

# Challenges of the Expansion of the Chinese T&D Networks

The 11<sup>th</sup> 5 Years (2006 – 2010) Plan  
China Grid Development

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**Dr. Pierre Kayoun**, Session Chairman:

We are now going to speak about the Chinese transmission and distribution network. I have bad news and good news. The bad news is that Mr. Shanlin Wen, who is from NEMA Beijing and wanted to give the next presentation was not able to make it because of passport problems. The good news is that the NEMA Beijing office is linked to the NEMA US office and Ed Gray, from the US office, has accepted to give this presentation on behalf of Mr. Shanlin Wen.

**Mr. Edward Gray:**

Ladies and gentlemen,  
these are the topics I will talk about:

1. Policy on the development of power and grids
2. Current situation of China grids
3. Investment on the grid construction
4. Grid development plan during 2006 - 2010
5. Brief introduction of the Three Gorge Projects

As the slides are self-explanatory, they do not need any further comments.

## Policy on the Development of Power and Grids

The development of power and grids is on the top priority in the 11<sup>th</sup> 5 years plan (2006 – 2010)

Specific Policy on Grids Development:

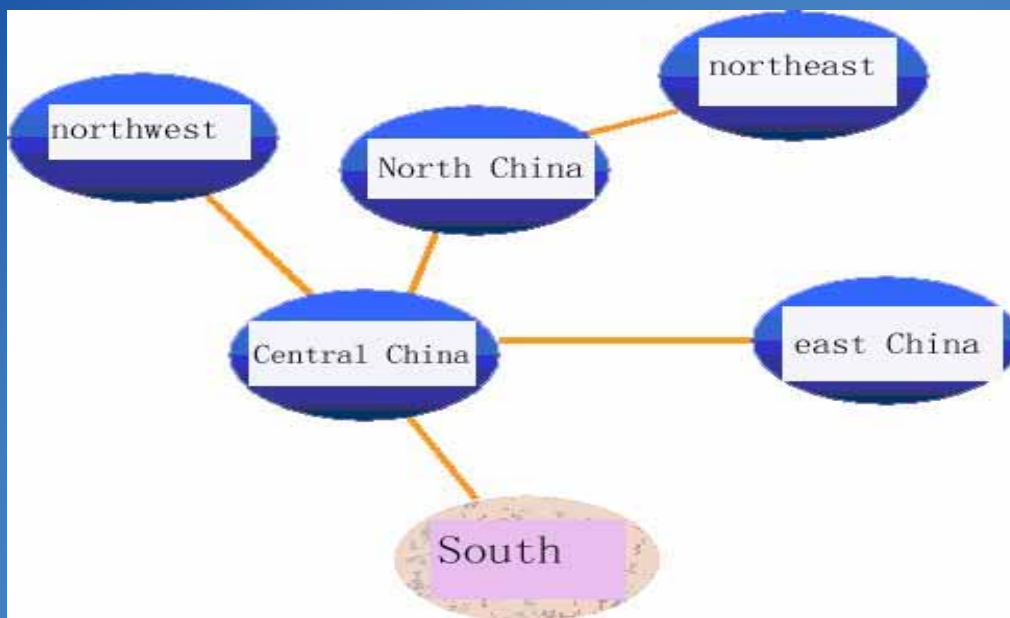
- Continue to build west-to-east power transmission corridors
- Continue to develop trans-regional power transmission and distribution lines
- Strengthen the construction for nation-wide interconnection
- Enhance regional & provincial grids
- Continue urban & rural network construction & innovation

## Current Situation of China Grids

China is covered by 2 Grids:

- **State Grid of China**  
Managed by State Grid Corporation of China (SGCC)
- **China Southern Grid**  
Managed by China Southern Grid Co. (CSGC)

## Main Structure of China Grid



## State Grid of China

- State Grid of China covers 26 provinces, autonomous regions and municipalities directly under the central government (88% of national territory)
- 220 kV and above transmission lines: 195,899 km
- Distribution capacity: 616.64 GVA

The State Grid of China consists of 5 regional grids:

**North China grid:** Beijing, Tianjing, Hebei, Shanxi, Shandong

**Northeast China grid:** Liaoning, Jilin, Heilongjing

**East China grid:** Shanghai, Jiangsu, Zhejiang, Anhui, Fujian

**Central China grid:** Hubei, Hunan, Henan, Jiangxi, Chongqing, Sichuan

**Northwest China grid:** Shanxi, Gansu, Ningi, Xinjiangxia, Qingh

## Installed Capacity of North China Grid (unit: 10,000 kW)

Sub-Grid	Full Capacity	Thermal	Hydro
NCG	11954	11701	253
JJTG	3287	3165	122
Total Capacity	15241	14866	375

## Installed Capacity of East China Grid (unit: 10,000 kW)

Sub-Grid	Full Capacity	Thermal	Hydro	Nuclear
Shanghai	13368.4	13344		24.4
Jiangsu	39887.2	39787.2	100	
Zhejiang	16591.4	15279.1	1002.3	310
Anhui	11683	11151	532	
Fujian	16578.6	8535.4	8021.8	21.35
Other	5679.8		2922.2	2757.6
Total Capacity	103788.35	88096.7	12578.3	3113.4

## Installed Capacity of Northeast China Grid (unit: 10,000 kW)

Sub-Grid	Full Capacity	Thermal	Hydro	Wind
Liaoning	1418	1329	77	12
Jilin	635	594	38	3
Heilongjiang	1204	1120	80	4
Other	899	527	367	5
<b>Total Capacity</b>	<b>4156</b>	<b>3570</b>	<b>561</b>	<b>24</b>

## Installed Capacity of Central China Grid (unit: 10,000 kW)

Note: Three Gorges power is not included

Full Capacity	Thermal	Hydro
8023	5383	2640

## Installed Capacity of Northwest China Grid

(unit: 10,000 kW)

Sub-Grid	Full Capacity	Thermal	Hydro
Northwest	3634.1	2448.8	1185.3
Power Dispatched Directly	1005	382	623
Huaneng	120	120	
Datang	438.3	385.8	52.5
Huadian	331.8	331.8	
Guodian	362.8	23	339.8
China Power Investment	503.2		503.2

### China Southern Grid

It covers 5 provinces:

- Guangdong, Guangxi, Yunnan, Guizhou, Hainan
- Total area: 1 M square km
- 220 kV and above transmission lines: 9,283 km including nine 500 kV west to east transmission lines
- Distribution capacity: 140.05 GVA

### Investment on the Grid Construction

- State Grid Corporation of China (SGCC)  
Total investment in the next 5 years:  
850 billion Chinese Yuan
- China Southern Grid Co. (CSGC)  
Total investment in the next 5 years:  
234 billion Chinese Yuan

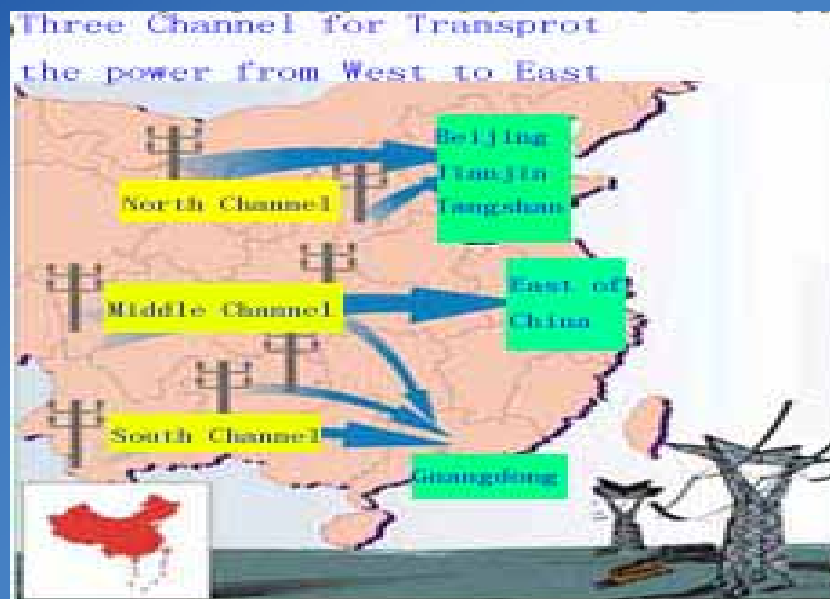
## Grid Development Plan During 2006 - 2010

Develop the West to East Transmission by building 3 west to east transmission corridors along with the power development in west region.

### What is “West to East Transmission”?

- Develop the power resource in the west region and transmit the power to the east region through 3 transmission corridors
- It is a major policy decision made by the “strategy of the development of west region in China”, and also it is the key project of the “development plan of west region in China”
- West region: Guizhou, Yunnan, Guangxi, Sichun. Inner Mongolia, Shanxi(山西) and Shanxi (陕西)
- East region: Guangdong, Shanghai, Jiansu, Zhejiang, Beijing, Tianjin and Tangshan area.

## Three West to East Transmission Corridors



## Three West to East Transmission Corridors

- **North Corridor:**

Transmit power to the Beijing-Tianjing-Tangshan area from the coal power base located in Shanxi (山西), Shanxi (陕西) and the west part of Inner Mongolia, Gongbo gorge and Laxiwa hydro power stations located at the upper reach of Yellow River.

- **Middle Corridor:**

Transmit ten million kW power to Central China, East China, Fujian and Guangdong from 22 hydropower stations along the Yangtze river. It is expected to be the largest transmission corridor in the world.

- **South Corridor:**

Develop hydro power stations in Yunnan, Guizhou and Guangxi provinces, and thermal power stations in Guizhou as supplement. Transmit power developed in above provinces to the east area of Guangdong province.

## Delivery Capacity of the 3 Transmission Corridors

**Total:**

- 2005: 31.48 million kW
- 2010: 66.3 million kW
- 2020: 140 million kW

**North Corridor**

It will be 26.5 million kW by 2010, including:

West Inner Mongolia grid: 7.8 million kW

Shanxi grid: 10 million kW

Northwest grid: 8.7 million kW

**Middle Corridor**

It will be 19.2 million kW by 2010, including the Three Gorges hydro power station: 18.2 million kW (8.4 million kW in 2005)

**South Corridor**

It will be 20.6 million kW by 2010



## Realize National Inter-Connection

This is the strategic goal, which was set up for the grid development at the beginning of the 21<sup>st</sup> century in China.

The interconnections between grids indicated below have been completed during 2001 and 2005:

- North China grid and Northeast China grid
- Chuan-Yu grid and Central China grid
- North China grid and Central China grid
- Central China grid and Southern China grid
- Shandong grid and North China grid
- Central China grid and Northwest China grid

## High Voltage Transmission & Distribution Lines Construction

Projects will be completed and put in operation by 2010:

- 330 kV and above AC line: 37,000 km  
including:
  - 750 kV line 1863 km
  - 500 kV line 32,620 km
  - 330 kV line 3712 km
- DC line: 7755 km

## UHV (1000 kV) AC Transmission Line

- Total 4200 km, including
- Jingdongnan-Shanghai line
  - Jingdongnan-Beijing line
  - Jingmen-Wuhan line
  - Huainan-Shanghai line

## 800 kV DC Transmission Line

- Jinsha River project (phase 1) will start
- Jinping project (deliver electricity to Central and East China) is under approval

## Urban & Rural Network Construction & Innovation

The total investment of grid construction is about 1200 billion RMB during 11<sup>th</sup> 5 years plan, among which 220 billion RMB is the investment for urban and rural grids.

## Enhance Regional Grids during 2006-2010

Regional Grid	New Capacity added (MKW)	New Project start (MKW)
North China	36.1	43
East China	43	47
Northeast China	14.4	19
Central China	44	35.5
Northwest China	19.5	21.5
China Southern	40	39

## Brief Introduction of Three Gorges Projects

### (1) Power Generation Capability

- 14 hydroelectric sets will be installed on the left bank
- 12 hydroelectric sets will be installed on the right bank
- Total installed capacity is 18.2 million kW

### (2) Present Situation

- 8 hydroelectric sets on left bank have been in operation
- 4 hydroelectric sets will be installed every year
- By 2009 all 26 hydroelectric sets will be in operation

### **Main customers:**

#### **East China Grid**

Transmission distance: 1000 – 1200 km  
Transmission channels: 500 kV DC lines (3)  
Transmission capability: 7.2 million kW

#### **Guangdong Grid**

Transmission distance: 1000 km  
Transmission channels: 500 kV DC line (1)  
Transmission capability: 3 million kW

#### **Central China Grid**

Transmission distance: 300 - 500 km  
Transmission channels: 500 kV AC lines (17)  
Transmission capability: 10 million kW

**Thank you for your attention!**