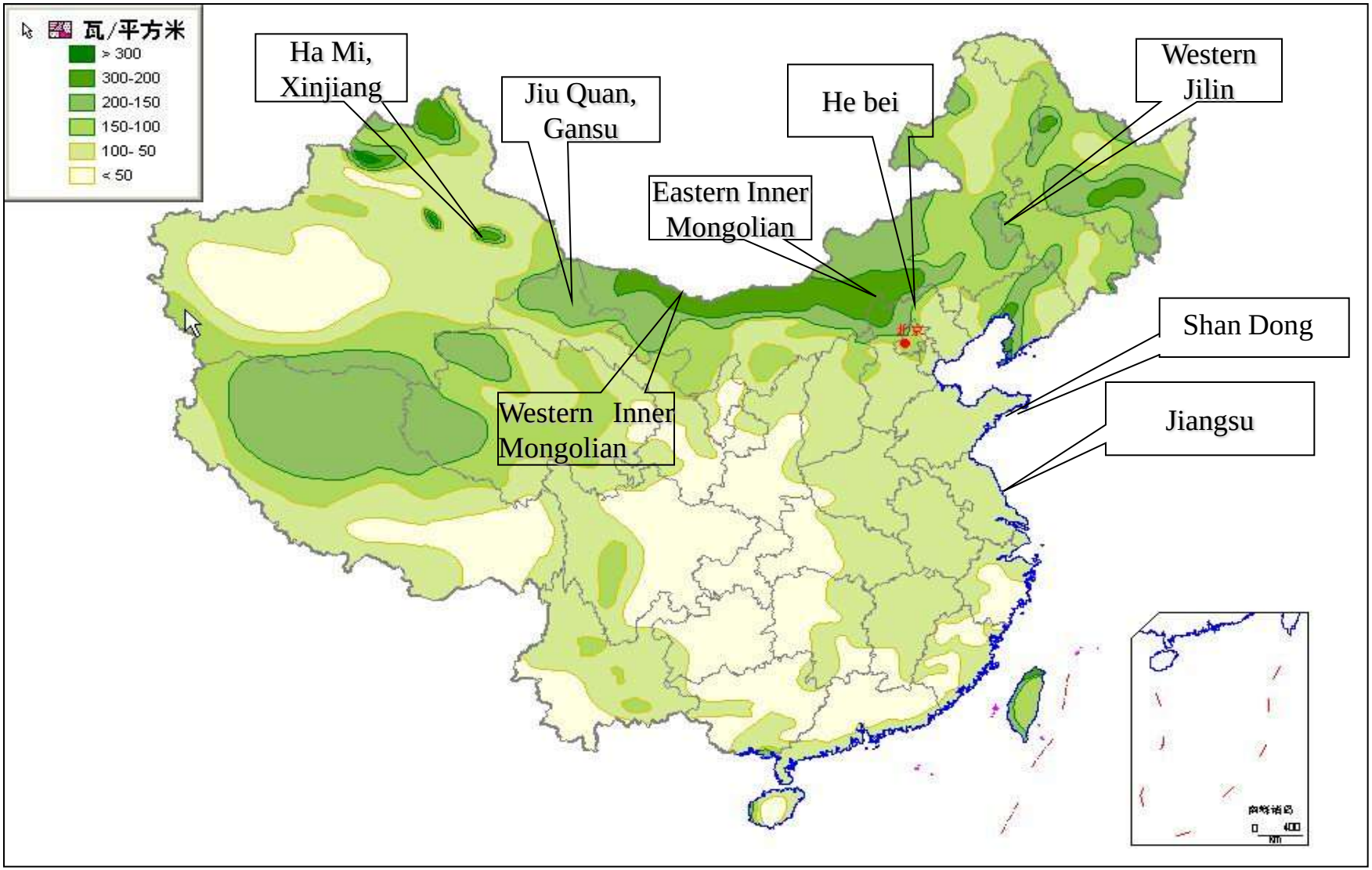
Country	MW	%
China	42,287	21.8
USA	40,180	20.7
Germany	27,214	14.0
Spain	20,676	10.6
India	13,065	6.7
Italy	5,797	3.0
France	5,660	2.9
UK	5,204	2.7
Canada	4,009	2.1
Denmark	3,752	1.9
Rest of the world	26,546	13.7
Total TOP 10	**167,844**	**86.3**
World Total	**194,390**	**100**

Prospect of Wind Energy Development in China

Target for renewable energy development from Chinese Government

- **Non-fossil Energy takes 15% of energy mix by 2020 .**
- **40% - 45% carbon emission reduction (per GDP) by 2020 compare with the level in 2005.**

Prospect of Wind Energy Development in China



Prospect of Wind Energy Development in China

Target of Wind Energy Capacity in China

Year	Capacity
2015	100 GW
2020	150~200 GW

Wind Energy Development in China

Wind Resources Distribution in China

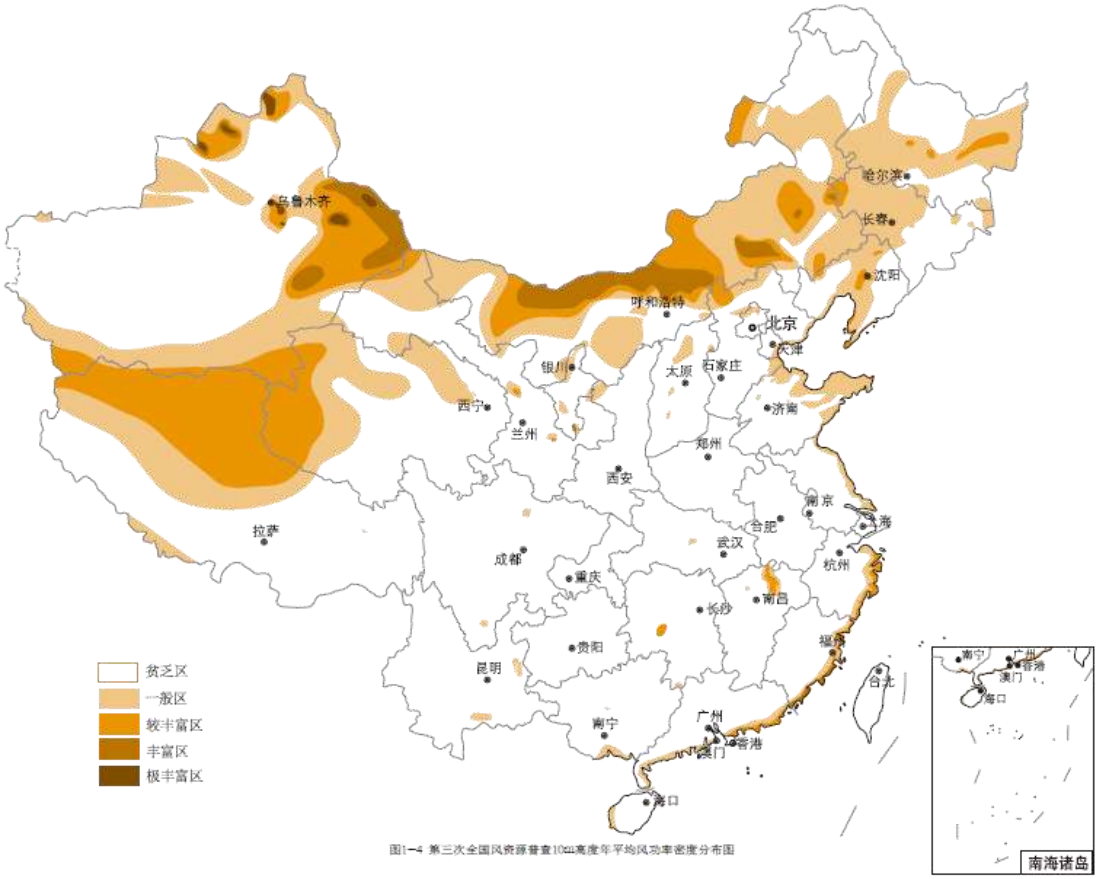


图1-4 第三次全国风资源普查10m高度年平均风功率密度分布图

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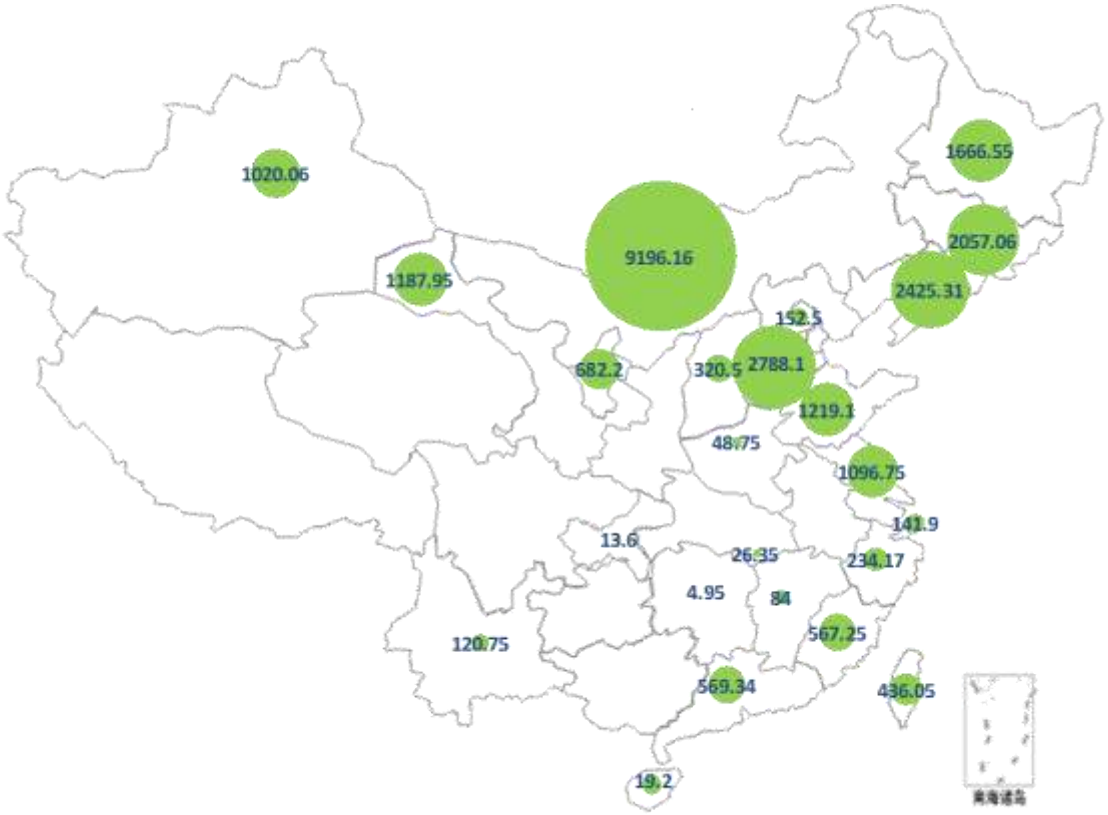
The Installed WTGS Distribution in 2009



Province	Total in 2008	Newly in 2009	Total In 2009
IM	3650.99	5545.17	9196.16
Hebei	1107.7	1680.4	2788.1
Liaoning	1224.26	1201.05	2425.31
Jilin	1066.46	997.4	2063.86
Heilongjiang	836.3	823.45	1659.75
Shandong	562.25	656.85	1219.1
Gansu	639.95	548	1187.95
Jiangsu	645.25	451.5	1096.75
Xinjiang	576.81	443.25	1020.06

Unit：MW

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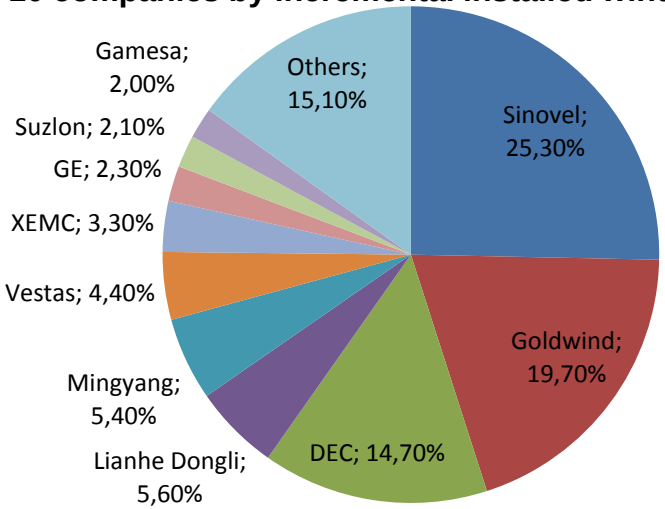
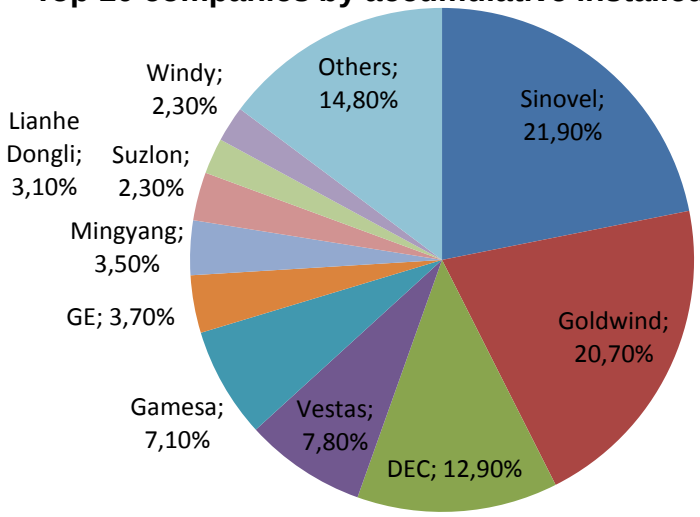
Top 10 companies by incremental installed wind capacity



Top 10 companies by accumulative installed wind capacity



Company	New Installed Capacity (MW) In 2009	Market Share
Sinovel	3495	25.3%
Goldwind	2722	19.7%
DEC	2035.5	14.7%
United Power	768	5.6%
Mingyang	748.5	5.4%
Vestas	608.75	4.4%
XEMC	454	3.3%
GE	322.5	2.3%
Suzlon	293	2.1%
Gamesa	276.25	2.0%
Others	2079.71	15.1%
total	13803.2	100.00%

Company	Total Installed Capacity(MW) until2009	Market Share
Sinovel	5652	21.9%
Goldwind	5343.85	20.7%
DEC	3328.5	12.9%
Vestas	2011.5	7.8%
Gamesa	1828.75	7.1%
GE	957	3.7%
Mingyang	895.5	3.5%
United Power	792	3.1%
Suzlon	605.25	2.3%
Windy	594	2.3%
Others	3814.45	14.8%
Total	25805.3	100.00%

Wind Energy Development in China

Multi-MW WTGS R&D in Process

Manufacturer	Multi MW WTGS
Sinovel	3MW, 5MW, 6MW
Goldwind	2.5MW, 3MW, 6MW
Dongqi	5MW
United Power	3MW, 5MW
Mingyang	3MW
XEMC Wind	5MW
Shanghai Electric	3.6MW
CSIC-Haizhuang	5MW
Yinhe-Avantis	3MW

Wind Energy Development in China

MW-class Wind Turbine Generation System

Gold wind 1.5MW

Sinovel 1.5MW

Dongfang 1.5MW

Wind Energy Development in China

MW-class Wind Turbine Generation System

XEMC2.0MW

CSIC 2.0MW

Sinovel 3.0MW

Wind Energy Development in China

Challenges for Wind Power development in China

1, Lack of experience on R/D

2, Unstable, out-dated grid infrastructure

3, Lack of support policies for grid companies

4, Lack of skilled engineers and experienced developers

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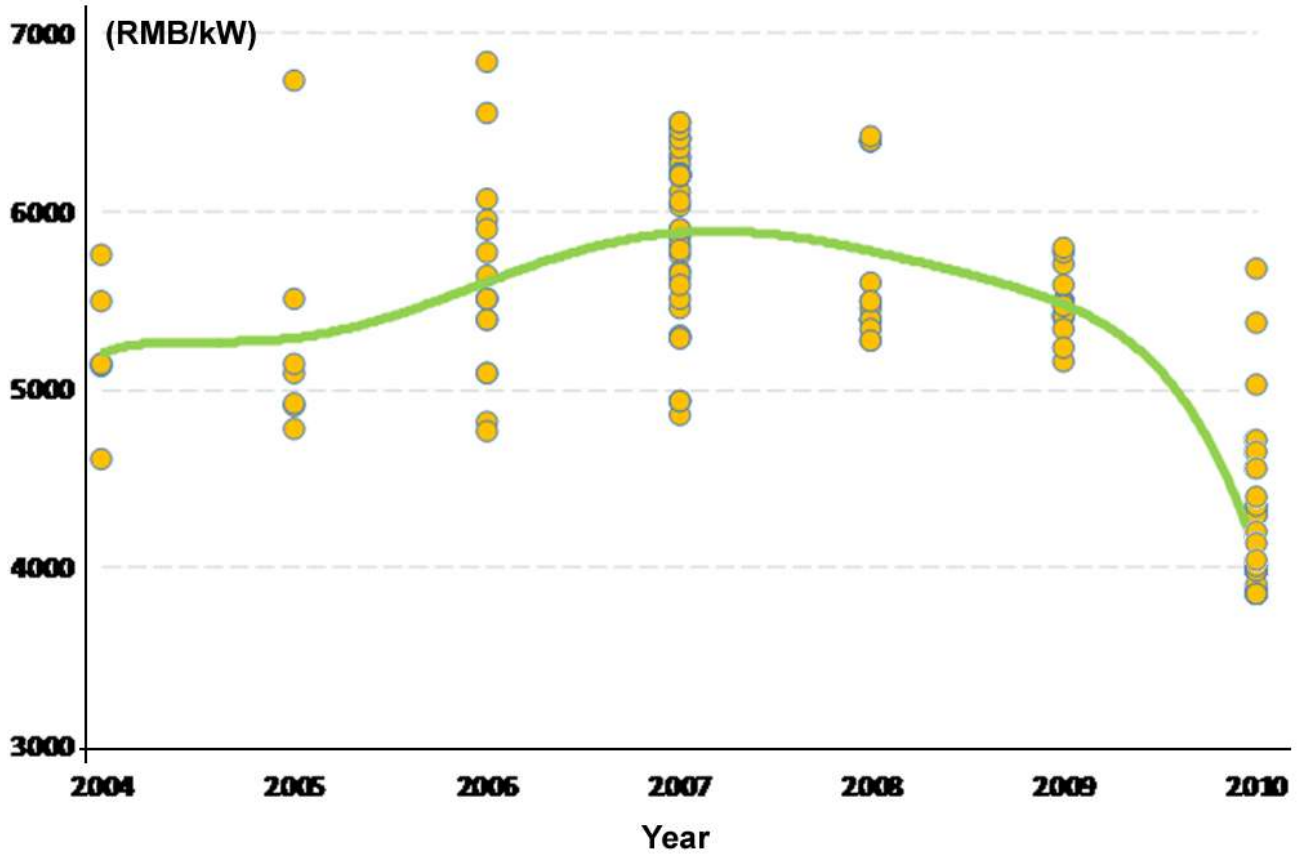
Domestic WTGS Market Price



SOURCE: CWEA

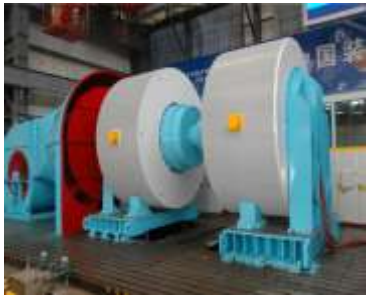
Wind Energy Development in China

The Fundamental Research on Wind Power

Physical Experiment of WTGS

Gearbox

Blade



Generator

WTGS main drivetrain chain

Wind Energy Development in China

WTGS Design and Manufacturing Technology

Reliability Research in Tough Climate Conditions

- Typhoon
- Lighting strike
- Corrosion
- Sand Dust Storm
- Cold Climate

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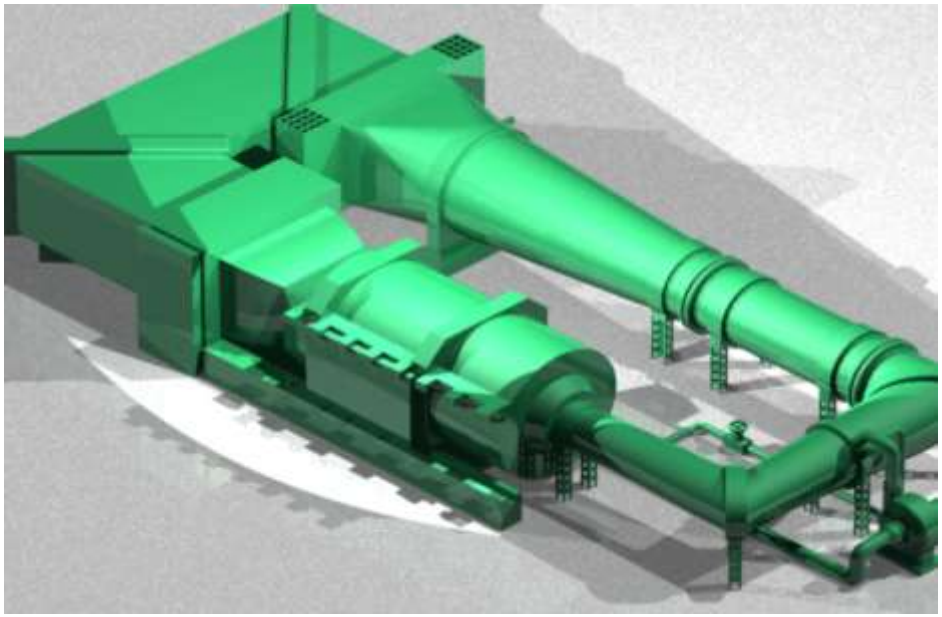
WTGS Design and Manufacturing Technology

Reliability Research in Cold Climate Conditions



The wind tunnel for icing and acoustic experiments

Wind Energy Development in China

WTGS Design and Manufacturing Technology

Reliability Research in Cold Climate Conditions

Piezoelectric film-type Ice level Detector

Wind Energy Development in China

WTGS Design and Manufacturing Technology

Reliability Research in Cold Climate Conditions

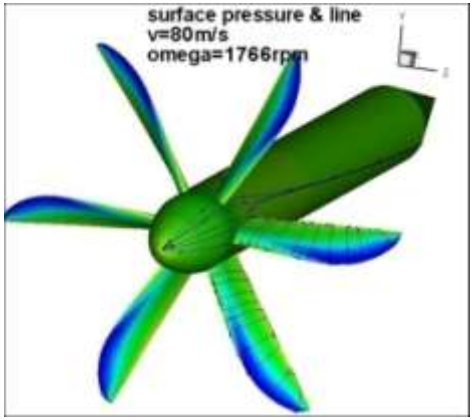
Fiber-type Ice Detector

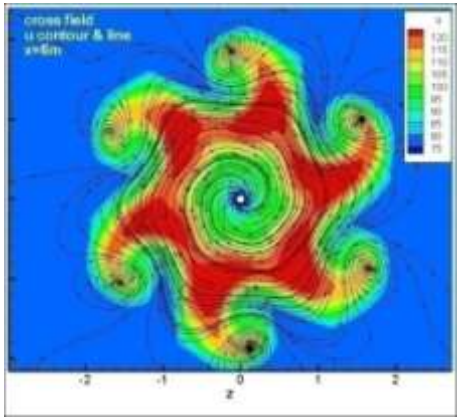
Wind Energy Development in China

WTGS Design and Manufacturing Technology

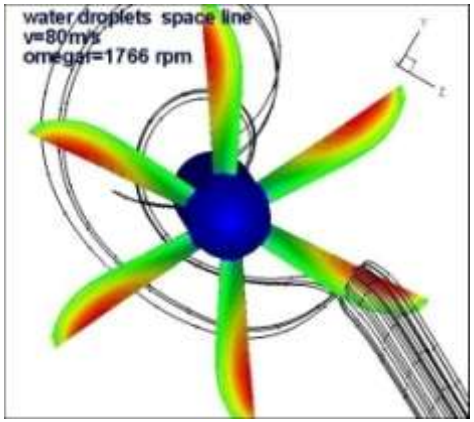
Reliability Research in Cold Climate Conditions

Numerical Simulation of WTGS





numerical simulation of propeller flow field



numerical simulation of propeller droplet trajectory

Prospect of Wind Energy Development in China

Next move for wind power development in China

- Further increase the investment on R&D
- National wind energy technology research centers and public service platform
- Improve standard, testing and certification system
- Training programmes to the engineers in the field
- International cooperation and information exchange

Thanks for Listening!