



# 中国风电的发展情况与激励措施

## Wind Power Industry Status and Preferential Policies in China

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# 目 录 catalog

- 1 风能资源调查与评估  
● **Wind Resource Investigation and Evaluation**
- 2 风电设备制造业的情况  
● **Wind Power Equipment Manufacturing**
- 3 风电场与电网  
● **Wind Farms and the Grids**
- 4 风电发展的动力和激励政策  
● **Driving Force and Preferential Polices in Wind Power Field**
- 5 结束语  
● **Conclusion**



# 1 风能资源调查与评估

Wind Resource Investigation and Evaluation



# 1、风能资源调查与评估

## Wind Resource Investigation and Evaluation

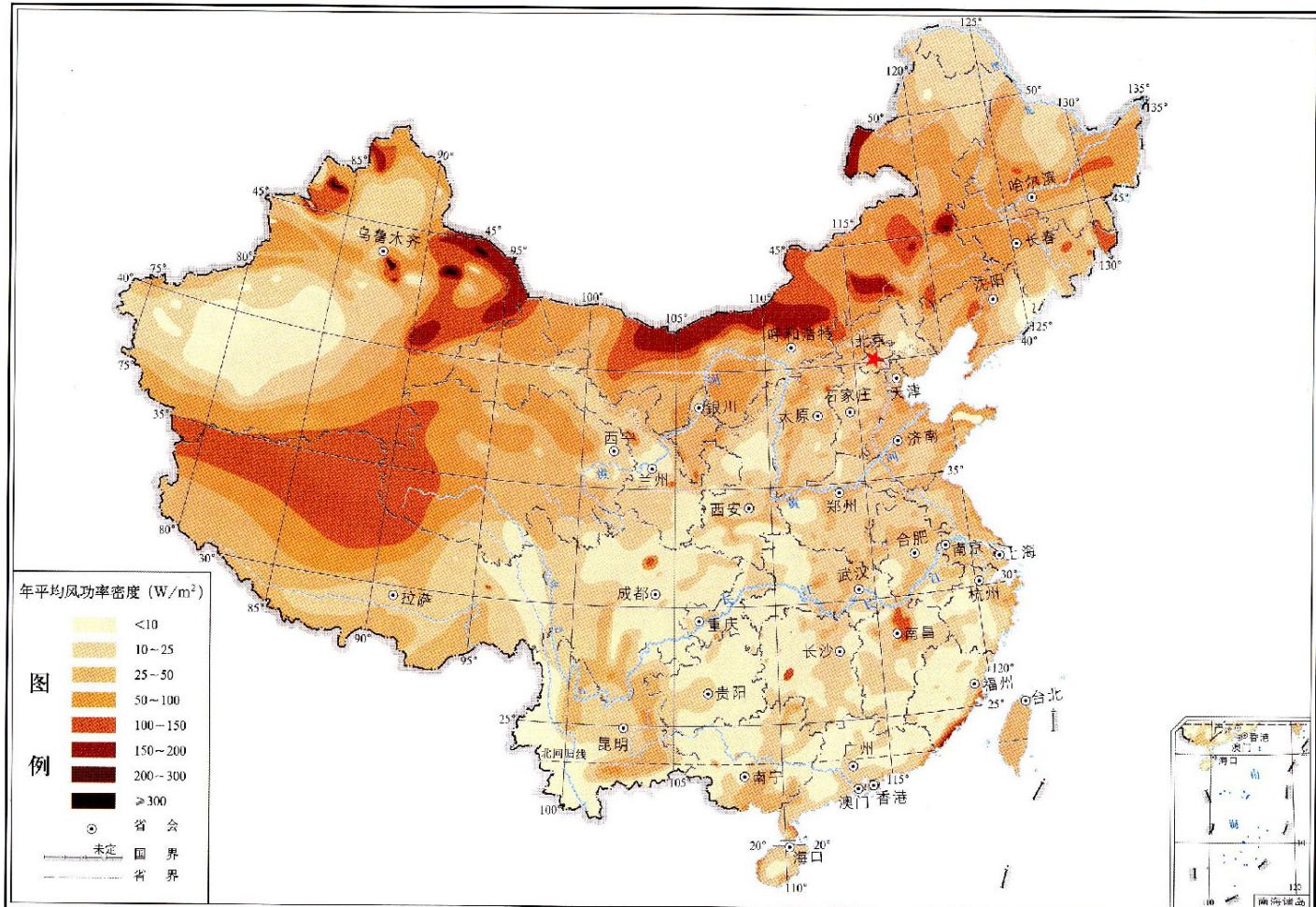


图3.2 全国年平均风功率密度图(色斑图)

# 1、风能资源调查与评估

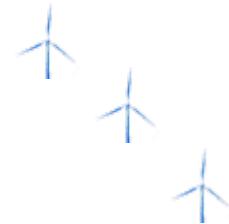
## Wind Resource Investigation and Evaluation

国家气象局在前三次中国风能资源调查与评价的基础上，又承担了发改委和财政部委托的全国风能资源详查工作（400个测风塔）。

After 3 investigations of the wind resource in China, the CMA now is conducting a detail wind resource investigation and evaluation granted by NDRC and the Ministry of Finance(400 masts :3 120m,68 100m,329 70m)

除此以外，目前由风电开发商和地方政府在风能资源比较丰富的区域建设的测风塔超过1800座。

In addition, wind power developers and local governments have set up more than 1,800 wind masts in rich wind resource regions.



## 2 风电设备制造业

Wind Power Equipment Manufacturing



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## 2 风电设备制造业

### Wind Power Equipment Manufacturing

- 2007年新装机：国产设备占56%，首次超过一半

New installed WTs in 2007: Domestic 56%, the first year in majority.

2007 年风电设备市场份额

Market share in 2007

制造商 Manufacturer	容量 Capacity (kW)	占国产风机比例 Percentage of Domestic made WTs	占当年新增总装机比例 Percentage of total WTs
金风 Goldwind	829950	44.93%	25.12%
华锐 Huarui	679500	36.79%	20.57%
东汽 DEC	222000	12.02%	6.72%
运达 Windey	65250	3.53%	1.98%
上海电气 Sewind	22500	1.22%	0.68%
常牵新誉 New Unite	9000	0.49%	0.27%
湘电 XEMC	8000	0.43%	0.24%
其他 Others	10850	0.59%	0.33%
合计 Total	1847050	100%	55.91%

## 2 风电设备制造业

### Wind Power Equipment Manufacturing

- 2007年底国产机组占累计装机总数的45%

Cumulative in 2007: Domestic made WTs 45%

2007年底累计装机中国产设备市场份额情况

market share of Cumulative WTs by the end 2007

制造商 Manufacturer	容量 Capacity (kW)	占内资制造商比例 Percentage of domestic made WTs	占总装机比例 Percentage of total WTs
金风 Goldwind	1497300	56.55%	25.35%
华锐 Sinovel	754500	28.50%	12.77%
东汽 DEC	237000	8.95%	4.01%
运达 Windey	97000	3.66%	1.64%
上海电气 Sewind	22500	0.85%	0.38%
常牵新誉 New Unite	9000	0.34%	0.15%
湘电 XEMC	8000	0.30%	0.14%
海装 CSIC	3700	0.14%	0.06%
华创 Huachuang	3000	0.11%	0.05%
万电 Wandian	2400	0.09%	0.04%
惠德 Huide	2000	0.08%	0.03%
其他 Others	11210	0.43%	0.21%
合计 Total	2647610	100.00%	44.83%

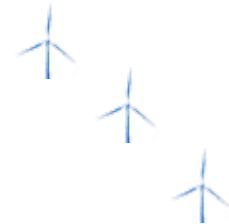
## 2 风电设备制造业

### Wind Power Equipment Manufacturing

- 风电机组总装厂分布图

Location of the WTs manufactures





### 3 风电场与电网

Wind Farms and the Grids



### 3 风电场与电网

### Wind Farms and the Grids

#### 3.1 风电发展情况

#### Wind Power Development

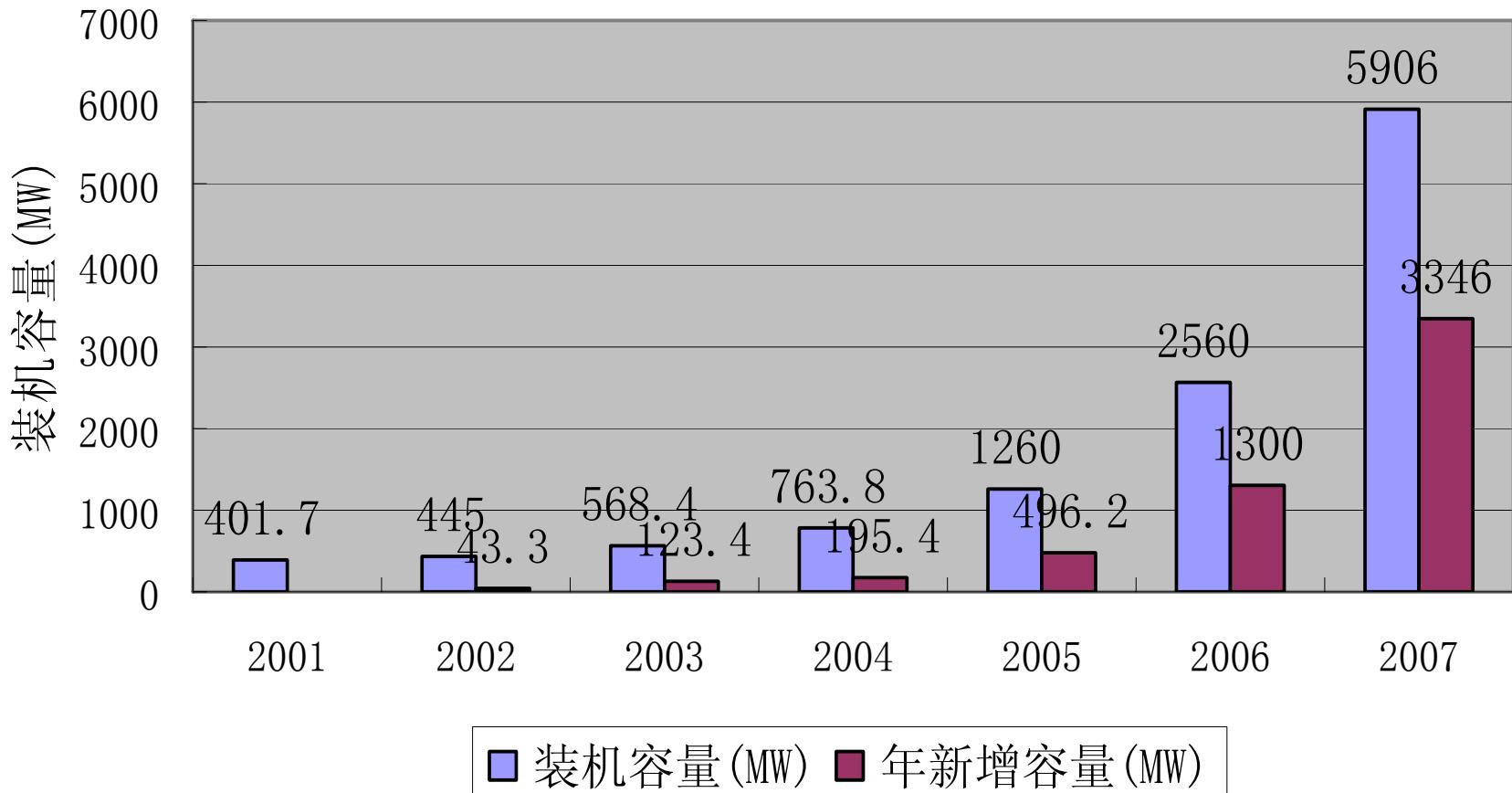
风电装机容量统计  
Installed wind power capacity

年份 year	2002	2003	2004	2005	2006	2007
中国电源总装机容量 (MW) total Installed capacity	356,570	391,410	440,000	500,000	600,000	713,290
中国风电总装机容量* (MW) Installed capacity of wind power	445.0	568.4	763.8	1260.0	2560.0	6050.0
中国的风电装机比例* (%) Percentage of wind power installation	0.125	0.145	0.174	0.250	0.430	0.840
世界风电总装机容量 (MW) Installed capacity in the world	31,000	40,300	47,317	59,004	73,904	93,849

\*装机指风电场的吊装容量

### 3 风电场与电网

### Wind Farms and the Grids



中国风电装机容量统计

Installed wind power capacity in China

### 3 风电场与电网

#### Wind Farms and the Grids

2007年部分风电场的发电量调查

wind generation investigation of some wind farms in 2007

- 12个省47个风电场满发小时数平均值1787。  
The annual average full load operation hour of 47 wind farms in 12 provinces is 1787h.
- 12个省中平均最高2401，最低1325。  
The highest is 2401h, the lowest is 1325h.

### 3 风电场与电网

## Wind Farms and the Grids

省区 Provinces	省场数 Num. Of wind farms	等效满负荷小时数 Full load hours	容量系数 Capacity factor	单机(千瓦) Unit capacity	装机(万千瓦) Installed capacity
河北 Hebei	4	2373	0.27	885	8.8
内蒙 Inner Mongolia	7	1933	0.22	770	39.0
辽宁 Liaoning	9	1325	0.15	715	21.7
吉林 Jilin	4	1931	0.22	798	17.8
上海 Shanghai	2	1651	0.19	1356	2.4
浙江 Zhejiang	1	1344	0.15	609	2.13
福建 Fujian	5	2000	0.23	986	8.9
山东 Shangdong	3	1728	0.20	881	6.5
广东 Guangdong	6	1600	0.18	566	20.7
海南 Hainan	1	1417	0.16	483	0.87
甘肃 Gansu	2	1737	0.20	786	12.7
新疆 Xinjiang	4	2401	0.27	654	16.7
12个省 12 provinces	47	1787	0.20	791	158.0

注：主流机组容量为750kW, 850kW, 1.5MW和2.0MW， 1.5MW数量最多。

**Main market share:750kW,850kW,1.5MW and 2.0MW.**

### 3 风电场与电网

#### Wind Farms and the Grids



#### 3.2 风电场项目

##### Wind farm projects

###### 3.2 .1 国家发改委审批的项目

###### Projects approved by NDRC

1.普通50MW及以上的风电项目

**General wind power projects with capacity not less than 50MW**

2.国家级特许权项目

**National wind power concession projects (not less than 100MW)**

3.百万千瓦级风电基地

**1000MW Wind farm group**

4.千万千瓦级风电基地

**10GW Wind farm group**

### 3 风电场与电网

#### Wind Farms and the Grids

##### 1. 普通50MW及以上的风电项目

General wind power projects with capacity not less than 50MW

开发商建议书或预可研

Developers proposals or preliminary reports

开发商可行性研究报告（土地使用，环保评价，水土保持评价等）

Developers feasibility reports ( land, environment, soil and water conservation, etc.)

接入审批 Approval of integration

设备招标 Bidding for equipment

发改委最后审批电价 NDRC Final approval

### 3 风电场与电网

#### Wind Farms and the Grids

##### 2. 国家级特许权项目

###### National wind power concession projects

- 在2003~2007年中，每年一次国家级特许权招标。  
**A concession project bidding held each year from 2003 to 2007.**
- 确定风电项目的开发商或者风电开发商和风电机组制造商。  
**The bidding committee decides wind farm developers or developers plus wind turbine manufactures.**
- 风电机组制造本地化率**50%(70%)**  
**The localization ratio of WTs 50%(70%)**

### 3 风电场与电网

#### Wind Farms and the Grids

- 电网部门负责建设风电场输电通道及有关电网改造。  
**Power grid companies in charge of the construction of transmission grids.**
- 开发商与省电网公司签定购电合同，25年特许权经营期内等效满负荷3万小时为中标电价；后期当地平均电价。  
**PPAs signed between developers and grid companies. The equivalent full-load 30,000h paid with biding price in 25-year. After that, the local average price.**

### 3 风电场与电网

#### Wind Farms and the Grids

##### 3. 百万千瓦级风电基地

###### 1000 MW Wind Farm Group

按照2006年国家特许权项目河北省单晶河风电场（200MW）的条件，在该省又批准了9个项目共1,100MW。

According to same requirements on concession project of Hebei Danjinghe wind farm in 2006, another 9 projects with 1,100MW were approved.

按照2007年国家特许权项目辽宁省北清河风电场（300MW）的条件，在该省又批准了 $4 \times 300\text{MW}$  4个项目。

According to same requirements on concession project of Liaoning Beiqinghe wind farm in 2007, another 4 wind power projects with 300MW approved.

### 3 风电场与电网

### Wind Farm and Power Grid

内蒙古批准了多个百万千瓦级风电基地的规划，如达茂旗、巴彦淖尔、乌兰察布、锡林郭勒盟等地区的风电规划。

**Some 1000MW wind farm group planned in Inner Mongolia Bayannaoer, Wulanchabu , xilinguole and so on.**

吉林省正在进行32个50MW级风电项目可行性研究。

**The feasibility studies of 32 wind farms with 50MW in Jilin.**

### 3 风电场与电网

### Wind Farms and the Grids

#### 4. 千万千瓦级风电基地

##### 10GW Wind farm group

按照2007年国家特许权甘肃省酒泉风电项目（200MW）的条件，在该省又批准了 $18 \times 200\text{MW} + 2 \times 100\text{MW}$  项目共3,800MW，设备招标2008年6月完成。该省的规划2010年5000MW，2015年12710MW，2020年实现千万千瓦。

According to the same requirements on concession project of Gusu Jiuquan wind farm in 2007, another 20 wind projects with  $18 \times 200\text{MW} + 2 \times 100\text{MW}$  (in a total 3,800MW) approved in Gusu province. WTs bidding in June, 2008. It is planned 5000MW in 2010, 12710MW in 2015, 10GW in 2020 in Gusu.

### 3 风电场与电网

### Wind Farms and the Grids

江苏省沿海地区正在进行2020年底前建设千万千瓦风电基地的规划工作。

**A plan of 10GW wind farm group by the end of 2020 in Jiangsu coastal areas**

新疆哈密地区正在进行2020年2000万千瓦风电基地规划。

**A plan of 20GW wind farm group by the end of 2020 in Xinjiang Hami.**

### 3 风电场与电网

### Wind Farms and the Grids



#### 3. 2. 2省（市）发改委审批的项目

Projects approved by Provincial Development and Reform Commission

1. 普通50MW及以下的风电项目

A wind power project not larger than 50MW

2. 省级特许权项目

The provincial concession projects

### 3 风电场与电网

## Wind Farms and the Grids

### 3.3 电网公司 Grid Co., Ltd

公司经营区域覆盖26个省、自治区、直辖市，覆盖国土面积的88%以上，供电服务人口10.4亿。2006年装机容量4.84亿千瓦，全社会用电量2.25万亿千瓦时。

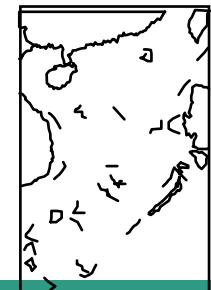


SGCC's service area covers 26 provinces, autonomous regions and municipalities in China, which amounts to over 88% of national territory.

China Southern Grid Co., Ltd  
中国南方电网公司

中国电力科学研究院

CHINA ELECTRIC POWER RESEARCH INSTITUTE



### 3 风电场与电网

### Wind Farms and the Grids

## 发展规划 Development Plan

2006: 装机容量 6.22 亿千瓦

**Installed capacity: 622GW**

用电量 28200 亿千瓦时

**Consumption : 2820TWh**

最大负荷 4.2亿千瓦

2010: 预计装机容量 8.6 亿千瓦

**Installed capacity : 860GW**

预计用电量 38100 亿千瓦时

**Consumption : 3810TWh**

预计最大负荷 6.12亿千瓦

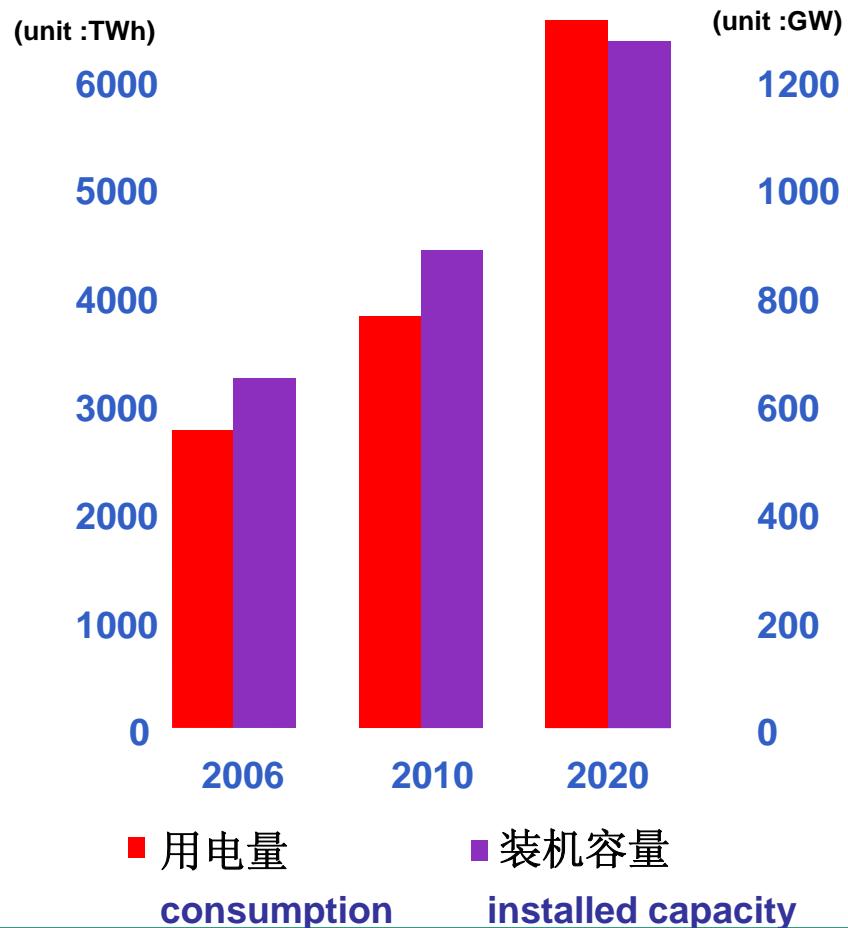
2020: 预计装机容量 13.2 亿千瓦

**Installed capacity: 1320GW**

预计用电量 65800 亿千瓦时

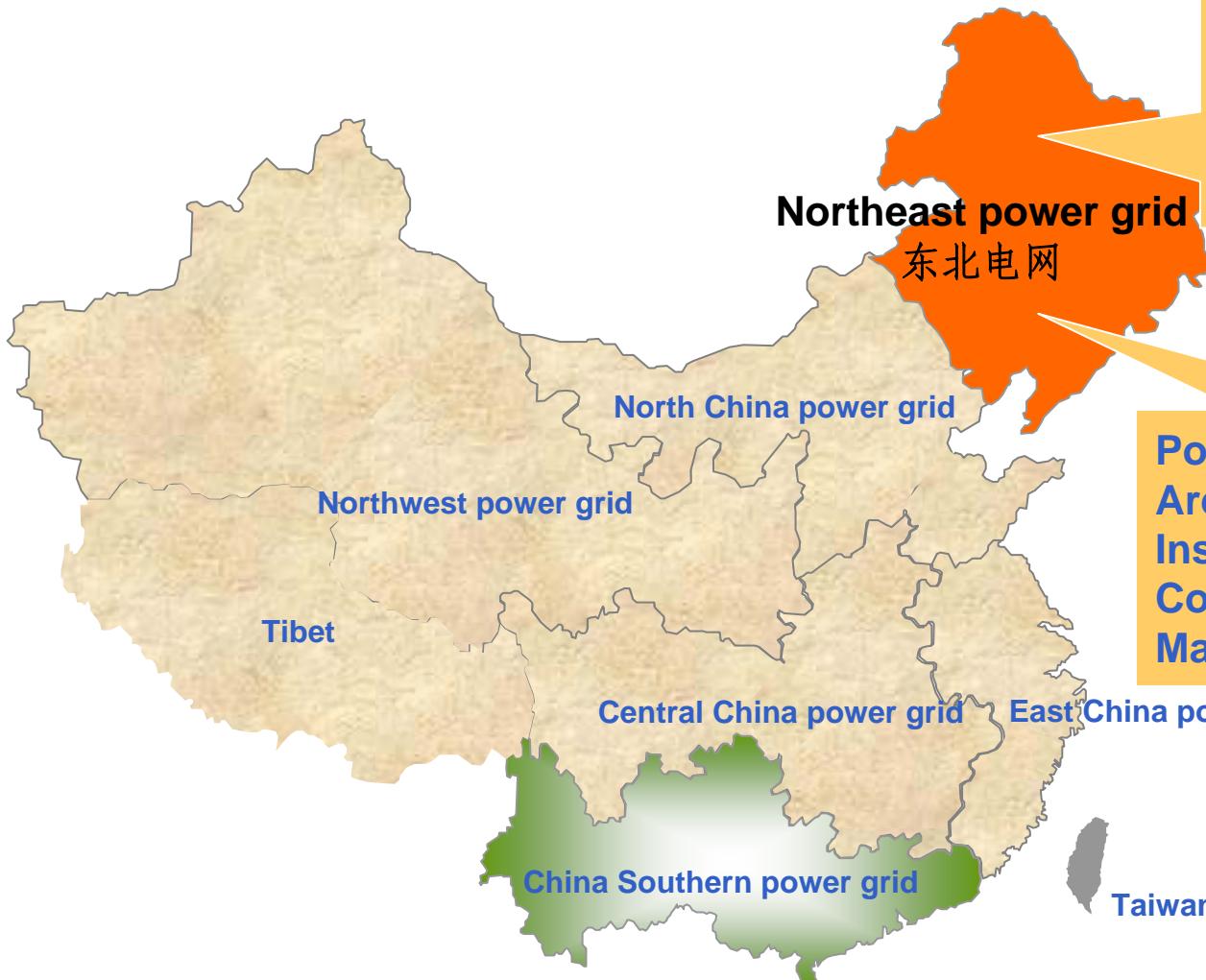
**Consumption : 6580TWh**

预计最大负荷 11亿千瓦



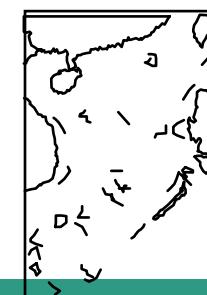
### 3 风电场与电网

### Wind Farms and the Grids



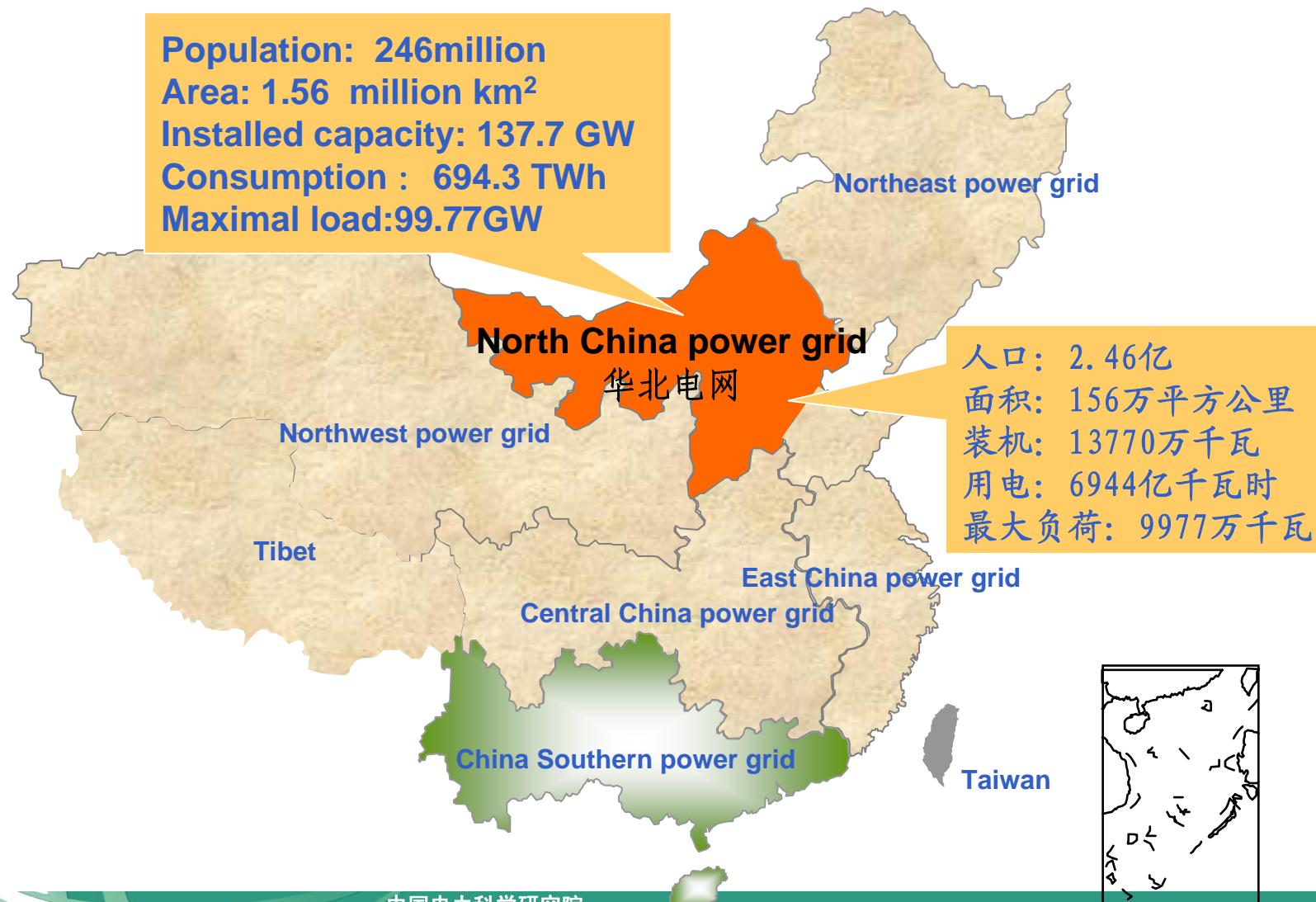
人口: 1.18亿  
面积: 124万平方公里  
装机: 4747万千瓦  
用电量: 2355亿千瓦时  
统调最高负荷: 3369万千瓦

Population : 118million  
Area : 1.24 million km<sup>2</sup>  
Installed capacity : 47.47GW  
Consumption: 235.5TWh  
Maximal load:33.69GW



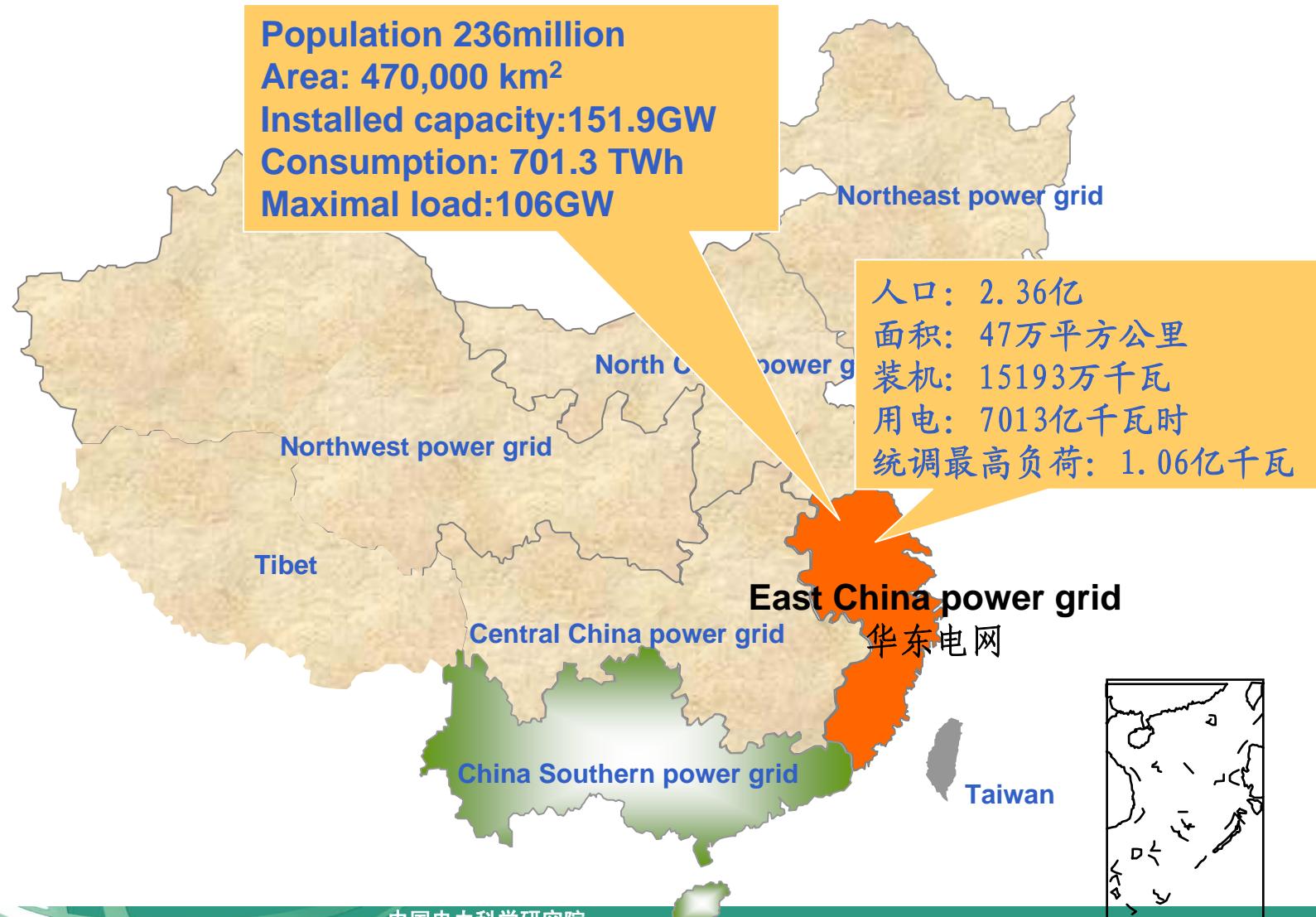
### 3 风电场与电网

### Wind Farms and the Grids



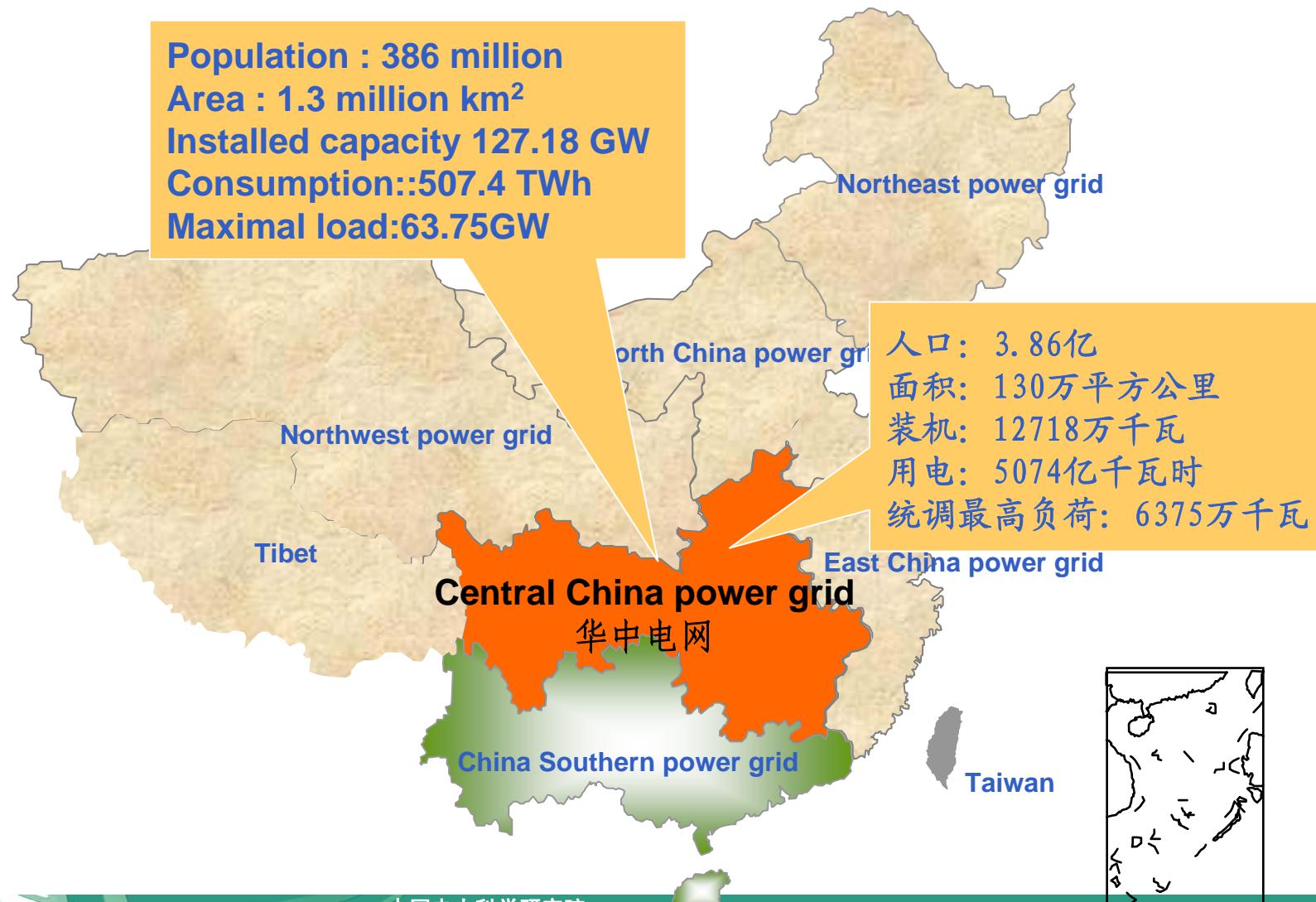
### 3 风电场与电网

### Wind Farms and the Grids



### 3 风电场与电网

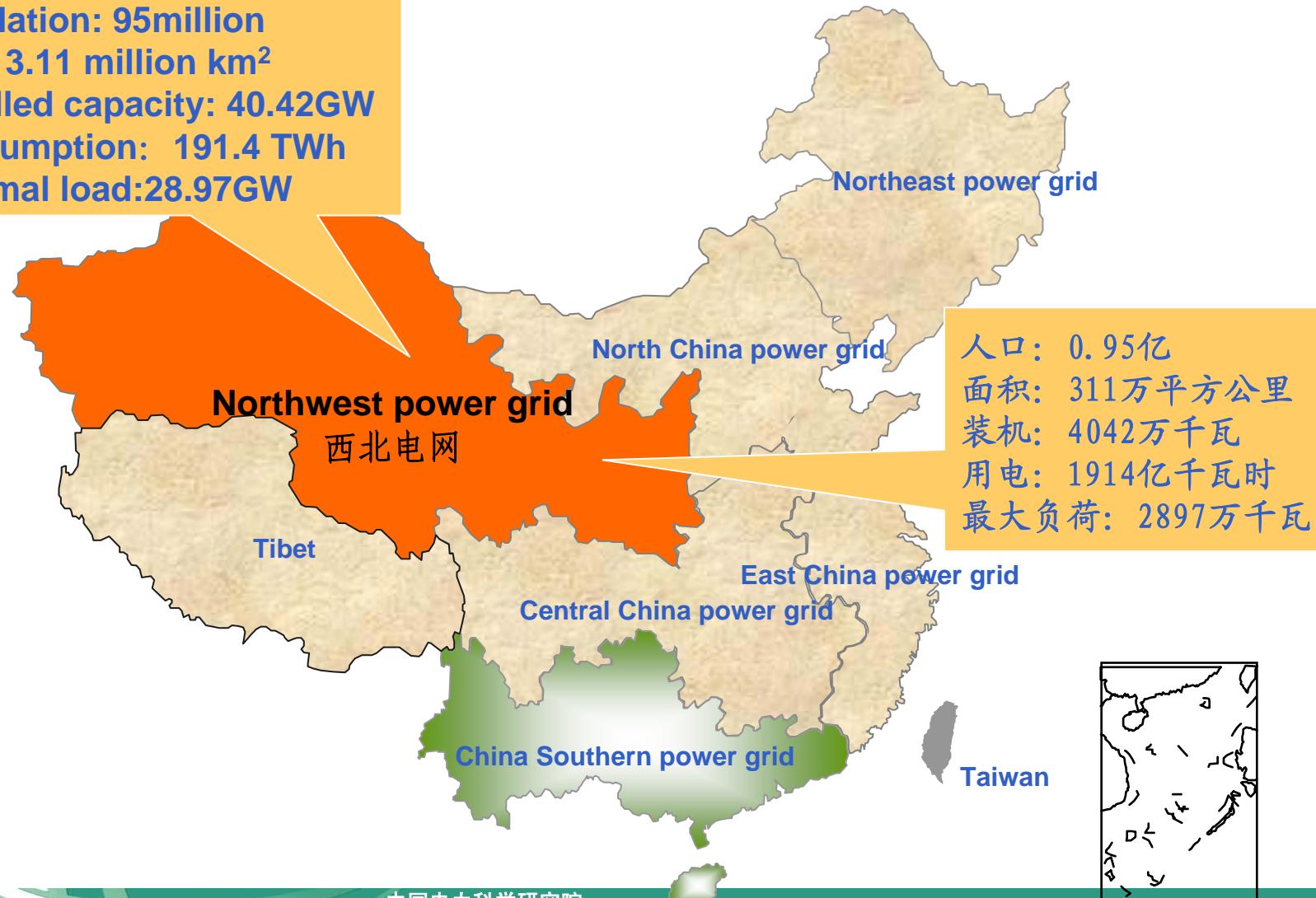
### Wind Farms and the Grids



### 3 风电场与电网

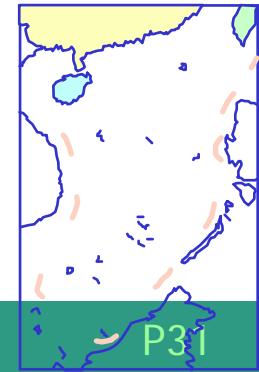
### Wind Farms and the Grids

population: 95million  
area: 3.11 million km<sup>2</sup>  
Installed capacity: 40.42GW  
Consumption: 191.4 TWh  
Maximal load:28.97GW



### 3 风电场与电网

### Wind Farms and the Grids



### 3 风电场与电网

### Wind Farms and the Grids

#### 丹麦风电场 Wind farms in Denmark

风电总装容量为  
2374MW，接在10KV以下  
电压等级为2173MW，占  
总容量的92%。

The total installed capacity  
of wind power is 2374MW,  
in which 2173MW capacity  
connected to 10kV and  
below voltage level(92% of  
total capacity).

#### Western part of the power system



Max. demand = 3800 MW

Min. demand = 1150 MW

Source: Energinet.dk

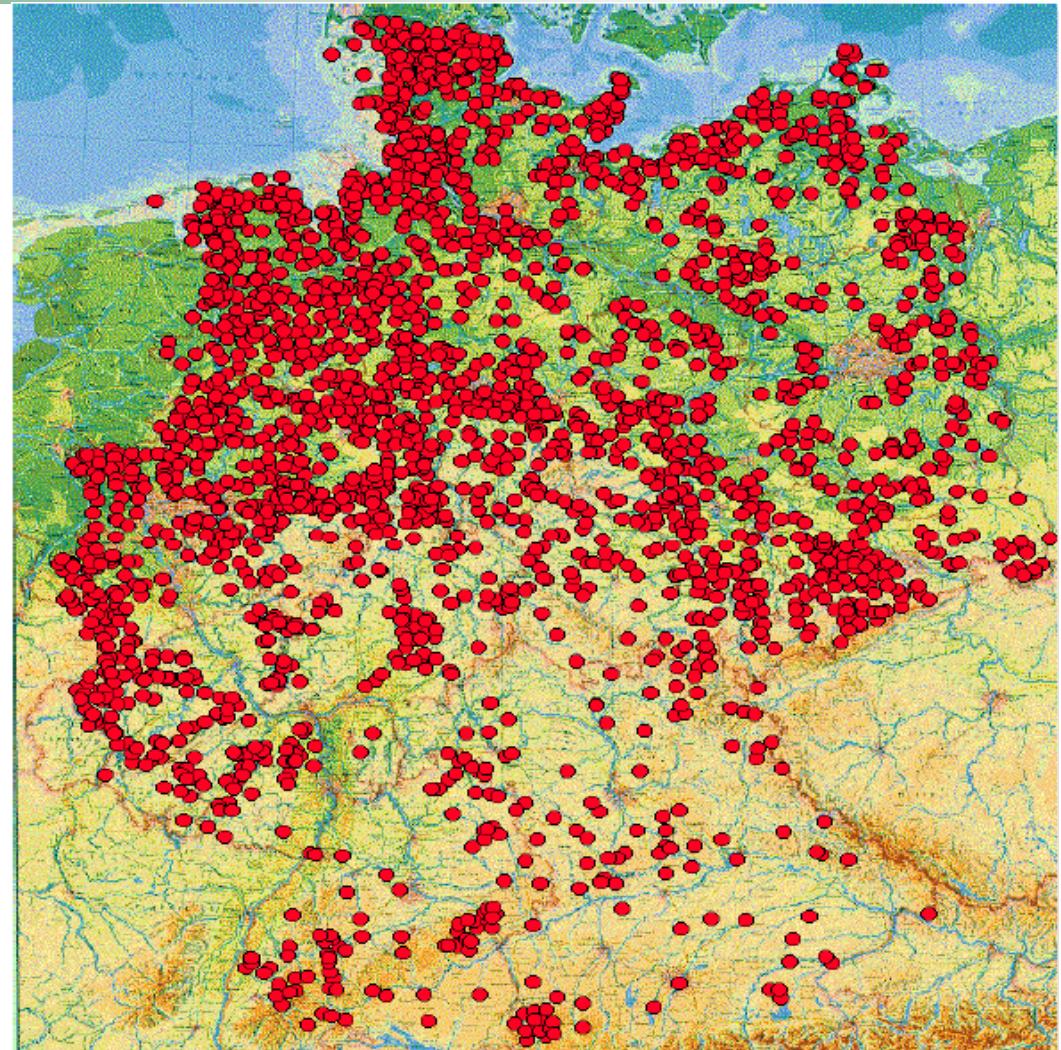
400 kV	4 central units	1488 MW
150 kV	6 central units 1 wind farm	2014 MW 160 MW
50 kV	17 DCHP units 34 wind turbines	569 MW 41 MW
10 kV	475 DCHP units 2180 wind turbines	991 MW 1597 MW
0,4 kV	260 DCHP units 1880 wind turbines	83 MW 576 MW
		7519 MW

### 3 风电场与电网

### Wind Farms and the Grids

德国风电场分布图

Distribution map of wind farms in Germany



### 3 风电场与电网

## Wind Farms and the Grids

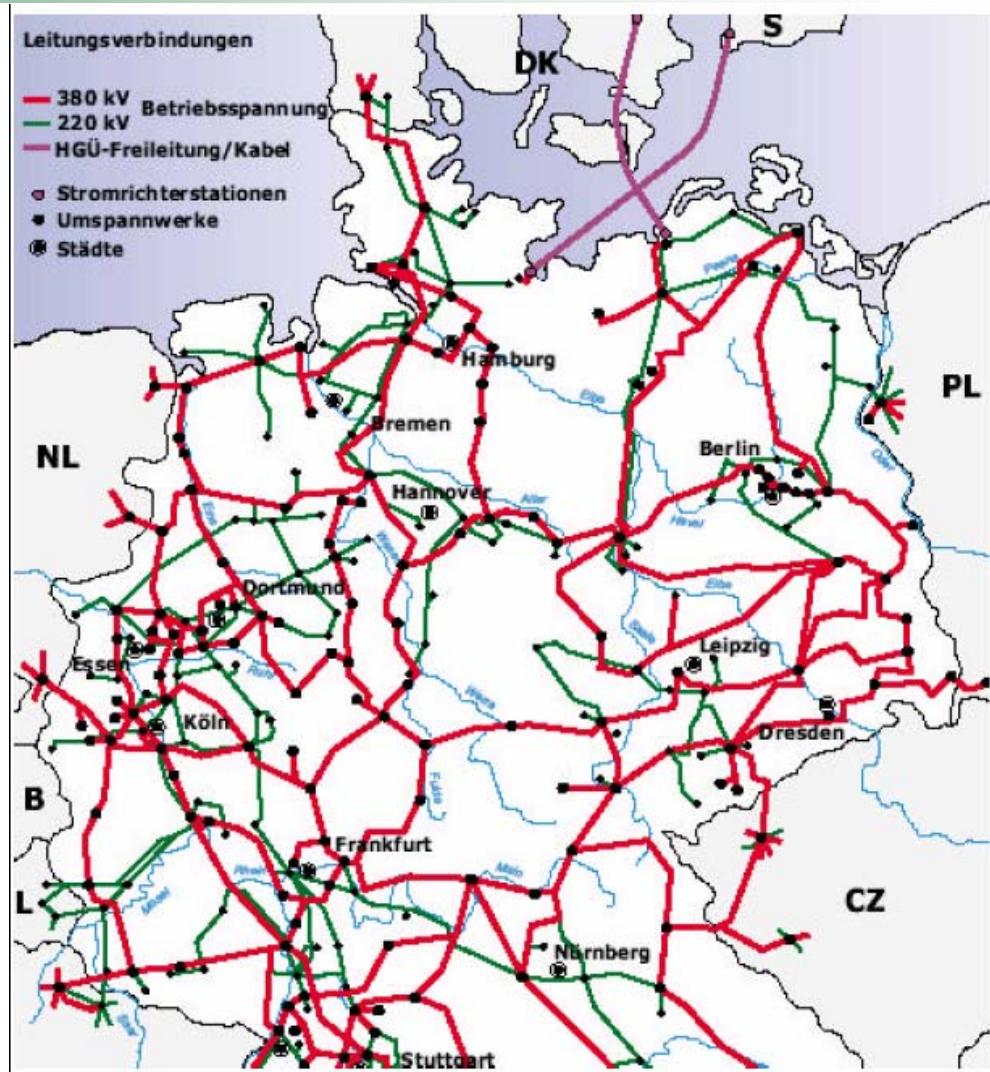
2006年3月德国电网结构图

Germany Network Configuration

March,2006

从电网密度观察，根据2002年  
用电量与国土面积比，德国为我国  
的12倍还多。

Power density in Germany is more  
than 12 times in China in 2002.





## 4、促进风电发展的动力与激励政策

Driving Force and Preferential Polices in Wind Power Field



## 4、促进风电发展的动力与激励政策

### Driving Force and Preferential Polices in Wind Power Field



《联合国气候变化框架公约》

<United Nations Framework Convention on Climate Change>

《中国应对气候变化国家方案》

<National Scheme of China on Coping with Global Climate Change>

到2010年，力争使可再生能源开发利用总量（包括大水电）在一次能源供应结构中的比重提高到10%左右。

It's expected that the proportion of renewable energy including hydropower in primary energy supply to about 10% by 2010.

## 4、促进风电发展的动力与激励政策

### Driving Force and Preferential Polices in Wind Power Field

2007年8月31日国家发改委颁布实施《中国可再生能源中长期发展规划》

#### <Long-term Development Program of Renewable Energy in China>

非水电可再生能源发电目标：到2010年和2020年，大电网覆盖地区非水电可再生能源发电在电网总发电量中的比例分别达到1%和3%以上；权益发电装机超过500万千瓦的投资者，所拥有的非水电可再生能源发电权益装机应分别达到其权益发电装机的3%和8%以上。

The of renewable generation or installation excluding hydropower as follows:

- (a) The renewable generation excluding hydropower not less than 1% and 3% respectively by the end of 2010 and 2020.
- (b) The developers, who own power capacity more than 5 GW, should own more than 3% and 8% renewable capacity excluding hydropower of their total capacity respectively by the end of 2010 and 2020.

## 4、促进风电发展的动力与激励政策

### Driving Force and Preferential Polices in Wind Power Field

2006年1月1日中国《可再生能源法》正式实施

同时出台：

- 《可再生能源发电价格和费用分摊管理试行办法》（发改价格[2006]7号）

可再生能源发电上网电价高于当地燃煤机组标杆上网电价的部分等费用，通过向全国电力用户统一征收电价附加的方式解决；各省级电网企业按其销售电量占全国的比例，分摊全国可再生能源电价附加额(0.002元/kWh).各省的风电电价差额全国分摊。

Renewable energy fund from consumer side 0.002RMB/kWh.

## 4、促进风电发展的动力与激励政策

### Driving Force and Preferential Polices in Wind Power Field

- 《可再生能源发电有关管理规定》

可再生能源发电配套电网设施建设规划，纳入国家和省级电网发展规划，电网公司要确保可再生能源发电全额上网；可再生能源并网发电接入系统，由电网企业建设和管理，发电企业经与电网企业协商，也可以投资建设。

Grid co. responsible for wind farm connected network planning, construction and management .

风电场输电线路过网费 Fees collected by grid co.:

=<50km	0.01元/kWh	=<50km	0.01RMB/kWh
50 ~ 100km	0.02元/kWh	50 to 100km	0.02RMB/kWh
=>100km	0.03元/kWh	=>100km	0.03RMB/kWh

## 4、促进风电发展的动力与激励政策

### Driving Force and Preferential Polices in Wind Power Field

另外， in addition

➤ 财税规定，风电企业增值税减半征收。

The value-added tax for the wind farms is only a half of that for thermal and big hydro power plants

➤ 企业所得税法规定，对可再生能源企业所得税实行“三免三减半”政策。

The renewable energy enterprise enjoys the enterprise income tax ‘3-year tax exempt and 3-year a half tax exempt’.

➤ 合资企业采购本地产的风电机组，退还所得税(VAT 17%)。

Joint ventures enjoy VAT exempt if WTs locally made.

## 4、促进风电发展的动力与激励政策

### Driving Force and Preferential Polices in Wind Power Field

- 风电项目可以申请成为CDM项目
- Wind power projects could apply to be CDM projects
  
- 2008年财政部发布的《风力发电设备产业化专项资金管理暂行办法》对符合支持条件制造商的首 50 台兆瓦级风电机组，按600元 / kW予以补助(约占设备总价的10 %)。  
If the manufacturers meet the supporting condition, the first made 50 sets of WTs enjoy a subsidy 600RMB/kW .

## 4、促进风电发展的动力与激励政策

### Driving Force and Preferential Polices in Wind Power Field

国家发改委提出的风电发展目标(2002年提出)

Wind power development targets by NDRC

年份 year	2005	2010	2015	2020
装机(MW) Installed capacity	1,000	4,000 (5,000) (10,000)	10,000 (15,000)	20,000 (30,000) <b>80,000</b> <b>100,000</b>

注：预计2008年底风电装机将超过10,000MW,其中五大发电集团装机将超过4,500MW。

The installed wind power capacity will be more than 10,000MW among which 4,500MW developed by big five generation Comp. by the end of 2008.

# 5 结束语 Conclusion

针对中国发展风电的实际情况，风电场与电网的协调规划和建设是当前最关键的问题。

**Regarding the situation in wind power field of China,  
coordinating development plan and construction between wind  
farms and the grids is the most important issue at present.**

謝 謝

Thank you

