Development and Innovation of Renewable Energy in China

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1.1 SGCC Overview

**Geographic Coverage**
88% of China’s territory

**Customers**
Serving over 1.1 billion population,

**Employee**
1.87 million

**Key Figures (2014)**
Assets: $474.1Bn, Revenue $338.1Bn

**Core business**
Power grid construction and operation, R&D

**Overseas business**
Runs overseas business in the Philippines, Portugal, Brazil, Australia, Italy, etc.

**Ranked 7th Fortune Global 500**
2.1 Large-scale Renewable Energy in China

- **Hydro power**: 290 GW, ranking No.1 in the world;
- **Wind power**: 91.42 GW, ranking No.1 in the world;
- **PV power**: 18.1 GW, ranking No.2 in the world;
- **Wind power has been the third biggest power source in China.**

Wind and PV power capacity growth from 2006 to 2014

Over 20%
8 large-scale wind power bases are in plan and construction, each of them is with the capacity of more than 10GW.

Wind: 100GW
Solar: 21GW

Wind: 200GW
Solar: 100GW

2.2 Large-scale Renewable Energy in China

2015
Wind, Solar, Storage Pilot Project
Wind: 600MW
Solar: 60MW
Storage: 50MW

2020
2.4 UHV Power Transmission in China

**Engineering construction:**
- Completed 2 AC and 4 DC UHV projects
- Delivered over 200TWh electricity in total

### Commissioned UHV projects

<table>
<thead>
<tr>
<th>Projects</th>
<th>Length of line</th>
<th>Conversion capacity</th>
<th>Annual CO2 emission reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000kV Jindongnan--Jimen</td>
<td>640km</td>
<td>18GVA</td>
<td>--</td>
</tr>
<tr>
<td>± 800kV Xiangjia-Shanghai</td>
<td>1,907km</td>
<td>12.8GW</td>
<td>26.0 million tons</td>
</tr>
<tr>
<td>± 800kV Jinping-Sunan</td>
<td>2,059km</td>
<td>14.4GW</td>
<td>32.4 million tons</td>
</tr>
<tr>
<td>1000kV Huainan-Zhebei-Shanghai</td>
<td>2 × 649km</td>
<td>21GVA</td>
<td>--</td>
</tr>
<tr>
<td>± 800kV Haminan-Zhengzhou</td>
<td>2,210km</td>
<td>16GW</td>
<td>40 million tons</td>
</tr>
<tr>
<td>± 800kV Xiluodu-Zhexi</td>
<td>1,669km</td>
<td>16GW</td>
<td>34.0 million tons</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>9,782km</strong></td>
<td><strong>98.20G</strong></td>
<td><strong>132.4 million tons</strong></td>
</tr>
</tbody>
</table>
By 2020
- More than 22 UHVDC lines
- Wind power: 200GW
- Solar power: 100GW

1 System ± 660 kV
19 Systems ± 800 kV
2 Systems ± 1100 kV
Fossil Energy: Environmental pollution & Climate changes

- Fossil Energy: Carbon dioxide Emissions: **73.8%**
- By end of 21 century CO2 will reach to **450ppm** and Global temperature will increase over **4°C** if nothing will be done.

Global Fossil Energy consumption (Coal in Ton)

<table>
<thead>
<tr>
<th>Year</th>
<th>Fossil Energy (Bn)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1965</td>
<td>5.1 Bn</td>
</tr>
<tr>
<td>2013</td>
<td>15.8 Bn</td>
</tr>
</tbody>
</table>

Smokes in London
Hazes in Beijing
4.1 Proposed solution

- **Clean replacement:** to replace fossil energy with clean energy for energy development, embark on a low-carbon and green development path.
- **Electricity replacement:** to replace coal and oil by electricity in consumption and raise the share of electric energy in end consumption, thus reducing fossil energy consumption and environment pollution.

<table>
<thead>
<tr>
<th>Resource</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydro power</td>
<td>5,000 GW+</td>
</tr>
<tr>
<td>Onshore wind</td>
<td>1000TW+</td>
</tr>
<tr>
<td>Solar</td>
<td>100,000 TW</td>
</tr>
</tbody>
</table>

Total hydro, wind and solar energy in the world.
4.2 Proposed solution

Vision for North Pole Intercontinental Transmission Highway

Rich wind power at North Pole:
- Average utilizable hour: 4000 hours
- Annual generation volume: 80,000 TWh

3000-5000km from north part of North America Continent
3000-4000km from north Europe
3500-4500km from northeast and north China
4.3 Proposed solution

**Exploitable Solar Energy in Equatorial belt Area**
*(Annual generation volume)*

- **North Africa**: 27,000 TWh
- **Middle East**: 9,000 TWh
- **Australia**: 15,000 TWh
- **North America**: 5,000 TWh
4.4 Global Energy Interconnection
Thank you for your attention!